Resource Conservation and Recovery Act (RCRA) Corrective Measures Proposal

Former Tecumseh Products Company Site
Tecumseh, Michigan

RCRA-05-2010-0012

January 2016

Resource Conservation and Recovery Act (RCRA) Corrective Measures Proposal

Former Tecumseh Products Company Site
Tecumseh, Michigan

RCRA-05-2010-0012

January 2016

Prepared For
Tecumseh Products Company

1540 Eisenhower Place, Ann Arbor, MI 48108 ● 734.971.7080 Phone ● 734.971.9022 Fax
www.TRCsolutions.com

Table of Contents

Executive Summary viii

1. Introduction 1-1
   - 1.1 Site Description 1-1
   - 1.2 Project Background 1-2
   - 1.3 Purpose and Scope 1-3

2. Site History 2-1
   - 2.1 Introduction 2-1
   - 2.2 Site Development 2-1
   - 2.3 Historical Site Operations and Chemical Use 2-1
   - 2.4 Recent Site Operations 2-2

3. Investigation Summary 3-1
   - 3.1 Summary of Investigation Activities by Others 3-1
   - 3.2 Remedial Investigation Activities by TPC 3-1
   - 3.3 Documentation of Previous Investigation Activities 3-2

4. Site Setting 4-1
   - 4.1.5 Current Off-Site Land Use 4-3

5. Nature and Extent of Contamination 5-1
   - 5.1 Introduction 5-1
   - 5.2 Selection of COCs 5-2
     - 5.2.1 Drinking Water Pathway 5-2
     - 5.2.2 Groundwater-Surface Water Interface Pathway 5-3
     - 5.2.3 Volatilization to Indoor Air Migration Pathway 5-3
     - 5.2.4 Direct Contact Pathway 5-4
     - 5.2.5 Volatilization to Ambient Air Migration Pathway 5-5
     - 5.2.6 Inhalation of Soil Particulates Migration Pathway 5-5
   - 5.3 Source Identification 5-6
     - 5.3.1 HRSC – Passive Soil Gas Survey 5-7
     - 5.3.2 HRSC – Membrane Interface Probe Investigation 5-7
     - 5.3.3 HRSC – MIP Confirmation Sampling 5-8
     - 5.3.4 HRSC – Groundwater Sampling 5-9

5.3.5 Evaluation of On-Site Storms Sewers as Potential Sources 5-10
5.3.6 Summary of Potential Source Areas 5-11
5.4 Nature and Extent of COCs in Soil 5-12
5.4.1 Soil Affected above Soil Saturation Levels 5-13
5.4.2 Soil Affected above Risk-Based Screening Levels 5-13
5.4.3 Soil Affected above SVIAI Criteria 5-14
5.4.4 Other On-Site Soils 5-14
5.4.5 Off-Site Soils 5-15
5.5 Nature and Extent of COCs in Groundwater 5-16
5.5.1 3D Visual Modeling of Groundwater Data 5-16
5.5.2 Northern Source Area and Associated Downgradient Plume 5-18
5.5.3 Southern Source Area and Associated Downgradient Plume 5-20
5.6 Nature and Extent of COCs in Soil Gas and Indoor Air 5-23
5.6.1 Evaluation of On-Site Sub-Slab Soil Gas Data 5-23
5.6.2 VOCs in On-Site Indoor Air 5-23
5.6.3 Summary of Perimeter and Off-Site Soil Gas Investigation Activities 5-24
5.6.4 VOCs in Off-Site Indoor Air 5-25
5.6.5 Evaluation of Utility Corridors as Potential Preferential Pathways 5-26
5.7 Nature and Extent of COCs in Ambient Air 5-27
5.8 Nature and Extent of COCs in Surface Water 5-28

6. Interim Corrective Measures 6-1
6.1 Existing Declaration and License Agreement 6-1
6.2 Potable Groundwater Use 6-2
6.2.1 Public Water Supply Well Survey 6-2
6.2.2 Potable Well Survey and Decommissioning 6-2
6.2.3 Groundwater Ordinance 6-3
6.3 Permeable Reactive Barrier 6-4
6.4 On-Site Vapor Mitigation 6-4
6.4.1 Sub-Slab Depressurization/Ventilation System in S-Building 6-4
6.4.2 Northern P-Building Soil Vapor Extraction System 6-5
6.4.3 Southern Perimeter Soil Vapor Extraction System 6-6
6.5 Off-Site Indoor Air Evaluation and Mitigation 6-6
6.5.1 Residential Properties 6-6
6.5.2 Non-Residential Properties 6-7

7. Exposure Pathway Evaluation 7-1
7.1 Conceptual Site Model 7-1
7.2 Overview of Methodology 7-1

7.3 Potential Receptors 7-2
7.3.1 Potential On-Site Receptors 7-2
7.3.2 Potential Off-Site Receptors 7-4
7.4 Exposure Assumptions 7-6
7.5 Fate and Transport Modeling 7-7
7.5.1 Groundwater Volatilization into a Trench 7-7
7.5.2 Volatilization into Indoor Air from Subsurface 7-8
7.6 Exposure Pathway Evaluation 7-8

8. Cleanup Levels and Treatment Areas 8-1
8.1 Pathway Evaluation and Site Specific Risk Calculations 8-2
8.2 Methodology for the Determination of Cleanup Levels 8-4
8.2.1 Exposure Assumptions 8-4
8.2.2 Constituents of Concern 8-4
8.2.3 Toxicity Assessment 8-5
8.2.4 Target Risk Levels 8-6
8.2.5 Calculation of Cleanup Levels 8-6
8.3 Cleanup Levels and Areas for Soil Corrective Measures 8-8
8.4 Cleanup Levels and Areas for Groundwater Corrective Measures 8-9
8.4.1 Risk-Based Cleanup Levels 8-9
8.4.2 Groundwater Surface Water Interface 8-11

9. Evaluation of Final Corrective Measures Alternatives 9-1
9.1 Threshold Criteria for Corrective Measures 9-1
9.2 Balancing Criteria for Corrective Measures 9-2
9.2.1 Long-Term Effectiveness 9-3
9.2.2 Reduction in Toxicity, Mobility, or Mass/Volume of Contaminants 9-3
9.2.3 Short-Term Effectiveness 9-3
9.2.4 Implementability 9-4
9.2.5 Sustainability 9-4
9.2.6 Cost Effectiveness 9-5
9.3 Evaluation of Corrective Measures for Soil 9-5
9.3.1 Alternative 1: Soil Vapor Extraction 9-5
9.3.2 Alternative 2: *In Situ* Thermal Desorption 9-9
9.3.3 Alternative 3: *In Situ* Chemical Oxidation 9-11
9.3.4 Alternative 4: Excavation and Disposal 9-14
9.3.5 Alternative 5: Intuitional and Engineering Controls 9-16
9.4 Evaluation of Corrective Measures for Groundwater 9-18
9.4.1 Alternative 1: SVE/Air Sparge 9-18

9.4.2 Alternative 2: *In Situ* Thermal Desorption 9-21
9.4.3 Alternative 3: *In Situ* Chemical Oxidation 9-24
9.4.4 Alternative 4: Enhanced Reductive Dechlorination 9-27
9.4.5 Alternative 5: Institutional and Engineering Controls 9-30

10. Recommended Final Corrective Measures 10-1
10.1 Institutional and Engineering Controls 10-1
10.1.1 Proprietary Controls (On-Site) 10-1
10.1.2 Proprietary Controls (Off-Site) 10-3
10.1.3 Governmental Controls (on and off-site) 10-3
10.2 Recommended Corrective Measures for Soil 10-4
10.2.1 Institutional Controls Including Recording of the New Declaration 10-4
10.2.2 S-Building SSDV 10-4
10.2.3 Soil Vapor Extraction 10-4
10.2.4 *In Situ* Soil Treatment/Soil Conditioning Combined with SVE (PCE source) 10-6
10.3 Recommended Corrective Measures for Groundwater 10-7
10.3.1 Institutional and Engineered Controls Including Recording of the New Declaration 10-7
10.3.2 Enhanced Reductive Dechlorination 10-7

11. Groundwater Corrective Measures 11-1
11.1 Summary of Proposed Treatment Technology 11-1
11.2 Proof of Concept 11-2
11.3 Proposed Amendments 11-3
11.3.1 Electron Donors 11-3
11.3.2 pH Buffer 11-4
11.3.3 Bioaugmentation Cultures 11-4
11.3.4 Deoxygenating Amendments 11-4
11.3.5 Methane Inhibitors 11-5
11.4 EISB Implementation Strategy 11-5
11.4.1 Predictive Modeling of Extraction Cells 11-5
11.4.2 Extraction 11-7
11.4.3 Carbon Treatment 11-7
11.4.4 Injection 11-7
11.5 Effectiveness Monitoring Program 11-8
11.5.1 Injection Monitoring 11-8
11.5.2 Groundwater Effectiveness Monitoring 11-9
11.6 Contingent Corrective Measures for Groundwater 11-10

12. Performance Monitoring 12-1
12.1 Groundwater Monitoring Program 12-1
12.1.1 Monitoring Points for Groundwater Treatment System Performance 12-1
12.1.2 Monitoring Points for Contaminant Mass Reduction 12-2
12.1.3 Compliance Monitoring Points for Cleanup Levels 12-2
GSI Monitoring Points 12-3
12.1.4 Side Gradient and Up Gradient Monitoring Points for Plume Stability 12-4
12.2 Soil Gas Monitoring Program 12-4

13. Project Schedule 13-1
13.1 Environmental Work to be Completed during Review Process 13-1
13.2 Final Corrective Measures 13-2

14. Cost Estimate 14-1

15. References 15-1

List of Tables

Table 1 Human Health and Ecological Exposure Pathway Analysis for On-Site Receptors
Table 2 Human Health and Ecological Exposure Pathway Analysis for Off-Site Receptors
Table 3 Target Cleanup Levels for Soil
Table 4 Target Cleanup Levels for Groundwater
Table 5 Remedial Technology Balancing Criteria Evaluation
Table 6 Proposed Groundwater Monitoring Program
Table 7 Proposed Soil Gas Monitoring Program
Table 8 Cost Estimate

List of Charts

Chart 1 Conseptual Site Model – On-Site Receptors
Chart 2 Conseptual Site Model – Off-Site Receptors
Chart 3 Project Schedule

List of Figures

Figure 1 Site Layout and Sample Locations
Figure 2 Site Features and Demolition Areas
Figure 3 Summary of Current Land Use
Figure 4 Summary of Local Zoning

Figure 5	On-Site Sample Locations
Figure 6	Subsurface Utilities
Figure 7	Cross-Section Location Map and Groundwater Contour Map – November 2015
Figure 8	Cross Sections A-A′ and B-B′
Figure 9	Cross Sections C-C′ and D-D′
Figure 10	Elevation of Top of Clay Confining Unit
Figure 11	Thickness of Surficial Low Permeability Zone
Figure 12	Results of Passive Soil Gas Survey – Distribution of TCE and Breakdown Products
Figure 13	MIP Investigation Results – Distribution of Maximum ECD Response in Vadose Zone
Figure 14	MIP Investigation Results – Distribution of Maximum ECD Response in Saturated Zone
Figure 15	Soil Areas Above Risk-Based Screening Levels
Figure 16	Lateral Distribution of Tetrachloroethene in Groundwater
Figure 17	Lateral Distribution of Trichloroethene in Groundwater
Figure 18	Lateral Distribution of cis-1,2-Dichloroethene in Groundwater
Figure 19	Lateral Distribution of Vinyl Chloride in Groundwater
Figure 20	Lateral Distribution of Chlorinated Ethenes in Groundwater
Figure 21	Extent of VOCs in Groundwater above Michigan Part 201 Criteria
Figure 22	Summary of Residential Vapor Intrusion Pathway – Multiple Lines of Evidence Analysis
Figure 23	Summary of Non-Residential Vapor Intrusion Pathway – Multiple Lines of Evidence Analysis
Figure 24	P-Building SVE System Layout
Figure 25	Perimeter SVE System Layout
Figure 26	Geographic Areas for Vapor Intrusion Modeling
Figure 27	Areas Identified for Soil Corrective Measures
Figure 28	Areas Identified for Groundwater Corrective Measures
Figure 29	Recirculation Cell Layout and Proposed Monitoring Program
Figure 30	Enhanced In Situ Bioremediation – Process Flow Diagram

List of Appendices

Appendix A	Chronology of Investigation Activities
Appendix B	Documentation of Ongoing GSI Investigation and Risk Assessment
Appendix C	Documentation of PCE Source Area Investigation
Appendix D	Analytical Data Tables Summarizing COCs in Potentially Affected Media
Appendix E	Potential Source Evaluation and Soil Investigation Workplan

Appendix F	Supplemental Groundwater Profile Sampling Workplan
Appendix G	Residential Vapor Intrusion Evaluation Data Tables
Appendix H	RBCA Modeling Summary
Appendix I	MHC Calculations and Indoor Air Sample Data
Appendix J	Ambient Air Calculations
Appendix K	Declarations of Restrictive Covenants and License Agreement
Appendix L	Groundwater Ordinance
Appendix M	SVE System Performance
Appendix N	Exposure Assumption Tables
Appendix O	Trench Calculations
Appendix P	Cleanup Level Calculations
Appendix Q	Microbial Insights Laboratory Report
Appendix R	Supporting Documentation for EISB
Appendix S	Supporting Information for Cost Estimate

Executive Summary

This Corrective Measures Proposal (CMP) is Tecumseh Products Company's timely submittal of a description of the recommended final corrective measures to be completed at the former Tecumseh Products Company (TPC) facility located at 100 East Patterson Street, in Tecumseh, Michigan ("Site"). Preparation of this CMP is pursuant to Section VI, Paragraph 15 of the Resource Conservation and Recovery Act (RCRA) 3008(h) Administrative Order on Consent (AOC), effective March 29, 2010.

During the operational life of the facility, the Site was occupied by a series of interconnected buildings/building additions that had a total area of approximately 750,000 square feet. The Site is comprised of approximately 50.5 acres. TPC began manufacturing and storage operations at the Site in the 1930s. Products manufactured by TPC included automotive parts, refrigeration systems, small tools, and toys. By June 2008, when manufacturing operations ceased at the Site, TPC operations focused on the production and reconditioning of compressors and condensing units for refrigeration and air conditioning units. During these processes, solvents composed primarily of trichloroethene (TCE) were used for parts degreasing. Over time, TCE-based solvents were replaced by 1,1,1-trichhlorethane (TCA)-based solvents. TPC records indicate that the use of chlorinated solvents for parts degreasing was discontinued in March 1992.

In February 2009, TRC Environmental Corporation (TRC) reviewed a Phase II investigation report performed during the course of the sale of the former TPC facility. In March 2009, TPC initiated a phased series of investigations. On March 29, 2010, the AOC between TPC and the United States Environmental Protection Agency (USEPA) was finalized. Per the requirements of the AOC, additional groundwater and soil investigations were performed. A detailed chronology of investigation activities conducted from 2009 through 2015 is provided in Appendix A.

While site investigation was being performed, implementation of numerous interim corrective measures were completed including the recording of the Existing Declaration, described below, a Groundwater Ordinance adopted by the City of Tecumseh, decommissioning of potable water wells, installation of a permeable reactive barrier at the Site property line, installation of two on-site soil vapor extraction (SVE) systems, and implementation of off-site vapor intrusion sampling and mitigation measures.

TRC found that groundwater contamination was present off site above relevant USEPA and MDEQ screening levels. TRC continued to investigate the nature and extent of soil and groundwater through a series of investigations through 2015, during which time it submitted the Environmental Indicator Reports and Remedial Investigation Report pursuant to the AOC,

along with supplements to those Reports. Using data collected from the various investigations performed at the Site and vicinity, TPC evaluated potential exposure pathways consistent with USEPA risk assessment guidance that included a determination of the potential exposure pathways which merited further evaluation and/or corrective measures. This exposure pathway evaluation considered receptors potentially exposed to constituents of concern (COCs) under reasonably expected future land use scenarios as required in the AOC, which were determined to be commercial/industrial on-site, and residential, commercial/industrial, and ecological/wetland habitat off-site. Based on this exposure pathway evaluation potentially complete and significant exposure pathways were identified. Risk-based cleanup levels for those potentially complete and significant exposure pathways are calculated in this CMP.

In consideration of the risk-based cleanup levels as well as affected soil as a potential source to other media (e.g. groundwater and indoor air), target areas for soil corrective measures were identified. Soil corrective measures were screened in accordance with RCRA and Parts 111 and 201 of the Natural Resources and Environmental Protection Act (P.A. 451, of 1994, as amended), implementing regulations, and applicable agency guidance documents, as required by the AOC.

- TCE concentrations exceed the risk-based cleanup level of 25 mg/kg beneath the Site building slab. Exposures to soil concentrations exceeding 25 mg/kg of TCE are expected to be managed through a combination of institutional controls (ICs) and engineering controls (ECs).
- Tetrachloroethene (PCE) concentrations exceed soil saturation levels in the PCE source area. Due to the on-going potential for leaching to groundwater, soil concentrations above saturation levels will be targeted for treatment.
- Additional soil investigation is proposed in the CMP to refine the areas over which soils exceed either risk-based cleanup levels or soil saturation levels. The data will be used to refine areas over which ICs and ECs are applied and to support decision making regarding the potential expansion of the SVE system(s) to reduce contaminant mass in the unsaturated zone.

With respect to groundwater, TRC performed site-specific risk-based cleanup level calculations and vapor intrusion modeling to determine risk-based cleanup levels for groundwater. Based on these calculations, the vapor intrusion pathway for future use under reasonably expected land use scenarios typically has the lowest cleanup level. Areas that exceeded these cleanup levels were identified, and corrective measures were evaluated that would reduce groundwater concentrations in the areas where cleanup levels protective of that pathway are exceeded.

Site investigations identified two areas on-site with elevated COC concentrations which result in off-site contaminant mass migration in groundwater. Both of these areas have been identified for groundwater treatment to reduce overall contaminant mass and facilitate

achievement of cleanup goals for groundwater protective of the off-site vapor intrusion pathway. TRC screened potential treatment technologies that would achieve the cleanup levels using threshold and balancing criteria, and recommends that enhanced *in situ* bioremediation (EISB) be performed to reduce groundwater contaminant mass and reach risk-based cleanup levels. Details regarding this technology are described in this CMP. In conjunction with the proposed EISB, ICs and ECs will be used to control or eliminate potential exposure pathways, e.g., the Groundwater Ordinance to eliminate the drinking water exposure pathway.

With respect to groundwater potentially venting to surface water/adjacent wetlands, TPC will continue to evaluate the GSI pathway as described in the CMP. Cleanup levels protective of the GSI pathway will be developed based on this evaluation, and if appropriate target treatment areas may be adjusted.

This CMP includes details regarding the proposed corrective measures, how they will be implemented, and how performance will be measured. As outlined in Section 13, a project schedule was developed to outline the timing and milestones for implementation of the CMP. As outlined in the schedule, TPC intends to perform additional activities concurrently with USEPA review of the CMP. Additionally, as described in Section 14, the cost estimate has been revised to incorporate the proposed corrective measures, including ongoing supplemental investigation activities described in this CMP.

Section 1
Introduction

This Corrective Measures Proposal (CMP) is Tecumseh Products Company's timely submittal of a description of the recommended final corrective measures to be completed at the former Tecumseh Products Company (TPC) facility located in Tecumseh, Michigan ("Site"). Preparation of this CMP is pursuant to Section VI, Paragraph 15 of the Resource Conservation and Recovery Act (RCRA) 3008(h) Administrative Order on Consent (AOC), effective March 29, 2010. This CMP was prepared by TRC Environmental Corporation (TRC)[1] on behalf of the Respondent, Tecumseh Products Company (TPC). The United States Environmental Protection Agency (USEPA) facility identification number for the Site is MID-005-049-440 and the AOC identification number is RCRA-05-2010-0012.

1.1 Site Description

The Site is located at 100 East Patterson Street in Tecumseh, Michigan (Figure 1), and is comprised of two parcels which occupy a total of approximately 50.5 acres. Parcel number 325-0250-00 is a 3.4 acre grass covered area located outside the southern fence. Parcel number 325-0241-00 occupies 47.1 acres and is located along the northern portion of the Site. This parcel includes the main manufacturing building with is located along the western perimeter of the Site. East of the main building, the Site is occupied by the former parking area in the north and a grassy area in the south (Figure 2).

During the operational life of the facility, the Site was occupied by a series of interconnected buildings/building additions that had a total area of approximately 750,000 square feet (main building) at the time that manufacturing operations ceased in 2008. There are other buildings on-site, but they are significantly smaller in size, and were typically not utilized for manufacturing operations. Letter designations, i.e., Area K, Q-Building, etc., for each building/building addition are shown on Figure 2.[2] The oldest portions of the main building, referred to as Area H, Area D, and Area B, were constructed around 1908, prior to TPC's ownership of the Site. These areas are located in the northern portion of the Site; subsequent building expansions and additions have connected these areas and expanded the main building to the south and east.

---

[1] On June 6, 2011 TRC acquired the Environmental Business Unit of RMT, Inc. For purposes of this and future reports, references to TRC are inclusive of RMT, Inc., prior to its acquisition by TRC.
[2] In 2013 a portion of the main building and several outbuildings were demolished; the building slab remains in place. The demolished portion of the facility is illustrated on Figure 2.

1.2 Project Background

TPC began manufacturing and storage operations at the Site in the 1930s. Products manufactured by TPC included automotive parts, refrigeration systems, small tools, and toys. By June 2008, when manufacturing operations ceased at the Site, TPC operations focused on the production and reconditioning of compressors and condensing units for refrigeration and air conditioning units. During these processes, solvents composed primarily of trichloroethene (TCE) were used for parts degreasing.

In 2008, a Phase I Environmental Site Assessment (ESA) was conducted by Atwell-Hicks, LLC, as part of the sale of the Site. The Phase I ESA Report recommended that a Phase II subsurface investigation be conducted to address the recognized environmental conditions (RECs) identified in the Phase I ESA. A Phase II investigation was performed by ATC Environmental Consultants (ATC) on behalf of the buyer between December 2008 and February 2009. A copy of the draft Limited Phase II report was provided to TPC in February 2009, and was finalized on September 4, 2009.

Following receipt of the draft Phase II report, TPC retained TRC, to assist with environmental investigation and remediation activities at the former TPC. A phased series of investigations ensued.

Following initial investigation activities conducted between February and September 2009, the Current Conditions Report (CCR) was submitted to the USEPA and the Michigan Department of Environmental Quality (MDEQ) in October 2009. The CCR described and summarized the physical setting of the Site, the historical operations, sampling data, potentially complete exposure pathways, and voluntary remedial activities undertaken by TPC (RMT, 2009). The USEPA was subsequently designated the lead regulatory agency for the Site. On March 29, 2010 the RCRA 3008(h) Administrative Order on Consent (RCRA-05-2010-0012) for the Site (MID-005-049-440) was executed. Since that time TPC has been working cooperatively with USEPA to complete investigation activities and remedial activities pursuant to Section VI, Work to be Performed, of the AOC. Section 3 provides a summary of investigation activities, and Appendix A provides a chronology of investigation activities.

In January 2014 USEPA provided comments regarding the site assessment and requested the completion of high-resolution site characterization (HRSC) to refine and verify the conceptual site model. In 2014 a passive soil gas (PSG) survey and a membrane interface probe (MIP) investigation were completed to identify potential source areas throughout the Site. Between April and June 2015 an intensive soil and groundwater investigation was completed which included subsequent MIP confirmation sampling and HRSC vertical profile sampling throughout the area of affected groundwater. In October 2015, the *2015 High Resolution Site Characterization Report and Updated Conceptual Site Model* was submitted to document the

findings of the HRSC investigation and data evaluation, including an updated Site description including site geology and hydrogeology, an evaluation of MIP confirmation sample data, and an evaluation of groundwater chemistry data. On December 8, 2015, TPC met with USEPA to discuss the findings of the HRSC investigation and the upcoming CMP submittal. Due to meeting time constraints, a subsequent conference call was scheduled on December 14, 2015 to discuss in detail the exposure pathway evaluation and risk assessment that would be included as part of the CMP.

1.3 Purpose and Scope

This CMP provides a description of the recommended final corrective measures to be completed at the Site. Preparation of this CMP is pursuant to Section VI, of the AOC as described below:

- Paragraph 15 of the AOC states that "Tecumseh Products shall propose to U.S. EPA within 36 months of the effective date of this Order[3] what final corrective measures are necessary to protect human health and the environment from all current and future unacceptable risks due to releases of hazardous waste or hazardous constituents at or from the facility (the "Final Corrective Measures Proposal"). The Final Corrective Measures Proposal shall describe all interim corrective measures implemented at the facility since the effective date of this Order. It shall also include a description of all other final corrective measures that Tecumseh Products evaluated, a detailed explanation why Tecumseh Products preferred the proposed final corrective measures, and cost estimates for the final corrective measures evaluated. The Final Corrective Measures Proposal shall also include a detailed schedule for constructing and implementing the final corrective measures, and for submitting the Final Remedy Construction Completion Report."
- Paragraph 16 of the AOC states that "As part of developing its Final Corrective Measures Proposal, Tecumseh Products shall propose appropriate: a) risk screening criteria, b) cleanup objectives c) and points of compliance under current and reasonably expected future land use scenarios and provide the basis and justification for these decisions."

Pursuant to the requirements of the AOC, and recent discussions with USEPA, the CMP includes the following components:

- A summary of the site history and operations;
- A brief summary of previous investigation activities;
- A site description including site setting with land use, climate, topography, geology and hydrogeology;
- A description of constituents of concern;

[3] Note that on March 6, 2013, the submittal date for the CMP was subsequently extended to January 31, 2016.

- A description of the nature and extent of contamination, including an evaluation of potential source areas and workplans for proposed additional investigation where appropriate;
- A description of interim corrective measures;
- An exposure pathway evaluation;
- A summary of the cleanup objectives and target treatment areas;
- An evaluation of final corrective measures alternatives, including costs;
- Recommended final corrective measures;
- A preliminary design of the recommended final corrective measures; and
- A schedule and cost for corrective measures implementation.

Section 2
Site History

2.1 Introduction

Tecumseh Products Company (TPC) began manufacturing and storage operations at the former TPC property ("Site") in 1934. Those manufacturing and storage operations were largely discontinued in 2008. A detailed description of past operations is provided in Section 2 of the 2012 *Remedial Investigation Report and Groundwater Environmental Indicator Report*, including a description of historical land use, site operations, types of waste generated, historic waste management and environmental permits, on-site treatment facilities, on-site chemical/waste storage facilities, waste disposal activities, and documented past releases. A brief summary of the site history, including a description of operations and land use since TPC discontinued manufacturing and storage operations is provided below.

2.2 Site Development

The Site was first developed for industrial use from farmland in the late 1800s and early 1900s. TPC began operations on portions of the Site in 1934. The Site was occupied by various divisions of TPC between 1934 and 2009. Historical documents indicate that the uses of the Site have not changed significantly since 1934, other than changes in some product lines, several episodes of facility expansion, and an increasing level of development until June 2008. In 2008, the Site was occupied by a series of interconnected buildings/building additions that had a total area of approximately 750,000 square feet (main building). There are other buildings on-site, but they are significantly smaller in size, and were typically not utilized for manufacturing operations. Letter designations, i.e., Area K, Q-Building, etc., for each building/building addition are shown on Figure 2. The oldest portions of the main building, referred to as Area H, Area D, and Area B (Figure 2), were constructed around 1908, prior to TPC's ownership of the Site. These areas are located in the northern portion of the Site; subsequent building expansions and additions have connected these areas and expanded the main building to the south and east.

2.3 Historical Site Operations and Chemical Use

TPC began manufacturing and storage operations at the Site in the 1930s. Products manufactured by TPC included automotive parts, refrigeration systems, small tools, and toys. By June 2008, when manufacturing operations ceased at the Site, TPC operations focused on the production and reconditioning of compressors and condensing units for refrigeration and air

conditioning units. Significant manufacturing processes formerly conducted at the Site are listed below:

- Parts degreasing (trichloroethene [TCE], 1,1,1-trichloroethane [TCA], and water)
- Unit assembly
- Paint preparation (water, citric acid, iron phosphate, fix solution)
- Unit painting
- Unit reconditioning
- Shipping and receiving, including use of an on-site rail spur until the 1960s

During these processes, solvents composed primarily of TCE were used for parts degreasing. Over time, TCE-based solvents were replaced by TCA-based solvents[4]. TPC records indicate that the use of chlorinated solvents for parts degreasing was discontinued in March 1992. The locations of on-site treatment facilities, on-site storage facilities (e.g., storage tanks), and waste management area (e.g., solid waste management units [SWMUs]), which were evaluated as potential source areas, are illustrated on Figure 2. Investigation activities, prior to 2015, also identified comparably low concentrations of tetrachloroethene (PCE) in isolated areas of the Site, indicating that, although the use of PCE-based solvents was very limited, PCE had also, apparently, been used at the Site.[5] Based on TPC records and standard industry practice, TCE use would have occurred predominantly from the 1930s through the 1950s and TCA use would have occurred between the 1950s and 1992.

2.4 Recent Site Operations

Site operations since June 2008 are outlined below:

- Research and product testing continued at the Site after manufacturing operations ceased in June 2008. Approximately 30 TPC employees continued to occupy the office and engineering portions of the main building (Areas H, J, and Z), located in the northwest portion of the Site. During this time period the remainder of the facility was unoccupied, with the exception of S-Building, which housed on-site security.

---

[4] Company records documenting the timeline over which TCE was replaced by TCA have not been found. However, common industry practice suggests that TCE was largely replaced by TCA in the 1950s.
[5] Due to isolated detections of PCE during previous investigation activities, PCE was documented as a constituent of concern as early as 2009. As described later in this document, PCE was detected at relatively high concentrations near the southern property line during 2015 HRSC investigation activities. The source of this PCE is unknown. TPC subsequently reviewed internal records and interviewed former TPC personnel in an effort to identify how and when PCE-based solvents were used at the site. However, this investigation did not find any documented use of PCE at the facility.

- In December 2009, the property was purchased by Tecumseh Bakery, LLC, and was intended to be occupied by its affiliate Consolidated Biscuit Company (CBC). Site use and occupancy was not immediately impacted by the property sale. TPC research and development staff continued to occupy the office and engineering portions of the main building through a sub-lease, and on-site security was maintained.
- In April 2010, CBC was purchased by Healthside Food Solutions; Tecumseh Bakery, LLC, became an independent entity and plans to occupy the Site for bakery operations were terminated. Site occupancy and use were not impacted.
- In February 2012, the property was purchased by Tecumseh Food, Machinery & Engineering, LLC (TFME). A TFME site manager was employed. He worked out of an office located in the old security area (S-Building). Intermittently TFME hired temporary employees to scrap the equipment that TFME had stored on Site.
- In June 2012, TPC completed the relocation of its research and development team to a new facility in Ann Arbor, Michigan.
- In 2013, TFME finished scrapping the equipment stored on-site and obtained a permit from the City of Tecumseh for phased building demolition. On-site utility service (electrical, water, etc.) was discontinued except where maintained by TPC to power on-site soil vapor extraction (SVE) systems. The southern portion of the main manufacturing building and a number of outbuildings were demolished in 2013 (Figure 2). Although plans to demolish the remainder of the main building, excluding P-Building and S-Building, remain in place, no further demolition has been completed since 2013.
- In 2015, TPC was advised that TFME entered into a purchase agreement with a prospective purchaser. TPC is advised that this prospective purchaser is preparing to close on the property in 2016, pending USEPA and MDEQ review of the New Declaration, as described fully in Section 10.

Section 3
Investigation Summary

3.1 Summary of Investigation Activities by Others

In 2008, a Phase I Environmental Site Assessment (ESA) was conducted by Atwell-Hicks, LLC, as part of the potential sale of the Tecumseh Products Company (TPC) facility ("Site") to Consolidated Biscuit Company (CBC). The Phase I ESA Report recommended that a Phase II subsurface investigation be conducted to determine the nature and extent of the recognized environmental conditions.

A Phase II investigation was conducted by ATC Environmental Consultants (ATC) on behalf of CBC between December 2008 and February 2009. The Limited Phase II investigation included the advancement of 30 on-site soil borings. Soil borings conducted by ATC are designated as GP-XX (installed with a Geoprobe®) or HB-XX (installed with a hand auger). The results of the Phase I ESA were used by ATC to identify sample locations and to select parameters for analysis. Soil and groundwater samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), metals, and/or cyanide.

3.2 Remedial Investigation Activities by TPC

In February 2009, TRC Environmental Corporation (TRC) reviewed ATC's draft Phase II investigation report on behalf of TPC. Based on this review, TRC identified two likely source areas: the Northern Source Area and the Southern Source Area. The Northern South Area is in the vicinity of soil borings GP-14 and GP-15 (Figure 1) where the highest concentration of trichloroethene (TCE) was found in the soil, and up gradient of GP-2 where high concentrations of TCE were found in the groundwater. The Southern Source Area is in the vicinity of GP-21 and GP-22 where high concentrations of TCE and 1,1,1-trichloroethane (TCA) were found in the groundwater.

After review of the draft Phase II investigation report, TRC concluded that there was a potential for off-site migration of VOCs above the Michigan Department of Environmental Quality (MDEQ) Part 201 generic cleanup criteria (Part 201 criteria). Therefore, in March 2009, TPC initiated a phased series of investigations to support a risk-based evaluation of potential exposure pathways, including:

- On-site source area investigation activities were conducted to:
  - Determine the nature and extent of constituents of concern (COCs) in soil, including non-aqueous phase parent products;

  - Determine the nature and extent of COCs in groundwater, including non-aqueous phase parent products;
  - Evaluate the physical parameters of the source areas and the affected aquifer characteristics that might affect contaminant fate and transport;
  - Evaluate the stability of COCs in source area groundwater;
  - Identify potential receptors, and evaluate risk to those receptors;
  - Identify and implement a variety of interim measures; and
  - Support the design and selection of final corrective measures.
- Source area, perimeter and off-site groundwater investigation activities were conducted to:
  - Determine the horizontal and vertical extent of COCs in groundwater;
  - Evaluate the stability of the groundwater plume;
  - Identify potential receptors, and evaluate risk to those receptors; and
  - Support the design and selection of final corrective measures.
- Surface water investigation activities were conducted to:
  - Define current discharges to surface water, if any;
  - Identify potential receptors, and evaluate risk to those receptors; and
  - Support the design and selection of corrective measures.
- Soil gas and indoor air investigation activities were conducted to:
  - Determine the area over which indoor air may be affected above risk-based screening levels;
  - Identify potential receptors, and evaluate risk to those receptors; and
  - Support the design and selection of corrective measures.

A detailed chronology of investigation activities is provided in Appendix A. See Section 4 for a description of the site setting, including site geology and hydrogeology. See Section 5 for a description of the nature and extent of contamination, including selection of COCs.

3.3 Documentation of Previous Investigation Activities

Pursuant to the requirements of the Agreed Order on Consent (AOC), TPC has communicated with the United States Environmental Protection Agency (USEPA) frequently and in good faith as investigation activities were conducted. Investigation activities are summarized in a series of documents, which were previously submitted to USEPA. In October 2009, the *Current Conditions Report* (CCR) was submitted, and therefore preparation of a CCR was not included in the AOC. The CCR described and summarized the physical setting of the Site, the historical

operations, sampling data collected to date, potentially complete exposure pathways, and voluntary remedial activities undertaken by TPC. Following that submittal, investigations continued pursuant to the requirements of the AOC to support a risk-based evaluation of potential exposure pathways. In September 2012, data from all of the investigations activities completed at that time were compiled in the *Remedial Investigation Report and Groundwater Environmental Indicator Report.*

On October 29-30, 2012, TPC met with the USEPA at USEPA Region 5 Headquarters in Chicago, to discuss current Site conditions and work to be undertaken pursuant to the AOC. During that meeting, USEPA provided comments on the *Remedial Investigation Report and Groundwater Environmental Indicator Report*. The *Supplemental Groundwater Investigation Workplan for the Former Tecumseh Products Company Site* (2013a) was prepared in response to those comments and AOC deadlines associated with the Remedial Investigation and Groundwater Stability Environmental Indicators were subsequently extended to allow time for the completion of that work. On July 15, 2013 the Technical Memorandum titled *Summary of the Supplemental Groundwater Investigation Activities and First Quarter and Second Quarter 2013 Compliance Monitoring Events* was submitted which documented remedial investigation activities and monitoring well installation completed as described in that workplan.

In September 2013, the *Supplement to the Current Human Exposures Under Control Environmental Indicator Report* was submitted to provide a comprehensive summary and compilation of data collected, at the request of USEPA to support the September 2011 evaluation of current human exposures. That report included:

- Calculation of a site-specific groundwater contact criteria for TCE to reflect TCE toxicity values which were updated by USEPA on September 29, 2011;
- Documentation that all private wells within the area restricted by the Groundwater Ordinance (described below) had been abandoned;
- Crawl space and indoor air sampling results from residential properties east of the Site and S-Building on-site; and
- Documentation that no CVOCs were detected in the ambient air sample collected downwind of the P-Building soil vapor extraction (SVE) system.

In January 2014 USEPA provided comments regarding the human exposures evaluation and site assessment. TRC prepared and summited a *Scope of Work* to address those comments in March 2014. The proposed work was initiated in early 2014 and is ongoing. That work includes indoor air sampling and/or sub-slab depressurization system installation at residential properties north and west of the Site, a building specific vapor intrusion assessment for the non-residential property immediately southeast of the Site, and high resolution site characterization

(HRSC) to more precisely define the nature and extent of on-site and off-site contamination. Work completed since January 2014 was executed and documented as described below.

- Between 2010 and 2014 passive soil gas (PSG) surveys were completed throughout the footprint of the manufacturing area and beyond to several areas which had the potential to be discrete source areas, specifically the former drum storage areas, tank areas, areas adjacent to former railroad spurs where loading/unloading of materials may have occurred, and the area east/southeast of the southern portion of the building where a number of outbuildings and two hazardous waste storage areas were located. This work was completed as described in the March 27, 2014 *Scope of Work* and the June 18, 2014 Technical Memorandum titled *Summary of 2014 Passive Soil Gas Survey Activities*; *Former Tecumseh Products Company Site in Tecumseh, Michigan (RCRA-05-2010-0012).* PSG survey results were used to determine the reasonable lateral extent of source areas to be targeted for further investigation.
- Following completion of PSG survey investigation activities, a membrane interface probe (MIP) investigation was completed between June 17 and July 24, 2014. The purpose of the MIP investigation was to provide high-density vertical distribution data in the source areas/potential source areas. Using PSG survey data, a total of 21 initial MIP investigation locations were selected with input from USEPA prior to initiation of MIP investigation activities. MIP investigation techniques allow data to be viewed and reported in real time. TRC staff reviewed these preliminary MIP data as they became available, adjusting the project scope and selecting additional investigation locations based on the findings at previous investigation locations. This dynamic approach allowed vertical screening throughout the study area to be completed in a single mobilization. Ultimately a total of 68 MIP borings were completed. Findings of the MIP investigation were provided in a presentation to USEPA on October 23, 2014. At that time, USEPA requested that a workplan be prepared for the remaining HRSC work which had been proposed in the March 27, 2014 *Scope of Work* including MIP confirmation sampling and off-site vertical profile sampling. MIP investigation data were evaluated and three-dimensional (3-D) visualizations of these data were prepared using Environmental Visualization System (EVS) software. Results of the MIP investigation and a workplan for ongoing HRSC activities were documented in the *MIP Investigation Report and Workplan for High Resolution Site Characterization* (HRSC Workplan).
- Between April 27, 2015 and June 9, 2015, MIP confirmation sampling and HRSC vertical profile sampling were completed in general accordance with the HRSC Workplan. Draft data were provided to USEPA as they became available. On July 31, 2015 final data were provided to USEPA including a figure showing investigation locations, tabulated soil and groundwater data, laboratory analytical reports, and soil boring logs. Subsequently a comprehensive evaluation of HRSC data collected during the April through June 2015 investigation activities was completed by TRC. The *2015 High Resolution Site Characterization Report and Updated Conceptual Site Model* (CSM Report) was prepared to document the findings of that data evaluation. The CSM Report, which was submitted in October 2015,

included an updated site description including site geology and hydrogeology, an evaluation of MIP confirmation sample data, an evaluation of groundwater chemistry data, and a summary of ongoing and proposed future investigation activities.

- Between November 30 and December 15, 2015, supplemental groundwater surface water interface investigation activities were completed as proposed in the October 14, 2015 Technical Memorandum titled *STATUS UPDATE - Investigation of the Potential Groundwater to Surface Water Migration Pathway*. The findings of those investigation activities are documented in Appendix B.
- In December 2015, a supplemental investigation was completed in the tetrachloroethene (PCE) source area as proposed in the November 12, 2015 Technical Memorandum titled *PCE Source Area Investigation*. The findings of those investigation activities are documented in Appendix C.

Section 4
Site Setting

4.1 Land Use

4.1.1 Historic On-Site Land Use

The former Tecumseh Products Company (TPC) property ("Site") was first developed for industrial use from farmland in the late 1800s and early 1900s. TPC began operations on portions of the Site in 1934. The Site was occupied by various divisions of TPC between 1934 and 2009. Historical documents indicate that the uses of the Site have not changed significantly since 1934, other than changes in some product lines, several episodes of facility expansion, and an increasing level of development until June 2008. TPC operations focused on the production and reconditioning of compressors and condensing units for refrigeration and air conditioning units. During these processes, solvents composed primarily of trichloroethene (TCE) were used for parts degreasing. Over time, TCE-based solvents were replaced by 1,1,1-trichloroethane (TCA) based solvents, as discussed above.

4.1.2 Current On-Site Land Use

In February 2012, the Site was purchased by Tecumseh Food, Machinery & Engineering, LLC (TFME). A TFME site manager was employed. He worked out of an office located in the old security area (S-Building). Intermittently, TFME hired temporary employees to scrap the equipment that TFME had stored on-site. In 2013, TFME finished scrapping the equipment stored on-site and building demolition began. On-site utility service (electrical, water, etc.) was discontinued except where maintained by TPC to power on-site soil vapor extraction (SVE) systems. The southern portion of the main manufacturing building and a number of outbuildings were demolished in 2013 (Figure 2). Although plans to demolish the remainder of the main building exists, excluding P-Building and S-Building, no further demolition has been completed since 2013. Since demolition activities were discontinued in 2013, the Site has been unoccupied.

4.1.3 Future On-Site Land Use

As discussed above, in 2015, TFME entered into a purchase agreement with a prospective purchaser. With the exception of P and S Buildings, the remaining structure is derelict with broken windows and crumbling support columns and walls. With the

exception of P-Building and S-Building, the cost to repair and reuse the remaining structure is prohibitive. If the pending property sale is finalized, the Site redevelopment plan includes demolition of the remaining on-site structures, with the exception of P-Building and S-Building, site grading, and subsequent construction of commercial buildings. There is no reasonable expectation that on-site structures other than P Building and S Building will be used in the future.

Concurrently with TPC's sale of the property in 2009, a License Agreement was executed and a Declaration of Environmental Restrictive Covenants was recorded with the Lenawee County Register of Deeds on January 14, 2010 ("Existing Declaration"). The Existing Declaration will be amended and replaced by the New Declaration. Both the Existing Declaration and New Declaration ensure that future land use will be non-residential.

Reasonably anticipated land use includes site redevelopment followed by use of the property for industrial and/or commercial purposes. Of those structures remaining on-site, only P-Building and S-Building could reasonably be expected to be repaired and occupied in the future. Institutional Controls (ICs) and Engineering Controls (ECs) are described in detail in Section 10.

4.1.4 Historic Off-Site Land Use

The area was first developed from farmland in the late 1800s and early 1900s. Land use in the immediate vicinity of the Site and the associated groundwater plume was developed as a mix of residential and non-residential properties.

The construction dates of houses in the area range from as early as the 1820s through 2002. Significant periods of residential development occurred in the late 1800s and again from approximately 1940 to 1950, concurrent with industry development and expansion in the area.

In addition to the Site, a number of properties were used for non-residential purposes. Typically, properties developed for commercial/industrial use remain commercial/industrial. However, the nature of property use may change. Notable examples include:

- Use of a portion of the property designated by parcel number 325-0081-00, currently owned by the City of Tecumseh, as a dump. This historic waste disposal area is located at the eastern end of Cummins Street where a steep drop in the natural topography occurs in proximately to the River Raisin. These dumping activities filled a portion of the natural floodplain and wetland area. The effects of this historic

dumping remain visible on current aerial photographs and surface topographic maps.

- The off-site property designated by parcel number 305-1600-00 is the location of a former dry cleaner with documented PCE contamination resulting from the use of dry cleaning solvents. Evidence of the off-site migration of this contamination from the former dry cleaner has been found during environmental work for the Site, pursuant to the AOC, in the vicinity of monitoring well MW-12s.

4.1.5 Current Off-Site Land Use

Residential and non-residential properties within the area of affected groundwater and the vicinity are illustrated on Figure 3. Current off-site land use is summarized below:

- **Up gradient (west)**: The property is bounded by a railroad right of way to the west. The area beyond the railroad is comprised of an industrial facility (a corrugated box manufacturer) and residential properties.
- **Side Gradient (northwest):** The property is bounded to the northwest by the former TPC international building and parking area. Further to the northwest, beyond the railroad right of way which continues north, land use is a mix of residential/commercial operations including a landscaping company.
- **Downgradient (north/northeast):** East of Ottawa Street, and north of Patterson Street, the property is bounded to the north by a mix of industrial/commercial operations (two substations, a towing and auto repair facility, a limousine garage, and a cable company). Further downgradient, from Cummins Street to Wyandotte Street, land use is primarily residential interspaced with commercial properties including a counseling center, a church, and an ambulance bay.
- **Downgradient (east):** The property is bounded to the east by a mix of industrial/commercial operations and three residences, including a warehouse owned by TPC, a greenhouse, a phone company field operations center, a specialty auto parts store, a school bus garage, and a furniture warehouse. Further downgradient, property use includes two additional residential properties, an automotive service center, and several storage facilities. Beyond these properties is the River Raisin and the associated undeveloped flood plain/wetland area.
- **Side Gradient (South):** The property is bounded to the south by a mix of industrial/commercial operations including the City of Tecumseh fire station and a furniture/appliance warehouse.

In addition to the overview of property use provided above, current land use was evaluated to determine if any sensitive populations were present within the area of affected groundwater.

- **Residential:** The locations of residential properties are illustrated on Figure 3.

- **Schools:** There are no schools located in the area of affected groundwater.
- **Day-Care Facilities:** There are no commercial day-care facilities located in the area of affected groundwater or the vicinity. Additionally, the State of Michigan licenses childcare providers, including in home child care providers. A list of licensed childcare providers is available via the Michigan Department of Health and Human Services website http://www.dleg.state.mi.us/brs_cdc/sr_lfl.asp. There are no licensed childcare providers within the area of affected groundwater.
- **Hospitals and Medical Service Facilities**: The Herrick Memorial Hospital occupies the block west of Wyandotte Street between Pottawatamie Street and Cummins Street. Around the perimeter of the hospital property, the area is historically residential. However, hospital growth has resulted in the conversion of a number of residential properties for non-residential use. Complementary property use in this area includes an ambulance bay, several outpatient service buildings, a dentist office, a parking lot, and a driveway from East Chicago Boulevard to the emergency hospital entrance along Pottawatamie Street.
- **Nursing Homes**: There are no nursing homes or assisted living facilities located in the area of affected groundwater.

4.1.6 Future Off-Site Land Use

Zoning for the City of Tecumseh is illustrated on Figure 4. In areas zoned Industrial or Industrial/Commercial (shaded yellow and orange on Figure 4), there is no reasonable expectation that existing industrial/commercial properties will be developed for residential use. This area includes the Site, and extends at least one block beyond the Site in all directions except west. West (up gradient) of the Site, zoning is a mix of residential and industrial. Within the area zoned Industrial or Industrial/Commercial there are currently seven residences (Figure 3). Reasonable anticipated future land use at those parcels includes both continued residential use and commercial/industrial use. At the remaining parcels within this area, reasonable anticipated future land use is exclusively non-residential.

North of Cummins Street, within the area of affected groundwater, the majority of properties are currently either residential or commercial properties associated with the hospital. Zoning in this area includes residential, office service and downtown edge classifications. Anticipated future land use in this area is a mix of residential and non-residential properties.

Further east/northeast of the Site, the flood plain for the River Raisin is zoned residential. However, future development is not expected due to both physical features (access over steep topography, flooding, etc.) and institutional controls (restrictions on

development in regulated wetlands). Therefore, development of this area for either residential or non-residential use is not reasonably anticipated in the future.

4.2 Regional and Site Climate

Based on long-term regional weather records, southeast Michigan receives an average of 33 inches of rainfall per year (MSU, 2012). Winds in the area are predominately from the west with an average wind speed of 4.5 meters/second.

4.3 Topography and Surface Drainage

Topographically, the region is relatively flat sloping downward to the east, toward the River Raisin, which is located approximately 2000 feet east of the Site. However, as illustrated on Figure 1, in proximity to the River Raisin, the surface topography drops steeply east (downgradient) of the Site from an approximate elevation of 780 feet above mean sea level (ft MSL) to an approximate elevation of 750 ft MSL in the wetland area adjacent to the River Raisin.

On site, the topography slopes predominately to the east at an approximately 1-percent grade. Storm water from the building and the limited paved areas around the perimeter of the building footprint is managed through an on-site storm sewer system. A site survey and historic NPDES permits indicate that this storm water discharges to the City of Tecumseh storm sewer system at five locations: 4 along Patterson Street and 1 along South Maumee Street. The approximate locations of these outfalls are illustrated on Figure 5. Prior to building demolition, the on-site storm sewer system would have managed, on average, 15 million gallons of storm water per year from the roof of the building. At present, the on-site storm sewer system manages approximately 11 million gallons of storm water per year from the roof of the building. The majority of storm water from the unpaved portion of the Site, including the former parking area, is managed through natural infiltration. During heavy rainfall, when the rainfall rate exceeds the infiltration rate, storm water drains across the parking area to the east, and is discharged to the catch basins located along South Maumee Street. Figure 5 illustrates the storm sewer system on-site and immediately around the perimeter of the Site. Storm sewers around the perimeter of the Site discharge to the River Raisin flood plain, as illustrated on Figure 6.

4.4 Regional Geology

The Site is located near the southeast rim of the Michigan Basin. The region is relatively flat and characterized by glaciofluvial sediments at the surface (Figure 1). The geology consists of a series of unconsolidated Holocene and Pleistocene age glacial deposits, predominantly gravel and sand with areas of silt and clay, overlying Mississippian age shales. The thickness of the glacial deposits varies from a few feet to over 200 feet thick throughout the region. Local water

well logs within one mile of the Site indicate bedrock in that area is approximately 150 to 200 feet below ground surface (ft bgs).

4.5 Local Geology

TRC used geologic data collected during investigation activities completed through August 2015 to evaluate local geology. These data were used to prepare input files for the Environmental Visualization System (EVS) Software so that local geology could be modeled and evaluated in three dimensions. The EVS modeling process and output are described in detail in the October 2015 report titled *2015 High Resolution Site Characterization Report and Updated Conceptual Site Model*. Site geology data were Kriged to create surfaces which define the interfaces between the various soil types, and groundwater contour lines from the Second Quarter 2015 Groundwater Contour Map were Kriged to define the top of the aquifer. Model outputs were used to illustrate and refine previous descriptions of local geology. Figure 7 is the most recent groundwater contour map and cross section location map. Figure 8 includes Cross Sections A-A′ and B-B′, and Figure 9 includes Cross Sections C-C′ and D-D′. Cross Section A-A′ extends from the northern portion of the Site, in the direction of groundwater flow through the area of highest chlorinated volatile organic compound (CVOC) mass in groundwater in the northeast. Section B-B′ extends from west to east along the northern, downgradient perimeter of the Site, illustrating site geology and CVOC mass distribution at the northern property line. Cross Section C-C′ extends from the southern portion of the Site, in the direction of groundwater flow through the area of highest CVOC mass in groundwater in the south. Cross Section D-D′ extends from north to south along the eastern, downgradient perimeter of the Site, illustrating site geology and the CVOC mass distribution at the eastern property line. Additionally, EVS Software model outputs were used to prepare an updated figure illustrating the elevation of the top of the clay confining unit (Figure 10) and to illustrate the thickness of the low permeability surficial silty/sandy clay unit (Figure 11).

Site geology generally consists of a surficial silty/sandy clay interval, underlain by unconsolidated fine to coarse sand and gravel. A deep clay layer which has a hydraulic conductivity between 1.8×10^{-8} centimeters per second (cm/s) to 1.9×10^{-8} cm/s is present beneath the Site (RMT, 2010a) and serves to limit the vertical extent of affected groundwater. Soil boring data show that this second clay layer is continuous across the study area. In the area northeast of the Site, a sand unit is observed within the surficial clay. Perched groundwater is present in this sand unit. The perched groundwater is not hydraulically connected to the Site. East of the Site, an intermediate clay layer which bifurcates the affected aquifer is observed (Cross Sections A-A′ and C-C′ on Figures 8 and 9).

Data collected from the soil borings and monitoring wells installed during subsurface investigation activities indicate that shallow groundwater typically ranges in depth from 6 to

30 ft bgs within the sand and gravel aquifer[6]. The variation in groundwater depth is largely a result of Site topography, which slopes downward to the east, toward the River Raisin. The deep clay unit represents a significant confining layer for vertical groundwater movement into deeper aquifers.

The 2015 high resolution site characterization (HRSC) investigation activities and the subsequent data interpretation and modeling served to refine and clarify the previously reported geologic findings. The 2015 geologic findings are summarized below.

- The underlying clay confining unit was confirmed to be present throughout the study area except in the far northeast where the limits of the drilling equipment (typically approximately 50 feet) were reached prior to confirming the presence of the underlying clay confining unit. Based on the soil boring log for monitoring well MW-29d, the clay confining unit is approximately 63.5 ft bgs in this area.
- The underlying clay confining unit was confirmed to have a minimum thickness of 5 feet throughout the area of affected groundwater.
- The elevation of the underlying clay confining unit ranges from approximately 730 ft MSL to 765 ft MSL. The figure illustrating the elevation of the underlying clay confining unit (Figure 10) was updated to reflect 2015 HRSC data. As previously documented, relative lows in this clay surface are in the far northeast of the study area near monitoring wells MW-29s/d and in the far southeast of the study area near monitoring wells MW-40s/d. Relative highs in the clay surface elevation (approximately 760 to 765 ft MSL) extend from the central portion of the Site (near monitoring well MW-37s) northeast to monitoring wells MW-10s/d. Geologic data collected during the HRSC investigation indicate that this relative high in the clay surface elevation extends further north than previously shown to include monitoring well MW-23 and soil borings B-91 and B-92.
- The laterally discontinuous intermediate clay layer which is illustrated on Cross-Section A-A' (Figure 8) was present in all but one (B-91) of the borings in the northeast area located along Wyandotte Street or further east. This intermediate clay unit which is present between 766 ft MSL and 773 ft MSL has a thickness of 0.5 to 4.5 feet in this area. Between soil boring B-95 and monitoring wells MW-10s/d the elevation of the top of the underlying deep clay confining unit ranges from approximately 760 to 765 ft MSL, and the water table has an elevation of approximately 776 ft MSL. Collectively these features result in a vertically narrow permeable saturated zone.
- Northeast of the Site, near-surface soils are predominately silty/sandy clay. This unit is bisected by a silty sand/sand unit. As illustrated on Figure 11, the bottom of the surficial silty/sandy clay unit is greater than 8 feet below ground surface from soil borings B-73 and B-75 along Cummins Street to the northeast. At most of the investigation locations in this area, a perched groundwater unit was observed at depths ranging from 5 to 8 feet below

[6] In the wetland area, depth to groundwater is shallower, typically 0 to 4 ft bgs.

ground surface, confirming the continuity of this silty/sandy clay unit. The elevation of the perched groundwater unit (785 ft MSL along Maumee Street to approximately 781 ft MSL along Wyandotte Street) is well above the elevation of the top of the affected aquifer (777 ft MSL along Maumee Street to approximately 774 ft MSL along Wyandotte Street). These elevations verify that this perched groundwater is not hydraulically connected to the affected groundwater.

4.6 Hydrogeology

Groundwater elevation data are collected semi-annually. A groundwater contour map, developed using elevation data from the most recent sampling event, November 2015, is included as Figure 7. The depth to groundwater and the direction of groundwater flow has been generally consistent. Groundwater flow at the Site is generally east toward the River Raisin, the nearest body of water located 1,500 to 2,500 feet east of the Site. The River Raisin is the regional discharge feature for groundwater beneath the Site. A mean horizontal hydraulic gradient of 0.001 was measured across the Site using the November 2015 groundwater elevation data. Data from *in situ* hydraulic conductivity tests performed on monitoring wells screened in the unconfined sand and gravel aquifer were used to calculate a geometric mean hydraulic conductivity. The geometric mean hydraulic conductivity is 9.5×10^{-3} cm/s with an upper 95-percent confidence limit of 2.2×10^{-1} cm/s and a lower 95-percent confidence limit of 4.2×10^{-4} cm/s. Assuming an effective porosity of 0.2 (Marsily, 1986), the resultant estimated groundwater flow velocity is 4.8×10^{-5} cm/s (49 feet per year). The surface topography drops steeply downgradient of the Site from an approximate elevation of 780 ft MSL to an approximate elevation of 750 ft MSL in the wetland area adjacent to the River Raisin. East of the Site, in proximity to the change in surface elevation, the horizontal hydraulic gradient increases; with this increase the groundwater flow velocity also increases east of the Site.

The vertical hydraulic gradient in the upper sand/gravel aquifer is evaluated semi-annually at seventeen nested well pairs. Along the western (up gradient) portion of the Site, the measured vertical hydraulic gradient is essentially neutral. Similarly, on-site nested well pairs also exhibit near neutral vertical gradients. Northeast of the Site, the hydraulic gradient varies from downward at well pairs MW-29s/d and MW-12s/d to near neutral at well pair MW-30s/d. East of the Site a downward hydraulic gradient is observed, with the downward hydraulic gradient increasing to the south. This significant vertical downward gradient in the upper sand/gravel aquifer east/southeast of the Site is the result of the presence of a higher hydraulic conductivity sand and gravel deposit that underlies the sand deposit, and a significant change in surface topography. At well pair MW-40s/d, near the river, the vertical gradient returns to near neutral. Throughout the duration of the project, these vertical gradients between well pairs have been consistent and stable.

The 2015 HRSC investigation activities and the subsequent data interpretation and modeling served to refine and clarify the previously reported hydrogeologic findings, as summarized below.

- As illustrated on Figure 10, relative highs in the clay surface elevation (approximately 760 to 765 ft MSL) extend from the central portion of the Site (near monitoring well MW-37s) northeast to monitoring wells MW-10s/d and north to soil borings B-91. This peak in the underlying clay surface, in combination with the presence of an intermediate clay unit which is present between 766 ft MSL and 773 ft MSL and has a thickness of 0.5 to 4.5 feet in this area, restricts groundwater flow in the easterly direction due to a vertically narrow permeable saturated zone. Consequently, groundwater flow from the northern portion of the Site does not follow a straight line path to the River Raisin, but is diverted to the north first as described above. Both groundwater chemistry data and groundwater elevation data (from previously installed monitoring wells) indicate that groundwater flow from the northern portion of the Site is to the north-northeast from Patterson Street to Maumee Street. Beyond Maumee Street (south of Pottawatamie Street), flow is redirected to the east, following the path of least resistance to the River Raisin.[7]
- Downgradient (east) of the southern plume, a similar peak in the underlying clay surface is not observed. In fact, the elevation of the clay surface decreases modestly to the south and east from the Site (~750 ft MSL) to the River Raisin (~740 ft MSL). Both groundwater chemistry data and groundwater elevation data indicate that groundwater in this area appears to follow a nearly straight line path from west to east.

[7] Note that the River Raisin is dammed just north of East Chicago Boulevard. The surface water impoundment created by this dam is expected to be a significant groundwater recharge feature. This groundwater recharge is expected to produce a hydraulic impediment to groundwater flow further to the north.

Section 5
Nature and Extent of Contamination

5.1 Introduction

In 2008, a Phase I Environmental Site Assessment (ESA) was conducted by Atwell-Hicks, LLC, as part of the potential sale of the former Tecumseh Products Company (TPC) facility ("Site") to Consolidated Biscuit Company (CBC). The Phase I ESA report recommended that a Phase II subsurface investigation be conducted to determine the nature and extent of the recognized environmental conditions. A Phase II investigation conducted by ATC Environmental Consultants (ATC) on behalf of CBC was performed between December 2008 and February 2009. Results of the Phase I ESA were used to identify sample locations and select parameters for sample analysis. Based on past operations, ATC considered volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), metals and cyanide potential constituents of concern (COCs). ATC developed a sampling strategy based on historical Site usage. A table summarizing the rationale for each investigation location, as well as parameters analyzed was included in the 2012 Remedial Investigation and Groundwater Environmental Indicator Report (2012 RI/EI Report). Sample locations, designated with either GP-XX or HB-XX are shown on Figure 5.

The Phase II investigation conducted by ATC found that VOCs are present in soil and groundwater below the former manufacturing area. Chlorinated solvents including trichloroethene (TCE) and 1,1,1-trichloroethane (TCA) were found in soil and groundwater above risk-based screening levels. Because 1,4-dioxane is commonly used to stabilize 1,1,1-TCA, TRC Environmental Corporation (TRC) considered 1,4-dioxane a potential, previously unevaluated COC in the areas with 1,1,1-TCA in soil and groundwater. Therefore, a subset of the soil, groundwater and storm sewer samples collected during the April 2009 investigation activities conducted by TRC, were also analyzed for 1,4-dioxane. None of the samples detected 1,4-dioxane.

Soil and groundwater data from these investigations activities were compared to the generic cleanup criteria specified in the Michigan Department of Environmental Quality (MDEQ) Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), also known as Part 201 criteria. Part 201 criteria have been developed for common risk-based exposure pathways to facilitate site assessment. These criteria do not contemplate all potential exposure routes (e.g., incidental ingestion or groundwater volatilization ambient air in a trench during construction activities). However, for each parameter, the most restrictive of these criteria are typically protective of the drinking water exposure pathway or surface water (for human recreational and ecological receptors) at

the groundwater-surface water interface. For preliminary screening, and the selection of COCs, the most restrictive Part 201 criteria are expected to be lower than soil and groundwater concentrations which would pose a risk to receptors along a more obscure exposure route. A detailed evaluation of potential COCs, and a rational for the selection of site-specific COCs is provided in Section 7 of the 2012 RI/EI Report. Based on this assessment a subset of volatile organic compounds (VOCs) were identified as the COCs for the Site. Other compounds, including 1,4-dioxane, SVOCs, PCBs, metals and cyanide were eliminated as potential COCs. As such, subsequent investigation activities focused on determining the nature and extent of VOCs in the environment. The identification of specific COCs within the VOC chemical compound group is described below.

5.2 Selection of COCs

5.2.1 Drinking Water Pathway

In order to evaluate the potential residential and non-residential drinking water exposure pathway, VOC concentrations were compared to the following criteria:

- Soil
  - Part 201 Residential Drinking Water Protection (DWP) Criteria
  - Part 201 Non-Residential DWP Criteria
- Groundwater
  - Part 201 Health-Based Residential Drinking Water (DW) Criteria
  - Part 201 Health-Based Non-Residential DW Criteria

Based on these criteria the following compounds are COCs for the drinking water exposure pathway:

- Acetone
- Benzene
- 2-Butanone
- n-Butyl Benzene
- sec-Butylbenzene
- Chloroethane
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,1-Dichloroethene
- cis-1,2-Dichloroethene
- trans-1,2-Dichloroethene
- Ethylbenzene
- n-Propyl Benzene
- Tetrachloroethene
- Toluene
- 1,1,1-Trichloroethane
- 1,1,2-Trichloroethane
- Trichloroethene
- 1,2,4-Trimethylbenzene

- 1,3,5-Trimethylbenzene
- Vinyl Chloride
- Total Xylenes

5.2.2 Groundwater-Surface Water Interface Pathway

In order to evaluate the potential exposures at the groundwater-surface water interface, VOC concentrations were compared to the following criteria:

– Soil
  - Part 201 Groundwater to Surface Water Interface Protection (GSIP) Criteria

– Groundwater
  - Part 201 Groundwater to Surface Water Interface (GSI) Criteria

Based on these criteria the following compounds are COCs for potential exposures at the groundwater-surface water interface:

- Acetone
- 2-Butanone
- 1,1-Dichloroethane
- 1,1-Dichloroethene
- cis-1,2-Dichloroethene
- Ethylbenzene
- 2-Methyl-naphthalene
- Naphthalene
- Tetrachloroethene
- Toluene
- 1,1,1-Trichloroethane
- Trichloroethene
- 1,2,4-Trimethylbenzene
- 1,3,5-Trimethylbenzene
- Vinyl Chloride
- Total Xylenes

5.2.3 Volatilization to Indoor Air Migration Pathway

In order to evaluate the potential volatilization to indoor air migration pathway, VOC concentrations were compared to the following screening criteria:

– Soil
  - Part 201 Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria[8]

– Groundwater[9]

---

[8] As discussed in Section 5.5, there is no reasonable mechanism by which off-site soils can be affected above risk-based screening levels. Current and future on-site land use is restricted to non-residential. Therefore only non-residential soil criteria apply.

[9] Part 201 criteria include Residential and Non-Residential Groundwater Volatilization to Indoor Air Inhalation [GVIAI] criteria. However, these Generic criteria are subject to the applicability criteria set

- MDEQ Residential Groundwater Screening Levels for Vapor Intrusion (GWSLs)
- MDEQ Non-Residential GWSLs

Based on these screening criteria the following compounds are COCs for the potential volatilization to indoor air migration pathway[10]:

- Chloroethane
- 1,1-Dichloroethene
- cis-1,2-Dichloroethene
- Ethylbenzene
- Tetrachloroethene
- Toluene
- Trichloroethene
- Vinyl Chloride
- Total Xylenes

5.2.4 Direct Contact Pathway

In order to evaluate the potential for unacceptable exposures due to direct contact with affected media, VOC concentrations were compared to the following criteria:

– Soil
  - Part 201 Non-Residential Direct Contact (DC) Criteria

– Groundwater
  - Part 201 Groundwater Contact Criteria[11]
  - Calculated Groundwater Contact Criterion for TCE[12]

Based on these criteria the following compounds are COCs for direct contact with affected media:

- Tetrachloroethene (groundwater)
- Vinyl Chloride (groundwater)

---

forth in R 299.14. Therefore the more restrictive MDEQ residential and non-residential GWSLs for vapor intrusion from the May 2013 Guidance Document for the Vapor Intrusion Pathway are used to determine COCs for the volatilization to indoor air migration pathway.

[10] Isopropylbenzene was detected at one location (PRB-03s) above the residential GWSL during one sampling event. Isopropylbenzene has not been detected in the eight subsequent sampling events. Therefore isopropylbenzene is not included in the list of COCs for the volatilization to indoor air migration pathway

[11] Part 201 Groundwater Contact Criteria are taken from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Contact Criteria were removed from the Part 201 cleanup criteria tables with the December 30, 2013 Rule revisions.

[12] The groundwater contact criterion for TCE was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011. These calculations were included as Appendix G of the 2012 RI/EI Report.

5.2.5 Volatilization to Ambient Air Migration Pathway

In order to evaluate the potential volatilization to ambient air migration pathway, VOC concentrations were compared to the following screening criteria:

- Soil
    - Part 201 Non-Residential Infinite Source Volatile Soil Inhalation (VSI) Criteria
    - Part 201 Non-Residential VSI Criteria for a 5 meter source
    - Part 201 Non-Residential VSI Criteria for a 5 meter source
- Compounds which have exceeded screening criteria for soil protective of the volatilization to ambient air migration pathway are listed below:
    - Tetrachloroethene
    - Trichloroethene
- Groundwater: Neither MDEQ nor EPA has published screening levels for the volatilization of VOCs in groundwater to ambient air. Therefore MDEQ Non-Residential GWSLs for Vapor Intrusion were used to select COCs for a site-specific pathway evaluation and remedial goal calculations related to the relevant volatilization of VOCs in groundwater to ambient air migration pathways (e.g. trench worker scenario). Compounds which have exceeded MDEQ Non-Residential GWSLs are listed below:
    - cis-1,2-Dichloroethene
    - Ethylbenzene
    - Tetrachloroethene
    - Trichloroethene
    - Vinyl Chloride
    - Total Xylenes

5.2.6 Inhalation of Soil Particulates Migration Pathway

In order to evaluate the potential inhalation of soil particulates migration pathway, VOC concentrations were compared to the following screening criteria for soil:

- Part 201 Non-Residential Particulate Soil Inhalation (PSI) Criteria

No compounds have exceeded screening criteria for soil protective of the inhalation of soil particulates migration pathway.

5.3 Source Identification

Based on review of historical property use and the Phase II investigation (ATC, 2009), VOCs, particularly chlorinated VOCs (CVOCs) were identified as the COCs at the Site. As described in Section 2, TPC operations focused on the production and reconditioning of compressors and condensing units for refrigeration and air conditioning units. During these processes, solvents composed primarily of TCE and later TCA were used for parts degreasing. Although other VOCs are detected above risk-based criteria in soil and groundwater, investigation data indicate that TCE and TCA represent the bulk of the contaminant mass. Investigation activities, prior to 2015, also identified comparably low concentrations of tetrachloroethene (PCE) in isolated areas of the Site, indicating that, although the use of PCE-based solvents was very limited, PCE had also, apparently, been used at the Site. Due to their prevalence, PCE, TCE, and their breakdown products: 1,1-dichloroethene (1,1-DCE), 1,2-cis-dichloroethene (cis-DCE), 1,2-trans-dichloroethene (trans-DCE), and vinyl chloride were identified as the COCs in on-site soil and/or groundwater.

Historical documents and TPC employee knowledge of the Site history were used to identify potential source areas for COCs, including:

- Solid Waste Management Units (SWMUs);
- Former drum storage areas, and
- Former aboveground and underground storage tank (AST and UST) areas.

These potential source areas are described in detail in Section 3.9 of the 2009 Current Conditions Report (CCR). The locations of these potential source areas are illustrated on Figure 5.

As documented in the 2009 CCR, soil and analytical data indicate that operations related to SWMU 5, the distillation and solvent recovery system, may be a significant source area for TCA and TCE in soil and groundwater. There is no evidence that other units (SWMUs, USTs, ASTs, etc.) are the source of on-site CVOCs. Rather, on-site CVOCs appear to be a result of incidental releases at the Site. Based on COCs in the downgradient contaminant plume, two general source areas were identified. The northern source area is in the vicinity historic machining operations in Area K, Area B and the western portion of P-Building and extends south to the former chemical stockroom (Area D), where elevated concentrations of TCE have been found in soil and groundwater. The southern source area is in the vicinity of SWMU 5, where high concentrations of TCE and TCA were found in the groundwater. As described below, high resolution site characterization (HRSC) was used to identify more discretely the potential source areas within these generalized areas of relatively high COCs concentrations.

5.3.1 HRSC – Passive Soil Gas Survey

Between 2010 and 2014 passive soil gas (PSG) surveys were completed throughout the footprint of the manufacturing area and beyond to several areas which had the potential to be discrete source areas, specifically the former drum storage areas, tank areas, areas adjacent to former railroad spurs where loading/unloading of materials may have occurred, and the area east/southeast of the southern portion of the building where a number of outbuildings and two hazardous waste storage areas were located. This work was completed as described in the March 27, 2014 Scope of Work and the June 18, 2014 Technical Memorandum titled *Summary of 2014 Passive Soil Gas Survey Activities*; *Former Tecumseh Products Company Site in Tecumseh, Michigan (RCRA-05-2010-0012).* The semi-quantitative PSG data collected during this investigation activities were used to prepare compound distribution maps for select constituents. Figure 12 illustrates the distribution of TCE and its degradation products (1,1-DCE, cis-DCE, trans-DCE, and vinyl chloride). Within the PSG survey area, the distribution map illustrates the reasonable lateral extent of potential source areas to be targeted for further investigation (e.g. areas highlighted red to yellow on Figure 12). Note that elevated PSG response does not automatically indicate the presence of a soil source. Rather, elevated PSG response may be due to one or more of the following:

- Near proximity to an original source of contamination,
- Near proximity to affected soils along the path of contaminant migration, and/or
- Locations overlying groundwater contamination at the water table (i.e., affected groundwater is in contact with soil gas allowing VOCs to volatilize and enter the overlying soil gas).

5.3.2 HRSC – Membrane Interface Probe Investigation

Following completion of PSG survey investigation activities, a membrane interface probe (MIP) investigation was completed to provide high-density vertical distribution data in these source areas/potential source areas. Using PSG survey data, a total of 21 initial MIP investigation locations were selected with input from the United States Environmental Protection Agency (USEPA) prior to initiation of MIP investigation activities. MIP investigation techniques allow data to be viewed and reported in real time. TRC staff reviewed these preliminary MIP data as they became available, adjusting the project scope and selecting additional investigation locations based on the findings at previous investigation locations. This dynamic approach allowed vertical screening throughout the investigation area to be completed in a single mobilization. Ultimately a total of 68 MIP borings were completed.

MIP investigation data were evaluated and three-dimensional (3-D) visualizations of these data were prepared using Environmental Visualization System (EVS) software. Results of the MIP investigation were documented in the *MIP Investigation Report and Workplan for High Resolution Site Characterization* (HRSC Workplan, 2015). Figure 13 illustrates the lateral distribution of electron capture detector (ECD)[13] response in the vadose zone, and Figure 14 illustrates the lateral distribution of ECD response in the saturated zone. The highest ECD response in the vadose zone is observed in the vicinity of the southern source area and to a lesser degree in the vicinity of boring MIP-14 (yellow to red on Figure 14). By comparison, elevated responses in the unsaturated soil in the vicinity of the northern source are typically 5 to 10 times lower (light blue to green). The maximum observed ECD response below the water table is consistent with groundwater chemistry data collected at existing monitoring wells. Both data sets indicate that the areas of highest groundwater contamination have shifted to be downgradient of the soil source areas. This phenomena indicates that the soil sources, particularly in the south, have diminished significantly over time. The flux of clean groundwater from the west has "washed" residuals from the saturated zone beneath the source area. Further downgradient, without the benefit of clean water flushing the system, concentrations have persisted at higher concentrations. This data illustrates the natural degradation of the plume and does not inherently indicate that the groundwater plume is not stable.

In general, MIP response was much higher in the saturated zone, when compared to the vadose zone. Overall, MIP data indicate that the bulk of the on-site contaminant mass is present in groundwater.

5.3.3 HRSC – MIP Confirmation Sampling

MIP response data are semi-quantitative. MIP confirmation sampling was completed to develop a correlation between MIP response and VOC concentrations. To that end, confirmation sample locations and depth intervals were selected to target a broad range of ECD peak heights. Locations with high ECD response offer the most insight into an improved understanding of potential dense non-aqueous phase liquid (DNAPL) residuals. Therefore, the sample selection was biased to include a greater percentage of those peak locations. MIP confirmation sampling was completed at 24 locations as described in the HRSC Workplan to help correlate soil/groundwater concentrations with

[13] The MIP detector array included an ECD, a photoionization detector (PID), and a flame ionization detector (FID). ECD responds primarily to compounds with high chlorination status, e.g., parent products like tetrachloroethene (PCE), TCE and TCA. PID and FID respond to a broader range of constituents. Consequently, when evaluating MIP data, relative ECD response most accurately represents the concentration parent CVOCs.

MIP response. MIP confirmation sample locations were designated with an "SB" followed by the MIP boring number, e.g. SB-MIP-23 to distinguish between the original MIP boring and the confirmation boring. Soil and groundwater samples were collected at each confirmation boring location specified in the HRSC Workplan.

A summary of detected VOCs at soil sample locations, including MIP confirmation sample locations is provided in Table D1 of Appendix D. A summary of detected VOCs at on-site groundwater sample locations, including MIP confirmation sample locations, is provided in Table D2 of Appendix D. As described in the *2015 High Resolution Site Characterization Report and Updated Conceptual Site Model* (CSM Report), groundwater data were used to develop a correlation between ECD response and TCE concentrations in groundwater. Predicted TCE concentrations (based on the linear 90th percentile maximum value correlation) are provided in Table D3 of Appendix D. The correlation between ECD response and soil concentrations is poor. Consequently, these data were not used to assign concentration data to MIP locations where soil samples were not collected.

5.3.4 HRSC – Groundwater Sampling

As described in Section 5.5 below, extensive on-site and off-site groundwater investigation activities have been completed to characterize the nature and extent of COCs in groundwater. Groundwater chemistry data are summarized in Table D2 (on-site grab sample locations), Table D3 (correlated MIP results), Table D4 (perimeter and off-site grab sample locations), Table D5 (compliance monitoring well locations), and Table D6 (permeable reactive barrier monitoring well locations) of Appendix D.

These data were evaluated to correlate potential on-site source areas with areas of significant off-site groundwater migration. HRSC included tightly spaced MIP and/or vertical groundwater profile sampling along the downgradient perimeter of the Site, in order to verify that no additional sources of significance, beyond those identified during PSG and MIP investigation activities, are present on the Site. During these investigation activities, two areas with COC concentrations in groundwater above 1-percent of solubility were identified.

- Downgradient of the northern plume area, up to 12,000 micrograms per liter [µg/L] of TCE was identified in groundwater at boring location SB-MIP-57 (Figure 17). The lateral extent of TCE in this area is bounded to the west by MIP confirmation boring SB-MIP-55 and to the east by MIP boring MIP-63. Similar TCE concentrations in this area are observed up gradient (west-southwest) to soil boring SB-MIP-38 (up to 9,100 ug/L). Soil boring SB-MIP-38 is located in an area of relatively high PSG response (Figure 12). Concentrations exceeding 1-percent of solubility (11,000 ug/L) are not

vertically distributed, e.g. they were observed at only one depth interval at SB-MIP-57 (21-24'). Concentrations decrease rapidly with increased depth (4,000 ug/L from 24-27 feet and 2,400 ug/L from 27-30 feet). Consequently, slight differences in the sample depth interval, relative to the TCE source, likely account for the "lower" measured concentration in the source area at SB-MIP-38. However, during the December 8, 2015 Project Meeting with USEPA Region 5 postulated that groundwater concentrations at SB-MIP-57 were higher than those observed on-site due to a leaking storm sewer along Patterson Street. This theory was evaluated, and determined to be unlikely, as described in Subsection 5.3.5 below.

– Within the southern plume area, up to 15,000 µg/L of PCE was identified in groundwater at boring location B-81 (Figure 16). The lateral extent of PCE in this area is bounded to the north by groundwater profile sample location B-82 and to the south by groundwater profile sample location B-80. The PCE in this area was subsequently tracked up gradient (west) to a source area near soil boring B-100. This source area is beyond the historical use area investigated during PSG and MIP investigation activities. Nevertheless, through HRSC activities along the downgradient perimeter of the Site, TPC was able to identify and locate this source area. Source area delineation to support the development of recommended corrective measures was completed in December 2015, as described in Appendix C.

5.3.5 Evaluation of On-Site Storms Sewers as Potential Sources

As described in Section 4.3, storm water from the building and the limited paved areas around the perimeter of the building footprint is managed through an on-site storm sewer system. This storm water discharges to the City of Tecumseh storm sewer system at five locations: four along Patterson Street and one along South Maumee Street. The following provides multiple lines of evidence indicating that discharge of contaminants to these storm sewers is not a significant source of off-site contamination.

– In 2009 samples were collected directly from the storm sewer around the perimeter of the Site. Sample data are included in Table D7 of Appendix D and sample locations, designated STW-XX are illustrated on Figure 1. Concentrations were below all potentially applicable criteria at all locations except STW-2, where the vinyl chloride concentration was measured at 23 ug/L. This concentration is well below concentrations indicative of potential source areas. Nevertheless, follow-up sampling was performed and the detection was not confirmed in any of the four subsequent sampling events.

– Storm sewers typically exhibit open channel flow. Where storms sewers are below the water table, the hydraulic head of the groundwater is higher than the hydraulic head in the storm sewer. Therefore, groundwater may gravity flow into leaks in the storm sewer piping, but there is no physical force (e.g. pressure or gravity) to enable storm water to flow into the aquifer. Shallow groundwater along the eastern

perimeter of the Site (approximately 7 feet below ground surface [ft bgs]), relative to the depth of storm sewers located along South Maumee Street and the eastern portion of Patterson Street, results in the storm sewers being located below the water table. As noted above, concentrations observed in storm water are below risk-based criteria. Affected groundwater does not infiltrate the storm sewer system in sufficient quantity to impact storm water above risk-based criteria.

- In instances where storm sewers are above the water table (e.g. along the western portion of Patterson Street), storm water may gravity flow from leaks in the storm sewer piping to the surrounding vadose zone soils. Therefore this potential was evaluated further. The vast majority of on-site storm water discharged to the Patterson Street storm sewer is collected on the roof of the building. There is no reasonable mechanism for this storm water to be impacted by CVOCs. As illustrated on Figure 5, there are a limited number of catch basins located in the paved area around the perimeter of the building. There are no documented releases of TCE or other chlorinated solvents to these catch basins or the storm sewer system. The impact of a hypothetical discharge of TCE into one of these catch basins was calculated to determine whether discharge from the storm sewer to the underlying vadose zone soils could reasonably be an ongoing source to groundwater in the vicinity of soil boring SB-MIP-57.
    - Approximate volume of water discharged from the Site to Patterson Street storm sewer: 11 million gallons (42 million liters) per year
    - Assume proportional leakage rate is constant.
    - Assumed release date: 1960 (near the end of peak in commercial TCE use)
    - Volume of water discharged from Site to Patterson Street storm sewer since 1960: 600 million gallons (2.3 billion liters)
    - Maximum concentration observed in groundwater: 12,000 ug/L
    - Required mass of TCE released to be a source for the observed concentration (conservatively assuming constant discharge to the aquifer): greater than 27,600 kilograms (5,000 gallons of undiluted free product)
- Based on this evaluation, a historical release of more than 5,000 gallons of undiluted TCE into the storm sewer would be required for that release to be the current source of the TCE concentrations observed at SB-MIP-57. There is no basis to believe that past Site operations would have resulted in a release equivalent to one hundred 55-gallon drums of product.

5.3.6 Summary of Potential Source Areas

Based on the HRSC activities described above, 13 discrete areas were identified as potential source areas. These potential source areas include 11 areas of comparably high

passive soil gas response, 1 area of comparably high MIP response in the vadose zone, and 1 PCE source area delineated during investigation activities completed in December 2015. A comprehensive evaluation of PSG, MIP and soil data from each of these potential source areas was completed as described in Appendix E to assess the nature and extent of these potential source areas, including the following:

- An evaluation of whether elevated PSG response was due to soil and/or groundwater contamination;
- An assessment of the whether observed concentrations exceed, or are likely to exceed risk-based screening levels;
- An assessment of the lateral extent of contaminants, including whether additional investigation is merited to more precisely define the lateral extent of contamination above target concentrations (e.g., risk-based screening levels and/or site-specific remedial goals);
- An assessment of the vertical distribution of contaminants, including whether additional investigation is merited to more precisely define that distribution; and
- An assessment of the soil type in which contaminants are present.

The nature and extent of COCs in and around these areas as they pertain to soil and groundwater are described in detail in Sections 5.4 (soil) and 5.5 (groundwater) below.

5.4 Nature and Extent of COCs in Soil

The nature and extent of COCs in on-site soil is evaluated in the context of Part 201 risk-based screening levels for exposure to soil[14], specifically:

- Part 201 Non-Residential Direct Contact (DC) Criteria
- Part 201 Non-Residential Infinite Source Volatile Soil Inhalation (VSI) Criteria
- Part 201 Non-Residential VSI Criteria for a 5 meter source
- Part 201 Non-Residential VSI Criteria for a 2 meter source
- Part 201 Non-Residential Particulate Soil Inhalation (PSI) Criteria

Additionally, this section considers the extent of soils with concentrations exceeding Part 201 Non-Residential Soil Volatilization Indoor Air Inhalation (SVIAI) Criteria. Exceedences of these

[14] Groundwater protection criteria for soil (e.g. drinking water protection criteria and groundwater surface water interface protection criteria) represent the concentration at which concentrations in soil (under the right conditions) may leach to groundwater above the corresponding groundwater protection criteria. Exceedences of groundwater protection criteria are not risk-based criteria for human or ecological exposure to soil affected above those criteria, and as such are not considered in this discussion. The nature and extent of COCs in groundwater are discussed in Section 5.5.

criteria do not assess the risk associated with soil directly, but can be used to assess the area over which indoor air may be affected (Section 5.6).

Soil sample locations are illustrated on Figure 15, and soil data are compared to Part 201 Criteria in Table D1 of Appendix D. The large majority of soil samples were collected in and around suspected source areas, e.g. from beneath the building or in the immediate vicinity of the building. As such, sample data can reasonably be considered representative of worst-case site conditions. Most of these samples were collected from the vadose zone to define the nature and extent of COCs in soils. However, in some cases, soil samples were collected from the capillary fringe, the aquifer, or the underlying clay unit. These saturated soil samples are representative of groundwater condition and are not used to evaluate the nature and extent of COCs in soil. Saturated soil samples are shaded blue in Table D1, and were not considered in this evaluation of the nature and extent of COCs in soil.

5.4.1 Soil Affected above Soil Saturation Levels

As described above, a total of 13 potential on-site soil source areas were identified during HRSC investigation activities. A comprehensive evaluation of PSG, MIP and soil data from each of these potential source areas was completed as described in Appendix E to assess the nature and extent of these potential source areas. PCE is the only compound that has been detected above soil saturation levels (88 mg/kg). These concentrations of PCE were identified in the area designated as the "PCE source area" and is located near the southern perimeter of the Site, in the vicinity of soil boring B-100, as illustrated on Figure 15. An investigation of this area was conducted in December 2015. The findings of those investigation activities are provided in Appendix C.

5.4.2 Soil Affected above Risk-Based Screening Levels

As described above a total of 13 potential on-site soil source areas were identified during HRSC investigation activities. A comprehensive evaluation of PSG, MIP and soil data from each of these potential source areas was completed as described in Appendix E to assess the nature and extent of these potential source areas. Based on this assessment, six areas with soil impacted, or potentially impacted above VSI criteria for TCE were identified as illustrated on Figure 15. These areas were identified based on the following parameters:

- COC concentrations exceed one/or more risk-based screening levels; or
- PSG and/or MIP response was elevated.

All of these areas are all located below the concrete building slab/impermeable surfaces, and therefore will be subject to Institutional Controls as described later in this CMP.

Additionally, PCE exceeds VSI criteria in the PCE source area. No other compounds exceed VSI criteria. VOC concentrations have not exceeded non-residential DC or PSI criteria in any of the soil samples collected. However, as described in Appendix E, in some cases, soil data are insufficient to fully characterize the nature and extent of COCs in soil. Appendix E includes a scope of work to better characterize these areas. In the interim, as described in Section 7, the direct contact and inhalation of soil particulates migration pathways are considered potentially relevant.

5.4.3 Soil Affected above SVIAI Criteria

In general MIP data and soil concentration data indicate that the highest concentrations of COCs are present in the low permeability surficial silty/sandy clay that is present ranging from 0 to 8 ft bgs over much of the Site. TCE concentrations in the large majority of soil samples collected from this low permeability unit are above the non-residential SVIAI criterion. In practice, COCs concentrations are likely highest in this unit because they are relative immobile, and volatilize into adjacent soil gas much more slowly than VOCs in sand. SVIAI criteria were developed as a screening tool to be protective of reasonable worst-case vadose zone conditions, and are likely very conservative when applied to low permeability soils. Nevertheless, TCE concentrations above SVIAI criteria are widespread, and potential future property development at the Site may result in the relocation of some of these soils. The potential exposure risk associated with these exceedences is addressed through the New Declaration, discussed in the CMP.

TCE concentrations above SVIAI criteria persist through the sandy portion of the vadose zone in the vicinity of the former chemical stockroom (SB-MIP-40) in the north and in the vicinity of the former distillation solvent recovery system in the south (SB-MIP-03) and beyond (SB-MIP-01, SB-MIP-05, SB-MIP-60), and corrective measures with respect to this soil may include remediation and addition to ICs, as discussed in Section 10

5.4.4 Other On-Site Soils

As described above, soil investigation activities have focused on defining the nature and extent of potential soil source areas. Consequently, the large majority of soil samples have been collected from beneath the building or in the immediate vicinity of the building. These sample data can reasonably be considered representative of worst-case conditions. Based on the limited extent of soils affected above applicable risk-based screening levels in these potential soil source areas, it is unlikely that other on-site soils, beyond the areas of historic solvent use are impacted above risk-based screening levels. However, during a conference call in December 2015 regarding the risk assessment, USEPA requested that additional soil sampling be performed to establish baseline

surface and sub-surface soil conditions in the area beyond the area of historic solvent use for purposes of risk assessment. Appendix E includes a scope of work to address this comment.

5.4.5 Off-Site Soils

Based on recent comments from USEPA, TPC was requested to evaluate the potential for off-site soil contamination resulting from releases of hazardous waste or constituents by TPC. TRC performed a review of the existing data to determine if data supported the conclusion that off-site soils are impacted above risk-based screening levels for soil. Based on this review, there is no reasonable transport mechanism by which off-site soils (excluding those below the water table and within the capillary fringe) could be affected by source area soil and groundwater contamination above appropriate risk-based screening levels. Therefore, proposed remedial investigation activities do not include the collection of off-site soils for VOCs analysis. This assessment considered the following potential transport mechanisms:

- Dispersion through ambient air: This transport mechanism is the most common means by which off-site soils are affected. However, the COCs are volatile. Metals and other non-volatile COCs which may persist and sorb to soil particulates may be disbursed by ambient air. However, the lateral transport of volatiles in air (which are not absorbed to soil particles) toward and over off-site properties, and downward deposition of these airborne volatiles back into off-site soils is highly unlikely and physically improbable (due to the volatile nature of the COCs). Therefore, off-site migration of on-site soil COCs into off-site soils is not a reasonable or significant transport mechanism.
- Transport of contaminants through storm sewer and subsequent storm sewer leakage: This transport mechanism was considered and determined to be insignificant as discussed in Sub-Section 5.3.5.
- Erosion of affected surface soils: The on-site soil evaluation indicates that only TCE and PCE areas are impacted above risk-based screening levels for soil. PCE concentrations in surface soil are not impacted above risk-based screening levels. Therefore there is no potential the erosion of PCE affected soil above risk-based screening levels onto adjacent properties. TCE exceedences of risk-based screening levels are all beneath the building slab, which prevents erosion. Moreover, if surface soils were impacted by VOCs above risk based criteria, the erosion process itself, would likely result in volatilization to ambient air, rather than significant lateral transport to off-site soils.

5.5 Nature and Extent of COCs in Groundwater

5.5.1 3D Visual Modeling of Groundwater Data

Chemistry data for the project are managed in a Microsoft™ Access database. This database was updated to include groundwater chemistry data collected during 2015 HRSC investigation activities and estimated groundwater concentrations predicted from MIP response data. This database was used to prepare model input files for EVS Software. EVS is a dynamic modeling tool that provides 3-D visualization of chemistry and geologic data to support groundwater studies and corrective measures. Based on preliminary review of groundwater chemistry data, chlorinated ethenes were targeted for further data evaluation, specifically PCE, TCE, cis-DCE and vinyl chloride. Although other VOCs are detected in groundwater, these compounds represent the bulk of the contaminant mass.[15] Moreover, risk values associated with these compounds, particularly TCE and vinyl chloride, are expected to drive decision making related to final corrective measures. As such, EVS input files including survey data, sample location data, groundwater elevation data, groundwater chemistry data were prepared to support 3-D visual modeling.

Using these input files, the EVS Software was used to interpolate between data points (i.e., Krig data)[16]. Specifically, chemistry data for each compound were Kriged to create 3-D visualizations of the contaminate body.

For each compound, isovolumes (3-D visualizations of the plume above a specific concentration value) were prepared for applicable Michigan 201 criteria (e.g., drinking water and groundwater-surface water interface criteria). Additionally, isovolumes were prepared for a high intermediate concentration to better visualize the core of the most affected area. For PCE, TCE, and cis-DCE a concentration of 2,000 μg/L was used, and for vinyl chloride a concentration of 200 μg/L was used. For TCE and vinyl chloride, an additional high-high concentration was selected corresponding to concentrations potentially relevant to risk assessment and final corrective measures (1 percent of solubility for TCE [11,000 μg/L] and the Michigan Part 201 groundwater contact criterion for vinyl chloride [1,000 μg/L]). After Kriging was complete, isovolumes were cut along

---

[15] The lateral distribution of other VOCs is very limited, and well within that extent of chlorinated ethenes.

[16] Kriging or Gaussian process regression is a method of interpolation that, under suitable assumptions, can provide linear unbiased predictions of intermediate values between data points. As with all modeling software, data interpolation is affected by boundary conditions. Poorly defined conditions along the perimeter of the modeled area may cause anomalies in the interpolated data in those areas.

the Kriged water table surface.[17] These isovolumes were used to prepare output files to support the preparation of isoconcentration maps. The lateral distribution of PCE is illustrated on Figure 16. The lateral distribution of TCE is illustrated on Figure 17. The lateral distribution of cis-DCE is illustrated on Figure 18, and the lateral distribution of vinyl chloride is illustrated on Figure 19.[18]

Isovolumes were also prepared for total chlorinated ethenes. These output files were used to prepare a figure illustrating the lateral distribution total chlorinated ethenes (Figure 20). Additionally, these output files were used to add chemistry data to the cross sections. Figure 7 is the cross section location map. Figure 8 includes Cross Sections A-A′ and B-B′, and Figure 9 includes Cross Sections C-C′ and D-D′. Cross Section A-A′ extends from the northern portion of the Site, in the direction of groundwater flow through the area of most highly impacted groundwater in the northeast. Cross Section B-B′ extends from west to east along the northern, downgradient perimeter of the Site. Cross Section C-C′ extends from the southern portion of the Site, in the direction of groundwater flow through the area of most highly impacted groundwater in the south. Cross Section D-D′ extends from north to south along the eastern, downgradient perimeter of the Site.

The lateral distributions of each individual compound were combined to prepare a series of figures to support pathway evaluation and risk assessment:

- Figure 21 illustrates the lateral extent of VOCs above Michigan 201 criteria (e.g., drinking water and groundwater-surface water interface criteria);
- Figure 22 illustrates the lateral extent of VOCs above Michigan residential groundwater screening levels for vapor intrusion (GWSLs) in shallow groundwater; and
- Figure 23 illustrates the lateral extent of VOCs above Michigan non-residential GWSLs in shallow groundwater.

Industrial solvents composed largely of TCE, such as those used for machining and degreasing operations, were used in the building. Two general areas of relatively high TCE concentrations were identified prior to 2015 – the northern source area and the southern source area. Groundwater chemistry data are summarized in Table D2 (on-site

[17] Kriging is a three dimensional process. The EVS Software does not readily account for physical constraints (e.g., the water table) and processes (e.g., groundwater flow direction) when interpolating between data points.

[18] This modeling process incorporated all data collected through the third quarter 2015. Minor modifications to these figures were made in January 2016 to reflect data collected during PCE source and GSI investigation activities completed in November-December 2015.

sample locations), Table D3 (correlated MIP results), Table D4 (perimeter and off-site sample locations), Table D5 (compliance monitoring well locations), and Table D6 (permeable reactive barrier monitoring well locations) of Appendix D.

5.5.2 Northern Source Area and Associated Downgradient Plume

The northern source area was the primary area used for machining and degreasing activities prior to the mid-1900s, when TCE was commonly used as a solvent. This area includes a former chemical stockroom from which chemicals (including TCE-based solvents) were distributed for use in machining processes. No single significant source has been identified in this area, rather the bulk of contamination appears to be due to incidental use and spillage during regular operations. Chemical use and incidental spillage in this area was not restricted to TCE. The co-deposition of other carbon-rich compounds (e.g. cutting oils, etc.) has provided a food source which supports reductive dechlorination. COCs associated with the northern source area extend to the northeast in the direction of groundwater flow. The presence of degradation products (cis-DCE and vinyl chloride) on-site and downgradient are indicative of robust reductive dechlorination throughout this area. As described above, a number of figures were prepared to illustrate the nature and extent of CVOCs in groundwater. Significant characteristics of the northern source area and associated groundwater plume are outlined below.

- Robust reductive dechlorination is observed through the northern contaminant plume. The highest concentrations of the parent product (TCE) are observed on-site and along the northern perimeter of the Site (Figure 17). Along the downgradient perimeter of the Site (Patterson Street), the bulk of the contaminant mass is TCE and to a lesser degree cis-DCE (Figures 17 and 18). Along Cummins Street the bulk of the contaminant plume is composed of cis-DCE, and to a lesser degree TCE and vinyl chloride (Figures 17, 18 and 19). Along Maumee Street, north of Cummins Street, the bulk of the contaminant mass is present as vinyl chloride with only low level detections of cis-DCE (Figures 18 and 19). Further downgradient along Wyandotte Street and beyond, only vinyl chloride is detected (Figure 19).
- The bulk of the on-site contaminant mass is present as TCE. Although PCE is also a potential parent product, PCE is detected only in isolated areas at relatively low concentrations (up to 30 μg/L) (Figure 16).
- PCE was detected at a concentration of 11 μg/L in the sample collected at the water table from soil boring B-85, located 1,800 feet northeast of the Site. PCE was NOT detected at any soil boring locations north of the Patterson Street right-of-way between the Site and the northern source area. As documented in the July 31, 2015 *Supplement to Remedial Investigation and Environmental Indicator Report*, this PCE may

be attributed to a former dry cleaner located along East Chicago Boulevard, west of soil boring B-85 (Figure 16).

- The lateral distribution of TCE is illustrated on Figure 17. The highest concentration of TCE (12,000 μg/L) was observed at SB-MIP-57 from 21 to 24 ft bgs (771 to 768 feet mean sea level [ft MSL]) approximately 6 feet below the water table. This is the only sample in which TCE was detected above 1-percent of solubility (11,000 μg/L). Based on feedback from USEPA, TPC has proposed the installation of two additional HRSC groundwater profile sampling locations downgradient of SB-MIP-57 along the centerline of the plume to better define the downgradient extent of TCE above 1-percent of solubility. A workplan for proposed supplemental groundwater profile sampling is included as Appendix F.
- Elevated TCE concentrations can be tracked from SB-MIP-57 up gradient to SB-MIP-38 (up to 9,100 μg/L TCE).
- On-site TCE concentrations are typically highest in the upper portion of the aquifer (2 to 12 feet below the water table).
- In the lower half of the aquifer, concentrations typically decrease with depth on-site.
- Concentrations at depth are not indicative of residual DNAPL.
- In the vicinity of the former chemical stockroom (SB-MIP-40, SB-MIP-41, SB-MIP-44) concentrations of TCE are comparably low (<1,000 μg/L) and degradation products make up a greater portion of the contaminant mass.
- As described in Section 4, geology, particularly relative highs in the underlying clay surface elevation and the presence of an intermediate clay layer, restricts groundwater flow in the easterly direction from the northern source area. Both groundwater chemistry data and groundwater elevation data (from previously installed monitoring wells) indicate that groundwater flow from the northern portion of the Site is to the north-northeast from Patterson Street to Maumee Street. Beyond Maumee Street (south of Pottawatamie Street) flow is redirected to the east, following the path of least resistance to the River Raisin.
- The highest concentrations of cis-DCE (Figure 18) extend downgradient to Cummins Street from the area of highest TCE contamination (Figure 17).
- The highest concentrations of vinyl chloride (Figure 19) extend downgradient from the downgradient edge of highest concentrations of cis-DCE (Figure 18) near the corner of Cummins Street and Maumee Street downgradient to the corner of Maumee Street and Kilbuck Street.
- Downgradient of the Site, the highest concentrations of COCs are typically below the water table.

- The lateral distribution of the total contaminant plume is illustrated on Figure 20. Through dispersion and degradation, the contaminant mass is depleted downgradient of the Site.
- Concentrations of COCs do not exceed drinking water criteria beyond the limits of the area of the Groundwater Ordinance which prohibits potable water wells in the area shown on Figure 21.
- Concentrations of COCs do not exceed GSI criteria adjacent to the River Raisin in the associated surface water features (Figure 21).
- Concentrations of COCs in shallow groundwater exceed MDEQ GWSLs in the northern source area and north-northeast to Cummins Street as illustrated on Figures 22 and 23.
- At soil borings B-71 (23.5-29.5 ft bgs), B-72 (22.5-34.5 ft bgs), and B-73 (26-29 ft bgs) vinyl chloride concentrations exceed the groundwater contact criterion (1,000 μg/L) (Figure 19). The depth of these exceedences is well below the depths at which a typical utility or construction worker is expected to be exposed to groundwater.

5.5.3 Southern Source Area and Associated Downgradient Plume

The previously defined southern source area is located in the vicinity of a former distillation solvent recovery system. Despite the presence of a likely source, PSG survey results indicate that at least a portion of the contaminant mass in this area is due to incidental use and spillage beyond the immediate vicinity of the distillation system. Unlike the northern portion of the Site, the southern source area is not characterized by the co-deposition of other carbon-rich compounds. COCs associated with the southern source area extend to the east in the direction of groundwater flow. Due to the absence of other carbon-rich compounds, reductive dechlorination is less robust than in the northern areas of the Site, and TCE persists in groundwater downgradient of the Site (approximately 1,800 ft). In 2011, a permeable reactive barrier (PRB) was installed along the Site perimeter downgradient of the southern source area to facilitate reductive dechlorination. The organic substrate in the PRB was successful in creating reducing conditions within the PRB and downgradient of the PRB, indicating the presence of reducing bacteria essential for reductive dechlorination are present.

As described above, a number of figures were prepared to illustrate the nature and extent of CVOCs in groundwater. Significant characteristics of the southern source area and associated groundwater plume are outlined below.

- The bulk of the contaminant mass beneath the building footprint is present as TCE. Within the building footprint, PCE is detected only in isolated areas at relatively low concentrations (up to 120 μg/L) (Figure 16).

- The 2015 HRSC investigation identified a PCE source area within the previously documented area of affected groundwater near the southern perimeter of the Site. At soil boring B-100, PCE concentrations as high as 32,000 μg/L were measured. As illustrated on Figure 16, PCE concentrations decrease rapidly side gradient (north/south) and up gradient (west) of boring location B-100. As described in Appendix C, a PCE source investigation was completed to support the development of recommended final corrective measures in this area.
- As indicated by elevated PCE concentrations at boring location B-81, groundwater downgradient of this area has been affected. PCE concentrations in the PCE source area and beyond to soil boring B-81 exceed 1-percent of solubility (2,000 μg/L). Based on feedback from USEPA, TPC has proposed the installation of six additional HRSC groundwater profile sampling locations downgradient of B-81 to better define the downgradient extent of PCE above 1-percent of solubility. A workplan for the proposed supplemental groundwater profile sampling is included as Appendix F.
- PCE is degraded to TCE, cis-DCE and vinyl chloride. The highest concentrations of TCE in the southern plume (8,900 μg/L) are observed at soil boring B-81 downgradient of the PCE source area. Further downgradient along Mohawk Street and beyond, PCE has not been detected.
- With the exception of the PCE source area described above, HRSC investigation activities have not identified a significant source area outside the building footprint.
- TCE concentrations beneath the building footprint indicate that concentrations in the TCE source area are stable or decreasing as the residual mass is depleted. TCE concentrations increase in the downgradient direction from soil boring B-90 (up to 2,400 μg/L), to monitoring well MW-35I (up to 5,100 μg/L) to soil boring SB-MIP-49 (up to 5,400 μg/L). These data show that although the up gradient source of TCE may be somewhat depleted, TCE persists beyond this source area (Figure 17).
- TCE concentrations on-site are typically highest in the upper portion of the aquifer from the water table to approximately 12 feet below the water table. A second, lower, peak in TCE concentrations is observed in the deep intermediate aquifer at several locations (B-90, SB-MIP-23 and SB-MIP-30).
- In the lower half of the aquifer, concentrations typically decrease in proximity to the underlying clay. TCE is detected in the underlying clay at soil borings SB-MIP-03 and SB-MIP-25. Diffusion from the clay to the overlying groundwater results in a modest increase in TCE concentrations (up to 240 μg/L) immediately above the clay at these locations. On-site, the highest concentration of TCE at the underlying clay surface was observed at soil boring B-90 (1,500 μg/L).
- Concentrations at depth are not indicative of residual DNAPL.
- The relative high in the underlying clay surface elevation between monitoring wells MW-35i/d and soil boring SB-MIP-48, in conjunction with the relative low in the clay

surface elevation between soil boring B-79 and B-80, likely affects the lateral distribution of TCE at depth, diverting flow slightly to the south.

- The PRB along Maumee Street has significantly reduced the mass of TCE migrating off-site in the shallow aquifer. Downgradient of the PCE source (near soil boring B-81) the effect of the PRB is apparent in the quantity of PCE degradation products when compared to water chemistry data at soil boring B-100. However, because the PRB was not designed to manage such high influent concentrations, reductive dechlorination is not complete.
- Downgradient of the Site, the groundwater plume flows west to east toward the River Raisin. Site geology and hydrogeology serve to limit the lateral dispersion of COCs. In fact, the plume actually narrows towards the River Raisin due to the higher conductive sand and gravel deposits. Along Mohawk Street, concentrations of TCE above 1,000 µg/L are observed at monitoring well MW-21 and soil borings B-86 and B-87. The highest concentrations are observed at B-86 (2,800 µg/L), yet approximately 200 feet to the south at monitoring well MW-14D and soil boring B-103 no COCs are detected.
- The highest concentrations of TCE essentially follow a straight line path from the PCE source area (B-100) through soil borings B-81 (8,900 µg/L) and B-86 (2,800 µg/L) to soil boring B-108 (1,200 µg/L).
- As illustrated on Figure 18, relatively low concentrations of cis-DCE are observed in the vicinity of the TCE source area. In this area, cis-DCE is present primarily in the deep aquifer where naturally reductive conditions (low dissolved oxygen) facilitate reductive dechlorination. Elevated concentrations of cis-DCE are also present in the shallow aquifer in the vicinity of the PCE source area and the associated contaminant plume.
- The highest concentrations of cis-DCE at depth are observed at soil boring B-80 (up to 3,000 µg/L). These concentrations likely correspond to the depleted TCE source observed at soil borings SB-MIP-03 and SB-MIP-25 as described above.
- The increase in the cis-DCE concentration from soil boring B-86 to soil boring B-108 indicates that far downgradient of the Site, reductive dechlorination is occurring and the total contaminant mass is being reduced.
- As illustrated on Figure 19, relatively low concentrations of vinyl chloride are observed in the vicinity of the TCE source area. In this area, vinyl chloride is present primarily in the deep aquifer where naturally reductive conditions (low dissolved oxygen) facilitate reductive dechlorination. Relatively higher concentrations of vinyl chloride are present in the shallow aquifer in the vicinity of PCE source and the associated contaminant plume.

- The lateral distribution of the total contaminant plume is illustrated on Figure 20. Dispersion and degradation of the contaminant mass is limited downgradient of the site.
- Concentrations of COCs do not exceed drinking water criteria beyond the limits of the area of the Groundwater Ordinance as shown on Figure 21.
- Concentrations of COCs exceed generic GSI criteria at three locations (soil borings B-108, B-113 and B-114) along the up gradient perimeter of the wetland area adjacent to the River Raisin (Figure 21).
- Concentrations of COCs in shallow groundwater exceed MDEQ GWSLs throughout the southern source area and east to soil boring B-108, as illustrated on Figures 22 and 23.
- Groundwater concentrations in and downgradient of the PCE source area exceed the groundwater contact criterion for PCE (12,000 µg/L) and vinyl chloride (1,000 µg/L) (Figure 21).

5.6 Nature and Extent of COCs in Soil Gas and Indoor Air

5.6.1 Evaluation of On-Site Sub-Slab Soil Gas Data

Sub-slab soil gas concentrations were evaluated at 18 sample locations within the main manufacturing building. Sample locations are designated SV-XX, where XX is the sample location number, as shown on Figure 5. Sample results are summarized in Table D8 of Appendix D. Concentrations of PCE, TCE, TCA, 1,1-dichloroethane (1,1-DCA) and 1,2-dichloroethane (1,2-DCA) were detected above MDEQ sub-slab non-residential soil gas screening levels (SGSLs). TCE was detected above sub-slab non-residential SGSLs at all sample locations except SV-05. SV-05 is located in Area H which has been used historically as office and research space (Figure 2). The maximum TCE concentration measured in sub-slab soil gas was 118,000 parts per billion by volume (ppbv) compared to a non-residential sub-slab SGSL of 210 ppbv. These data indicated that the on-site volatilization to indoor air migration pathway was likely complete, prompting an evaluation of CVOCs in indoor air as described below.

5.6.2 VOCs in On-Site Indoor Air

Given the elevated concentrations of COCs in soil (Section 5.4), groundwater (5.5) and sub-slab soil gas, indoor air samples were collected to evaluate risk directly. Sample locations are designated IA-XX, where XX is the sample location number, as shown on Figure 5. Indoor sample results are provided in Table D9 of Appendix D (Note: Samples dated February 2, 2010 were collected during a ventilation test. Sample conditions are not representative of current stagnant indoor air conditions). The

following provides an assessment of indoor air concentrations relative to indoor air screening levels:

- No CVOCs are present at a concentration greater than 1-percent of their respective United States Department of Labor, Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs).
- TCE was detected above the long-term non-residential indoor air criterion (1.5 ppbv). The highest detected concentration of TCE in indoor air was 19.8 ppbv (IA-02).
- 1,1-DCA was detected above the non-residential indoor air criterion (1.2 ppbv) at one sample location (IA-15, 1.5 ppbv).

On-site indoor air sampling was completed in 2010, when reuse of the entire manufacturing facility was expected. Since that time a portion of the building has been demolished and a large percentage of the remaining structure is derelict with broken windows and crumbling support columns and walls. Since indoor air sampling was completed, natural ventilation through much of the building has increased substantially. Additionally, as described in Section 6, a soil vapor extraction (SVE) system was installed beneath P-Building in 2012 to mitigate the potential for migration of affected soil gas into indoor air. Consequently current indoor air concentrations are likely lower than those tabulated in Table D9. Because the Site is currently unoccupied and future use is uncertain, indoor air sampling has not been completed.

5.6.3 Summary of Perimeter and Off-Site Soil Gas Investigation Activities

Concentrations of CVOCs in perimeter and off-site groundwater have exceeded applicable risk-based screening levels for vapor intrusion. These exceedences prompted further evaluation of the volatilization to indoor air migration pathway. Soil gas concentrations have been evaluated at 26 perimeter and off-site soil gas sample locations. Sample results are provided in Table D10 of Appendix D, and summarized on Figures 22 and 23. Overall, the extent of CVOCs above SGSLs closely mirrors the extent of VOCs in shallow groundwater above GWSLs. However, as documented previously, and confirmed during 2015 HRSC investigation activities, laterally contiguous low permeability soil and perched water provide a physical barrier to vapor intrusion in the northeast. Shallow groundwater concentrations at soil boing B-75 exceed both residential and non-residential GWSLs. However, soil gas concentrations measured at soil gas sample point SG-11, where this low permeability soil and perched water have depth of approximately 8 feet, have consistently been below both residential and non-residential SGSLs for 16 consecutive sampling events.

5.6.4 VOCs in Off-Site Indoor Air

5.6.4.1 Residential Properties

Indoor air sampling and/or installation of a sub-slab depressurization ventilation (SSDV) system has been completed at all of the houses located within 100 feet of shallow groundwater above residential GWSLs as illustrated on Figure 22. With the exception of the two houses located at the northwest corner of Cummins Street and South Maumee Street (shaded purple on Figure 22) where geologic and soil gas data both indicate the vapor intrusion pathway is effectively controlled by low permeability soil and perched water in the vadose zone. Properties where a SSDV system has been installed are shaded green on Figure 22. Properties where indoor air sampling was completed, but a SSDV system has not been installed are shaded orange on Figure 22. Indoor air, crawl space and soil gas concentration data collected at these properties are tabulated in Appendix G. No COCs have been detected above residential indoor air criteria at any of these houses. If a SSDV system has not been installed, TPC has proposed a total of three indoor air sampling events at each property to assess temporal variability and confirm sampling data. Three sampling events were completed at each of the houses east of the Site. The second sampling event was completed at properties west and north of the Site in January 2016. These data are included in Appendix G. As appropriate this evaluation will be updated when the third sampling event has been completed.

Additionally, TRC used the GSI Environmental Risk-Based Corrective Action (RBCA) Toolkit vapor intrusion modeling to calculate site-specific groundwater cleanup levels protective of the residential and non-residential pathway. These cleanup levels will ensure that indoor air in new residential structures is not adversely impacted by releases emanating from the Site. At properties where a SSDV system has been installed, indoor air concentrations are not reasonably expected to exceed indoor air criteria, regardless of the continued operation of the SSDV system, once the groundwater cleanup levels are at the appropriate point of compliance. These calculations are included in Appendix H, and cleanup levels are described in detail in Section 8.

USEPA has requested further verification that the extent of shallow groundwater above residential GWSLs, as illustrated on Figure 22, is accurately represented between Cummins Street and South Maumee Street. TPC has initiated communications with the owner of the Parcel 305-2170-00. If access is granted, a shallow monitoring well and soil gas sample point will be installed

along the northern perimeter of this property. Data from those sampling locations will be used to further evaluate the lateral extent of shallow groundwater above residential GWSLs.

5.6.4.2 Non-Residential Properties

Figure 23 illustrates the lateral extent shallow groundwater above non-residential GWSLs. Aerial imagery and property-specific information were used to determine the location of non-residential buildings within the area over which non-residential GWSLs are exceeded in shallow groundwater. Figure 23 also illustrates the approximate building footprint of non-residential structures within or near that area. Each non-residential property is assigned a map number for reference purposes. A brief description of each property, including current land use is provided in Table H1 of Appendix H. A total of 12 occupied (or potentially occupied) non-residential buildings are located within the area of concern. The building on Property 1, was identified as the building having the highest potential risk. A property-specific soil gas attenuation factor was calculated for this property, and indoor air sampling was completed to verify these calculations. Appendix I includes these calculations, as well as tabulated indoor air data. Indoor air is not impacted above applicable indoor air criteria at this location.

For the remaining occupied buildings within the affected area, TRC used GSI RBCA Toolkit vapor intrusion modeling to predict indoor air concentrations for each of these buildings. This modeling, including property-specific input parameters, is documented in Appendix H. Calculated indoor air concentrations are provided in Table H3. All of the calculated indoor air concentrations are below applicable indoor air criteria.

Additionally, GSI RBCA Toolkit vapor intrusion modeling was used calculate cleanup levels for groundwater at off-site non-residential properties protective of the vapor intrusion pathway. These cleanup levels were calculated to ensure that indoor air concentrations in reasonable, worst-case, new non-residential structures are acceptable with respect to releases from the Site. These calculations are documented in Appendix H, and summarized in Table H4. Cleanup levels are described in detail in Section 8.

5.6.5 Evaluation of Utility Corridors as Potential Preferential Pathways

As requested by USEPA, a figure illustrating major underground utilities in the area near the Site was prepared. This figure was provided to USEPA on August 24, 2012.

Figure 6 illustrates the approximate locations of sanitary sewer lines, storm sewers, and water lines. Figure 6 was developed from utility maps provided by the City of Tecumseh. Manhole depths were compared to boring logs from TPC investigation activities (specifically measured depth to groundwater) to determine which portions of these utilities are below the water table. Blue highlighting is used to identify the submerged portions of the major utilities. In general, utility corridors are saturated in the area with perched water and the area where the true water table is at or near the bottom of an overlying clay unit (Figure 6). Saturated utility corridors are NOT a potential lateral migration pathway for affected soil gas.

In most cases, city utilities were installed as the city developed. As such, the majority of these utilities were installed more than 50 years ago. Given their age, TRC expects that these utilities were typically bedded and backfilled with soil from the native sand and gravel unit. Because backfill material is likely dominated by native materials which have had years to settle and compact, even unsaturated utility corridors in the vicinity of the Site are unlikely to be significant lateral migration pathways for affected soil gas.

Other underground utilities (fiber optic, cable and gas lines) are also present in the vicinity of the Site. However, those utilities are smaller and are typically installed at depths less than 5 feet. Because of their shallow depth, other underground utilities are expected to be unsaturated and significantly influenced by ambient air. Because of their relative connectedness to ambient air and their smaller size, other underground utilities are not expected to be significant lateral migration pathways for affected soil gas.

5.7 Nature and Extent of COCs in Ambient Air

Prior to September 2011, concentrations of VOCs in outdoor ambient air had not been measured directly. However, indoor air concentrations were measured above the source areas. The highest measured indoor air concentration of TCE at the Site was 19.8 ppbv, compared to an indoor air criterion of 0.37 ppbv. The highest detected concentration of 1,2-DCA in indoor air was 1.5 ppbv, compared to an indoor air criterion of 0.24 ppbv. Source area indoor air concentrations are expected to be diluted significantly as VOCs migrate outdoors. Therefore, TRC determined that outdoor air is not expected to be affected above background ambient air concentrations and risk-based screening levels (TRC, 2011).

USEPA did not indicate any concerns with the September 2011 evaluation of human exposure to outdoor air. In 2012, a SVE system was installed in the vicinity of the northern source area. During the March 2012 project meeting, USEPA did express concern that exhaust from the SVE system could have a negative impact on ambient air quality. Therefore, TRC collected an ambient air sample downwind of the SVE system exhaust following completion of the full-scale SVE system installation. As documented in the February 2013, *Full-Scale Soil Vapor Extraction*

System Construction Documentation Report, no CVOCs were detected in the ambient air sample (Table D11 of Appendix D).

In 2015, USEPA expressed concern that the discharge from sub-slab depressurization/ventilation (SSDV) systems installed at residential properties within the area of affected groundwater had the potential to discharge unacceptable concentrations of CVOCs to ambient air. When compared to regulated air emissions, the flow rate for these SSDV systems is very small. Nevertheless, TRC used concentrations from nearby soil gas points to calculate ambient air concentrations downwind of these systems. These calculations indicate that emissions of CVOCs from SSDV systems do not pose an unacceptable risk to human health. The calculation package is included as Appendix J.

5.8 Nature and Extent of COCs in Surface Water

There are no surface water bodies located at the Site. The nearest surface water body is the River Raisin which is located approximately 1,500 to 2,500 feet downgradient of the Site. The River Raisin and associated wetland area is a regional discharge feature. There are two potential mechanisms for VOCs migrating from the Site to reach the River Raisin:

- The storm sewer along the perimeter of the Site discharges at storm water sample location STW-01 (Figure 6) into the river basin; and
- The River Raisin is a regional discharge feature for the groundwater beneath the Site as illustrated on Cross Section D-D' (Figure 9).

Storm water samples were collected from around the Site. Sample results are presented in Table D7 of Appendix D; sample locations are shown on Figure 1. The concentration of vinyl chloride at storm sewer sample location STW-02 on April 13, 2009 (23 ug/L) was above the GSI criterion (13 ug/L) and the Rule 57 human non-cancer value (HCV) (13 ug/L). Four subsequent sample events at this location have not confirmed this exceedence, nor were any VOCs detected above screening levels at the storm water discharge point (STW-01) during any of six sample events. Surface water is not affected above risk-based screening levels due to storm water discharge.

Surface water concentrations have been measured directly in the wetland area east of monitoring well MW-22, at sample location WL-01, and at a seep located adjacent to the former Blood Road Bridge (SEEP). No VOCs have been detected at these locations (Table D12 of Appendix D).

Generic GSI criteria are exceeded in groundwater, indicating that groundwater has the potential to vent to the River Raisin and the associated wetland area above risk-based screening levels. The extent of VOCs above generic GSI criteria is illustrated on Figure 21.

In 2015, supplemental GSI investigation activities were initiated to evaluate groundwater concentrations along the up gradient perimeter of the wetland area. Appendix B summarizes the results of these investigation activities and provides a workplan for additional investigation activities. Notably:

- GSI investigation results indicate that groundwater concentrations exceed generic GSI criteria at the wetland boundary, but concentrations remain below surface water standards and estimated mixing zone based GSI criteria previously calculated by TRC (TRC 2013c). Use of site-specific mixing zone-based GSI criteria is a viable approach to demonstrate GSI pathway compliance for groundwater with the potential to vent to the River Raisin.
- Groundwater concentrations exceed generic GSI criteria at three locations along the up gradient perimeter of the wetland (B-108, B-113 and B-114). These samples were collected several feet below ground surface. Based on feedback from MDEQ, the point of GSI compliance for the wetland is the near surface pore water. Demonstration of compliance using pore water samples at the wetland GSI has a high probability of success given that groundwater flow is expected to preferentially flow toward the river, and, for groundwater that does manage to discharge to the wetland, the three feet of peat and organic-rich soil are expected to significantly reduce the VOCs in groundwater through anaerobic degradation prior to venting (Waldron 2007). Appendix B includes a sampling plan that will be implemented to evaluate pore water concentrations at the point of compliance in this area.

Section 6
Interim Corrective Measures

During the performance of environmental work at the former Tecumseh Products Company (TPC) property ("Site"), certain interim corrective measures were performed prior to the preparation of this Final Corrective Measures Proposal. Additional information related to these interim measures can be found in the Current Human Exposures Under Control Environmental Indicator Report (2011 EI Report), the Remedial Investigation Report and Groundwater Environmental Indicator (2012 RI/EI Report), and the Supplement to the Current Human Exposures Under Control Environmental Indicator Report (2013 Supplemental EI Report).

6.1 Existing Declaration and License Agreement

Concurrently with TPC's sale of the property in 2009, a Declaration of Environmental Restrictive Covenants was recorded with the Lenawee County Register of Deeds on January 14, 2010, at Liber 2396, Page 0535 ("Existing Declaration"), included in Appendix K. TPC and the purchaser also signed a License Agreement Regarding Environmental Work, dated December 18, 2009 ("License Agreement"), included in Appendix K. Paragraph 16 of the License Agreement provides: "All of the rights, responsibilities, terms, and provisions of this License Agreement shall be binding upon the parties, their successors and assigns, and shall inure to the benefit of their successors and assigns. Grantor shall not convey any interest in the Property to any other party without requiring that party to accept in writing and be subject to the terms of this License Agreement so long as it remains effective."

Paragraph 7 of the Agreed Order on Consent (AOC), referring to these two documents, states: "Collectively, these documents which have been provided to the U.S. EPA ensure that, despite the transfer, all institutional controls required now or in the future for the facility will be implemented and maintained."

Concurrently with the sale of the property by Tecumseh Bakery, LLC to Tecumseh Food, Machinery & Engineering, LLC (TFME), those parties entered into an Assignment and Assumption of Lease and License, dated February 3, 2012, and an Acknowledgment and Acceptance of the Terms of the License Agreement Regarding Environmental Work, dated January 16, 2012, copies of which are included in Appendix K.

The Existing Declaration for the property ensures that all on-site exposures are non-residential. Additionally, the Existing Declaration ensures that future site operations, through the prohibition of on-site supply and injection wells, do not impact the groundwater flow regime in a manner that could potentially exacerbate the migration of contaminants. The License

Agreement, discussed above, also ensures site owner cooperation with TPC for the completion of the environmental work, and allows for additional restrictions to be applied, specifically via the New Declaration. The New Declaration is included in Appendix K.

6.2 Potable Groundwater Use

Although the ingestion of affected groundwater is a relevant migration pathway, activities were performed to render this pathway incomplete as described below.

6.2.1 Public Water Supply Well Survey

The City of Tecumseh owns and operates two municipal well fields. One well field is located north of the City of Tecumseh, and is on the north (opposite) side of the River Raisin relative to the Site. The second well field (south) is located approximately one-half mile west of the Site, west of South Union Street. This well field is hydraulically up gradient of the Site, and analytical data from water quality testing routinely performed by the City of Tecumseh on both municipal well fields indicate that these wells are unaffected by constituents of concern (COCs) for the Site.

6.2.2 Potable Well Survey and Decommissioning

In 2009, TRC conducted a private well survey to determine whether potentially affected off-site groundwater was used as a potable water supply or for any other uses. The survey area extended from Pearl Street west of the Site to the River Raisin in the east, and from Russell Road south of the Site to Pottawatamie Street north of the Site. The survey included a search of publicly available water well logs through the Michigan Department of Environmental Quality (MDEQ) website (Well Logic System and historical well logs database) and through a Freedom of Information Act request to the Lenawee County Health Department (LCHD). Well logs obtained from the MDEQ and the LCHD for the area described above are included in the Current Conditions Report (RMT, 2009). TRC also worked with the City of Tecumseh to identify properties that do not use municipal water (i.e., are occupied, but are not receiving a water bill from the City of Tecumseh).

In 2009 and 2010, Notices of Off-Site Migration (NOMs) were sent to potentially affected property owners. Each NOM requested that property owners with private wells contact TPC to arrange for their well to be tested at no cost to them. A representative from TPC and TRC hand delivered NOMs to the owners of the properties not connected to city water in order to personally verify the presence of a private well (or not) and to request permission to collect a sample for analysis. Of the properties receiving NOMs, one non-

potable (irrigation) supply well and five potable water supply wells were identified as documented in the Current Conditions Report (RMT 2009).

During the 2009 private well survey, described above, six private water supply wells were identified in the vicinity of affected groundwater (one irrigation and five potable). All of these wells have been decommissioned/abandoned in accordance with applicable regulations. A letter documenting well abandonment activities was sent to the City of Tecumseh in August 2012.

6.2.3 Groundwater Ordinance

In 2010 and 2011, the City of Tecumseh worked with the MDEQ and TPC to prepare an amendment to the City's Code of Ordinances, Chapter 82 (Utilities), Article IV (Water Supply System), consisting of new Section 82-120 (Private Water Wells) (referred to herein as the "Groundwater Ordinance") to restrict the private use of groundwater. The City of Tecumseh passed the Groundwater Ordinance on June 6, 2011, as Ordinance No. 4-11. This ordinance restricts groundwater use in the groundwater plume, including a buffer zone created in cooperation with MDEQ, identified in the Groundwater Ordinance as the "restricted zone." Specifically, the restricted zone includes the area of affected groundwater, as well as an approximate one-block (minimum) buffer zone around the area of affected groundwater (Figure 21). A total of 272 parcels are included in the restricted zone. A copy of the Groundwater Ordinance is included as Appendix L. Groundwater use is restricted as follows:

- The installation, development, maintenance, and use of private water wells is prohibited;
    - Connection to the municipal water supply is required; and
    - Existing private water wells must be abandoned.

  Consequently, the Groundwater Ordinance reliably controls the following exposures pathways:
    - Residential drinking water;
    - Non-residential drinking water;
    - Residential groundwater contact; and
    - Non-residential groundwater contact for all workers excluding those whose job duties include subsurface excavations to depths at or below the water table.

In conjunction with preparation of the Groundwater Ordinance, TPC agreed to identify and abandon, with owner consent, private wells within the restricted zone. On March

25, 2011, RMT, Inc. (RMT), on behalf of TPC, mailed a letter to each of the property owners affected by the Groundwater Ordinance. The letters included a well survey card. On May 12, 2011, June 30, 2011, and August 8, 2011 follow-up letters with additional copies of the well survey cards were sent to property owners which had not yet responded. During August and September 2011, TPC also conducted a telephone survey and a door-to-door survey to obtain responses from owners that did not respond to the letter survey. TPC facilitated the abandonment of all of the private wells identified, including those that were no longer in use. As of June 2012, all private wells within the restricted zone had been decommissioned.

6.3 Permeable Reactive Barrier

In May 2011 a permeable reactive barrier (PRB) was installed in two sections as described in the "Construction Documentation Report for the Permeable Reactive Barrier Downgradient of the Southern Source Area" (TRC, February 2012). The location of the PRB is shown on Figure 5. Groundwater monitoring has been performed, specifically to monitor the performance of the PRB, according to the "Workplan Addendum to Install Additional PRB Performance Monitoring Wells at the Former Tecumseh Products Site in Tecumseh, Michigan" (Workplan Addendum) which was submitted to USEPA on July 8, 2011. The September 2012, Performance Monitoring Report documented the results of the PRB monitoring activities through July 2012. Data provided in that report indicated that during the first year of operation the PRB enabled reductive dechlorination of the chlorinated volatile organic compounds (CVOCs) in the shallow groundwater flow system by establishing favorable geochemical conditions and by providing a food source for dehalogenating bacteria.

The results of the PRB monitoring activities through June 2013 were provided in the September 2013, Second Annual PRB Performance Monitoring Report. Data provided in that report indicate that the PRB continued to enable reductive dechlorination of the CVOCs in the shallow groundwater flow system by maintaining favorable geochemical conditions and by providing a food source for dehalogenating bacteria. Groundwater treatment up gradient of the PRB is planned as described in latter sections of this Corrective Measures Proposal. It is expected that the PRB will continue to provide benefit by polishing CVOC concentrations downgradient of the area of enhanced *in situ* bioremediation.

6.4 On-Site Vapor Mitigation

6.4.1 Sub-Slab Depressurization/Ventilation System in S-Building

In 2011 a sub-slab depressurization/ventilation (SSDV) system was installed in S-Building. This small building area is located off the northwestern perimeter of P-Building (Figure 2). Historically it had been used to house on-site security and first

aid services for the facility. In 2011 it was being used as an office area for the Site manager. At present, the building is no longer occupied by the site manager or any other employees. The current property owner has disconnected electrical service. Consequently, this SSDV system is not, at present, operating. However, the SSDV system remains in place, and is expected to be fully functional, if and when, power is restored to the building. Indoor air sampling, completed in S-Building following SSDV system installation, confirmed that indoor air concentrations were below applicable indoor air criteria.

6.4.2 Northern P-Building Soil Vapor Extraction System

TPC proposed the installation of a soil vapor extraction (SVE) system in P-Building during a meeting with USEPA on March 5-6, 2012. As discussed during that meeting, the proposed SVE system was designed to render incomplete the potential vapor intrusion exposure pathway for the occupied area, reduce or eliminate the potential for lateral migration of affected soil gas from the Site; and extract residual CVOCs from the on-site soil matrix reducing the long-term potential for migration of CVOCS into soil gas and groundwater, i.e., source control.

The SVE Workplan was prepared to provide design and installation details for the proposed full-scale SVE system design and to document results of the SVE pilot study conducted in April and May 2012. In 2012, the SVE system was installed in P-Building as documented in the February 2013 Full-Scale Soil Vapor Extraction System Construction Documentation Report: P-building at 100 East Patterson Street. The system layout including extraction well locations and system piping is illustrated on Figure 24. The SVE system components are housed in a corrugated shipping container which is generally mobile and can be moved to other areas of the Site, as appropriate.

Measured TCE concentrations prior to carbon treatment were used in combination with cumulative flow volumes to calculate mass removal. As illustrated in Chart M1 of Appendix M, the cumulative mass of TCE removed is estimated to be 603 kilograms (approximately 100 kilograms in 2015). The SVE system is an efficient and effective means of treating subsurface source areas in the vadose zone. The system removed approximately 150 kilograms of trichloroethene (TCE) from the subsurface in the first 4 to 5 months of operation. Since that time, the rate of TCE removal has gradually declined. Continued, somewhat stable mass removal may be attributed in large part to volatilization from groundwater. Removal of TCE from the vadose zone prevents those contaminants from entering on-site structures, from migrating off-site laterally in the soil gas or from mixing with the groundwater and migrating off-site in the dissolved phase.

6.4.3 Southern Perimeter Soil Vapor Extraction System

Soil gas concentrations of TCE measured at soil gas sample point SG-01 exceeded the MDEQ non-residential deep soil gas screening level. In order to expeditiously address the potential vapor intrusion migration pathway, TPC installed a perimeter SVE system downgradient of the southern source area (Figure 25). This system was also designed to be expandable, i.e., the blower, carbon treatment system and associated components are sufficiently sized to manage additional flow. As illustrated in Chart M2 of Appendix M, the cumulative mass of TCE removed is estimated to be 154 kilograms (75 kilograms in 2015); the cumulative mass of tetrachloroethene (PCE) removed is estimated to be 77 kilograms (60 kilograms in 2015); and cumulative mass of 1,1,1-trichloroethane (TCA) removed is estimated to be 22 kilograms (9 kilograms in 2015). The perimeter system was installed along the Site perimeter outside of soil source areas. Groundwater volatilization to soil gas, in the absence of groundwater treatment, provides somewhat constant source to soil gas. As indicative of sub-surface contaminants volatilizing from groundwater source, the rate of mass removal have been relatively constant for all constituents. Removal of TCE from the vadose zone prevents those contaminants from entering on-site structures, from migrating off-site laterally in the soil gas, or from mixing with the groundwater and migrating off-site in the dissolved phase.

6.5 Off-Site Indoor Air Evaluation and Mitigation

6.5.1 Residential Properties

TPC has performed off site indoor air sampling and/or installation of sub-slab depressurization ventilation (SSDV) mitigation systems to address the potential for vapor intrusion at all of the houses located within 100 feet of shallow groundwater affected above residential groundwater screening levels for vapor intrusion (GWSLs) as illustrated on Figure 22. As shown on Figure 22, monitoring and mitigation of off-site indoor air has included:

- Installation of a SSDV system at one residential property east of the Site, five residential properties north of the Site and one residential property west of the Site.
- Completion of crawlspace sampling activities at four residential properties east of the Site and one residential property north of the Site.
- Completion of indoor air sampling at one residential property east of the Site, four residential properties north of the Site and four residential properties west of the Site.

As described in Section 5.6 no COCs have been detected above residential indoor air criteria at any of these houses. If a SSDV system has not been installed, TPC has

targeted a total of three indoor air sampling events at each property, to assess temporal variability and confirm sampling data. Three sampling events were completed at each of the houses east of the Site, and two sampling events have been completed at properties west and north of the Site. The third and final sampling event at these properties is expected to be completed in the second or third quarter of 2016.

6.5.2 Non-Residential Properties

Figure 23 illustrates the lateral extent shallow groundwater above non-residential GWSLs. Aerial imagery and property-specific knowledge were used to determine the location of non-residential buildings within the area over which non-residential GWSLs are exceeded in shallow groundwater. Figure 23 also illustrates the approximate building footprint of non-residential structures within or near that area. Each non-residential property is assigned a map number for reference purposes. A total of 12 occupied (or potentially occupied) non-residential buildings are located within this area. The building on Property 1 was identified as the building having the highest potential risk. A site-specific soil gas attenuation factor was calculated for this property, and indoor air sampling was completed to verify these calculations. As documented in Appendix I, indoor air is not impacted above applicable indoor air criteria at this location.

For the remaining occupied buildings within the affected area, TRC used the GSI Environmental Risk-Based Corrective Action (RBCA) Toolkit vapor intrusion modeling to predict indoor air concentrations. This modeling, including site-specific input parameters, is documented in Appendix H. All of the calculated indoor air concentrations are below applicable indoor air criteria.

Section 7
Exposure Pathway Evaluation

This section presents a summary of the current and future exposure pathways for both on-site and off-site receptors, in addition to providing an update to the previous exposure pathway evaluations and risk assessment reflective of the 2015 high resolution site characterization (HRSC) investigation data and subsequent data evaluation, including ongoing investigation and risk assessment activities.

The exposure pathway evaluation identifies human health and ecological receptors potentially exposed to constituents of concern (COCs) under reasonably expected future use scenarios.

7.1 Conceptual Site Model

The Conceptual Site Model (CSM) is graphically depicted on two charts which illustrate the potential exposure pathways for human health and ecological receptors of concern. Chart 1 summarizes the exposure pathway evaluation for on-site receptors, and Chart 2 summarizes the exposure pathway evaluation for off-site receptors. The CSM was developed using site-specific data presented in Sections 4 and 5 of this report. Section 4 provides a description of the site setting, including current and reasonably anticipated land use, climate, surface topography and drainage, geology and hydrogeology. Section 5 provides a description of the nature and extent of contamination, including a description of COCs for the Site, potential source areas, as well as a description of the nature and extent of COCs in each potentially affected media relative to risk-based screening levels.

7.2 Overview of Methodology

An exposure pathway evaluation contains five elements (1) the contaminant source, (2) contamination of environmental media, (3) an exposure point, (4) an exposure route, and (5) potentially exposed populations. An exposure pathway is considered potentially complete if all five elements are present. A complete exposure pathway does NOT, by itself, indicate unacceptable risk, but rather, that exposure may occur based on the current and future exposure scenarios. Each potential exposure pathway is identified as one of the following:

- Potentially complete and significant,
- Potentially complete and potentially significant,
- Potentially complete, but insignificant, or
- Incomplete.

Exposure pathways are considered significant or potentially significant based on the two requirements: (1) the exposure pathway is complete or potentially complete and (2) the environmental media is (or may be) affected above applicable risk-based screening levels at the point of exposure. Note that in some cases, a qualitative assessment may be used to determine if a pathway is insignificant. For example, current and future environmental workers may encounter sub-surface soils; however, the surface area of soils removed from the subsurface during environmental work is negligible (typically 1-5 square feet) when compared to the area used to calculate Part 201 VSI criteria (one-half acre). In this case the assumptions used to determine the generic risk-based screening levels are not valid, and a qualitative assessment is made, e.g. the VSI exposure pathway is complete, but insignificant for an environmental worker.

7.3 Potential Receptors

Based on current and reasonably expected future land use, the following potential receptors were identified as having the potential to contact affected media. These potential receptors were considered in the exposure pathway evaluation.

7.3.1 Potential On-Site Receptors

On-site receptors which have the potential to contact affected media are described below. These receptors include environmental workers, trespassers, non-routine outdoor workers (e.g. one-time building construction workers, occasional excavation/maintenance workers, and site redevelopment workers), routine outdoor workers, and routine indoor workers. Table 1 provides a detailed evaluation of current and future exposure pathways for each on-site receptor-exposure medium combination. The exposure pathways meriting further evaluation for each receptor, e.g. potentially complete and significant or potentially complete and potentially significant, are outlined below.

- **Environmental Worker:** The environmental worker typically spends the majority of their workday outdoors completing investigation activities, routine sampling activities, mitigation activities and/or routine operation and maintenance of mitigation systems. Environmental work is completed both on-site and off-site. Occasionally on-site environmental workers may complete short duration (typically 1 day or less) tasks (e.g. groundwater sampling, soil vapor extraction system maintenance, etc.) inside the former manufacturing facility. For on-site environmental workers, exposure pathways meriting further evaluation include:
    - Direct contact (incidental ingestion and dermal contact) with surface and sub-surface soils;

    - Inhalation of surface soil particulates and volatiles into ambient air (future only);
    - Direct contact with affected on-site groundwater via incidental ingestion and dermal contact; and
    - Inhalation of indoor air impacted by vapor intrusion from affected soils or groundwater (future only).
- **Trespasser:** Although access to the Site is restricted by a locked perimeter fence, an on-site trespasser could enter the facility and come into contact with affected media. For purposes of this evaluation, the most frequent trespasser is assumed to be an adolescent aged 10-16 years old. For trespassers, exposure pathways meriting further evaluation include:
    - Direct contact (incidental ingestion and dermal contact) with surface soils;
    - Inhalation of surface soil particulates and volatiles into ambient air (future only); and
    - Inhalation of indoor air impacted by vapor intrusion from affected soils or groundwater (future only).
- **Non-Routine Outdoor Workers:** As part of the redevelopment and maintenance of the Site, workers may conduct short-term demolition, construction, excavation, and/or trenching activities. There are currently no non-routine outdoor workers on-site. On-site anticipated future trenching and excavation activities may include slab removal during site redevelopment, potential excavation/mixing of affected soils as part of a mitigation strategy, installation of new water and sewer lines to facilitate site redevelopment, and maintenance of current and potential future subsurface utilities. Based on the depths of existing on-site and perimeter utilities, reasonably anticipated future sub-surface utilities are expected to be located at depths that do not exceed 15 feet below ground surface (ft bgs). Along the western portion of the Site, the depth to groundwater is approximately 7 ft bgs; therefore groundwater may be encountered during the completion of these activities. For non-routine outdoor workers, potential future exposure pathways meriting further evaluation include:
    - Direct contact (incidental ingestion and dermal contact) with surface and sub-surface soils;
    - Inhalation of surface and sub-surface soil particulates and volatiles into ambient air;
    - Direct contact with affected on-site groundwater via incidental ingestion and dermal contact; and
    - Inhalation of trench air impacted by vapor intrusion from affected groundwater. Note that this potentially significant pathway was

subsequently determined to be insignificant through site-specific fate and transport modeling, as described in Section 7.5 below.

- **Routine Outdoor Worker:** The routine outdoor worker may be a subcontracted lawn service that maintains the grounds or he/she may be a facility worker who is responsible for maintaining industrial equipment at the Site. This worker typically spends a portion of their workday outdoors moving between buildings for operational purposes. For routine outdoor workers, exposure pathways meriting further evaluation include:
    - Direct contact (incidental ingestion and dermal contact) with surface soils; and
    - Inhalation of surface soil particulates and volatiles into ambient air (future only).
- **Routine Indoor Worker:** The indoor worker is comprised of those on-site workers who spend their workday in a commercial or industrial building. There are currently no routine indoor workers on-site. For routine indoor workers, potential future exposure pathways meriting further evaluation include:
    - Inhalation of indoor air impacted by vapor intrusion from affected soils or groundwater (future only).

7.3.2 Potential Off-Site Receptors

Off-site receptors which have the potential to contact affected media are described below. These receptors include environmental workers, non-routine outdoor workers (e.g., one-time building construction workers and occasional excavation/maintenance workers), routine outdoor workers, routine indoor workers, residents, recreational users, and ecological receptors. Table 2 provides a detailed evaluation of current and future exposure pathways for each off-site receptor-exposure medium combination. The exposure pathways meriting further evaluation for each receptor, e.g., potentially complete and significant or potentially complete and potentially significant, are outlined below.

- **Environmental Worker:** The environmental worker typically spends the majority of their workday outdoors completing investigation activities, routine sampling activities, mitigation activities and/or routine operation and maintenance of mitigation systems. Environmental work is completed both on-site and off-site. Off-site environmental workers typically do not work indoors. For off-site environmental workers, exposure pathways meriting further evaluation include:
    - Direct contact with affected off-site groundwater via incidental ingestion and dermal contact.

- **Non-Routine Outdoor Workers:** As part of maintenance or construction activities off-site, workers may conduct short-term demolition, construction, excavation, and/or trenching activities. Off-site current and potential future anticipated trenching/excavation activities include the installation and maintenance of subsurface utilities in areas where the depth to groundwater is 15 feet or less and excavations for new construction. For non-routine outdoor workers, potential future exposure pathways meriting further evaluation include:
    - Direct contact with affected off-site groundwater via incidental ingestion and dermal contact; and
    - Inhalation of trench air impacted by vapor intrusion from affected groundwater. Note that this potentially significant pathway was subsequently determined to be insignificant through site-specific fate and transport modeling, as described in Section 7.5 below.
- **Routine Outdoor Worker:** The routine outdoor worker may be a subcontracted lawn service that maintains the grounds or he/she may be a facility worker who is responsible for maintaining industrial equipment at the Site. This worker typically spends a portion of their workday outdoors moving between buildings for operational purposes. For off-site routine outdoor workers, there are no exposure pathways meriting further evaluation.
- **Indoor Worker:** The indoor worker is comprised of those workers who spend their workday in a commercial or industrial building. For indoor workers, potential exposure pathways meriting further evaluation include:
    - Inhalation of indoor air impacted by vapor intrusion from affected groundwater. Note that this potentially significant pathway was subsequently determined to be insignificant for current indoor workers using site-specific fate and transport modeling, as described in Section 7.5 below. This pathway remains potentially significant for future indoor workers.
- **Resident:** The resident includes children and adults who live within the area of potentially affected groundwater. Household water use is supplied by the City of Tecumseh. The installation and use of private wells within the area of affected groundwater is prohibited by a Groundwater Ordinance (described below). Therefore, groundwater exposure pathways related to direct contact (ingestion, dermal contact) are considered incomplete. For residents, potential exposure pathways meriting further evaluation include:
    - Inhalation of indoor air impacted by vapor intrusion from affected groundwater.
- **Recreational User:** Recreational land use may occur off-site at properties within the area of affected groundwater and at the River Raisin. Recreational land use occurs

out-of-doors. There is no reasonable mechanism for recreational users to directly contact affected soil or groundwater. However, affected groundwater may migrate into wetlands and ultimately, the River Raisin. For recreational users, potential exposure pathways meriting further evaluation include:

    - Direct contact with affected surface water via incidental ingestion and dermal contact.

– **Ecological Receptors:** Ecological receptors are present in the River Raisin and associated wetlands located directly east of the Site. Affected groundwater may vent to the River Raisin and/or the associated wetland and drainage area. For ecological receptors, potential exposure pathways meriting further evaluation include:

    - Direct contact with affected surface water via ingestion and dermal contact.

7.4 Exposure Assumptions

Site-specific exposure assumptions were identified for each complete and potentially significant exposure pathway described above. Exposure pathway assumptions for each receptor are provided in Appendix N. Tables N1 through N7 summarize the exposure assumptions for on-site receptors, while Tables N8 through N12 summarize the exposure assumptions for off-site receptors. If a site-specific value was not available, recommended/default values were obtained from the following references:

- Risk Assessment Guidance for Superfund (RAGS) Volume I Human Health Evaluation Manual Part A. EPA/540/1-89-002. December 1989 (USEPA, 1989).
- Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December, 2002 (USEPA, 2002a).
- Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment). Final. Office of Emergency and Remedial Response, Washington D.C. EPA/540/R/99/005. July 2004 (USEPA, 2004).
- Exposure Factors Handbook, 2011 Edition. National Center for Environmental Assessment, Office of Research and Development, Washington D.C. EPA/600/R-09/052F. September 2011 (USEPA, 2011).
- Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9200.1-120. February 6, 2014 (USEPA, 2014a).

In addition, excavation-related exposure assumptions for groundwater contact by a construction worker were obtained from two State references:

- RRD Operation Memorandum No. 1, Technical Support Document – Attachment 4 Part 201 Groundwater Contact Criteria. Michigan Department of Environmental Quality, Remediation and Redevelopment Division. July 2006 (MDEQ, 2006).

- *Voluntary Remediation Program Risk Assessment Guidance.* Virginia Department of Environmental Quality. Waste Management. Section 3.2.2 Exposure of Workers to Volatiles in a Construction/Utility Trench. August 2014 (VDEQ, 2014).

These exposure assumptions were used for both site-specific risk assessment as described below and for the calculation of site-specific cleanup levels as described in Section 8.

7.5 Fate and Transport Modeling

As shown in both the on-site and off-site CSM charts, exposure to COCs may occur through a variety of contact or release mechanisms. Where appropriate, fate and transport modeling was used to quantitatively evaluate certain exposure pathways as part of the risk evaluation. This fate and transport modeling is described briefly below.

7.5.1 Groundwater Volatilization into a Trench

A fate and transport model was used to evaluate the risk associated with a current/future construction/excavation worker who may potentially inhale air which has been impacted by the volatilization of COCs from groundwater while working in a trench. The construction worker trench evaluation is conducted by calculating a chemical-specific groundwater volatilization factor (VF), which estimates the transfer of a volatile compound-from groundwater into the breathing zone of the trench. The VF is input into groundwater risk calculations for potential receptor. As described above, the inhalation of trench air impacted by vapor intrusion from affected groundwater is complete and potentially significant for both on-site and off-site non-routine outdoor workers. As summarized in Appendix N, for purposes of this assessment, several sub-categories of non-routine outdoor workers were considered including: on-site redevelopment workers, on-site building construction workers, off-site building construction workers, on-site utility maintenance workers and on-site utility maintenance workers.

The modeling approach to evaluate this pathway uses a trench worker volatilization model provided by Virginia Department of Environmental Quality (VDEQ) (VDEQ, 2014). For modeling purposes, a site-specific minimum depth to groundwater (7 ft bgs) was assumed. When the depth to groundwater is less than or equal to 15 feet, the VDEQ trench model assumes that a worker has direct exposure to groundwater standing in the bottom of the trench. Therefore, the groundwater VF is based on mass transfer coefficients of the liquid phase and gas phase from the exposed groundwater in the trench. These groundwater VF and trench-related worker groundwater cleanup level calculations are documented in Appendix O. The VDEQ model input parameters are

summarized in Table O1, calculated VFs are summarized in Table O2, and calculated site-specific risk-based criteria are summarized in Table O3.

Groundwater concentrations throughout the area of affected groundwater, are below site-specific risk-based criteria for inhalation of trench air impacted by vapor intrusion from affected groundwater. Therefore, the inhalation of trench air impacted by vapor intrusion from affected groundwater was determined to be insignificant for all receptors including: on-site redevelopment workers, on-site building construction workers, off-site building construction workers, on-site utility maintenance workers and on-site utility maintenance workers.

7.5.2 Volatilization into Indoor Air from Subsurface

As shown in Charts 1 and 2, volatilization of COCs from subsurface soil and groundwater up through the unsaturated zone and into indoor air is a potentially complete and significant exposure pathway for any receptor who spends a significant time indoors (e.g., off-site resident, on/off-site indoor worker). As a result, the GSI Environmental Risk-Based Corrective Action (RBCA) Toolkit was used to model vapor intrusion for these receptors. The RBCA Toolkit was used to calculate both baseline risks (e.g. predict indoor air concentrations of COCs) at off-site non-residential properties and groundwater cleanup levels protective of the potential future off-site vapor intrusion pathway. The modeling is described in detail in Appendix H, and cleanup levels are described in Section 8.

As summarized in Table H3 of Appendix H, calculated indoor air concentrations at each of the occupied non-residential structures within the area of affected groundwater are below non-residential indoor air criteria. Therefore, the inhalation of affected indoor air by current off-site indoor workers was determined to be insignificant. As described in Section 8, off-site groundwater concentrations do exceed cleanup levels for potential new residential and non-residential structures. Therefore this pathway remains potentially significant for future off-site indoor workers and residents.

7.6 Exposure Pathway Evaluation

With the data collected as described in Section 5, and the risk evaluation process described in Section 7, TRC completed an exposure pathway evaluation for the Site for each of the potential receptors described above. The results of that evaluation are summarized in Charts 1 and 2. The details of that evaluation are presented in Tables 1 and 2 for each potential receptor. The exposure pathways requiring further evaluation are those which are considered potentially complete and significant and are summarized for on-site and off-site receptors in Charts 1 and 2, respectively. As described in Section 8, risk-based cleanup levels were calculated for these particular exposure pathways and all associated receptors.

Section 8
Cleanup Levels and Treatment Areas

As documented previously in this Corrective Measures Proposal (CMP), long-term industrial operations at the former Tecumseh Products Company (TPC) facility ("Site") has resulted in the release of volatile organic compounds (VOCs), particularly chlorinated VOCs (CVOCs) into soil and groundwater. On-site soil and groundwater (on-site and off-site) have shown detections of hazardous substances above risk-based screening levels. As described in Section 7 and summarized in Tables 1 and 2, an exposure pathway evaluation was completed to determine those exposure pathways which merit further evaluation and/or corrective measures. This exposure pathway evaluation identifies human and ecological receptors potentially exposed to constituents of concern (COCs) associated with the Site, under current and reasonably expected future land use scenario. The conceptual site model (CSM) which summarizes the exposure pathway evaluation is illustrated in Chart 1 (on-site) and Chart 2 (off-site).

Based on the findings of the exposure pathway analysis in Section 7, TRC evaluated the potentially complete and significant exposure pathways and calculated risk-based cleanup levels. This section describes the process by which those cleanup levels were calculated, and provides a framework for the selection of areas subject to corrective measures. For those exposure pathways which merit further evaluation and/or corrective measures, one or more of the following risk management options are evaluated below:

- **Further Evaluation:** Additional investigation activities have been proposed to more fully evaluate several potentially significant exposure pathways. The results of these investigation and sampling activities may be used to determine whether or not a potentially significant exposure pathway is significant, and merits corrective action.
- **Institutional Control:** Institutional controls (ICs) are non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for human exposure to contamination and protect the integrity of the remedy. ICs provide information and/or restrictions that help modify or guide human behavior at facilities and properties where hazardous wastes and contamination prevent unlimited use and unrestricted exposure.
- **Engineering Controls:** Engineering Controls (ECs) are physical barriers or methods employed to actively or passively contain, stabilize, or monitor contamination, restrict the movement of contamination to ensure the long-term effectiveness of a cleanup measure, or eliminate potential exposure pathways to contamination. ECs include, but are not limited to, pavement, caps, covers, subsurface barriers, vapor barriers, slurry walls, building ventilation systems, fences, access controls, provisions for alternative water supplies via connection to an existing public water supply, adding treatment technologies to such water supplies, and installing filtration devices on private water supplies. ECs and ICs typically

work together, in that ICs provide a legal basis to guide human behavior and ensure ECs are installed, used and maintained in a manner that is appropriately protective.

- **Treatment:** For those complete exposure pathways that cannot be reliably restricted with ICs or ECs, soil and/or groundwater treatment may be used to reduce concentrations to calculated site-specific risk-based cleanup levels.

8.1 Pathway Evaluation and Site Specific Risk Calculations

TRC performed site specific risk-based calculations for the pathways that were potentially complete and significant. A summary of the exposure pathway evaluation by media are provided below.

- **On-Site Surface Soil**
  - **Direct Contact:** Site-specific risk-based cleanup levels were calculated for on-site environmental workers, trespassers, non-routine outdoor workers, and routine outdoor workers.
  - **Inhalation of Soil Particulates:** Site-specific risk-based cleanup levels were calculated for on-site environmental workers, trespassers, non-routine outdoor workers, and routine outdoor workers.
  - **Inhalation of Soil Volatiles in Ambient Air:** Site-specific risk-based cleanup levels were calculated for on-site environmental workers, trespassers, non-routine outdoor workers, and routine outdoor workers.
- **On-Site Sub-Surface Soil**
  - **Direct Contact:** Site-specific risk-based cleanup levels were calculated for on-site environmental workers and non-routine outdoor workers.
  - **Inhalation of Soil Particulates:** Site-specific risk-based cleanup levels were calculated for non-routine outdoor workers.
  - **Inhalation of Soil Volatiles in Ambient Air:** Site-specific risk-based cleanup levels were calculated for non-routine outdoor workers.
  - **Inhalation of Soil Volatiles in Indoor Air:** Michigan Part 201 Soil Volatilization to Indoor Air Inhalation (SVIAI) criteria were used as screening levels to assess this pathway. Soil concentrations exceed these generic SVIAI screening levels. Actual soil volatilization to indoor air is highly dependent on the physical characteristics of the soil. For example soil volatiles in sandy soil may migrate readily into indoor air, whereas soil volatiles in clayey soil may be virtually immobile. However, due to the inherent heterogeneity of soil, there is no established, accepted method to calculate site-specific risk-based cleanup levels for the inhalation of soil volatiles. Potential receptors include on-site environmental workers, trespassers, non-routine outdoor workers, and routine outdoor workers.

- **On-Site Groundwater**
  - **Ingestion:** The ingestion of on-site groundwater is reliably restricted with existing ICs, therefore no site specific risk based calculations were performed.
  - **Direct Contact:** Site-specific risk-based cleanup levels were calculated for on-site environmental workers and non-routine outdoor workers**.**
  - **Inhalation of Groundwater Volatiles in Trench Air:** TRC performed fate and transport modeling to calculate site-specific screening levels.
  - **Inhalation of Groundwater Volatiles in Indoor Air:** TRC performed fate and transport modeling of the groundwater volatilization to indoor air migration pathway, as described in Subsection 5.6.4, in order to calculate site-specific risk-based cleanup levels for the routine indoor worker.
- **On-Site Concrete**
  - **Intact –** Media serves to limit exposure to COCs and does not itself pose a significant risk to potential receptors. Therefore, no risk based calculations were performed.
  - **Debris** – If existing concrete slab is removed, ICs will ensure the debris will be managed and characterized in accordance with applicable law. Therefore, no risk based calculations were performed.
- **Off-Site Surface Soil –** Based on on-site soil data, the volatile nature of the COCs, and an assessment of potential transport mechanisms, the media is not expected to be impacted off site above risk-based screening levels.
- **Off-Site Sub-Surface Soil –** Based on on-site soil data, the volatile nature of the COCs, and an assessment of potential transport mechanisms, the media is not expected to be impacted off site above risk-based screening levels.
- **Off-site Groundwater**
  - **Ingestion:** Current and future ingestion of off-site groundwater is reliably restricted with existing ICs. Therefore, no risk based calculations were performed.
  - **Direct Contact:** Site-specific risk-based cleanup levels were calculated for off-site environmental workers and non-routine outdoor workers**.**
  - **Inhalation of Groundwater Volatiles in Trench Air:** TRC performed site-specific fate and transport modeling of groundwater concentrations.
  - **Inhalation of Groundwater Volatiles in Indoor Air:** TRC performed fate and transport modeling of the groundwater volatilization to indoor air migration pathway, as described in Subsection 5.6.4, in order to calculate site-specific risk-

based cleanup levels for routine indoor workers (current and future) and residents (future).[19]

- **Off-Site Surface Water:** The groundwater surface water interface (GSI) pathway is still under evaluation with regard to the wetland adjacent to the River Raisin. TPC will complete further evaluation as described in Appendix B.
- **Off-Site Ecological Receptors:** VOCs do not bioaccumulate, therefore ecological receptors are not a potential exposure media (through consumption) for human or other higher trophic organisms.

8.2 Methodology for the Determination of Cleanup Levels

TRC risk assessment practitioners were utilized to perform the risk assessment calculations provided in this CMP. The methodology used to establish the cleanup levels is described in detail in Appendix P and is summarized below.

8.2.1 Exposure Assumptions

As with any risk assessment process, conservative exposure assumptions are made to perform site-specific risk-based calculations for establishment of cleanup levels. TRC used appropriate risk assessment guidance documents as described in Section 7 to develop these exposure assumptions. The exposure assumptions for each potential receptor are provided in Appendix N. Where applicable, these exposure assumptions were used to calculate exposure intake values for each receptor. These exposure intake calculations are described in Appendix P.

8.2.2 Constituents of Concern

COCs for each exposure pathway are described in detail in Section 5.

8.2.2.1 Soil

Trichloroethene (TCE) and tetrachlorothene (PCE) are the only COCs which have exceeded risk-based screening levels for soil. Therefore these are the only COCs included in the calculation of cleanup levels for soil.[20]

---

[19] The current groundwater volatilization to indoor air migration pathway is addressed, as described previously in Section 5.6, through indoor air testing and/or mitigation, at each house within the area where shallow groundwater exceeds generic groundwater screening levels for vapor intrusion.

[20] 1,1-dichloroethene is detected in soil above the SVIAI criterion at one sample location. TCE was also above the applicable SVIAI criterion at this location. Given that this exceedence was isolated, 1,1-dichloroethene is not included in the COC list for soil.

8.2.2.2 Groundwater

Because the drinking water pathway is reliably restricted with ICs, COCs which only exceed screening levels protective of the drinking water pathway were not considered in the calculation of risk-based cleanup levels. As described in Appendix B, investigation of the GSI pathway is ongoing. Therefore, for completeness, each of these COCs detected above generic GSI criteria, were included in the calculation of groundwater cleanup levels for direct (e.g. dermal contact and incidental ingestion) exposure to groundwater. However, the only compounds which exceed generic MDEQ groundwater contact (GC) criteria are PCE and vinyl chloride. The generic GC criteria for TCE was calculated prior to the 2011 USEPA updates TCE toxicity values.

PCE, TCE, 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-DCE), vinyl chloride have been detected in groundwater at off-site sample locations above generic groundwater screening levels for vapor intrusion (GSWLs). Therefore cleanup levels protective of the vapor intrusion pathway were calculated for each of these parameters.

8.2.3 Toxicity Assessment

An integral part of a risk evaluation involves identifying toxicity information for each COC. Toxicity is described in terms of dose-response where the observed or potential toxic effects in humans and/or laboratory animals are associated with a given chemical exposure and include both carcinogenic and non-carcinogenic response endpoints. Non-carcinogenic toxicity information is provided as an oral reference dose (RfD) or inhalation reference concentration (RfC), while carcinogen dose-response data is presented as an oral Slope Factor (SF) or inhalation unit risk factor (URF).

The primary source of toxicity information is USEPA's Integrated Risk Information System (IRIS), which is available online (www.epa.gov/iris). This information, along with other sources of toxicity information is summarized in USEPA's RSL Table, which was last updated in November 2015 and is available online (http://www.epa.gov/region9/superfund/prg/).

Because many of the construction/excavation-type workers are considered short-term workers with an Exposure Duration (ED) of just one (1) year, use of non-cancer sub-chronic toxicity information is appropriate when evaluating this worker. Non-cancer sub-chronic toxicity information is summarized in Table P1 of Appendix P, when available. If a sub-chronic toxicity value is not available, conventional non-cancer chronic toxicity information was used.

8.2.4 Target Risk Levels

Consistent with the Part 201 statute, a hazard quotient of 1 was used to calculate non-cancer risk, and a carcinogenic target risk level (TRL) of one in 100,000 (e.g. 1×10^{-5}) was used.

8.2.5 Calculation of Cleanup Levels

The exposure assumptions, toxicity data and target risk levels outlined above were used to calculate cleanup levels for each applicable (or potentially applicable) COC. Site specific vapor intrusion modeling was performed to establish groundwater cleanup levels for that pathway. More specific details regarding that evaluation are described in Appendix H and Sub-Section 8.2.5.1 below. For all other potentially complete and significant exposure pathways, cleanup levels were calculated as described in Appendix P and Sub-Section 8.2.5.2 below. Exposure assumptions used to determine the cleanup levels for each potential receptor are provided in Appendix N. For COCs with both cancer and non-cancer toxicity values, cleanup levels were calculated for both carcinogenic effects and non-cancer effects, and the lower cleanup levels are used for comparison to site-specific data.

8.2.5.1 Vapor Intrusion Modeling

Volatilization of COCs from subsurface groundwater up through the unsaturated zone and into indoor air is a potentially complete and significant exposure pathway for any receptor who spends a significant time indoors (e.g., off-site resident, on/off-site indoor worker). As a result, the GSI Environmental Risk-Based Corrective Action (RBCA) Toolkit was used to model vapor intrusion for these receptors. The RBCA toolkit was used to calculate both baseline risks (e.g. predict indoor air concentrations of COCs) at off-site non-residential properties and groundwater cleanup levels protective of the potential future off-site vapor intrusion pathway. The modeling is described in detail in Appendix H. Vapor intrusion is dependent on a number of site-specific building, soil, and groundwater parameters. The RBCA Toolkit allowed TRC to make site specific changes based on the different site conditions and determine groundwater cleanup levels for vapor intrusion based on these parameters.

Ten different geographic areas were modeled as described in Appendix H and shown on Figure 26. These geographic areas are characterized by land use, dominant vadose soil type, plume width, plume thickness, depth to groundwater, and hydraulic gradient. For each of these geographic areas, a groundwater cleanup level, protective of the vapor intrusion pathway, was

calculated using area-specific input parameters. The cleanup levels for each geographic area are summarized on Table H4 and include cleanup levels for residential and non-residential scenarios based on current and reasonably expected future land use scenarios. As such, residential cleanup levels are not calculated in areas that are and will remain non-residential and vice versa. Cleanup levels for Area 10 were not calculated for either receptor because Area 10 is a wetland where building construction (for residential or non-residential use) is not reasonably expected in the future.

Calculated groundwater cleanup levels for vapor intrusion are summarized in Table H4 of Appendix H. Note that modeling, mitigation, and/or indoor air sampling has been completed to verify that risks associated with the current vapor intrusion pathway are acceptable. These cleanup levels are considered protective of the vapor intrusion pathway under reasonably expected **future** land use scenarios based on the conservative modeling assumptions. RBCA calculations included vinyl chloride for completeness. However, vinyl chloride degrades readily in oxidative environments (e.g. the vadose zone). Five years of soil gas sample data (Table D10 in Appendix D) collected throughout the area of affected groundwater demonstrate vinyl chloride emanating from the Site does not volatilize into soil gas, therefore the vapor intrusion pathway with respect to vinyl chloride is not complete. Furthermore, VOCs in groundwater below the water table are not in contact with soil gas and cannot result in a vapor intrusion risk. With the exception of values calculated for vinyl chloride, the calculated vapor intrusion groundwater cleanup levels are appropriate for comparison to shallow[21] groundwater (e.g., the water table) concentrations. Because the vinyl chloride vapor intrusion pathway is incomplete, the proposed cleanup level for vinyl chloride is described 8.2.5.2.

8.2.5.2 Cleanup Levels for Other Pathways

Standard risk assessment equations were used to calculate cleanup levels for pathways other than vapor intrusion, e.g. dermal contact, incidental ingestion, inhalation of soil volatiles in ambient air, and inhalation of soil particulates in ambient air. The exposure assumptions tabulated for each potential receptor in Appendix N were used to calculate exposure intake values for each receptor-pathway pair. Note that for purposes of these calculations, exposures assumptions were developed for each of several subcategories of non-routine

[21] VOCs in groundwater below the water table are not in contact with soil gas and cannot result in a vapor intrusion risk.

outdoor workers (e.g. one-time construction workers, occasional excavation/utility maintenance workers, and site redevelopment workers). Exposure intake calculations are described in Appendix P. Exposure intake values and toxicity data for each COC were then used to calculate cancer and non-cancer cleanup levels for each exposure pathway. For each media, these pathway specific cleanup levels were composited to determine combined risk-based cleanup levels protective of all of the pathways considered.[22] These calculations are described in detail in Appendix P. A summary of calculated soil cleanup levels for each receptor-COC pair is provided in Table P2, while groundwater cleanup levels are presented in Table P3 for each receptor-COC pair. The lowest applicable cleanup level across the various receptors is highlighted in these tables.

8.3 Cleanup Levels and Areas for Soil Corrective Measures

The cleanup levels across the various receptors are summarized in Table 3. As part of the risk assessment process, TRC compared soil data for COCs to these risk based cleanup levels. For TCE, the lowest risk-based cleanup level is 25 milligram per kilogram (mg/kg), and for PCE the lowest risk-based cleanup level is 7,430 mg/kg. In consideration of these risk-based cleanup levels as well as affected soil as a potential source to other media (e.g. groundwater and indoor air), the following geographic areas for soil corrective measures have been established:

- TCE concentrations exceed 25 mg/kg beneath the building slab in several locations as shown on Figure 27. Exposures to soil exceeding 25 mg/kg will be managed through ICs and ECs.
- All soil concentrations have been well below the risk-based cleanup levels for PCE, therefore soil treatment is not necessary to achieve risk-based soil cleanup levels. However, as described in Section 5.4, PCE concentrations do exceed soil saturation levels in the PCE source area. Due to the potential for leaching to groundwater, soil concentrations above saturation levels will be address as described in Section 10. The area over which PCE concentrations exceed soil saturation levels is illustrated on Figure 27.
- As discussed in Appendix E, additional soil investigation will be performed in certain potential source areas. Following the completion of investigation activities, site-wide soil data will be compared to the site-specific risk based cleanup levels to determine if additional areas for soil corrective measures, beyond those illustrated on Figure 27, are appropriate.
- Soil concentrations exceed generic SVIAI screening levels through the majority of the building footprint. Actual soil volatilization to indoor air is highly dependent on the physical characteristics of the soil. For example, soil volatiles in sandy soil may migrate

[22] For COCs with both cancer and non-cancer toxicity values, combined cleanup levels were calculated for both carcinogenic effects and non-cancer effects, and the lower cleanup level is used for comparison to site data.

readily into indoor air, whereas soil volatiles in clayey soil may be virtually immobile. However, due to the inherent heterogeneity of soil, there is no established, accepted method to calculate site-specific risk-based cleanup levels for the inhalation of soil volatiles. The potential soil vapor intrusion pathway is expected to be managed through a combination of site-wide ICs and ECs (e.g. vapor barriers, sub-slab depressurization/ventilation [SSDV] systems). USEPA has requested additional soil sampling performed in these areas to further characterize site conditions. A workplan describing this sampling is included in Appendix E.

8.4 Cleanup Levels and Areas for Groundwater Corrective Measures

The groundwater cleanup levels for each geographic area (Figure 26) are summarized in Table 4. As part of the risk assessment process, TRC compared groundwater data from each geographic area to these risk based cleanup levels. Note that as described in Section 6.5, soil gas, crawl space, and indoor air testing confirm that there are no current unacceptable risks to residential properties. As discussed in Section 7.5, modeling performed by TRC to evaluate non-residential properties show that there are no current unacceptable risks at these non-residential locations.

8.4.1 Risk-Based Cleanup Levels

As described previously, ten different geographic areas were modeled as described in Appendix H and shown on Figure 26. These geographic areas are characterized by land use, dominant vadose soil type, plume width, plume thickness, depth to groundwater, and hydraulic gradient. For each of these geographic areas, a groundwater cleanup level, protective of the vapor intrusion pathway, was calculated using area-specific input parameters. The cleanup levels for each geographic area are summarized on Table H4 and include cleanup levels for residential and non-residential scenarios based on current and reasonably expected future land use scenarios. Comparisons of groundwater data to the calculated future use cleanup levels showed that:

- The cleanup levels protective of the vapor intrusion pathway for off-site residential and non-residential **future** use are the most restrictive cleanup levels for groundwater at the Site.
- Groundwater concentrations exceed risk-based cleanup levels for vapor intrusion for the following COCs: PCE, TCE and cis-DCE.

The results of that evaluation are illustrated on Figure 28, and summarized below for each COC that exceeded the risk-based cleanup levels for vapor intrusion.

8.4.1.1 Tetrachloroethene (PCE)

- Measured PCE concentrations do not exceed residential risk-based cleanup levels in any current or potential future residential areas.
- Geographic Area 6 - Measured PCE concentrations exceed the area-specific risk-based cleanup level in Area 6, which is a non-residential area located along the southern downgradient perimeter of the Site. Concentrations of PCE measured in samples collected from boring locations B-100, B-116, B-121, B-122, and B-125 exceed the cleanup level for PCE (19,000 ug/L). A perimeter SVE extraction system was installed to control lateral off-site migration from this area. Subsequent indoor air testing performed at the building on Property 1 as illustrated on Figure 26 indicates that concentrations are currently acceptable. Treatment of groundwater in this area is recommended as described in Section 10.

8.4.1.2 Trichloroethene (TCE)

Measured TCE concentrations exceed the area-specific risk-based cleanup levels for the potential future use scenario in three non-residential areas.

- Geographic Area 4 - Concentrations of TCE measured along the northern perimeter of the Site adjacent to Geographic Area 4 (locations MW-04s, MW-04i, SB-MIP-55, and SB-MIP-58) exceed the cleanup level for TCE in this area (6,000 ug/L). Modeling performed for the existing occupied building in this area shows there is no current unacceptable risk. Groundwater treatment is recommended in this area as described in Section 10.
- Geographic Area 6 – Concentrations of TCE measured along the southern perimeter of the Site, adjacent to Geographic Area 6 exceed the cleanup level for TCE (1,300 ug/L). A perimeter SVE extraction system was installed to control lateral off-site migration from this area. Subsequent indoor air testing performed at the building located on Property 1 (as designated on Figure 28) indicates that concentrations are currently acceptable. Groundwater and soil treatment is recommended in this area as described in Section 10.
- Geographic Area 8 - Concentrations of TCE measured downgradient of the southern source area in Geographic Area 8 (locations MW-21, B-86, and B-87) exceed the non-residential cleanup level for TCE in Geographic Area 8 (1,400 ug/L). This area is downgradient of the southern source area and PCE source area where soil and groundwater is recommended for treatment as described in Section 10.

Measured TCE concentrations exceed the cleanup level in two residential areas.

- Geographic Area 2- Concentrations of TCE measured downgradient of the northern source area in Geographic Area 2 (B-76 only, 660 ug/L at the water table) exceed the residential risk-based cleanup level for TCE (130 ug/L). Indoor air testing and/or installation of presumptive mitigation systems has been completed in this area and no current unacceptable risks have been identified. Details regarding this assessment are included in Section 5.6. This area is downgradient of the northern source where groundwater treatment as described in Section 10.
- Geographic Area 8 - Concentrations of TCE measured downgradient of the southern source area in Geographic Area 8 (locations MW-21, B-86, and B-87) exceed the residential cleanup level for TCE (140 ug/L). Indoor air testing and/or installation of presumptive mitigation systems has been completed in this area and no current unacceptable risks have been identified. This area is downgradient of the southern source area and PCE source area where groundwater treatment is recommended as described in Section 10.

8.4.1.3 Cis-DCE

- Measured cis-DCE concentrations do not exceed any of the non-residential cleanup levels for any geographic area.
- Geographic Area 2 - Measured cis-DCE concentrations exceed the cleanup level in one residential area (Geographic Area 2). The concentration of cis-DCE measured in samples collected from boring location B-76 (up to 4,600 ug/L) exceed the cleanup level for cis-DCE (3,800 ug/L). Note that shallow groundwater concentrations at this location (150 ug/L) are well below the applicable risk-based cleanup level. Indoor air testing and/or installation of presumptive mitigation systems has been completed in this area. Additional details are included in Section 5.6. This area is downgradient of the northern source where groundwater treatment is recommended as described in Section 10.

8.4.2 Groundwater Surface Water Interface

GSI investigation results indicate that groundwater concentrations exceed generic GSI criteria along the up gradient perimeter of the wetland (B-108, B-113 and B-114). As described in Appendix B, additional evaluation of the GSI will be completed. Cleanup levels protective of the GSI pathway will be developed based on this evaluation, and if appropriate will be treated as described in Section 10.

Section 9
Evaluation of Final Corrective Measures Alternatives

9.1 Threshold Criteria for Corrective Measures

TRC Environmental Corporation (TRC) evaluated site conditions and preliminary corrective measures alternatives in order to see which alternatives did not meet the United Stated Environmental Protection Agency (USEPA) Resource Conservation and Recovery Act's (RCRA's) three threshold criteria:

- Protection of human health and the environment;
- Achieve media cleanup objectives (e.g., media cleanup levels, points of compliance, and cleanup timeframes); and
- Control the sources or release so as to reduce or eliminate, to the extent practicable, further releases of hazardous waste or hazardous constituents that may pose a threat to human health and the environment.

The information applied while screening the potential corrective measures technologies evaluated in this Corrective Measures Proposal (CMP) was based on the following information sources:

- Technical literature sources (e.g., USEPA, Interstate Technology and Regulatory Council [ITRC]);
- Published case studies of technology applications and performance;
- Discussions with commercial vendors of applicable technologies; and
- TRC's knowledge of site conditions, our experience at the Site, and our experiences with other similar sites.

Some examples of the alternatives which were eliminated from further consideration and the basis for why these alternatives did not meet the threshold criteria are provided below:

- **No Action** – The no action alternative would not achieve the media cleanup objectives within a reasonable timeframe.
- **Phytoremediation** – Phytoremediation relies on plants to capture and treat affected groundwater. This technology is very effective in the right circumstances. However, the depth of affected groundwater above the proposed cleanup levels, when compared to the effective depth of treatment with phytoremediation, is beyond the depths from which the plants uptake water. Because the chlorinated volatile organic compounds (CVOCs) in

groundwater extend to depths greater than the anticipated maximum treatment depth for phytoremediation, the attainment of media cleanup objectives would not be achieved in a reasonable timeframe.

- **Monitored Natural Attenuation (MNA)** – Given the concentrations in groundwater in the northern plume and the southern plume, attainment of the media cleanup levels described in Section 8 within a reasonable timeframe would not be achieved through the use of MNA alone. Although natural attenuation and degradation processes are certainly components of technologies that meet the threshold criteria.
- **Groundwater Recovery and Treatment** – Groundwater recovery and treatment is a technology that is well understood. This technology has been available and in use for decades. However, this technology has fallen from favor given the extended duration of operation and maintenance (and associated high costs) and the frequent failure to meet media cleanup objectives. Also, this technology typically requires significant amounts of infrastructure to construct, and energy to operate extraction pumps and treatment systems (air strippers), making this technology unfavorable from a sustainability standpoint. Similar to the MNA approach, attainment of media cleanup objectives would not be achieved in a reasonable timeframe using groundwater recovery and treatment alone, so the technology was not retained. However, using a pulsed groundwater circulation technology along with enhanced biostimulation is a technology that met the threshold criteria and was considered further.

9.2 Balancing Criteria for Corrective Measures

TRC screened corrective measure options for possible use that passed the threshold screening evaluation (Section 9.1) using RCRA's corrective measures balancing criteria and an additional balancing criterion that takes into consideration the sustainability aspect of the corrective measure. The evaluation process consisted of a weighted comparison of each alternative based on the benefits and drawbacks of each option, considering the following:

- Long-Term Effectiveness
- Reduction in the Toxicity, Mobility, or Mass/Volume of Contaminants
- Short-Term Effectiveness
- Implementability
- Sustainability
- Cost Effectiveness

The proposed corrective measures are based on the balance between these various criteria for each alternative, rather than basing the corrective measure selection on only one of the criteria (e.g., cost). Each of these balancing criteria is discussed further in the following sections. The ranking metrics for the balancing criteria are presented in Table 5. The balancing criteria

assessment took into consideration the individual assessment parameters and resulted in the ranking of the alternative as "low," "moderate," or "high" for each criterion.

The assessment helped to highlight the benefits and drawbacks of each option, and therefore facilitated final selection of the proposed corrective measure(s). The evaluation of all technologies is based on literature review of sites using these technologies with characteristics similar to the Site, government guidance documents, modeling (if necessary), interim remedial measures data, and previous activities at the Site. Balancing criteria are described below.

9.2.1 Long-Term Effectiveness

The long-term effectiveness was evaluated based on the alternative's applicability to the onsite conditions. The long-term operation of such a system must be flexible enough to handle any unforeseen changes in the site conditions. These attributes, along with the overall useful life of the system components such as equipment and structures were evaluated to determine the long-term effectiveness of each alternative. The long-term reliability and effectiveness were evaluated based on:

- Reliability and Effectiveness
- Life expectancy of the corrective measure
- Operation and maintenance requirements
- Operational flexibility

9.2.2 Reduction in Toxicity, Mobility, or Mass/Volume of Contaminants

A comparison was made based on initial site conditions to expected post-corrective measure conditions in order to estimate the reduction of toxicity, mobility, and volume/mass of COCs. This is an important part of the balancing criteria because it helps to assess whether each alternative's effectiveness in contaminant reduction outweighs the challenges associated with the other balancing criteria (i.e., implementability, cost, etc.). The ability to reduce the toxicity, mobility, or volume/mass of affected media had a large influence on TRC's alternative recommendation.

9.2.3 Short-Term Effectiveness

In order to evaluate short-term effectiveness, an estimate was made of the time frame needed for each alternative to reduce the toxicity, mobility, and mass/volume of the contamination to the selected cleanup levels. Additionally, consideration was given to the risks directly associated with the treatment technology, including: fire, explosion, exposure to hazardous substances and potential threats associated with treatment, excavation, transportation, disposal, or containment of waste material. The short-term

effectiveness of each alternative was weighted based on the short-term risk/potential risk that the contaminants pose to any onsite workers and surrounding community members when compared to the risk associated with implementation of the treatment technology.

9.2.4 Implementability

An evaluation of site physical characteristics was made in order to assess the constructability of each alternative. Implementability was determined based on the following parameters:

- Amount of time it will take to obtain permits/approvals required for construction
- Considerations for bench scale or pilot-scale studies
- Amount of time it will take to construct
- Amount of time to achieve desired results
- Availability and proximity to materials/supplies, disposal services, storage capacity, and other technical services
- Availability of the technology
- Potential impacts on existing and planned land use
- Health and safety issues associated with implementation and construction.

9.2.5 Sustainability

Although not considered one of RCRA's traditional five balancing criteria, sustainability is a criterion that evaluates the impact of the corrective measure alternatives considering environmental, social, and economic factors throughout the project life cycle. In doing so, decision makers can lessen negative effects of the corrective measure, while protecting human health and the environment, and still meet regulatory objectives. The consideration of these factors has several names (e.g., Sustainable Remediation, Green and Sustainable Remediation [ITRC] , Green Remediation [USEPA]), but all value the site-specific use of products, processes, technologies, and procedures that mitigate contaminant risk to receptors while balancing community goals, economic impacts, and net environmental effects. Sustainability has emerged as a beneficial approach that optimizes all phases of remediation, from site investigation to attainment of media cleanup objectives. The goal of sustainable remediation is to integrate sustainable decisions and principals across the project life cycle by considering:

- Use of innovative solutions that mitigate contaminants while reducing material resource consumption and carbon footprints

- Implementing Best Management Practices (BMPs) that reduce energy, water, and material resource consumption during remediation
- Implementing management strategies to reduce future liabilities and ongoing maintenance while enabling property to be returned to beneficial use
- Integrating renewal energy resources during the remediation life cycle to reduce environmental footprints and achieve more sustainable cleanups

9.2.6 Cost Effectiveness

This balancing criterion includes an estimate of cost for all of the components involved in the preparation, design, operations and maintenance of each technology. Cost estimates include engineering, site preparation, construction, materials, labor, sampling and analysis, waste management and disposal, permitting, health and safety measures, training, operation and maintenance, etc. These estimates include the probable costs for construction, engineering design, and quality assurance inspection during construction. The estimates also include the net present worth (NPW) cost of operation, maintenance, and monitoring. These budgetary estimated costs are sufficient for comparative analysis, but do not represent firm construction cost estimates. The budgetary costs for the evaluated technologies are summarized in Appendix S.

9.3 Evaluation of Corrective Measures for Soil

Four alternatives were retained in the evaluation for soil corrective measures after the threshold screening evaluation was completed:

- Alternative 1: Soil Vapor Extraction (SVE)
- Alternative 2: *In situ* Thermal Desorption (ISTD)
- Alternative 3: *In situ* Chemical Oxidation (ISCO)
- Alternative 4: Excavation and Disposal
- Alternative 5: Institutional Controls (ICs) and Engineering Controls (ECs)

The recommended corrective measures include a combination of several alternatives. A summary of the balancing criteria evaluation for soil is located in Table 5.

9.3.1 Alternative 1: Soil Vapor Extraction

SVE is a technology in which a high vacuum is applied to the subsurface to create vapor phase pressure gradients to the extraction well and to remove vapor from the well. The SVE remediation technology uses vacuum blowers and extraction wells to induce gas flow through the subsurface, collecting contaminated soil vapor, which is subsequently treated aboveground. SVE systems can rely on gas inflow through natural routes or

specific wells may be installed for gas inflow (forced or natural). The vacuum extraction of soil gas induces gas flow across a site, increasing the mass transfer driving force from aqueous (soil moisture), non-aqueous (pure phase), and solid (soil) phase into the gas phase. The ability of the SVE system to propagate air flow across a site is critical to the successful use of SVE. Even with high air flow, soil moisture and subsurface heterogeneity (i.e., a mixture of low and high permeability materials) can result in less vapor flow across some zones, reducing the overall effectiveness of SVE. SVE may be used as a stand-alone soil treatment technology, or in conjuncture with air sparge to treat soil and groundwater. As described in Section 6, SVE is being used as an interim measure at the Site. Data collected from these systems show this technology to be an effective means to address CVOCs in on-site soils.

The native on-site geology consists of a near surface lower permeability silt/clay unit underlain by high permeability sand and gravel deposits. In most locations, Site development has resulted in the excavation and replacement of the near surface lower permeability silt/clay with more permeable fill material beneath much of the existing building footprint. As such, most of the vadose zone soils at the Site are highly conducive to vapor flow. However, in some locations, near surface soils are lower in permeability and therefore do not allow for effective vapor flow. In these areas, soil amendments could be blended and mixed with the soil to increase the soil permeability and increase the mass transfer of soil gas through the vadose zone. Typically 3-percent calcium oxide (aka Quick Lime) is successful in conditioning clay rich soils for *in situ* treatment using SVE. By conditioning of the soil and performing SVE, off-site disposal of contaminated soil can be avoided. Blending and then implementing SVE would only be cost effective in small areas (e.g., 3,000 -6,000 ft^2) based on the cost to blend large areas.

9.3.1.1 Long-Term Effectiveness

Two SVE systems are currently operating at the Site. Operation and maintenance (O&M) of these systems have been relatively trouble free over several years of operation. Based on this, SVE would be effective in treating on-site high-permeability soils with COCs above the relevant soil cleanup levels where a surface cap (e.g., concrete building slab or natural surficial low-permeability soil) is in place. The most significant component of SVE systems, i.e., the blower enclosure and carbon treatment system, were constructed inside shipping containers and thus can be relocated at relatively low cost to new/different treatment areas as soil cleanup levels are met. The design and construction of SVE systems can accommodate current and anticipated future land use.

After construction of an SVE system, operation, maintenance, and monitoring activities would include:

- Routine SVE system inspections and maintenance, including replacement of activated carbon treatment media;
- System part replacements as necessary;
- Vapor effluent sampling; and
- Groundwater monitoring.

SVE is ranked "high" in long-term reliability and effectiveness. This rating considers that the technology is reliable and effective in addressing the relevant cleanup levels. However, the reliability and effectiveness is dependent upon active operation, maintenance, and monitoring of the system.

9.3.1.2 Reduction in the Toxicity, Mobility and/or Volume/Mass of Contaminants

SVE will result in a reduction in mobility of the contaminants in two ways. SVE controls lateral migration of affected soil gas from the treatment area. Additionally, by reducing the CVOC mass in soil, the potential for leaching to groundwater is reduced. SVE will not result in a reduction in overall toxicity of the COCs (since they are not being destroyed *in situ*), but will reduce the mass of COCs present in the subsurface to levels below the appropriate cleanup levels. Therefore, SVE is ranked "moderate" for this criterion.

9.3.1.3 Short-term Effectiveness

The Site is currently not occupied and access is controlled to prevent risk to on-site workers or community. However, if the site is redeveloped, SVE can be performed while redevelopment is underway with the cooperation of the site developer, as set forth in the New Declaration. Upon the selection of any corrective action, a site specific health and safety plan (HASP) will be developed to mitigate exposure to on-site workers associated with expansion of the SVE system. This exposure concern is primarily limited to shallow depth (<6 feet) trenching operations during the installation of subsurface extraction piping (if required).

The design and construction of a SVE system with a new blower enclosure is expected to take approximately six months, primarily due to the anticipated 90-day lead time on the blower. However, once started up, the SVE system will

start removing COCs from the subsurface very quickly. Therefore, SVE is ranked as "high" for short-term effectiveness.

9.3.1.4 Implementability

As mentioned previously, two SVE systems are operating at the site as interim measures. Implementability of the option depends primarily on the constructability of the system. The SVE technology is easily constructible for the Site. Permitting of the SVE technology is not expected to impact the implementation time. The equipment for the technology is readily available for construction and maintenance of the system. TPC has considerable experience with the technology at the site already, enabling design improvements for an expanded system. The health and safety issues associated with implementation are minimal and simply managed through a HASP during construction. The technology is rated for "high" implementability based on these criteria.

9.3.1.5 Sustainability

The SVE systems rely on carbon to adsorb the CVOCs that are present in the soil gas prior to discharge to the atmosphere. Discharge of off gas is monitored to verify that the air permit exemptions are met. Because carbon is used to sorb the CVOCs, and the carbon is required to be replaced and recycled approximately every 6 months, the carbon footprint is higher than other more passive technologies. Because of this, from a sustainability perspective, the technology is ranked "moderate" since there are carbon treatment costs, and electrical costs to operate the blowers. Ongoing O&M costs are significant, but because the site conditions are very favorable for this technology, the overall project duration is expected to be relatively short.

9.3.1.6 Cost Effectiveness

If SVE were to be coupled with air sparge, the cost for implementing this technology would be considerably higher than if this technology was coupled with another technology (i.e., ERD). The estimated NPW cost for implementing this technology coupled with air sparge is $1,239,000. The cost to expand the existing system and couple it with ERD is estimated at $440,000. The SVE technology requires annual operation and maintenance (i.e., electrical, maintenance, effluent sampling, etc.) that increase the overall cost of this technology. However, given that there is currently two SVE systems at the site, additional capacity is available to expand the system, and there is a potential to relocate the systems around the facility, reducing the capital costs for new

extraction and treatment equipment. The cost effectiveness of the SVE technology is ranked "moderate" when coupled with air sparge, and "high" when coupled with other *in situ* groundwater treatment technologies (i.e., ERD, ISCO.

9.3.2 Alternative 2: *In Situ* Thermal Desorption

ISTD is a process in which energy (electrical or steam) is provided to the subsurface by a series of thermal wells/electrodes that heat the soil, groundwater and contaminants in the ground until the contaminants, and in some cases the water contained in the soil matrix are vaporized. A number of vacuum wells, typically operated at relatively low vacuum and air flow rates compared to a SVE system, are installed to draw vapors through the hot soil where volatilization, oxidation, hydrolysis, and pyrolysis reactions occur *in situ* due to the increased subsurface temperatures. These reactions normally result in 95 to 99 percent *in situ* removal of the contaminants. Steam distillation of the VOC contaminants also occurs during the heating process, provided that sufficient temperatures (e.g., 100°C and greater) are attained in the soil matrix.

In summary, ISTD is used to boil off the soil moisture, desiccate the soil, and volatilize the contaminants at temperatures close to their boiling points. Desiccation of the soil is not necessary for removal of contaminants. However, roughly 30 percent of the moisture content must be removed to effectively boil off the solvents (LaChance, *et al.*, 2004).

The technical and economic feasibility of utilizing ISTD on this project depends on soil characteristics, hydrogeology, and the presence of coincident affected soil and groundwater at the Site. The soil must achieve the target temperature of nearly 100°C for ISTD to be successful.

9.3.2.1 Long-Term Effectiveness

ISTD is expected to be effective in dealing with soil with COCs above the relevant cleanup levels. Provided that the target temperature levels are achieved, ISTD will remove the VOCs identified at the Site through volatilization and collection with a vapor extraction system. An important consideration in reaching the target temperature levels of 99°C is not allowing excessive water to enter the treatment area and thus act as a heat sink. Typically ISTD is used to treat soil and groundwater concurrently. At sites with high permeability vadose zones, optimizing the soil moisture content can be difficult. Given the high hydraulic conductivity of the soil underlying the Site, management of groundwater flux and achievement of target temperatures

will be difficult below the water table, but is feasible within the vadose zone. Provided that the target temperatures can be reached, the treatment time is expected to be less than 1 year to reach the cleanup levels in groundwater and soil in the soil treatment areas. The O&M requirements of the ISTD technology (after the treatment period) involve groundwater monitoring to demonstrate stable and decreasing CVOC mass downgradient of the treatment area.

ISTD is ranked as "moderate" for long-term reliability and effectiveness. This rating considers that the technology is reliable and effective in addressing the relevant cleanup levels. It is critical to the success of ISTD that moisture levels in the vadose zone can be optimized and target treatment temperatures achieved in the treatment zone.

9.3.2.2 Reduction in the Toxicity, Mobility, or Volume of Contaminants

ISTD will result in the volatilization of the VOCs from the subsurface with subsequent collection in a vapor extraction system (e.g., SVE). Very little of the material is expected to be destroyed due to the relatively low temperatures of steam distillation. Therefore, the toxicity of the VOCs will not significantly be reduced. Removal of the material exceeding the soil cleanup levels will reduce the mobility, as soil cleanup levels were developed based on soil saturation levels for the system. ISTD will not result in a reduction in overall toxicity of the COCs (since they are not being destroyed *in situ*), but will reduce the mass of COCs present in the system to levels below the soil cleanup levels. Therefore, ISTD is ranked "moderate" for this criterion.

9.3.2.3 Short-term Effectiveness

The Site is currently not occupied and access is controlled to prevent risk to on-site workers or community. However, because of the amount of infrastructure involved with the ISTD technology, it is difficult to implement this technology effectively in occupied or high traffic areas. Therefore, short-term effectiveness can be adversely impacted during property redevelopment. Upon the selection of any corrective action, a site-specific HASP will be developed to mitigate any hazards to on-site workers associated with implementation of ISTD. Only parties with expertise in implementation of thermal systems will be contracted to install the remediation system if ISTD is selected. ISTD has been reported in some instances to remediate soil to below remedial goals in time periods less than one year, provided that the system works as designed. ISTD is ranked as "high" for short-term effectiveness.

9.3.2.4 Implementability

Implementability of the option depends primarily on the constructability of the system. ISTD is very energy intensive and requires a large utility service. The technology requires a utility service of 4,000 kilovolt-amperes three phase 480 volts. There are some implementation challenges for the ISTD technology at the Site which can be overcome, but increase project life cycle costs significantly. Permitting of ISTD technology is not expected to be a barrier to implementation, as vapors and produced water could be controlled and permitted as necessary. The technology is rated "moderate" for implementability based on these criteria.

9.3.2.5 Sustainability

This technology has a high carbon footprint due to the energy needs to introduce heat to the subsurface despite the ability to achieve soil cleanup levels in a relatively short time frame. In addition, capture of the CVOCs is typically performed by activated carbon, which needs to be either recycled or disposed of. Other methods of CVOC treatment include on-site steam stripping of activated carbon which requires a significant amount of energy. Given the amount of infrastructure required for the construction and operation of the ISTD system, and the amount of energy (steam or electric), the technology is ranked "low."

9.3.2.6 Cost Effectiveness

The estimated NPW cost for implementing this technology is $7,250,000. The capital cost for ISTD is very high compared with other options and therefore the technology is ranked "low" for this category.

9.3.3 Alternative 3: *In Situ* Chemical Oxidation

In situ chemical oxidation (ISCO) is a well-recognized technology for remediation of contaminated soil. Common *in situ* oxidative technologies used for chlorinated solvents include permanganate, persulfate oxidation and Fenton's oxidation. The technology has been proven to be effective for a wide variety of chlorinated compounds. However, many applications exist where the technology is ineffective due to site specific conditions, often due to difficulties in delivery of oxidants in various soil matrices or due to the natural oxidant demand from the solids. Critical components in evaluating this technology are the soil properties and the oxidant demand of the system.

Two items critical to the success of ISCO are the contact and dosage. It is important that both of these parameters be met to ensure the success of ISCO. Although the natural oxidant demand of the site soil is favorable for ISCO, the presence of co-deposited hydrocarbons would consume a significant amount of oxidant used as part of the ISCO process. The presence of these co-deposited hydrocarbons has resulted in robust reductive dechlorination in the northern plume area. Use of an ISCO technology would disrupt this process, potentially significantly, resulting in undesired consequences.

With regard to contact, the selected application technology must ensure that there is contact between the reagents and the soil. This is difficult in coarser grained unsaturated materials (sands and gravels) and a very close injection spacing would be required to achieve the desired contact. Because of the tighter spacing of injection points, typically multiple applications are necessary to address potential for CVOC rebound after treatment.

The dosage is the other key parameter for ISCO. Provided that the reagents can contact the contamination, a sufficient dosage must be applied to oxidize the target compounds and any other oxidant scavengers in the system.

The target treatment interval at the Site is primarily a surficial sandy soil. TRC has performed a chemical analysis on the system to help support the evaluation of various treatment technologies. These tests indicate that the organic carbon content of the soil is moderate at roughly 1 percent. Therefore, the approach that is evaluated is to apply excess oxidant such that there is plenty of oxidant available for the target compounds.

9.3.3.1 Long-Term Effectiveness

ISCO is effective in reducing the concentration of COCs in soil and groundwater below relevant cleanup levels, provided that both contact and sufficient dosage can be achieved. Oxidative chemistry is well documented in its ability to oxidize TCE, as well as other chlorinated VOCs and petroleum based VOCs such as benzene, etc. However, for effective soil treatment contact between the oxidant and affected soil must be achieved.

Given the high permeability of the majority of vadose zone soils, sufficient contact and oxidant dosage would be difficult to achieve without also impacting the saturated zone. There are several oxidants available for ISCO. Some persist in the environment for longer periods (potassium permanganate) or are relatively short-lived (e.g., persulfate). Selection of oxidant is an important consideration in the design of an ISCO treatment strategy.

Provided that both sufficient contact and oxidant dosage are achieved, the treatment time is expected to be less than 1 year to reach the cleanup levels for soil and groundwater in the soil treatment areas. The O&M requirements of the ISCO technology (after the treatment period) involve groundwater monitoring to show decreasing concentrations of CVOCs in groundwater downgradient of the treatment zones. ISCO can significantly impact microbial populations within the treatment areas and closely outside for 1-2 years after treatment (expected to be impacted only to a few feet outside of treatment area). Perhaps more significant of a concern is the impact to the robust reductive dechlorination which is occurring in the north plume. Because oxidative technologies treat both CVOC and non CVOC hydrocarbons, there would be a reduction in the known food source for the microbes (i.e., the COCs) hindering reductive dechlorination.

ISCO is ranked as "moderate" for long-term reliability and effectiveness. Although this technology is demonstrated to be effective in certain geologic conditions, achieving contact and sufficient dosage would be difficult to achieve. A field scale demonstration of the technology to troubleshoot the application method and fine tune the dosing and other design parameters is critical to the success of ISCO.

9.3.3.2 Reduction in the Toxicity, Mobility, or Volume of Contaminants

ISCO will result in the thorough destruction of the COCs to water and inorganic acids through oxidation in the treatment areas. This is in contrast to other evaluated technologies that will remove the COCs from the subsurface and require collection and/or treatment at the surface. Therefore, ISCO reduces the toxicity of the COCs in the areas of interest. Removal of the material exceeding the soil cleanup levels will reduce the mobility from the treatment areas. However, the concurrent mass reduction in co-deposited hydrocarbons and the destruction of microbial populations could negatively impact the downgradient plume. ISCO is ranked as "moderate" for reduction in toxicity, mobility, or volume of waste.

9.3.3.3 Short-term Effectiveness

The property is not currently active and access is controlled. Upon the selection of any corrective action, a site specific HASP will be developed to mitigate hazards to on-site workers associated with implementation of ISCO. Only parties that are trained in this area of application of ISCO and have an excellent health and safety record will be contracted to perform this work if chemical

oxidation is selected. Provided that contact can be achieved, ISCO technology can be used to reach remedial goals in the treatment area in time periods less than one year, provided that the system works as designed. Given the necessity of a field scale demonstration of the technology to troubleshoot the application method and fine tune the dosing and other design parameters, ISCO is ranked as "moderate" for short-term effectiveness.

9.3.3.4 Implementability

Implementability of the option depends primarily on the constructability of the system. Because the property is currently unoccupied, the implementation of ISCO in a tightly spaced grid pattern would be reasonable to implement. This technology is more difficult to implement at active facilities. The technology is rated "high" for implementability based on this analysis.

9.3.3.5 Sustainability

The technology is ranked "moderate" since the duration of the project will not require extensive O&M, the energy costs are relatively low when compared to other technologies, and the infrastructure necessary to implement the technology is not extensive.

9.3.3.6 Cost Effectiveness

The estimated NPW cost for implementing this technology is $1,377,000. Based on its lifetime cost compared to other technologies, the technology is ranked "moderate" for this category.

9.3.4 Alternative 4: Excavation and Disposal

The excavation process involves the removal and transportation of contaminated material to a permitted off-site treatment and/or disposal facilities. Considerations for this corrective measure include acceptance of material into disposal facility, proximity to disposal facility, and quantity of material in need of disposal. These are all factors that could influence the applicability and cost-effectiveness of this option. Some pretreatment of the contaminated media could be required.

9.3.4.1 Long-Term Effectiveness

Excavation and disposal is expected to be effective in dealing with soil with COCs above the relevant soil cleanup levels. Excavation and disposal combined with an effective sampling program to define the extent of excavation is a reliable means of removing contaminant from the area, although

typically a very capital intensive means of remediation. The O&M requirements of excavation and disposal (after the treatment period) involve only groundwater monitoring to demonstrate that the excavation was effective and concentrations downgradient of the excavated materials are decreasing. Soil would be excavated to concentrations below the relevant soil cleanup levels as determined by verification sampling. This rating considers that the technology is reliable and effective in addressing the relevant soil cleanup levels. Therefore, excavation and disposal is ranked as "high" for this category.

9.3.4.2 Reduction in the Toxicity, Mobility, or Volume of Contaminants

Excavation and disposal will result in removal of soil from the subsurface where soil cleanup levels are exceeded. The toxicity will not be reduced and the material will be disposed of in an off-site waste facility. Removal of the material exceeding the soil cleanup levels will reduce the mobility, as soil cleanup levels were developed based on soil saturation levels for the system. Excavation and disposal will not result in a reduction in overall toxicity of the COC but will reduce the mass of COCs present in the system to levels below the appropriate soil cleanup levels. Therefore, excavation is ranked "moderate" for this criteria.

9.3.4.3 Short-term Effectiveness

The Site is currently not occupied and access is controlled. Upon the selection of any corrective action, a site specific HASP will be developed to mitigate hazards to on-site workers associated with excavation. Excavation and disposal is an effective short-term solution since there is no waiting period for remediation. However, this option has issues with community acceptance due to the expected increase in large truck traffic. There is also the risk inherent in ground transport to a disposal area using public transportation systems. Additionally, excavation, transport, and disposal inherently involve exposure of remediation workers to contaminants. Excavation and disposal is ranked as "high" for short-term effectiveness.

9.3.4.4 Implementability

Implementability of the option depends primarily on the constructability of the system. Permitting of excavation and disposal is not expected to be a barrier to implementation, as vapors and produced water could be controlled and permitted as necessary. Implementability depends largely on whether physical barriers limit access to the target treatment area. For example, excavation and

disposal of soils beneath an existing building or excavation and disposal of deep soils. Typically the challenges associated with physical barriers can be overcome. Therefore this technology is rated "moderate" for implementability based on these criteria. Note that for certain treatment areas, e.g. near surface soils without other physical barriers, this rating could be increased to "high."

9.3.4.5 Sustainability

The technology is ranked "low" to "moderate" based on the volume and scope of the excavation.

9.3.4.6 Cost Effectiveness

The capital cost for excavation is typically very high compared with other options particularly if physical barriers limit accessibility. Overall for this project the technology is ranked "low" for this category.

Although excavation is a costly option for the project as a whole, it may be cost effective in some select areas. The design and planning costs of excavation projects are relatively unaffected by the volume of soil to be managed. By contrast, other technologies typically have upfront design/build costs that are significantly affected by the treatment volume. In areas where the target treatment volume is small and physical barriers are not a concern, implementability is high. However, in general, the cost effectiveness ranking for this category is "low."

9.3.5 Alternative 5: Intuitional and Engineering Controls

EPA defines ICs as non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for human exposure to contamination and protect the integrity of the remedy. ICs provide information and/or restrictions that help modify or guide human behavior at facilities and properties where hazardous wastes and contamination prevent unlimited use and unrestricted exposure. ICs are commonly used with Engineering Controls (ECs) that provide a physical barrier or method to eliminate exposure. As described in Sections 7 and 8, ICs were implemented as interim corrective measures. These ICs include:

- The Groundwater Ordinance
- The Existing Declaration, and the License Agreement, which include the following provisions:

- Development and use of the property for residential purposes is prohibited. This prohibition also includes certain commercial uses such as daycares, schools, hospitals and nursing homes.
- The Property may not be used to construct or use any underground water wells or other devices to extract groundwater on or under the Property for consumption, irrigation, or any other use, except for wells and devices that are part of any investigation, corrective measures or response activities
- The owner shall comply with any additional reasonable remedy-related restrictions (including restrictions necessary for remedy implementation), due care plans or risk mitigation plans.

Where existing ICs control or limit potential exposure pathways, these ICs were assumed to be a component of the final corrective measures. As such, soil cleanup levels were developed for other corrective measures which could work in conjunction with ICs to limit and control those risks and exposure pathways that have not been controlled with the existing ICs. Additionally, the License Agreement for the site ensures the legally enforceable cooperation of the facility owner, and allows additional restrictions to be recorded with the register of deeds to support corrective measures, and the New Declaration will amend and replace the Existing Declaration to support the recommended final corrective measures.

9.3.5.1 Long-Term Effectiveness

Where ICs impart only minimal limitations on the affected parties (e.g. requiring that an industrial property is not developed for residential use or requiring appropriate due care during site development), ICs are expected to be a reliable and effective mechanism to controlling certain exposure pathways. However, ICs alone cannot reasonably be used to control all potential exposure pathways (e.g. off-site vapor intrusion due to volatilization from affected groundwater). ICs are ranked as "moderate" for long-term effectiveness.

9.3.5.2 Reduction in the Toxicity, Mobility, or Volume of Contaminants

ICs typically do not have any impact on the toxicity, mobility, or mass/volume of contaminants. Therefore, ICs are ranked "low" for this criterion.

9.3.5.3 Short-term Effectiveness

ICs are an effective short-term solution since there is no waiting period for remediation. ICs are expected to be a reliable and effective mechanism to controlling certain exposure pathways. However, as discussed above, ICs

alone cannot reasonably be used to control all potential exposure pathways. Based on preliminary discussions with the perspective purchaser, it is anticipated that new ICs can be completed in a relatively short timeframe (e.g., several months. ICs are ranked as "high" for short-term effectiveness.

9.3.5.4 Implementability

Implementability of the option depends primarily on the acceptance of the affected parties. Existing ICs have already been implemented. Additionally, the License Agreement for the Site ensures the legally enforceable cooperation of the facility owner, and allows additional restrictions to be recorded with the register of deeds to supplement the Existing Declaration to support corrective measures. ICs are rated "high" for implementability based on these criteria.

9.3.5.5 Sustainability

The energy, water, and material resource consumption of ICs is virtually zero. ICs are ranked "high" based on these criteria.

9.3.5.6 Cost Effectiveness

Because the cost for implementing ICs and ICs are typically low when compared to active remediation technologies, while affording the same level of protection, ICs are ranked "high" for cost effectiveness.

9.4 Evaluation of Corrective Measures for Groundwater

The following five alternatives were retained in the evaluation of corrective measure for the affected groundwater after the threshold screening analysis for groundwater:

- Alternative 1: Soil Vapor Extraction (SVE)/Air Sparge
- Alternative 2: *In situ* Thermal Desorption (ISTD)
- Alternative 3: *In situ* Chemical Oxidation (ISCO)
- Alternative 4: Enhanced *In situ* Bioremediation (EISB)
- Alternative 5: Institutional Controls (ICs) and Engineering Controls (ECs)

A summary of the balancing criteria evaluation for groundwater is located in Table 5.

9.4.1 Alternative 1: SVE/Air Sparge

Air sparging involves the direct injection of atmospheric air into and below the contaminated groundwater zone. The technology is based on the transfer of

contaminant mass from the dissolved phase into the vapor phase, relying on the volatility of the contaminant. This technology would require implementation concurrently with SVE, to capture and treat the contaminant mass that is transferred into the vapor phase. There are several methods of performing SVE/Air Sparge and several patented delivery mechanisms (e.g., Accelerated Remediation Technologies, Inc. [ART] wells).

9.4.1.1 Long-Term Effectiveness

SVE/Air Sparge would be effective in dealing with soil and groundwater concentrations above the relevant cleanup levels. The SVE/Air Sparge technology essentially creates an *in situ* air stripper to remove contaminant mass from the aqueous and sorbed phases. The SVE/Air Sparge technology would be reliable since the technology is relatively simple and is well understood. Treatment is dependent on air contact and migration through the affected media. Traditional air sparge systems rely on closely spaced air sparge wells throughout the treatment area. ART well technology reduces the number of sparge wells needed and increases the air-water contact time by recirculating water from the bottom of the groundwater treatment area to near the ground surface. Air flow generated by the SVE system increases air-water contact time as groundwater percolates through the vadose zone.

Groundwater monitoring of the monitoring wells would be performed in conjunction with this technology to verify system effectiveness. The life expectancy of the system is expected to be 5 years of operation and an additional 2 years of monitoring. After construction of this system, significant operation, maintenance, and monitoring activities would include:

- Routine SVE/Air Sparge system inspections and maintenance
- Carbon replacement
- System part replacements as necessary
- Groundwater monitoring to confirm that contamination is not spreading beyond the treatment areas.

SVE/Air Sparge is a proven technology for remediation of VOCs from contaminated soil and groundwater. Overall, this technology would be effective long-term in reducing soil concentrations below the cleanup levels.

Air sparge will aerate the aquifer, essentially shutting down the robust natural dechlorination that is occurring, especially in the northern plume. Traditional

sparge wells would need to be placed very close together to get effective coverage. As such, on-site treatment will have limited ability to reach beyond the Site perimeter to treat off-site groundwater affected above cleanup levels.

SVE/Air Sparge is ranked "moderate" in long-term reliability and effectiveness. This rating considers that the technology is reliable and effective in addressing the relevant groundwater cleanup levels. However, the reliability and effectiveness is dependent upon active operation, maintenance, and monitoring of the system.

9.4.1.2 Reduction in the Toxicity, Mobility, or Volume of Contaminants

SVE/Air Sparge will result in the CVOCs being moved from the water phase to the gas phase by sparging and subsequently removed from the subsurface by the SVE system. The addition of oxygen to the system may have a limited impact on CVOCs toxicity (e.g. small quantities for vinyl chloride may be reduced to less toxic ethenes). Overall, very little of the contaminant mass is expected to be destroyed in the process. Therefore, the toxicity of the VOCs will not significantly be reduced. Removal of the material exceeding the groundwater cleanup levels will reduce the mobility, as groundwater cleanup levels were developed based on soil saturation levels for the system.

SVE/Air Sparge will have little impact on toxicity of the COCs, but will reduce the mass of COCs present in the system to levels below the appropriate groundwater cleanup levels. Therefore, SVE/Air Sparge is ranked "moderate" for this criterion.

9.4.1.3 Short-Term Effectiveness

The site is currently not occupied and access is controlled. Upon the selection of any corrective action, a site specific HASP will be developed to mitigate any hazards to on-site workers associated with expansion of the SVE/Air Sparge system. The amount of underground construction (well heads and extraction lines) will be significant and may take several months to complete. However, once operational, the SVE/Air Sparge system will begin removing COCs from the subsurface immediately. On-site reductions in groundwater concentrations should be expected to be observed shortly after start-up. However, reductions in groundwater concentrations may not be observed at downgradient wells for years. Therefore, SVE/Air Sparge is ranked as "moderate" for short-term effectiveness.

9.4.1.4 Implementability

Implementability of the option depends primarily on the constructability of the system. The SVE/Air Sparge technology is easily constructible on the Site. However, due to the high density of wells required in the treatment area, this technology has the potential to be highly disruptive to site operations and site development. Permitting of the SVE/Air Sparge technology is not expected to impact the implementation time. The equipment for the technology is readily available for construction of the system. The health and safety issues associated with implementation are minimal and simply managed through a site HASP during construction. The technology is rated "moderate" for implementability based on these criteria.

9.4.1.5 Sustainability

The technology is ranked "low" since water and material resource consumption is low but ongoing energy costs are significant.

9.4.1.6 Cost Effectiveness

The estimated NPW cost for implementing air sparge is $2,218,000. SVE/Air Sparge technology is most cost effective in areas where both soil and groundwater require treatment. The groundwater treatment area is significantly larger than the soil treatment area at the Site. Consequently Air Sparge technology would require the installation of SVE beyond the soil treatment area, significantly increasing the cost for the SVE component. Additionally, Air Sparge in the sandy soil will require a relatively large number of sparge wells (and associated piping, etc.). Due to high capital costs and moderate operation and maintenance costs, the technology is ranked "low" in the cost category for groundwater treatment.

9.4.2 Alternative 2: *In Situ* Thermal Desorption

ISTD is a process in which thermal energy (electrical or steam) is provided to the subsurface by a series of thermal wells that heat the soil, groundwater and contaminants in the ground until the contaminants, and in some cases the water contained in the soil matrix, are vaporized. A number of vacuum wells, typically operated at relatively low vacuum and air flow rates compared to a SVE system, are installed to draw vapors through the hot soil where volatilization, oxidation, hydrolysis, and pyrolysis reactions occur *in situ* due to the increased subsurface temperatures. These reactions normally result in 95 to 99 percent *in situ* removal of the contaminants. Steam distillation of the VOC contaminants also occurs during the heating process, provided that sufficient

temperatures (e.g., 100°C and greater) are attained in the soil matrix. ISTD is used to increase soil temperature and volatilize the contaminants at temperatures close to their boiling points. Roughly 30 percent of the moisture content must be removed to effectively boil off the solvents (LaChance, *et al.*, 2004). The technical and economic feasibility of utilizing ISTD on this project depends on soil characteristics and hydrogeology of the Site. It is requisite that the soil must achieve the target temperature of nearly 100°C for ISTD to be successful.

9.4.2.1 Long-Term Effectiveness

ISTD is expected to be effective in treating groundwater affected above the cleanup levels. Provided that the target temperature levels can be achieved, ISTD will remove the VOCs identified at the site through volatilization and collection with a vapor extraction system. An important consideration in reaching the target temperature levels of 99°C is not allowing excessive water to enter the treatment area and thus act as a heat sink. Consequently ISTD is most often used for groundwater treatment in low permeability soils where the influx of groundwater is limited. Provided that the target temperatures can be reached, the treatment time is expected to be less than 1 year to reach the cleanup levels in groundwater and soil treatment areas. The O&M requirements of the ISTD technology (after the treatment period) involve long-term monitoring. On-site treatment is not expected to increase soil and groundwater temperatures to the target temperature levels. As such, on-site treatment will have limited ability to reach beyond the site perimeter to treat off-site groundwater affected above groundwater cleanup levels. Additionally, the high temperatures associated ISTD may destroy or inhibit the microbial populations in the area. TRC has demonstrated that there is an active microbial population that is attenuating the CVOCs in the system through reductive dechlorination. Application of ISTD will result in large areas with reduced microbial levels. This reduction could negatively impact the off-site plume.

It is critical to the success of ISTD that target treatment temperatures can be achieved in the treatment zone. Given the high hydraulic conductivity of the saturated zone, and the potential difficulty in reaching target temperatures, ISTD is ranked "moderate" for long-term reliability and effectiveness. This rating considers that the technology is not likely to be reliable and effective in addressing the relevant cleanup levels.

9.4.2.2 Reduction in the Toxicity, Mobility, or Volume of Contaminants

ISTD will result in the volatilization of the VOCs from the subsurface with subsequent collection in a vapor extraction system. Very little of the material is expected to be destroyed due to the relatively low temperatures of steam distillation. Therefore, the toxicity of the VOCs will not significantly be reduced. Removal of the material exceeding the groundwater cleanup levels will reduce the total mass/volume of contaminants on-site, and will consequently reduce releases to off-site groundwater. Unlike ERD technologies, described later, ISTD will not treat off site groundwater. Also, ISTD will not result in a reduction in overall toxicity of the COCs (since they are not being destroyed *in situ*), but will reduce the mass of COCs present in the system to levels below the appropriate groundwater cleanup levels. Therefore, ISTD is ranked "moderate" for this criteria.

9.4.2.3 Short-term Effectiveness

The site is currently not occupied and access is controlled. Upon the selection of any corrective action, a site specific HASP will be developed to mitigate any hazards to on-site workers associated with implementation of ISTD. Only parties with expertise in implementation of thermal systems will be contracted to install the remediation system if ISTD is selected. ISTD has been reported in some instances to remediate groundwater to below cleanup levels in time periods less than one year, provided that the system works as designed. However, reductions in groundwater concentrations may not be observed at downgradient wells for years. ISTD is ranked as "moderate" for short-term effectiveness.

9.4.2.4 Implementability

Implementability of the option depends primarily on the constructability of the system. ISTD is very energy intensive and requires a large utility service, which is one main drawback in utilizing ISTD. The Site does not currently have utility service typical for ISTD (4,000 Kva three phase 480 volt). In addition to installing an adequate power supply, there are other implementation challenges for the ISTD technology. For example, special engineering controls would be required to utilize ISTD near utilities. Implementation of this technology also requires the installation of a grid of electrodes to heat the subsurface. As such it has the potential to be highly disruptive to existing operations, making it inappropriate at off-site locations. Permitting of ISTD technology is not expected to be a barrier to implementation, as vapors and

produced water could be controlled and permitted as necessary. ISTD is rated "low" for implementability.

9.4.2.5 Sustainability

Operation of the system would be relatively short (i.e., less than 1-2 years). During that time, energy use would be exceptionally high, particularly in light of the high groundwater flow rate through the system. Additionally, a significant amount of infrastructure is required to construct, operate and maintain the system during the period of operation. Consequently ISTD is rated "low" for sustainability.

9.4.2.6 Cost Effectiveness

Capital costs for ISTD are estimated to be very high. The total costs of ISTD (including power) for the areas requiring groundwater corrective action are expected to be high for ISTD when compared with other options. The ISTD technology for soil and the large area of affected groundwater make the overall project cost prohibitive for the Site. Although long-term (post-treatment) O&M costs are minimal, as only groundwater monitoring is typically required to monitor effectiveness after treatment, these savings are more than off-set by very high capital and operation costs during treatment. The estimated NPW cost for implementing this technology for groundwater is $13,355,000. Therefore, the technology is ranked "low" for the cost category for groundwater treatment.

9.4.3 Alternative 3: *In Situ* Chemical Oxidation

ISCO is a well-recognized technology for remediation of contaminated soil and groundwater. Common *in situ* oxidative technologies used for chlorinated solvents include permanganate oxidation and Fenton's oxidation. The technology has been proven to be effective for a wide variety of chlorinated compounds. However, many applications exist where the technology is ineffective due to site specific conditions, often due to difficulties in delivery of oxidants in various soil matrices or due to the natural oxidant demand from the solids. A critical feature in evaluating this technology is the hydrogeological setting in order to determine the feasibility of delivery and the oxidant demand of the system.

Two items critical to the success of ISCO are the contact and dosage. It is important that both of these parameters be met to ensure the success of ISCO. The selected application

technology must ensure that there is contact between the reagents and the contaminated media.

The dosage is the other key parameter for ISCO. Provided that the reagents can contact the contamination, a sufficient dosage must be applied to oxidize the target compounds and any other oxidant scavengers in the system. For this reason, ISCO is often not feasible in materials of extremely high carbon content, such as peat or other carbon-rich soil, since the carbonaceous material acts as an oxidant scavenger and drives the dosage requirements.

The target treatment interval at the Site is a medium to fine sand. TRC has performed a chemical analysis on the system to help support the evaluation of various treatment technologies. These tests indicate that the organic carbon content of the soil is moderate at roughly 1 percent. Therefore, the approach that is evaluated is to apply excess oxidant such that there is plenty of oxidant available for the target compounds.

In this groundwater system, there is the opportunity to inject oxidants and have them travel with the natural groundwater flow. In this system, more persistent oxidants such as potassium permanganate may be used because after injection they travel with groundwater, oxidizing contaminants in the groundwater and soil along the flow path. Less persistent oxidants would have a smaller treatment area, increasing the required number of injection points to achieve comparable treatment. Regardless of the oxidant used, the persistence of oxidants is limited, consequently without off-site injections, off-site groundwater cleanup levels would be reached primarily through reductions in off-site mass flux at establish groundwater flow rates.

9.4.3.1 Long-Term Effectiveness

ISCO is expected to be effective in reducing concentrations of COCs in soil and groundwater below relevant cleanup levels, provided that both contact and sufficient dosage can be achieved. Potassium permanganate chemistry is well documented in its ability to oxidize TCE, as well as other chlorinated VOCs and petroleum based VOCs such as benzene, etc.

Provided that both sufficient contact and oxidant dosage are achieved, the treatment time is expected to be less than 1 year to reach the groundwater cleanup levels in the treatment areas. The O&M requirements of the ISCO technology (after the treatment period) involve only long-term monitoring. However, concurrent with treatment, microbial populations will be destroyed in the treatment areas and the near proximity for 1-2 years after treatment (expected to be impacted only to a few feet outside of treatment area). There

would also be a reduction in the known food source for the microbes (i.e., the COCs). These effects could negatively impact the downgradient plume stability.

ISCO is ranked as "moderate" for long-term reliability and effectiveness. This rating considers that the technology is reliable and effective in addressing the relevant cleanup levels on-site, provided that contact and sufficient dosage are achieved. Unless off-site access is obtained, this technology will not reach off-site groundwater.

9.4.3.2 Reduction in the Toxicity, Mobility, or Volume of Contaminants

ISCO will result in the thorough destruction of the COCs to water and inorganic acids within the treatment area. This is in contrast to SVE/Air Sparge for groundwater, which will remove the COCs from the groundwater and require collection and/or treatment at the surface. ISCO reduces the toxicity of the COCs in the treatment area. Application of ISCO to groundwater will reduce the off-site mass flux of the contamination. However, the concurrent mass reduction in co-deposited hydrocarbons and the destruction of microbial populations could negatively impact the downgradient plume stability. ISCO is ranked as "moderate" for reduction in toxicity, mobility, or volume of waste.

9.4.3.3 Short-term Effectiveness

Provided that contact can be achieved and sufficient dosage is applied, ISCO technology can be used to reach on-site cleanup levels in time periods less than one year. ISCO also has the potential to destroy contaminants in both water and soil. This effect leads to lower toxicity and no further concerns with the on-site contaminants. However, reductions in groundwater concentrations may not be observed at downgradient wells for years. The effectiveness of ISCO to ensure that contact and dosage can be achieved is best determined through the field scale application of ISCO to one treatment area to fine tune the design parameters prior to full-scale implementation. ISCO is ranked as "moderate" for short-term effectiveness since its effectiveness has not been tested at the pilot scale.

9.4.3.4 Implementability

Implementability of the option depends primarily on the constructability of the system. The application of ISCO with injection wells or Geoprobe® rods can be done with readily available equipment. Locations would be closely spaced, so

encumbrances like building walls would affect implementation. Closely spaced wells make off-site application of this technology problematic. ISCO has been rated "moderate" for implementability.

9.4.3.5 Sustainability

Material resource consumption, particularly treatment chemical, could be high. However, energy and water usage is relatively low. Therefore, this technology is ranked "low" for sustainability.

9.4.3.6 Cost Effectiveness

The present value costs of ISCO for the areas requiring corrective measures for groundwater indicate that the costs would be moderate to high due to the large volume of groundwater and aquifer material that needs to be treated. The approximate NPW cost for implementing this technology is $7,150,500. Therefore, the technology is ranked "low" for the cost category for groundwater treatment.

9.4.4 Alternative 4: Enhanced Reductive Dechlorination

Enhanced reductive dechlorination (ERD) refers to improving the natural biological and chemical processes, which, under favorable conditions, lead to a reduction in mass, toxicity, mobility, and/or volume of organic contaminants in soil and/or groundwater. ERD is typically coupled with an appropriate monitoring program to verify and track the progress of the dechlorination processes.

For the COCs and the geological setting of the Site, natural attenuation is primarily due to microbial degradation. Significant attenuation via sorption to soil is not anticipated, and the COCs are relatively persistent and unlikely to chemically degrade to any appreciable levels in the subsurface.

The primary COCs in the groundwater are PCE, TCE, and their products of degradation (i.e., cis-DCE, vinyl chloride, etc.). PCE and TCE are primarily degraded by microbes using the reductive dechlorination pathway, rather than an oxidative pathway. Soil and groundwater can be sampled for typical parameters and evaluated to determine if conditions for reductive dechlorination are present and favorable.

TRC has previously reported that monitoring wells in the on-site locations were tested for various reductive dechlorination indicator parameters. These data have provided strong evidence of an active natural attenuation process. The samples from the indicator monitoring were analyzed for compounds associated with microbial activity, such as

oxygen, carbon dioxide, nitrate, sulfate, iron, etc. The results of the sampling clearly indicate that there is an active reductive dechlorination process taking place in the northern plume area and that reductive dechlorination was successfully enhanced in the southern plume area as a result of placement of the Daramend® permeable reactive barrier (PRB) and injection of ABC Plus®.

Unlike other treatment technologies, ERD works with the natural degradation processes. ERD, as delivered in the form of enhanced *in situ* bioremediation (EISB), can be specifically designed to support and enhance the existing microbial populations. EISB at the Site would include the injection of carbon substrates that are utilized by subsurface bacteria for food and energy. This carbon substrate is stable in the subsurface, and will persist until consumed by subsurface bacteria. Consequently, with sufficient dosing, the carbon substrate can persist well beyond the injection point.

ERD can be implemented through a variety of delivery mechanisms ranging from a network of injection points to a PRB. ERD implementation through the creation of subsurface recirculation cells is a recent innovation in EISB system design that take advantage of the persistence of the carbon substrate, in order to reduce the number of injection points, improve treatment time and/or extend the treatment area. Through the use of recirculation cells, groundwater flow rates are increased in the treatment area, and greatly improve the treatment time in areas beyond the injection point. The time to reach groundwater cleanup levels at the injection point is greater with ERD when compared to other technologies. However, the ability to deliver treatment media off-site greatly reduces the time to reach cleanup levels off-site when compared to less persistent additions (air, heat or oxidative chemicals).

9.4.4.1 Long-Term Effectiveness

Based on the sampling results, ERD, particularly EISB, is expected to be effective in reducing the concentration of COCs in groundwater below relevant cleanup levels, as there is an active reductive dechlorination process taking place in the groundwater. Unlike other treatment technologies, ERD works with the natural degradation processes, to support and enhance the existing microbial populations. Based on the groundwater data, EISB is ranked as "high" for long-term reliability and effectiveness.

9.4.4.2 Reduction in the Toxicity, Mobility, or Volume of Contaminants

Reductive dechlorination results in destruction of the COCs, as they are used as part of the metabolic processes of the microorganisms in the system. Therefore, reductive dechlorination reduces the toxicity of the COCs in the areas of

interest. Through reductive dechlorination, EISB also reduces the mass of CVOCs in the subsurface. Because the carbon substrate is relatively persistent, the use of appropriately designed recirculation cells can greatly speed the reduction in downgradient contaminant mass/volume when compared to other treatment technologies. EISB is ranked as "high" for reduction in toxicity, mobility, or volume of waste.

9.4.4.3 Short-term Effectiveness

Bioremediation is already active in the northern plume area and has been enhanced by substrate addition in the southern plume area, as evident from the groundwater sampling. Microorganisms are already degrading the COCs, as evident by the presence of breakdown products, i.e. cis 1,2-DCE and vinyl chloride. Moreover, reductions in groundwater concentrations downgradient of the Site (without active off-site treatment) are expected to occur much sooner when compared to other treatment technologies. Therefore, EISB with reductive dechlorination as the primary degradation mechanism is ranked "high" for short-term effectiveness.

9.4.4.4 Implementability

Implementability of the option depends primarily on the constructability of the system. Based on sampling conducted to date, there is an active microbial population present in the system that is actively breaking down the COCs. Systems to add additional substrate to the groundwater can be constructed using existing technology (e.g. injection wells). The health and safety issues associated with implementation are minimal and simply managed through a site HASP during construction. The MDEQ may consider the injection of the amendments a permit required activity. However, the proposed amendments are commercially available products and the same or similar commercially available products have been approved by MDEQ on other projects.

EISB through the addition of a carbon substrate with reductive dechlorination as the primary degradation mechanism is rated "high" for implementability.

9.4.4.5 Sustainability

Although the active treatment time is expected to be longer (2-4 years) than other treatment technologies, the total energy, water, and material resource consumption of this technology is comparable or less when compared to other

active groundwater treatment technologies. ERD using EISB is ranked "moderate" for sustainability.

9.4.4.6 Cost

The estimated NPW cost for implementing this technology is $1,900,000. These costs are based on an EISB system that utilizes recirculation cells as the delivery mechanism for the carbon substrate. The costs for ERD include the initial capital cost of the wells, pumps, and treatment system. Costs will also include O&M of the system over its lifetime, plus the cost of the carbon substrate (e.g. lactate) and other additives. The comparative costs for ERD using direct push technology is $3,100,000. The ERD EISB technology is ranked "high" for the cost.

9.4.5 Alternative 5: Institutional and Engineering Controls

ICs as non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for human exposure to contamination and protect the integrity of the remedy. ICs provide information and/or restrictions that help modify or guide human behavior at facilities and properties where hazardous wastes and contamination prevent unlimited use and unrestricted exposure. ICs are commonly used with Engineering Controls (ECs) that provide a physical barrier or method to eliminate exposure. As described in Sections 7 and 8, ICs were implemented as interim corrective measures. These IC include:

- The Groundwater Ordinance
- The Existing Declaration, and the License Agreement, which include the following provisions:
    - Development and use of the property for residential purposes is prohibited. This prohibition also includes certain commercial uses such daycares, schools, hospitals and nursing homes.
    - The Property may not be used to construct or use any underground water wells or other devices to extract groundwater on or under the Property for consumption, irrigation, or any other use, except for wells and devices that are part of any investigation, corrective measures or response activities
    - The owner shall comply with any additional reasonable remedy-related restrictions (including restrictions necessary for remedy implementation), due care plans or risk mitigation plans.

Where existing ICs control or limit potential exposure pathways, these ICs were assumed to be a component of the final corrective measures. As such, soil cleanup levels

were developed for other corrective measures which could work in conjunction with ICs to limit and control those risks and exposure pathways that have not been controlled with the existing ICs. Additionally, the License Agreement for the Site ensures the legally enforceable cooperation of the facility owner, and allows additional restrictions to be recorded with the register of deeds to supplement the Existing Declaration to support corrective measures. The New Declaration will amend and replace the Existing Declaration.

9.4.5.1 Long-Term Effectiveness

Where ICs impart only minimal limitations on the affected parties (e.g. prohibiting the installation of supply wells in an area serviced by a municipal water supply), ICs are expected to be a reliable and effective mechanism to controlling certain exposure pathways. However, it would be difficult to control all potential exposure pathways (e.g. off-site vapor intrusion due to volatilization from affected groundwater) through the use of ICs alone. Based on these considerations, ICs are ranked as "moderate" for long-term reliability and effectiveness.

9.4.5.2 Reduction in the Toxicity, Mobility, or Volume of Contaminants

ICs typically do not have any impact on the toxicity, mobility, or mass/volume of contaminants. Therefore, ICs are ranked "low" for this criteria.

9.4.5.3 Short-term Effectiveness

ICs are an effective short-term solution since there is no waiting period for remediation. ICs are expected to be a reliable and effective mechanism to controlling certain exposure pathways. However, as discussed above, ICs alone cannot reasonably be used to control all potential exposure pathways. Additionally, new ICs may take months or even years to prepare and implement if affected parties are opposed to the IC. ICs are ranked as "high" to "moderate" for short-term effectiveness.

9.4.5.4 Implementability

The implementability of this option depends primarily on the acceptance of the affected parties. Existing ICs have already been implemented. Additionally, the License Agreement for the Site ensures the legally enforceable cooperation of the facility owner, and allows additional restrictions to be recorded with the register of deeds to supplement the Existing Declaration to support corrective measures. ICs are rated "high" for implementability based on these criteria.

9.4.5.5 Sustainability

The energy, water, and material resource consumption of ICs is virtually zero. ICs are ranked "high" based on these criteria.

9.4.5.6 Cost Effectiveness

Because the cost for implementing ICs and ECs are typically low when compared to active remediation technologies, while affording the same level of protection, ICs are ranked "high" for cost effectiveness.

Section 10
Recommended Final Corrective Measures

This section presents the overall recommended corrective measures for the former Tecumseh Products Company (TPC) property ("Site"). The recommended corrective measures are consistent with the results of the detailed evaluation of the individual corrective measures described in Section 9. The selection of corrective measures considered the ability to integrate the corrective measures for each media into interim corrective measures that are ongoing (e.g., permeable reactive barrier [PRB] and soil vapor extraction [SVE]) in order to provide an overall strategy to meet the cleanup objectives for soil and groundwater.

10.1 Institutional and Engineering Controls

Institutional Controls (ICs) and Engineering Controls (ECs) will be incorporated into the recommended final corrective measures for soil and groundwater described in Sections 10.2 and 10.3 below. Existing controls include the Declaration of Environmental Restrictive Covenants recorded on January 14, 2010 ("Existing Declaration"), the License Agreement Regarding Environmental Work, dated December 18, 2009 ("License Agreement"), and the City of Tecumseh Groundwater Ordinance. Existing controls are described in detail in Sections 6.1 and 6.2 of this Corrective Measures Proposal (CMP). These existing controls in conjunction with the proposed New Declaration restrict use and control exposures as described below.

10.1.1 Proprietary Controls (On-Site)

A copy of the New Declaration is included in Appendix K, which outlines the use restrictions including:

Access

- Owner shall grant to the Grantees the right to enter the Property at reasonable times for the purpose of determining and monitoring compliance with the Final Decision and this Restrictive Covenant, including the right to take samples, inspect the operation of the corrective measures, inspect any records relating thereto, and to perform any actions necessary to maintain compliance with the Part 111 and the Final Decision.

Property Use

- Owner shall prohibit all uses of the Property that are not compatible or consistent with the exposure assumptions for the non-residential cleanup criteria. Uses that are compatible with non-residential cleanup criteria are generally described in the Description of Allowable Uses, attached as Exhibit 4 to the New Declaration.

Groundwater

- The property owner shall not remove, disturb or damage any monitoring wells on the Property without prior written approval from (USEPA and TPC).
- No groundwater extraction wells may be installed or used on the property except for wells and devices that are part of an MDEQ or USEPA approved response activity/corrective measure, and for short-term dewatering for construction purposes
- Activities on the Property shall not interfere with the groundwater treatment system operation and maintenance, without prior written approval from USEPA and TPC.
- The Owner shall prohibit the installation of storm water detention basins on the property that are unlined or have the potential for infiltration that may alter groundwater flow and migration of hazardous substances at the Site.

Soil

- The Owner shall manage contaminated soils, media, and/or debris and all other soils located on the Property in accordance with the requirements of Part 111, of the Resource Conservation and Recovery Act (RCRA) Subtitle C, the administrative rules promulgated pursuant to Part 111 and the RCRA. This includes if the Owner elects to remove any slabs, pavement or other impervious surface on the Property.
- No contaminated soils, if any are present, may be relocated on the property except, as provided under Part 201, Section 20120c, MCL 324.20120c.
- If Owner elects to remove any slabs, pavement or other imperious surface on the Property, Owner shall be responsible for obligations under environmental laws arising from any such removal, alteration or disturbance.
- Owner shall not excavate or disturb the soils in the areas depicted on Exhibit 2[23] (Appendix K) of the New Declaration without a soils management plan approved in writing by USEPA.
- If owner elects to remove any slabs, pavement, or other impervious surface on the Property from the locations shown on Exhibit 2 of the New Declaration (Appendix K), the Owner will replace the impervious surface with an equivalent impervious surface or engineered barrier.
- Activities on the Property shall not interfere with the operation and maintenance of the Soil Vapor Extraction systems currently installed at the site or as may be expanded as described in the Final Decision, without the prior written consent of USEPA and TPC.

[23] Note that Exhibit 2 of the New Declaration is a draft figure. This Exhibit, as discussed and agreed with the Prospective Purchaser, will be updated based on the outcome of Environmental Work described in Appendix E.

Soil Vapor

- The Owner shall not build or occupy any building on the property without first completing one of the following:
    - Evaluate and determine in accordance with applicable environmental laws, rules, or regulations that no unacceptable vapor intrusion risks to human health exist in any existing or newly constructed buildings; or
    - Install, operate and maintain a vapor barrier and/or mitigation system designed to eliminate the potential for subsurface vapor phase hazardous substances to migrate into any building at concentrations greater than applicable criteria.
- If Option 2 above is selected, the Owner shall install and thereafter maintain a vapor barrier and/or install and thereafter operate and maintain a vapor intrusion mitigation system in accordance with applicable standards and criteria at the time.

10.1.2 Proprietary Controls (Off-Site)

As described in earlier sections of this CMP, TPC has installed sub slab depressurization/ventilation (SSDV) systems at off-site properties. Agreements are in place allow future access by TPC, TRC, and USEPA.

10.1.3 Governmental Controls (on and off-site)

The Groundwater Ordinance, which was approved by MDEQ staff specializing in groundwater use restrictions, was enacted by the City of Tecumseh on June 6, 2011, as Ordinance No. 4-11. The restricted zone includes the area of affected groundwater, as well as a one block (minimum) buffer zone around the area of affected groundwater as illustrated on Figure 21. Groundwater use is restricted as follows:

- The installation, development, maintenance, and use of private water wells is prohibited;
- Connection to the municipal water supply is required; and
- Existing private water wells must be abandoned.

Between 2009 and 2011, TPC completed a private well survey area to identify all wells within restricted zone and facilitate compliance with the Groundwater Ordinance. As of June 2012, all properties were connected to the municipal water supply and all private wells within the restricted zone were decommissioned.

The recommended final corrective measures for groundwater incorporate the existing Groundwater Ordinance. As described in Sections 7 and 8, the Groundwater Ordinance reliably controls the following exposure pathways:

- Residential drinking water;
- Non-residential drinking water;
- Residential groundwater contact; and
- Non-residential groundwater contact for all workers excluding those whose job duties include subsurface excavations to depths at or below the water table.

10.2 Recommended Corrective Measures for Soil

The following investigation/corrective measures are proposed to address potentially affected unsaturated soils at the Site.

10.2.1 Institutional Controls Including Recording of the New Declaration

ICs will be utilized to control on-site exposure pathways related to on-site soils. These ICs are described in detail in Section 10.1 of this CMP.

10.2.2 S-Building SSDV

A SSDV system is installed in S-Building. This building is not currently occupied. Given the uncertainty in Site development plans, it is currently uncertain if S-Building will remain. If this structure is going to remain and become occupied, then the SSDV system should continue to be operated. Continued operation of the SSDV for S-Building is required by the ICs described above.

10.2.3 Soil Vapor Extraction

Currently there are two SVE systems operating at the facility. The SVE systems were constructed as interim measures while site investigations were performed and during development of this CMP.

10.2.3.1 Northern SVE System

The purpose of the northern SVE system was to:

- Mitigate the potential for vapor intrusion into P-Building so that the space could be occupied, and
- Prevent potential chlorinated volatile organic compounds (CVOCs) in soil gas from migrating laterally onto adjacent properties, and
- Reduce contaminant mass in the unsaturated soils.

CVOCs may be present in soil gas as a consequence of CVOCs in shallow groundwater and/or CVOCs in adjacent unsaturated soils. As part of the soil

sampling workplan included in Appendix E, additional soil sampling is proposed to verify that operation of the P-Building SVE system has effectively reduced CVOC concentrations in soil to concentrations below applicable risk-based criteria.

Concentrations of CVOCs in the groundwater beneath P-Building currently exceed calculated building-specific groundwater cleanup levels for vapor intrusion. Therefore, the continued operation of this system (or similar) is expected until groundwater in the north is treated to levels that do not result in a potentially complete and significant vapor intrusion pathway for indoor air in P-Building.

10.2.3.2 Southern Perimeter SVE System

The purpose of the southern perimeter SVE system was to:

- Eliminate the potential lateral migration of soil gas from potential on-site soil source areas, and
- Capture soil gas volatilizing from VOC affected groundwater from the southern plume area.

The continued operation of this system (or similar) is predicated on the treatment of groundwater such that the groundwater concentrations in the southern plume area do not result in vapor migration above applicable levels, and on the treatment of on-site soil source such that lateral soil gas migration from these areas is acceptable. There are currently no structures in this area of the Site. As such, ongoing operation of this system is not required to control the on-site vapor intrusion pathway. ICs ensure that any future on-site construction in this area will have its own vapor mitigation system installed; therefore operation of this SVE is not predicated on site development. Consequently, the southern perimeter SVE system will continued to be operated to manage soil vapor while on-site groundwater treatment, and if necessary on-site soil treatment, are occurring.

10.2.3.3 Potential Expansion or Relocation of Existing SVE Systems

As part of the comprehensive soil data evaluation described in Appendix E, two potential soil source areas were identified with TCE concentrations in the permeable portion of the vadose zone that could represent ongoing sources to soil gas:

- Soils in the vicinity of the former chemical stockroom area near sample location SB-MIP-40;
- Soils in the vicinity of the former distillation and solvent recovery system, e.g., the southern source area.

As described in the soil sampling workplan included in Appendix E, additional soil sampling is proposed at potential source areas to quantitatively determine if concentrations of contaminants in the unsaturated zone could result in a potentially complete and significant vapor intrusion pathway for indoor air in nearby structures (e.g. P-Building in the north and off-site beyond the perimeter SVE system in the south) even after groundwater cleanup levels are achieved. Based on the outcome of this investigation, expansion and/or relocation of the existing SVE systems may be proposed as part of the final corrective measures for soil. Note that in the north (chemical stockroom area), SVE system expansion is predicated on the eventual building demolition and subsequent installation of subsurface conveyance piping, as installation in the current structure (other than P-Building) is not sustainable, nor is the current structure suitable for installation of SVE wells and connection to the SVE system.

10.2.4 *In Situ* Soil Treatment/Soil Conditioning Combined with SVE (PCE source)

As described in Section 5.4, and Appendix C, tetrachloroethene (PCE) is present in the vicinity of soil boring B-100 above the soil saturation limit, and is resulting in off-site migration of PCE and other degradation byproducts (TCE, cis-DCE, and vinyl chloride) above the cleanup levels for groundwater. In order to achieve the cleanup goals for groundwater, it is necessary to reduce the concentrations of CVOCs in soil and groundwater within this area. As described in Appendix E, additional sampling is proposed to complete the lateral delineation of soil concentrations above soil saturation levels. Following completion of this investigation, a recommendation for an appropriate interim corrective measure can be made.

Based on the volume of soil that is expected to be treated, the off-site disposal cost for soil disposal at a landfill is likely prohibitive. Therefore, the proposed interim measures will focus on treatment technologies that address this source area *in situ*. Soil blending with *in situ* chemical oxidation (ISCO) or *in situ* enhanced reductive dechlorination (ERD) technologies are under consideration. We anticipate these activities will be performed in 2016, with consultation with USEPA, while the CMP is under review and the Final Decision is issued by USEPA. Use of soil blending in this area serves two purposes: 1) application of the treatment chemical, and 2) soil conditioning. PCE is

present in both the near surface low permeability material and the deeper sandy material. During soil blending the natural compaction of the clayey soils will disturbed increasing the soil permeability, e.g. conditioning the soil to allow for more effective use of SVE technologies. Consequently, if additional (polishing) treatment is necessary, a SVE extraction well, will be installed in this area and connected to the existing perimeter SVE system to polish residual contamination in the unsaturated zone. Because the depth to groundwater in this area is relatively shallow (less than 15 feet), soil blending can also be used to treat the contaminant mass in the capillary fringe and upper portion of the saturated zone, significantly reducing the contaminate mass in the groundwater prior to implementation of groundwater corrective measures as described below.

10.3 Recommended Corrective Measures for Groundwater

10.3.1 Institutional and Engineered Controls Including Recording of the New Declaration

ICs and ECs will be utilized to control on-site and off-site exposure pathways related to groundwater. These ICs are described in detail in Section 10.1 of this CMP.

10.3.2 Enhanced Reductive Dechlorination

Based on the threshold and balancing criteria analysis performed in Section 9, **Alternative 4: Enhanced Reductive Dechlorination (ERD),** specifically Enhanced *In Situ* Bioremediation (EISB) with treatment chemicals introduced to the subsurface through recirculation cells, is recommended as the corrective measure for groundwater. As proposed, ERD rates moderate to high for all six of the balancing criteria for corrective measures.

ERD can be accomplished through the addition of chemical amendments (e.g. zero valent iron) which create a strongly reducing environment in which chlorinated compounds are chemically degraded to benign ethenes and ethanes. Alternatively, ERD can be accomplished through EISB. EISB involves the addition of chemical amendments (e.g. lactate) which concurrently create (or maintain) a reducing environment and support microbial growth. Where subsurface conditions can support microbial growth, EISB is typically the preferred form of enhanced ERD due to implementability, sustainability, and cost considerations.

ERD can be implemented through a variety of delivery mechanisms ranging from a network of injection points to a permeable reactive barrier. ERD implementation through the creation of subsurface circulation cells is a recent innovation in EISB system design that takes advantage of the persistence of the carbon substrate (in comparison to ISCO treatment chemicals), in order to reduce the number of injection points, improve

treatment time and/or extend the treatment area. Through the use of circulation cells, groundwater flow rates are increased in the treatment area, greatly improving the treatment time in areas beyond the injection point, including off-site.

The addition of carbon substrate to the subsurface will enhance the reductive dechlorination that is already occurring. EISB circulation cells are proposed to expedite the delivery and enhance the distribution of amendments throughout the aquifer. Four groundwater recirculation cells will be established to distribute the substrate in the aquifer: two recirculation cell in the northern plume area, and two recirculation cells in the southern plume area. These cells and associated treatment areas are shown in Figure 29.

Proposed system design, implementation and monitoring are described in detail in Section 11. Each recirculation cell will consist of an extraction well (EW) and an injection well (IW). Modeling predicts that EISB amendments will travel from the injection well to the extraction well in approximately 6 months. Therefore, the injections will be conducted over a period of approximately 6 months with the injection rate for each well at approximately 10 gallons per minute (gpm). After 6 months of injection, it is expected that the presence of amendments will be detected in the extraction well. At which time, the circulation cell will be turned off while the amendments are consumed by anaerobic degradation.

Operation, maintenance, and monitoring (OM&M), including groundwater monitoring, will be performed to evaluate the performance of the EISB program. System operation data (e.g. flow rates, back pressure, carbon usage, etc.) and groundwater concentration data (VOCs and MNA parameters) will be used to make changes to the system in order to improve treatment efficiency and to assess the need for contingency corrective measures (see Section 11.6). Note that operation of the EISB systems for the northern plume area and the southern plume area will be completed independently and when the performance objectives have been met for a specific area, the system can be switched off independent of the performance of the other area. Performance monitoring is described in Section 12.

Section 11
Groundwater Corrective Measures

This section presents a detailed preliminary design of the final corrective measures for groundwater at the former Tecumseh Products Company (TPC) property ("Site") that are proposed in addition to the institutional controls (ICs) and Engineering Controls (ECs), discussed in Section 10. The recommended corrective measures are consistent with the results of the detailed evaluation of the individual corrective measures described in Section 9. The selection of corrective measures considered the ability to integrate the corrective measures for groundwater with the interim corrective measures that are ongoing (e.g., permeable reactive barrier [PRB] and soil vapor extraction [SVE]) in order to provide a complementary strategy to meet the groundwater cleanup levels. Corrective measures for groundwater include a combination of institutional controls (e.g., Groundwater Ordinance) and groundwater treatment to reduce concentrations in groundwater to the groundwater cleanup levels. A construction level design will be prepared to facilitate treatment system design, vendor selection, and system installation after the Final Decision has been issued.

11.1 Summary of Proposed Treatment Technology

Based on the threshold and balancing criteria analysis performed in Section 9, **Alternative 4: Enhanced Reductive Dechlorination (ERD),** specifically Enhanced *In Situ* Bioremediation (EISB) with treatment chemicals introduced to the subsurface through recirculation cells, is recommended as the treatment technology to reduce groundwater concentrations. As proposed, ERD rates moderate to high for all 6 of the balancing criteria for corrective measures.

ERD can be accomplished through the addition of chemical amendments (e.g., zero valent iron) which create a strongly reducing environment in which chlorinated compounds are chemically degraded to benign ethenes and ethanes. Alternatively, ERD can be accomplished through EISB. EISB involves the addition of chemical amendments (e.g., lactate) which concurrently create (or maintain) a reducing environment and support microbial growth. Where subsurface conditions can support microbial growth, EISB is typically the preferred form of enhanced ERD due to implementability, sustainability, and cost considerations.

ERD can be implemented through a variety of delivery mechanisms ranging from a network of injection points to a PRB. ERD implementation through the creation of subsurface recirculation cells is a recent innovation in EISB system design that takes advantage of the persistence of the carbon substrate (relative to chemical oxidants), in order to reduce the number of injection points, improve treatment time and/or extend the treatment area. Through the use of recirculation cells, groundwater flow rates are increased in the treatment area, greatly

improving the treatment time in areas beyond the injection point, including off-site. TRC has used recirculation to implement EISB at other industrial sites with good success. Recirculation improves the distribution of the substrate so that it can be spread or concentrated where most needed. Recirculation also increases the speed that the substrate is delivered. Where TRC has applied this method in the past, TRC observed more rapid and more complete degradation of chlorinated volatile organic compounds (CVOCs) when compared to similar project which relied on subsurface injection alone, using the ambient hydraulic gradient to deliver the substrate to the treatment area.

The addition of carbon substrate to the subsurface will enhance the reductive dechlorination that is already occurring. EISB recirculation cells are proposed to expedite the delivery and enhance the distribution of amendments. Four groundwater recirculation cells will be established to distribute the substrate in the alluvial aquifer: two recirculation cells in the northern plume area and two recirculation cells in the southern plume area. These cells and associated treatment areas are shown in Figure 29.

11.2 Proof of Concept

In order to verify that EISB will be an effective corrective measure for groundwater, samples of groundwater were collected at four locations for microbial analysis. The samples were analyzed by Microbial Insights using their QuantArray® analysis. Although quantification of Dehalococcoides has become a component of assessment, remedy selection, and performance monitoring at sites impacted by chlorinated solvents, additional bacterial groups such as *Dehalobacter spp*. and *Dehalogenimonas spp*. can play key roles in reductive dechlorination of chlorinated compounds. Moreover, reductive dechlorination is not the only potential biodegradation pathway – some chlorinated compounds are susceptible to aerobic (co)metabolic biodegradation mechanisms. In order to assess these processes, TRC contracted Microbial Insights to perform analysis to provide a quantification of a variety of halorespiring bacteria (Dehalococcoides, Dehalobacter, Dehalogenimonas, Desulfitobacterium, etc.) to assess the potential for reductive dechlorination of chloroethenes, chloroethanes, chlorobenzenes, chlorophenols and chloroform. Testing also included quantification of functional genes involved in aerobic (co)metabolic pathways for biodegradation of chlorinated solvents and even competing biological processes to evaluate the potential for biodegradation of a spectrum of common chlorinated contaminants through a multitude of anaerobic and aerobic (co)metabolic pathways to give a much more clear and comprehensive view of contaminant biodegradation.

The laboratory report summarizing the analysis is included as Appendix Q. Two samples were collected in the southern plume (i.e. B-81 and SB-MIP-48) and 2 samples were collected from the northern plume (i.e. SB-MIP-38 and SB-MIP-40) as shown on Figure 1.

As shown in the laboratory report, the sample collected at B-81 had the highest and most numerous microbial populations of bacteria involved in reductive dechlorination. This is not surprising since B-81 is located downgradient and adjacent to the Daramend® PRB. This PRB was designed to add organic carbon to the subsurface in order to enhance conditions for and encourage reductive dechlorination. The results of CVOC analysis of samples collected at B-81 show high concentrations of breakdown products, cis-1,2-dichloroethene (cis-DCE) and vinyl chloride, which support the presence of high concentrations of microbes that perform reductive dechlorination. The sample collected at SP-MIP-48, up gradient from the PRB, shows the presence of most of the same microbial populations as B-81 albeit at lower concentrations.

Samples collected at two locations in the north plume also showed the presence of similar microbial populations. The abundance of each population is likely influenced by the amount of available carbon, and the geochemical condition of the ambient groundwater. The groundwater sample collected at soil boring SB-MIP-38 shows the presence of a wide variety of microbes capable of degrading CVOCs, although at lower concentrations. The relatively low concentrations of dechlorinating microbes may be due to lower concentrations of available organic carbon in this area when compared to the former chemical stockroom area. Up gradient at SB-MIP-40 (in the vicinity of the former chemical stockroom), similar strains of microbes are present at higher concentrations, indicating better geochemical conditions and/or more available organic carbon to support the microbes. Overall the data analysis illustrate that site conditions are very favorable for ERD.

11.3 Proposed Amendments

Multiple amendments were selected to permit flexibility, as modifications will likely be needed during implementation as new information is obtained and evaluated. Product specifications and Safety Data Sheets (SDSs) for the commercially-available versions of the amendments listed below are provided in Appendix R. For amendments where there are multiple commercial products, the exact commercial products will be selected at the time of the injections based on availability and cost. The following subsections provide an overview of the injection amendments to be employed for the corrective measure. Note that these amendments have been approved for use in other projects in the State of Michigan, and although use of these amendments will require consulting with the Michigan Department of Environmental Quality (MDEQ) as part of the design phase, TRC does not anticipate the addition of these amendments into the contaminant plume to be difficult for MDEQ to approve.

11.3.1 Electron Donors

In situ bioremediation is typically enhanced with the introduction of carbon substrates that are utilized by subsurface bacteria for food and energy, which are essential to the bioremediation of contaminants. There are many organic substrates, which can be

degraded and fermented in the subsurface that result in the generation of hydrogen (i.e., release of electron donor) and also provide carbon for cell growth. Substrates most commonly added for enhanced anaerobic bioremediation of CVOCs include: lactate, poly lactates, and emulsified vegetable oils (EVO), among others.

Anaerobic Biochem (ABC®) manufactured by Redox-Tech, LLC was selected as the primary amendment for biostimulation. ABC® is a patented mixture of soluble lactic acid and alcohols as well as slow- and long-term releasing fatty acids. ABC® also contains a phosphate buffer (and other alkaline materials, when necessary) to help maintain optimal pH levels and to provide a micronutrient for bioremediation.

11.3.2 pH Buffer

Bioremediation of CVOCs is optimal in a pH range between 6 and 8. The targeted injection zones appear to have near-neutral pH levels, which is optimal for the bacteria involved in the reductive dechlorination of CVOCs. If the introduction of electron donor (into the treatment area) results in depression of pH levels, buffers (a mixture of dipotassium phosphate, sodium phosphate, trisodium phosphate, sodium bicarbonate, and potassium bicarbonate) would be utilized to maintain pH within the optimal range on an as-needed basis.

11.3.3 Bioaugmentation Cultures

Bioaugmentation is a process by which specialized natural bacterial cultures are introduced into the aquifer to accelerate or increase efficiency of biodegradation. As described in Section 11.2, TRC has performed biological population tests on groundwater at the site. These data indicate that the indigenous bacteria present in the groundwater will degrade the CVOCs. The need for bioaugmentation will be assessed at the baseline sampling event and during groundwater treatment implementation by monitoring microbial concentrations, geochemical conditions and CVOC reduction. If bioaugmentation is necessary, TRC proposes to use a commercially-available microbial culture containing *Dehalococcoides* (DHC) species that has been shown to fully dechlorinate tetrachloroethene (PCE) and trichloroethene (TCE) to ethene.

11.3.4 Deoxygenating Amendments

The specialized bacteria that reductively dechlorinate CVOCs are anaerobic bacteria that are very sensitive to the presence of oxygen. Therefore, adjustments to the injection fluids will be applied at storage tanks or at injection wells, as necessary, to maintain anaerobic conditions during injection and recirculation. These amendments may

include gaseous nitrogen (N_2), sodium thiosulfate, sodium sulfite, liquid sucrose, and/or yeast extract.

11.3.5 Methane Inhibitors

Enhanced anaerobic bioremediation may generate methane as a by-product of the substrate degradation. Water-soluble amendments can be used as a supplement to effectively control methane production when combined with various ERD amendments (e.g., [emulsified] oils, lecithin, lactates, molasses, sugars, etc.) or conventional *in situ* chemical reduction (ISCR) reagents that do not (and cannot) have antimethanogenic compounds. As a contingency, a methane inhibitor will be added to the injection fluids initially. This methane inhibitor will be Provect-CH4™ Methane Inhibitor (Provectus Environmental Products), which contains a proprietary red yeast rice extract and precipitated silica. The amendment will either be pre-blended with the substrate by the manufacturer or added separately to the injection fluid. The methane inhibitor may be continually or intermittently used during the injection and recirculation program as needed. Product specifications for the products likely to be used are included in Appendix R.

11.4 EISB Implementation Strategy

The groundwater treatment area is divided into the northern plume area system and the southern plume area system. The objective of the injection programs is to significantly reduce CVOC mass in the groundwater on-site in the northern and southern plume areas, resulting in decreasing concentrations groundwater downgradient and off site. By using injection and extraction cells, it is possible to control the distribution of biostimulants throughout the aquifer both on-site at the source and a limited distance downgradient, essentially encompassing the area of highest CVOC concentration, including areas off site. Each system will have 2 injection wells and 2 extraction wells as described below.

11.4.1 Predictive Modeling of Extraction Cells

In order to design the injection and extraction well cells, TRC utilized an analytic element model to evaluate groundwater injection/capture scenarios of the CVOC plumes. An analytic element model was selected for this analysis because of its ability to accurately simulate groundwater flow around singularities such as injection and extraction wells and because of its efficiency to set up. The model used in this application is GFLOW, which is a groundwater flow model developed by Haitjema Software, a subdivision of Haitjema Consulting, Inc. GFLOW is a Windows program based on the analytic element method. It models steady state flow in a single layer within a homogeneous or heterogeneous aquifer.

The capture zone model was developed using information from site boring logs, groundwater level measurements, and previous aquifer testing. The model is not intended to be a fully calibrated groundwater model of the shallow sand aquifer system, rather the model is intended to be used to evaluate potential remediation scenarios,

The model was setup using measured aquifer parameters and reasonable boundary conditions, as listed below:

- Hydraulic conductivity = 27 ft/day
- Effective porosity = 0.2
- Aquifer base = 760 ft NGVD (water table condition)
- Uniform hydraulic gradient = 0.001
- Boundary: River Raisin constant head (variable elevation)
- Pumping and injection wells fully penetrating

Extraction/injection well couplets were simulated in each of the north and south plume areas. The number, location, and flow rate of these wells were varied to optimize treatment areas. The capture zones associated with the optimized pumping scenario are shown in Figure 29. Under the illustrated pumping scenario, two extraction/injection well couplets are simulated in each of the north and south plume areas. These extraction wells were simulated with pumping rates of 10 gallons per minute (gpm) and the injection wells were also each simulated as recharging the aquifer at a rate of 10 gpm. Visual model outputs, overlay these path-lines on aerial to help to define and illustrate the capture zones and treatment areas. Each path-line has small tick marks (circles) that are spaced at one month travel time intervals. Within each extraction/injection well couplet, the shortest travel time between the injection well and the extraction well is approximately 6 months.

The north extraction and injection system has been designed to distribute substrate throughout the source area and provide capture and containment at the recovery wells. The path-lines shown in Figure 29 illustrate the area that encompasses the injection and capture zones of system. The system is designed to be practically self-contained. The extraction wells, in addition to speeding the movement of substrate through the aquifer, also serve to contain the substrate and affected groundwater within the recirculation cell. The extraction wells will have the additional positive effect of drawing back a certain amount of off-site impact within their capture zone, as shown in Figure 29. Groundwater monitoring will be performed to ensure the desired affects are observed.

The south extraction/injection system has also been designed to distribute substrate throughout the source area and provide capture and containment at the recovery wells. Similar to the north system, the south system has been designed to be largely self-contained. However, in the south plume area, the PRB provides additional buffer for off-site migration.

11.4.2 Extraction

The extraction wells will be constructed in the alluvial aquifer and will be screened to fully penetrate the aquifer as shown conceptually on the geologic cross sections (Figures R1 and R2) included in Appendix R. The appropriate screen interval will be confirmed when wells are installed. Wells will be 6 to 8 inches in dimeter to accommodate the extraction pump. The two extraction wells in each system will pump at generally low pumping rates to allow for a more passive distribution of EISB additives, at a flow rate of approximately 10 gpm each for a total system flow of approximately 20 gpm in the north and 20 gpm in the south.

11.4.3 Carbon Treatment

A process flow diagram is shown on Figure 30. As illustrated, the extracted groundwater will flow through granular activated carbon (GAC)-filled vessels to reduce concentrations of TCE and other volatile organic compounds (VOCs) prior to reinjection. The proposed carbon treatment systems are designed to reduce groundwater concentrations prior to reinjection. A separate carbon treatment system will be used for each of the northern and southern treatment areas. Each carbon treatment system will consist of two 2,000 pound vessels operated in series. Preliminary calculations indicate the following carbon usage rates:

- **Northern System:** 1 pound of carbon per 1000 gallons of water
- **Southern System:** 1.5 pounds of carbon per 1000 gallons of water

Effluent monitoring at each vessel will be used to determine the appropriate timeline for carbon replacement. Following carbon treatment, substrate and other additives (e.g. nutrients and buffers) will be added to the treated groundwater, which will be reinjected at the injection wells.

11.4.4 Injection

The injection wells will be constructed in the alluvial aquifer and will be screened to fully penetrate the aquifer as conceptually shown on the geologic cross sections included in Appendix R. The screened interval will be confirmed when wells are installed. The proposed corrective measure will consist of injecting the pretreated, amended

groundwater in the injection wells. The following provides a summary of the amendment injection points, groundwater extraction wells and amendment quantities. The amendment loadings and injection rates are design estimates, and actual quantities will depend on field conditions and observations.

The amendment solution will be added to the pretreated groundwater at the injection wells. The quantities of amendments that may be injected are presented below. Adjustments to injection rates, pressures, dosages and injection locations will be made based on

- measured changes in total organic carbon (TOC) and CVOC concentrations in groundwater over time and as the remediation progresses,
- high backpressure during injection, or
- biofouling in the piping and wells.

Summary of Proposed Loadings of Amendment

Treatment Area	Total System Flow (gpm)	Electron Donor (ABC® or Equivalent [1] (Gal/day)	Methane Inhibitor [1] (lbs/day)	Bio-augmentation Culture (if needed) (L/day)	Yeast Extract (Gal/day)	Sodium Sulfite [2] (lbs/day)	Buffer [3] (if needed) (lbs/day)
Northern Plume	20	40	4	TBD	TBD	2	TBD
Southern Plume	20	40	4	TBD	TBD	2	TBD

Notes:
1. ABC® to include a methane inhibitor to reduce methane generation
2. Sodium Sulfite, will be utilized to deoxygenate the mix water, as needed.
3. Buffer solution will be added based on groundwater conditions observed in the field to maintain neural pH to foster bacteria populations responsible for bioremediation.

Addition of microbes may be implemented as a contingency to accelerate remediation only if needed following the first quarterly sampling event.

11.5 Effectiveness Monitoring Program

11.5.1 Injection Monitoring

For both the northern and southern plume area systems the injection and extraction rates will be monitored and adjustments made to the pumping/injection scheme as needed. These adjustments may include changes to pumping and injection rates, injection pressures, amendment concentrations and injection locations. The systems will

be operated with the goal of balancing pumping and injection flows within each recirculation cell. Operations and maintenance logs will be used to tabulate and maintain records of the rate, volume and concentration of amendment being injected.

The radius of influence and amendment distribution will be assessed through periodic gauging and groundwater sampling of nearby monitoring wells. Water level measurements will be recorded at regular intervals during the injection process. Water level measurements and groundwater geochemical parameters (pH, temperature, dissolved oxygen [DO], specific conductance [SC], ORP, turbidity and salinity) will be recorded at regular intervals during injection to further assess the progress of the injectate through the treatment area. To further assess the ROI, total organic carbon concentrations in groundwater will also be periodically monitored.

11.5.2 Groundwater Effectiveness Monitoring

Groundwater monitoring will be performed for two purposes; to monitor groundwater quality at the perimeter of the plume, and to monitor the effectiveness of EISB in meeting the performance goals of this CMP. Proposed groundwater monitoring locations for each system are summarized in Table 6. These monitoring locations include both existing wells and new wells. The approximate locations of proposed new wells are illustrated on Figure 29.

For wells proposed to monitor EISB effectiveness, groundwater monitoring locations include wells at various depths within each recirculation cell to monitor the injection progress as described above. Additionally wells within and downgradient of the treatment areas will be monitored to evaluate the performance of the treatment system.

To evaluate remediation progress, groundwater sampling will be performed as shown on Table 6 as follows:

- Pre-injection (baseline) – at least two sampling events at newly installed wells;
- Monthly for the first six months after the initial injection event at selected wells (e.g. those within the core of the recirculation cell) for select parameters in order to monitor the progress of the injectate through the recirculation cell;
- Quarterly for the duration of system operation to monitor system effectiveness at wells within the treatment area; and
- Semi-annually for the duration of system operation to monitor system effectiveness at wells downgradient of the treatment area.

The groundwater measurements and analyses will include the following, or a subset of the following, depending on the sampling event:

- Groundwater depth;
- Field-measured geochemical indicator parameters: pH, Temperature, DO, conductivity, ORP and Turbidity;
- VOCs;
- Monitored natural attenuation parameters (MNA) which may include some or all of the following: total organic carbon (TOC), dissolved iron, dissolved manganese, alkalinity, chloride, sulfate, sulfide, nitrate, nitrite, phosphate, dissolved methane, dissolved ethene, dissolved ethane, dissolved hydrogen, dissolved carbon dioxide, and volatile fatty acids (VFAs)[24]; and
- Microbial population testing (only if expected mass reduction is not achieved).

Groundwater samples will be collected via low-flow sampling methods at discrete vertical sampling depths within the saturated screen section of the wells. Table 6 provides a preliminary recommendation for sampling frequency and parameters at each monitoring location. This proposed sampling program is expected to be a working document which may be modified in consultation with USEPA as appropriate to meet project objectives.

11.6 Contingent Corrective Measures for Groundwater

If the proposed substrate injection and groundwater recirculation does not result in significant mass reduction to levels near the groundwater cleanup objectives in the projected timeframe (two complete treatment cycles), several options will be considered. The implemented contingent measures will be selected based on the data and observations from the injection/recirculation events, in consultation with USEPA.

If the data indicate that there is sufficient substrate and suitable geochemical conditions to promote reductive dechlorination, but the dechlorination is slow or incomplete, the injectate will be augmented with additional dechlorinating bacteria. The bacteria are available from commercial sources and can be added using the proposed injection wells and mixing system.

If the data indicate that the substrate is being consumed within a short distance/time from the point of injection, the concentration of substrate will be increased in order to provide sufficient carbon to facilitate the reductive dechlorination process. The added substrate may be more of a long-lasting carbon source, e.g. emulsified vegetable oil (EVO), to increase its persistence in the subsurface.

[24] Final selection of MNA parameters, MNA sampling locations, and MNA sampling frequency will be made during the final design process.

Other contingent modifications to the system could include increasing the pumping rate or modifying the additives to improve effectiveness.

If subsequent monitoring data indicate that groundwater cleanup objectives will not be attained, a root cause evaluation will be completed. That evaluation will be used to determine appropriate corrective action. Corrective action may include (but is not limited to) the following:

- Restarting and extending the duration of the EISB treatment to address residual contamination in the saturated zone;
- Modifications to EISB injection and extraction well locations; and/or
- Additional soil treatment to address residual contamination in the vadose zone that may be contributing to groundwater contamination, if additional soil treatment is determined to be necessary.

Section 12
Performance Monitoring

12.1 Groundwater Monitoring Program

The proposed groundwater performance monitoring program is described below and summarized in Table 6.

12.1.1 Monitoring Points for Groundwater Treatment System Performance

Groundwater monitoring to evaluate the performance of the groundwater treatment system will be completed for the duration of active treatment as described below.

12.1.1.1 Northern Treatment Area

Groundwater within the northern treatment area will be monitored for volatile organic compounds (VOCs), and other parameters as described in Section 11 to assess system performance during active treatment. Groundwater chemistry data will be used to assess contaminant mass reduction, aquifer conditions critical to reductive dechlorination, and the migration of the carbon substrate through the treatment area. This data will be used to support operation and maintenance of the active groundwater treatment system. Sample locations include: NEW-1, NEW-2, MW-04s, MW-04i, MW-44s, MW-44i, MW-55s and MW-55i. Monitoring will be performed until cleanup levels are achieved and verified over four semi-annual sampling events to verify cleanup levels are maintained post-treatment.

12.1.1.2 Southern Treatment Area

Groundwater within the southern treatment area will be monitored for VOCs, and other parameters as described in Section 11. To assess system performance during active treatment, groundwater chemistry data will be used to evaluate contaminant mass reduction, aquifer conditions critical to reductive dechlorination, and the migration of the carbon substrate through the treatment area. This data will be used to support operation and maintenance of the active groundwater treatment system. Sample locations include: SEW-01, SEW-02, MW-35i, MW-35d, MW-49s, MW-49i, MW-50s, MW-50i, MW-51i, and MW-01s. Monitoring will be performed until cleanup levels are achieved and verified over four semi-annual sampling events to verify cleanup levels are maintained post-treatment.

12.1.2 Monitoring Points for Contaminant Mass Reduction

Groundwater monitoring will continue at the groundwater monitoring points described below for the duration of groundwater treatment to establish contaminant mass reduction through the core of the contaminant plume.

12.1.2.1 Northern Treatment Area

In, and downgradient of, the northern treatment area VOC concentrations near the centerline of the contaminant mass will be monitored to assess overall contaminant mass reduction.

- Source/Treatment Area Locations: MW-04s, MW-04i, MW-44s, MW-44i, MW-55s and MW-55i.
- Downgradient Locations: MS-O3s, MW-46s, MW-46i, MW-45s, MW-43s, MW-47i, and MW-23
- Monitoring will be performed until stable or decreasing VOC concentrations are established. Due to groundwater flow rates, the time to establish stable or decreasing VOC concentrations at far downgradient locations is expected to be longer; therefore, monitoring for contaminant mass reduction will be completed independently at each well.

12.1.2.2 Southern Treatment Area

In, and downgradient of, the southern treatment area VOC concentrations near the centerline of the contaminant mass will be monitored to assess overall contaminant mass reduction.

- Source/Treatment Area Locations: MW-01s, MW-35i, MW-49s, MW-49i, MW-50s, MW-50i, and MW-51i.
- Downgradient Locations: MW-52s, MW-52i, MW-53s, MW-53d, MW-54s, and MW-54d.
- Monitoring will be performed until stable or decreasing VOC concentrations are established. Due to groundwater flow rates, the time to establish stable or decreasing VOC concentrations at far downgradient locations is expected to be longer; therefore, monitoring for contaminant mass reduction will be completed independently at each well.

12.1.3 Compliance Monitoring Points for Cleanup Levels

As described in Section 8, risk-based cleanup levels were developed for each of several geographic areas. A network of compliance monitoring points is proposed to monitor decreasing concentrations within the areas where cleanup levels.

- **P-Building:** When the cleanup level of **2,600 microgram per liter (ug/L) for trichloroethene (TCE)** has been achieved and verified over 4 semiannual sampling events, the operation of the P-Building soil vapor extraction (SVE) system is no longer necessary to control groundwater volatilization to indoor air. Compliance monitoring points for this cleanup level include: **MW-55S and MW-04S**.
- **Geographic Area 2:** This is the residential area located downgradient of the northern source area. The cleanup level for this area is **130 ug/L for TCE.** Compliance monitoring points for this cleanup level include: **MW-43S and MW-45S**.
- **Geographic Area 4:** This non-residential area is located along the northern perimeter of the Site. The cleanup level for this area is **6,000 ug/L for TCE.** Compliance monitoring points for this cleanup level include: **MW-04S, MW-46S and MW-45S**.
- **Geographic Area 6:** This non-residential area is located along the southern perimeter of the Site. The cleanup levels for this area, including adjacent on-site locations, are **19,000 ug/L for PCE and 1,300 ug/L of TCE.** Compliance monitoring points for these cleanup levels include: **MW-01S, and MW-50S**.
- **Geographic Area 8:** This area is located downgradient of the southern source area. The cleanup level for residential structures in this area is **140 ug/L for TCE,** and the cleanup level for non-residential structures in this area is **1,400 ug/L.** This area is currently zoned for non-residential use only. There is one residential property in this area. If the property use in this area becomes non-residential, then the cleanup level will become non-residential. Compliance monitoring points for this cleanup level include: **MW-53S and MW-54S**.

Compliance point groundwater monitoring will continue until the applicable cleanup level(s) has been achieved and verified over four semi-annual sampling events.

GSI Monitoring Points

The following monitoring points will be used to evaluate and monitor the downgradient extent of the contaminant plume and the groundwater-surface water interface (GSI): MW-29s, MW-48S, MW-48I, MW-30S, MW-30D, MW-10D, MW-41, MW-17S, MW-42D, and MW-14D. Monitoring at these locations will continue until contaminant mass reduction, as described above, has been established at up gradient wells.

As described in Appendix B, additional evaluation of the GSI will be completed. Cleanup levels protective of the GSI pathway will be developed based on this evaluation, and TPC will work with the Michigan Department of Environmental Quality and USEPA to establish appropriate compliance monitoring point(s) in this area.

12.1.4 Side Gradient and Up Gradient Monitoring Points for Plume Stability

The following monitoring points will be used to evaluate and monitor plume stability along the up gradient and side gradient perimeter of the treatment areas and contaminant plume:

- Up Gradient: MW-02s, MW-32S, MW-32D, MW-37S, MW-34S, and MW-34D;
- Side Gradient of Southern Area: MW-39S, MW-39D, PRB-08S, PRB-08D, PRB-02S, MW-38S, MW-38D, PRB-11S, MW-20S, MW-20D, MW-27S, MW-27D, and MW-14D;
- Side Gradient of Northern Area: MW-24S, MW-24D, MW-12S, MW-12D, MW-36S, and MW-36D.

Side gradient and up gradient monitoring will continue on an annual basis until contaminant mass reduction in the associated groundwater treatment area has been demonstrated and verified with four semi-annual sampling events.

12.2 Soil Gas Monitoring Program

The area over which soil gas monitoring will be conducted has been revised to be consistent with areas where risk based cleanup levels for vapor intrusion are exceeded. Soil gas sample points are illustrated on Figure 29 and the revised soil gas monitoring program is summarized in Table 7. As described in this CMP, current human exposures are acceptable. Soil gas monitoring will continue until four consecutive semi-annual groundwater monitoring events show stable or decreasing groundwater concentrations in compliance groundwater monitoring wells corresponding to the applicable geographic area, as listed in Section 12.1.3. The following soil gas monitoring is proposed:

- **Geographic Area 2:** This is the residential area located downgradient of the northern source area. Soil gas monitoring in this area and the near vicinity will include soil gas sample points SG-10, SG-11 and SG-26.
- **Geographic Area 4:** This non-residential area is located along the northern perimeter of the Site. Soil gas monitoring in this area and the near vicinity will include soil gas sample points SG-06 and SG-07.
- **Geographic Area 6:** This non-residential area is located along the southern perimeter of the Site. Soil gas monitoring in this area and the near vicinity will include soil gas sample points SG-01, SG-22 and SG-25.
- **Geographic Area 8:** This area is located downgradient of the southern source area. Soil gas monitoring in this area and the near vicinity will include soil gas sample point SG-09.

Section 13
Project Schedule

A project schedule is provided in Chart 3. As shown on this schedule, the Corrective Measures Proposal (CMP) is being submitted to the United States Environmental Protection Agency (USEPA) on February 1, 2016. The USEPA has indicated to TRC that it may take eight months to a year for USEPA to issue the Final Decision (FD). During that period, there will be review of the document by USEPA and the Michigan Department of Environmental Quality (MDEQ), the issuance of a statement of basis, the public comment period, and then the issuance of the Final Decision.

13.1 Environmental Work to be Completed during Review Process

As outlined in this CMP, and as shown on the project schedule, there are a number of tasks that TPC intends to undertake concurrently during the CMP review and approval process to move the project to completion. The following provides a brief summary of the activities to be undertaken during the CMP review process:

- **New Declaration** – the New Declaration will be signed and recorded concurrently with the closing on the property by the prospective purchaser. This is expected to occur in early 2016. A copy of the New Declaration is included in Appendix K.
- **GSI Investigation** – As outlined in Appendix B, Tecumseh Products Company (TPC) intends to undertake additional activities to demonstrate compliance at the groundwater-surface water interface (GSI) when there is substantial agreement between MDEQ, USEPA, and TPC regarding the workplan. Completion of the proposed activities in the workplan is also expected to follow the schedule outlined in Chart 3.
- **PCE Source Area Interim Measure** – As described in Appendix C, concentrations of PCE in soil have resulted in tetrachloroethene (PCE) migration to groundwater. Groundwater downgradient of this area has chlorinated volatile organic compound (CVOC) concentrations above groundwater cleanup levels. As a result, TPC has elected to perform an Interim Measure to address this source. The schedule outlines the proposed timeline to address this area.
- **Soil Evaluation and Workplan** – As outlined in the Soil Evaluation and Workplan (Appendix E), TPC intends to undertake additional soil investigation. This work is expected to follow the schedule outlined on Chart 3. TPC anticipates that this work will begin when there is substantial agreement between TPC and USEPA regarding the scope of the activities outlined in the workplan.
- **High Resolution Site Characterization** – High resolution site characterization (HRSC) borings are proposed as described in the workplan included in Attachment F. TPC and

USEPA have reached conceptual agreement on the location of these borings. We anticipate initiating this work when access to off-site properties is secured, which is expected within about 30-60 days. If TPC is unable to secure access in a timely manner, TPC will notify USEPA and discuss alternatives.

- **Monitoring Well/Soil Gas Probe Installation** – This CMP describes several additional monitoring well locations to be installed and sampled during the implementation of the CMP. The following monitoring well installations are proposed to be performed prior to USEPA issuance of the FD. A groundwater monitoring well (MW-43S) and a soil gas monitoring probe (SG-26) are proposed at the location shown on Figure 29. These monitoring locations will determine the northernmost extent of TCE above the cleanup goal, and guide the decision-making process for any additional vapor intrusion investigation activities to the north. These wells will be installed as soon practical after access is secured, which TPC anticipate will be within 30 days of submittal of this CMP. TPC will notify USEPA if access is not secured, and discuss alternative strategies.
- **Existing SVE System** – The two existing soil vapor extraction (SVE) systems will continue to be operated during the CMP review process.
- **Monitoring** – Groundwater and Soil Gas Monitoring will be performed semiannually as described in Section 12.
- **EISB Design** – It is anticipated that there will be substantial agreement between TPC and USEPA regarding the enhanced *in situ* bioremediation (EISB) system within approximately 7 months from submittal of this CMP. If so, TPC will initiate the final design of the system so that construction of the system can proceed, dependent on weather conditions.

This schedule may change based on information from the activities described above, and based on obtaining necessary off-site access, and agency review periods and comments. TPC will inform USEPA if the schedule for the above activities changes.

13.2 Final Corrective Measures

Once the FD is issued by USEPA, TPC will implement the corrective measures associated with the EISB system. The schedule (Chart 3) provides the anticipated timeline to complete the construction and startup of the system. This will include a construction level design of the EISB system, installation of compliance monitoring wells that have not yet been installed, procurement of the system components and treatment buildings, installation of injection and extraction wells and connections of the associated piping to the treatment buildings, followed by a brief startup and shakedown period. Operation and maintenance, including post-startup groundwater performance monitoring will then commence. After the EISB system is constructed, TPC will submit the construction completion report (CCR) to the USEPA documenting the activities performed to construct and startup the system.

Section 14
Cost Estimate

The following cost estimate was prepared to outline the anticipated cost to complete the proposed final corrective measures outlined in this Corrective Measures Proposal (CMP). A summary of the estimated costs and the years these costs will likely be incurred is provided in Table 8:

- **Workplan Implementation and Reports –** TRC has estimated the proposed supplemental investigation activities described in the workplans attached to this CMP will cost $223,200. This cost estimate includes:
  - High Resolution Site Characterization (HRSC) Borings ($61,000)
  - On-Site Soil Investigation ($55,000)
  - Off Site Monitoring Well (MW-43s) and Soil Gas Probe (SG-26) Installation ($4,500)
  - Groundwater Surface Water Interface Investigation ($41,000)
  - Groundwater Monitoring Well Installations ($57,500)
- **Interim and Final Corrective Measures**
  - **EISB Groundwater Treatment** – TRC has estimated the cost to construct and operate the enhanced *in situ* bioremediation (EISB) groundwater treatment system is $1,900,000. Details regarding operation of the system are included in Section 11.
  - **Soil Vapor Extraction** - The estimate for operating the SVE systems includes the following:
    - **SVE System Expansion –** On-site geology is ideal for the soil vapor extraction (SVE), yielding treatment areas of more than 25,000 square feet (10,000 cubic yards) with a single extraction well. Therefore, TRC anticipates that corrective measures will include continued operation and maintenance of the existing SVE systems and expansion of those systems to include additional extraction wells in soil source areas located and confirmed through the workplan in Appendix E. Based on the costs to install the existing P-Building and Perimeter SVE systems, TRC has estimated an installation cost of $20,000 per additional extraction well including the associated conveyance piping. With the potential to reconfigure the treatment equipment, the estimated cost to expand/modify the existing SVE systems is $210,000.
    - SVE system operation and maintenance (O&M) is expected to cost $50,000 per year through 2020 for ongoing operation and maintenance of the P-Building and SVE and the perimeter SVE systems. The projected costs

should increase for several years and then decrease over time as the projected carbon usage rate declines after groundwater treatment is implemented.

- **PCE Source Area Interim Measure** – Based on data collected during December, the estimated volume of soil in the tetrachloroethene (PCE) source area to be treated is approximately 1,700 cubic yards. Based on discussions with vendors who market and blend *in situ* chemical oxidation (ISCO) and enhanced reductive dechlorination (ERD) chemicals, the estimated cost to treat this area is $150,000. Design and oversight are estimated at $25,000. Therefore the estimated cost for implementing an interim measure to treat the soil in the PCE Source area is $175,000.
- **Construction Completion Report** – TRC has estimated the Construction Completion Report (CCR) will cost $10,000 to prepare. The CCR will be submitted to USEPA after the EISB system is constructed.

- **Decommissioning and Closure Activities**
  - **Close and Abandon Monitoring Wells/Points** – TRC has estimated that well closure and abandonment will cost approximately $30,000.
  - **Decommission Remediation System(s)** – TRC has estimated that remediation system will cost approximately $25,000 to decommission.
  - **Closure Report** – TRC has estimated the Closure Report will cost $20,000 to prepare.
- **Compliance Monitoring, Reporting, and Meetings**
  - **Groundwater Monitoring** – Quarterly groundwater monitoring was initiated in 2009. At least 8 sample events have been completed at existing compliance monitoring wells. Baseline concentrations have been established at all monitoring locations and sufficient data have been collected to assess the potential for seasonality. Given the groundwater flow rate, trends in groundwater chemistry do not require quarterly monitoring. Additional wells are planned to be installed in 2016 to further define off-site concentrations allowing the value of each well to be critically evaluated. TRC has estimated that groundwater monitoring and reporting through 2024 will cost a total of $570,000.
  - **Soil Gas Monitoring** – TRC has estimated that ongoing soil gas monitoring will continue for an additional 2 years. The total cost of soil gas monitoring through 2018 is estimated to be $ 37,000.
  - **Quarterly Progress Reports and Semi-Annual Meetings** – TRC has estimated an annual reporting and meeting cost of $12,000 through 2024 for a total estimated cost of $108,000.
  - **Project Management and Coordination** – TRC has estimated an annual project management and coordination cost of $20,000 through 2024 during the active investigation and construction portion of the project, and an annual cost of $10,000

from 2020 through 2024 during the monitor and maintain portion of the project. The total cost is estimated to be $130,000.

TRC has estimated the total cost, in current dollars, to complete these project activities to be approximately $3,683,200.

Section 15
References

ATC Associates, Inc. 2009. Phase II Environmental Site Assessment, Tecumseh Products Company, 100 East Patterson Street, Tecumseh, Michigan. Prepared for Consolidated Biscuit Company, Toledo, Ohio.

Atwell-Hicks Development Consultants, Michigan. October 9, 2008. Phase I Environmental Site Assessment for the Tecumseh Products, 100 and 101 East Patterson; 402, 404, and 805 South Evans; 600 South Ottawa; and 420 South Maumee, Tecumseh, Michigan. Prepared for Fifth Third Bank, Cincinnati, Ohio.

ENVIRON International Corporation, New Jersey. 2007. Environmental Site Assessment of Tecumseh Products Company, Tecumseh, Michigan. Prepared for Tecumseh Products Company, as Borrower; Tricap Partners, LLC, as Lender and Administrative Agent; and Citicorp USA, Inc. as Collateral Agent. January 2007

Jones and Henry Engineers, Ltd., Toledo Ohio. June 1997. Wellhead Protection Program Delineation of Wellhead Protection Area. Prepared for the City of Tecumseh, Michigan.

Marsily, 1986. Quantitative Hydrogeology: Groundwater Hydrology for Engineers. Ghislain de Marsily. Academic Press, Inc. 1986.

MDEQ 2006. RRD Operation Memorandum No. 1, Technical Support Document - Attachment 4 Part 201 Groundwater Contact Criteria. Michigan Department of Environmental Quality, Remediation and Redevelopment Division. July 2006.

MDEQ 2012. RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels. Michigan Department of Environmental Quality, Remediation and Redevelopment Division. September 28, 2012.

MDEQ 2013. Guidance Document for the Vapor Intrusion Pathway. Michigan Department of Environmental Quality, Remediation and Redevelopment Division. May 2013.

MDEQ 2013. RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels. Michigan Department of Environmental Quality, Remediation and Redevelopment Division. December 30, 2013.

MDEQ 2016. Wellogic. Michigan Department of Environmental Quality. Online water well database available online at http://www.michigan.gov/deq/0,4561,7-135-3306_6828-16124--,00.html.

Michigan State University (MSU) – Department of Geography. 2012. Michigan State Climatology Maps. Available online at http://climate.geo.msu.edu/climate_maps.html.

NOAA 2014. National Oceanic and Atmospheric Administration - Climate Data Online Search. www.ncdc.noaa.gov/cdo-web/search.

ODEQ 2010. Human Health Risk Assessment Guidance. Oregon Department of Environmental Quality, Environmental Cleanup Program, Portland, OR. October 2010.

Pankow and Cherry, 1996. Dense Chlorinated Solvents and other DNAPLs in Groundwater. James F Pankow and John A Cherry. Waterloo Press, Guelph, Ontario. 1996.

RMT, Inc. 2009. Current Conditions Report – Tecumseh Manufacturing Facility. Prepared for Tecumseh Products Company. September 2009.

RMT, Inc. 2010a. Technical Memorandum: Status Update – Characterization of Volatile Organic Compounds in Groundwater; Former Tecumseh Products Company Site, Tecumseh, Michigan. February 12, 2010.

RMT, Inc. 2010b. Technical Memorandum: Summary of Groundwater Investigation Activities – March 2010 through June 2010, Former Tecumseh Products Company Site, Tecumseh, Michigan. July 14, 2010.

RMT, Inc. 2011. Technical Memorandum: Summary of 2010 Soil and Groundwater Source Area Investigation Activities, RCRA 3008(h) Consent Order (RCRA-05-2010-0012) – Tecumseh Products Company. January 10, 2011.

TRC Environmental Corporation. 2011. Current Human Exposures Under Control Environmental Indicator Report (RCRA-05-2010-0012); Tecumseh Products Company; Tecumseh, Michigan. September 2011.

TRC Environmental Corporation. 2012a. Isoconcentration Maps and Supporting Information for the Tecumseh Products Company Site in Tecumseh, Michigan. June 18, 2012.

TRC Environmental Corporation. 2012b. Remedial Investigation and Groundwater Environmental Indicator Report: RCRA-05-2010-0012 – Former Tecumseh Products Company Site, Tecumseh, Michigan. September 2012.

TRC Environmental Corporation. 2013a. Supplemental Groundwater Investigation Workplan for the Former Tecumseh Products Company Site in Tecumseh, Michigan. January 15, 2013.

TRC Environmental Corporation. 2013b. Technical Memorandum: Summary of the Supplemental Groundwater Investigation Activities and First and Second Quarter 2013 Compliance Monitoring Events: Former Tecumseh Products Company Site in Tecumseh, Michigan. July 15, 2013.

TRC Environmental Corporation. 2013c. Supplement to the Current Human Exposures Under Control Environmental Indicator Report: RCRA-05-2010-0012 – Former Tecumseh Products Company Site, Tecumseh, Michigan. September 2013.

TRC Environmental Corporation. 2014a. Technical Memorandum: Summary of 2014 Passive Soil Gas Survey Activities: Former Tecumseh Products Company Site in Tecumseh, Michigan. June 18, 2014.

TRC Environmental Corporation. 2014b. Technical Memorandum: Scope of Work to Accommodate the USEPA Comment Letter Dated January 31, 2014 Regarding the Human Exposure Environmental Indicator Report. March 3, 2014, Revised March 27, 2014.

TRC Environmental Corporation. 2014c. MIP Investigation Report and Workplan for High Resolution Site Characterization: RCRA-05-2010-0012, Former Tecumseh Products Company Site, Tecumseh, Michigan. December 2014, Revised March 2015 and April 2015.

TRC Environmental Corporation. 2015a. Supplement to the Remedial Investigation and Environmental Indicator Report (Migration of Contaminated Groundwater Under Control): Tecumseh Products Company Site, Tecumseh, Michigan. July 2015.

TRC Environmental Corporation. 2015b. STATUS UPDATE – *Investigation of the Potential Groundwater to Surface Water Migration Pathway*: Former Tecumseh Products Company Site in Tecumseh, Michigan (RCRA-05-2010-0012). October 14, 2015.

TRC Environmental Corporation. 2015c. 2015 High Resolution Site Characterization Report and Updated Conceptual Site Model: Former Tecumseh Products Company Site, Tecumseh, Michigan; RCRA-05-2010-0012. October 2015.

TRC Environmental Corporation. 2015d. PCE Source Area Investigation: Former Tecumseh Products Company Site in Tecumseh, Michigan (RCRA-05-2010-0012). November 12, 2015.

USEPA 1989. Risk Assessment Guidance for Superfund (RAGS) Volume I Human Health Evaluation Manual Part A. United States Environmental Protection Agency. EPA/540/1-89-002. December 1989.

USEPA 2000. Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment Bulletins. United States Environmental Protection Agency, Region 4.

USEPA 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. United States Environmental Protection Agency, Office of Solid Waste and Emergency Response. OSWER 9355.4-24. December 2002.

USEPA 2004. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment). Final. United States Environmental Protection Agency, Office of Emergency and Remedial Response. EPA/540/R/99/005. July 2004.

USEPA 2010. Administrative Order on Consent: RCRA-05-2010-0012. United States Environmental Protection Agency, Region 5. March 29, 2010.

USEPA 2011. Exposure Factors Handbook, 2011 Edition. United States Environmental Protection Agency, National Center for Environmental Assessment, Office of Research and Development. EPA/600/R-09/052F. September 2011.

USEPA. 2013. Extension of Project Deadlines: RCRA 3008(h) Consent Order (RCRA-05-2010-0012) – Tecumseh Products Company – MID 005-049-440. March 6, 2013.

USEPA 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. United States Environmental Protection Agency, Office of Solid Waste and Emergency Response. OSWER Directive 9200.1-120. February 6, 2014.

USEPA 2015. OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air. United States Environmental Protection Agency, Office of Solid Waste and Emergency Response. OSWER Publication 9200.2-154. June 2015.

VDEQ 2005. Voluntary Remediation Program Risk Assessment Guidance. Virginia Department of Environmental Quality. Waste Management. Section 3.2.2 Exposure of Workers to Volatiles in a Construction/Utility Trench. On-line at http://www.deq.state.va.us/vrprisk/raguide.html.

Waldron 2007. Characterization of Chlorinated Ethene Degradation in a Vertical Flow Constructed Wetland – Thesis. James M. Waldron. Air Force Institute of Technology. 2007.

Tables

Table 1
Human Health and Ecological Exposure Pathway Analysis for On-Site Receptors

Table 2
Human Health and Ecological Exposure Pathway Analysis for Off-Site Receptors

Table 3
Target Cleanup Levels for Soil

Table 4
Target Cleanup Levels for Groundwater

Table 5
Remedial Technology Balancing Criteria Evaluation

Table 6
Proposed Groundwater Monitoring Program

Table 7
Proposed Soil Gas Monitoring Program

Table 8
Cost Estimate

Table 1
Human Health and Ecological Exposure Pathway Analysis for On-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options and Status
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
Environmental Worker	On-Site Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Potentially Significant	Potentially Significant	Environmental workers may contact surface soil during routine site investigation activities; therefore, this exposure pathway is considered potentially complete. Based on the existing soil sample dataset this pathway is insignificant. However, soil concentrations above applicable direct contact criteria may be identified during the proposed soil investigation activities. This pathway remains potentially significant until those investigation activities have been completed.	Collect additional soil data to characterize on-site soil conditions and verify pathway not significant.
		Inhalation of Soil Particulates in Ambient Air	Complete	Complete	Insignificant	Potentially Significant	Environmental workers may contact surface soil; therefore, this exposure pathway is considered potentially complete. Ambient air data indicate this pathway is currently insignificant. Based on the existing soil sample dataset, this pathway is insignificant for future exposures as well. However, soil concentrations above applicable criteria may be identified during the proposed soil investigation activities, and site redevelopment/grading could expose soils, which are currently below the slab, resulting in unacceptable exposures. This pathway remains potentially significant until those investigation activities have been completed.	Collect additional soil data to characterize on-site soil conditions and verify pathway not significant.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Potentially Significant	Environmental workers may contact surface soil; therefore, this exposure pathway is considered potentially complete. Ambient air data indicate this pathway is currently insignificant. Based on the existing soil sample dataset this pathway is potentially significant if soils below slab are disturbed. Site redevelopment and grading could expose soils, which are currently below the slab, resulting in unacceptable volatilization to ambient air.	Use institutional and engineering controls to ensure exposures remain acceptable during site redevelopment and beyond. Collect additional soil data to refine areas subject to these controls.
	On-Site Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Potentially Significant	Potentially Significant	Environmental workers may contact surface soil during routine site investigation activities; therefore, this exposure pathway is considered potentially complete. Based on the existing soil sample dataset this pathway is insignificant. However, soil concentrations above applicable direct contact criteria may be identified during the proposed soil investigation activities. This pathway remains potentially significant until those investigation activities have been completed.	Collect additional soil data to characterize on-site soil conditions and verify pathway not significant.
		Inhalation of Soil Particulates in Ambient Air	Complete	Complete	Insignificant	Insignificant	Environmental workers may expose subsurface soil during routine site investigation activities; therefore this pathway is considered potentially complete. The volume of subsurface soil exposed during subsurface investigation activities is very small: typically having a surface area of 1 to 5 square feet. By contrast screening levels are calculated assuming the area of soil exposed is one-half acre. Therefore, this exposure pathway is considered insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Environmental workers may expose subsurface soil during routine site investigation activities; therefore this pathway is considered potentially complete. The volume of subsurface soil exposed during subsurface investigation activities is very small: typically having a surface area of 1 to 5 square feet. By contrast screening levels are calculated assuming the area of soil exposed is one-half acre. Therefore, this exposure pathway is considered insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air [(1)]	Complete	Complete	Insignificant	Potentially Significant	Environmental work may periodically include operation/maintenance/monitoring activities in the existing P-Building, and may in the future be required in other, yet to be constructed, structures. Subsurface volatile compounds have the potential to migrate into indoor air. Therefore this pathway is considered potentially complete. A soil vapor extraction (SVE) system controls current exposures in P-Building; therefore this pathway is currently insignificant. However, there are currently no controls in place protective of exposures in other, yet to be constructed, structures; therefore this pathway remains potentially significant for future exposures.	Continue operation of the existing P-Building SVE system or equivalent, until groundwater treatment and necessary soil treatment beneath P-Building is complete. Use institutional and engineering controls to ensure pathway is either incomplete or insignificant in the future.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Drinking water is supplied by the City of Tecumseh municipal water supply. There are no on-site production wells. Future installation and use of on-site wells for any purpose other than environmental monitoring and treatment is reliably restricted with both the on-site restrictive covenant and the City of Tecumseh Groundwater Use Ordinance. Therefore, this exposure pathway is incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Complete	Complete	Potentially Significant	Potentially Significant	Environmental workers may contact groundwater during routine site investigation activities; therefore, this exposure pathway is considered potentially complete. Exceedances of applicable Part 201 groundwater contact criteria have been observed in localized areas; therefore, this pathway is considered potentially significant.	Site-specific risk-based clean-up levels (RBCLs) calculated for the exposure pathway. Groundwater concentrations do not exceed RBCLs. Evaluation complete, exposures are acceptable.
		Inhalation of Trench Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Environmental workers do not work in trenches; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Indoor Air Vapors [(1)]	Complete	Complete	Insignificant	Potentially Significant	Environmental work may periodically include operation/maintenance/monitoring activities in the existing P-Building, and may in the future be required in other, yet to be constructed, structures. Subsurface volatile compounds have the potential to migrate into indoor air. Therefore, this pathway is considered potentially complete. A soil vapor extraction (SVE) system controls current exposures in P-Building; therefore, this pathway is currently insignificant. However, there are currently no controls in place protective of exposures in other, yet to be constructed, structures; therefore this pathway remains potentially significant for future exposures.	Continue operation of the existing P-Building SVE system or equivalent, until groundwater treatment and necessary soil treatment beneath P-Building is complete. Use institutional and engineering controls to ensure pathway is either incomplete or insignificant in the future.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Environmental workers may work in the area of existing and former structures that have building slabs remaining. Therefore, this pathway is potentially complete. However, given that the constituents of concern are volatile in nature, they are not expected to be present in high concentrations with the high surface area building slab. Direct contact with the surface of impervious concrete is not reasonably expected to result in direct contact or incidental ingestion risk. This pathway is considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Potentially Complete	Not Applicable	Insignificant	The current, intact slab is not expected to be a source of soil particulates. Therefore, this pathway is currently incomplete. The slab may be crushed during site redevelopment activities; therefore, this pathway is potentially complete in the future. However, given that constituents of concern are volatile in nature, they are not expected to be present at sufficient concentrations within the high surface area building slab to pose a risk. Therefore, this pathway is considered insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Environmental workers may work in the area of existing and former structures that have building slabs remaining. Therefore, this pathway is potentially complete. However, given that the constituents of concern are volatile in nature, they are not expected to be present at sufficient concentrations within the high surface area building slab to pose a risk. Therefore, this pathway is considered insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Complete	Complete	Insignificant	Insignificant	Environmental workers may work in the area of existing and former structures that have building slabs remaining. Therefore, this pathway is potentially complete. However, given that the constituents of concern are volatile in nature, they are not expected to be present at sufficient concentrations within the high surface area building slab to pose a risk. Therefore, this pathway is considered insignificant.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	There is no on-site surface water or sediment; therefore, contact with on-site surface water or sediment is considered incomplete.	No further evaluation required.

1. At present, the site is unoccupied and secured by locked perimeter fence. Throughout the majority of the building that has not been demolished, windows are broken out and bay doors are open to allow light into the building. In this area, due to the open air nature of the structure, the interior environment of the former manufacturing facility is considered part of the outside environment for purposes of risk assessment. At present, the portion of the building which remains substantially intact and closed to the outside environment is restricted to S-Building and P-Building.

Table 1
Human Health and Ecological Exposure Pathway Analysis for On-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options and Status
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
Trespasser (Adult & Adolescent)	On-Site Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Potentially Significant	Potentially Significant	Trespassers may contact surface soil; therefore, this exposure pathway is considered potentially complete. Based on the existing soil sample dataset, this pathway is insignificant. However, soil concentrations above applicable direct contact criteria may be identified during the proposed soil investigation activities. This pathway remains potentially significant until those investigation activities have been completed.	Collect additional soil data to characterize on-site soil conditions and verify pathway not significant.
		Inhalation of Soil Particulates in Ambient Air	Complete	Complete	Insignificant	Potentially Significant	Trespassers may contact surface soil; therefore, this exposure pathway is considered potentially complete. Ambient air data indicate this pathway is currently insignificant. Based on the existing soil sample dataset this pathway is insignificant for future exposures as well. However, soil concentrations above applicable criteria may be identified during the proposed soil investigation activities, and site redevelopment/grading could expose soils which are currently below the slab, resulting in unacceptable exposures. This pathway remains potentially significant until those investigation activities have been completed.	Collect additional soil data to characterize on-site soil conditions and verify pathway not significant.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Potentially Significant	Trespassers may contact surface soil; therefore, this exposure pathway is considered potentially complete. Ambient air data indicate this pathway is currently insignificant. Based on the existing soil sample dataset, this pathway potentially significant if soils below slab are disturbed. Site redevelopment and grading could expose soils, which are currently below the slab, resulting in unacceptable volatilization to ambient air.	Use institutional and engineering controls to ensure exposures remain acceptable during site redevelopment and beyond. Collect additional soil data to refine areas subject to these controls.
	On-Site Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Trespassers do not contact subsurface soils; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Soil Particulates	Incomplete	Incomplete	Not Applicable	Not Applicable	Trespassers do not contact subsurface soils, nor are they expected to be on-site during active construction activities; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Trespassers do not contact subsurface soils, nor are they expected to be on-site during active construction activities; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air (1)	Incomplete	Incomplete	Not Applicable	Not Applicable	Trespassers are not expected to be indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Drinking water is supplied by the City of Tecumseh municipal water supply. There are no on-site production wells. Future installation and use of on-site wells for any purpose other than environmental monitoring and treatment is reliably restricted with both the on-site restrictive covenant and the City of Tecumseh Groundwater Use Ordinance. Therefore, this exposure pathway is incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Trespassers do not contact groundwater; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Trench Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Trespassers do not work in trenches; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Indoor Air Vapors (1)	Incomplete	Incomplete	Not Applicable	Not Applicable	Trespassers are not expected to be indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Trespassers may be in the area of existing and former structures that have building slabs remaining. Therefore this pathway is potentially complete. However, given that the constituents of concern are volatile in nature, they are not expected to be present in high concentrations with the high surface area building slab. Direct contact with the surface of impervious concrete is not reasonably expected to result in direct contact or incidental ingestion risk. This pathway is considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Potentially Complete	Insignificant	Insignificant	The current, intact slab is not expected to be a source of soil particulates. Therefore this pathway is currently incomplete. The slab may be crushed during site redevelopment activities; therefore this pathway is potentially complete in the future. However, given that constituents of concern are volatile in nature, they are not expected to be present at sufficient concentrations within the high surface area building slab to pose a risk. Therefore, this pathway is considered insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Trespassers may be in area of existing and former structures that have building slabs remaining. Therefore this pathway is potentially complete. However, given that the constituents of concern are volatile in nature, they are not expected to be present at sufficient concentrations within the high surface area building slab to pose a risk. Therefore, this pathway is considered insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Trespassers are not expected to be indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	There is no on-site surface water or sediment; therefore, contact with on-site surface water or sediment is considered incomplete.	No further evaluation required.

1. At present, the site is unoccupied and secured by locked perimeter fence. Throughout the majority of the building that has not been demolished, windows are broken out and bay doors are open to allow light into the building. In this area, due to the open air nature of the structure, the interior environment of the former manufacturing facility is considered part of the outside environment for purposes of risk assessment. At present, the portion of the building which remains substantially intact and closed to the outside environment is restricted to S-Building and P-Building.

Table 1
Human Health and Ecological Exposure Pathway Analysis for On-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options and Status
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
One-Time Building Construction Worker, Occasional Excavation / Maintenance Worker, Redevelopment Worker	On-Site Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Incomplete	Complete	Not Applicable	Potentially Significant	Currently there is no construction work at the site; therefore, this pathway is currently incomplete. In the future, construction workers may contact surface soil; therefore, this exposure pathway is considered potentially complete. Based on the existing soil sample dataset, this pathway is insignificant. However, soil concentrations above applicable direct contact criteria may be identified during the proposed soil investigation activities. This pathway remains potentially significant until those investigation activities have been completed.	Collect additional soil data to characterize on-site soil conditions and verify pathway not significant.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Complete	Not Applicable	Potentially Significant	Currently there is no construction work at the site; therefore, this pathway is currently incomplete. In the future, construction workers may contact surface soil; therefore, this exposure pathway is considered potentially complete. Ambient air data indicate this pathway is currently insignificant. Based on the existing soil sample dataset, this pathway is insignificant for future exposures as well. However, soil concentrations above applicable criteria may be identified during the proposed soil investigation activities, and site redevelopment/grading could expose soils which are currently below the slab resulting in unacceptable exposures. This pathway remains potentially significant until those investigation activities have been completed.	Collect additional soil data to characterize on-site soil conditions and verify pathway not significant.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Complete	Not Applicable	Potentially Significant	Currently there is no construction work at the site; therefore, this pathway is currently incomplete. In the future, construction workers may contact subsurface soil; therefore, this exposure pathway is considered potentially complete. Based on the existing soil sample dataset, this pathway is potentially significant if soils below slab are disturbed. Site redevelopment and grading could expose soils which are currently below the slab resulting in unacceptable volatilization to ambient air.	Use institutional and engineering controls to ensure exposures remain acceptable during site redevelopment and beyond. Collect additional soil data to refine areas subject to these controls.
	On-Site Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Incomplete	Complete	Not Applicable	Potentially Significant	Currently there is no construction work at the site; therefore, this pathway is currently incomplete. In the future, construction workers may contact subsurface soil; therefore, this exposure pathway is considered potentially complete. Based on the existing soil sample dataset, this pathway is insignificant. However, soil concentrations above applicable direct contact criteria may be identified during the proposed soil investigation activities. This pathway remains potentially significant until those investigation activities have been completed.	Collect additional soil data to characterize on-site soil conditions and verify pathway not significant.
		Inhalation of Soil Particulates	Incomplete	Complete	Not Applicable	Potentially Significant	Currently there is no construction work at the site; therefore, this pathway is currently incomplete. In the future, construction workers may contact subsurface soil; therefore, this exposure pathway is considered potentially complete. Based on the existing soil sample dataset, this pathway is insignificant for future exposures as well. However, soil concentrations above applicable criteria may be identified during the proposed soil investigation activities, and site redevelopment/grading could expose soils which are currently below the slab resulting in unacceptable exposures. This pathway remains potentially significant until those investigation activities have been completed.	Collect additional soil data to characterize on-site soil conditions and verify pathway not significant.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Complete	Not Applicable	Potentially Significant	Currently there is no construction work at the site; therefore, this pathway is currently incomplete. In the future, construction workers may contact surface soil; therefore, this exposure pathway is considered potentially complete. Ambient air data indicate this pathway is currently insignificant. Based on the existing soil sample dataset, this pathway is potentially significant if soils below slab are disturbed. Site redevelopment and grading could expose soils which are currently below the slab resulting in unacceptable volatilization to ambient air.	Use institutional and engineering controls to ensure exposures remain acceptable during site redevelopment and beyond. Collect additional soil data to refine areas subject to these controls.
		Inhalation of Volatile Compounds in Indoor Air (1)	Incomplete	Incomplete	Not Applicable	Not Applicable	Construction workers do not work indoors. Therefore, this exposure pathway is considered incomplete.	No further evaluation required.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Drinking water is supplied by the City of Tecumseh municipal water supply. There are no on-site production wells. Future installation and use of on-site wells for any purpose other than environmental monitoring and treatment is reliably restricted with both the on-site restrictive covenant and the City of Tecumseh Groundwater Use Ordinance. Therefore, this exposure pathway is incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Incomplete	Complete	Not Applicable	Potentially Significant	Currently there is no construction work at the site; therefore, this pathway is currently incomplete. In the future, construction workers may contact groundwater during construction activities; therefore, this exposure pathway is considered potentially complete. Exceedances of applicable Part 201 groundwater contact criteria have been observed in localized areas; therefore this pathway is considered potentially significant.	Site-specific risk-based clean-up levels (RBCLs) calculated for the exposure pathway. Groundwater concentrations do not exceed RBCLs. Evaluation complete, exposures are acceptable.
		Inhalation of Trench Air Vapors	Incomplete	Complete	Not Applicable	Insignificant	Currently there is no construction work at the site; therefore, this pathway is currently incomplete. In the future, construction workers may inhale volatiles while working in a trench; therefore, this exposure pathway is considered potentially complete. No generic risk-based screening levels are available for this exposure pathway, therefore, site-specific risk-based screening levels were calculated. Based on this evaluation this pathway is insignificant.	Site-specific risk-based screening levels calculated for the exposure pathway. Groundwater concentrations do not exceed screening levels. Evaluation complete, exposures are acceptable.
		Inhalation of Indoor Air Vapors (1)	Incomplete	Incomplete	Not Applicable	Not Applicable	Construction workers do not work indoors. Therefore, this exposure pathway is considered incomplete.	No further evaluation required.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Incomplete	Complete	Insignificant	Insignificant	Currently there is no construction work at the site; therefore, this pathway is currently incomplete. In the future, construction workers may work in the area of existing and former structures that have building slabs remaining. Therefore this pathway is potentially complete. However, given that the constituents of concern are volatile in nature, they are not expected to be present in high concentrations with the high surface area building slab. Direct contact with the surface of impervious concrete is not reasonably expected to result in direct contact or incidental ingestion risk. This pathway is considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Potentially Complete	Insignificant	Insignificant	The current, intact slab is not expected to be a source of soil particulates. Therefore, this pathway is currently incomplete. The slab may be crushed during site redevelopment activities; therefore this pathway is potentially complete in the future. However, given that constituents of concern are volatile in nature, they are not expected to be present at sufficient concentrations within the high surface area building slab to pose a risk. Therefore, this pathway is considered insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Complete	Insignificant	Insignificant	Currently there is no construction work at the site; therefore, this pathway is currently incomplete. In the future, construction workers may work in the area of existing and former structures that have building slabs remaining. Therefore this pathway is potentially complete. However, given that the constituents of concern are volatile in nature, they are not expected to be present at sufficient concentrations within the high surface area building slab to pose a risk. Therefore, this pathway is considered insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Construction workers do not work indoors. Therefore, this exposure pathway is considered incomplete.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	There is no on-site surface water or sediment; therefore, contact with on-site surface water or sediment is considered incomplete.	No further evaluation required.

1. At present, the site is unoccupied and secured by locked perimeter fence. Throughout the majority of the building that has not been demolished, windows are broken out and bay doors are open to allow light into the building. In this area, due to the open air nature of the structure, the interior environment of the former manufacturing facility is considered part of the outside environment for purposes of risk assessment. At present, the portion of the building which remains substantially intact and closed to the outside environment is restricted to S-Building and P-Building.

Table 1
Human Health and Ecological Exposure Pathway Analysis for On-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options and Status
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
Routine Outdoor Worker	On-Site Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Potentially Significant	Potentially Significant	Outdoor workers may contact surface soil during routine job duties; therefore, this exposure pathway is considered potentially complete. Based on the existing soil sample dataset this pathway is insignificant. However, soil concentrations above applicable direct contact criteria may be identified during the proposed soil investigation activities. This pathway remains potentially significant until those investigation activities have been completed.	Collect additional soil data to characterize on-site soil conditions and verify pathway not significant.
		Inhalation of Soil Particulates in Ambient Air	Complete	Complete	Insignificant	Potentially Significant	Outdoor workers may contact surface soil; therefore, this exposure pathway is considered potentially complete. Ambient air data indicate this pathway is currently insignificant. Based on the existing soil sample dataset, this pathway is insignificant for future exposures as well. However, soil concentrations above applicable criteria may be identified during the proposed soil investigation activities, and site redevelopment/grading could expose soils, which are currently below the slab, resulting in unacceptable exposures. This pathway remains potentially significant until those investigation activities have been completed.	Collect additional soil data to characterize on-site soil conditions and verify pathway not significant.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Potentially Significant	Outdoor workers may contact surface soil; therefore, this exposure pathway is considered potentially complete. Ambient air data indicate this pathway is currently insignificant. Based on the existing soil sample dataset this pathway potentially significant if soils below slab are disturbed. Site redevelopment and grading could expose soils, which are currently below the slab, resulting in unacceptable volatilization to ambient air.	Use institutional and engineering controls to ensure exposures remain acceptable during site redevelopment and beyond. Collect additional soil data to refine areas subject to these controls.
	On-Site Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers do not contact subsurface soils; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Soil Particulates	Incomplete	Complete	Not Applicable	Insignificant	Migration of sub-surface soil particulates into the breathing zone is a potentially complete pathway for outdoor workers working near the site during future on-site redevelopment activities; however, atmospheric dilution and mixing results in negligible concentrations beyond the immediate work area. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Complete	Not Applicable	Insignificant	Migration of sub-surface soil volatiles into the breathing zone is a potentially complete pathway for outdoor workers working near the site during future on-site redevelopment activities; however, atmospheric dilution and mixing results in negligible concentrations beyond the immediate work area. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air (1)	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers are not expected to be indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Drinking water is supplied by the City of Tecumseh municipal water supply. There are no on-site production wells. Future installation and use of on-site wells for any purpose other than environmental monitoring and treatment is reliably restricted with both the on-site restrictive covenant and the City of Tecumseh Groundwater Use Ordinance. Therefore this exposure pathway is incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers do not contact groundwater; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Trench Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers do not work in trenches; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Indoor Air Vapors (1)	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers would not be indoors for any significant period of time; therefore, this pathway is considered incomplete.	No further evaluation required.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Outdoor workers may work in the area of existing and former structures that have building slabs remaining. Therefore this pathway is potentially complete. However, given that the constituents of concern are volatile in nature, they are not expected to be present in high concentrations with the high surface area building slab. Direct contact with the surface of impervious concrete is not reasonably expected to result in direct contact or incidental ingestion risk. This pathway is considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Potentially Complete	Insignificant	Insignificant	The current, intact slab is not expected to be a source of soil particulates. Therefore this pathway is currently incomplete. The slab may be crushed during site redevelopment activities; therefore this pathway is potentially complete in the future. However, given that constituents of concern are volatile in nature, they are not expected to be present at sufficient concentrations within the high surface area building slab to pose a risk. Therefore, this pathway is considered insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Outdoor workers may work in area of existing and former structures that have building slabs remaining. Therefore this pathway is potentially complete. However, given that the constituents of concern are volatile in nature, they are not expected to be present at sufficient concentrations within the high surface area building slab to pose a risk. Therefore, this pathway is considered insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers would not be indoors for any significant period of time; therefore, this pathway is considered incomplete.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	There is no on-site surface water or sediment; therefore, contact with on-site surface water or sediment is considered incomplete.	No further evaluation required.

1. At present, the site is unoccupied and secured by locked perimeter fence. Throughout the majority of the building that has not been demolished, windows are broken out and bay doors are open to allow light into the building. In this area, due to the open air nature of the structure, the interior environment of the former manufacturing facility is considered part of the outside environment for purposes of risk assessment. At present, the portion of the building which remains substantially intact and closed to the outside environment is restricted to S-Building and P-Building.

Table 1
Human Health and Ecological Exposure Pathway Analysis for On-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options and Status
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
Indoor Routine Worker	On-Site Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers do not contact surface soil; therefore, this exposure pathway is considered incomplete.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers do not contact surface soil; therefore, this exposure pathway is considered incomplete.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers do not contact surface soil; therefore, this exposure pathway is considered incomplete.	No further evaluation required.
	On-Site Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers do not contact subsurface soil; therefore, this exposure pathway is considered incomplete.	No further evaluation required.
		Inhalation of Soil Particulates	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers do not contact subsurface soil; therefore, this exposure pathway is considered incomplete.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers do not contact subsurface soil; therefore, this exposure pathway is considered incomplete.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air [(1)]	Incomplete	Complete	Not Applicable	Potentially Significant	At present there are not indoor workers at the site; therefore, this pathway is currently incomplete. In the future, indoor workers may work in the existing P-Building, or in other, yet to be constructed, structures. Subsurface volatile compounds have the potential to migrate into indoor air. Therefore this pathway is considered potentially complete. A soil vapor extraction (SVE) system controls current exposures in P-Building; therefore, this pathway is reliably controlled. However, there are currently no controls in place protective of exposures in other, yet to be constructed, structures; therefore, this pathway remains potentially significant for future exposures.	Continue operation of the existing P-Building SVE system or equivalent, until groundwater treatment and necessary soil treatment beneath P-Building is complete. Work with site owner to update and finalize restrictive covenant to ensure potential future pathway remains incomplete.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Drinking water is supplied by the City of Tecumseh municipal water supply. There are no on-site production wells. Future installation and use of on-site wells for any purpose other than environmental monitoring and treatment is reliably restricted with both the on-site restrictive covenant and the City of Tecumseh Groundwater Use Ordinance. Therefore, this exposure pathway is incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers do not contact groundwater. Therefore, groundwater-related pathways are considered incomplete and do not required further evaluation.	No further evaluation required.
		Inhalation of Trench Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers do not work in trenches; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Indoor Air Vapors [(1)]	Incomplete	Complete	Not Applicable	Potentially Significant	At present there are not indoor workers at the site; therefore, this pathway is currently incomplete. In the future, indoor workers may work in the existing P-Building, or in other, yet to be constructed, structures. Subsurface volatile compounds have the potential to migrate into indoor air. Therefore this pathway is considered potentially complete. A soil vapor extraction (SVE) system controls current exposures in P-Building; therefore, this pathway is reliably controlled. However, there are currently no controls in place protective of exposures in other, yet to be constructed, structures; therefore, this pathway remains potentially significant for future exposures.	Continue operation of the existing P-Building SVE system or equivalent, until groundwater treatment and necessary soil treatment beneath P-Building is complete. Work with site owner to update and finalize restrictive covenant to ensure potential future pathway remains incomplete.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Incomplete	Complete	Not Applicable	Insignificant	At present there are not indoor workers at the site; therefore this pathway is currently incomplete. In the future, indoor workers may work in the existing P-Building. Therefore this pathway is potentially complete. However, P-Building was improved and expanded in the 1990s after chlorinated solvent use at the site had discontinued. Those building improvements included replacement of the existing concrete slab with new concrete. This new concrete is not impacted; therefore this pathway is considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers only spend time indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers only spend time indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Complete	Not Applicable	Insignificant	At present there are not indoor workers at the site; therefore this pathway is currently incomplete. In the future, indoor workers may work in the existing P-Building. Therefore this pathway is potentially complete. However, P-Building was improved and expanded in the 1990s after chlorinated solvent use at the site had discontinued. Those building improvements included replacement of the existing concrete slab with new concrete. This new concrete is not impacted; therefore this pathway is considered insignificant.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	There is no on-site surface water or sediment; therefore, contact with on-site surface water or sediment is considered incomplete.	No further evaluation required.

1. At present, the site is unoccupied and secured by locked perimeter fence. Throughout the majority of the building that has not been demolished, windows are broken out and bay doors are open to allow light into the building. In this area, due to the open air nature of the structure, the interior environment of the former manufacturing facility is considered part of the outside environment for purposes of risk assessment. At present, the portion of the building which remains substantially intact and closed to the outside environment is restricted to S-Building and P-Building.

Table 2
Human Health and Ecological Exposure Pathway Analysis for Off-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
Environmental Worker	Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Environmental workers may contact surface soil during routine site investigation activities; therefore, this exposure pathway is considered potentially complete. However, based on data collected at on-site locations, it is not reasonable to expect surface soils to be affected above risk-based screening levels for these exposure pathways. Therefore, these exposure pathways are considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil particulates into the off-site breathing zone is a potentially complete pathway for environmental workers working near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil volatiles into the off-site breathing zone is a potentially complete pathway for environmental workers working near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
	Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Environmental workers may contact subsurface soil during routine site investigation activities; therefore, this exposure pathway is considered potentially complete. However, based on data collected at on-site locations, it is not reasonable to expect subsurface soils to be affected above risk-based screening levels for these exposure pathways. Therefore, these exposure pathways are considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates	Incomplete	Complete	Not Applicable	Insignificant	Migration of on-site sub-surface soil particulates into the off-site breathing zone is a potentially complete pathway for environmental workers working near the site during future on-site redevelopment activities; however, atmospheric dilution and mixing results in negligible concentrations beyond the immediate work area. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Complete	Not Applicable	Insignificant	Migration of on-site sub-surface soil volatiles into the off-site breathing zone is a potentially complete pathway for environmental workers working near the site during future on-site redevelopment activities; however, atmospheric dilution and mixing results in negligible concentrations beyond the immediate work area. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Environmental workers do not work indoors at off-site properties. Therefore, this exposure pathway is considered incomplete and does not require further evaluation.	No further evaluation required.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Drinking water is supplied by the City of Tecumseh municipal water supply. There are no production wells within the area of affected groundwater. Future installation and use of wells for any purpose other than environmental monitoring and treatment is reliably restricted by the City of Tecumseh Groundwater Use Ordinance. Therefore, this exposure pathway is incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Complete	Complete	Potentially Significant	Potentially Significant	Environmental workers may contact groundwater during routine site investigation activities; therefore, this exposure pathway is considered potentially complete. Exceedances of applicable Part 201 groundwater contact criteria have been observed in localized areas; therefore, this pathway is considered potentially significant.	Site-specific risk-based clean-up levels (RBCLs) calculated for the exposure pathway. Groundwater concentrations do not exceed RBCLs. Evaluation complete, exposures are acceptable.
		Inhalation of Trench Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Environmental workers do not work in trenches; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Indoor Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Environmental workers do not work indoors at off-site properties. Therefore, this exposure pathway is considered incomplete.	No further evaluation required.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, direct contact by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab particulates by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab volatiles by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, off-site indoor air is not impacted, and the exposure pathway is incomplete.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Affected groundwater may discharge to the River Raisin and associated wetland area. Environmental workers may periodically collect samples from the wetland area. Concentrations in groundwater discharging to surface water are well below groundwater contact criteria. Therefore, this exposure pathway is considered potentially complete, but insignificant.	No further evaluation required.

Table 2
Human Health and Ecological Exposure Pathway Analysis for Off-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
One-Time Building Construction Worker, Occasional Excavation / Maintenance Worker	Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Construction workers may contact surface soil during construction activities; therefore, this exposure pathway is considered potentially complete. However, based on data collected at on-site locations, it is not reasonable to expect surface soils to be affected above risk-based screening levels for these exposure pathways. Therefore, these exposure pathways are considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil particulates into the off-site breathing zone is a potentially complete pathway for construction workers working near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil volatiles into the off-site breathing zone is a potentially complete pathway for construction workers working near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
	Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Construction workers may contact subsurface soil during routine construction activities; therefore, this exposure pathway is considered potentially complete. However, based on data collected at on-site locations, it is not reasonable to expect subsurface soils to be affected above risk-based screening levels for these exposure pathways. Therefore, these exposure pathways are considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil particulates into the off-site breathing zone is a potentially complete pathway for construction workers working near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil volatiles into the off-site breathing zone is a potentially complete pathway for construction workers working near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Construction workers do not work indoors. Therefore, this exposure pathway is considered incomplete.	No further evaluation required.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Drinking water is supplied by the City of Tecumseh municipal water supply. There are no on-site production wells. Future installation and use of on-site wells for any purpose other than environmental monitoring and treatment is reliably restricted with both the on-site restrictive covenant and the City of Tecumseh Groundwater Use Ordinance. Therefore, this exposure pathway is incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Complete	Complete	Potentially Significant	Potentially Significant	Construction workers may contact groundwater during construction activities; therefore, this exposure pathway is considered potentially complete. Exceedances of applicable Part 201 groundwater contact criteria have been observed in localized areas; therefore, this pathway is considered potentially significant.	Site-specific risk evaluation complete. No further evaluation required.
		Inhalation of Trench Air Vapors	Complete	Complete	Potentially Significant	Potentially Significant	Construction workers may inhale volatiles while working in a trench; therefore, this exposure pathway is considered potentially complete. No generic risk-based screening levels are available for this exposure pathway, therefore, site-specific risk-based screening levels were calculated. Based on this evaluation this pathway is insignificant.	Site-specific risk evaluation.
		Inhalation of Indoor Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Construction workers do not work indoors. Therefore, this exposure pathways is considered incomplete.	No further evaluation required.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, direct contact by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab particulates by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab volatiles by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, off-site indoor air is not impacted, and the exposure pathway is incomplete.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Construction workers would not contact off-site surface water. Therefore, these exposure pathways are considered incomplete.	No further evaluation required.

Table 2
Human Health and Ecological Exposure Pathway Analysis for Off-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
Routine Outdoor Worker	Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Outdoor workers may contact surface soil during construction activities; therefore, this exposure pathway is considered potentially complete. However, based on data collected at on-site locations, it is not reasonable to expect surface soils to be affected above risk-based screening levels for these exposure pathways. Therefore, these exposure pathways are considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil particulates into the off-site breathing zone is a potentially complete pathway for outdoor workers working near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil volatiles into the off-site breathing zone is a potentially complete pathway for outdoor workers working near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
	Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers do not contact subsurface soils; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Soil Particulates	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil particulates into the off-site breathing zone is a potentially complete pathway for outdoor workers working near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil volatiles into the off-site breathing zone is a potentially complete pathway for outdoor workers working near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers are not expected to be indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Drinking water is supplied by the City of Tecumseh municipal water supply. There are no on-site production wells. Future installation and use of on-site wells for any purpose other than environmental monitoring and treatment is reliably restricted with both the on-site restrictive covenant and the City of Tecumseh Groundwater Use Ordinance. Therefore this exposure pathway is incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers do not contact groundwater; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Trench Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers do not work in trenches; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Indoor Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers would not be indoors for any significant period of time; therefore, this pathway is considered incomplete.	No further evaluation required.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, direct contact by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab particulates by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab volatiles by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, off-site indoor air is not impacted, and the exposure pathway is incomplete.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Outdoor workers would not contact off-site surface water. Therefore, these exposure pathways are considered incomplete.	No further evaluation required.

Table 2
Human Health and Ecological Exposure Pathway Analysis for Off-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
Indoor Routine Worker	Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers only spend time indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers only spend time indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers only spend time indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
	Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers only spend time indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Soil Particulates	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers only spend time indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers only spend time indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Off-site soils are not impacted. Therefore, this exposure pathways is considered incomplete.	No further evaluation required.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Drinking water is supplied by the City of Tecumseh municipal water supply. There are no production wells within the area of affected groundwater. Future installation and use of wells for any purpose other than environmental monitoring and treatment is reliably restricted by the City of Tecumseh Groundwater Use Ordinance. Therefore this exposure pathway is incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers do not contact groundwater; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Trench Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers do not work in trenches; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Indoor Air Vapors	Complete	Complete	Potentially Significant	Potentially Significant	Volatiles in off-site groundwater may migrate into indoor air at off-site non-residential structures. Therefore this pathway is considered potentially complete. Site specific fate and transport modeling was completed which indicates that indoor air concentrations in existing off-site non-residential structures is acceptable. This pathway is currently insignificant. However new construction in areas of highly affected groundwater could result in significant exposures in the future.	Site-specific risk evaluation completed. Treat groundwater to address potential future exposures.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, direct contact by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab particulates by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab volatiles by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, off-site indoor air is not impacted, and the exposure pathway is incomplete.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Indoor workers would not contact off-site surface water. Therefore, this exposure pathway is considered incomplete.	No further evaluation required.

Table 2
Human Health and Ecological Exposure Pathway Analysis for Off-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
Resident (Adult & Child)	Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Residents may contact surface soil during domestic activities; therefore, this exposure pathway is considered potentially complete. However, based on data collected at on-site locations, it is not reasonable to expect surface soils to be affected above risk-based screening levels for these exposure pathways. Therefore, these exposure pathways are considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil particulates into the off-site breathing zone is a potentially complete pathway for residents near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil volatiles into the off-site breathing zone is a potentially complete pathway for residents near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
	Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Residents do not contact subsurface soils; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Soil Particulates	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil particulates into the off-site breathing zone is a potentially complete pathway for residents near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil volatiles into the off-site breathing zone is a potentially complete pathway for residents near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Off-site soils are not impacted. Therefore, this exposure pathways is considered incomplete.	No further evaluation required.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Drinking water is supplied by the City of Tecumseh municipal water supply. There are no production wells within the area of affected groundwater. Future installation and use of wells for any purpose other than environmental monitoring and treatment is reliably restricted by the City of Tecumseh Groundwater Use Ordinance. Therefore this exposure pathway is incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Residents do not contact groundwater; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Trench Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Residents do not work in trenches; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of SSDV Building System Vapors	Complete	Complete	Insignificant	Insignificant	Although residents may inhale groundwater vapors emanating from the SSDV system of their home, the atmospheric mixing and dilution of these vapors, combined with the elevated height of the effluent, making this a potentially complete but insignificant exposure pathway.	Site-specific calculations completed to verify this assessment. No further evaluation required.
		Inhalation of Indoor Air Vapors	Complete	Complete	Potentially Significant	Potentially Significant	Volatiles in off-site groundwater may migrate into indoor air at off-site residential structures. Therefore this pathway is considered potentially complete. SSDV system installation and/or indoor air sampling has been completed at all homes within the documented extent of shallow groundwater above applicable screening levels. This pathway is currently insignificant at all evaluated properties. Proposed additional investigation activities may extend to current evaluation area. Until investigation activities are complete this pathway remains potentially significant for current and future exposures.	Collect additional groundwater/soil gas data as proposed verify that pathway is currently not significant. Treat groundwater to address potential future exposures.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, direct contact by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab particulates by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab volatiles by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, off-site indoor air is not impacted, and the exposure pathway is incomplete.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Residents would not contact off-site surface water. Therefore, this exposure pathway is considered incomplete.	No further evaluation required.

Table 2
Human Health and Ecological Exposure Pathway Analysis for Off-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
Recreational User	Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Recreational users may contact surface soils; therefore, this exposure pathway is considered potentially complete. However, based on data collected at on-site locations, it is not reasonable to expect surface soils to be affected above risk-based screening levels for these exposure pathways. Therefore, these exposure pathways are considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil particulates into the off-site breathing zone is a potentially complete pathway for recreational users near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil volatiles into the off-site breathing zone is a potentially complete pathway for recreational users near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
	Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Recreational users do not contact subsurface soils; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Soil Particulates	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil particulates into the off-site breathing zone is a potentially complete pathway for recreational users near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Complete	Complete	Insignificant	Insignificant	Migration of on-site soil volatiles into the off-site breathing zone is a potentially complete pathway for recreational users near the site; however, atmospheric dilution and mixing results in negligible concentrations. Therefore, this pathway is considered potentially complete, but insignificant.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Recreational users are not expected to be indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Drinking water is supplied by the City of Tecumseh municipal water supply. There are no production wells within the area of affected groundwater. Future installation and use of wells for any purpose other than environmental monitoring and treatment is reliably restricted by the City of Tecumseh Groundwater Use Ordinance. Therefore this exposure pathway is incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Recreational users do not contact groundwater; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Trench Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Recreational users do not work in trenches; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Indoor Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Recreational users are not expected to be indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, direct contact by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab particulates by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab volatiles by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, off-site indoor air is not impacted, and the exposure pathway is incomplete.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Complete	Complete	Potentially Significant	Potentially Significant	Affected groundwater may discharge to the River Raisin and associated wetland area. Recreational users may contact off-site surface water and sediment in the wetlands and River Raisin. Therefore, this exposure pathway is considered complete and potentially significant	Complete ongoing GSI investigation. Use data collected to evaluate impacts on receptors in the wetland and calculate a site specific mixing zone based GSI criteria for the River Raisin.
	Aquatic Receptors (e.g., fish)	Ingestion	Complete	Complete	Insignificant	Insignificant	Recreational users may catch fish in the wetlands and River Raisin for consumption. Therefore, this exposure pathway is considered complete. However, site constituents of concern of volatile compounds which do not bioaccumulate; therefore this exposure pathway is insignificant.	No further evaluation required.

Table 2
Human Health and Ecological Exposure Pathway Analysis for Off-Site Receptors
Former Tecumseh Products Company Site
Tecumseh, Michigan

Receptor	Exposure Medium	Exposure Pathway	Exposure Pathway Complete?		Exposure Pathway Significance		Rationale	Risk Management Options
			Current Scenario	Future Scenario	Current Scenario	Future Scenario		
Ecological Receptors	Surface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Ecological Receptors may contact surface soils; therefore, this exposure pathway is considered potentially complete. However, based on data collected at on-site locations, it is not reasonable to expect surface soils to be affected above risk-based screening levels for these exposure pathways. Therefore, these exposure pathways are considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Inhalation of soil particulates or volatiles from on-site sources by an ecological receptor (e.g., fish, burrowing animal) is highly unlikely and considered an incomplete pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Inhalation of soil particulates or volatiles from on-site sources by an ecological receptor (e.g., fish, burrowing animal) is highly unlikely and considered an incomplete pathway.	No further evaluation required.
	Subsurface Soil & Fill	Dermal Contact and Incidental Ingestion	Complete	Complete	Insignificant	Insignificant	Ecological Receptors may contact subsurface soils; therefore, this exposure pathway is considered potentially complete. However, based on data collected at on-site locations, it is not reasonable to expect subsurface soils to be affected above risk-based screening levels for these exposure pathways. Therefore, these exposure pathways are considered insignificant.	No further evaluation required.
		Inhalation of Soil Particulates	Incomplete	Incomplete	Not Applicable	Not Applicable	Inhalation of soil particulates or volatiles from on-site sources by an ecological receptor (e.g., fish, burrowing animal) is highly unlikely and considered an incomplete pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Inhalation of soil particulates or volatiles from on-site sources by an ecological receptor (e.g., fish, burrowing animal) is highly unlikely and considered an incomplete pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	Ecological receptors do not dwell indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
	Groundwater	Ingestion from Domestic Use	Incomplete	Incomplete	Not Applicable	Not Applicable	Ecological receptors doe not contact groundwater directly; therefore, these pathways are considered incomplete.	No further evaluation required.
		Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	Ecological receptors doe not contact groundwater directly; therefore, these pathways are considered incomplete.	No further evaluation required.
		Inhalation of Trench Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Ecological receptors do not dwell in trenches; therefore, this pathway is considered incomplete.	No further evaluation required.
		Inhalation of Indoor Air Vapors	Incomplete	Incomplete	Not Applicable	Not Applicable	Ecological receptors do not dwell indoors; therefore, this pathway is considered incomplete.	No further evaluation required.
	Concrete Building Slab	Dermal Contact and Incidental Ingestion	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, direct contact by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Soil Particulates in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab particulates by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Ambient Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, inhalation of concrete slab volatiles by off-site receptors is considered an incomplete exposure pathway.	No further evaluation required.
		Inhalation of Volatile Compounds in Indoor Air	Incomplete	Incomplete	Not Applicable	Not Applicable	The potentially impacted concrete slab is only present on-site; therefore, off-site indoor air is not impacted, and the exposure pathway is incomplete.	No further evaluation required.
	Surface Water and Sediment	Dermal Contact and Incidental Ingestion	Complete	Complete	Complete	Complete	Affected groundwater may discharge to the River Raisin and associated wetland area. Ecological receptors users may contact surface water (e.g., River Raisin and the associated wetland area). Concentrations in groundwater discharging to surface water are above generic GSI criteria. Therefore, this exposure pathway is considered potentially complete.	Complete ongoing GSI investigation. Use data collected to evaluate impacts on receptors in the wetland and calculate a site specific mixing zone based GSI criteria for the River Raisin.
	Aquatic Receptors (e.g., fish)	Ingestion	Complete	Complete	Insignificant	Insignificant	Ecological receptors may eat other lower trophic organisms in the wetlands and River Raisin. Therefore, this exposure pathway is considered complete. However, site constituents of concern of volatile compounds which do not bioaccumulate; therefore this exposure pathway is insignificant.	No further evaluation required.

Table 3
Soil Risk-Based Cleanup Levels Protective of Future Exposures
Former Tecumseh Products Company Site
Tecumseh, Michigan

Constituent of Concern	CAS #	Soil Cleanup Level (mg/kg)
Tetrachloroethene	127-18-4	7,430
Trichloroethene	79-01-6	25

Notes:
mg/kg = milligram per kilogram

Table 4

Groundwater Cleanup Levels Protective of Future Exposures
Former Tecumseh Products Company Site
Tecumseh, Michigan

Constituent of Concern		1,1-Dichloroethene (1)	cis-1,2-Dichloroethene (1)	Tetrachloroethene (1)	Trichloroethene (1)	Vinyl chloride (2)
Units		ug/L	ug/L	ug/L	ug/L	ug/L
Geographic Area 1	Residential	4,900	3,900	2,000	130	NA
	Non-residential	49,000	40,000	20,000	1,300	2,930
Geographic Area 2	Residential	4,800	3,800	2,000	130	NA
	Non-residential	NA	NA	NA	NA	NA
Geographic Area 3	Residential	51,000	48,000	26,000	1,600	NA
	Non-residential	NA	NA	NA	NA	NA
Geographic Area 4	Residential (4)	NA	NA	NA	NA	NA
	Non-residential	220,000	210,000	76,000	6,000	2,930
Geographic Area 5	Residential (4)	NA	NA	NA	NA	NA
	Non-residential	630,000	610,000	>210,000	20,000	2,930
Geographic Area 6	Residential (4)	NA	NA	NA	NA	NA
	Non-residential	47,000	37,000	19,000	1,300	2,930
Geographic Area 7 (3)	Residential	33,000	29,000	16,000	1,000	NA
	Non-residential	620,000	610,000	>210,000	20,000	2,930
Geographic Area 8 (3)	Residential	5,100	4,100	2,100	140	NA
	Non-residential	51,000	42,000	21,000	1,400	2,930
Geographic Area 9	Residential (4)	NA	NA	NA	NA	NA
	Non-residential	680,000	670,000	>210,000	22,000	2,930
Geographic Area 10 (5)	Residential	NA	NA	NA	NA	NA
	Non-residential	NA	NA	NA	NA	NA
	Ecological	TBD	TBD	TBD	TBD	TBD

Notes:

ug/L = micrograms per liter

NA = Not Applicable, pathway is incomplete or insignificant

TBD = To Be Determined pending completion of the Groundwater Surface Water Interface (GSI) Investigation as described in Appendix B.

(1) Determined using the Risk-Based Corrective Action (RBCA) Tool Kit for fate and transport modeling for vapor intrusion pathway of potential residential and non-residential exposures.

(2) Vinyl chloride groundwater cleanup levels for non-residential scenarios were based on cleanup levels for contact with groundwater.

(3) Geographic Areas 7 and 8 are zoned industrial/commercial. Residential calculations were performed because there are currently residential structures in these areas. New residential development is not reasonably expected in these areas. If existing residential properties are converted to non-residential use, the residential cleanup levels no longer apply.

(4) Residential cleanup levels were not calculated for geographic areas where current or future land use does not include reasonably anticipated residential use.

(5) Geological Area 10 is a regulated wetland area. Reasonable future use does not include building construction and occupancy.

Table 5
Remedial Technology Balancing Criteria Evaluation
Former Tecumseh Products Company Site
Tecumseh, Michigan

Remedial Technology / Process	Long Term Effectiveness	Reduction in Toxicity, Mobility, or Volume of Contaminants	Short Term Effectiveness	Implementability	Sustainability	Cost Effectiveness	Retained for Evalation?
Soil							
Soil Vapor Extraction (SVE)	High	Moderate	High	High	Moderate	Moderate	Yes
In situ Thermal Desorption (ISTD)	Moderate	Moderate	High	Moderate	Low	Low	No
In situ Chemical Oxidation (ISCO)	Moderate	Moderate	High	High	Moderate	Moderate	No (1)
Excavation and Off-Site Disposal	High	Moderate	High	High	Low	Low	No (2)
Institutional Controls (ICs) / Engineering Controls (ECs)	High	Low	High	High	High	High	Yes
Groundwater							
SVE/Air Sparge (4)	Moderate	Moderate	Moderate	Moderate	Low	Low	No
In situ Thermal Desorption (ISTD)	Moderate	Moderate	Moderate	Low	Low	Low	No
In situ Chemical Oxidation (ISCO)	Moderate	High	Moderate	Moderate	Low	Low	No
Enhanced Reductive Dechlorination (ERD)	High	High	High	High	Moderate	High	Yes (3)
Institutional Controls (ICs) / Engineering Controls (ECs)	High	Low	High	High	High	High	Yes

Notes:

1) ISCO treatment using soil blending techniques will be retained for consideration for smaller sized areas.
2) Excavation and Disposal option will be retained for small localized areas
3) Although not reflected in this table, enhanced reductive dechlorination (ERD) for soil using blending techniques will be retained for consideration based on treatment area volume. Because of its potential ability to work in both the satura andd the unsaturated zone, it may be an apppropriate technology to treat both source area soil and shallow groundwater at certain locations.
4) SVE and Air Sparge would be combined due to the requirement to capture contaminants in the vadose zone.
5) Certain technologies were evaluated based on their ability to treat soil and groundwater individually, but when implemented would be combined. Cost synergies for this were considered when evaluating cost to implement.

Table 6

Preliminary Recommendations for Sampling Locations, Sampling Paramters and Sampling Frequency

Former Tecumseh Products Company Site

Tecumseh, Michigan

Groundwater Sample Location	During Review of Corrective Measures Proposal			Baseline (before treatment, <6 months)			Treatment Period - Start-Up Phase (~6 months)			Treatment Period - Post Start-Up (~18 months, until cleanup levels met in treatment area)			Post Treatment - Period 1 (~2 years, verify cleanup levels are maintained in treatment area)			Post Treatment - Period 2 (~2 years, achieve cleanup objectives at downgradient locations)			Post Treatment - Period 3 (2 years, verify cleanup objectives are maintained at downgradient locations)		
	Water Level	VOCs	MNA	Water Level	VOCs	MNA	Water Level	VOCs	MNA	Water Level	VOCs	MNA	Water Level	VOCs	MNA	Water Level	VOCs	MNA	Water Level	VOCs	MNA
Northern Plume - Active Treatment Area																					
NEW-01	NI	NI		Q	Q	SA	Q	M	Q	Q	Q	SA									
NEW-02	NI	NI		Q	Q	SA	Q	M	Q	Q	Q	SA									
MW-04s	SA	SA		SA	SA		Q	Q		Q	Q		SA	SA		SA	A		SA	A	
MW-04i	SA	SA		SA	SA	SA	Q	M	Q	Q	Q	SA	SA	SA		SA	A		SA	A	
MW-44s	NI	NI		Q	Q		Q	Q		Q	Q		SA	SA		SA	A		SA	A	
MW-44i	NI	NI		Q	Q	SA	Q	M	Q	Q	Q	SA	SA	SA		SA	A		SA	A	
MW-55s	NI	NI		Q	Q	SA	Q	Q		Q	Q		SA	SA		SA	A		SA	A	
MW-55i	NI	NI		Q	Q	SA	Q	M	Q	Q	Q	SA	SA	SA		SA	A		SA	A	
Northern Plume - Downgradient of Treatment Area																					
MW-03s	SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
MW-45s	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
MW-46s	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
MW-46i	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
MW-43s	NI, SA	NI, SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
MW-47i	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
MW-23	SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
Northern Plume - Up Gradient/Side Gradient of Treatment Area and Downgradient Plume																					
MW-02s	SA	A		SA	A		SA	A		SA	A		SA	A	A	SA			SA		
MW-32s	SA	A		SA	A		SA	A		SA	A		SA	A	A	SA			SA		
MW-32d	SA	A		SA	A		SA	A		SA	A		SA	A							
MW-36s	SA	A		SA	A		SA	A		SA	A		SA	A	A	SA			SA		
MW-36d	SA	A		SA	A		SA	A		SA	A		S	A							
MW-24s	SA	A		SA	A		SA	A		SA	A		SA	A		SA			SA		
MW-24d	SA	A		SA	A		SA	A		SA	A		SA	A							
MW-12s	SA	A		SA	A		SA	A		SA	A		SA	A		SA			SA		
MW-12d	SA	A		SA	A		SA	A		SA	A		SA	A							
Northern Plume - Downgradient of Treatment Area/Plume																					
MW-29s	SA	A		SA	A		SA	A		SA	A		SA	A		SA	A		SA	A	
MW-48s	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	A		SA	A	
MW-48i	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	A		SA	A	
MW-30s	SA	A		SA	A		SA	A		SA	A		SA	A		SA	A		SA	A	
MW-30d	SA	A		SA	A		SA	A		SA	A		SA	A		SA	A		SA	A	
MW-10s	SA			SA			SA	A		SA	A		SA	A		SA	A		SA	A	
MW-10d	SA	A		SA	A		SA	A		SA	A		SA	A		SA	A		SA	A	

Notes:

VOCs = Volatile Organic Compounds

MNA = Monitored Natural Attenuation. MNA parameters to be determined, but may include total organic carbon, dissolved iron, dissolved manganese, alkalinity, chloride, sulfate, sulfide, nitrate, nitrite, phosphate, dissolved methane, dissolved ethane, dissolved ethene, and/or volatile fatty acids.

M = Monthly, Q = Quarterly, SA = Semi-Annually, A = Annually

NI = Not Installed. MW-43s will be installed as soon as feasible. Remaining new wells will be installed following issuance of the Final Decision.

This proposed sampling program is expected to be a working document which may be modified as appropriate to meet project objectives

Table 6

Preliminary Recommendations for Sampling Locations, Sampling Paramters and Sampling Frequency

Former Tecumseh Products Company Site

Tecumseh, Michigan

Groundwater Sample Location	During Review of Corrective Measures Proposal			Baseline (before treatment, <6 months)			Treatment Period - Start-Up Phase (~6 months)			Treatment Period - Post Start-Up (~18 months, until cleanup levels met in treatment area)			Post Treatment - Period 1 (~2 years, verify cleanup levels are maintained in treatment area)			Post Treatment - Period 2 (~2 years, achieve cleanup objectives at downgradient locations)			Post Treatment - Period 3 (2 years, verify cleanup objectives are maintained at downgradient locations)		
	Water Level	VOCs	MNA	Water Level	VOCs	MNA	Water Level	VOCs	MNA	Water Level	VOCs	MNA	Water Level	VOCs	MNA	Water Level	VOCs	MNA	Water Level	VOCs	MNA
Southern Plume - Active Treatment Area																					
SEW-01	NI	NI		Q	Q	SA	Q	M	Q	Q	Q	SA									
SEW-02	NI	NI		Q	Q	SA	Q	M	Q	Q	Q	SA									
MW-49s	NI	NI		Q	Q	SA	Q	Q		Q	Q		SA	SA		SA	A		SA	A	
MW-49i	NI	NI		Q	Q	SA	Q	M	Q	Q	Q	SA	SA	SA		SA	A		SA	A	
MW-35i	SA	SA		SA	SA	SA	Q	M	Q	Q	Q	SA	SA	SA		SA	A		SA	A	
MW-35d	SA	SA		SA	SA		Q	Q		Q	Q		SA	SA		SA	A		SA	A	
MW-50s	NI	NI		Q	Q	SA	Q	Q		Q	Q		SA	SA		SA	A		SA	A	
MW-50i	NI	NI		Q	Q		Q	M	Q	Q	Q	SA	SA	SA		SA	A		SA	A	
MW-51i	NI	NI		Q	Q		Q	Q		Q	Q		SA	SA		SA	A		SA	A	
MW-01s	SA	SA		SA	SA		Q	Q		Q	Q		SA	SA		SA	A		SA	A	
Southern Plume - Downgradient of Treatment Area																					
MW-52s	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
MW-52i	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
MW-53s	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
MW-53d	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
MW-54s	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
MW-54d	NI	NI		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	SA	
Southern Plume - Up Gradient/Side Gradient of Treatment Area and Downgradient Plume																					
MW-34s	SA	A		SA	A		SA	A		SA	A		SA	A		SA			SA		
MW-34d	SA	A		SA	A		SA	A		SA	A		SA	A							
MW-37s	SA	A		SA	A		SA	A		SA	A		SA	A		SA			SA		
MW-39s	SA	A		SA	A		SA	A		SA	A		SA	A		SA			SA		
MW-39d	SA	A		SA	A		SA	A		SA	A		SA	A							
PRB-08s	SA	A		SA	A		SA	A		SA	A		SA	A		SA			SA		
PRB-08d	SA	A		SA	A		SA	A		SA	A		SA	A							
PRB-02s	SA	A		SA	A		SA	A		SA	A		SA	A		SA			SA		
MW-38s	SA	A		SA	A		SA	A		SA	A		SA	A		SA			SA		
MW-38d	SA	A		SA	A		SA	A		SA	A		SA	A							
PRB-11s	SA	A		SA	A		SA	A		SA	A		SA	A		SA			SA		
MW-20s	SA	A		SA	A		SA	A		SA	A		SA	A		SA			SA		
MW-20d	SA	A		SA	A		SA	A		SA	A		SA	A							
MW-27s	SA	A		SA	A		SA	A		SA	A		SA	A		SA			SA		
MW-27d	SA	A		SA	A		SA	A		SA	A		SA	A							
Southern Plume - Downgradient of Treatment Area/Plume																					
MW-41	SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	A		SA	A	
MW-17s	SA	A		SA	A		SA	A		SA	A		SA	A		SA	A		SA	A	
MW-42d	SA	SA		SA	SA		SA	SA		SA	SA		SA	SA		SA	A		SA	A	
MW-14d	SA	A		SA	A		SA	A		SA	A		SA	A		SA	A		SA	A	

Notes:

VOCs = Volatile Organic Compounds

MNA = Monitored Natural Attenuation. MNA parameters to be determined, but may include total organic carbon, dissolved iron, dissolved manganese, alkalinity, chloride, sulfate, sulfide, nitrate, nitrite, phosphate, dissolved methane, dissolved ethane, dissolved ethene, and/or volatile fatty acids.

M = Monthly, Q = Quarterly, SA = Semi-Annually, A = Annually

NI = Not Installed. MW-43s will be installed as soon as feasible. Remaining new wells will be installed following issuance of the Final Decision.

This proposed sampling program is expected to be a working document which may be modified as appropriate to meet project objectives

Table 7
Revised Soil Gas Monitoring Program
Former Tecumseh Products Company Site
Tecumseh, Michigan

Soil Gas Sample Location	TO-15 VOC Analysis				Comments
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	
SG-01 (8-8.5')		√		√	Located adjacent to the non-residential area desginated "Geographic Area 6" along the southern perimeter of the Site. Monitor soil gas concentrations until cleanup levels for tetrachloroethene and trichloroethene concentrations are achieved at verified at monitoring wells MW-01s and MW-50s
SG-06 (8-8.5')		√		√	Located adjacent to the non-residential area desginated "Geographic Area 4" along the northern perimeter of the Site. Monitor soil gas concentrations until stable or decreasing trichloroethene concentrations are established at monitoring wells MW-04s, MW-45s, and MW-46s.
SG-07 (8-8.5')		√		√	Located adjacent to the non-residential area desginated "Geographic Area 4" along the northern perimeter of the Site. Monitor soil gas concentrations until stable or decreasing trichloroethene concentrations are established at monitoring wells MW-04s, MW-45s, and MW-46s.
SG-09 (5.5-6')		√		√	Located adjacent to the residential and non-residential area desginated "Geographic Area 8" east of the Site. Monitor soil gas concentrations until stable or decreasing trichloroethene concentrations are established at monitoring wells MW-53s and MW-54s
SG-10 (5-5.5')		√		√	Located adjacent to the residential area desginated "Geographic Area 2" north of the Site. Monitor soil gas concentrations until stable or decreasing trichloroethene concentrations are established at monitoring wells MW-43s and MW-45s
SG-11 (5.5-6')		√		√	Located adjacent to the residential area desginated "Geographic Area 2" north of the Site. Monitor soil gas concentrations until stable or decreasing trichloroethene concentrations are established at monitoring wells MW-43s and MW-45s
SG-22 (6-6.5')		√		√	Located adjacent to the non-residential area desginated "Geographic Area 6" along the southern perimeter of the Site. Monitor soil gas concentrations until cleanup levels for tetrachloroethene and trichloroethene concentrations are achieved at verified at monitoring wells MW-01s and MW-50s
SG-25 (5-5.5')		√		√	Located adjacent to the non-residential area desginated "Geographic Area 6" along the southern perimeter of the Site. Monitor soil gas concentrations until cleanup levels for tetrachloroethene and trichloroethene concentrations are achieved at verified at monitoring wells MW-01s and MW-50s
SG-26 (Proposed)		√		√	Located adjacent to the residential area desginated "Geographic Area 2" north of the Site. Monitor soil gas concentrations until stable or decreasing trichloroethene concentrations are established at monitoring wells MW-43s and MW-45s

Notes:

There is not an immediate plan to decommission the existing monitoring points that are not sampled in this revised monitoring program.

Table 8
Cost Estimate
Former Tecumseh Products Company Site
Tecumseh, Michigan
January 2016

Project Activity	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total Project Costs
	1	2	3	4	5	6	7	8	9	10	
CMP Workplan Implementation											
CMP Workplans/Investigations -											
Off-Site High Resolution Site Characterization	$ 61,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 61,000
On-Site Soil Investigation	$ 55,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 55,000
Install Off Site VI Monitoring Well	$ 4,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,500
PCE Source Investigation	$ 4,200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,200
GSI Investigation	$ 41,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 41,000
Groundwater Monitoring Well Installation	$ -	$ 57,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 57,500
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal	**$ 165,700**	**$ 57,500**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 223,200**
Final Corrective Measures											
Corrective Measures Implementation -											
EISB Groundwater Treatment	$ 350,000	$ 550,000	$ 550,000	$ 450,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,900,000
SVE System Expansion	$ -	$ 210,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 210,000
SVE O&M	$ 35,000	$ 55,000	$ 55,000	$ 50,000	$ 50,000	$ -	$ -	$ -	$ -	$ -	$ 245,000
PCE Source Investigation and Treatment	$ 175,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 175,000
Construction Completion Report	$ -		$ 10,000		$ -	$ -	$ -	$ -	$ -	$ -	$ 10,000
Subtotal	**$ 560,000**	**$ 815,000**	**$ 615,000**	**$ 500,000**	**$ 50,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 2,540,000**
Decommissioning and Closure Activities											
Decommission Monitoring Wells / Points	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ -	$ 30,000
Decommission Remediation System(s)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,000	$ -	$ 25,000
Closure Report	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,000	$ -	$ 20,000
Subtotal	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 75,000**	**$ -**	**$ 75,000**
Compliance Monitoring, Reporting and Meetings											
Groundwater Monitoring (including EISB monitoring)	$ 75,000	$ 90,000	$ 90,000	$ 80,000	$ 70,000	$ 55,000	$ 55,000	$ 55,000	$ -	$ -	$ 570,000
Soil Gas Monitoring	$ 18,500	$ 18,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 37,000
Progress Reports	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ -	$ 108,000
Project Meetings, Management, and Coordination	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ -	$ 130,000
Subtotal	**$ 125,500**	**$ 140,500**	**$ 122,000**	**$ 112,000**	**$ 92,000**	**$ 77,000**	**$ 77,000**	**$ 77,000**	**$ 22,000**	**$ -**	**$ 845,000**
Corrective Measures Implementation Total	**$ 851,200**	**$ 1,013,000**	**$ 737,000**	**$ 612,000**	**$ 142,000**	**$ 77,000**	**$ 77,000**	**$ 77,000**	**$ 97,000**	**$ -**	**$ 3,683,200**

Charts

Chart 1
Conceptual Site Model – On-Site Receptors

Chart 2
Conceptual Site Model – Off-Site Receptors

Chart 3
Project Schedule

Chart 1
On-Site Conceptual Site Model
Former Tecumseh Products Company Site
Tecumseh, Michigan

Primary Source	Media Potentially Affected	Contact or Release Mechanism	Secondary Source	Contact or Release Mechanism	Tertiary Source	On-Site Receptor: Environmental Worker Current	Environmental Worker Future	One-Time Building Construction Worker Current	One-Time Building Construction Worker Future	Occasional Excavation / Maintenance Worker Current	Occasional Excavation / Maintenance Worker Future	Redevelopment Worker Current	Redevelopment Worker Future	Routine Outdoor Worker Current	Routine Outdoor Worker Future	Indoor Routine Worker Current	Indoor Routine Worker Future	Trespasser Current	Trespasser Future
Former Site Operations (including site-wide operational impacts to asphalt, concrete building slab, sewers, tanks, process area, etc.)	On-Site Surface Soil & Fill	Direct Contact with On-Site Surface Soil				DC	DC		DC		DC		DC	DC	DC			DC	DC
		Wind Erosion / Volatilization	Ambient Air Particulates			Ih	Ih		Ih		Ih		Ih	Ih	Ih			Ih	Ih
			Ambient Air Vapors			Ih	Ih		Ih		Ih		Ih	Ih	Ih			Ih	Ih
	On-Site Subsurface Soil & Fill	Direct Contact with On-Site Subsurface Soil				DC	DC		DC		DC		DC						
		On-Site Construction Activities	Ambient Air Particulates			Ih	Ih		Ih		Ih		Ih		Ih				
			Ambient Air Vapors			Ih	Ih		Ih		Ih		Ih		Ih				
		Volatilization to Indoor Air	Indoor Air			Ih	Ih										Ih		
		Leaching to GW	On-Site Groundwater	Ingestion of On-Site GW (1)															
				Direct Contact with On-Site GW (2)		DC	DC		DC		DC		DC						
				Volatilization to Trench Air	On-Site Trench Air Vapors				Ih		Ih		Ih						
				Volatilization to Indoor Air	On-Site Indoor Air Vapors	Ih	Ih										Ih		
	Concrete Slab	Concrete slab to be managed as debris and characterized in accordance with applicable law (Part 111/Part 115) of NREPA as recited in the Declaration of Restrictive Covenant																	

Notes:

DC = Dermal Contact and Incidental Ingestion
Ih = Inhalation
Ing = Ingestion
GW = Groundwater
SSDV = Sub-Slab Depressurization/Ventilation System
SW = Surface Water

DC	A shaded box indicates that exposure pathway is potentially complete AND significant, and requires further evaluation.
Ih	An unshaded box with text indicates that the exposure pathway is potentially complete, BUT insignificant, and does not require further evaluation.
	An unshaded box without text indicates that the exposure pathway is incomplete and does not require further evaluation.

(1) A groundwater use ordinance is in place which prohibits supply wells in the area of affected groundwater. The ingestion of affected groundwater migration pathway is not complete.

(2) Depth to groundwater ranges from 5-25 feet below ground surface in the area of affected groundwater. Where groundwater is present less than 15 feet below ground surface a construction worker could encounter groundwater while completing excavation activities such as sub-surface utility repair.

Chart 2

Off-Site Conceptual Site Model
Former Tecumseh Products Company Site
Tecumseh, Michigan

Primary Source	Media Potentially Affected	Contact or Release Mechanism	Secondary Source	Contact or Release Mechanism	Tertiary Source	Contact or Release Mechanism	Quaternary Source	Contact or Release Mechanism	Quinary Source	Off-Site Receptor: Environmental Worker Current	Environmental Worker Future	One-Time Building Construction Worker Current	One-Time Building Construction Worker Future	Occasional Excavation / Maintenance Worker Current	Occasional Excavation / Maintenance Worker Future	Routine Outdoor Worker Current	Routine Outdoor Worker Future	Indoor Routine Worker Current	Indoor Routine Worker Future	Resident Current	Resident Future	Recreational User Current	Recreational User Future	Ecological Receptors Current	Ecological Receptors Future
Former Site Operations (including site-wide operational impacts to asphalt, concrete building slab, sewers, tanks, process area, etc.)	On-Site Surface Soil & Fill	Direct Contact w/ On-Site Surface Soil (1)																							
		Erosion / Volatilization	Ambient Air Particulates							Ih	Ih	Ih	Ih	Ih	Ih	Ih	Ih			Ih	Ih				
			Ambient Air Vapors							Ih	Ih	Ih	Ih	Ih	Ih	Ih	Ih			Ih	Ih				
			Off-Site Soil	Direct Contact w/ Off-Site Surface Soil						DC	DC	DC	DC	DC	DC	DC	DC			DC	DC	DC	DC	DC	DC
				Wind Erosion / Volatilization	Ambient Air Particulates					Ih	Ih	Ih	Ih	Ih	Ih	Ih	Ih			Ih	Ih				
					Ambient Air Vapors					Ih	Ih	Ih	Ih	Ih	Ih	Ih	Ih			Ih	Ih				
	On-Site Subsurface Soil & Fill	Direct Contact w/ On-Site Subsurface Soil (1)																							
		On-Site Construction Activities	Ambient Air Particulates							Ih	Ih	Ih	Ih	Ih	Ih	Ih	Ih			Ih	Ih				
			Ambient Air Vapors							Ih	Ih	Ih	Ih	Ih	Ih	Ih	Ih			Ih	Ih				
		Volatilization to Indoor Air	Indoor Air																						
		Leaching to GW	On-Site Groundwater	Direct Contact with GW (1)																					
				Volatilization to Trench Air	On-Site Trench Air Vapors																				
				Volatilization to Indoor Air	On-Site Indoor Air Vapors																				
				Lateral GW Transport	Off-Site GW (including NAPL)	Ingestion of Off-Site GW (2)																			
						Direct Contact with Off-Site GW (3)				DC	DC	DC	DC	DC	DC										
						Volatilization to Trench Air	Off-Site Trench Air					Ih	Ih	Ih	Ih										
						Volatilization to Indoor Air	Off-Site Indoor Air											Ih	Ih	Ih	Ih				
						SSDV Building System	Ambient Air Near Off-Site Buildings													Ih	Ih				
						Wetlands Porewater Mixing	Off-Site Wetlands SW & Sediment			DC	DC											DC	DC	DC	DC
								Bioaccumulation	Ecological Receptors (4)													Ing	Ing	Ing	Ing
						Surface Water Mixing	Off-Site SW & Sediment			DC	DC											DC	DC	DC	DC
								Bioaccumulation	Ecological Receptors (4)													Ing	Ing	Ing	Ing

Notes:

DC = Dermal Contact and Incidental Ingestion
Ih = Inhalation
Ing = Ingestion

GW = Groundwater
SSDV = Sub-Slab Depressurization/Ventilation System
SW = Surface Water

DC	A shaded box indicates that exposure pathway is potentially complete AND potentially significant.
Ih	An unshaded box with text indicates that the exposure pathway is potentially complete, BUT insignificant, and does not require further evaluation.
	An unshaded box without text indicates that the exposure pathway is incomplete and does not require further evaluation.

(1) Off-site receptors cannot contact on-site media. Therefore, these pathways are incomplete for all off-site receptors.
(2) A groundwater use ordinance is in place which prohibits supply wells in the area of affected groundwater. The ingestion of affected groundwater migration pathway is not complete.
(3) Depth to groundwater ranges from 5-25 feet below ground surface in the area of affected groundwater. Where groundwater is present less than 15 feet below ground surface a construction worker could encounter groundwater while completing excavation activities such as sub-surface utility repair.
(4) This pathway is complete for receptors that may consume organisms (e.g. fish) in contact with affected media. However, volatile organic compounds do not bioaccumulate; therefore, this pathway is insignificant.

Chart 3
Corrective Measures Proposal Schedule
Former Tecumseh Products Company Site
Tecumseh, Michigan

ID	Task Name	Start	Finish
1	**Corrective Measures Proposal**		
2	TPC Submits Corrective Measures Proposal		
3	USEPA /MDEQ Review of Corrective Measures Proposal		Sep 27
4	USEPA Issuance of Final Decision		
5			
6	**Restrictive Covenant**		
7	USEPA / MDEQ Review of Declaration of Restrictive Covenant		Apr 30
8	Execution of Restrictive Covenant		
9			
10	**ESIB Groundwater Treatment**		
11	Construction Level Design		Oct 27
12	System Procurement		Feb 24
13	System Installation		Jun 24
14	System Startup / Shakedown		Jul 8
15	Prepare Construction Completion Report		Aug 22
16	Submit Construction Completion Report		
17	ESIB Circulation Cell Operation		Jan 4
18	ESIB Circulation Cell Stabilization		Jul 3
19	ESIB Circulation Cell Operation		Dec 10
20	ESIB Post Treatment Monitoring		Nov 9
21			
22	**PCE Source Area (Interim Measure)**		
23	Complete Delineation of PCE Above cSAT		Apr 15
24	Amendment Selection and Treatment Design		May 30
25	Procurement		Jun 29
26	In Situ Treatment		Jul 29
27	Post Treatment Sampling		Oct 11
28	Evaluate Data and Determine if Connection to SVE is Necessary		Nov 1
29			
30	**Groundwater-Surface Water Interface**		
31	USEPA / MDEQ feedback regarding GSI Investigation		Mar 31
32	Procurement / Coordination		Apr 21
33	Perform Pore Water Sampling Event 1		Apr 28
34	Perform Pore Water Sampling Event 2		Aug 3
35	Perform Pore Water Sampling Event 3		Nov 8
36	Evaluate Data [contingency required unscheduled]		Nov 12
37	TPC Submits Mixing Zone Criteria Request to MDEQ		
38	MDEQ & WRD Review of Mixing Zone Request		Sep 24
39	MDEQ Issuance of Preliminary Site Specific Mixing Zone Criteria		
40	Prepare Summary Report Requesting Approval to Rely on Mixing Zone Criteria		Jan 7
41	MDEQ Approval of Mixing Zone Based GSI		Jul 6
42	Establishment of Cleanup Goals for GSI Compliance		
43			
44	**High Resolution Site Characterization and Monitoring Well Installation**		
45	USEPA Feedback Regarding HRSC Workplan		Mar 16
46	Obtain Site Access		Mar 30
47	Implement HRSC Workplan		Apr 29
48	Review HRSC Data and Prepare Report		Jun 28
49	USEPA feedback on HRSC Report		Jul 28
50			
51	**Off Site Residential VI Well Installation**		
52	USEPA Feedback Regarding Location of Well		Mar 15
53	Obtain Site Access		Apr 14
54	Install and Sample Monitoring Well MW-43s and SG-26		Apr 28
55	Receive and Evaluate Data and Determine if Additional Actions are Necessary		Jun 27
56			
57	**On-Site Soil Investigation Work at PSG Locations**		
58	USEPA Feedback on Workplan		Mar 31
59	Implement Soil Investigation Workplan		Jun 13
60	Prepare Report Summarizing Data and Soils Corrective Measures Determination		Sep 11
61	USEPA / MDEQ Review of Soil Report		Nov 10
62			
63	**SVE Operation and Maintenance**		
64	Expansion of SVE System (contingent on building demolition)		
65	SVE System O&M		Nov 5
66			
67	**Monitoring**		
68	Installation of CMP Monitoring Wells		Nov 26
69	Groundwater Monitoring		No
70	Soil Gas Monitoring		Dec 30
71			

CMI Schedule
Fri 1/29/16

Task | Milestone | Inactive Task | Inactive Milestone | Manual Task | Manual Summary Rollup | Start-only
Summary | Recurring Tasks | Inactive Task | Inactive Summary | Duration-only | Manual Summary | Finish-only

\\intapa-annarbor\aam-vol1\-\WPAAM\PJT2\246667\0003\CMP\CMP Project Schedule.mpp

Figures

Figure 1
Site Layout and Sample Locations

Figure 2
Site Features and Demolition Areas

Figure 3
Summary of Current Land Use

Figure 4
Summary of Local Zoning

Figure 5
On-Site Sample Locations

Figure 6
Subsurface Utilities

Figure 7
Cross-Section Location Map and Groundwater Contour Map – November 2015

Figure 8
Cross Sections A-A' and B-B'

Figure 9
Cross Sections C-C' and D-D'

Figure 10
Elevation of Top of Clay Confining Unit

Figure 11
Thickness of Surficial Low Permeability Zone

Figure 12
Results of Passive Soil Gas Survey – Distribution of TCE and Breakdown Products

Figure 13
MIP Investigation Results – Distribution of Maximum ECD Response in Vadose Zone

Figure 14
MIP Investigation Results – Distribution of Maximum ECD Response in Saturated Zone

Figure 15
Soil Areas Above Risk-Based Screening Levels

Figure 16
Lateral Distribution of Tetrachloroethene in Groundwater

Figure 17
Lateral Distribution of Trichloroethene in Groundwater

Figure 18
Lateral Distribution of cis-1,2-Dichloroethene in Groundwater

Figure 19
Lateral Distribution of Vinyl Chloride in Groundwater

Figure 20
Lateral Distribution of Chlorinated Ethenes in Groundwater

Figure 21
Extent of VOCs in Groundwater above Michigan Part 201 Criteria

Figure 22
Summary of Residential Vapor Intrusion Pathway – Multiple Lines of Evidence Analysis

Figure 23
Summary of Non-Residential Vapor Intrusion Pathway – Multiple Lines of Evidence Analysis

Figure 24
P-Building SVE System Layout

Figure 25
Perimeter SVE System Layout

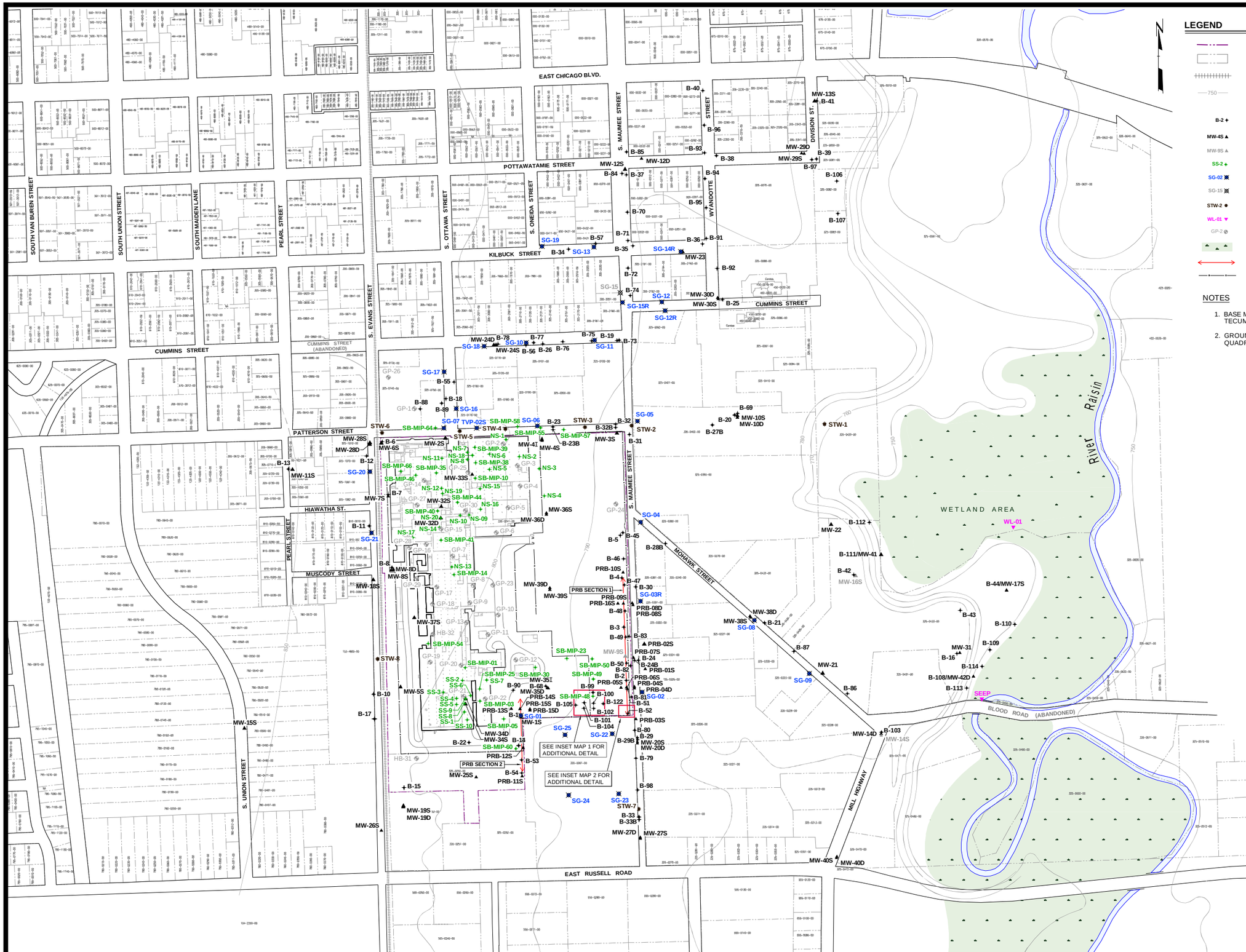
Figure 26
Geographic Areas for Vapor Intrusion Modeling

Figure 27
Areas Identified for Soil Corrective Measures

Figure 28
Areas Identified for Groundwater Corrective Measures

Figure 29
Recirculation Cell Layout and Proposed Monitoring Program

Figure 30
Enhanced In Situ Bioremediation – Process Flow Diagram

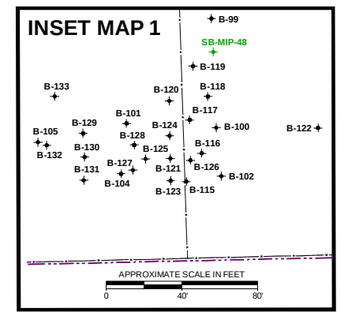


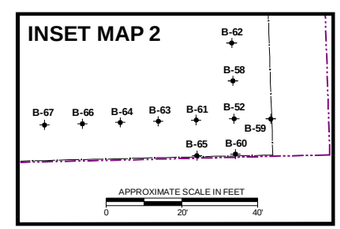
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.





NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

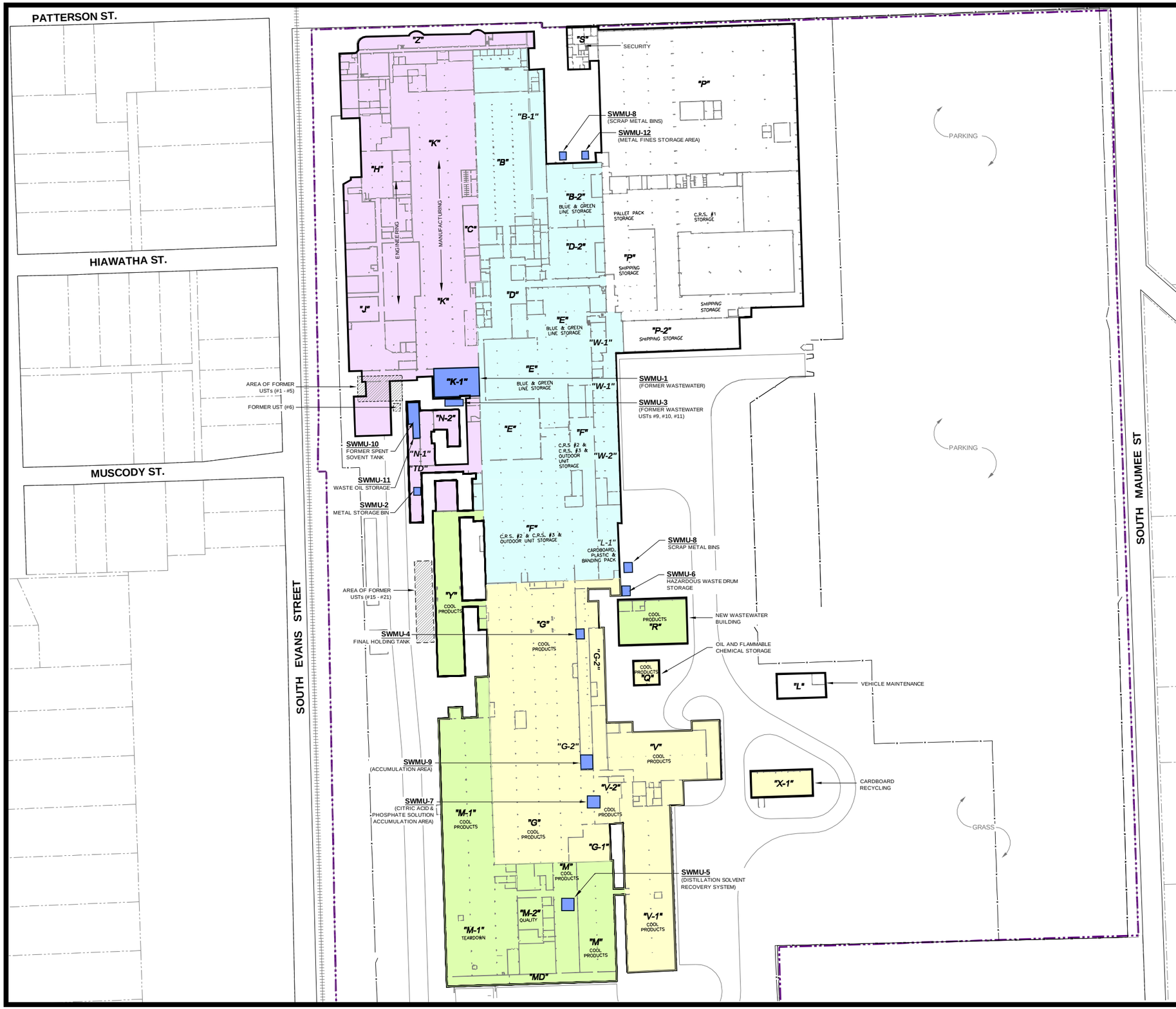
PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: SITE LAYOUT AND SAMPLE LOCATIONS

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.01.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 1	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

AUTOCAD
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Rpt\246667.0003.01.dwg
Operator Name: STEVE AL DWAYI
Drawing Up Scale: (1.00000)
Attached Xref's: tecr105116 (Filed)
Attached Images: TCE_Page_11 VOCs
Layout: FIGURE 1 SSL2 & Samples
Dwg Size: 1.61 Mb
Plot Date: January 27, 2016
Plot Time: 1:42 PM



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- TECUMSEH PRODUCTS BUILDING OUTLINE
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- APPROXIMATE LOCATION OF FORMER SOLID WASTE MANAGEMENT UNITS (SWMUs)
- FENCE LINE

Demolition Key

- PHASE I DEMOLITION AREA (DEMOLITION COMPLETE - 2013)
- PHASE II DEMOLITION AREA (DEMOLITION COMPLETE - 2013)
- PHASE III DEMOLITION AREA (PROPOSED)
- PHASE IV DEMOLITION AREA (PROPOSED)

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. SEE SECTION 2 OF THE SEPTEMBER 2012 REMEDIAL INVESTIGATION AND GROUNDWATER ENVIRONMENTAL INDICATOR REPORT FOR A DESCRIPTION OF SWMUs, UNDERGROUND STORAGE TANKS AND OTHER RELEVANT DATA.

N

0 80' 160' 240' 320'
APPROXIMATE SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: SITE FEATURES AND DEMOLITION AREAS

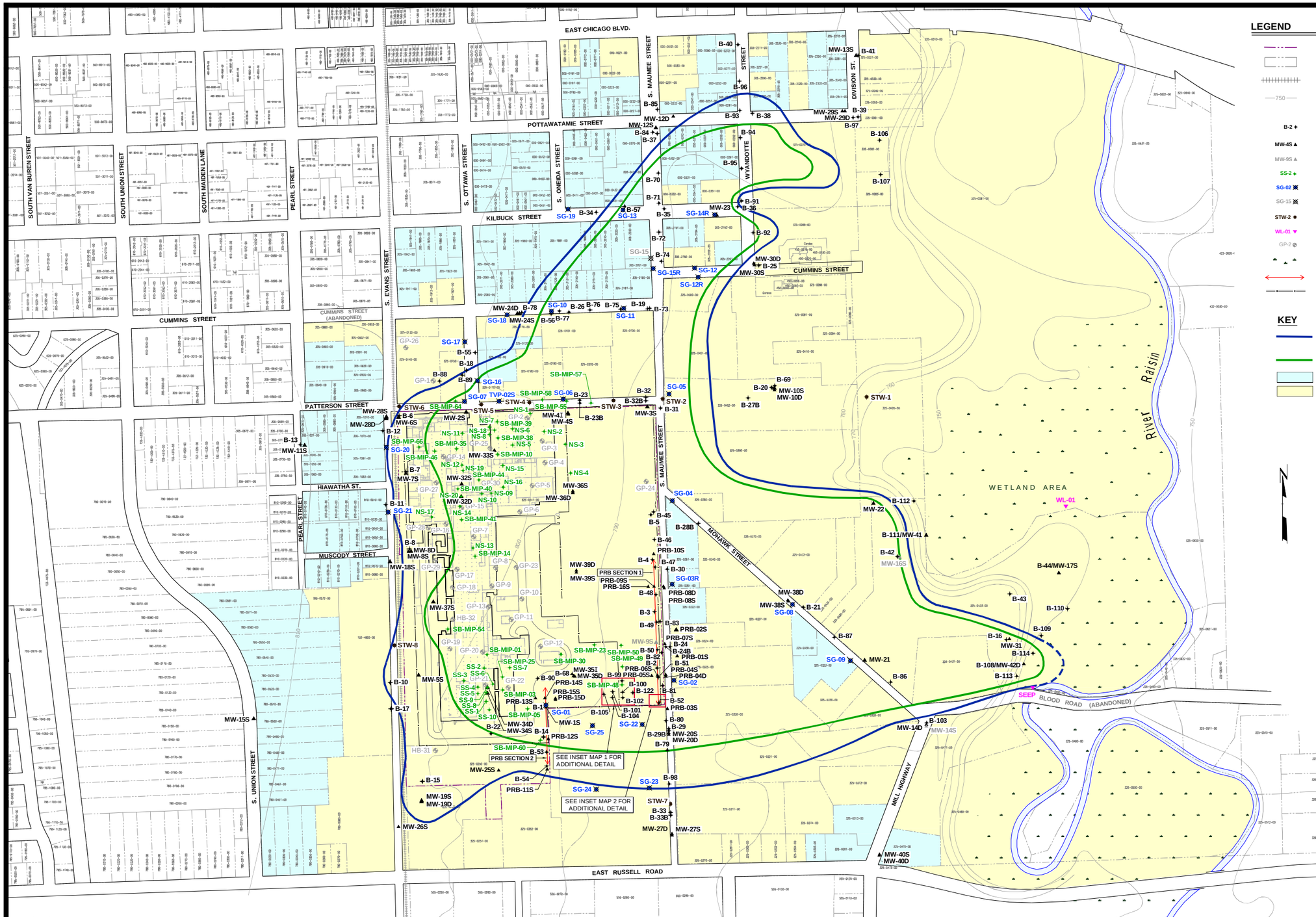
DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.02.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 2	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CAP Rpt\246667.0003.02.dwg
Operator Name: STEWALE, DAWAH
Drawing Plot Name: 246667

Dwg Size: 2.69 Mb
Plot Date: January 06, 2016
Plot Time: 3:17 PM

Attached Xref's: tec0301r10
Attached Images: 10026 Site Features & Demo Areas
Layout: 10026 Site Features & Demo Areas

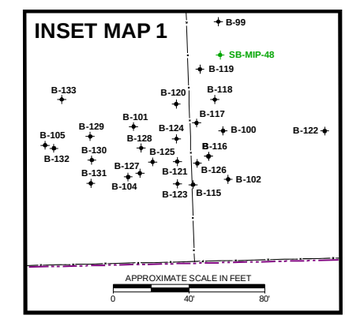


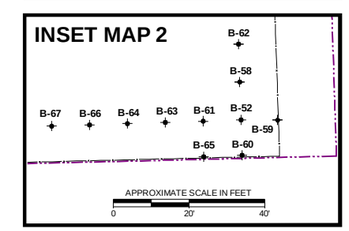
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

KEY

- EXTENT OF VOCs ABOVE MICHIGAN PART 201 DRINKING WATER CRITERIA
- EXTENT OF VOCs ABOVE MICHIGAN PART 201 GROUNDWATER SURFACE WATER INTERFACE CRITERIA
- RESIDENTIAL PROPERTY
- NON-RESIDENTIAL PROPERTY





0 250' 500' 750' 1000'
APPROXIMATE SCALE IN FEET

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. CURRENT LAND USE BEYOND THE AREA WITH GROUNDWATER USE RESTRICTED BY A CITY OF TECUMSEH GROUNDWATER USE ORDINANCE.

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

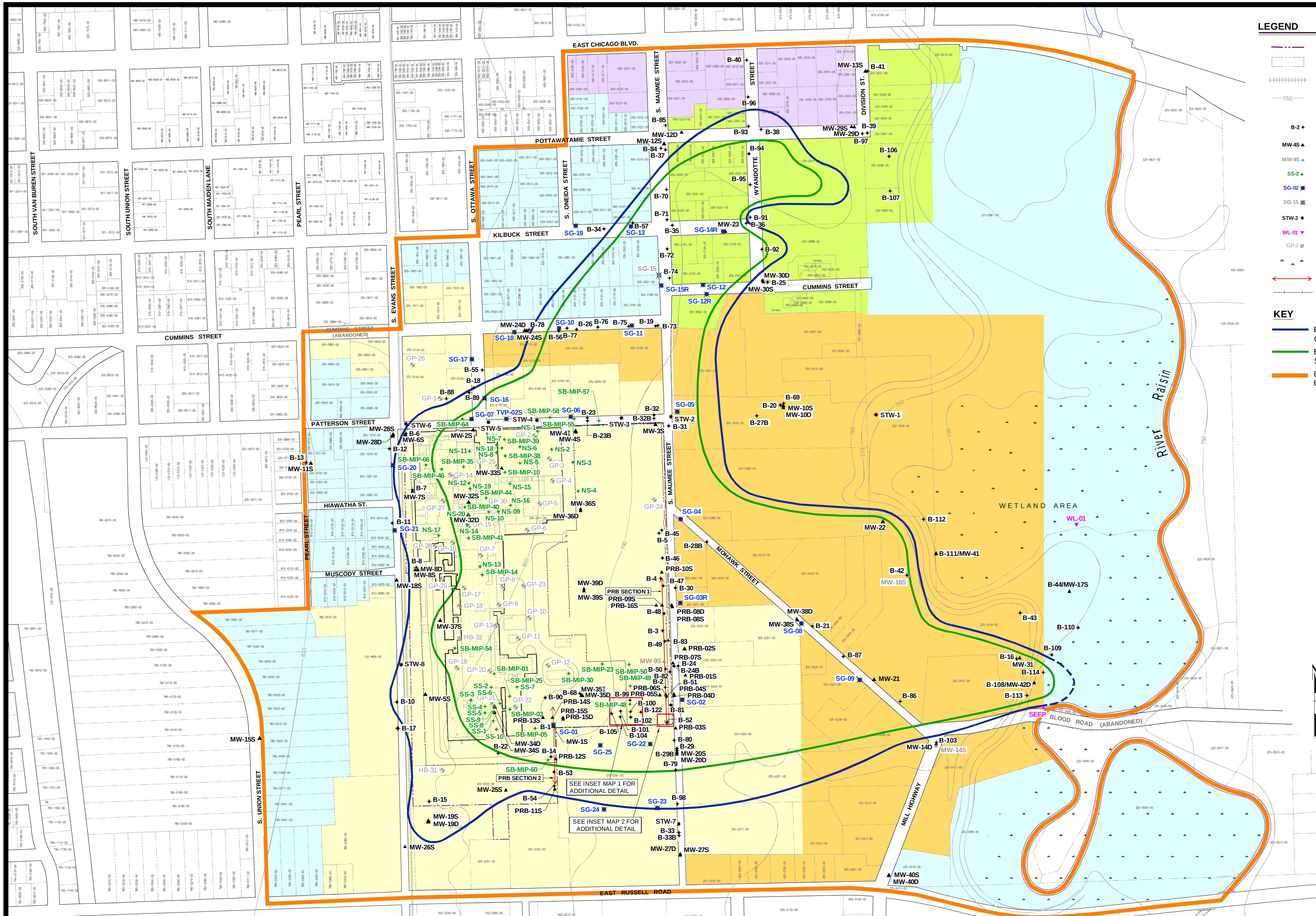
PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: SUMMARY OF CURRENT LAND USE

DRAWN BY: DGS	SCALE:	PROJ. NO.	246667.0003
CHECKED BY: SEM	AS INDICATED	FILE NO.	246667.0003.03.dwg
APPROVED BY: GC	DATE PRINTED:	FIGURE 3	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

Attached Xref's: tecr09115 (Filed)
Attached Image(s): TOC Page 5 ; TPC-FS80-XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Layout: FIGURE-Current Land Use
Dwg Size: 1.64 Mb
Plot Date: January 28, 2016
Plot Time: 3:11 PM
JL:\TRC\Tecumseh Products\Tecumseh MI\246667\CDS_CMP Rpt\246667.0003.03.dwg
Drawing Name: 246667.0003.03.dwg
Drawing Path Name: JL:\TRC\Tecumseh Products\Tecumseh MI\246667\CDS_CMP Rpt\246667.0003.03.dwg
PLOT DATA

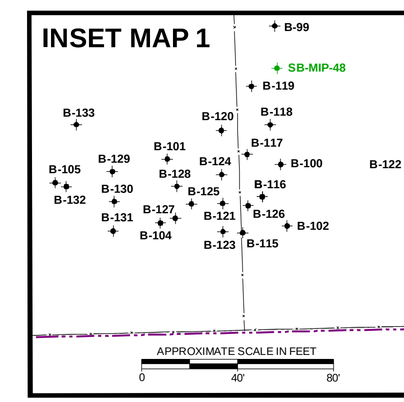


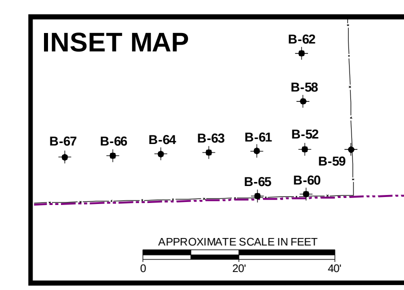
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

KEY

- EXTENT OF VOCs ABOVE MICHIGAN PART 201 DRINKING WATER CRITERIA
- EXTENT OF VOCs ABOVE MICHIGAN PART 201 GROUNDWATER SURFACE WATER INTERFACE CRITERIA
- BOUNDARY OF AREA WITH GROUNDWATER USE RESTRICTED BY A CITY OF TECUMSEH GROUNDWATER USE ORDINANCE





0 250' 500' 750' 1000'
APPROXIMATE SCALE IN FEET

ZONING KEY

- INDUSTRIAL
- RESIDENTIAL
- INDUSTRIAL/COMMERCIAL
- OFFICE SERVICES
- DOWNTOWN EDGE

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. ZONING DISTRICTS FROM THE ZONING MAP FOR THE CITY OF TECUMSEH, MICHIGAN PREPARED BY MCKENNA ASSOCIATES, DATED 01/13/2009. FOR PURPOSES OF THIS FIGURE VARIOUS ONE-FAMILY AND MULTIPLE FAMILY RESIDENTIAL ZONING DISTRICTS WERE GROUPED UNDER A SINGLE "RESIDENTIAL" DESCRIPTION.

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

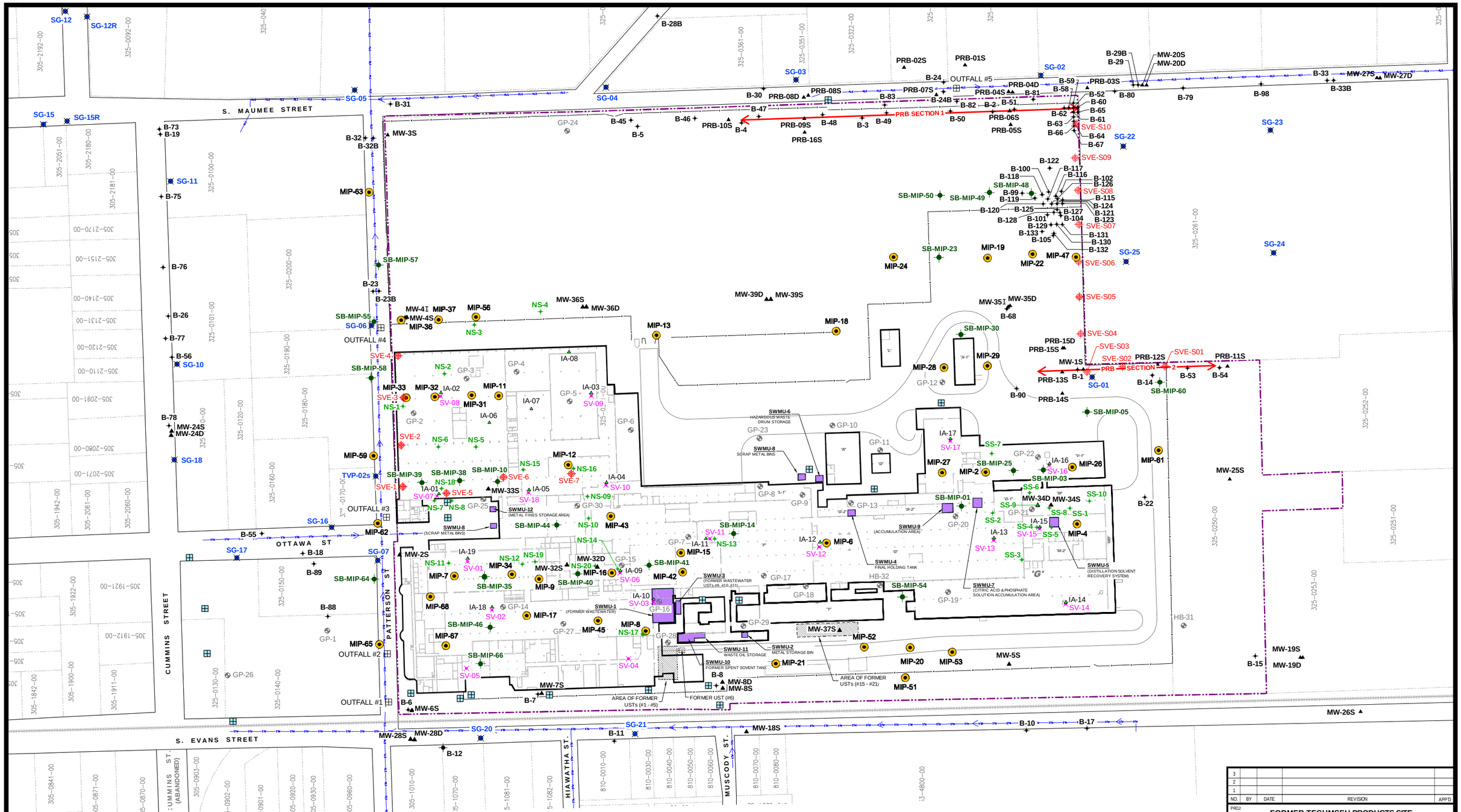
PROJ: **FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN**

TITLE: **SUMMARY OF LOCAL ZONING**

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.04.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 4	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Rpt\246667.0003.04.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.388863
Dwg Size: 1.83 Mb
Plot Date: January 29, 2016
Plot Time: 3:13 PM
Attached Xrefs: bm100110 (Filled)
Attached Images: TOE_Page_1; TPC FIG9 XXXXXXXXX-100820151314 20;
Layout: FIG04 Local Zoning



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- FENCE LINE
- PARCEL BOUNDARY
- PRB LOCATION
- B-8 PERIMETER/OFF-SITE INVESTIGATION BORING LOCATION AND NUMBER
- MW-8D MONITORING WELL LOCATION AND NUMBER
- SS-10 SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- GP-23 ATC PHASE II ESA BORING LOCATION AND NUMBER
- SVE-7 SOIL VAPOR EXTRACTION WELL LOCATION AND NUMBER
- SG-01 SOIL GAS SAMPLE LOCATION AND NUMBER
- SV-08 SUB-SLAB SOIL GAS SAMPLE LOCATION AND NUMBER
- MIP-40 MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- IA-03 INDOOR AIR SAMPLE LOCATION AND NUMBER
- STORM SEWER CATCH BASIN (2006 SITE SURVEY)
- OUTFALL FROM ON-SITE STORM SEWER
- AREA OF FORMER UST
- APPROXIMATE LOCATION OF FORMER SOLID WASTE MANAGEMENT UNITS (SWMUs)
- STORM WATER SEWER

0 100 200 300 400
APPROXIMATE SCALE IN FEET

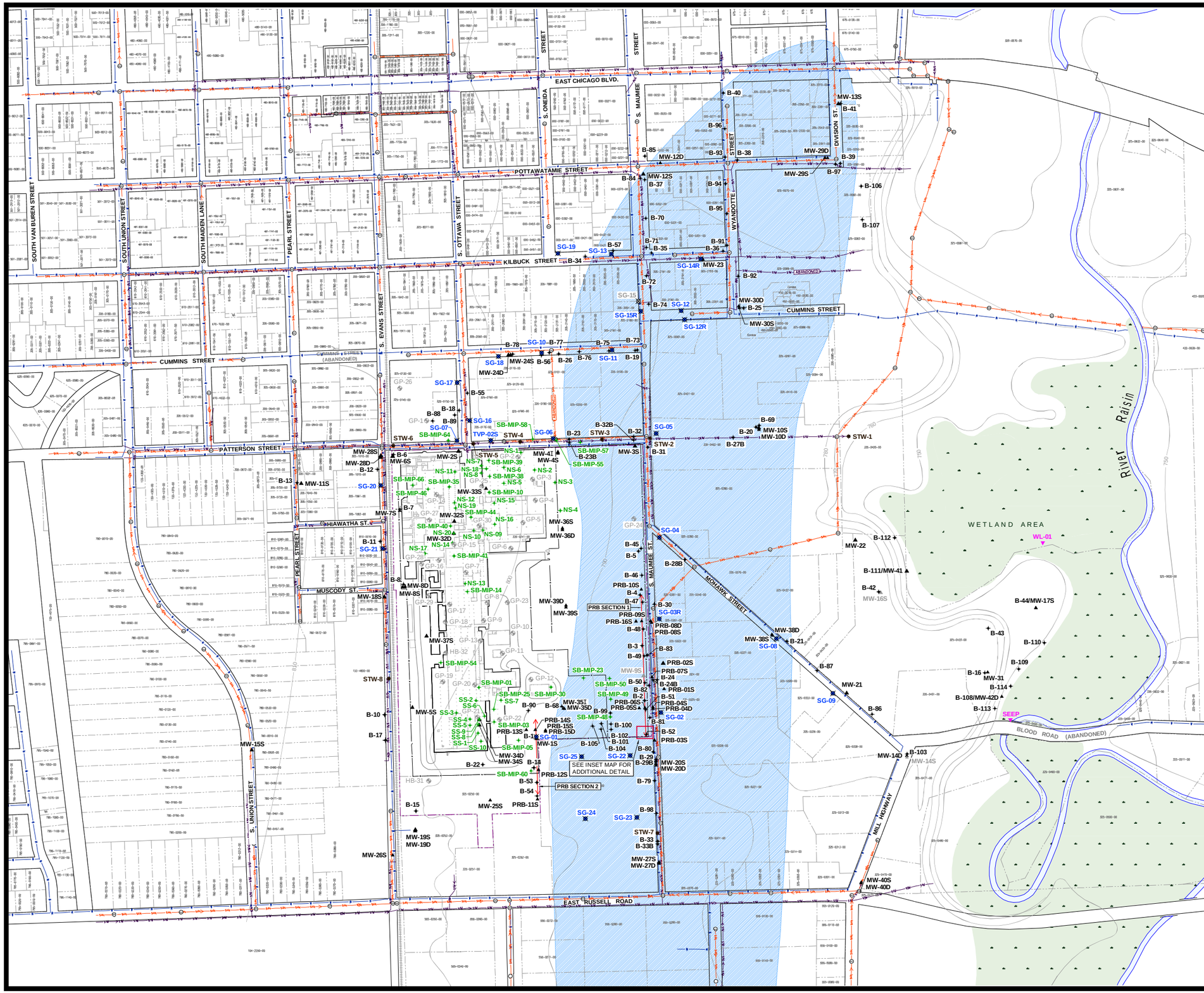
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: ON-SITE SAMPLE LOCATIONS

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0000	
CHECKED BY: SEM		FILE NO. 246667.0005.05.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 5	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

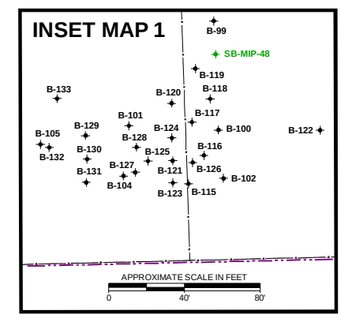


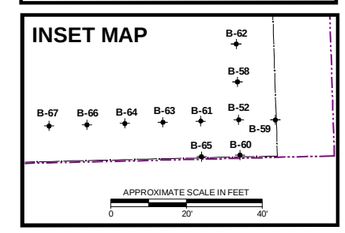
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- WATER LINE
- SANITARY SEWER
- STORM SEWER
- MANHOLE
- AREA OVER WHICH GROUNDWATER IN THE AFFECTED AQUIFER IS PRESENT AT DEPTHS LESS THAN 15 FEET BELOW GROUND SURFACE

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.





0 250' 500' 750' 1000'
APPROXIMATE SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

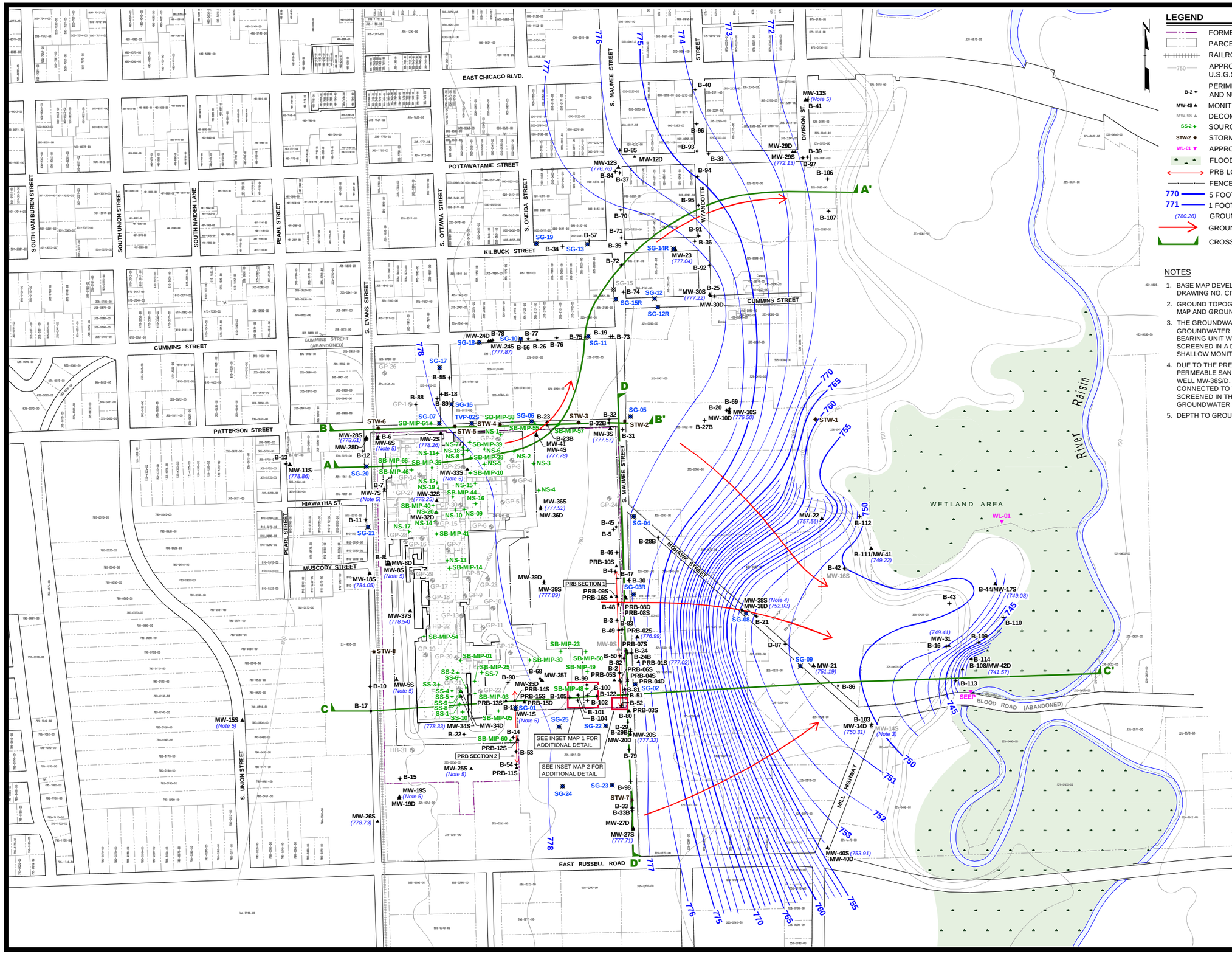
PROJ: **FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN**

TITLE: **SUBSURFACE UTILITIES**

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.06.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 6	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

Attached Xref's: trc100710 (FIbed)
Attached Images: TCS_Page_5_VOCs
Layout: FIG06 Subsurface Utilities
Dwg Size: 1.0x1.4b
Plot Date: January 27, 2016
Plot Time: 5:47 PM
J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Rp\246667.0003.06.dwg
Drawing Name: 246667.0003.06.dwg
Operator Name: STEHLE, DAVAH
Drawing Plot Scale: 0.500000
PLOT DATE:

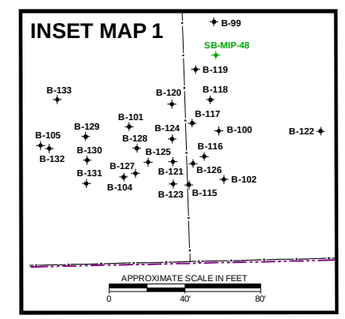


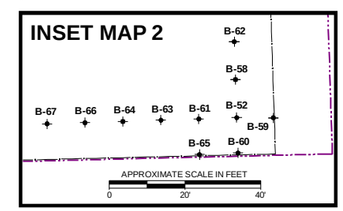
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- 770 — 5 FOOT GROUNDWATER CONTOUR LINE
- 771 — 1 FOOT GROUNDWATER CONTOUR LINE
- (780.26) — GROUNDWATER / SURFACE WATER ELEVATION
- GROUNDWATER FLOW DIRECTION
- CROSS-SECTION LOCATION LINE

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. THE GROUNDWATER ELEVATION MEASURED AT MW-14D WAS USED TO DEVELOP GROUNDWATER CONTOURS, BECAUSE MW-14D IS SCREENED IN THE DEEPER WATER BEARING UNIT WHICH IS HYDRAULICALLY CONNECTED TO THE SITE. MW-14S WAS SCREENED IN A DIFFERENT, PERCHED, WATER BEARING UNIT THAN THE OTHER SHALLOW MONITORING WELLS ON-SITE AND HAS SINCE BEEN ABANDONED.
4. DUE TO THE PRESENCE OF AN INTERMEDIATE CLAY LAYER UNDERLAIN BY A HIGHLY PERMEABLE SAND AND GRAVEL UNIT, THE AQUIFER IS BIFURCATED AT MONITORING WELL MW-38S/D. BOTH THE SHALLOW AND THE DEEP WELLS ARE HYDRAULICALLY CONNECTED TO THE SITE. THE WATER LEVEL IN THE DEEPER WELL, WHICH IS SCREENED IN THE HIGHER PERMEABILITY UNIT, WAS USED TO ILLUSTRATE GROUNDWATER CONTOURS AND HORIZONTAL GRADIENT ACROSS THIS AREA.
5. DEPTH TO GROUNDWATER NOT MEASURED.





0 250' 500' 750' 1000'
APPROXIMATE SCALE IN FEET

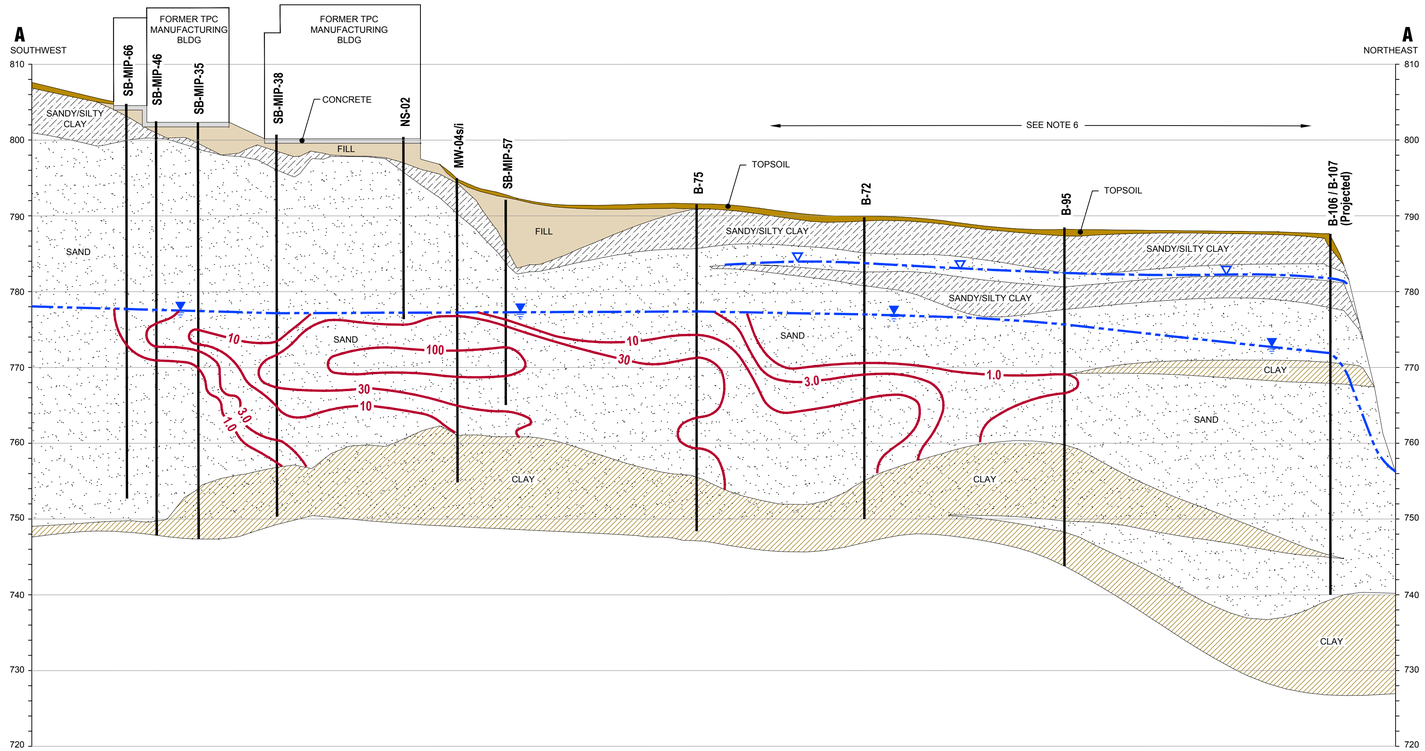
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

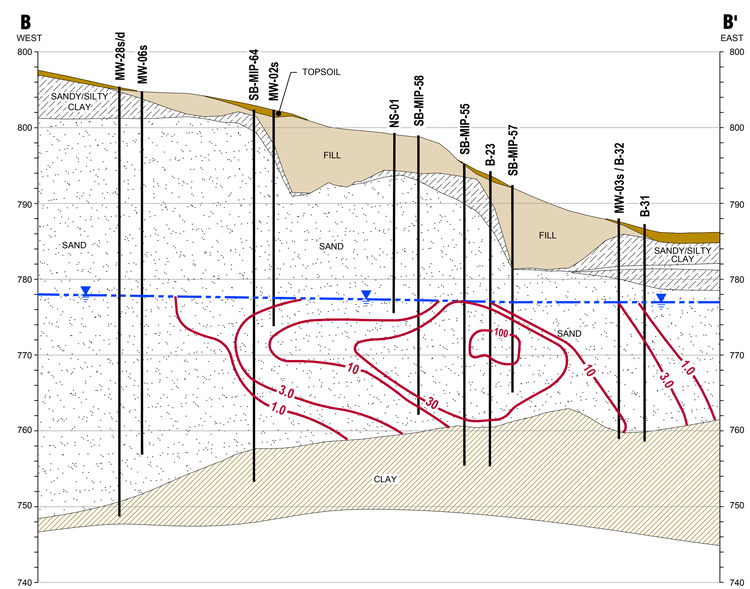
PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: CROSS-SECTION LOCATION MAP AND GROUNDWATER CONTOUR MAP
NOVEMBER 2015

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.07.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 7	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022





LEGEND

- TOPSOIL
- FILL
- SAND
- CLAY
- SANDY / SILTY CLAY
- CONCRETE
- APPROXIMATE GROUNDWATER ELEVATION
- PERCHED GROUNDWATER ELEVATION
- 100 — TOTAL CHLORINATED ETHENES ISOCONCENTRATION LINE (SEE NOTES 2, 3 AND 4)

NOTES

1. GROUNDWATER ELEVATIONS REFLECT ELEVATION DATA COLLECTED DURING THE MAY 2015 SAMPLING EVENT.
2. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
3. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE OUTPUTS AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.
5. ISOCONCENTRATION LINES REPRESENT THE TOTAL CONCENTRATION (IN MICROMOLES PER LITER [uM]) OF CHLORINATED ETHENES (TETRACHLOROETHENE [PCE], TRICHLOROETHENE [TCE], cis-1,2-DICHLOROETHENE [cis-DCE], AND VINYL CHLORIDE [VC]) IN GROUNDWATER. MOLAR CONCENTRATIONS ARE USEFUL IN ILLUSTRATING TOTAL CONTAMINANT MASS. THE TABLE BELOW PROVIDES A COMPARISON BETWEEN MOLARITY AND MASS BASED CONCENTRATION UNITS.

MOLAR CONCENTRATION	PCE (ug/L)	TCE (ug/L)	cis-DCE (ug/L)	VC (ug/L)
1.0 uM	166	131	97.0	62.5
3.0 uM	497	394	291	188
10 uM	1,660	1,310	970	625
30 uM	4,970	3,940	2,910	1,880
100 uM	16,600	13,100	9,700	6,250

6. THE SURFICIAL SANDY/SILTY CLAY AND ASSOCIATED PERCHED GROUNDWATER HAS A THICKNESS GREATER THAN 8 FEET THROUGHOUT THIS AREA.

VERTICAL SCALE: 0, 10', 40'

APPROXIMATE HORIZONTAL SCALE: 0, 200', 400'

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJECT: FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN

TITLE: CROSS SECTIONS A - A' AND B - B'

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.08-09.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 8	
DATE: JANUARY 2016			

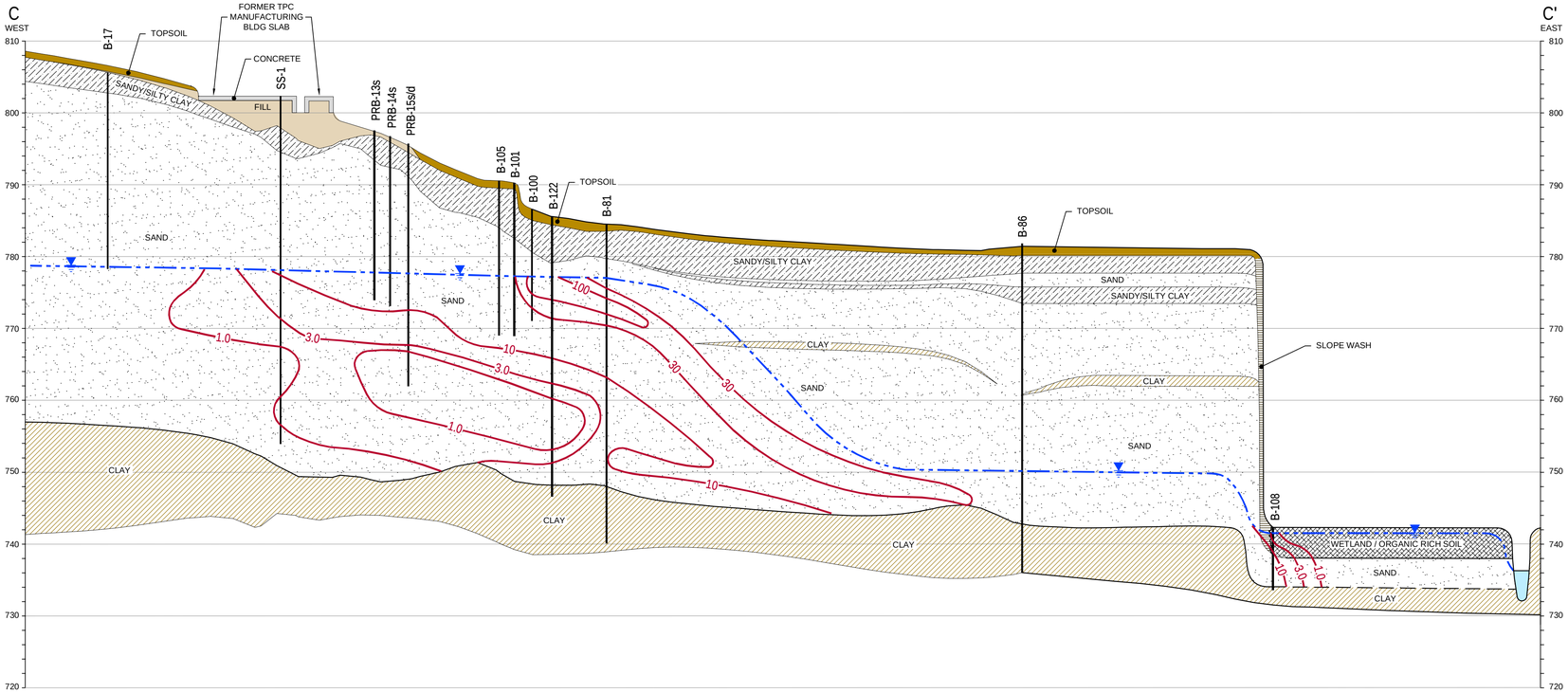
TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

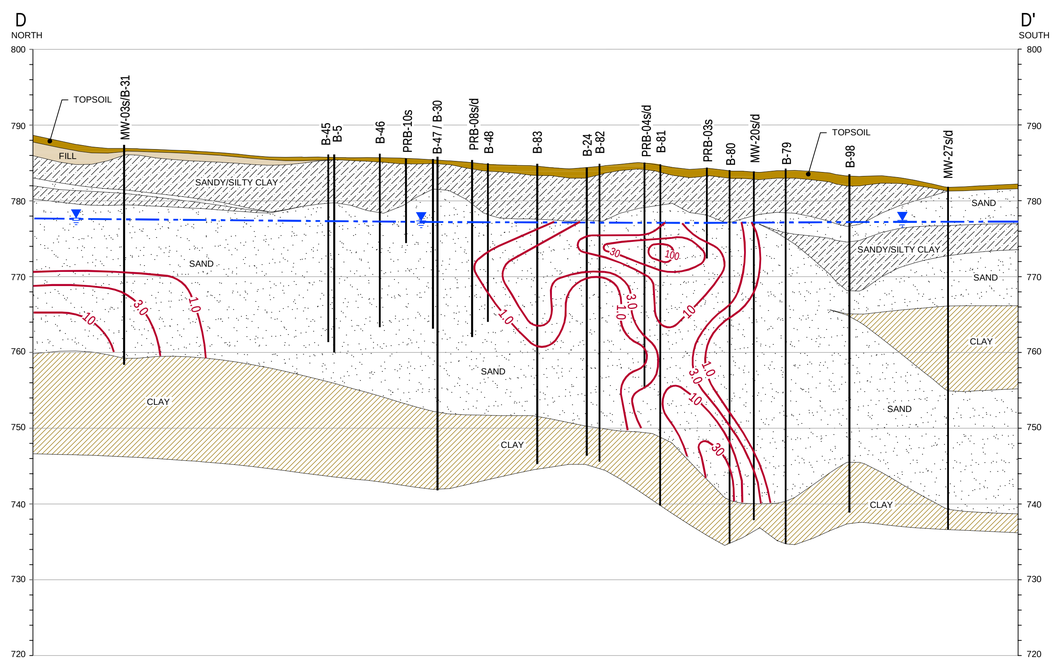
Attached Xref's: Attached Images: Layout: XS as wells: XS cc wells: XS DD wells: F8000 A1-B8 North

Dwg Size: 2.56 Mb Plot Date: January 29, 2016 Plot Time: 3:58 PM

J:_TRC\Tecumseh Products\Tecumseh MI\246667.0003_CMP Rpt\246667.0003.08-09.dwg

PLOT DATA: Drawing Name: Operator Name: Drawing Plot Scale: STEHLE, SIANAH 0.438863





LEGEND

- TOPSOIL
- FILL
- SAND
- CLAY
- SANDY / SILTY CLAY
- ORGANIC RICH WETLAND SOIL / MUCK
- SLOPE WASH
- CONCRETE
- APPROXIMATE GROUNDWATER ELEVATION
- 100 — TOTAL CHLORINATED ETHENES ISOCONCENTRATION LINE (SEE NOTES 2, 3 AND 4)

NOTES

1. GROUNDWATER ELEVATIONS REFLECT ELEVATION DATA COLLECTED DURING THE MAY 2015 SAMPLING EVENT.
2. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
3. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE OUTPUTS AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.
5. ISOCONCENTRATION LINES REPRESENT THE TOTAL CONCENTRATION (IN MICROMOLES PER LITER [uM]) OF CHLORINATED ETHENES (TETRACHLOROETHENE [PCE], TRICHLOROETHENE [TCE], cis-1,2-DICHLOROETHENE [cis-DCE], AND VINYL CHLORIDE [VC]) IN GROUNDWATER. MOLAR CONCENTRATIONS ARE USEFUL IN ILLUSTRATING TOTAL CONTAMINANT MASS. THE TABLE BELOW PROVIDES A COMPARISON BETWEEN MOLARITY AND MASS BASED CONCENTRATION UNITS.

MOLAR CONCENTRATION	PCE (ug/L)	TCE (ug/L)	cis-DCE (ug/L)	VC (ug/L)
1.0 uM	166	131	97.0	62.5
3.0 uM	497	394	291	188
10 uM	1,660	1,310	970	625
30 uM	4,970	3,940	2,910	1,880
100 uM	16,600	13,100	9,700	6,250

VERTICAL SCALE: 0, 10', 20'

APPROXIMATE HORIZONTAL SCALE: 0, 200', 400'

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJECT: **FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN**

TITLE: **CROSS SECTIONS C - C' AND D-D'**

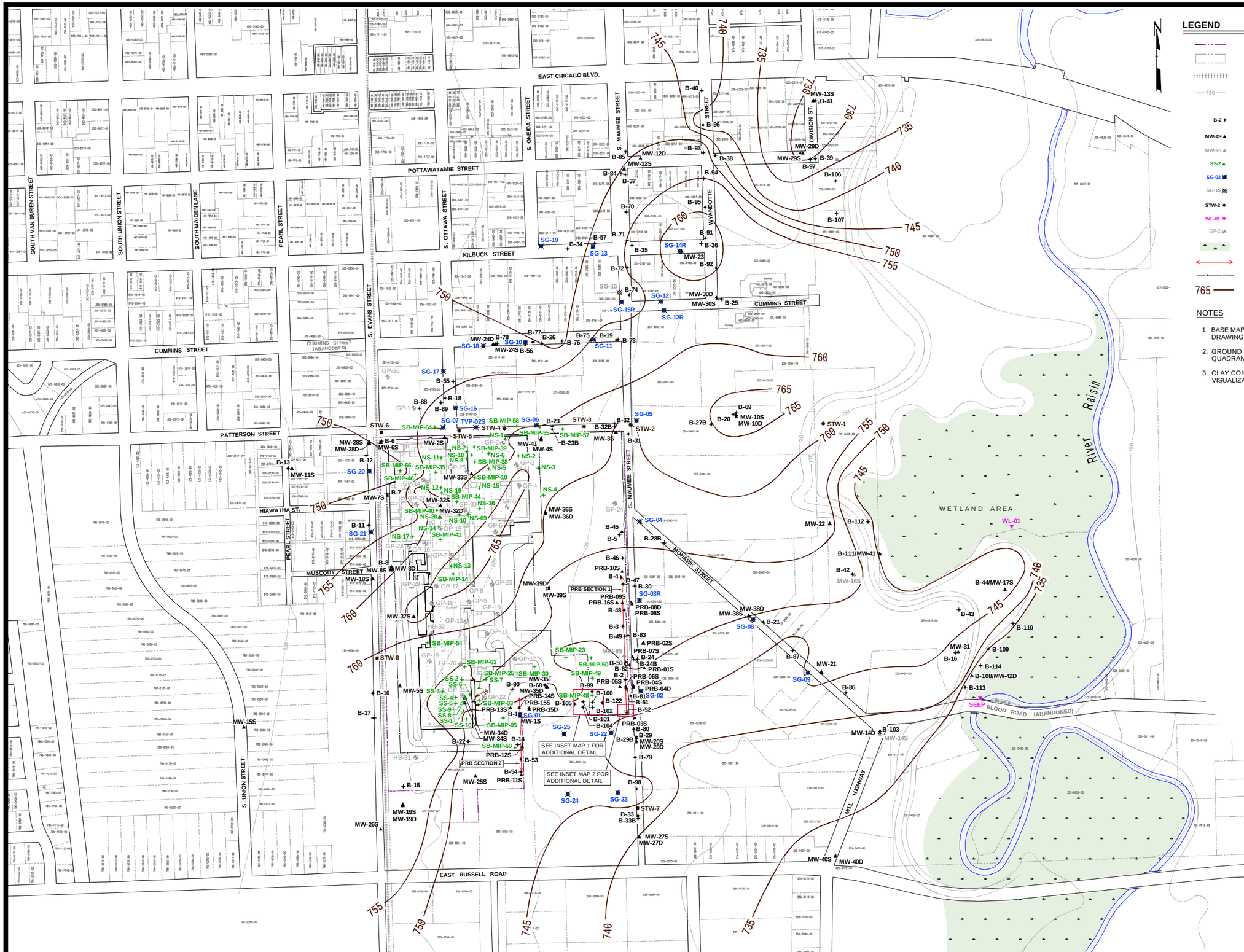
DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.08-09.dwg	
APPROVED BY: GC	DATE PRINTED:	**FIGURE 9**	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Rpt\246667.0003.08-09.dwg
Operator Name: STEHLE, GRANAH
Drawing Plot Date: 01/28/2016

Attached Xref's: XS as wells; XS cs wells; XS DD wells;
Attached Images: Layout: R0803 CC-DD South

Dwg Size: 2.58 Mb
Plot Date: January 27, 2016
Plot Time: 10:54 AM

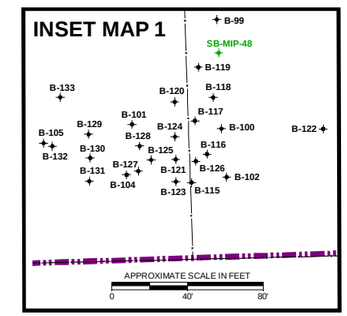


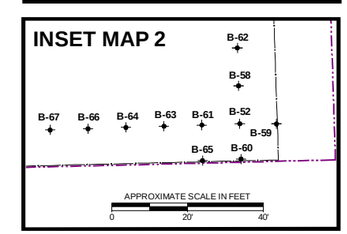
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- 765 — 5 FOOT TOP OF CLAY CONFINING UNIT CONTOUR LINE

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. CLAY CONTOURS DEVELOPED USING OUTPUTS FROM ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE.





APPROXIMATE SCALE IN FEET: 0, 250', 500', 750', 1000'

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

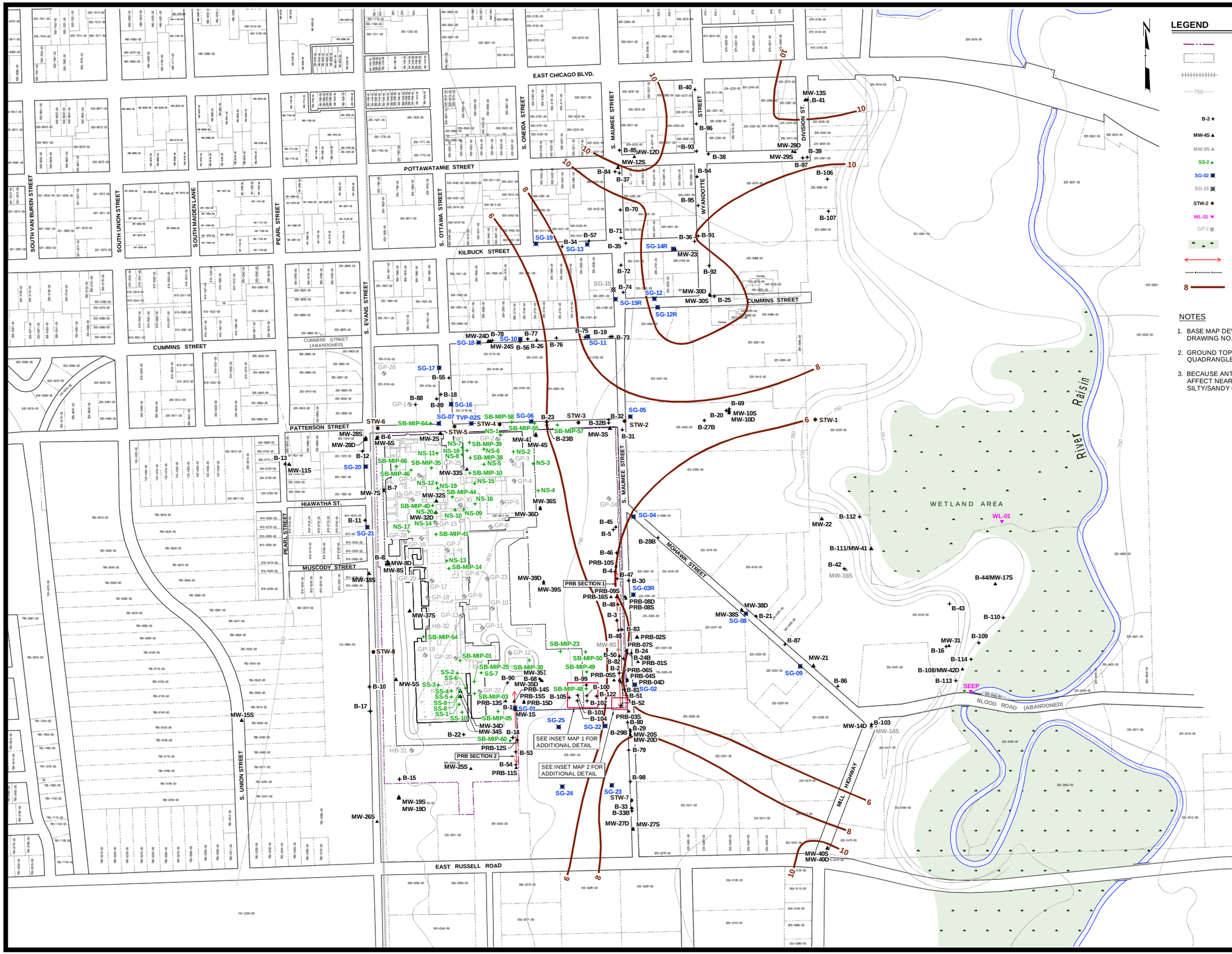
PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: ELEVATION AT THE TOP OF CLAY CONFINING UNIT

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.10.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 10	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

AUTOCAD
Drawing Name: J:_TRC\Documents\Products\Documents\MV\246667\DGN_CMP\246667.0003.10.dwg
Operator Name: STEALE, DAWN
Drawing Scale: 1:0.0000
Dwg Size: 1.63 Mb
Plot Date: January 27, 2016
Plot Time: 13:19:44
Attached Xref's: tsrr100110 (Fitted)
Attached Images: TCE_Page_1.1.VOCs;
Layout: FIGURE 10(1.1.VOCs)

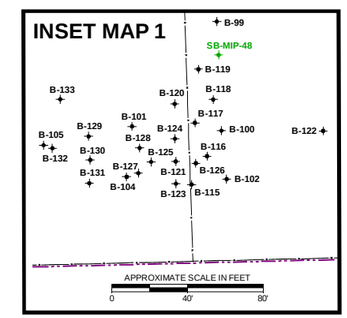


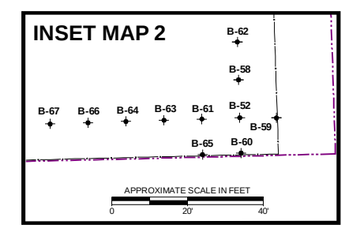
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- 8 — DEPTH IN FEET TO THE BOTTOM OF THE SURFICIAL SILTY/SANDY CLAY UNIT

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. BECAUSE ANTHROPOLOGIC ACTIVITIES IN DEVELOPED AREAS ARE EXPECTED TO AFFECT NEAR SURFACE GEOLOGY, DEPTH CONTOURS FOR THE SURFICIAL SILTY/SANDY CLAY ARE NOT DRAWN FOR DEPTHS LESS THAN SIX FEET.





0 250' 500' 750' 1000'
APPROXIMATE SCALE IN FEET

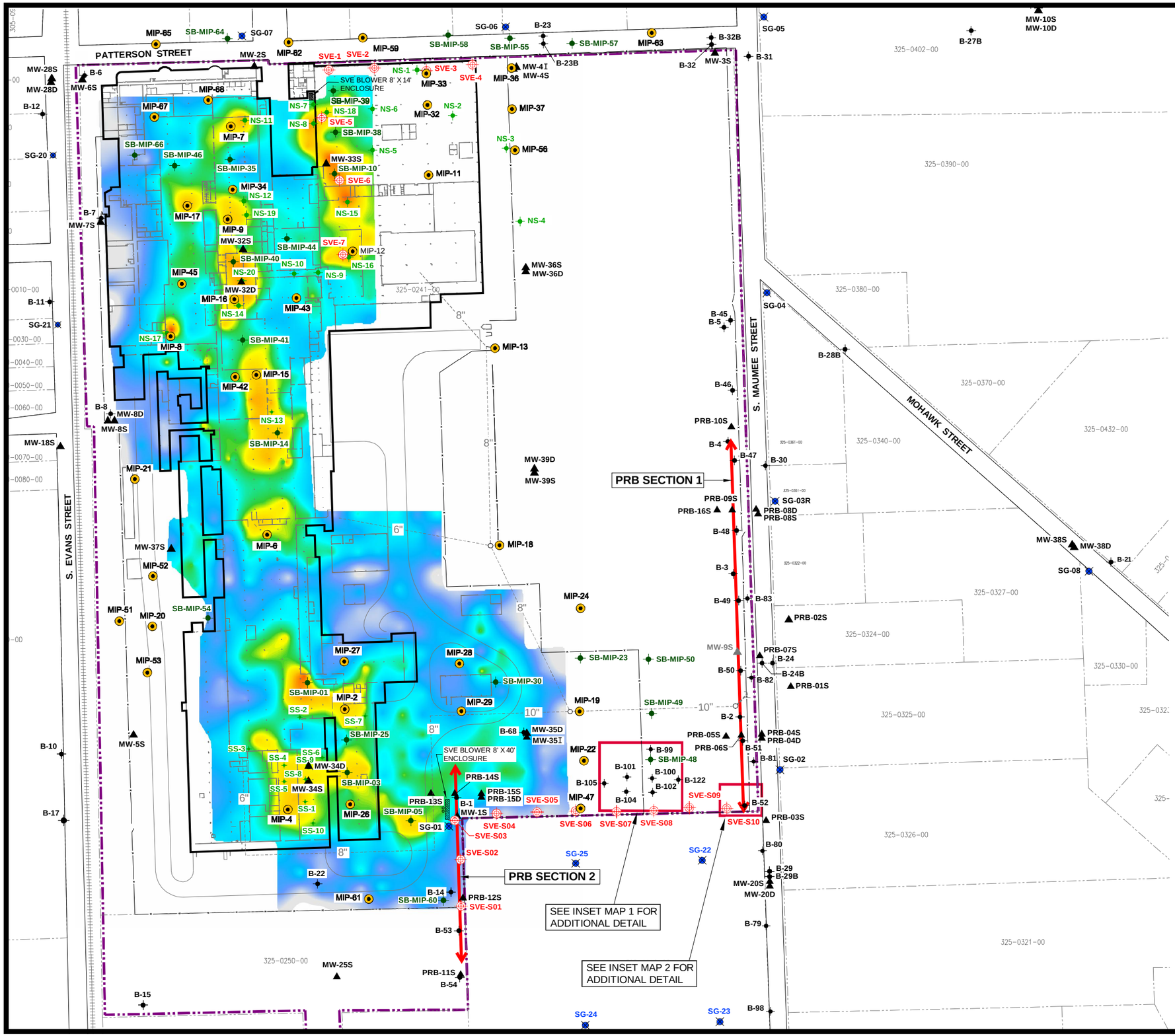
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: THICKNESS OF SURFICIAL LOW PERMEABILITY ZONE

DRAWN BY:	DGS	SCALE:	AS INDICATED	PROJ. NO.	246667.0003
CHECKED BY:	SEM			FILE NO.	246667.0003.11.dwg
APPROVED BY:	GC	DATE PRINTED:		FIGURE 11	
DATE:	JANUARY 2016				

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

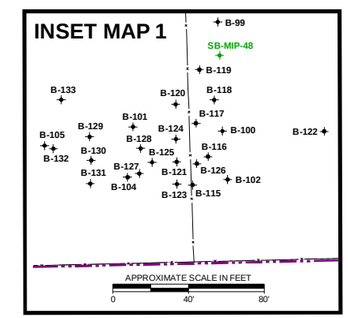


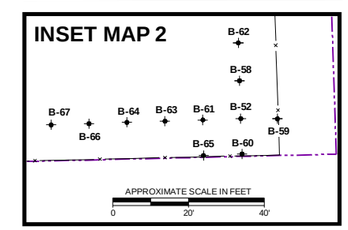
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- B-54 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- MIP-40 — MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- SVE-S04 — EXTRACTION WELL LOCATION AND NUMBER
- 8" — PIPE DIAMETER AND APPROXIMATE LOCATION OF ON-SITE SANITARY SEWER
- PRB LOCATION
- FENCE LINE

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. TCE BREAKDOWN PRODUCTS INCLUDE cis-1,2-DICHLOROETHENE; trans-1,2-DICHLOROETHENE; 1,1-DICHLOROETHENE, AND VINYL CHLORIDE.





COLOR SCALE FOR RELATIVE RESPONSE FROM PASSIVE SOIL GAS SURVEY - TCE AND BREAKDOWN PRODUCTS

450
400
350
300
250
200
150
100
50
0

Color Scale (micrograms)

0 100 200 300 400
APPROXIMATE SCALE IN FEET

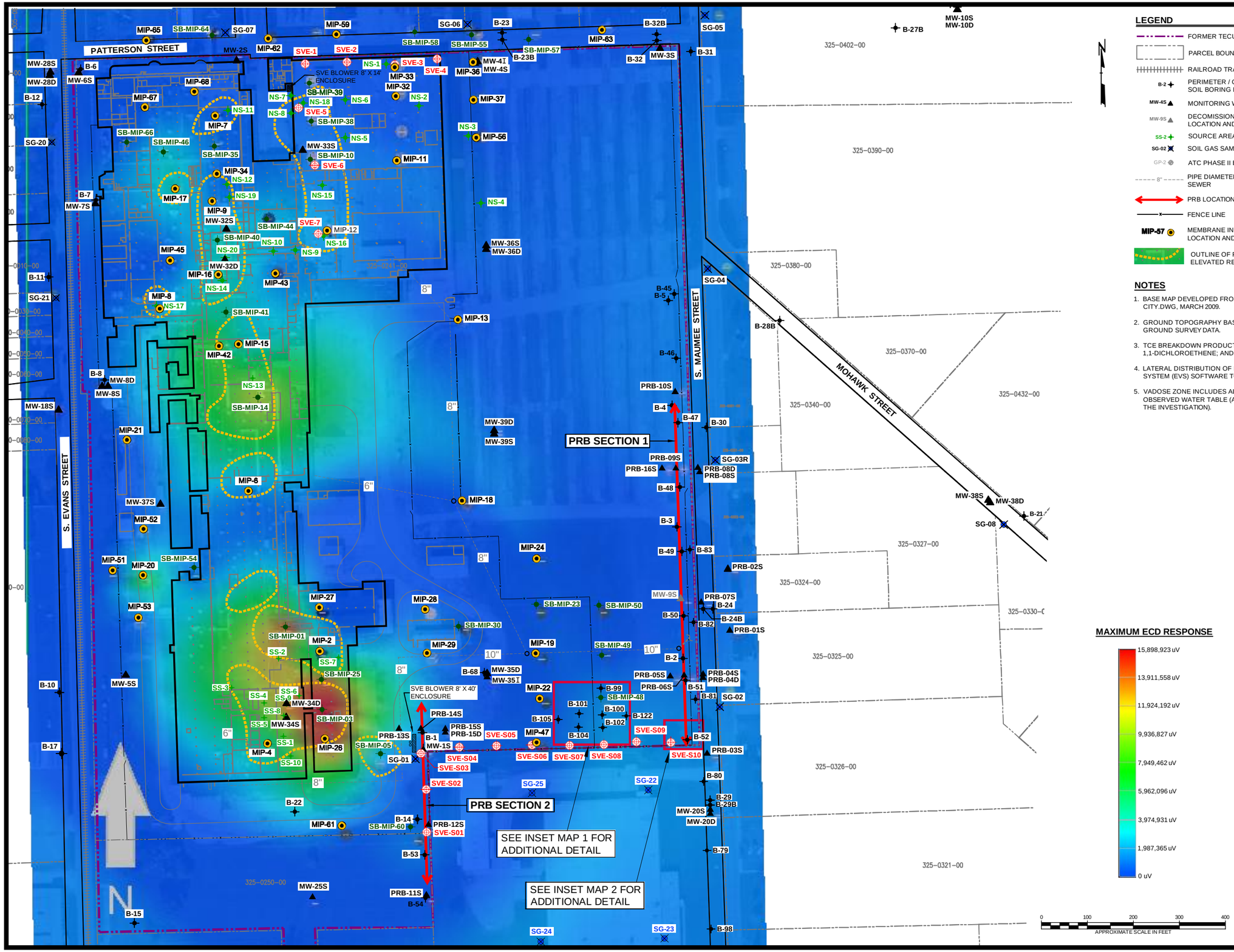
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN

TITLE: RESULTS OF PASSIVE SOIL GAS SURVEY DISTRIBUTION OF TCE AND BREAKDOWN PRODUCTS

DRAWN BY: DGS	SCALE:	PROJ. NO.	246667.0003
CHECKED BY: SEM	AS INDICATED	FILE NO.	246667.0003.12.dwg
APPROVED BY: GC	DATE PRINTED:	FIGURE 12	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

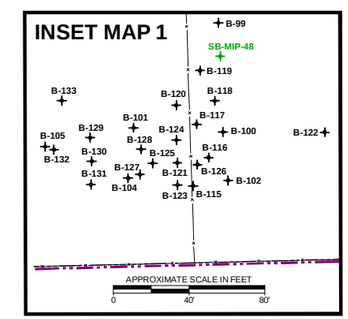


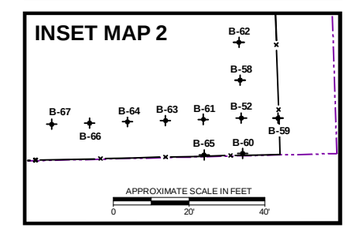
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- 8" — PIPE DIAMETER AND APPROXIMATE LOCATION OF ON-SITE SANITARY SEWER
- PRB LOCATION
- FENCE LINE
- MIP-57 — MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- OUTLINE OF PASSIVE SOIL GAS SURVEY AREAS WITH TCE AND BREAKDOWN ELEVATED RESPONSE FOR PRODUCTS

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. TCE BREAKDOWN PRODUCTS INCLUDE cis-1,2-DICHLOROETHENE; trans-1,2-DICHLOROETHENE; 1,1-DICHLOROETHENE; AND VINYL CHLORIDE.
4. LATERAL DISTRIBUTION OF ECD RESPONSE MAPPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE TO KRIG MIP DATA.
5. VADOSE ZONE INCLUDES ALL DEPTHS FROM THE GROUND SURFACE TO THE MAXIMUM OBSERVED WATER TABLE (APPROXIMATELY 2 FEET ABOVE THE WATER TABLE AT THE TIME OF THE INVESTIGATION).





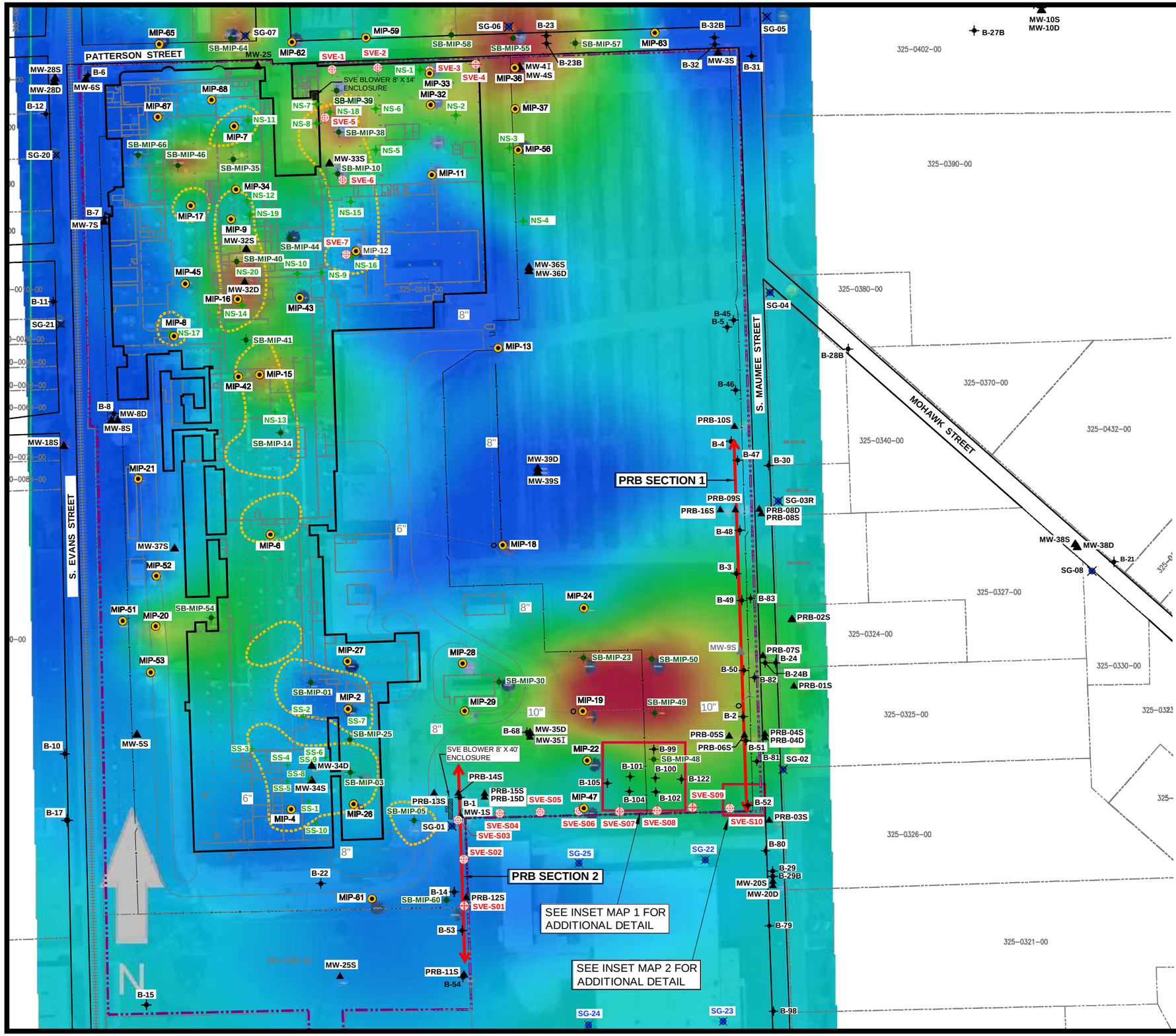
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: MIP INVESTIGATION RESULTS
DISTRIBUTION OF MAXIMUM ECD RESPONSE
IN VADOSE ZONE

DRAWN BY: DGS	SCALE:	PROJ. NO. 246667.0003	
CHECKED BY: SEM	AS INDICATED	FILE NO. 246667.0003.13.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 13	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- 8" — PIPE DIAMETER AND APPROXIMATE LOCATION OF ON-SITE SANITARY SEWER
- PRB LOCATION
- FENCE LINE
- MIP-57 — MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- OUTLINE OF PASSIVE SOIL GAS SURVEY AREAS WITH ELEVATED RESPONSE FOR TCE AND BREAKDOWN PRODUCTS

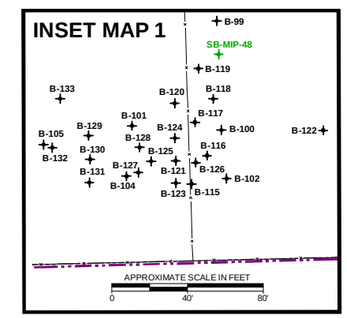
MAXIMUM ECD RESPONSE

- 15,898,923 uV
- 13,911,558 uV
- 11,924,192 uV
- 9,936,827 uV
- 7,949,462 uV
- 5,962,096 uV
- 3,974,731 uV
- 1,987,365 uV
- 0 uV

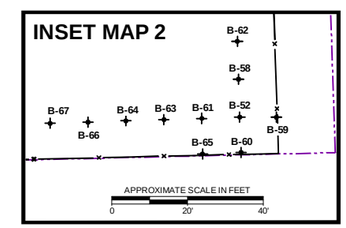
NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. TCE BREAKDOWN PRODUCTS INCLUDE cis-1,2-DICHLOROETHENE; trans-1,2-DICHLOROETHENE; 1,1-DICHLOROETHENE; AND VINYL CHLORIDE.
4. LATERAL DISTRIBUTION OF ECD RESPONSE MAPPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE TO KRIG MIP DATA.
5. SATURATED ZONE INCLUDES ALL DEPTHS FROM THE MAXIMUM OBSERVED WATER TABLE (APPROXIMATELY 2 FEET ABOVE THE WATER TABLE AT THE TIME OF THE INVESTIGATION) TO THE SURFACE OF THE UNDERLYING CLAY CONFINING UNIT.

INSET MAP 1



INSET MAP 2



0 100 200 300 400
APPROXIMATE SCALE IN FEET

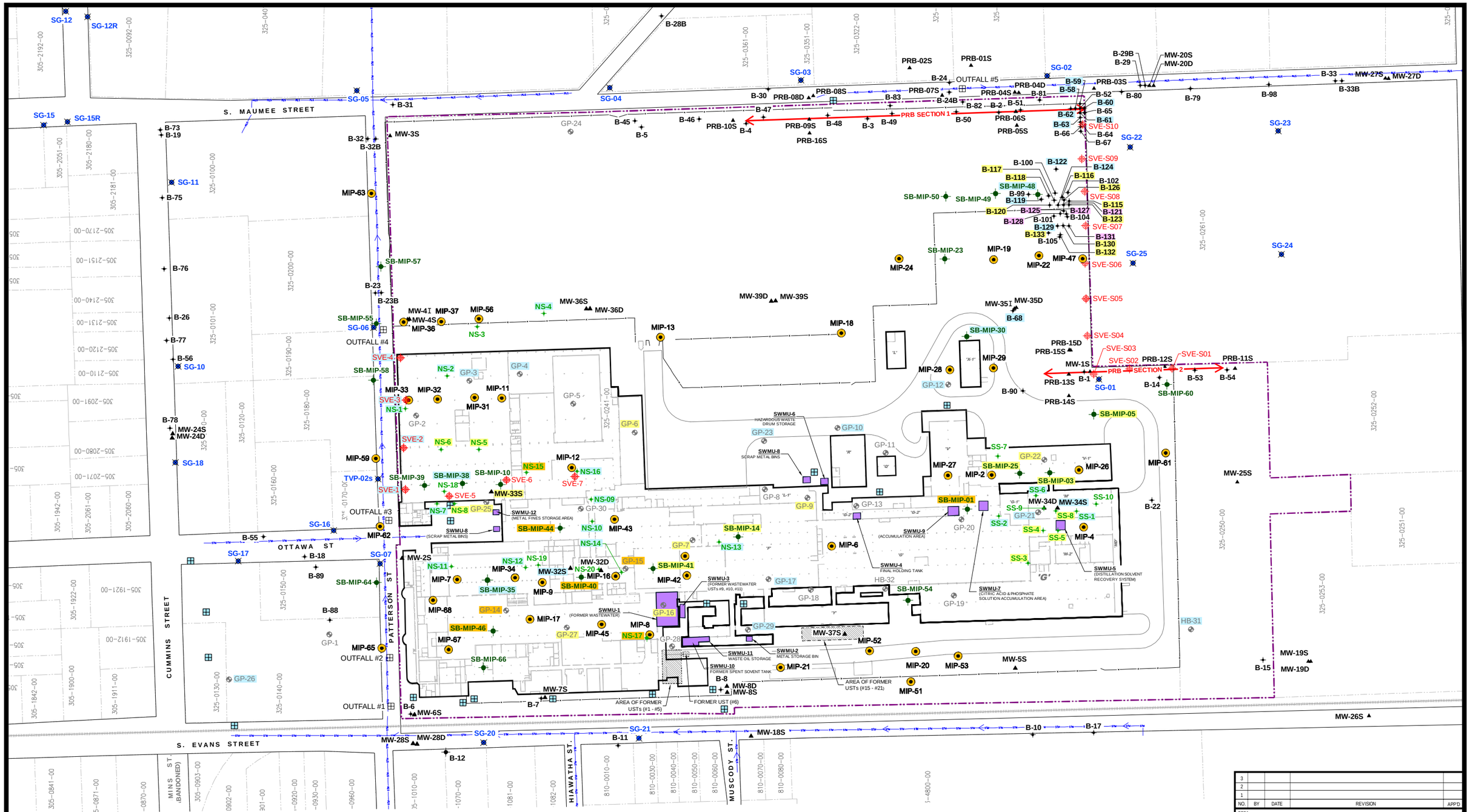
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: **FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN**

TITLE: **MIP INVESTIGATION RESULTS DISTRIBUTION OF MAXIMUM ECD RESPONSE IN SATURATED ZONE**

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.14.dwg	
APPROVED BY: GC	DATE PRINTED:	**FIGURE 14**	
DATE: JANUARY 2015			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- FENCE LINE
- PARCEL BOUNDARY
- PRB LOCATION
- B-8 PERIMETER/OFF-SITE INVESTIGATION BORING LOCATION AND NUMBER
- MW-8D MONITORING WELL LOCATION AND NUMBER
- SS-10 SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- GP-23 ATC PHASE II ESA BORING LOCATION AND NUMBER
- SVE-7 SOIL VAPOR EXTRACTION WELL LOCATION AND NUMBER
- SG-01 SOIL GAS SAMPLE LOCATION AND NUMBER
- MIP-40 MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- STORM SEWER CATCH BASIN (2006 SITE SURVEY)
- OUTFALL FROM ON-SITE STORM SEWER
- AREA OF FORMER UST
- APPROXIMATE LOCATION OF FORMER SOLID WASTE MANAGEMENT UNITS (SWMUs)
- STORM WATER SEWER
- BLUE HIGHLIGHTING INDICATES SOIL SAMPLE LOCATIONS WHERE CONCENTRATIONS DO NOT EXCEED RISK-BASED SCREENING LEVELS
- YELLOW HIGHLIGHTING INDICATES LOCATIONS WHERE TCE OR PCE CONCENTRATIONS EXCEEDS THE NON-RESIDENTIAL SOIL VOLITILIZATION TO INDOOR AIR INHALATION CRITERIA (1.9 mg/kg for TCE; 21 mg/kg FOR PCE)
- ORANGE HIGHLIGHTING INDICATES LOCATIONS WHERE TCE CONCENTRATIONS EXCEED NON-RESIDENTIAL VOLATILE SOIL INHALATION CRITERIA (14 mg/kg)
- PINK HIGHLIGHTING INDICATES LOCATIONS WHERE PCE CONCENTRATIONS EXCEED SOIL SATURATION SCREENING LEVELS

0 100 200 300 400
APPROXIMATE SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ.: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

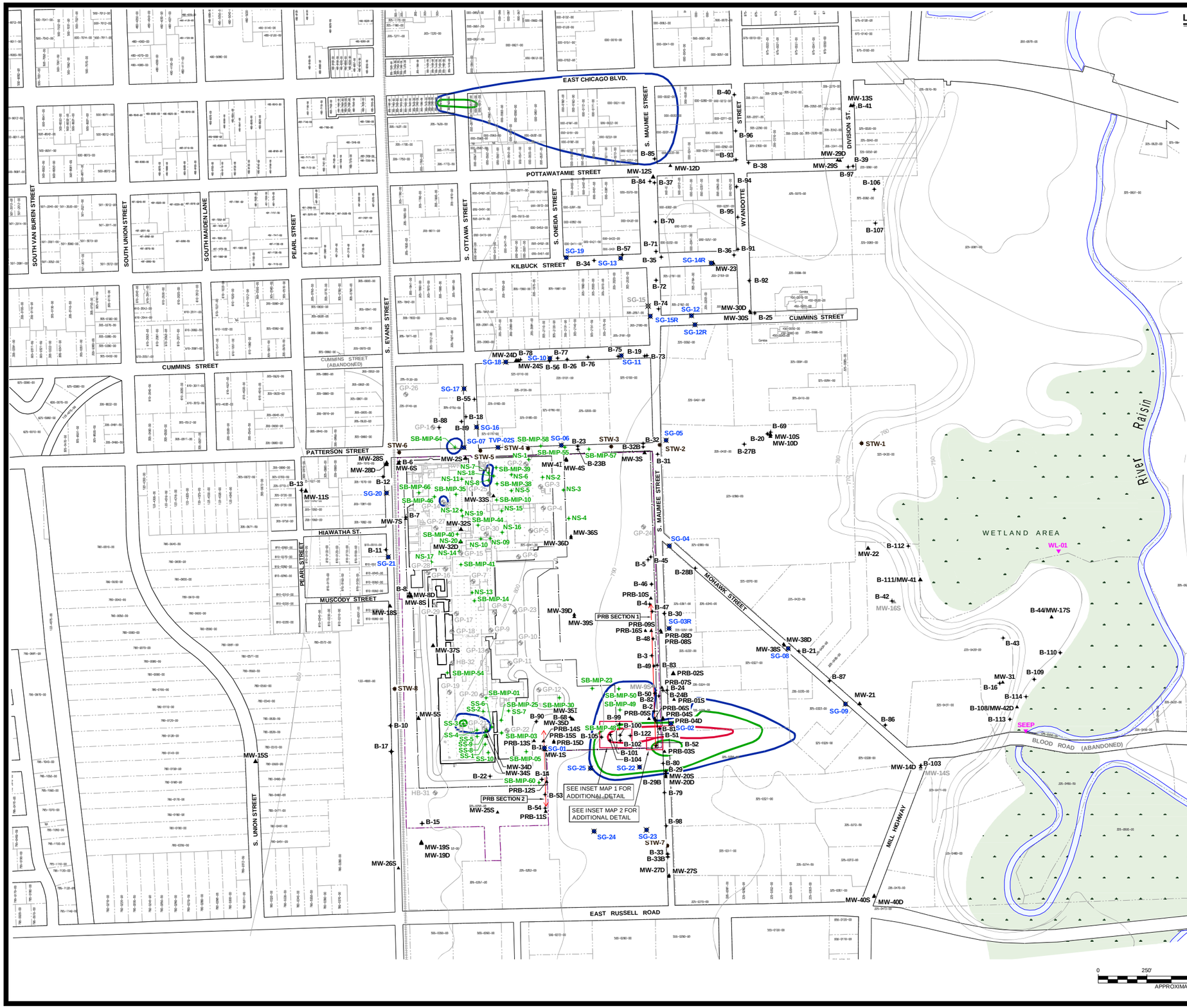
TITLE: SOIL AREAS ABOVE RISK-BASED SCREENING LEVELS

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.15.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 15	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: A:\TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Rp2\246667.0003.15.dwg
Operator Name: STEHLE, EMANUEL
Drawing File Name: 0.dwg

Drawing Scale: 1:50.00
Plot Date: February 1, 2016
Plot Time: 11:06:54
Attached Xref's: tecr100116 (Filed)
Attached Images: F0016 Soil Areas Above Risk
Layout: 15



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

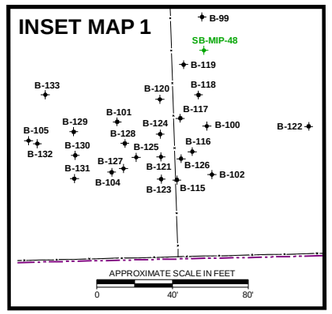
KEY

- EXTENT OF TETRACHLOROETHENE (PCE) ABOVE MICHIGAN PART 201 DRINKING WATER CRITERION (5 ug/L)
- EXTENT OF PCE ABOVE MICHIGAN PART 201 SURFACE WATER INTERFACE CRITERION (60 ug/L)
- EXTENT OF PCE ABOVE 2000 ug/L

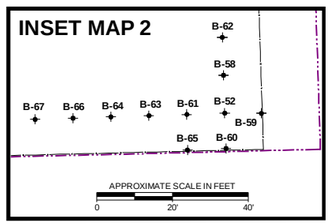
NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE OUTPUTS AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.
5. PARCEL NUMBER 305-1600-00 IS THE LOCATION OF A FORMER DRY CLEANER WITH DOCUMENTED PCE CONTAMINATION IN SOIL AND GROUNDWATER. ISOCONCENTRATION LINES EXTRAPOLATED BEYOND THE MODEL AREA BASED ON PHASE II SITE INVESTIGATION DATA COLLECTED DURING SITE REDEVELOPMENT.

INSET MAP 1



INSET MAP 2



NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: LATERAL DISTRIBUTION OF TETRACHLOROETHENE IN GROUNDWATER

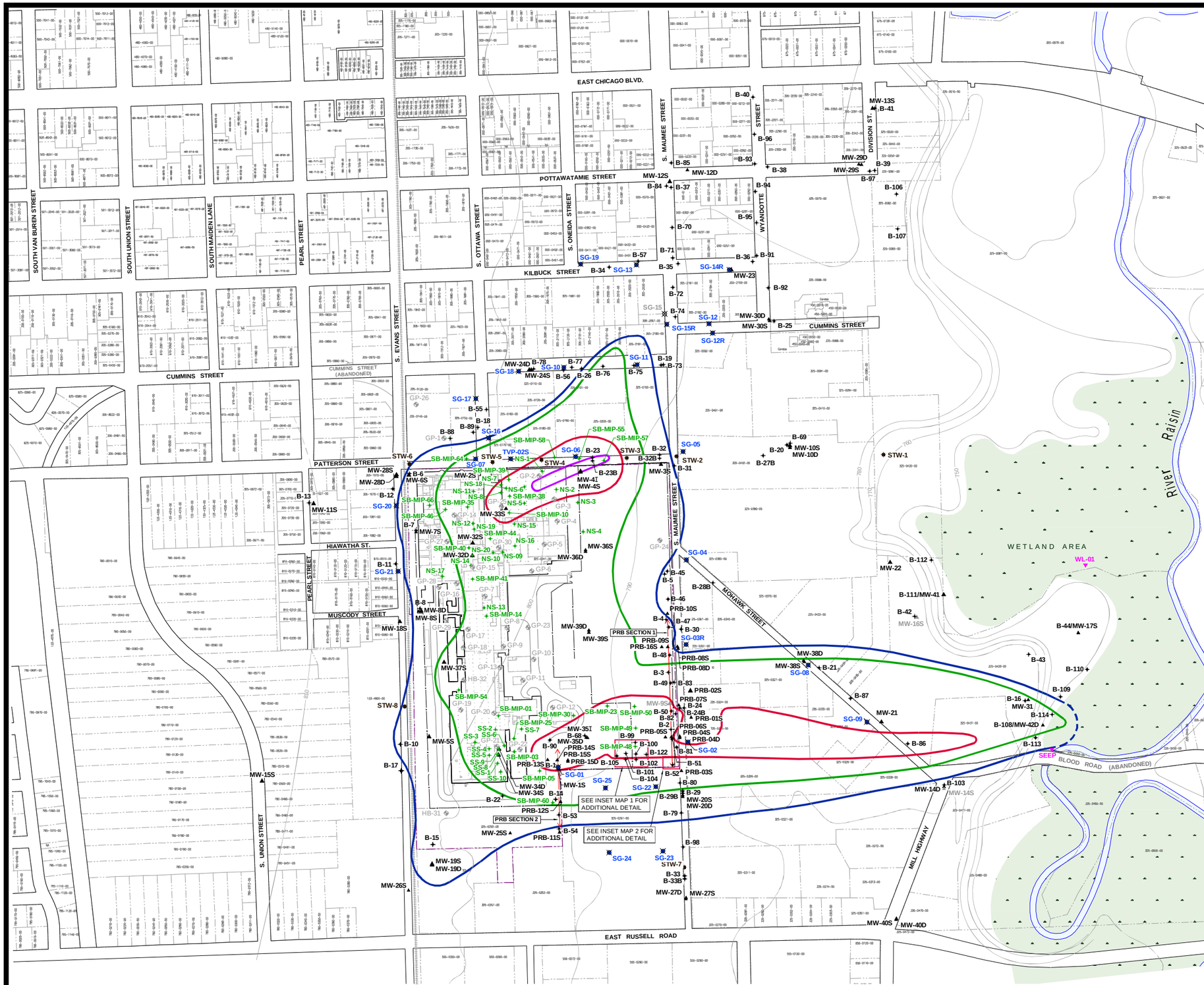
DRAWN BY: DGS	SCALE:	PROJ. NO.	246667.0003
CHECKED BY: SEM	AS INDICATED	FILE NO.	246667.0003.16.dwg
APPROVED BY: GC	DATE PRINTED:	FIGURE 16	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: x:_TRC\Tecumseh Products\Tecumseh MI\246667\CADD_CAP Fig\246667.0003.16.dwg
Opener Name: STEVE DWAHI
Drawing File Size: 0.00MB

Attached Xref's: tem109116 (Filed)
Attached Images: TCE_Fig_11 VOCs;
Layout: FIG16 Lateral PCE.DWG

Dwg Size: 1.83 Mb
Plot Date: January 27, 2016
Plot Time: 12:41 PM



LEGEND

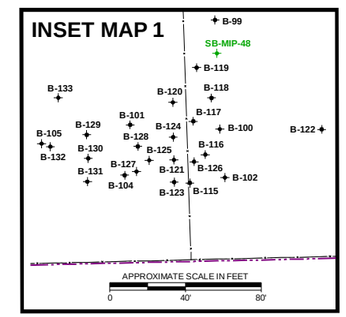
- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

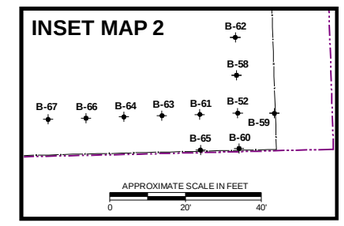
KEY

- EXTENT OF TRICHLOROETHENE (TCE) ABOVE THE MICHIGAN PART 201 DRINKING WATER CRITERION (5 ug/L)
- EXTENT OF TCE ABOVE THE MICHIGAN PART 201 GROUNDWATER SURFACE WATER INTERFACE CRITERION (200 ug/L)
- EXTENT OF TCE ABOVE 2000 ug/L
- EXTENT OF TCE ABOVE 11,000 ug/L

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE AND KNOWLEDGE OF SITE GEOLOGY/ HYDROGEOLOGY.





NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

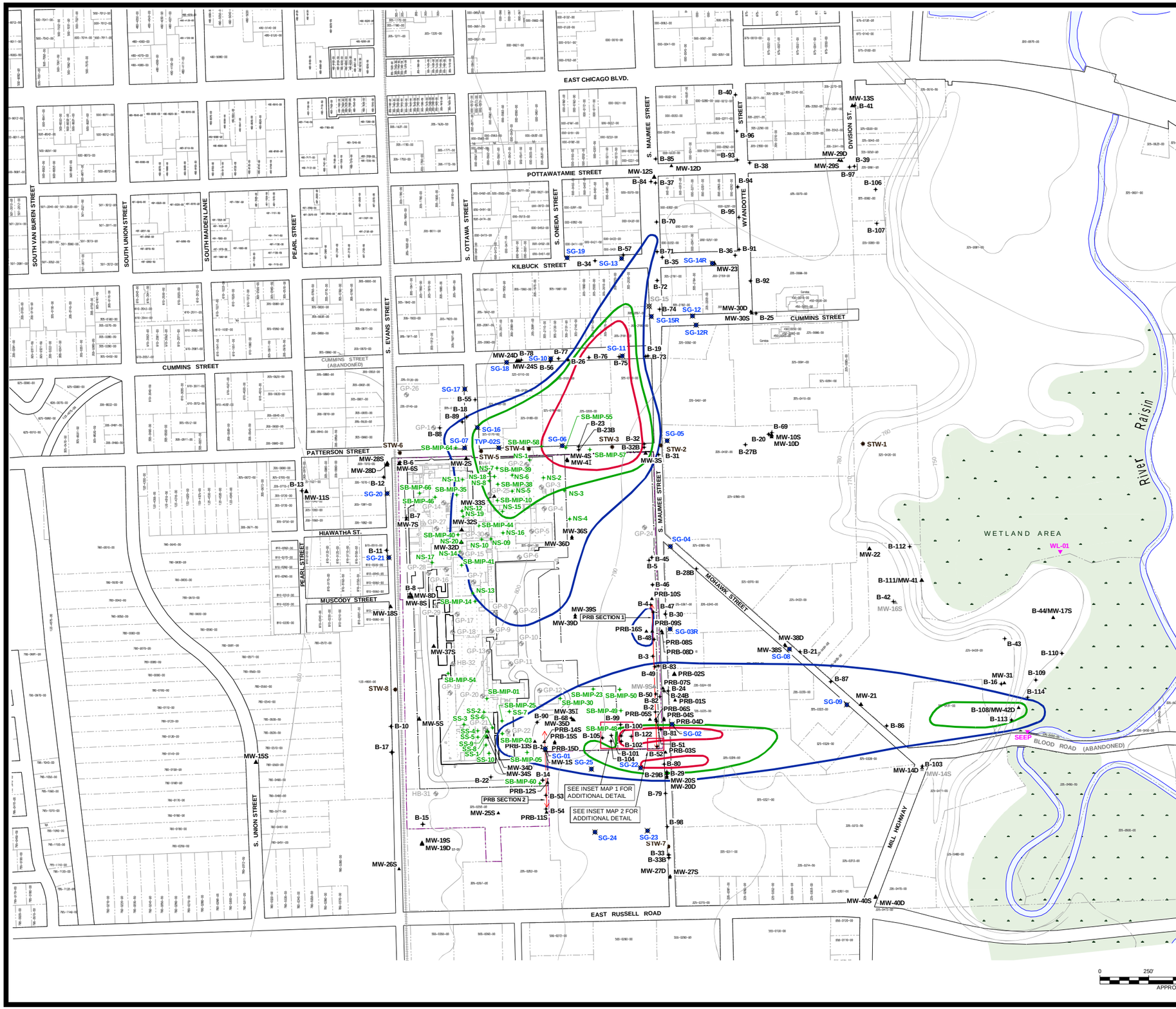
PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: LATERAL DISTRIBUTION OF TRICHLOROETHENE IN GROUNDWATER

DRAWN BY: DGS	SCALE:	PROJ. NO.	246667.0003
CHECKED BY: SEM	AS INDICATED	FILE NO.	246667.0003.17.dwg
APPROVED BY: GC	DATE PRINTED:	FIGURE 17	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: JL_TRCTecumseh Products\Tecumseh MI\246667\0003_CAP Rpt\246667.0003.17.dwg
Operator Name: STEVE EL DAWAH
Drawing Pen Table: 246666
Attached XrefS: tem19115 (Plan); TCE; Pgs_1; VOCs;
Attached Images:
Layout: 17017 Lat Dist TCE-WI
Dwg Size: 1.61 Mb
Plot Date: January 27, 2016
Plot Time: 12:21 PM



LEGEND

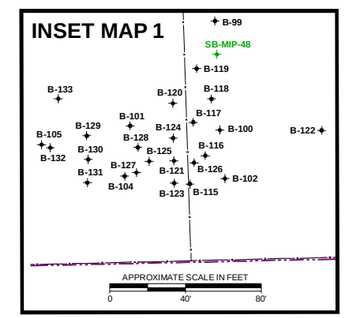
- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

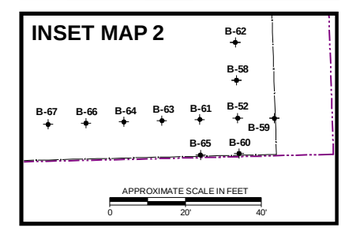
KEY

- EXTENT OF cis-1,2-DICHLOROETHENE (cis-DCE) ABOVE THE MICHIGAN PART 201 DRINKING WATER CRITERION (70 ug/L)
- EXTENT OF cis-DCE ABOVE THE MICHIGAN PART 201 GROUNDWATER SURFACE WATER INTERFACE CRITERION (620 ug/L)
- EXTENT OF cis-DCE ABOVE 2000 ug/L

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATIONN LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.





NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

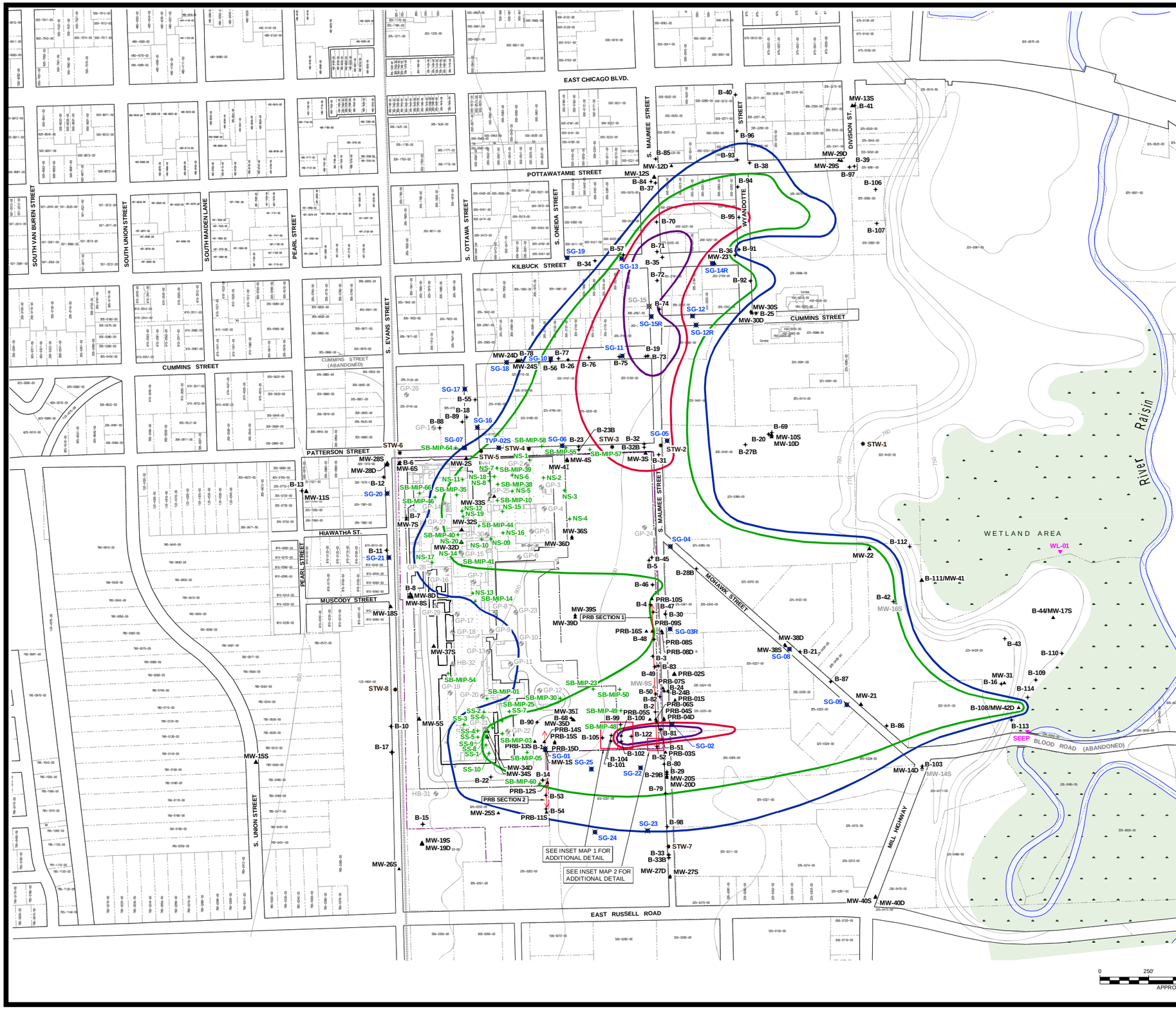
PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: LATERAL DISTRIBUTION OF cis-DICHLOROETHENE IN GROUNDWATER

DRAWN BY: DGS	SCALE:	PROJ. NO.	246667.0003
CHECKED BY: SEM	AS INDICATED	FILE NO.	246667.0003.18.dwg
APPROVED BY: GC	DATE PRINTED:	FIGURE 18	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\CADD_CAP Plots\246667.0003.18.dwg
Operator Name: STEVE SWAHN
Drawing File Name: 0.dwg
Attached Xref's: bm109116 (Filed)
Attached Images: TCE_Page_11; VOCs;
Layout: FIG18 Lat dist cis DCE DW
Dwg Size: 1.62 kb
Plot Date: January 27, 2016
Plot Time: 12:47 PM



LEGEND

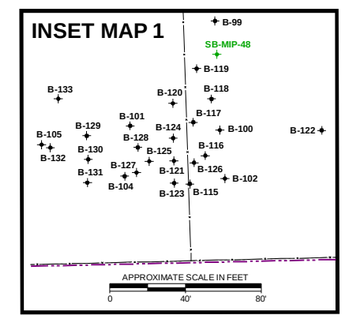
- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

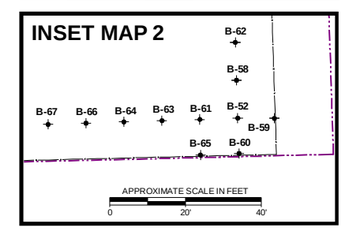
KEY

- EXTENT OF VINYL CHLORIDE (VC) ABOVE THE MICHIGAN PART 201 DRINKING WATER CRITERION (2 ug/L)
- EXTENT OF VC ABOVE THE MICHIGAN PART 201 GROUNDWATER SURFACE WATER INTERFACE CRITERION (13 ug/L)
- EXTENT OF VC ABOVE 200 ug/L
- EXTENT OF VC ABOVE 1,000 ug/L

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE AND KNOWLEDGE OF SITE GEOLOGY/ HYDROGEOLOGY.





NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

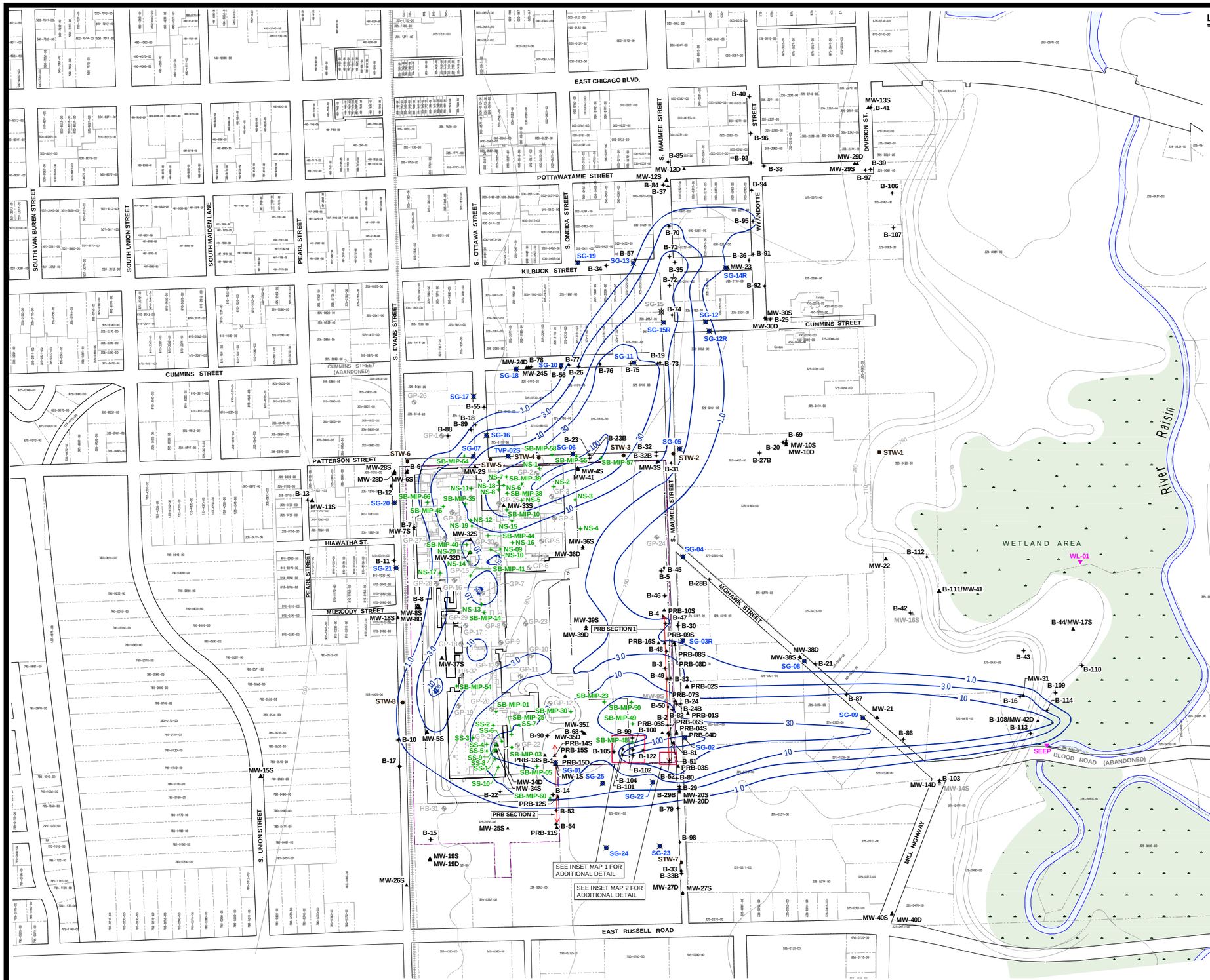
PROJ: **FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN**

TITLE: **LATERAL DISTRIBUTION OF VINYL CHLORIDE IN GROUNDWATER**

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.19.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 19	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\CADD_CMP Rpts\246667.0003.19.dwg
Operator Name: STEVE SWAHN
Drawing File Size: 5.00MB
Attached Xref's: tecr020116 (Filed)
Attached Images: TCE_Page_11 WCs;
Layout: FIG19 Lat Dist VC-GW
Dwg Size: 1.83 kb
Plot Date: January 27, 2016
Plot Time: 12:47 PM



LEGEND

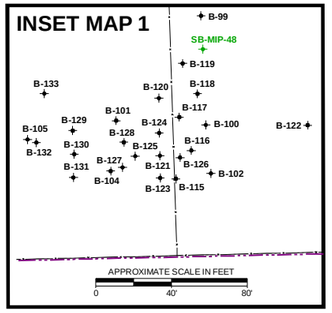
- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- 3.0 — TOTAL CHLORINATED ETHENE ISOCONCENTRATION LINE (SEE NOTES 3, 4 AND 5)

NOTES

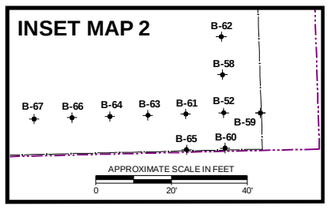
1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE AND KNOWLEDGE OF SITE GEOLOGY/ HYDROGEOLOGY.
5. ISOCONCENTRATION LINES REPRESENT THE TOTAL CONCENTRATION (IN MICROMOLES PER LITER [uM]) OF CHLORINATED ETHENES (TETRACHLOROETHENE [PCE], TRICHLOROETHENE [TCE], cis-1,2-DICHLOROETHENE [cis-DCE], AND VINYL CHLORIDE [VC]) IN GROUNDWATER. MOLAR CONCENTRATIONS ARE USEFUL IN ILLUSTRATING TOTAL CONTAMINANT MASS. THE TABLE BELOW PROVIDES A COMPARISON BETWEEN MOLARITY AND MASS BASED CONCENTRATION UNITS.

MOLAR CONCENTRATION	PCE (ug/L)	TCE (ug/L)	cis-DCE (ug/L)	VC (ug/L)
1.0 uM	166	131	97.0	62.5
3.0 uM	497	394	291	188
10 uM	1,660	1,310	970	625
30 uM	4,970	3,940	2,910	1,880
100 uM	16,600	13,100	9,700	6,250

INSET MAP 1



INSET MAP 2



NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

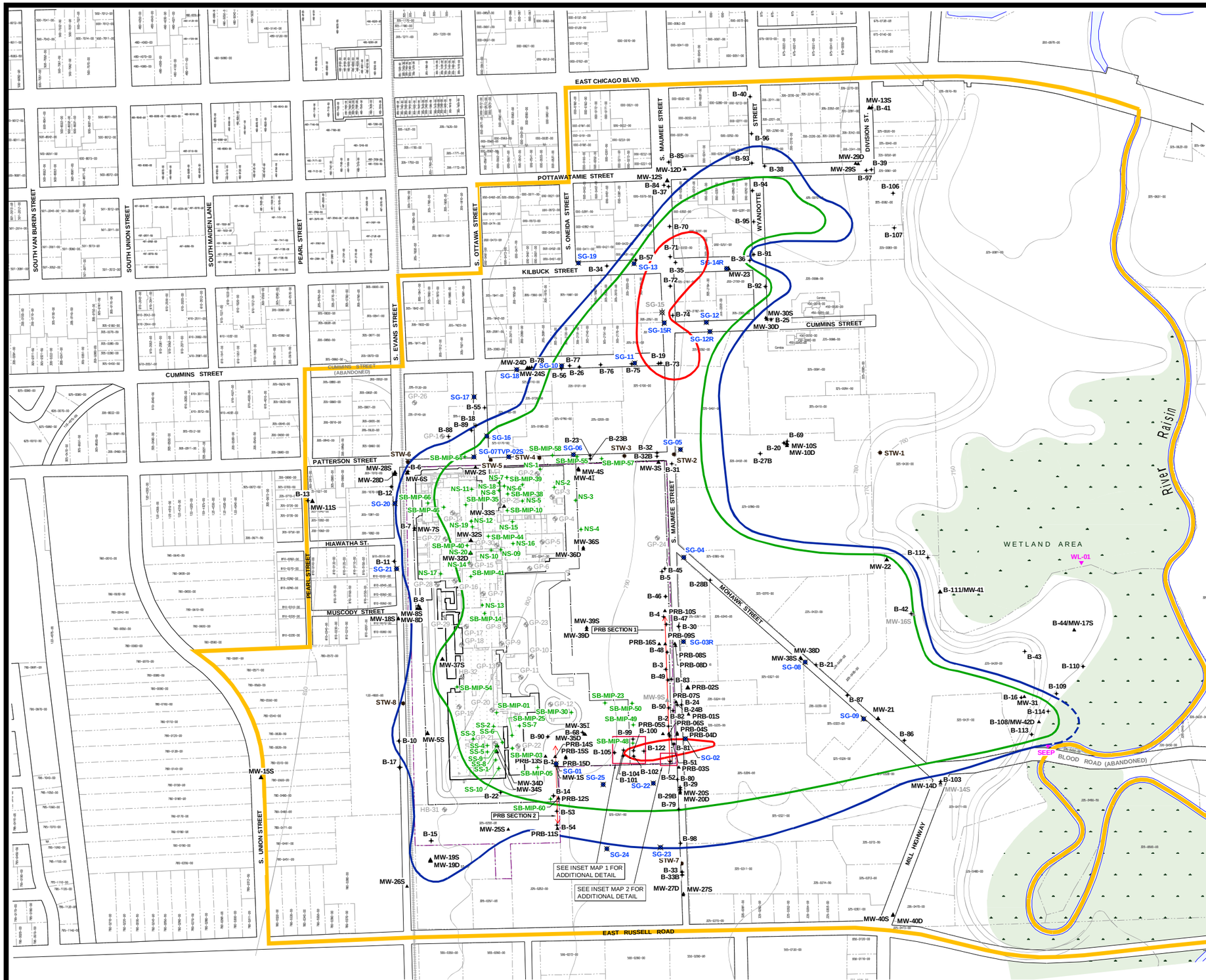
PROJ: FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN

TITLE: LATERAL DISTRIBUTION OF CHLORINATED ETHENES IN GROUNDWATER

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.20.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 20	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CAP Rpt\246667.0003.20.dwg
Operator Name: STEVE, DAWN
Drawing File Name: 0.DWG
Attached Xref's: tem1051516 (Filed)
Attached Images: TCE_Page_1; VOCs;
Layout: FIGURE 20 ORIGINAL
Dwg Size: 1.67 Mb
Plot Date: January 27, 2016
Plot Time: 1:54 PM



LEGEND

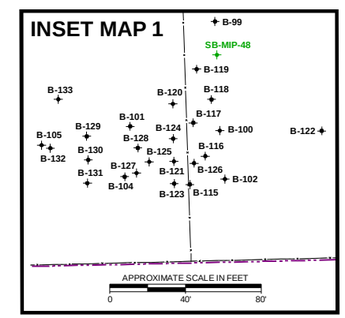
- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

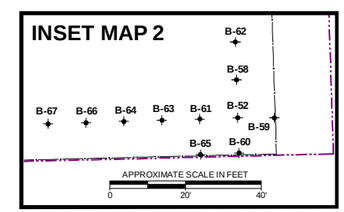
KEY

- BOUNDARY OF AREA WITH GROUNDWATER USE RESTRICTED BY A CITY OF TECUMSEH GROUNDWATER USE ORDINANCE
- EXTENT OF VOCs ABOVE THE MICHIGAN PART 201 DRINKING WATER CRITERIA
- EXTENT OF VOCs ABOVE THE MICHIGAN PART 201 GROUNDWATER SURFACE WATER INTERFACE CRITERIA
- EXTENT OF VOCs ABOVE THE MICHIGAN PART 201 GROUNDWATER CONTACT CRITERIA

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.





NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ:

FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

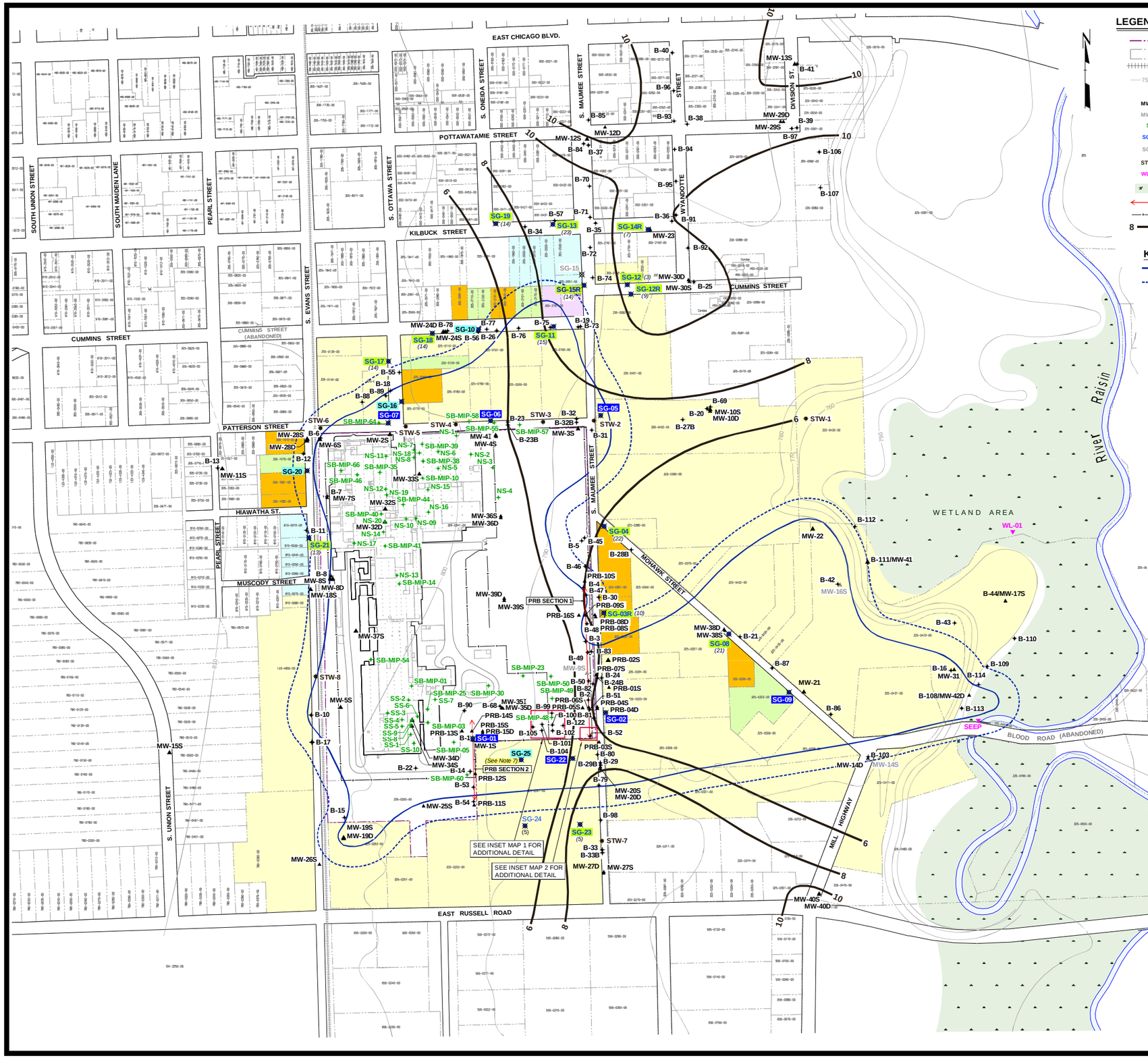
TITLE:

EXTENT OF VOCs ABOVE MICHIGAN PART 201 CRITERIA

DRAWN BY: DGS	SCALE:	PROJ. NO.	246667.0003
CHECKED BY: SEM	AS INDICATED	FILE NO.	246667.0003.21.dwg
APPROVED BY: GC	DATE PRINTED:		FIGURE 21
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Part\246667.0003.21.dwg
Operator Name: STEVE DWAHI
Drawing File Name: 0.DWG
Attached Xref's: tecf109116 (Filed)
Attached Images: TCE_Page_1 - VOCs
Layout: FIG21 (TCO-Clean 201)
Dwg Size: 1.65 Mb
Plot Date: January 27, 2016
Plot Time: 1:59 PM



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- 8 — DEPTH IN FEET TO THE BOTTOM OF THE SURFICIAL SILTY/SANDY CLAY UNIT

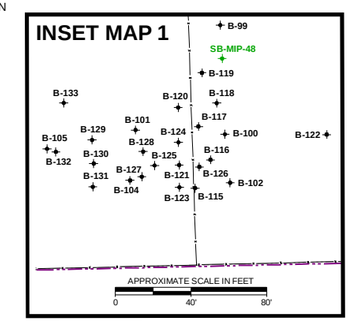
KEY

- EXTENT OF VOCs ABOVE THE GENERIC RESIDENTIAL MDEQ GWSLs
- 100 FOOT BUFFER AROUND EXTENT OF VOCs ABOVE THE GENERIC RESIDENTIAL MDEQ GWSLs
- SG-05 — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ABOVE NON-RESIDENTIAL SGSLs HAVE BEEN OBSERVED DURING AT LEAST 2 SAMPLING EVENTS.
- SG-10 — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ABOVE RESIDENTIAL SGSLs HAVE BEEN OBSERVED DURING AT LEAST 2 SAMPLING EVENTS.
- SG-15R (14) — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ARE CONSISTENTLY BELOW RESIDENTIAL SGSLs. THE NUMBER OF CONSECUTIVE SAMPLING EVENTS WITH CONCENTRATIONS BELOW RESIDENTIAL SGSLs, AS OF SEPTEMBERE 2015, IS LISTED IN PARENTHESIS.

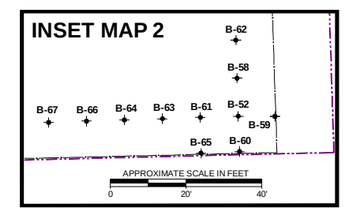
PROPERTY KEY

- RESIDENTIAL PROPERTY - CRAWL SPACE/INDOOR AIR TESTING PERFORMED; COCs BELOW INDOOR AIR CRITERIA
- RESIDENTIAL PROPERTY - PRESUMPTIVE MITIGATION SYSTEM INSTALLED
- RESIDENTIAL PROPERTY - MULTIPLE LINES OF EVIDENCE INDICATE VAPOR INTRUSION PATHWAY IS INCOMPLETE
- RESIDENTIAL PROPERTY - HOUSE LOCATED MORE THAN 100 FEET FROM SHALLOW GROUNDWATER AFFECTED ABOVE APPLICABLE SCREENING LEVELS
- NON-RESIDENTIAL PROPERTY

INSET MAP 1



INSET MAP 2



0 250' 500' 750' 1000'
APPROXIMATE SCALE IN FEET

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE OUTPUTS AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.
5. VINYL CHLORIDE IS DETECTED ABOVE THE RESIDENTIAL GSWL IN THE UPPERMOST SAMPLE COLLECTED FROM THE AFFECTED AQUIFER AT SOIL BORINGS B-70, B-92 AND B-94. HOWEVER THIS AREA IS CHARACTERIZED BY AN ADDITIONAL (HIGHER) WATER BEARING UNIT THAT IS NOT HYDRAULICALLY CONNECTED TO THE SITE. THIS UNIT IS UNDERLAIN BY A SANDY/SILTY CLAY HAVING A DEPTH GREATER THAN A REASONABLE MAXIMUM BASEMENT DEPTH (8 FEET). AS SUCH, THIS UNAFFECTED PERCHED GROUNDWATER UNIT IS THE RELEVANT GROUNDWATER UNIT WHEN CONSIDERING THE VAPOR INTRUSION PATHWAY.
6. BECAUSE ANTHROPOLOGIC ACTIVITIES IN DEVELOPED AREAS ARE EXPECTED TO AFFECT NEAR SURFACE GEOLOGY, DEPTH CONTOURS FOR THE SURFICIAL SILTY/SANDY CLAY ARE NOT DRAWN FOR DEPTHS LESS THAN SIX FEET.
7. SAMPLE POINT SG-25 WAS INSTALLED AFTER THE INSTALLATION AND START-UP OF THE PERIMETER SOIL VAPOR EXTRACTION SYSTEM. ONGOING OPERATION OF THIS SYSTEM HAS LIKELY REDUCED THE OBSERVED CONCENTRATIONS AT THIS LOCATION.
8. UNSHADED PROPERTIES ARE MORE THAN 100 FEET FROM AREA OF SHALLOW GROUNDWATER AFFECTED ABOVE MDEQ RESIDENTIAL GROUNDWATER SCREENING LEVELS FOR VAPOR INTRUSION.

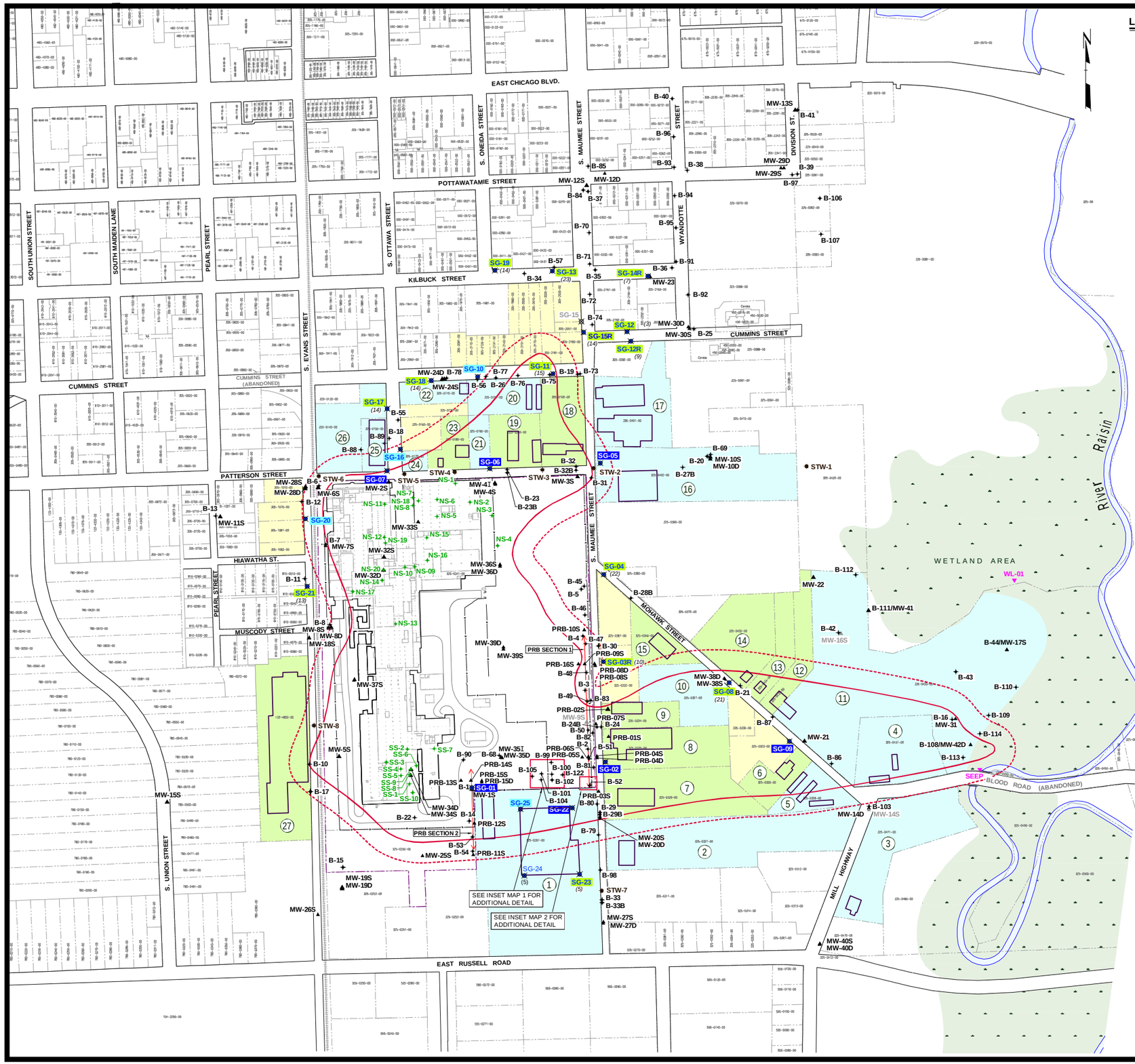
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: SUMMARY OF RESIDENTIAL VAPOR INTRUSION PATHWAY - MULTIPLE LINES OF EVIDENCE ANALYSIS -

DRAWN BY: DGS	SCALE:	PROJ. NO.	246667.0003
CHECKED BY: SEM	AS INDICATED	FILE NO.	246667.0003.22.dwg
APPROVED BY: GC	DATE PRINTED:	FIGURE 22	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

KEY

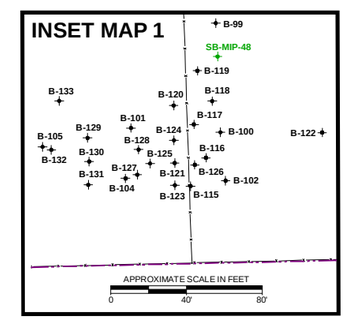
- EXTENT OF VOCs ABOVE THE GENERIC NON-RESIDENTIAL MDEQ GWSLs
- 100 FOOT BUFFER AROUND EXTENT OF VOCs ABOVE THE GENERIC NON-RESIDENTIAL MDEQ GWSLs
- SG-06 — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ABOVE NON-RESIDENTIAL SGSLs HAVE BEEN OBSERVED DURING AT LEAST 2 SAMPLING EVENTS.
- SG-10 — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ABOVE RESIDENTIAL SGSLs HAVE BEEN OBSERVED DURING AT LEAST 2 SAMPLING EVENTS.
- SG-15R (14) — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ARE CONSISTENTLY BELOW RESIDENTIAL SGSLs. THE NUMBER OF CONSECUTIVE SAMPLING EVENTS WITH CONCENTRATIONS BELOW RESIDENTIAL SGSLs, AS OF SEPTEMBERE 2015, IS LISTED IN PARENTHESIS.

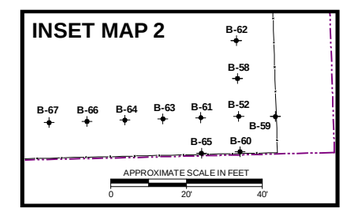
PROPERTY KEY

- RESIDENTIAL PROPERTY
- NON-RESIDENTIAL PROPERTY - PATHWAY CLOSED
- NON-RESIDENTIAL PROPERTY - SITE SPECIFIC ASSESSMENT PENDING
- APPROXIMATE NON-RESIDENTIAL BUILDING FOOTPRINT
- (16) MAP NUMBER

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE OUTPUTS AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.
5. SAMPLE POINT SG-25 WAS INSTALLED AFTER THE INSTALLATION AND START-UP OF THE PERIMETER SOIL VAPOR EXTRACTION SYSTEM. ONGOING OPERATION OF THIS SYSTEM HAS LIKELY REDUCED THE OBSERVED CONCENTRATIONS AT THIS LOCATION.
6. UNSHADED PROPERTIES ARE MORE THAT 100 FEET FROM THE AREA OF SHALLOW GROUNDWATER AFFECTED ABOVE MDEQ NON-RESIDENTIAL GROUNDWATER SCREENING LEVELS FOR VAPOR INTRUSION.





0 250' 500' 750' 1000'
APPROXIMATE SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

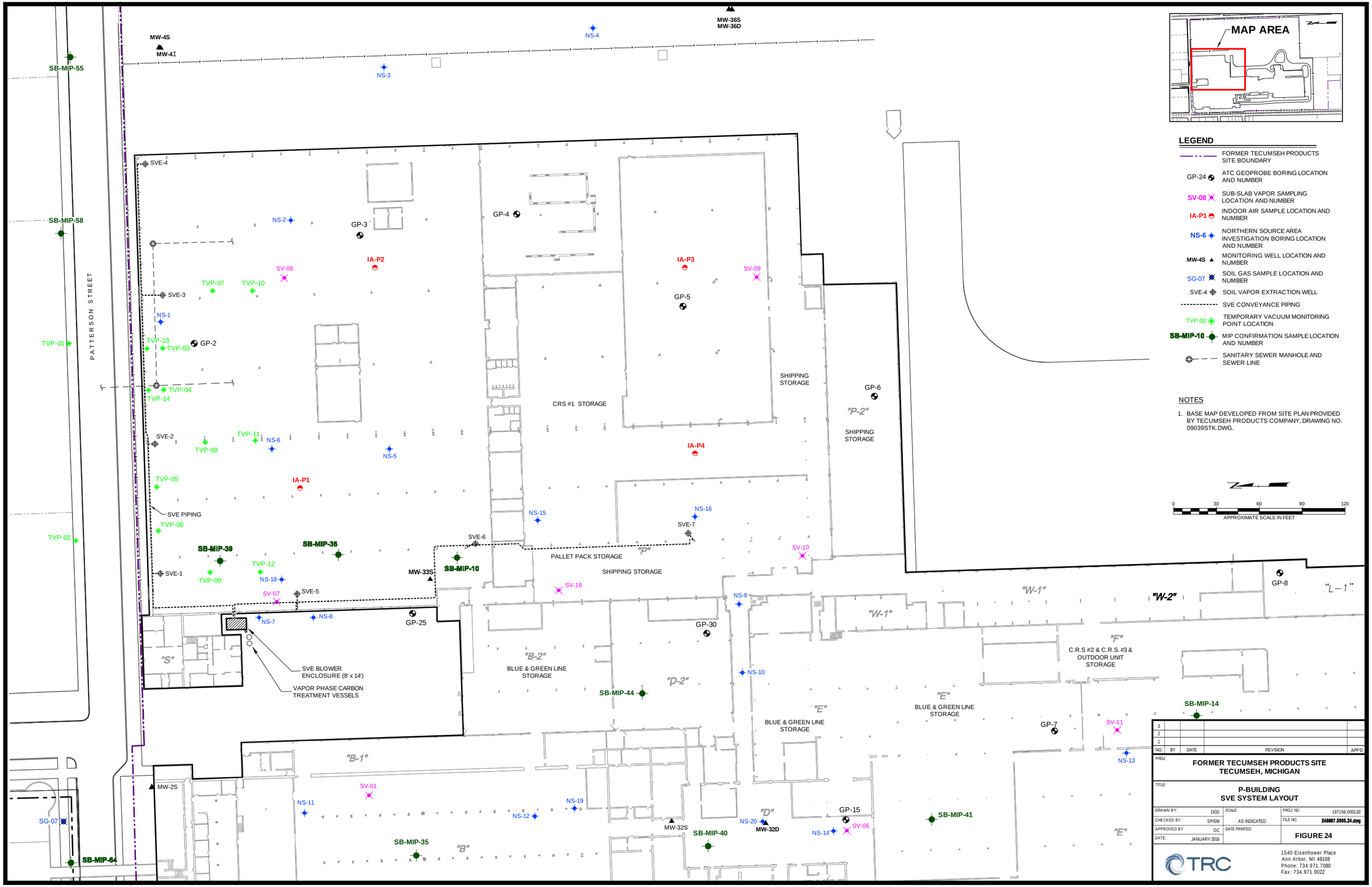
PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: SUMMARY OF NON-RESIDENTIAL VAPOR INTRUSION PATHWAY - MULTIPLE LINES OF EVIDENCE ANALYSIS -

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0000	
CHECKED BY: SEM		FILE NO. 246667.0003.23.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 23	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Rpt\246667.0003.23.dwg
Operator Name: STEHLE, DANIAH
Drawing Scale: 1:0.00000
Attached Xref: tem50019 (Filed) TCS Page_1, Tecumseh C2; Tecumseh B2; Tecumseh M2; Tecumseh B2; Tecumseh B2; Tecumseh M2; Tecumseh B2;
Attached Image: Layout: Model (1) Heavy duties
Dwg Size: 1.86 Mb
File Date: January 27, 2016
File Time: 13:31:16



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- GP-24 — ATC GEOPROBE BORING LOCATION AND NUMBER
- SV-08 — SUB-SLAB VAPOR SAMPLING LOCATION AND NUMBER
- IA-P1 — INDOOR AIR SAMPLE LOCATION AND NUMBER
- NS-6 — NORTHERN SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- SG-07 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SVE-4 — SOIL VAPOR EXTRACTION WELL
- SVE CONVEYANCE PIPING
- TVP-02 — TEMPORARY VACUUM MONITORING POINT LOCATION
- SB-MIP-10 — MIP CONFIRMATION SAMPLE LOCATION AND NUMBER
- SANITARY SEWER MANHOLE AND SEWER LINE

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY TECUMSEH PRODUCTS COMPANY, DRAWING NO. 09039STK.DWG.

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: **FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN**

TITLE: **P-BUILDING SVE SYSTEM LAYOUT**

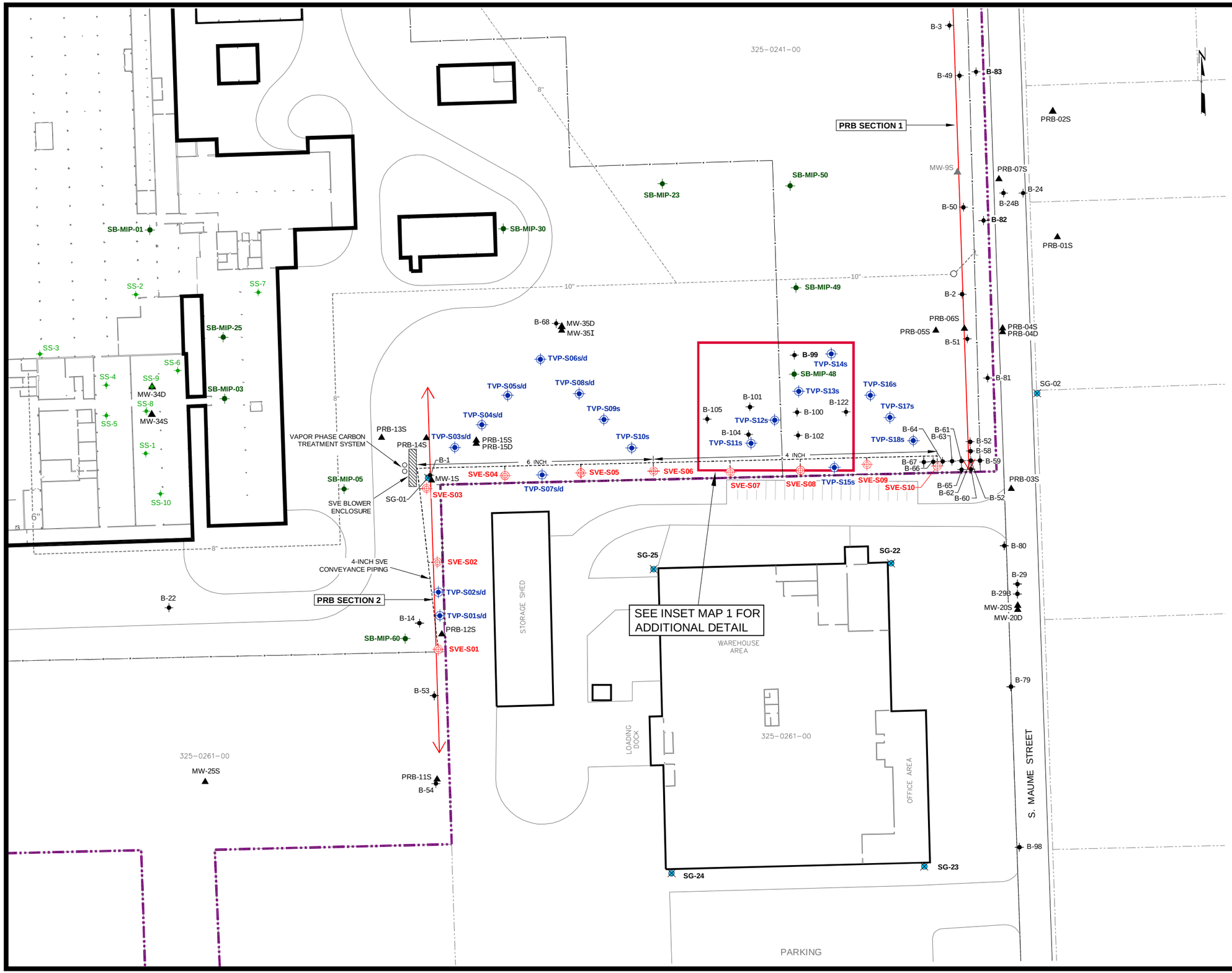
DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 187156.0001.02	
CHECKED BY: SPSM		FILE NO. 246867.0003.24.dwg	
APPROVED BY: GC	DATE PRINTED:	**FIGURE 24**	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

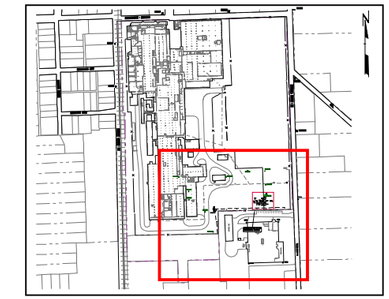
PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MA\246867\0003_CAP Rpt\246867.0003.24.dwg
Operator Name: STEINEL, SARAH
Drawing Plot Date: 01/06/2016

Attached Xref's: Bldg Columns
Attached Images: Beacon TDE-Bldgs Color Bldgs; Beacon TDE Contour Image; Beacon TDE-Bldgs Contour Image; DOQQ4191N
Layers: Hidden Bldg; Bldg Grp L3

Dwg Size: 5.49 Mb
Plot Date: Feb-wed 1, 2016
Plot Time: 7:01 AM



MAP AREA



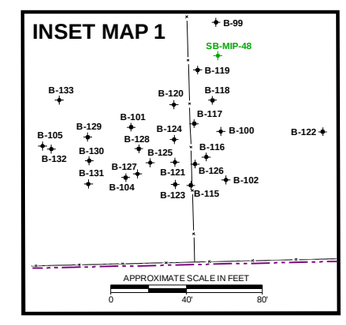
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- B-54 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- 8" — PIPE DIAMETER AND APPROXIMATE LOCATION OF ON-SITE STORM SEWER
- PRB LOCATION
- FENCE LINE
- SVE-S04 — PROPOSED EXTRACTION WELL LOCATION
- TVP-S09 — PROPOSED VACUUM MONITORING POINT LOCATION
- SVE CONVEYANCE PIPING

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.

INSET MAP 1



0 50 100 150 200
APPROXIMATE SCALE IN FEET

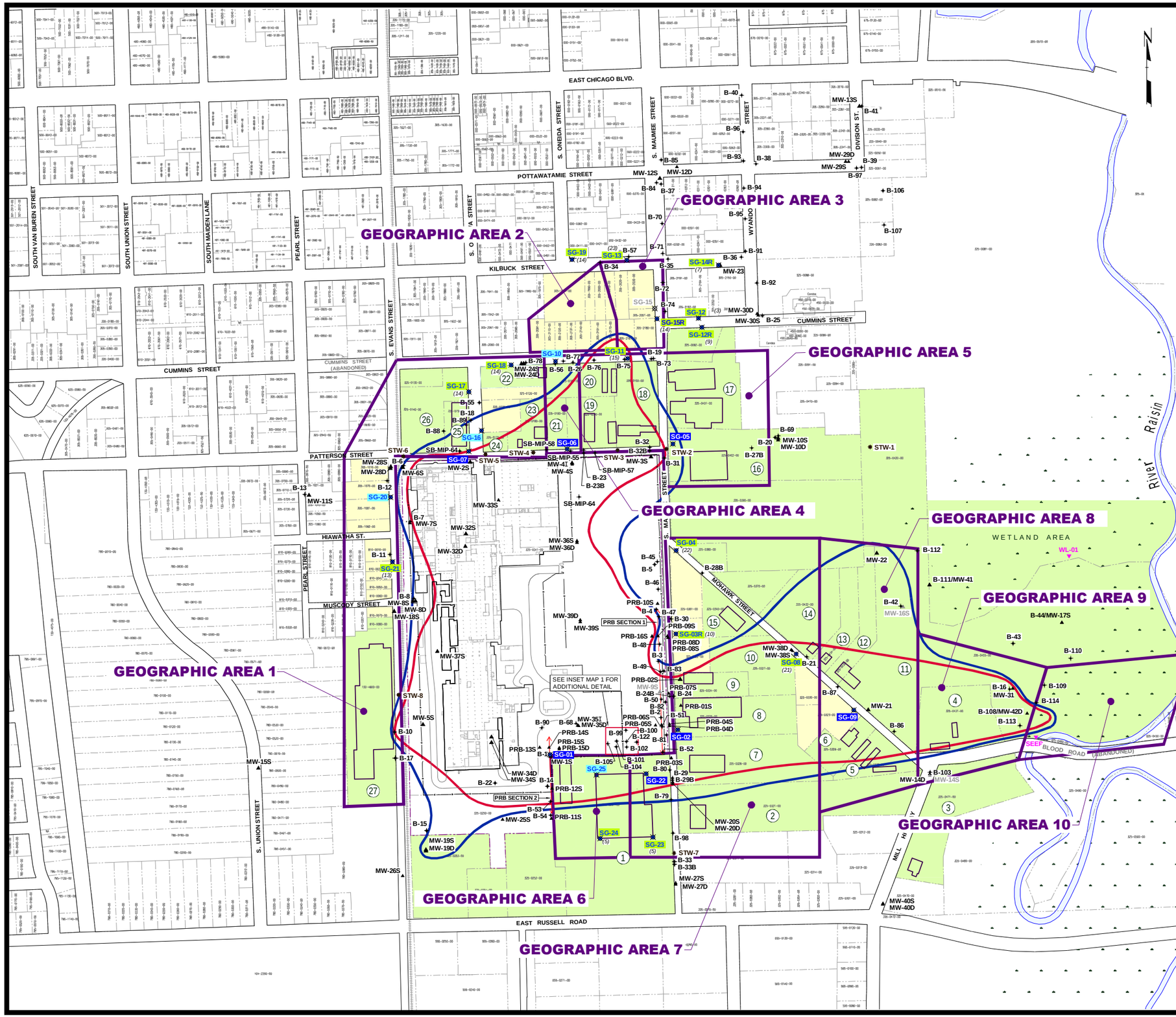
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: PERIMETER SVE SYSTEM LAYOUT

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.28.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 25	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

KEY

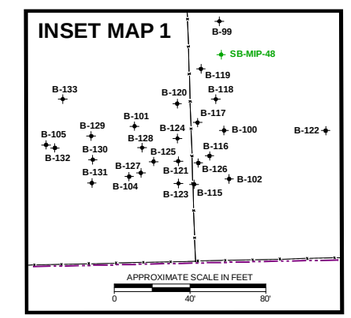
- EXTENT OF VOCs ABOVE THE GENERIC NON-RESIDENTIAL MDEQ GWSLs
- EXTENT OF VOCs ABOVE THE GENERIC RESIDENTIAL MDEQ GWSLs
- SG-06 — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ABOVE NON-RESIDENTIAL SGSLs HAVE BEEN OBSERVED DURING AT LEAST 2 SAMPLING EVENTS.
- SG-10 — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ABOVE RESIDENTIAL SGSLs HAVE BEEN OBSERVED DURING AT LEAST 2 SAMPLING EVENTS.
- SG-15R (14) — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ARE CONSISTENTLY BELOW RESIDENTIAL SGSLs. THE NUMBER OF CONSECUTIVE SAMPLING EVENTS WITH CONCENTRATIONS BELOW RESIDENTIAL SGSLs, AS OF SEPTEMBERE 2015, IS LISTED IN PARENTHESIS.

PROPERTY KEY

- RESIDENTIAL PROPERTY
- NON-RESIDENTIAL PROPERTY
- APPROXIMATE NON-RESIDENTIAL BUILDING FOOTPRINT
- (16) MAP NUMBER

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE OUTPUTS AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.
5. SAMPLE POINT SG-25 WAS INSTALLED AFTER THE INSTALLATION AND START-UP OF THE PERIMETER SOIL VAPOR EXTRACTION SYSTEM. ONGOING OPERATION OF THIS SYSTEM HAS LIKELY REDUCED THE OBSERVED CONCENTRATIONS AT THIS LOCATION.
6. UNSHADED PROPERTIES ARE MORE THAT 100 FEET FROM THE AREA OF SHALLOW GROUNDWATER AFFECTED ABOVE MDEQ GROUNDWATER SCREENING LEVELS FOR VAPOR INTRUSION.



0 250' 500' 750' 1000'
APPROXIMATE SCALE IN FEET

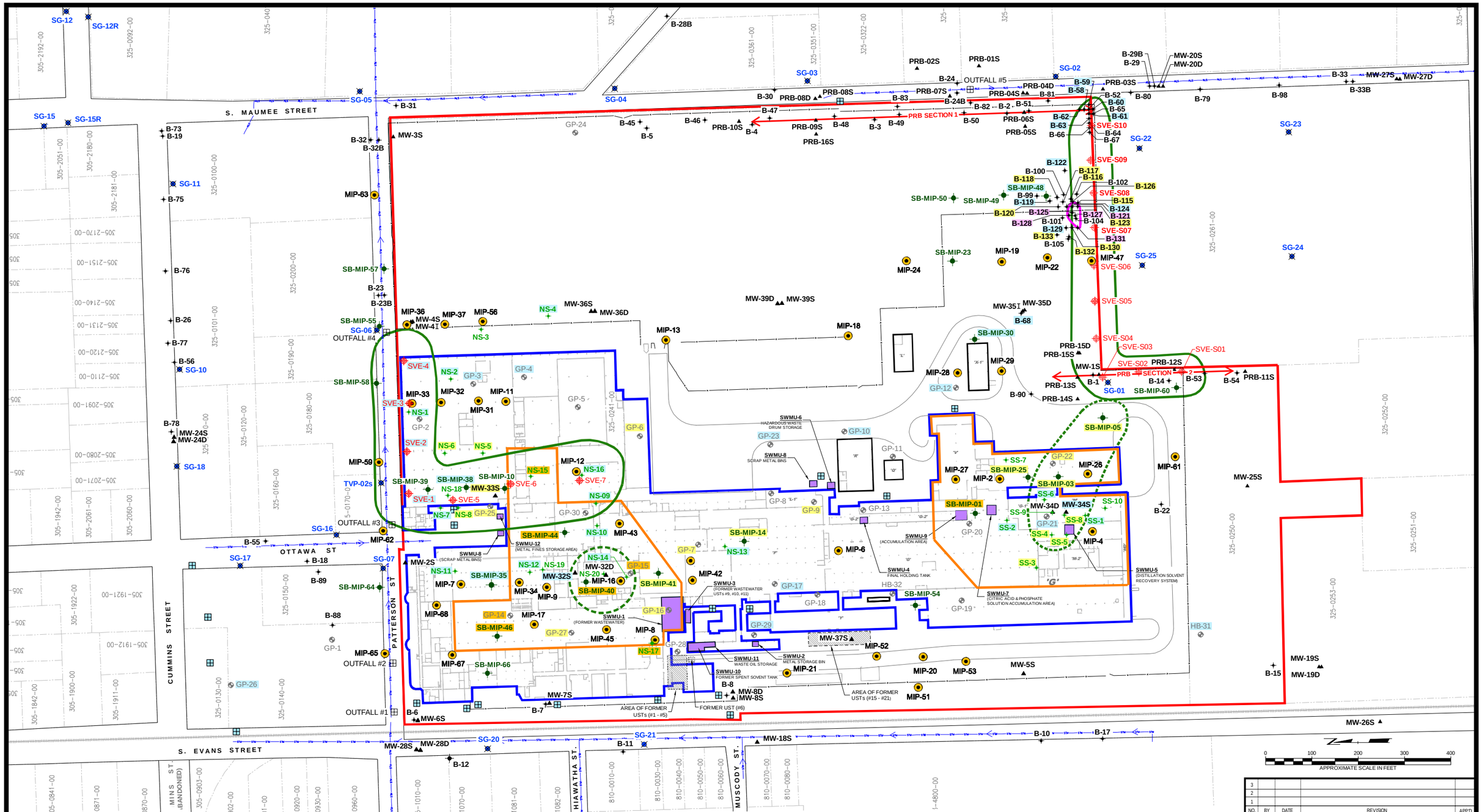
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: GEOGRAPHIC AREAS FOR VAPOR INTRUSION RISK ASSESSMENT

DRAWN BY:	DGS	SCALE:	PROJ. NO. 246667.0003
CHECKED BY:	ES	AS INDICATED	FILE NO. 246667.0003.26.dwg
APPROVED BY:	GC	DATE PRINTED:	FIGURE 26
DATE:	JANUARY 2016		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

- FENCE LINE
- PARCEL BOUNDARY
- PRB LOCATION
- STORM SEWER CATCH BASIN (2006 SITE SURVEY)
- OUTFALL FROM ON-SITE STORM SEWER
- AREA OF FORMER UST
- APPROXIMATE LOCATION OF FORMER SOLID WASTE MANAGEMENT UNITS (SWMUs)
- STORM WATER SEWER
- B-8 PERIMETER/OFF-SITE INVESTIGATION BORING LOCATION AND NUMBER
- MW-8D MONITORING WELL LOCATION AND NUMBER
- SS-10 SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- GP-23 ATC PHASE II ESA BORING LOCATION AND NUMBER
- SVE-7 SOIL VAPOR EXTRACTION WELL LOCATION AND NUMBER
- SG-01 SOIL GAS SAMPLE LOCATION AND NUMBER
- MIP-40 MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- BLUE HIGHLIGHTING INDICATES SOIL SAMPLE LOCATIONS WHERE CONCENTRATIONS DO NOT EXCEED RISK-BASED SCREENING LEVELS
- YELLOW HIGHLIGHTING INDICATES LOCATIONS WHERE TCE OR PCE CONCENTRATIONS EXCEEDS THE NON-RESIDENTIAL SOIL VOLITILIZATION TO INDOOR AIR INHALATION CRITERIA (1.9 mg/kg for TCE; 21 mg/kg FOR PCE)
- ORANGE HIGHLIGHTING INDICATES LOCATIONS WHERE TCE CONCENTRATIONS EXCEED THE SITE-SPECIFIC CLEANUP LEVEL (25 mg/kg)
- PINK HIGHLIGHTING INDICATES LOCATIONS WHERE PCE CONCENTRATIONS EXCEED SOIL SATURATION SCREENING LEVELS
- FACILITY BOUNDARY AND BOUNDARY OF AREA SUBJECT TO INSTITUTIONAL CONTROLS FOR VAPOR INTRUSION
- BOUNDARY OF AREA SUBJECT TO INSTITUTIONAL CONTROLS FOR MAINTENANCE OF SLAB OR EQUIVALENT IMPERMEABLE SURFACE BARRIER
- APPROXIMATE AREA SUBJECT TO INSTITUTIONAL CONTROLS FOR SOIL MANAGEMENT
- AREA OF ONGOING SOIL VAPOR EXTRACTION
- APPROXIMATE AREA OF POTENTIAL SOIL VAPOR EXTRACTION SYSTEM EXPANSION
- APPROXIMATE AREA OF TETRACHLOROETHENE SOIL TREATMENT AREA

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ.
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:
AREAS IDENTIFIED FOR SOIL CORRECTIVE MEASURES

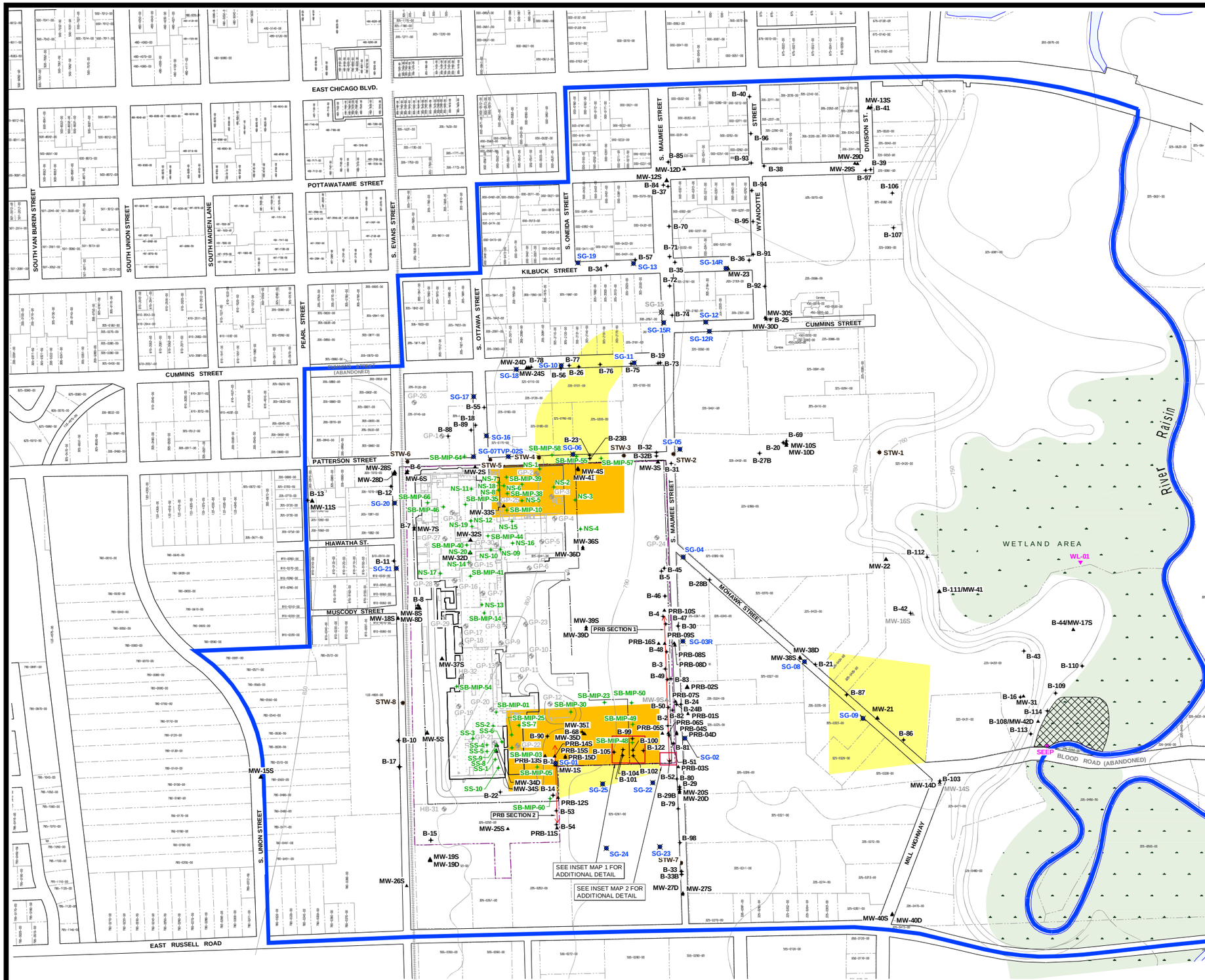
DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.27.dwg	
APPROVED BY: GC	DATE PRINTED:	**FIGURE 27**	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

Attached Xrefs: tsr19115 (FBs)
Attached Images:
Layouts: FIG27 Areas Soil Corrective Measures

Dwg Size: 1.87 Mb
Plot Date: February 1, 2016
Plot Time: 2:41 PM

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Rp\246667.0003.27.dwg
Operator Name: STEWART, DANIAH
Drawing File Name: 1280x800



LEGEND

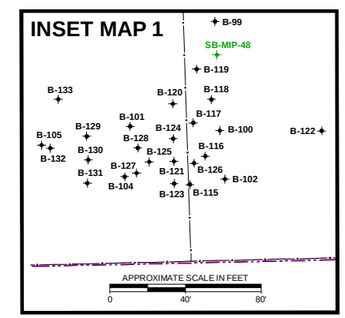
- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

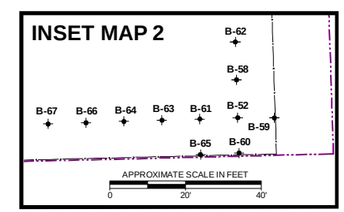
KEY

- BOUNDARY OF AREA WITH GROUNDWATER USE RESTRICTED BY A CITY OF TECUMSEH GROUNDWATER USE ORDINANCE
- APPROXIMATE AREAS WITH GROUNDWATER CONCENTRATIONS ABOVE RISK-BASED CLEANUP LEVELS
- APPROXIMATE AREA TARGETED FOR CONTAMINANT MASS REDUCTION
- APPROXIMATE SITE-SPECIFIC GROUNDWATER SURFACE WATER INTERFACE EVALUATION AREA

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.





NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

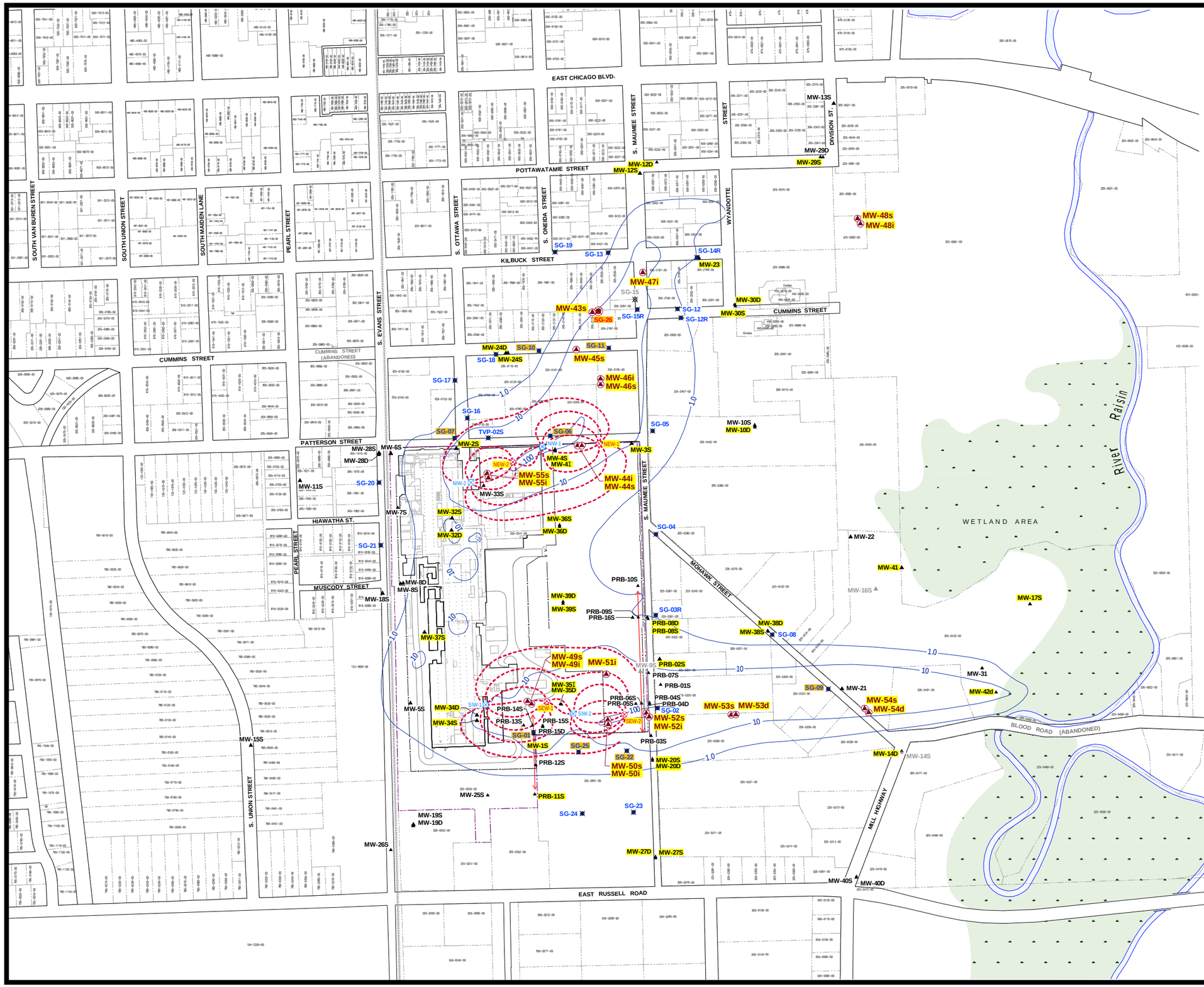
PROJ: **FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN**

TITLE: **AREAS IDENTIFIED FOR GROUNDWATER CORRECTIVE MEASURES**

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO.	246667.0003
CHECKED BY: SEM		FILE NO.	246667.0003.28.dwg
APPROVED BY: GC	DATE PRINTED:	**FIGURE 28**	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\CADD_CAP Fig\246667.0003.28.dwg
Opener Name: STEVE SWAHN
Drawing File Size: 5.00MB
Drawing Date: 1.65 kb
Plot Date: February 1, 2016
Plot Time: 12:07 PM
Attached Xref's: tecr0516 (Filed)
Attached Images: TCE_Page_1 VOCs
Layout: FIG28 Areas of GW Use



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- MW-4S ▲ MONITORING WELL LOCATION AND NUMBER
- MW-9S ▲ DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SG-02 ⊠ SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 ⊠ DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- MW-48i ▲ PROPOSED WELL LOCATION AND NUMBER
- SG-26 ⊗ PROPOSED SOIL GAS SAMPLE LOCATION AND NUMBER
- MW-30s YELLOW HIGHLIGHTED SAMPLE LOCATION INCLUDED IN PROPOSED GROUNDWATER SAMPLING PROGRAM
- SG-26 ORANGE HIGHLIGHTED SAMPLE LOCATION INCLUDED IN PROPOSED SOIL GAS SAMPLING PROGRAM
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- 1.0 TOTAL CHLORINATED ETHENE ISOCONCENTRATION LINE (SEE NOTES 3, 4 AND 5)
- EXTRACTION WELL
- INJECTION WELL
- FLOW LINE

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE AND KNOWLEDGE OF SITE GEOLOGY/ HYDROGEOLOGY.
5. ISOCONCENTRATION LINES REPRESENT THE TOTAL CONCENTRATION (IN MICROMOLES PER LITER [uM]) OF CHLORINATED ETHENES (TETRACHLOROETHENE [PCE], TRICHLOROETHENE [TCE], cis-1,2-DICHLOROETHENE [cis-DCE], AND VINYL CHLORIDE [VC]) IN GROUNDWATER. MOLAR CONCENTRATIONS ARE USEFUL IN ILLUSTRATING TOTAL CONTAMINANT MASS. THE TABLE BELOW PROVIDES A COMPARISON BETWEEN MOLARITY AND MASS BASED CONCENTRATION UNITS.

MOLAR CONCENTRATION	PCE (ug/L)	TCE (ug/L)	cis-DCE (ug/L)	VC (ug/L)
1.0 uM	166	131	97.0	62.5
10 uM	1,660	1,310	970	625
100 uM	16,600	13,100	9,700	6,250

N

0 250' 500' 750' 1000'
APPROXIMATE SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

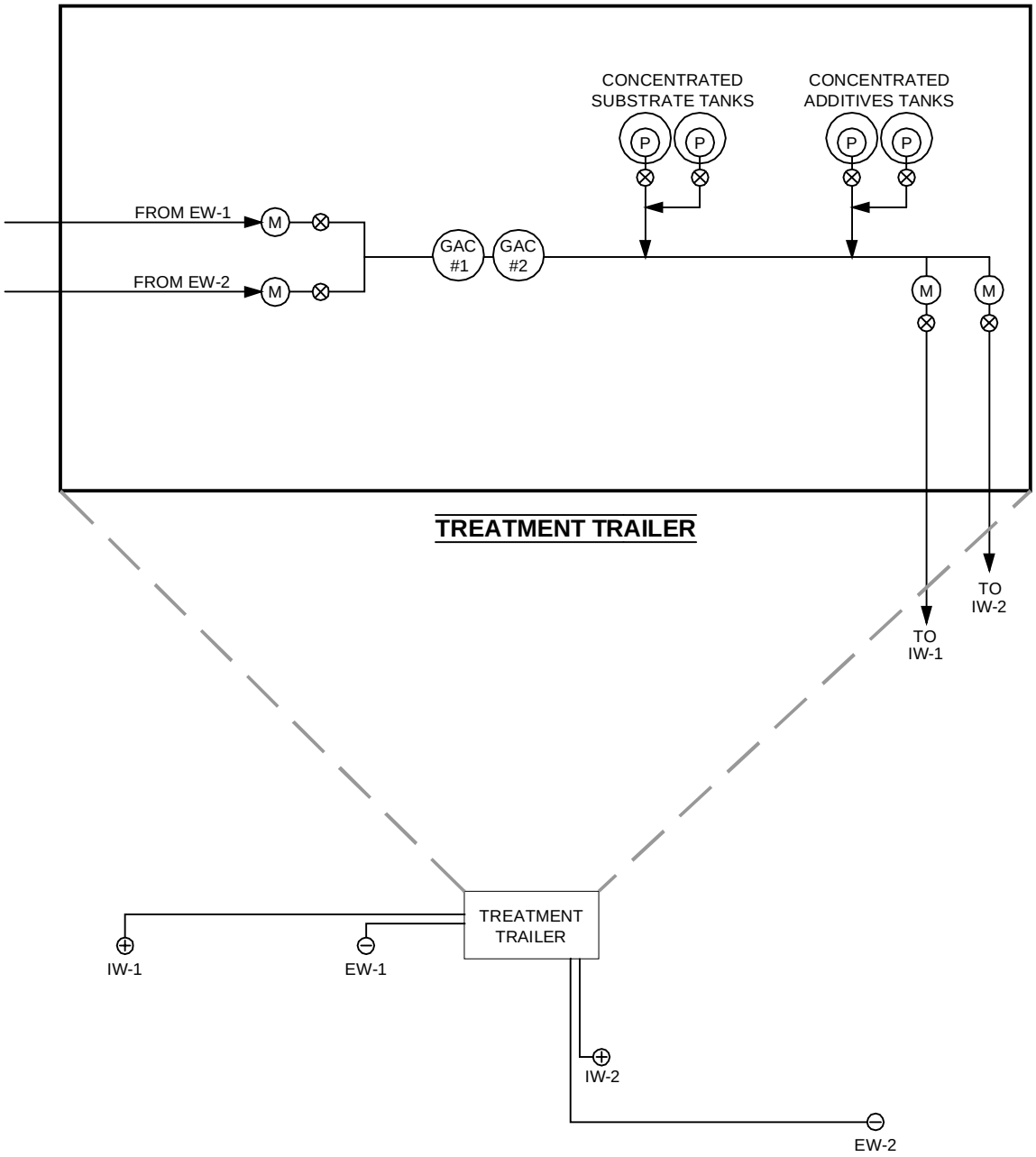
PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: PROPOSED RECIRCULATION CELL LAYOUT AND MONITORING PROGRAM

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.29.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 29	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: JL TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Rpt\246667.0003.29.dwg
Character Name: STEVE EL DAWAR
Drawing File Name: 0.dwg
Attached Xref: ter09019 (Filter)
Attached Image: TTC-Page 5, TPC-PBB XXXXXXXXXX-10000191914202;
Layout: 11X8.5 Proj. Issues Draft & Monitoring
Dwg Size: 1.69 Mb
Plot Date: February 1, 2016
Plot Time: 2:31 PM



PLUME TREATMENT SYSTEM

LEGEND

EW	EXTRACTION WELL
IW	INJECTION WELL
GAC	GRANULAR ACTIVATED CARBON
M	FLOW METER
P	CHEMICAL METERING PUMP

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PROJECT: FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN

TITLE: ENHANCED IN-SITE BIOREMEDIATION PROCESS FLOW DIAGRAM

DRAWN BY:	DSTEHLE
APPROVED BY:	GC
PROJ. NO.	246667.0000
FILE NO.	246667.0003.30.dwg
DATE:	JANUARY 2016

FIGURE 30

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP R pt246667.0003.30.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 1'-0" = 1'-0"
Dwg Size: 0.66 Mb
Plot Date: February 1, 2016
Plot Time: 8:27 AM
Attached Xrefs:
Attached Images:
Layout: FIG30 Enhanced BioRem PFD

Appendix A
Chronology of Investigation Activities

Chronology of Remedial Investigation Activities and Corrective Measures

Former Tecumseh Products Company Site
Tecumseh, Michigan

- **March 2009**
  - A perimeter groundwater investigation to determine whether VOCs had migrated off-site was conducted. The investigation included:
    - Installation of soil borings B-1 through B-8 for the collection of 13 grab groundwater samples for VOCs analysis; and
    - Installation of monitoring wells MW-01s through MW-09s. Specifically, the advancement of soil borings prior to well installation in order to evaluate site geology and depth to groundwater, well development, and completion of an initial groundwater sample event including collection of groundwater elevations and a groundwater sample for VOCs analysis from each monitoring well location.

- **April 2009**
  - An off-site subsurface investigation was conducted to help determine the horizontal and vertical extent COCs that had migrated off-site. The investigation included:
    - The advancement of 23 soil borings (B-10 through B-15, B-17 through B-26, and B-29 through B-35) using a Geoprobe®;
    - Visual classification of soils at 17 locations (B-13, B-14, B-18 through B-24, B-26, and B-29 through B-35) to evaluate site geology and depth to groundwater; and
    - Collection of one or more grab groundwater sample at each investigation location for VOCs analysis (42 total).
  - An investigation of potential preferential migration pathways was conducted, including:
    - Collection of 5 additional grab groundwater samples (B-23b, B-24b, B-27b, B-28b, and B-32b) from the backfill surrounding the storm and sanitary sewer system using an air-knife; and
    - Collection of water samples from eight storm sewer locations (STW-01 through STW-08) adjacent to the site.
  - An on-site sub-surface investigation to more completely define potential source areas, including:

        - The advancement of 18 soil borings (NS-01 through NS-10 and SS-01 through SS-08) using a Geoprobe®;
        - Visual classification of soils at nine locations (NS-01 through NS-04, NS-10 and SS-01 through SS-04) to evaluate site geology and depth to groundwater;
        - Collection of one or more grab groundwater sample at each investigation location for VOCs analysis (22 total); and
        - Collection of one or more soil sample at each investigation location, except NS-03 located outside the building footprint, for VOCs analysis (26 total).
    - Completion of a second groundwater sample event at monitoring wells MW-01s through MW-09s, including the collection of groundwater elevations and groundwater samples for VOCs analysis.
    - Because 1, 4-dioxane can be used to stabilize 1,1,1-trichroloethane (1,1,1-TCA), it was considered a potential, previously unevaluated COC in the areas with TCA in soil and groundwater. Therefore, a subset of the soil, groundwater and storm sewer samples described above were also analyzed for 1,4-dioxane. The evaluation included the samples collected at 28 investigation locations.
    - Samples were collected at the 5 potable private wells that were identified within the area potentially affected by off-site migration of VOCs. Note that at the owner's request, a sample was also collected at a well located outside the area of affected groundwater (3719 Mill Highway).

- **May 2009**
    - An off-site subsurface investigation was conducted to further define the horizontal and vertical extent COCs that had migrated off-site. The investigation included:
        - The advancement of soil borings at 5 locations (B-36 through B-41);
        - The installation of 6 shallow monitoring wells (MW-10s through MW-15s);
        - Visual classification of soils at each of the investigation locations to evaluate site geology and depth to groundwater; and
        - Collection of one or more groundwater sample at each investigation location for VOCs analysis (14 total).
    - The private well located at 610 Mohawk Street was decommissioned and the property was connected to municipal water.

- **June 2009**
    - Collection of groundwater elevations at monitoring well locations for the development of a groundwater contour map.

- **July 2009**
  - Additional off-site subsurface investigation activities were conducted to further define the horizontal and vertical extent COCs that had migrated off-site. The investigation included:
    - The advancement of soil borings at 3 locations (B-42 through B-44);
    - The installation of 2 shallow monitoring wells (MW-16s and MW-17s, co-located with soil borings B-42 and B-43, respectively);
    - Visual classification of soils at each of the investigation locations in order to evaluate site geology and depth to groundwater; and
    - Collection of a groundwater sample at monitoring well MW-17s for VOCs analysis. Samples were not collected at other investigation locations because monitoring well MW-16s was dry, and no water was encountered at soil boring B-43.
- **August 2009**
  - A sample was collected at the private irrigation well identified within the area potentially affected by off-site migration of VOCs.
- **September 2009**
  - The Current Conditions Report (CCR) was submitted to USEPA. The CCR provided a summary of the site history, a description of field activities conducted to date, provided an analysis of the data collected, and summarized the remaining data gaps.
- **October 2009**
  - On October 27, 2009, Michelle Mullin from USEPA, Peter Quackenbush of MDEQ and project staff from TPC and TRC conduct a site visit.
  - The Sub-Slab Vapor Sampling Workplan to investigate on-site sub-slab soil gas was implemented, including:
    - Installation of at 18 sub-slab sample points (SV-01 through SV-18) throughout the former TPC manufacturing building; and
    - Collection of sub-slab soil gas samples in at each location for analysis of site specific CVOCs (tetrachloroethene [PCE]; trichloroethene [TCE], 1,1-dichloroethene [1,1-DCE], 1,2-cis-dichloroethene [cis-DCE], 1,2-trans-dichloroethene [trans-DCE], vinyl chloride, 1,1,1-TCA, 1,1-dichloroethane [1,1-DCA], and 1,2-dichloroethane [1,2-DCA]) by USEPA Method TO-15.

- **November-December 2009**
  - Additional investigation activities were conducted to further evaluate the continuity and physical parameters of the aquifer and the clay confining unit, including:
    - Advancement of soil borings at nine locations (MW-10d, MW-18s, MW-19s/d, MW-20s/d, MW-21, MW-22, MW-23, MW-24s/d, and MW-25s), to evaluate the depth of clay around the perimeter of the area affected by VOCs in groundwater;
    - Collection of two undisturbed Shelby Tube samples from the clay confining unit for hydraulic conductivity testing;
    - Measurement of *in situ* hydraulic conductivity (slug tests) at eight locations (MW-14s, MW-19s, MW-19d, MW-20s, MW-20d, MW-23, MW-24s, and MW-24d); and
    - Collection and analysis of four soil samples for fraction organic carbon analysis. (Samples collected at well locations MW-10d, MW-23, MW-19s, and MW-19d).
  - Additional investigation activities were also performed to further define the vertical and horizontal extent of COCs in groundwater migrating off-site, including:
    - Installation of 12 new monitoring wells (MW-10d, MW-18s, MW-19s, MW19d, MW-20s, MW-20d, MW-21, MW-22, MW-23, MW-24s, MW-24d, and MW-25s) to evaluate the lateral and vertical extent of off-site contaminant migration in groundwater;
    - Collection and analysis of one "deep" grab groundwater sample at the location of MW-25s to confirm that VOCs were not present near the top of clay at this location; and
    - Collection of two additional groundwater samples (B-29b and B-33b) from the backfill surrounding the storm and sanitary sewer system using an air-knife to further assess the potential for preferential migration of VOCs along the public utility corridors.
  - A complete water sample event was conducted, which included:
    - Measurement of groundwater elevations at all monitoring well locations and surface water elevations at two points along the River Raisin;
    - Collection of groundwater from all monitoring well locations except MW-16s, which was dry, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all groundwater sample locations for VOCs, and analysis of a subset of groundwater samples for monitored natural attenuation (MNA)

parameters (ferrous iron, chloride, nitrate, sulfate, and total organic carbon);

    - Collection and analysis of water from the storm sewer at two locations (STW-1 and STW-2) including photoionization detector (PID) screening of the air space; and
    - Collection and analysis of samples from the three private potable water wells located at properties along Mohawk Street, within the lateral extent of affected groundwater.

- **January 2010**
  - After reviewing groundwater data from the December 2009 sample event, TRC identified results from six new monitoring well locations (MW-11s, MW-19s, MW-20s, MW-20d, MW-21, and MW-23) which had the potential to affect decisions related to future investigation activities. A second groundwater sample was collected for VOCs analysis at these locations to confirm the December 2009 sample results.
  - Further investigation of the on-site volatilization to indoor air migration pathway, including:
    - Collection of a second round of soil gas samples at sub-slab sample location SV-01 through SV-18;
    - Collection of 8-hour composite indoor air samples at five locations (IA-01 through IA-05) within P-Building, which, at the time, had been targeted for occupation and use in the near future; and
    - Analysis of samples for site specific CVOCs (PCE; TCE; 1,1-DCE; cis-DCE; trans-DCE; vinyl chloride; 1,1,1-TCA; 1,1-DCA; and 1,2-DCA) by USEPA Method TO-15.

- **February 2010**
  - A ventilation test was conducted to quantify the effect of ventilation on indoor air quality in P-Building. The ventilation test included the collection of 8-hour composite indoor air samples at eight locations (IA-01 through IA-08) within P-Building. Samples were analyzed for site specific COCs by USEPA Method TO-15.

- **March 2010**
  - Further investigation of the on-site volatilization to indoor air migration pathway, including:
    - Collection of a third round of soil gas samples at a subset of sub-slab sample locations (SV-02, SV-06, SV-11, SV-12, SV-15, and SV-16);

        - Collection of 8-hour composite indoor air samples at eleven locations (IA-09 through IA-19) within the secondary use area (the portion of the former manufacturing building which was targeted for incidental use, but not full-time occupation by Consolidated Biscuit Company, i.e., the bulk of the facility excluding P-Building and the TPC lease space); and
        - Analysis of samples for site specific CVOCs by USEPA Method TO-15.
    - Additional investigation activities were performed to further define the vertical and horizontal extent of COCs in groundwater migrating off-site, including:
        - Advancement of soil borings at six locations, to evaluate the depth of clay around the perimeter of the area affected by VOCs in groundwater; and
        - Installation of 11 new monitoring wells (MW-12d, MW-14d, MW-26s, MW-27s, MW-27d, MW-28s, MW-28d, MW-29s, MW-29d, MW-30s, and MW-30d) to evaluate the lateral and vertical extent of off-site contaminant migration in groundwater.
    - The first quarter 2010 water sample event was conducted. Note that monitoring well MW-26s was not installed until March 31, 2010, after this water sample event was conducted, and as such, was not included in this sample event. The first quarter 2010 sample event included:
        - Measurement of groundwater elevations at all monitoring well locations, and surface water elevations at two points along the River Raisin;
        - Collection of groundwater from 36 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
        - Analysis of all groundwater samples for VOCs;
        - Collection and analysis of water from the storm sewer at two locations (STW-1 and STW-2) including PID screening of the air space; and
        - Collection and analysis of water from the private well located at 307 Kilbuck Street in the vicinity of affected groundwater. Note that this well only has an external spigot which was frozen during the December 2009 sample event, preventing sample collection at that time.

- **April 2010**
    - Completion of a supplemental water sample event, which included:
        - Measurement of the groundwater elevation at MW-26s;
        - Collection of a groundwater sample from monitoring well MW-26s for measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) and VOCs analysis; and

        - Collection of a surface water sample, WL-01, from the wetland area downgradient of the site for VOCs analysis.
    - The Preliminary Off-Site Soil Gas Sampling Workplan to investigate the volatilization to indoor air migration pathway was implemented, including:
        - Installation of 14 deep perimeter and off-site soil gas sample points (SG-01 through SG-14) throughout the area of affected groundwater, with sample locations bias to include perimeter locations (areas with the highest groundwater concentrations) and residential areas;
        - Collection of soil gas samples at each location, except SG-12 and SG-14 where water in the sample port prevented sample collection; and
        - Analysis of samples for site specific CVOCs (PCE; TCE; 1,1-DCE; cis-DCE; trans-DCE; vinyl chloride; 1,1,1-TCA; 1,1-DCA; and 1,2-DCA) by USEPA Method TO-15.

- **May 2010**
    - The second quarter 2010 water sample event was conducted, including:
        - Measurement of groundwater elevations at all monitoring well locations, and surface water elevations at two points along the River Raisin;
        - Collection of groundwater from 37 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
        - Analysis of all groundwater samples for VOCs, and analysis of a subset of groundwater samples for MNA parameters (ferrous iron, chloride, nitrate, and sulfate);
        - Collection and analysis of water from the storm sewer at two locations (STW-1 and STW-2) including PID screening of the air space; and
        - Collection and analysis of water from four private wells located at 307 Kilbuck Street, 607 Mohawk Street, 611 Mohawk Street, and 615 Mohawk Street.

- **June-July 2010**
    - Additional investigation activities were performed to further define the vertical and horizontal extent of COCs in groundwater migrating off-site, including:
        - Advancement of one additional soil boring, to evaluate the depth of clay around the perimeter of the area affected by VOCs in groundwater; and
        - Installation of a new monitoring well (MW-31) at that location.

- Completion of a supplemental water sample event, which included:
  - Measurement of groundwater elevations at monitoring well MW-31 and at adjacent wells including MW-14d, MW-17s, MW-21, and MW-22 to support development of a groundwater contour map;
  - Measurement of surface water elevations at two points along the River Raisin;
  - Collection of a groundwater sample from monitoring well MW-31 for measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) and VOCs analysis; and
  - Collection of a surface water sample, WL-01, from the wetland area downgradient of the site for VOCs analysis.
- A passive soil gas (PSG) survey was conducted by TRC and Beacon Environmental Services, Inc. (Beacon) to help identify point sources, if any within the northern source area. The PSG survey included:
  - Installation a grid of 150 PSG samplers spaced approximately 40 feet apart throughout the northern source area. PSG samplers were installed in holes, having a total depth of 30 inches, in the sub-slab;
  - Following installation, sample holes were sealed with a temporary aluminum foil plug and concrete patch to limit the influence of ambient air on sample results; and
  - Samplers, which contain an adsorbent medium to collect VOCs from the soil gas, were removed after the designated exposure period (approximately 1 week) and submitted to Beacon for VOCs analysis by USEPA Method 8260C.

- **August 2010**
  - A draft Quality Assurance Project Plan (QAPP) is submitted to USEPA for review.

- **September 2010**
  - Additional soil and groundwater investigation activities are performed to further define and evaluate on-site source areas, including:
    - Site reconnaissance based on PSG survey results to help select investigation locations;
    - Advancement of soil borings at 10 locations (NS-11 through NS-17 and MW-32s through MW-34s) to evaluate site geology and depth to groundwater;
    - Collection of two soil samples at each boring location for VOCs analysis;

        - Collection of grab groundwater samples at 7 boring locations (NS-11 through NS-17); and
        - Installation and development of 3 new monitoring wells (MW-32s, MW-33s, and MW-34s) at source area locations.
    - The third quarter 2010 water sample event was conducted, including:
        - Measurement of groundwater elevations at all monitoring well locations, and surface water elevations at two points along the River Raisin;
        - Collection of groundwater from 40 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at those locations;
        - Analysis of all groundwater samples for VOCs;
        - Collection and VOC analysis of water from the storm sewer at two locations (STW-1 and STW-2) including PID screening of the air space; and
        - Collection of a surface water sample, WL-01, from the wetland area downgradient of the site for VOCs analysis.
    - Further investigation of the off-site groundwater volatilization to indoor air migration pathway was implemented, including:
        - Installation of 2 additional off-site soil gas sample points (SG-15 and SG-16);
        - Collection of soil gas samples at each location, except SG-12, SG-14 and SG-15, where water in the sample port prevented sample collection;
        - Analysis of soil gas samples for site specific CVOCs by USEPA Method TO-15; and
        - Collection of a grab groundwater sample from the true water table at 1 boring location (B-35 [11-16′]) for VOCs analysis.

- **October 2010**
    - The third quarter 2010 groundwater sample from monitoring well MW-21, was not analyzed prior the end of its two-week hold time. A resample event was conducted at this location, and the sample was analyzed for VOCs.
    - In response to a quality assessment of the September 2010 soil gas data, a resample event was conducted at four sample locations (SG-01, SG-02, SG-03, and SG-05). Samples were analyzed for site specific CVOCs as described above.
    - The irrigation well located at 509 South Maumee Street was decommissioned.

- **November 2010**
  - A supplemental groundwater sample event was conducted at new source area monitoring wells (MW-32s, MW-33s, and MW-34s), which included:
    - Measurement of groundwater elevations at new well locations;
    - Collection of groundwater and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations; and
    - Analysis of groundwater samples for VOCs.
- **December 2010**
  - Completion of the regular fourth quarter soil gas sample event, which included:
    - Collection of a soil gas sample at all soil gas sample point locations, except SG-02, SG-08, SG-14, and SG-15 where water in the sample point prevented sample collection; and
    - Analysis of soil gas samples by method TO-15 for the project specific list of CVOCs.
  - The fourth quarter 2010 water sample event was conducted, including:
    - Measurement of groundwater elevations at all monitoring well locations, and surface water elevations at two points along the River Raisin;
    - Collection of groundwater from 39 monitoring well locations (monitoring well MW-09s could not be located due to snow cover) and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all groundwater samples for VOCs, and analysis of a subset of groundwater samples for MNA parameters (ferrous iron, chloride, nitrate, and sulfate);
    - Collection and analysis of water from the storm sewer at one location (STW-1) including PID screening of the air space (flow at sample location STW-02 was insufficient to collect a sample);
    - Collection and analysis of water samples from four private wells located at 307 Kilbuck Street, 607 Mohawk Street, 611 Mohawk Street, and 615 Mohawk Street; and
    - Note that the wetland area where surface water sample WL-01 is typically collected was frozen, so no sample was collected during this sample event.

- **February 2011**
  - The first quarter 2011 water sample event was conducted, including:
    - Measurement of groundwater elevations at all monitoring well locations, and surface water elevations at two points along the River Raisin;
    - Collection of groundwater from 40 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all groundwater samples for VOCs; and
    - Note that the wetland area where surface water sample WL-01 is typically collected was frozen, so no sample was collected during this sample event.
  - Investigation activities to evaluate concentrations of VOCs and geochemical parameters in the shallow groundwater along the downgradient (eastern) perimeter of the site were conducted. Investigation activities included:
    - Advancement of soil borings at 12 locations to evaluate site geology and depth to groundwater (B-45 through B-54, PRB-01s, and PRB-02s);
    - Collection of two to three grab groundwater samples over a two-foot screened interval at 10 boring locations (B-45 through B-54);
    - Analysis of 27 groundwater samples for total VOCs;
    - Installation and development of two piezometers (PRB-01 and PRB-02) in the right-of-way on the east side of Maumee Street; and
    - In conjunction with regular quarterly groundwater sampling activities additional sample volume was collected at monitoring wells MW-01s and MW-09s for groundwater quality parameters which had not been measured previously at these locations, specifically calcium, iron, magnesium, manganese and total organic carbon.
  - Advancement of soil borings at 3 locations to evaluate the nature and thickness of the surficial clay unit northeast of the site (B-55 through B-57). Borings were advanced to the water table. No samples were collected for laboratory analysis.
- **March 2011**
  - Investigation activities to evaluate groundwater flow parameters along the downgradient (eastern) perimeter of the site were conducted. Investigation activities included:
    - Collection of groundwater elevations at five locations (MW-1s, MW-9s, MW-20s, PRB-01, and PRB-02); and

        - Completion of *in-situ* hydraulic conductivity tests (slug tests) at four locations (MW-1s, MW-9s, MW-20s, and PRB-01) in order to assess hydraulic conductivity over the investigation area.
    - Completion of the first quarter 2011 soil gas sample event, which included:
        - Collection of a soil gas sample at 11 of the 16 soil gas sample points (SG-01, SG-03, SG-04, SG-06, SG-07, SG-08, SG-09, SG-10, SG-11, SG-13, and SG-16). Water in the soil gas sample ports prevented sample collection at the remaining soil gas sample locations (SG-02, SG-05, SG-12, SG-14, and SG-15); and
        - Analysis of soil gas samples by method TO-15 for the project specific list of CVOCs.

- **April 2011**
    - Geoprobe® investigation activities were conducted to evaluate that nature and extent of aromatic petroleum hydrocarbon i.e., toluene, ethyl benzene and total xylenes in the vicinity of soil boring B-52 located near the southeast corner of the site. The investigation included:
        - Advancement of soil borings at ten on-site locations around soil boring B-52 to 12 feet below ground surface (ft-bgs) to evaluate site geology and depth to groundwater;
        - Collection of continuous soil samples at each soil boring location so that unsaturated soil could be screened with a PID equipped with a 10.6 eV lamp;
        - Collection of two soil samples at six soil boring locations for laboratory analysis (these six locations were located nearest the proposed trenched PRB);
        - Collection of one grab groundwater sample over a five-foot screened interval at each of the 10 boring locations; and
        - Analysis of 12 soil samples and 10 groundwater samples for benzene, toluene, ethylbenzene, and total xylenes (BTEX) compounds.
    - Completion of a soil gas resample event at sample location SG-01. The sample canister containing the sample collected in March 2011 was damaged in shipment and could not be analyzed. The sample was submitted to the laboratory of VOCs analysis by USEPA Method TO-15.

- **May 2011**
  - The second quarter 2011 water sample event was completed in May 2011, including:
    - Measurement of groundwater elevations at all monitoring well locations, and surface water elevations at two points along the River Raisin;
    - Collection of groundwater from 40 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all groundwater samples for VOCs, and analysis of a subset of groundwater samples for MNA parameters (ferrous iron, chloride, nitrate, and sulfate); and
    - Collection of a surface water sample, WL-01, from the wetland area downgradient of the site for VOCs analysis.
  - A permeable reactive barrier (PRB) was installed to mitigate the potential off-site groundwater volatilization to indoor air migration pathway by treating shallow CVOC-affected groundwater. Installation activities are documented in the *Construction Documentation Report – Permeable Reactive Barrier Downgradient of the Southern Source Area.*

- **June 2011**
  - Completion of the second quarter soil gas sample event, which included two mobilizations:
    - The initial second quarter 2011 soil gas sample event was conducted on in early June following heavy rain in late May. Samples were collected at 7 of the 16 soil gas sample points (SG-01, SG-04, SG-06, SG-07, SG-11, SG-13, and SG-16). Water in the soil gas sample ports prevented sample collection at the remaining soil gas sample locations (SG-02, SG-03, SG-05, SG-08, SG-09, SG-10, SG-12, SG-14, and SG-15);
    - Given the high percentage of samples with water in the sample point during the initial sample event. A resample event was conducted in late June, at soil gas sample locations where water prevented sample collection during the initial second quarter soil gas sample event. Soil gas samples were collected at SG-02, SG-03, SG-05, and SG-08. Water in the soil gas sample ports prevented sample collection at the remaining soil gas sample locations (SG-09, SG-10, SG-12, SG-14, and SG-15); and
    - Analysis of soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.

- **July 2011**
  - The third quarter 2011 water sample event was conducted, including:
    - Measurement of groundwater elevations at all monitoring well locations (including PRB-01s and PRB-02s), and surface water elevations at two points along the River Raisin;
    - Collection of groundwater from 39 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all groundwater samples for VOCs;
    - Collection of a surface water sample, WL-01, from the wetland area downgradient of the site for VOCs analysis; and
    - Note that MW-09s was excavated during PRB installation activities and is no longer included in the groundwater monitoring program.
- **August 2011**
  - The PRB performance monitoring network was installed and sampled as outlined in the Workplan Addendum to Install Additional PRB Performance Monitoring Wells, including:
    - Continuous soil sampling at each well/well nest location prior to well installation to evaluate depth to water and geology;
    - Installation of sixteen PRB monitoring wells (PRB-03s, PRB-04s, PRB-04d, PRB-05s, PRB-06s, PRB-07s, PRB-08s, PRB-08d, PRB-09s, PRB-10s, PRB-11s, PRB-12s, PRB-13s, PRB-14s, PRB-15s, and PRB-15d);
    - Completion of *in situ* hydraulic conductivity testing at the new PRB monitoring wells;
    - Measurement of groundwater elevations at all PRB monitoring well locations, including PRB-01s, PRB-02s, and the sixteen new monitoring wells;
    - Collection of groundwater samples at all 18 PRB monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations; and
    - Analysis of groundwater samples for VOCs and other PRB design parameters including chloride, sulfate, nitrate, calcium, iron, magnesium, manganese, and total organic carbon.

- **September 2011**
  - Completion of the third quarter 2011 soil gas sample event, which included:
    - Collection of a soil gas sample at 13 of the 16 soil gas sample points (SG-01, SG-02, SG-03, SG-04, SG-05, SG-06, SG-07, SG-08, SG-09, SG-10, SG-11, SG-13, and SG-16). Water in the soil gas sample ports prevented sample collection at the remaining soil gas sample locations (SG-12, SG-14, and SG-15); and
    - Analysis of soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
  - The Current Human Exposures Under Control Environmental Indicator Report was submitted to USEPA.

- **October 2011**
  - Completion of the installation and initial performance verification activities outlined in the *Workplan for the Installation of a Sub-Slab Depressurization/ Ventilation System: 704 Mohawk Street*, dated May 2011 and revised September 2011, including collection of soil gas sample from the system exhaust.
  - Completion of an initial crawl space sample event at four residential properties east of the site (610 Mohawk, 502 Mohawk, 505 South Maumee, and 507 South Maumee). Twenty-four hour samples were collected in 6-liter Summa® canisters for VOCs analysis by USEPA Method TO-15.
  - USEPA conducted a site visit to observed sub-slab depressurization/ventilation system installation and crawl space sampling activities.
  - The second quarter 2011 water sample event was conducted, including:
    - Measurement of groundwater elevations at all monitoring well locations, and surface water elevations at two points along the River Raisin;
    - Collection of groundwater from 39 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all groundwater samples for VOCs, and analysis of a subset of groundwater samples for MNA parameters (ferrous iron, chloride, nitrate, and sulfate); and
    - Collection of a surface water sample, WL-01, from the wetland area downgradient of the site for VOCs analysis.
  - Completion of the fourth quarter 2011 PRB performance groundwater sample event, which included:
    - Measurement of groundwater elevations at all 18 PRB monitoring well locations;

        - Collection of groundwater samples at all 18 PRB monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
        - Analysis of all 18 PRB groundwater samples for VOCs; and
        - Analysis of samples collected at shallow PRB monitoring locations downgradient of PRB Section 1 (PRB-01s, PRB-02s, PRB-04s, PRB-07s, and PRB-08s) for dissolved gasses (methane, ethane and ethylene).
    - Completion of the installation and initial performance verification activities outlined in the *Workplan for the Installation of a Sub-Slab Depressurization/ Ventilation System: S-Building at 100 East Patterson Street*, including collection of indoor air sample to verify system performance.
    - Installation of passive vents adjacent to the trenched portion of the PRB to help ensure that methane does not accumulate in the subsurface during the winter when the ground is frozen, as documented in the *Construction Documentation Report – Permeable Reactive Barrier Downgradient of the Southern Source Area*.

- **November 2011**
    - Completion of the fourth quarter 2011 soil gas sample event, which included:
        - Collection of a soil gas sample 15 of the 16 soil gas sample points. Water in the soil gas sample port prevented sample collection at the remaining soil gas sample location (SG-14); and
        - Analysis of soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
    - Measurement of methane concentrations at passive vent locations.
    - In accordance with the *Workplan for the Installation of a Sub-Slab Depressurization / Ventilation System: 704 Mohawk Street*, a performance verification sample event was conducted approximately 30-days after system installation.
    - Completion of a groundwater resample event at monitoring well MW-23 to confirm October 2011 VOC results.

- **December 2011**
    - Measurement of methane concentrations at passive vent locations.
    - A pilot study was conducted to determine system design parameters for an active methane control system.
    - Private wells located at 607 Mohawk Street, 611 Mohawk Street, 615 Mohawk Street, and 704 Mohawk Street were decommissioned.

- **January 2012**
  - The first quarter 2012 water sample event was conducted, including:
    - Measurement of groundwater elevations at all monitoring well locations and surface water elevations at two points along the River Raisin;
    - Collection of groundwater from 39 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all groundwater samples for VOCs; and
    - Collection of a surface water sample, WL-01, from the wetland area downgradient of the site for VOCs analysis.
  - Completion of the first quarter 2012 PRB performance groundwater sample event, which included:
    - Measurement of groundwater elevations at all 18 PRB monitoring well locations;
    - Collection of groundwater samples at all 18 PRB monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all 18 PRB groundwater samples for VOCs, iron, manganese, and sulfate; and
    - Analysis of samples collected at in-barrier, side gradient and downgradient PRB monitoring locations (all locations except PRB-05s and PRB-13s) for dissolved gasses and volatile fatty acids.
  - An active methane ventilation system was constructed at vent locations V-01, V-02, and V-03. While awaiting connection of the permanent power supply, a generator was used to power a single blower during business hours.
  - Completion of the first quarter 2012 soil gas sample event, which included:
    - Collection of a soil gas sample at 11 of the 16 soil gas sample points (SG-01, SG-02, SG-04, SG-06, SG-07, SG-08, SG-09, SG-10, SG-11, SG-13, and SG-16). Water in the soil gas sample ports prevented sample collection at the remaining soil gas sample locations (SG-03, SG-05, SG-12, SG-14, and SG-15); and
    - Analysis of soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
  - Measurement of methane concentrations and pressure at all vent locations.

- **February 2012**
  - A SSDV system inspection and indoor air sample event was conducted in accordance with the *Workplan for the Installation of a Sub-Slab Depressurization / Ventilation System: S-Building at 100 East Patterson Street*.
  - A SSDV system inspection was conducted in accordance with the *Workplan for the Installation of a Sub-Slab Depressurization/Ventilation System: 704 Mohawk Street*.
  - Permanent power was installed and the active methane ventilation system became fully functional.
  - Completion of a groundwater resample event at monitoring well PRB-09s in order to confirm January 2012 VOC sample results at that location.
  - Measurement of methane concentrations at all vent locations.
- **March 2012**
  - Measurement of methane concentrations at all vent locations.
  - A project meeting was conducted at USEPA Region V Headquarters to discuss environmental work and upcoming report obligations. Meeting was attended by Michelle Mullin, Bhooma Sundar, David Petrovski, Mario Mangino, Colleen Olsburg, Daniel Mazur, and Susan Perdomo of USEPA; Jason Smith of TPC; Graham Crockford, John Rice and Stacy Metz of TRC; and Douglas McClure of Conlin, McKenney and Philbrick, PC.
- **April 2012**
  - Field activities as outlined in the *Workplan to Conduct a Pilot study to Facilitate the Design and Installation of a Full-Scale Soil Vapor Extraction System* were completed, including:
    - The installation of four soil vapor extraction points (SVE-01 through SVE-04), including the collection of two soil samples at each location;
    - The installation of temporary subsurface vacuum monitoring points at 14 locations (TVP-01s/d through TVP-14s/d);
    - The installation of SVE system piping;
    - System connection to a temporary positive displacement blower (blower skid rented from Proact);
    - Completion of stepped-rate tests and a constant rate-test to determine radius of influence, piping loss and other full-scale SVE system design parameters; and

        - Collection of an exhaust sample from each on-site system (Pilot SVE system, S-Building SSDV system, and the methane ventilation system) to evaluate system air permit requirements.
    - Pilot SVE system construction documented in the Full-Scale Soil Vapor Extraction System Design and Installation Workplan.
    - The second quarter 2012 water sample event was conducted, including:
        - Measurement of groundwater elevations at all monitoring well locations and surface water elevations at two points along the River Raisin;
        - Collection of groundwater from 39 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
        - Analysis of all groundwater samples for VOCs, and analysis of a subset of groundwater samples for MNA parameters (ferrous iron, chloride, nitrate, and sulfate); and
        - Collection of surface water samples from the wetland area downgradient of the site (WL-01) and the seep near the former Blood Road bridge (SEEP) for VOCs analysis.
    - Completion of the second quarter 2012 PRB performance groundwater sample event, which included:
        - Measurement of groundwater elevations at all 18 PRB monitoring well locations;
        - Collection of groundwater samples at all 18 PRB monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
        - Analysis of all 18 PRB groundwater samples for VOCs, iron, manganese, and sulfate; and
        - Analysis of samples collected at in-barrier and shallow downgradient PRB Section 1 monitoring locations (PRB-01s, PRB-02s, PRB-04s, PRB-06s, PRB-07s, PRB-08s, and PRB-09s) for dissolved gasses and volatile fatty acids.

- **May 2012**
    - Because SVE system exhaust concentrations have the potential to drop quickly, a second exhaust sample was collected from Pilot SVE system to confirm April 2012 sample results for the evaluation of SVE system air permit requirements.
    - In accordance with the *Workplan for the Installation of a Sub-Slab Depressurization/ Ventilation System: 704 Mohawk Street*, a performance verification sample event was conducted approximately 180-days after system installation.

- Completion of a second crawl space sample event at four residential properties east of the site (610 Mohawk, 502 Mohawk, 505 South Maumee, and 507 South Maumee). Twenty-four hour samples were collected in 6-liter Summa® canisters for VOCs analysis by USEPA Method TO-15.

- **June 2012**
  - Field activities as outlined in the Full-Scale Soil Vapor Extraction System Design and Installation Workplan were completed, including:
    - The installation of three additional soil vapor extraction points (SVE-05 through SVE-07) and the associated SVE system piping;
    - System connection to the temporary positive displacement blower (blower skid rented from Proact);
    - Completion of stepped-rate tests and system balance; and
    - Note that Proact has been contracted to construct a permanent blower skid. A construction documentation report for the full-scale SVE will be prepared and submitted after the permanent blower is installed.
  - Measurement of methane concentrations and pressure at all PRB vent locations.
  - Additional soil gas investigation activities were conducted to further evaluate the potential for off-site vapor intrusion north and west of the site. Investigation activities included:
    - Advancement of soil borings at 8 locations to evaluate site geology and depth to groundwater;
    - Installation of 5 new soil gas monitoring points (SG-17, SG-18, SG-19, SG-20, and SG-21); and
    - Installation of 3 replacement soil gas monitoring points (SG-12R, SG-14R, and SG-15R) in the area northeast of the site.
  - Completion of the second quarter 2012 soil gas sample event, which included:
    - Sample collection at soil gas sample point locations installed in 2010 (SG-01 through SG-16), except for those locations where replacement sample points were installed in June 2012 (SG-12, SG-14, and SG-15);
    - Sample collection at all replacement soil gas sample point locations (SG-12R, SG-14R, and SG-15R);
    - Sample collection at new sample locations (SG-17 through SG-21);
    - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s); and

        - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
    - All remaining wells (8 total) within the area restricted by the groundwater use ordinance were decommissioned.

- **July 2012**
    - The third quarter 2012 water sample event was conducted, including:
        - Measurement of groundwater elevations at all monitoring well locations and surface water elevations at two points along the River Raisin;
        - Collection of groundwater from 40 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
        - Analysis of all groundwater samples for VOCs; and
        - Collection of surface water samples from the wetland area downgradient of the site (WL-01) and the seep near the former Blood Road bridge (SEEP) for VOCs analysis.
    - Completion of the third quarter 2012 PRB performance groundwater sample event, which included:
        - Measurement of groundwater elevations at all 18 PRB monitoring well locations;
        - Collection of groundwater samples at all 18 PRB monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
        - Analysis of all 18 PRB groundwater samples for VOCs, iron, manganese, and sulfate; and
        - Analysis of samples collected at in-barrier and shallow downgradient PRB Section 1 monitoring locations (PRB-01s, PRB-02s, PRB-04s, PRB-06s, PRB-07s, PRB-08s, and PRB-09s) for dissolved gasses.
    - Operation and maintenance of the P-Building SVE System, including collection of an exhaust sample.

- **August 2012**
    - Completion of investigation activities as outlined to the Workplan for Proposed Source Area Remedial Investigation Activities, which included:
        - The advancement of 6 soil borings (NS-18, NS-19, NS-20, SS-9, SS-10 and MW-35d/B-68) to evaluate site geology, depth to groundwater and depth to the clay confining unit;

    - Visual classification of soils to at least 1 foot below the top of the clay confining unit;
    - Collection of PID readings;
    - Collection of three soil samples at each source area boring location (NS-18, NS-19, NS-20, SS-9, and SS-10) for VOC and TOC analysis;
    - Installation of three temporary wells (at the water table, in the intermediate aquifer and immediately above the clay) at each source area boring location;
    - Installation of three temporary wells (one at the water table and two in the intermediate aquifer and immediately above the clay) and one permanent well at boring location MW-35d/B-68;
    - Development of all wells;
    - Collection of groundwater samples at all 19 well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all groundwater samples for VOCs, and source area groundwater samples for TOC; and
    - Gamma logging was conducted in the deep well at each location to support visual classification and evaluate aquifer homogeneity.
- Measurement of methane concentrations at all PRB vent locations.
- Operation and maintenance of the P-Building SVE System, including collection of a composite exhaust sample, as well as samples from each SVE header pipe (SVE Line 1 and SVE Line 2).
- In response to USEPA comments, one additional up gradient PRB monitoring well (PRB-16s) was installed. The well was installed and sampled, in accordance with the methods described in the Workplan Addendum.
    - Continuous soil sampling was conducted prior to well installation to evaluate depth to water and geology;
    - The well was constructed to the target depth (screened 5 to 10 ft-bgs) using direct push technology; and
    - Collection of an initial groundwater sample for VOCs, iron, manganese and sulfate analysis.

- **September 2012**
  - Operation and maintenance of the P-Building SVE System.
  - The Remedial Investigation and Groundwater Environmental Indicator Report was submitted to USEPA.
- **October 2012**
  - Completion of the third quarter 2012 soil gas sample event (rain in September resulted in project delay until the first week in October), which included:
    - Sample collection at soil gas sample point locations installed in 2010 and 2012 (SG-01 through SG-21), except for those locations where replacement sample points were installed in June 2012 (SG-12, SG-14, and SG-15);
    - Sample collection at replacement soil gas sample point locations (SG-12R and SG-15R);
    - A sample was attempted at soil gas sample point SG-14R. However due to low permeability soils, even after several hours of sample collection, an insufficient sample volume had been collected for analysis;
    - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s); and
    - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
  - The fourth quarter 2012 water sample event was conducted, including:
    - Measurement of groundwater elevations at all monitoring well locations and surface water elevations at two points along the River Raisin;
    - Collection of groundwater from 41 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Collection of groundwater from 1 temporary monitoring well location [B-68 (20.7-22.7')] and measurement of field parameters at this location;
    - Analysis of all groundwater samples for VOCs, and analysis of a subset of groundwater samples for MNA parameters (ferrous iron, chloride, nitrate, and sulfate); and
    - Collection of surface water samples from the wetland area downgradient of the site (WL-01) and the seep near the former Blood Road bridge (SEEP) for VOCs analysis.

- Completion of the fourth quarter 2012 PRB performance groundwater sample event, which included:
    - Measurement of groundwater elevations at all 19 PRB monitoring well locations;
    - Collection of groundwater samples at all 19 PRB monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all 19 PRB groundwater samples for VOCs, total organic carbon, calcium, iron, manganese, magnesium, nitrate and sulfate; and
    - Analysis of samples collected at in-barrier and shallow downgradient PRB Section 1 monitoring locations (PRB-01s, PRB-02s, PRB-04s, PRB-06s, PRB-07s, PRB-08s, and PRB-09s) for dissolved gasses.
- Operation and maintenance of the P-Building SVE System, including installation of the permanent blower skid and carbon treatment system.
- A project meeting was conducted at USEPA Region V Headquarters to discuss environmental work and USEPA comments on the Remedial Investigation and Groundwater Environmental Indicator Report. Meeting was attended by Joseph Kelly, Bhooma Sundar, David Petrovski, Mario Mangino, Colleen Olsburg, and Daniel Mazur, of USEPA; Graham Crockford and Stacy Metz of TRC; and Jason Smith of TPC.

- **November 2012**
    - In accordance with the *Workplan for the Installation of a Sub-Slab Depressurization / Ventilation System: 704 Mohawk Street*, a performance verification sample event was conducted approximately one year after system installation.
    - Completion of a third (final) crawl space sample event at four residential properties east of the site (610 Mohawk, 502 Mohawk, 505 South Maumee, and 507 South Maumee). Twenty-four hour samples were collected in 6-liter Summa® canisters for VOCs analysis by USEPA Method TO-15.
    - Weekly operation and maintenance of the P-Building SVE System, including:
        - Collection of SVE system influent and effluent samples approximately 48-hours after system start-up;
        - Installation of the permanent blower skid and carbon treatment system;
        - Collection of SVE system influent and effluent samples approximately 9-days after system start-up;

        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine appropriate timeline for carbon change out; and
        - Installation of buck booster transformers and connection of the SVE skid to the permanent power supply.
    - Completion of the fourth quarter 2012 soil gas sample event, which included:
        - Sample collection at soil gas sample point locations installed in 2010 and 2012 (SG-01 through SG-21), except for two locations where replacement sample points were installed in June 2012 (SG-14 and SG-15);
        - Sample collection at one replacement sample point location (SG-15R);
        - A sample was attempted at replacement soil gas sample point SG-12R. However water in the sample port prevented sample collection. Sample collection was subsequently attempted (and succeeded) at soil gas sample point SG-12;
        - A sample was attempted at soil gas sample point SG-14R. However due to low permeability soils, even after several hours of sample collection, an insufficient sample volume had been collected for analysis;
        - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s); and
        - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
    - Measurement of methane concentrations and pressure at all PRB vent locations.

- **December 2012**
    - Preparation and submittal of a technical memorandum summarizing action items agreed to during the October 2012 project meeting.
    - Operation and maintenance of the P-Building SVE System, including:
        - Collection of SVE system samples (influent into each carbon vessel) immediately prior to carbon change out to evaluate carbon adsorption capacity;
        - Carbon change out (removal and replacement of carbon in carbon treatment system) in both lead and lag treatment vessels; and
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine appropriate timeline for future carbon change out events.

- Collection of an ambient air sample downwind of the P-Building SVE System exhaust.
- Preparation and submittal of a technical memorandum summarizing proposed changes to the groundwater monitoring program.

- **January 2013**
  - Operation and maintenance of the P-Building SVE System, including:
    - Collection of SVE system samples to evaluate carbon adsorption capacity and usage;
    - Carbon change out (removal and replacement of carbon in carbon treatment system) in the lead treatment vessel. Note that following change out, system plumbing was adjusted such that the lag vessel became the lead vessel and the vessel with the new carbon became the lag vessel; and
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine appropriate timeline for future carbon change out events.
  - Preparation and submittal of a Supplemental Remedial Investigation Workplan.
  - Measurement of vacuum pressure and methane concentrations at all PRB vent locations.

- **February 2013**
  - Operation and maintenance of the P-Building SVE System, including:
    - Completion of piping repairs at SVE-6;
    - Installation of protective bollards at SVE-6 and SVE-7;
    - Carbon change out (removal and replacement of carbon in carbon treatment system) in the lead treatment vessel. Note that following change out, system plumbing was adjusted such that the lag vessel became the lead vessel and the vessel with the new carbon became the lag vessel;
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine appropriate timeline for future carbon change out events; and
    - Installation of an electrical conduit to house the power line from the main power drop to the electrical box on the SVE skid.
  - Preparation and Submittal of a Revised Supplemental Remedial Investigation Workplan.
  - Measurement of vacuum pressure and methane concentrations at all PRB vent locations.

- **March 2013**
  - The first quarter 2013 water sample event was conducted, including:
    - Collection of groundwater from 3 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at those locations; and
    - Analysis of all groundwater samples for VOCs.
  - Measurement of vacuum pressure and methane concentrations at all PRB vent locations.
  - Completion of the first quarter 2013 PRB performance groundwater sample event, which included:
    - Measurement of groundwater elevations at 18 PRB monitoring well locations;
    - Collection of groundwater samples at all 19 PRB monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all 19 PRB groundwater samples for VOCs; and
    - Analysis of samples collected at in-barrier and shallow downgradient PRB Section 1 monitoring locations (PRB-01s, PRB-02s, PRB-04s, PRB-06s, PRB-07s, PRB-08s and PRB-09s) for dissolved gasses.
  - Operation and maintenance of the P-Building SVE System, including:
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine appropriate timeline for future carbon change out events; and
    - Carbon change out (removal and replacement of carbon in carbon treatment system) in the lead treatment vessel. Note that following carbon change out, system plumbing was adjusted such that the lag vessel became the lead vessel and the vessel with the new carbon became the lag vessel.
  - Completion of the first quarter 2013 soil gas sample event, which included:
    - Sample collection at soil gas sample point locations installed in 2010 and 2012 (SG-01 through SG-21), except for three locations where replacement sample points were installed in June 2012 (SG-12, SG-14, and SG-15);
    - Sample collection at one replacement sample point location (SG-15R);
    - A sample was attempted at replacement soil gas sample point SG-12R, and subsequently at soil gas sample point SG-12. Water in the sample port prevented sample collection at both sample points. No sample was collected;

        - A sample was attempted at soil gas sample point SG-14R. However due to low permeability soils, even after several hours of sample collection, an insufficient sample volume had been collected for analysis;
        - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s); and
        - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
    - In accordance with the *Workplan for the Installation of a Sub-Slab Depressurization / Ventilation System: 704 Mohawk Street*, a quarterly system inspection was conducted.
    - Completion of investigation activities in general accordance with the *Supplemental Groundwater Investigation Workplan for the Former Tecumseh Products Company Site*, which included:
        - The advancement of 8 soil borings (B-69, MW-04i, MW-08d, MW-10, MW-36, MW-37, MW-38, MW-39, MW-40) to evaluate site geology, depth to groundwater, and depth to the clay confining unit;
        - Visual classification of soils to at least 2 feet below the top of the clay confining unit;
        - Field screening of unsaturated soils with a PID;
        - Field screening of saturated granular soils with the Color-Tec Method;
        - Installation of five permanent shallow wells at the water table (MW-36s, MW-37s, MW-38s, MW-39s, and MW-40s);
        - Installation of five permanent deep wells just above the top of the clay confining unit (MW-08d, MW-36d, MW-38d, MW-39d, and MW-40d);
        - Installation of one permanent intermediate depth well in the zone of highest contamination as indicated by field screening (MW-04i);
        - Conversion of one temporary well [B-68 (20.7-22.7')] which was installed in August 2012 to a permanent well (MW-35i);
        - Development of all new wells; and
        - Collection of a waste characterization sample, and analysis of that sample for pH, flashpoint, TCLP VOCs, TCLP SVOCs, and TCLP metals to support disposal of soil cuttings.

- **April 2013**
    - Met with USEPA on site to provide a facility tour and for a project discussion.
    - Completion of the supplemental groundwater sample event, which included:

        - Measurement of groundwater elevations at compliance monitoring well locations;
        - Collection of groundwater samples at all 12 new monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at those locations; and
        - Analysis of all 12 groundwater samples for VOCs.
    - Completion of a re-sample event at soil gas sample point SG-03 due to high levels of tracer in the sample. Re-sample event confirms problem with sample point integrity.

- **May 2013**
    - Plan of Action of Ongoing Environmental Work inside the facility building was submitted by TRC and approved by the City of Tecumseh.
    - Demolition permit issued by the City of Tecumseh.
    - Phase I demolition began on May 7, 2013.
    - TRC met with the demolition contractor (Site Prep) to locate interior monitoring locations and discuss safe access to monitoring points near the demolition area.
    - Soil gas sample point SG-03 abandoned and replaced.
    - Soil gas sample points SG-14 and SG-15 abandoned.
    - Soil gas sample point repairs completed at SG-02 and SG-17.
    - Monitoring well MW-14s abandoned.
    - Operation and maintenance of the P-Building SVE System, including:
        - Quarterly system inspection including flow and pressure measurements at each extraction well;
        - Collection of SVE system samples to evaluate carbon adsorption capacity and usage; and
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine appropriate timeline for future carbon change out events.
    - Installation of well covers at interior monitoring and investigation locations (MW-32d, MW-34d, NS-18, NS-19, NS-20, SS-09, and SS-10).
    - Completion of the second quarter 2013 soil gas sample event, which included:
        - Sample collection at soil gas sample point locations installed in 2010, 2012, and 2013 (SG-01 through SG-21), except for one location where replacement a sample point was installed in June 2012 (SG-12);

        - A sample was attempted at replacement soil gas sample point SG-12R, and subsequently at soil gas sample point SG-12. Water in the sample port prevented sample collection at both sample points. No sample was collected;
        - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s); and
        - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
    - Measurement of vacuum pressure and methane concentrations at all PRB vent locations.
    - In accordance with the *Workplan for the Installation of a Sub-Slab Depressurization / Ventilation System: 704 Mohawk Street*, a quarterly system inspection was conducted.

- **May-June 2013**
    - Completion of second quarter groundwater sampling activities which included:
        - Collection of groundwater samples at 43 monitoring locations, including all 5 interior monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at those locations;
        - Collection of surface water samples from the wetland area downgradient of the site (WL-01) and the seep near the former Blood Road bridge (SEEP); and
        - Analysis of the collected groundwater surface water samples for VOCs.

- **June 2013**
    - Completion of the second quarter 2013 PRB performance groundwater sample event, which included:
        - Measurement of groundwater elevations at all 19 PRB monitoring well locations;
        - Collection of groundwater samples at all 19 PRB monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
        - Analysis of all 19 PRB groundwater samples for VOCs; and
        - Analysis of samples collected at in-barrier and shallow downgradient PRB Section 1 monitoring locations (PRB-01s, PRB-02s, PRB-04s, PRB-06s, PRB-07s, PRB-08s, and PRB-09s) for dissolved gasses.

- Due to data quality issues, a second quarter 2013 soil gas re-sample event was conducted, which included:
    - Sample collection at soil gas sample point locations SG-01, SG-10, SG-16, and SG-21; and
    - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
- Phase I demolition completed and inspected by City on June 24, 2013.
- TRC met with the demolition contractor (Site Prep) to discuss removal/relocation of demolition debris and safe access for the passive soil gas survey.

- **July 2013**
    - A passive soil gas (PSG) survey was conducted by TRC and Beacon Environmental Services, Inc. (Beacon) to help identify point sources, if any within the southernmost portion of the building. The PSG survey included:
        - Installation a grid of 142 PSG samplers spaced approximately 40 feet apart throughout the southern building area. PSG samplers were installed in holes, having a total depth of 30 inches, in the sub-slab;
        - Following installation, sample holes were sealed with a temporary aluminum foil plug and concrete patch to limit the influence of ambient air on sample results; and
        - Samplers, which contain an adsorbent medium to collect VOCs from the soil gas, were removed after the designated exposure period (approximately 1 week) and submitted to Beacon for VOCs analysis by USEPA Method 8260C.
    - Operation and maintenance of the P-Building SVE System, including:
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine appropriate timeline for future carbon change out events.
- **August 2013**
    - Completion of the third quarter 2013 soil gas sample event, which included:
        - Sample collection at soil gas sample point locations installed in 2010, 2012, and 2013 (SG-01 through SG-21);
        - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s); and
        - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.

- Completion of the third quarter 2013 PRB performance groundwater sample event, which included:
    - Measurement of groundwater elevations at all 19 PRB monitoring well locations;
    - Collection of groundwater samples at all 19 PRB monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all 19 PRB groundwater samples for VOCs; and
    - Analysis of samples collected at in-barrier and shallow downgradient PRB Section 1 monitoring locations (PRB-01s, PRB-02s, PRB-04s, PRB-06s, PRB-07s, PRB-08s, and PRB-09s) for dissolved gasses.
- Completion of the third quarter groundwater sample event, which included:
    - Collection of groundwater samples at 17 monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at those locations; and
    - Analysis of all 17 groundwater samples for VOCs.
- Measurement of vacuum pressure and methane concentrations at all PRB vent locations and two downgradient soil gas sample points (SG-02 and SG-03R).
- In accordance with the *Workplan for the Installation of a Sub-Slab Depressurization / Ventilation System: 704 Mohawk Street*, a quarterly system inspection was conducted:
    - During the system inspection, the technician noted that the U-tube manometer was not working properly; and
    - A replacement U-tube manometer was purchased and installed as soon as possible.
- Operation and maintenance of the P-Building SVE System, including:
    - Quarterly system inspection including flow and pressure measurements at each extraction well;
    - Collection of SVE system samples to evaluate carbon adsorption capacity and usage;
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine appropriate timeline for future carbon change out events; and
    - Variable frequency drive (VFD) adjustments reduce energy costs while maintaining system effectiveness.

- **September 2013**
  - Operation and maintenance of the P-Building SVE System, including:
    - Carbon change out (removal and replacement of carbon in carbon treatment system) in the lead and lag treatment vessel. Note that following carbon change out, system plumbing was adjusted such that the lag vessel became the lead vessel and the vessel with the new carbon became the lag vessel.
  - A passive soil gas (PSG) survey was conducted by TRC to help identify point sources, if any within the central portion of the building and to develop a correlation between north and south PSG survey data. The PSG survey included:
    - Installation a grid of 49 PSG samplers spaced approximately 40 feet apart throughout the central portion of the building, including 5 duplicate locations from the northern PSG and 5 duplicate locations from the southern PSG survey. PSG samplers were installed in holes, having a total depth of 30 inches, in the sub-slab;
    - Following installation, sample holes were sealed with a temporary aluminum foil plug and concrete patch to limit the influence of ambient air on sample results; and
    - Samplers, which contain an adsorbent medium to collect VOCs from the soil gas, were removed after the designated exposure period (approximately 1 week) and submitted to Beacon for VOCs analysis by USEPA Method 8260C.
  - The S*upplement to the Current Human Exposures Under Control Environmental Indicator Report* was submitted to USEPA.
- **November 2013**
  - The fourth quarter 2013 water sample event was conducted, including:
    - Measurement of groundwater elevations at monitoring well locations and surface water elevations at two points along the River Raisin;
    - Collection of groundwater from 51 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Collection of a surface water sample from the seep near the former Blood Road bridge (SEEP) for VOCs analysis; and
    - Analysis of samples for VOCs.

    NOTE: Samples were not collected at three monitoring wells (MW-17s, MW-22, and MW-31) and one surface water sample location (WL-01) because the property owner would not allow access.

- Completion of the fourth quarter 2013 PRB performance groundwater sample event, which included:
    - Measurement of groundwater elevations at all 19 PRB monitoring well locations;
    - Collection of groundwater samples at all 19 PRB monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Analysis of all 19 PRB groundwater samples for VOCs; and
    - Analysis of samples collected at in-barrier and shallow downgradient PRB Section 1 monitoring locations (PRB-01s, PRB-02s, PRB-04s, PRB-06s, PRB-07s, PRB-08s, and PRB-09s) for dissolved gasses.
- Completion of the fourth quarter 2013 soil gas sample event, which included:
    - Sample collection at soil gas sample point locations installed in 2010, 2012, and 2013 (SG-01 through SG-21);
    - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s); and
    - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
- Measurement of vacuum pressure and methane concentrations at all PRB vent locations and two downgradient soil gas sample points (SG-02 and SG-03R).
- Due to lack of access to the interior of the house, a modified a quarterly SSDV system inspection was conducted at 704 Mohawk Street. No problems were noted.
- A SSDV system inspection was conducted for S-Building located at 100 East Patterson Street. No problems were noted.
- Operation and maintenance of the P-Building SVE System, including:
    - Quarterly system inspection including flow and pressure measurements at each extraction well;
    - Collection of SVE system samples to evaluate carbon adsorption capacity and usage; and
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine appropriate timeline for future carbon change out events.

- **December 2013**
    - Field activities as outlined in the *Workplan to Install a Perimeter Soil Vapor Extraction System* were conducted, including:

        - The installation of ten soil vapor extraction points (SVE-S01 through SVE-S10);
        - The installation of two nested subsurface vacuum monitoring points at 8 locations (TVP-S01s/d through TVP-S08s/d);
        - The installation of a single subsurface vacuum monitoring point at 10 locations (TVP-S09s through TVP-S18s);
        - The installation of SVE system piping; and
        - Installation of a subsurface electrical conduit to convey power from the power drop location to the anticipated SVE blower enclosure location.
    - Operation and maintenance of the SVE system, including:
        - Carbon change out (removal and replacement of carbon in carbon treatment system) in the lead vessel. Note that following carbon change out, system plumbing was adjusted such that the lag vessel became the lead vessel and the vessel with the new carbon became the lag vessel.

- **January 2014**
    - Measurement of vacuum pressure and methane concentrations at all PRB vent locations. Ice and snow in excess of 24 inches along the Maumee Street right-of-way prevented measurement at soil gas sample points (SG-02 and SG-03R).
    - TRC was notified of an alarm condition on the 704 Mohawk SSDV system by the home owner on January 27, 2014. A system inspection was conducted the next day. The fan was operational, but was not generating negative pressure. The most likely culprit was determined to be ice/snow blockage at the system exhaust. Repairs were scheduled and completed as soon as feasible, contingent on receipt of a replacement parts.
    - Operation and maintenance of the P-Building SVE System, including:
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine appropriate timeline for future carbon change out events.

- **February 2014**
    - SSDV system repairs were completed at the house located at 704 Mohawk Street. Repairs including replacement of exhaust piping which had been blocked with snow/ice and installation of a new exhaust fan. Following system repairs, the first quarter system inspection was conducted in accordance with the *Workplan for the Installation of a Sub-Slab Depressurization / Ventilation System: 704 Mohawk Street*.
    - Measurement of vacuum pressure and methane concentrations at all PRB vent locations. Ice and snow in excess of 24 inches along the Maumee Street right-of-way prevented measurement at soil gas sample points (SG-02 and SG-03R).

- **March 2014**
  - The DRAFT Preliminary Scope of Work to Address the USEPA Comment Letter Dated January 31, 2014 Regarding the Human Exposure Environmental Indicator Report was prepared and submitted to USEPA for review and comment on March 3, 2014.
  - Field activities as outlined in the *Workplan to Install a Perimeter Soil Vapor Extraction System* were conducted, including:
    - Completion of the power drop by the electrical company and subsequent connection to the on-site electrical system;
    - Installation of a temporary rental blower unit;
    - Installation of the carbon treatment system; and
    - System start-up and balance.
  - Operation and maintenance of the Perimeter SVE system, including:
    - Weekly maintenance of the rental blower;
    - Field measurement of the trichloroethene concentration at the blower exhaust; and
    - Collection of blower exhaust samples (no carbon treatment) for VOCs analysis to monitor VOC loading in the treatment system. Samples were collected approximately 1 day, 1 week, and 3 weeks after system start-up.
  - Operation and maintenance of the P-Building SVE system, including:
    - Quarterly system inspection including flow and pressure measurements at each extraction well;
    - Collection of SVE system samples for VOCs analysis to evaluate carbon adsorption capacity and usage;
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events; and
    - Variable frequency drive (VFD) adjustments from 84-percent to 100-percent to increase system capture.
  - Measurement of vacuum pressure and methane concentrations at all PRB vent locations and the two downgradient soil gas sample points (SG-02 and SG-03R).

- Substantial completion of the first quarter 2014 soil gas sample event, which included:
    - Sample collection at soil gas sample point locations installed in 2010, 2012, and 2013 (SG-01 through SG-21) except at four locations: SG-08, SG-09, SG-14R and SG-21.
        - A sample was attempted at soil gas sample point SG-14R. However due to low permeability soils, even after several hours of sample collection, an insufficient sample volume had been collected for analysis; and
        - Soil gas sample points SG-08, SG-09 and SG-21 were not sampled because they could not be located/accessed due to persistent snow and ice cover.
    - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s); and
    - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
- Completion of the first quarter groundwater sample event, which included:
    - Collection of groundwater samples at 19 monitoring well locations, and measurement of field parameters (pH, conductivity, turbidity, temperature, dissolved oxygen, and redox potential) at those locations;
    - Collection of a surface water sample from sample location WL-01 for VOCs analysis; and
    - Analysis of all samples for VOCs.

  NOTE: In addition to regular quarterly monitoring a sample was collected at three locations which could not be access during the fourth quarter sample event (MW-17s, MW-22, and WL-01) and one temporary well location (NS-18I). A sample was inadvertently not collected at MW-38s.
- On March 27, 2014 the Scope of Work to Accommodate the USEPA Comment Letter Dated January 31, 2014 Regarding the Human Exposure Environmental Indicator Report was prepared and submitted to USEPA. This document reflected feedback from USEPA provided on March 11, 2013 to the DRAFT Scope of Work.

- **April 2014**
    - Operation and maintenance of the P-Building SVE system, including:
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events;

    - Completion of minor system repairs; and
    - Carbon change out (removal and replacement of carbon in carbon treatment system) in the lead vessel. Note that following carbon change out, system plumbing was adjusted such that the lag vessel became the lead vessel and the vessel with the new carbon became the lag vessel.
- Completion of a supplemental soil gas sample event, which included:
    - Sample collection at SG-14R where water in the sample port prevented sample collection during the regular first quarter 2014 sample event;
    - Sample collection at soil gas sample point locations which could not be sampled during the regular first quarter 2014 sample event due to excessive snow cover: SG-08, SG-09 and SG-21;
    - Sample collection at soil gas sample points for which the preliminary first quarter 2014 laboratory data indicated a significant leak during sample collection: SG-02 and SG-12R.; and
    - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
- A passive soil gas (PSG) survey was conducted by TRC to evaluate areas identified as locations with potential point sources by USEPA. The PSG survey included:
    - Installation a grid of 252 PSG samplers spaced approximately 40 feet apart throughout the former engineering area, drum storage areas, tank area, areas adjacent to railroad spurs where loading and unloading may have occurred and the area east/southeast of the southern portion of the building where a number of outbuildings and two hazardous waste storage areas were located;
    - PSG samplers were installed in holes, having a total depth of 30 inches, in the sub-slab;
    - Following installation, sample holes were sealed with a temporary aluminum foil plug and patched with material similar to the adjacent surfacing to limit the influence of ambient air on sample results; and
    - Samplers, which contain an adsorbent medium to collect VOCs from the soil gas, were removed after the designated exposure period (approximately 1 week) and submitted to Beacon for VOCs analysis by USEPA Method 8260C.
- Repair of the sample port at PRB vent locations V-02.
- Field activities as outlined in the *Workplan to Install a Perimeter Soil Vapor Extraction System* were conducted, including:

        - Installation of surface casings around well vaults and instrument vaults; and
        - Completion of site grading and restoration.
    - Operation and maintenance of the Perimeter SVE system, including
        - Weekly maintenance of the rental blower; and
        - Field measurement of the trichloroethene concentration at the blower exhaust.

- **May 2014**
    - Operation and maintenance of the P-Building SVE system, including
        - Quarterly system inspection including flow and pressure measurements at each extraction well;
        - Collection of P-Building SVE System samples for VOCs analysis to evaluate carbon adsorption capacity and usage; and
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events.
    - At the request of the property owner, the quarterly SSDV system inspection was conducted at 704 Mohawk Street from the exterior of the house only. No problems were noted.
    - A SSDV system inspection was conducted for S-Building located at 100 East Patterson Street. The system is not operational because the power is off in the building. There is no longer a building occupant so operation of the system is not needed at this time.
    - Field activities as outlined in the *Workplan to Install a Perimeter Soil Vapor Extraction System* were conducted, including:
        - Stepped-rate tests at individual wells; and
        - System balance.
    - Operation and maintenance of the Perimeter SVE system, including:
        - Weekly maintenance of the rental blower;
        - Field measurement of the trichloroethene concentration at the blower exhaust; and
        - Collection of a blower exhaust sample (no carbon treatment) for VOCs analysis to monitor VOC loading in the treatment system. Sample was collected approximately 8 weeks after system start-up.

- Measurement of vacuum pressure and methane concentrations at all PRB vent locations. Water in the sample points prevented measurement at the two downgradient soil gas sample points (SG-02 and SG-03R).
- The second quarter 2014 water sample event was conducted, including:
    - Measurement of groundwater elevations at monitoring well locations. Note: measurement of surface water elevations at the two points along the River Raisin was inadvertently not completed;
    - Collection of groundwater from 43 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Collection of groundwater from 13 temporary monitoring locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Collection of surface water samples from the wetland area downgradient of the site (WL-01) and the seep near the former Blood Road bridge (SEEP); and
    - Analysis of samples for VOCs.
- Completion of the second quarter 2014 soil gas sample event, which included:
    - Sample collection at soil gas sample point locations installed in 2010, 2012, and 2013 (SG-01 through SG-21);
    - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s); and
    - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
- A project meeting was conducted at USEPA Region V Headquarters to discuss upcoming field activities outlined in the SOW. Meeting was attended by Joseph Kelly, Bhooma Sundar, David Petrovski, Mario Mangino, Michael Beedle, and Susan Perdomo of USEPA; Jason Smith of TPC; Graham Crockford and Stacy Metz of TRC; and Douglas McClure of Conlin, McKenney and Philbrick, PC.

- **May-June 2014**
    - Completion of the second quarter 2014 PRB performance groundwater sample event, which included:
        - Measurement of groundwater elevations at all 19 PRB monitoring well locations;

        - Collection of groundwater samples at all 19 PRB monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
        - Analysis of all 19 PRB groundwater samples for VOCs; and
        - Analysis of samples collected at in-barrier and shallow downgradient PRB Section 1 monitoring locations (PRB-01s, PRB-02s, PRB-04s, PRB-06s, PRB-07s, PRB-08s, and PRB-09s) for dissolved gasses.

- **June 2014**
    - Operation and maintenance of the P-Building SVE system, including:
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events.
    - Operation and maintenance of the Perimeter SVE system, including:
        - Weekly maintenance of the rental blower; and
        - Field measurement of the trichloroethene concentration at the blower exhaust.

- **June-July 2014**
    - TPC initiated communications with owners of 9 parcels located north of the site regarding the potential for installation of a sub-slab system.
    - Completion of membrane interface probe (MIP) investigation to support remedial design efforts, which included:
        - Completion of 68 MIP borings to the underlying clay confining unit;
        - Calibration was completed with a 1,000 ug/L solution of TCE (or PCE in the case of MIP-01 and MIP-02) before and after each boring;
        - At each boring, data were collected at 0.05-foot intervals;
        - The detector array collected electrical conductivity, ECD, FID and PID readings at each location;
        - At select locations (34 total) MIHPT was completed to evaluate hydraulic conductivity and more accurately assess site geology;
        - Completion of two confirmation sample borings at MIP-01 and MIP-03 to help correlate geology and soil/groundwater concentrations and with MIP response; at each confirmation boring location the following was completed:
            - Visual classification of soils to at least 2 feet below the top of the clay confining unit;

    - Field screening of unsaturated soils with a PID;
    - Collection of soil samples from depths with ECD, FID and/or PID peaks observed in the MIP log for laboratory analysis;
    - Installation of temporary wells having a 3-foot screened interval throughout the water column (8 total at each boring location);
    - Temporary wells were developed prior to sampling by purging until turbidity had stabilized; and
    - Samples were collected at each temporary well location using low-flow technique and analyzed for total VOCs to fully characterize the vertical concentration profile of the saturated unit.

- **July 2014**
  - Operation and maintenance of the P-Building SVE system, including:
    - Quarterly system inspection including flow and pressure measurements at each extraction well;
    - Collection of P-Building SVE System samples (prior to carbon treatment, between carbon treatment vessels and at the system exhaust) for VOCs analysis to evaluate carbon adsorption capacity and usage;
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events; and
    - Piping repairs at extraction well SVE-01.
  - At the request of the property owner, the quarterly SSDV system inspection was conducted at 704 Mohawk Street from the exterior of the house only. No problems were noted.
  - Field activities as outlined in the *Workplan to Install a Perimeter Soil Vapor Extraction System* were conducted, including:
    - Installation and start-up of the permanent blower enclosure;
    - System-wide stepped-rate tests; and
    - System balance.
  - Operation and maintenance of the Perimeter SVE system, including:
    - System inspections approximately 1 week and 3 weeks after start-up and system balance to evaluate flow and pressure at each extraction well and pressure monitoring points;

        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events; and
        - Collection of a blower exhaust sample (no carbon treatment) for VOCs analysis to monitor VOC loading in the treatment system. Samples were collected approximately 1 week and 3 weeks after system balance.
    - Measurement of vacuum pressure and methane concentrations at all PRB vent locations and at the two downgradient soil gas sample points (SG-02 and SG-03R).
    - The third quarter 2014 water sample event was conducted, including:
        - Collection of groundwater from 18 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
        - Collection of groundwater from 13 temporary monitoring locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations; and
        - Analysis of samples for VOCs.
    - Completion of the third quarter 2014 soil gas sample event, which included:
        - Sample collection at soil gas sample point locations installed in 2010, 2012, and 2013 (SG-01 through SG-21);
        - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s); and
        - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
    - Completion of an indoor air sample event at five residential properties north of the site (410 Ottawa, 217 E Cummins, 219 E Cummins, 223 E Cummins and 227 E Cummins). Twenty-four hour samples were collected in 6-liter Summa® canisters for VOCs analysis by USEPA Method TO-15.

- **July-August 2014**
    - Completion of a SSDV system installations at five residential properties north of the site (408 Ottawa, 219 E Cummins, 221 E Cummins, 229 E Cummins, and 231 E Cummins) as documented in letter reports submitted in December 2014 following final communication tests to verify system performance.

- **August 2014**
  - Operation and maintenance of the P-Building SVE system, including:
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events.
  - Operation and maintenance of the Perimeter SVE system, including:
    - Restarting the system after a local power failure;
    - A system inspection approximately 7 weeks after start-up to evaluate flow and pressure at each extraction well and pressure monitoring points;
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events; and
    - Collection of three Perimeter SVE System samples (prior to carbon treatment, between carbon treatment vessels and at the system exhaust) for VOCs analysis to evaluate carbon adsorption capacity and usage.
- **September 2014**
  - Operation and maintenance of the P-Building SVE system, including:
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events; and
    - Small trees and bushes growing between the building and blower enclosure were trimmed to help ensure good air flow through the system ventilation fan.
  - Operation and maintenance of the Perimeter SVE system, including:
    - Completion of a local power failure simulation and automatic restart;
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events;
    - Carbon change out (removal and replacement of carbon in carbon treatment system) in the lead and lag treatment vessel. Note that following carbon change out, system plumbing was adjusted such that the lag vessel became the lead vessel and the vessel with the new carbon became the lag vessel; and
    - Installation of a condensate drain line from the carbon vessels to the knock out tank to manage condensate accumulating in the carbon treatment system.

- Completion of a soil gas re-sample event, which included:
    - Sample collection at SG-03R where sample results from the July 2014 event were inconsistent with those observed previously;
    - Sample collection at soil gas sample point SG-02 as a control to help assess temporal variability between the July and September sample events; and
    - Analysis of soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
- Collection of a waste characterization sample from MIP soil cuttings, and analysis of that sample for pH, flashpoint, TCLP VOCs, TCLP SVOCs, and TCLP metals to support disposal of soil cuttings.
- The site owner signed a purchase agreement with a potential buyer. Purchase agreement requires that demolition activities are discontinued.
- An estimate of total CVOC removal via the SVE systems provided at the request of USEPA.

- **September-October 2014**
    - Installation of soil gas sample points on the property location at 805 S. Maumee Street to further evaluate the potential for vapor intrusion. Installation activities included:
        - Advancement of soil borings at 4 locations to evaluate site geology and depth to groundwater;
        - Installation of a soil gas monitoring points at each of the four corners of the main building (SG-22, SG-23, SG-24,, and SG-25);
        - Collection of an initial round of soil gas samples at those locations;
        - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs; and
        - Report preparation and submittal and in-person meeting to summarize and document installation and initial sample results.

- **October 2014**
    - Operation and maintenance of the Perimeter SVE system, including:
        - Quarterly system inspection including flow and pressure measurements at each extraction well;
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events;

        - Collection of three Perimeter SVE System samples (prior to carbon treatment, between carbon treatment vessels and at the system exhaust) for VOCs analysis to evaluate carbon adsorption capacity and usage;
        - Removal of condensate with had accumulated in the knock-out tank; and
        - The heat exchanger was turned off to improve system performance during cold weather.
    - TRC presents 3D-visualization and MIP results during a conference with EPA and TPC.

- **November 2014**
    - Operation and maintenance of the P-Building SVE system, including:
        - Quarterly system inspection including flow and pressure measurements at each extraction well;
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events; and
        - Hose repair between the lead and lag vessels of the carbon treatment system.
    - Operation and maintenance of the Perimeter SVE system, including:
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events;
        - Completion of a resample event at the sample location prior to carbon treatment (the October sample leaked in shipment); and
        - System re-set following alarm condition resulting from a power surge or brown out during extremely high wind conditions.
    - Completion of the fourth quarter 2014 soil gas sample event, which included:
        - Sample collection at soil gas sample point locations installed in 2010, 2012, 2013, and 2014 (SG-01 through SG-25);
        - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s); and
        - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
    - Measurement of vacuum pressure and methane concentrations at all PRB vent locations and at the two downgradient soil gas sample points (SG-02 and SG-03R).

- J. Kelly of EPA conducts site visit in conjunction with meeting with City of Tecumseh.
- TRC and TPC meet with City of Tecumseh to discuss site demolition status, property sale, use and potential future reuse of the site.

- **November-December 2014**
  - The fourth quarter 2014 water sample event was conducted, including:
    - Measurement of groundwater elevations at monitoring well locations and measurement of surface water elevations at the two points along the River Raisin;
    - Collection of groundwater from 54 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Collection of groundwater from 13 temporary monitoring locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Collection of surface water samples from the wetland area downgradient of the site (WL-01) and the seep near the former Blood Road bridge (SEEP); and
    - Analysis of samples for VOCs.
  - Completion of the fourth quarter 2014 PRB performance groundwater sample event, which included:
    - Measurement of groundwater elevations at all 19 PRB monitoring well locations;
    - Collection of groundwater samples at all 19 PRB monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at those locations;
    - Analysis of all 19 PRB groundwater samples for VOCs; and
    - Analysis of samples collected at in-barrier and shallow downgradient PRB Section 1 monitoring locations (PRB-01s, PRB-02s, PRB-04s, PRB-06s, PRB-07s, PRB-08s, and PRB-09s) for dissolved gasses.
  - At the request of the property owner, the quarterly SSDV system inspection was conducted at 704 Mohawk Street from the exterior of the house only. Negative pressure gradient was observed and verified relative to the exterior, but not relative to the basement. System improvements arranged for 2015.
  - Troubleshooting anomalous flow readings measured through the Perimeter SVE system, including:

        - Plumbing inspection to confirm there are no significant leaks;
        - Removal of condensate from pitot tubes used for flow measurements; and
        - Increasing the heater setting in the blower enclosure to limit future condensate accumulation.

- **December 2014**
    - Operation and maintenance of the P-Building SVE system, including:
        - Collection of P-Building SVE System samples (prior to carbon treatment, between carbon treatment vessels and at the system exhaust) for VOCs analysis to evaluate carbon adsorption capacity and usage; and
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events.
    - Measurement of vacuum pressure and methane concentrations at all PRB vent locations and at the two downgradient soil gas sample points (SG-02 and SG-03R).
    - Completion and submittal of construction documentation reports for the SSDV systems installed in 2014.
    - Operation and maintenance of the Perimeter SVE system, including:
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events.
    - Completion of a soil gas re-sample event, which included:
        - Sample collection at sample points SG-12R and SG-19 where sample results from the November 2014 event were inconsistent with those observed previously; and
        - Analysis of soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
    - Submittal of the *MIP Investigation Report and Workplan for High Resolution Site Characterization* to USEPA.

- **January 2015**
    - Operation and maintenance of the P-Building SVE system, including:
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events.

- Operation and maintenance of the Perimeter SVE system, including:
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events.
- SSDV system repairs were completed at the house located at 704 Mohawk Street. Repairs including replacement of exhaust piping which had been blocked with snow/ice and re-routing system piping to eliminate horizontal runs in order to prevent future blockage. Following system repairs, the first quarter system inspection was conducted in accordance with the *Workplan for the Installation of a Sub-Slab Depressurization/ Ventilation System: 704 Mohawk Street*.
- Measurement of vacuum pressure and methane concentrations at all PRB vent locations. Heavy snow cover along the Maumee Street right-of-way prevented measurement at soil gas sample points (SG-02 and SG-03R).

- **February 2015**
    - Operation and maintenance of the P-Building SVE system, including:
        - Quarterly system inspection including flow and pressure measurements at each extraction well;
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events; and
        - Collection of P-Building SVE System samples (prior to carbon treatment, between carbon treatment vessels and at the system exhaust) for VOCs analysis to evaluate carbon adsorption capacity and usage.
    - Operation and maintenance of the Perimeter SVE system, including:
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events; and
        - Collection of three Perimeter SVE System samples (prior to carbon treatment, between carbon treatment vessels and at the system exhaust) for VOCs analysis to evaluate carbon adsorption capacity and usage.
    - Measurement of vacuum pressure and methane concentrations at all PRB vent locations. Heavy snow cover along the Maumee Street right-of-way prevented measurement at soil gas sample points (SG-02 and SG-03R).
    - Installation of a sub-slab soil gas sample point (MHC-01) in the northeast corner of the industrial building located along Maumee Street south of the TPC site.
    - Survey of monitoring wells MW-32d and MW-34d and resurvey of PRB wells located adjacent to PRB Section 1.

- **February-March 2015**
  - The first quarter 2015 water sample event was conducted, including:
    - Collection of groundwater from 23 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
    - Collection of groundwater from 13 temporary monitoring locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations; and
    - Analysis of all samples for VOCs.
- **March 2015**
  - Submittal of the *Revised MIP Investigation Report and Workplan for High Resolution Site Characterization* to USEPA.
  - Operation and maintenance of the P-Building SVE system, including:
    - Finalization of the 2014 annual report;
    - Completion of minor system repairs (screen replacement in westernmost vessel);
    - Installation of new plumbing through the carbon treatment system; and
    - Carbon change out (removal and replacement of carbon in carbon treatment system) in the lead vessel. Note that following carbon change out, system plumbing was adjusted such that the lag vessel became the lead vessel and the vessel with the new carbon became the lag vessel.
  - Operation and maintenance of the Perimeter SVE system, including:
    - Quarterly system inspection including flow and pressure measurements at each extraction well; and
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events.
- **March-April 2015**
  - Completion of the first quarter 2015 soil gas sample event, which included:
    - Sample collection at soil gas sample point locations installed in 2010, 2012, 2013, and 2014 (SG-01 through SG-25);
    - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s);
    - Sample collection at one sub-slab soil gas sample point (MHC-01); and

        - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.

- **April 2015**
    - Completion of the second quarter 2015 PRB performance groundwater sample event, which included:
        - Measurement of groundwater elevations at all 19 PRB monitoring well locations;
        - Collection of groundwater samples at all 19 PRB monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at those locations;
        - Analysis of all 19 PRB groundwater samples for VOCs; and
        - Analysis of samples collected at in-barrier and shallow downgradient PRB Section 1 monitoring locations (PRB-01s, PRB-02s, PRB-04s, PRB-06s, PRB-07s, PRB-08s, and PRB-09s) for dissolved gasses.

- **April-May 2015**
    - Completion of the passive diffusion bag (PDB) groundwater sampling trial, which included:
        - Installation of PDB samplers at 5 monitoring locations; MW-03s, MW-04i, MW-25s, MW-34s, and MW-36s in early April; and
        - Collection of samples from the PRB samplers approximately 6.5 week later immediately prior to the regular second quarter sampling event.

- **May 2015**
    - Operation and maintenance of the P-Building SVE system, including:
        - Quarterly system inspection including flow and pressure measurements at each extraction well; and
        - Collection of P-Building SVE system samples (prior to carbon treatment, between carbon treatment vessels and at the system exhaust) for VOCs analysis to evaluate carbon adsorption capacity and usage.
    - Operation and maintenance of the Perimeter SVE system, including:
        - Replacement of the air filter, and
        - System re-set following alarm condition resulting from a power surge or brown out during extremely high wind conditions.

- Completion of an indoor air sample event at four residential properties west of the site (501 S. Evans, 505 S. Evans, 509 S. Evans and 511 S. Evans). Twenty-four hour samples were collected in 6-liter Summa® canisters for VOCs analysis by USEPA Method TO-15.
- At the request of the property owner, the quarterly SSDV system inspection was conducted at 704 Mohawk Street from the exterior of the house only. No problems were noted.
- Measurement of vacuum pressure and methane concentrations at all PRB vent locations and at the two downgradient soil gas sample points (SG-02 and SG-03R).
- The second quarter 2014 water sample event was conducted, including:
  - Measurement of groundwater elevations at monitoring well locations and measurement of surface water elevations at the two points along the River Raisin;
  - Collection of groundwater from 43 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
  - Collection of groundwater from 13 temporary monitoring locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
  - Collection of surface water samples from the wetland area downgradient of the site (WL-01) and the seep near the former Blood Road bridge (SEEP); and
  - Analysis of samples for VOCs.

- **April-June 2015**
  - Completion of a high-resolution site characterization (HRSC) investigation as described in the *MIP Investigation Report and Workplan for High Resolution Site Characterization* (Revised April 2015) which included:
    - Completion of groundwater profile sampling at 30 off-site boring locations (B-70 through B-89, B-91 through B-98, B-106 and B-107) and on-site boring location (B-90) to refine the horizontal and vertical distribution of the groundwater contaminant plume. Groundwater profile sampling included:
      - Visual classification of soils to at least 5 feet below the top of the clay confining unit (unless prevented by limitations in sampling equipment);
      - Field screening of soils with a PID;
      - Installation of temporary wells having a 3-foot screened interval throughout the water column;

  - Temporary wells were developed prior to sampling by purging until turbidity had stabilized; and
  - Samples were collected at each temporary well location using low-flow techniques[1] and analyzed for total VOCs to fully characterize the vertical concentration profile of the saturated unit.
- Completion of modified groundwater profile sampling at seven step out locations where the geology was previously well defined, including 1 boring location in the right-of-way (B-103) and 6 on-site locations (B-99, B-100, B-101, B-102, B-104 and B-105). Modified groundwater profile sampling included:
  - Blind drill to target depth;
  - Installation of a temporary well having a 3-foot screened interval at the target depth;
  - Temporary wells were developed, sampled, and analyzed for VOCs as described above.
- Completion of MIP confirmation sample borings at 24 locations as described in the Workplan to help correlate geology and soil/groundwater concentrations with MIP response; at each confirmation boring location the following was completed:
  - Visual classification of as specified in the Workplan;
  - Field screening of unsaturated soils with a PID;
  - Collection of soil samples from depths specified in the Workplan[2];
  - Installation of temporary wells having a 3-foot screened interval at depths specified in the Workplan[2];
  - Temporary wells were developed prior to sampling by purging until turbidity had stabilized; and
  - Samples were collected at each temporary well location using low-flow technique and analyzed for total VOCs to fully characterize the vertical concentration profile of the saturated unit.

---

[1] A small number of samples were collected with a bailer due to the inability of the peristaltic pump to overcome the head difference caused by a deep (typically >28 feet) water table and/or heavy/highly turbid groundwater. These samples were not stabilized for turbidity.
[2] As allowed by the Workplan, a small number of adjustments were made to the sample intervals based on field conditions encountered.

        - Collection of a number of additional soil and groundwater samples to be analyzed for parameters which may assist with remedial design and evaluation, including:
            - 15 groundwater samples for gasoline and diesel range total petroleum hydrocarbons;
            - 4 groundwater samples for microbial analysis to quantify microbes with genetic markers associated with the degradation of chlorinated compounds;
            - 4 soil samples for total oxidant demand; and
            - 4 soil samples for metals (iron, arsenic and chromium).

- **June 2015**
    - Completion of the second quarter 2015 soil gas sample event, which included:
        - Sample collection at soil gas sample point locations installed in 2010, 2012, 2013, and 2014 (SG-01 through SG-25) except SG-14R;
        - Sample collection at one exterior subsurface vacuum monitoring point (TVP-02s);
        - Sample collection at one sub-slab soil gas sample point (MHC-01); and
        - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
    - Operation and maintenance of the Perimeter SVE system, including:
        - Quarterly system inspection including flow and pressure measurements at each extraction well;
        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events;
        - System re-set following alarm condition resulting from a power surge or brown out during extremely high wind conditions; and
        - Carbon change out (removal and replacement of carbon in carbon treatment system) in the lead vessel. Note that following carbon change out, system plumbing was adjusted such that the lag vessel became the lead vessel and the vessel with the new carbon became the lag vessel.

- **July 2015**
    - The *Supplement to Remedial Investigation and Environmental Indicator Report (Migration of Contaminated Groundwater Under Control)* submitted to USEPA.

- **August 2015**
  - Decommission monitoring well MW-16s.
- **August-September 2015**
  - Installation of 5 temporary GSI monitoring points (B-108 through B-112) to evaluate groundwater concentrations at the groundwater-surface water interface;
  - Collection of samples at 5 temporary GSI monitoring points; and
  - Analysis of samples for VOCs.
- **September 2015**
  - Operation and maintenance of the P-Building SVE system, including:
    - Quarterly system inspection including flow and pressure measurements at each extraction well; and
    - Collection of P-Building SVE system samples (prior to carbon treatment, between carbon treatment vessels and at the system exhaust) for VOCs analysis to evaluate carbon adsorption capacity and usage.
  - Operation and maintenance of the Perimeter SVE system, including:
    - Quarterly system inspection including flow and pressure measurements at each extraction well;
    - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events; and
    - Collection of Perimeter SVE system samples (prior to carbon treatment, between carbon treatment vessels and at the system exhaust) for VOCs analysis to evaluate carbon adsorption capacity and usage.
  - Verification that SSDV system fan at 704 Mohawk Street is operational.
  - Measurement of vacuum pressure and methane concentrations at all PRB vent locations and at the two downgradient soil gas sample points (SG-02 and SG-03R).
  - Completion of the third quarter 2015 soil gas sample event, which included:
    - Sample collection at soil gas sample point locations installed in 2010, 2012, 2013, and 2014 (SG-01 through SG-25) except as described below:
      - A sample was attempted at replacement soil gas sample point SG-12R, and subsequently at soil gas sample point SG-12. Water in the sample port prevented sample collection at both sample points. No sample was collected; and

        - Soil gas sample point SG-14R which has been removed from the sampling program;
    - Sample collection at one sub-slab soil gas sample point (MHC-01); and
    - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
  - Calculation of a building-specific attenuation factor for the off-site non-residential property located at 805 S. Maumee Street.

- **October 2015**
  - Completion of the fourth quarter 2015 soil gas sample event, which included:
    - Sample collection at soil gas sample point locations specified in the 2015 monitoring program (SG-01, SG-02, SG-05, SG-06, SG-07, SG-09, SG-10, SG-11, SG-16, SG-20, SG-22 and SG-25), and
    - Analysis of all soil gas samples by USEPA Method TO-15 for the project specific list of CVOCs.
  - Completion of an indoor air/sub-slab soil gas sampling event to verify the building specific attenuation factor calculation for the off-site non-residential property located at 805 S. Maumee Street, including:
    - Collection of 24-hour composite indoor air samples at two locations (IA-MHC-01 and IA-MHC-02) within the building located at 805 S. Maumee Street;
    - Sample collection at one sub-slab soil gas sample point (MHC-01); and
    - Analysis of samples for site specific CVOCs (PCE; TCE; 1,1-DCE; cis-DCE; trans-DCE; vinyl chloride; 1,1,1-TCA; 1,1-DCA; and 1,2-DCA) by USEPA Method TO-15.
  - Submittal of the *2015 High Resolution Site Characterization Report and Updated Conceptual Site Model* to USEPA which included an updated evaluation of site geology and chemistry data to include 2015 HRSC data.

- **October-November 2015**
  - Operation and maintenance of the Perimeter SVE system, including:
    - Restarting the system after a VFD alarm;
    - Replacement of the air filter;
    - Quarterly system inspection including flow and pressure measurements at each extraction well;

        - Field measurement of trichloroethene concentrations in the carbon treatment system to determine the appropriate timeline for future carbon change out events; and
        - Collection of Perimeter SVE system samples (prior to carbon treatment, between carbon treatment vessels and at the system exhaust) for VOCs analysis to evaluate carbon adsorption capacity and usage.

- **November 2015**
    - Measurement of vacuum pressure and methane concentrations at all PRB vent locations and at the two downgradient soil gas sample points (SG-02 and SG-03R).

- **November-December 2015**
    - The fourth quarter 2015 water sample event was conducted as described in the revised Groundwater and Surface Water Monitoring Program (October 2015), including:
        - Measurement of groundwater elevations at monitoring well locations (46 total);
        - Collection of groundwater from 40 monitoring well locations and measurement of field parameters (pH, conductivity, turbidity, temperature dissolved oxygen, and redox potential) at these locations;
        - Collection of surface water samples from the seep near the former Blood Road bridge (SEEP) ; and
        - Analysis of samples for VOCs.
    - Completion of a supplemental GSI investigation including:
        - Installation of 5 additional drive point wells [B-108 (3-6′), B-113 (2-5′), B-113 (5-8′), B-114 (4-7′) and B-114 (7.4-10.4′) to evaluate groundwater concentrations at the wetland boundary;
        - Collection of groundwater samples for VOCs analysis at B-108 (5.6-8.6′) and all new drive point well locations to identify the location of most highly impacted groundwater;
        - Collection of a groundwater sample at B-108 (5.6-8.6′) (the location of highest VOC concentrations) for toxicity testing;
        - Completion of in situ hydraulic conductivity testing at B-108 (3-6'), B-108 (5.6-8.6'), B-109 (7.4-10.4') and B-113 (5-8'); and
        - Professional survey of all GSI drive point well locations.

- **December 2015**
  - Operation and maintenance of the P-Building SVE system, including
    - Quarterly system inspection including flow and pressure measurements at each extraction well;
    - Collection of P-Building SVE system samples (prior to carbon treatment, between carbon treatment vessels and at the system exhaust) for VOCs analysis to evaluate carbon adsorption capacity and usage; and
    - Carbon change out (removal and replacement of carbon in carbon treatment system) in the lead vessel. Note that following carbon change out, system plumbing was adjusted such that the lag vessel became the lead vessel and the vessel with the new carbon became the lag vessel.
  - At the request of the property owner, the quarterly SSDV system inspection was conducted at 704 Mohawk Street from the exterior of the house only. No problems were noted.
  - Operation and maintenance of the Perimeter SVE system, including:
    - Carbon change out (removal and replacement of carbon in carbon treatment system) in the lead vessel. Note that following carbon change out, system plumbing was adjusted such that the lag vessel became the lead vessel and the vessel with the new carbon became the lag vessel.
  - Completion of the PCE investigation as described in the November 12, 2015 Technical Memorandum titled *PCE Source Area Investigation* including:
    - Completion of 18 PCE source area investigation borings, including:
      - Visual classification of soils to 2.0 feet below the top of the water table;
      - Field screening of soils with a PID;
      - Collection of soil samples based on PID field screening as described in the Workplan;
      - Installation of temporary wells having a 3-foot screened interval at the water tables (16 locations);
      - Temporary wells were developed prior to sampling by purging until turbidity had stabilized; and
      - Samples were collected at each temporary well location using low-flow techniques and analyzed for total VOCs.
    - Completion of 1 groundwater profile sampling locations (B-122) to refine the horizontal and vertical distribution of the groundwater contaminant plume. Groundwater profile sampling included:

        - Visual classification of soils to 2.5 feet below the top of the clay confining unit;
        - Field screening of soils with a PID;
        - Collection of 2 soil samples based on PID field screening;
        - Installation of temporary wells having a 3-foot screened interval throughout the water column;
        - Temporary wells were developed prior to sampling by purging until turbidity had stabilized; and
        - Samples were collected at each temporary well location using low-flow techniques and analyzed for total VOCs to fully characterize the vertical concentration profile of the saturated unit.
    - Completion of soil samples near monitoring well MW-35i/d, including:
        - Visual classification of soil to 5 feet below ground surface;
        - Field screening of unsaturated soils with a PID; and
        - Collection of two soil samples from depths intervals with highest PID response.
  - A project meeting was conducted at USEPA Region V Headquarters to discuss the results of high resolution site characterization investigation and upcoming submittal of the corrective measures proposal. Meeting was attended by Joseph Kelly, Bhooma Sundar, David Petrovski, Mario Mangino, Michael Beedle, Colleen Olsberg, John Canar, and Susan Perdomo of USEPA; Jason Smith of TPC; Graham Crockford and Stacy Metz of TRC; and Douglas McClure of Conlin, McKenney and Philbrick, PC. Additionally, Dale Bridgford, Peter Quakenbush, Joseph Rogers and Kimberly Tyson of MDEQ conferenced in by phone.

- **January 2016**
  - Completion of an indoor air sample event at six residential properties north and west of the site (410 Ottawa, 223 E Cummins, 227 E. Cummins, 501 S. Evans, 509 S. Evans and 511 S. Evans). Twenty-four hour samples were collected in 6-liter Summa® canisters for VOCs analysis by USEPA Method TO-15.
  - Completion of an indoor air sample resample event at one residential properties north of the site (223 E Cummins), due to a malfunction of the sampling equipment during the sampling event earlier in the month.
  - Completion of a SSDV system installation at one residential properties west of the site (505 S. Evans).

Appendix B
Documentation of Ongoing GSI Investigation and Risk Assessment

Technical Memorandum

To:	Dale Bridgford, MDEQ; Peter Quackenbush, MDEQ; Joseph Kelly, USEPA
From:	Graham Crockford, TRC Environmental Corporation Sarah Holmstrom, TRC Environmental Corporation Stacy Metz, TRC Environmental Corporation
Subject:	Summary of Groundwater to Surface Water Migration Pathway Investigation Findings and Supplemental Investigation Workplan Former Tecumseh Products Company Site in Tecumseh, Michigan (RCRA-05-2010-0012)
Date:	January 27, 2016
cc:	Jason Smith, Tecumseh Products Company Chris DeWetter, Tecumseh Products Company Douglas McClure, Conlin, McKenney & Philbrick, PC
Project No.:	220003.0001.0000

Background

Tecumseh Products Company (TPC) retained TRC Environmental Corporation (TRC), to investigate soil and groundwater conditions at the former TPC site located in Tecumseh, Michigan. The potential for unacceptable risk to the environment related to the potential venting of affected groundwater to the River Raisin and associated wetlands was evaluated in the 2012 Remedial Investigation and Groundwater Environmental Indicator Report (RI/EI) Report. This evaluation included the development of site-specific mixing zone-based groundwater to surface water interface (GSI) criteria, which was submitted to the Michigan Department of Environmental Quality (MDEQ) and the United Stated Environmental Protection Agency (USEPA) in June 2012 then revised and re-submitted in August 2013 to reflect MDEQ rule changes related to mixing zone determinations. MDEQ/USEPA reviewed the application and requested additional information in order to further review the mixing zone-based GSI criteria.

In June 2014, the MDEQ released the draft guidance for GSI Pathway Compliance[1] to outline several approaches to address the GSI pathway. TRC has implemented several of these GSI compliance

[1] MDEQ RRD, June 2014 Draft MDEQ Groundwater/Surface Water Interface Pathway Compliance Options, Remediation and Redevelopment Division Resource Materials

options at a variety of sites. Each site is unique, so it is important to consider site-specific conditions and use multiple lines of evidence in order to obtain GSI compliance, which may involve using a combination of the available options. Because generic GSI criteria[2] are exceeded at the TPC site and there is a potential for venting to a wetland, additional investigation activities were completed as detailed below to evaluate the GSI pathway and demonstrate that potentially venting groundwater does not pose an ecological risk to wetland biota.

Between April and June 2015, High Resolution Site Characterization (HRSC) activities were completed by TPC to supplement existing site characterization data and more precisely document the nature and extent of chlorinated volatile organic compounds (CVOCs) in groundwater. These data were useful in addressing some of the agency comments related to the GSI pathway. Subsequent investigation activities were also completed in August and September 2015 to verify the approximate boundary of the wetland area and assess groundwater quality at the wetland boundary. These results were communicated to the MDEQ and USEPA in the October 14, 2015, *STATUS UPDATE – Investigation of the Potential Groundwater to Surface Water Migration Pathway: Former Tecumseh Products Company Site in Tecumseh, Michigan* Technical Memorandum. Data documented in the October 14, 2015, Technical Memorandum showed that there is a potential for CVOC-affected groundwater to vent to the wetland or river across an area limited to approximately 250 lineal feet along the western edge of the wetland. Therefore, further investigation was completed in November and December 2015 to evaluate groundwater potentially venting to the wetland adjacent to the River Raisin above the generic GSI criteria.

The following sections of this technical memorandum present a complete summary of the GSI investigation activities and findings from August through December 2015 along with a scope of work for a Supplemental GSI Investigation that will be performed to further evaluate the wetland GSI migration pathway and address MDEQ and USEPA comments.

Summary of GSI Investigation Activities

GSI investigation activities were completed in August through December 2015 in order to further evaluate the GSI pathway. The following section presents the field and data collection activities along with the results specific to evaluating groundwater with the potential to vent to the wetland (hereinafter referred to as the "wetland GSI"). Data collected throughout the wetland GSI investigation are also relevant to evaluating groundwater with the potential to vent to the River Raisin, however, that pathway can be addressed using site-specific mixing zone criteria whereas no mixing can be applied to venting to the wetland.

Sampling and well locations are shown on Figure 1. A representative cross-section is shown on Figure 2. Soil boring logs and well construction diagrams are included as Attachment 1. Detected VOCs concentrations in groundwater in the vicinity of the GSI are summarized on Table 1 and

[2] Michigan Part 201 (Environmental Remediation) of the Natural Resources and Environmental Protection Act (NREPA) (1994 PA 451, as amended)

Figure 3. Static water elevation data are summarized on Table 2 and a representative groundwater contour map is shown on Figure 4. Laboratory analytical reports specific to the GSI investigation activities are provided as Attachment 2. In-situ hydraulic conductivity test data are included as Attachment 3. The GLEC report summarizing the WET testing results is included as Attachment 4.

Define the Approximate Boundary of Wetland Area

In order to evaluate the GSI pathway and identify appropriate locations to investigate the GSI, a site reconnaissance and a geographic positioning system (GPS) survey was performed by TRC to more precisely document the up gradient (western) perimeter of the wetland area. The boundary was defined based on visual observations in the field and is reflected on Figure 1.

GSI Monitoring Point Installation

On August 25 through 26, 2015, TRC installed and sampled five hand-driven monitoring well points (B-108 to B-112) along the up gradient perimeter of the wetland area, downgradient from monitoring wells MW-22 and MW-31 at the locations shown on Figure 1; a conceptual cross section is attached as Figure 2. Each temporary well was constructed using a 1.25-inch I.D. stainless steel casing with a 3-foot-long stainless steel drive-point screen. TRC collected groundwater levels relative to ground surface and adjacent wetland/surface water features to determine if groundwater appears to be venting to the wetland area adjacent to the River Raisin, or directly into the river. Based on initial evaluation, there was a potential for groundwater to vent to the wetland and additional monitoring points were identified in order to further characterize VOCs concentrations in groundwater at the wetland boundary.

On November 30, 2015, five additional hand-driven temporary well points were added to vertically and horizontally characterize the location of highest VOC concentrations in groundwater in the vicinity of soil boring B-108 (renamed as MW-42d). Specifically, these points were: B-108 (3-6 feet below ground surface [ft-bgs]), B-113 (2-5 ft-bgs), B-113 (5-8 ft-bgs), B-114 (4-7 ft-bgs), and B-114 (7.4-10.4 ft-bgs) (Figure 1). Soil boring and monitoring well construction logs for the GSI investigation wells (B-108 through B-114) are provided in Attachment 1.

Groundwater Sampling

Groundwater analytical data were collected to assess groundwater chemistry downgradient of monitoring wells MW-22 and MW-31 adjacent to the wetland boundary. Following sample point installation, samples were collected on September 1, 2015, (B-108 through B-112) and December 1, 2015, (B-108 shallow and deep, B-113 shallow and deep, and B-114 shallow and deep). Groundwater samples were collected using low flow methodologies and submitted to TriMatrix Laboratories, Inc. for analysis of VOCs (EPA method 8260B). A summary of detected VOCs relative to Michigan Part 201 criteria are shown on Table 2. GSI exceedances are also shown on Figure 3.

Data show that concentrations in groundwater exceed one or more generic GSI criteria at the wetland boundary, with the highest concentrations observed at B-108/MW-42d. Groundwater data collected from the seven GSI investigation locations showed detections of one or more CVOCs at four locations

(B-108, B-109, B-113, and B-114), with CVOCs concentrations above the generic GSI criteria at only three of these locations (B-108, B-113, and B-114). Groundwater data were collected in both shallow and deeper intervals at these three locations and generally showed higher concentrations of CVOCs in the deeper sample (Table 1, Figure 3). The highest total CVOCs concentrations were measured at soil boring B-108/MW-42d (5.6-8.6 ft-bgs) (sampled in September and December 2015), with concentrations up to 1,200 micrograms per liter (ug/L) trichloroethene (TCE), 1,500 ug/L cis-1,2-dichloroethene (cis-1,2-DCE), and 23 ug/L vinyl chloride (VC). Although these concentrations exceed the generic GSI criteria, all concentrations are well below the following Rule 57 aquatic maximum values (AMV) and final acute values (FAVs)[3] for surface water:

- **AMVs**: TCE 1,800 ug/L, cis-1,2-DCE 5,500 ug/L, VC 8,400 ug/L
- **FAVs**: TCE 3,500 ug/L, cis-1,2-DCE 11,000, and VC 17,000 ug/L

Hydrogeologic Characterization

Hydrogeologic characterization is necessary to evaluate the GSI pathway and assess groundwater flow patterns and rates. The following work was completed to further characterize the hydrogeology near the wetland and evaluate potential venting to the wetland:

Static Water Level Measurements and Groundwater Flow Patterns

Subsequent to the completion of drilling activities, the top of casing elevations for the sampling points were surveyed by a professional surveyor to +/- 0.01 foot.

- Static water level elevation data were collected at several sampling points on September 1, 2015, and again on November 30 and December 1, 2015, following additional sampling point installation for the purpose of measuring hydraulic gradients and to confirm flow directions. Water level data were collected by lowering an electronic water level indicator probe down until groundwater was encountered, and then measuring the groundwater/ surface water depth from the established measuring point to the nearest 0.01 foot. Water level elevation data collected in the vicinity of the wetland are shown on Table 2.
- Water levels collected in September and November 2015 are generally consistent. Due to higher data density, a representative contour map was constructed using the data from November 2015 (Figure 4). The River Raisin is a regional discharge feature and groundwater flow is generally to the east, toward the river. As shown on the groundwater contour map, static water level data collected from the sand unit near the wetland boundary suggest that groundwater flow in that area is focused toward B-108/MW-42d, which is also where the highest CVOCs concentrations in groundwater were observed.
- The static water level elevation data indicate that the horizontal hydraulic gradient approaching the wetland, east of Mill Highway, averages 0.04 ft/ft. The horizontal

[3] Michigan Part 4 Water Quality Standards of Part 31 (Water Resources Protection) of the NREPA (1994 PA 451, as amended)

hydraulic gradient in this area is reflective of the topographic change that occurs in the same area, where there is a steep grade that flattens at the wetland. The horizontal hydraulic gradient is illustrated in cross-section on Figure 2 and in plan-view on Figure 4.

In Situ Hydraulic Conductivity Tests

In situ hydraulic conductivity testing, to facilitate calculation of groundwater venting and mass flux through the wetland and to the River Raisin, was completed so that more precise values for these parameters can be used in the development of mixing zone based GSI criteria for compliance at the River Raisin. On December 9 and 10, 2015, single well response tests (slug tests) were performed by TRC at four locations, B-108 (3-6 ft-bgs), B-108/MW-42d (5.6-8.6 ft-bgs), B-109 (7.4-10.4 ft-bgs), and B-113 (5-8 ft-bgs). Two tests were performed at each location (by both inserting and removing the slug) and resulted in an average hydraulic conductivity of 4.7×10^{-5} cm/sec (approximately 0.13 ft/day). The minimum hydraulic conductivity of 8.4×10^{-6} cm/sec (0.02 ft/day) was measured at B-108 (3-6 ft-bgs) and the maximum hydraulic conductivity of 1.1×10^{-4} cm/sec (0.32 ft/day) at B-113 (5-8 ft-bgs). The low hydraulic conductivity measured in the shallower well is consistent with what would be expected in the silt-rich organic material near the wetland surface. The higher hydraulic conductivity measured in the wells screened in the lower sandy interval are generally consistent with the sand and silty sand encountered at those locations. The *in situ* hydraulic conductivity test data evaluation and associated calculations are provided in Attachment 3.

Groundwater Flow Velocity

Assuming an effective porosity of 0.3, an average horizontal hydraulic gradient of 0.04 ft/ft, and the hydraulic conductivity measured at B-108/MW-42d of 0.3 ft/day, the estimated groundwater flow velocity leading up to the wetland boundary, in the vicinity of B-108/MW-42d, is approximately 15 ft/year. However, the groundwater flow velocity beneath the wetland is expected to be significantly less due to the lowering of the horizontal hydraulic gradient as the topographic gradient flattens throughout the wetland (Figure 2). Given the lower hydraulic conductivity of the surficial silt/organic-rich wetland soil compared to the more permeable sand layer underneath, groundwater is expected to flow preferentially through the sand layer, toward the topographically lower River Raisin, with limited flow upward into the wetland.

Whole Effluent Toxicity Testing

In order to evaluate whether or not the groundwater which has the potential to vent to the wetland poses an unacceptable ecological risk, whole effluent toxicity (WET) testing was selected to assess the combined toxic effect of groundwater on aquatic organisms.

WET testing was performed on groundwater collected from B-108/MW-42d (5.6-8.6 ft-bgs), where the highest measured CVOCs concentrations were observed in groundwater samples collected adjacent to the wetland. The WET sample was collected using low-flow methodologies and submitted to Great Lakes Environmental Center (GLEC) in Traverse City, Michigan, for acute toxicity testing using aquatic organisms *Ceriodaphnia dubia* (*C. dubia*) and the fathead minnow. GLEC performed a 48-hour

acute *C. dubia* and 96-hour fathead minnow toxicity test on the sample. The toxicity test was conducted with a dilution series that allowed the determination if the ≤1.0 acute toxic units (TUa) criteria are met. Testing procedures and report results follow the procedures outlined by *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms* (EPA, 2002).

Upon receipt by GLEC, the WET sample had an initial dissolved oxygen (DO) level of 17.2 mg/L. This was due to artificial oxygenation of the sample by TRC prior to submittal to GLEC. Previous sampling activities conducted at B-108/MW-42d indicated typical DO concentrations are on the order of 1 mg/L at that location. These DO concentrations are below the threshold of 4 mg/L that prompts the use of bubblers to aerate the sample during the WET test to increase the DO concentration, which in turn could drive off VOCs during the test. In order to eliminate the need for the bubblers and minimize VOC loss, TRC passively oxygenated the sample by filling a half-liter headspace in the cube container with oxygen (under controlled laboratory conditions) prior to overnight shipment of the sample to GLEC. No action was taken to reduce the oxygen level prior to conducting the toxicity tests, and all testing procedures were completed by GLEC using the above-referenced EPA procedures.

WET testing results were inconclusive and indicated that the groundwater is not acutely toxic to the fathead minnow, but is acutely toxic to the *C. dubia*. The fathead minnow test resulted in 100% survivability, or 0 TUa. The *C. dubia* toxicity was measured at 9.2 TUa, which is above the ≤1.0 TUa criteria presented in the MDEQ RRD draft Groundwater/Surface Water Interface Pathway Compliance Options document. According to GLEC, both organisms typically respond to the sample similarly, in this case the results are completely opposite. It is unexpected that the sample would be lethal to one organism and not affect the other. Therefore, the test is deemed inconclusive and will not be used to assess potential ecological risk groundwater may pose to the wetland. It is possible that the oxygen levels in the sample caused the anomaly in the results. Copies of the GLEC WET testing reports are included in Attachment 4.

Summary of Findings

The following is summary of highlights and conclusions based on the results of the GSI investigation:

- **Limited Extent of CVOCs Affected Groundwater at the GSI:** Based on the groundwater data collected at the wetland boundary, the potential venting area for CVOCs to the wetland and/or river above generic Michigan Part 201 criteria is limited to approximately 250 lineal feet along the western edge of the wetland between soil boring B-109, north of soil boring B-108, south to the seep sample location (Figure 3). This is further supported by the groundwater flow patterns observed in the vicinity of B-108, where groundwater flow is generally focused toward B-108/MW-42d (Figure 4).
- **Potential for Groundwater Venting to Surface Water:** Groundwater data at the edge of the wetland indicate exceedances of generic GSI criteria and static water elevation data indicate there is potential for groundwater to vent to the wetland and/or the river, suggesting that the GSI pathway is potentially complete (Figure 2).

- **Hydrogeologic Characterization:** Although data suggest that there is a potential for groundwater originating from the TPC site to vent to the wetland at concentrations above generic GSI criteria, data indicate that any such venting is of limited extent. The venting area is horizontally limited to the 250-ft lineal area near B-108/MW-42d and is bound vertically by the underlying clay. There is a potential for water to vent vertically to the wetland. However, the vertical component of flow upward toward the wetland is expected to be limited due to the hydrogeologic characteristics of the sand unit relative to the overlying surficial silt/organic-rich layer, which are expected to cause groundwater to flow preferentially through the more permeable sand layer, toward the River Raisin.
- **Natural Attenuation in the Wetland:** The presence of over three feet of peat/organic-rich soil in the wetland is likely acting as an anaerobic bioreactor and is expected to significantly reduce the VOCs in groundwater through anaerobic degradation prior to venting.
- **Toxicity of Groundwater at the Wetland Boundary**: WET testing was performed on groundwater with the highest potential to vent to the wetland and/or river as one of several measures taken to evaluate risk to ecological receptors in the wetland. The sample was collected from the well exhibiting the highest CVOCs concentrations at the wetland boundary (B-108/MW-42d), which, based on hydrogeologic data, is also the most likely area of groundwater migration to the surface water. The test showed contradictory results between the two organisms (*C. dubia* and fat head minnow) and thus deemed inconclusive and unusable for the GSI evaluation.

Demonstrating GSI Compliance

The GSI investigation indicates that the GSI pathway to the wetland and the River Raisin is complete. In order to demonstrate that the groundwater actually venting to the wetland and/or directly to the River Raisin does not pose an unacceptable risk to the environment, TRC proposes the following approach:

- **River Raisin GSI Compliance:** The additional GSI investigation results indicate that groundwater concentrations exceed generic GSI criteria at the wetland boundary, but concentrations remain below surface water standards and estimated mixing zone based GSI criteria previously calculated by TRC. Therefore, use of site-specific mixing zone-based GSI criteria is a viable approach to demonstrate GSI pathway compliance for groundwater with the potential to vent to the River Raisin. As such, submittal of a site-specific mixing zone application has been included in the GSI workplan below.
- **Wetland GSI Compliance:** Groundwater data suggest that there is a potential for groundwater to vent directly to the wetland above generic GSI criteria. Therefore, additional characterization is necessary to evaluate the potential risk to ecological receptors in the wetland. This can be accomplished by evaluating CVOCs concentrations in pore water at the wetland GSI (within the top foot of wetland soil where benthic organisms live) to determine compliance. Demonstration of compliance using pore water samples at the wetland GSI has a high probability of success given that groundwater flow is expected to preferentially flow toward the river, and, for groundwater that does manage to vent to the wetland, the three feet of peat and organic-rich soil

are expected to significantly reduce the VOCs in groundwater through anaerobic degradation prior to venting. A scope-of-work to conduct the pore water sampling is presented below.

Supplemental GSI Investigation Workplan

This section of the tech memo presents TRC's proposed workplan to further assess the GSI pathway in the wetland area down gradient from highest VOCs concentrations above generic GSI criteria at the edge of the wetland. The intent of this assessment is to evaluate concentrations of VOCs at the actual wetland GSI using temporary pore water well points.

Site-Specific Mixing Zone Application

A site-specific mixing zone-based GSI criteria will be requested from the MDEQ in order to establish cleanup criteria that will be used to address the CVOCs concentrations in groundwater with the potential to pose an unacceptable risk to the GSI at the River Raisin. TRC will update the previous mixing zone application prepared in 2011 using the most recent site characterization data. Subsequent to MDEQ issuance of the preliminary mixing zone criteria and TRC and TPC's review and evaluation of the criteria, TPC can pursue formal approval from the MDEQ to rely on the site-specific criteria for GSI compliance at the river.

Additional Investigation Scope

In order to further evaluate the migration of VOCs-affected groundwater at the wetland GSI, TPC will perform the following supplemental investigation activities.

- Up to seven (7) pore water samples will be collected using temporary stainless steel push point samplers (e.g., PushPoint™ sampler or equivalent). The samplers will be placed throughout the wetland down gradient from B-108/MW-42d as shown on Figure 5. The push point samplers will be advanced into the surficial organic material encountered within the wetland in order to collect pore water from the wetland GSI, approximately 6 inches below the ground surface, within the upper 0-1 feet of wetland soil where benthic organisms live. These locations and depths were selected based on the findings presented above and specific comments provided by the MDEQ during the December 14, 2015, project meeting to discuss the GSI pathway at the TPC site.
- The pore water samplers will be installed by manually pushing the sampling points into the surficial organic material until the top of screen is approximately 6 inches below the ground surface. The total depth and location may vary depending on the presence of water and/or subsurface impediments (wood, rocks, etc.) preventing the advancement of the push point sampler. Standing water is not typically observed in the wetland area. Therefore, surface water intrusion is not a concern. However, measures will be taken to minimize disturbance of the soil in the immediate vicinity of the sample point to avoid potential effects on sample integrity.
- This pore water sampling scope will be repeated three times during three separate quarters (e.g., spring, summer, fall), in order to account for any potential seasonal variation in the data at the wetland GSI.

Pore Water Sampling Methods and Analytical Program

Collection of the pore water samples will be performed in general accordance with USEPA Region 4 standard operating procedures[4]. Similar to the adjacent shallow wells at the wetland boundary (B-108, B-113 and B-114) where silt- and organic-rich soils with low hydraulic conductivities were also encountered, limited pore water recovery is anticipated. Pore water will be purged as practical from the sampling points using a peristaltic pump or syringe at a slow rate to minimize turbidity as follows:

1. Gently insert the push point sampler into the wetland soil until the top of the screen is approximately 6 inches below the ground surface, then remove the guard rod. Care must be taken not to disturb the soil immediately surrounding the push point sampler.
2. Connect new flexible tubing to the top of the sampler and purge out all air from the sampler using a peristaltic pump or syringe (if using a syringe, a new syringe will be used at each sampling location). Withdraw pore water as practical until it appears non-turbid.
3. Extract the pore water sample using a peristaltic pump or syringe, placing adequate sample volume in laboratory preserved sample container.
4. Subsequent to collecting the sample, if sufficient pore water volume is encountered, remove an aliquot of pore water and field measure pH, temperature, oxidation reduction potential (ORP), total dissolved solids (TDS) and specific conductivity using a Myron 6P Water Quality Meter or equivalent.

If surface water is encountered at a sampling location, surface water will also be purged from the sampler in Step 2 above and field parameters collected in Step 4 will be conducted prior to Step 3 sample collection. In addition, surface water field data (e.g., pH, temperature, conductivity) will be collected immediately before and after pore water sample collection and compared to the pore water field data to assess potential surface water infiltration. Lastly, if standing water is present, the static water level in the pore water will also be measured relative to surface water to determine the relative gradient (positive or negative).

TRC will submit the pore water samples collected from the GSI sampling locations to an off-site laboratory (e.g., TriMatrix) for analysis of VOCs (EPA method 8260B). For quality control purposes, the following samples will be collected and submitted to the laboratory for VOCs analysis as part of the pore water sampling event:

- One laboratory prepared trip blank.
- One blind duplicate will be collected from one of the seven pore water sample locations.

New tubing and push point sampler will be used at each location, therefore, there is no need to decontaminate equipment and no need for field equipment blanks.

---

[4] USEPA Region 4, Science and Ecosystem Support Division (SESD) Operating Procedure – Pore Water Sampling, February 28, 2013.

Upon collection of the pore water sample, the temporary push point sampler will be removed and the location documented using GPS and marked with a wooden survey stake.

Data Usage and Reporting

TPC and TRC will submit a request for preliminary mixing zone criteria to the MDEQ using the existing data set (prior to completion of the Supplemental GSI Investigation). Upon completion of the Supplemental GSI Investigation scope-of-work, TRC will evaluate the data to determine if the site characterization objectives have been achieved. Data will be summarized in a technical memorandum to USEPA and MDEQ that will present a tabulated summary of data collected in the investigation and evaluate if the Supplemental GSI Investigation data are sufficient to complete the delineation of VOCs in groundwater at the wetland GSI to below Michigan Part 201 generic GSI criteria. The additional GSI characterization data will also be used to pursue formal MDEQ approval of the site-specific mixing zone based criteria to address the GSI pathway at the river.

Attachments:

Table 1 – Summary of Detected VOCs in Groundwater and Surface Water at GSI Investigation and Observation Locations
Table 2 – GSI Investigation Groundwater Elevation Summary

Figure 1 – Site Layout and Sample Locations
Figure 2 – Cross-Section A-A'
Figure 3 – Summary of VOCs in Groundwater at GSI Locations
Figure 4 – Groundwater Contour Map – November-December 2015
Figure 5 – Proposed Pore Water Sampling Locations

Attachment 1 – Soil Boring Logs and Well Construction Diagrams (GSI Investigation Area)
Attachment 2 – Laboratory Analytical Data
Attachment 3 – In-Situ Hydraulic Conductivity Tests
Attachment 4 – Whole Effluent Toxicity Test Results

Tables

Table 1

Summary of Detected Volatile Organic Compounds in Groundwater and Surface Water at GSI Investigation and Observation Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		2-Butanone[2]	Acetone	1,1-Dichloro-ethane	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Toluene[1]	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
Residential DW Criteria		13,000	730	880	70	100	1,000	200	5.0	2.0
Non-Residential DW Criteria		38,000	2,100	2,500	70	100	1,000	200	5.0	2.0
GSI Criteria		2,200	1,700	740	620	1,500[2]	270	89	200[2]	13[2]
Residential GWSL for Vapor Intrusion		4.3E+06	8.2E+06	4,300	83	360	36,000	17,000	10	2.8
Non-Residential GWSL for Vapor Intrusion		1.8E+07	3.4E+07	18,000	350	1,500	1.5E+05	71,000	41	52
Groundwater Contact Criteria		2.4E+08	3.1E+07	2.4E+06	2.0E+05	2.2E+05	5.3E+05	1.3E+06	13,000[3]	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screen Interval	Sample Collection Date									
B-108 (3-6')	12/1/2015	<100	<400	<20	**1,700**	<20	<20	<20	<20	**36**
B-108 (5.6-8.6') / MW-42d	9/1/2015	<50	<200	**15**	**1,100**	**11**	<10	**25**	**1,200**	**23**
	12/1/2015	<50	<200	**16**	**1,500**	**14**	<10	**22**	**1,100**	**23**
B-109 (7.4-10.4')	9/1/2015	<5.0	<20	**6.5**	**6.9**	<1.0	<1.0	<1.0	**2.7**	<1.0
B-109 (7.4-10.4') (DUP-01)	9/1/2015	<5.0	<20	**6.6**	**7.1**	<1.0	<1.0	<1.0	**2.8**	<1.0
B-110 (7.3-10.3')	9/1/2015	<5.0	**41**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
B-111 (3.3-6.3') / MW-41	9/1/2015	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
B-112 (4.4-7.4')	9/1/2015	<5.0	**25**	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0
B-113 (2-5')	12/1/2015	<100	<400	<20	**1,600**	<20	<20	<20	**86**	<20
B-113 (5-8')	12/1/2015	<50	<200	<10	**1,400**	**12**	<10	**12**	**120**	<10
B-114 (4-7')	12/1/2015	<5.0	<20	**15**	**11**	<1.0	<1.0	<1.0	<1.0	**1.3**
B-114 (7.4-10.4')	12/1/2015	<12	<50	**25**	**57**	<2.5	<2.5	<2.5	**270**	<2.5

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

-- = No data

Bold font denotes concentrations detected above laboratory reporting limits

* An asterisk indicates that the observed depth to groundwater intersects or is near an overlaying clay unit that may act as a localized confining unit. The true piezometric surface may have a depth less than the recorded depth to groundwater.

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

5) Frozen; no sample collected.

Table 1
Summary of Detected Volatile Organic Compounds in Groundwater and Surface Water at GSI Investigation and Observation Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Acetone	1,1-Dichloro-ethane	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Toluene[1]	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
Residential DW Criteria		13,000	730	880	70	100	1,000	200	5.0	2.0
Non-Residential DW Criteria		38,000	2,100	2,500	70	100	1,000	200	5.0	2.0
GSI Criteria		2,200	1,700	740	620	1,500[2]	270	89	200[2]	13[2]
Residential GWSL for Vapor Intrusion		4.3E+06	8.2E+06	4,300	83	360	36,000	17,000	10	2.8
Non-Residential GWSL for Vapor Intrusion		1.8E+07	3.4E+07	18,000	350	1,500	1.5E+05	71,000	41	52
Groundwater Contact Criteria		2.4E+08	3.1E+07	2.4E+06	2.0E+05	2.2E+05	5.3E+05	1.3E+06	13,000[3]	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screen Interval	Sample Collection Date									
MW-17s (3-8')	7/23/2009	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/7/2009	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/18/2010	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2010	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/8/2010	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/16/2010	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/15/2011	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/11/2011[4]	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/21/2011	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2011	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/5/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/2/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/3/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/3/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/28/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/11/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/19/2015	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/4/2015	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

-- = No data

Bold font denotes concentrations detected above laboratory reporting limits

* An asterisk indicates that the observed depth to groundwater intersects or is near an overlaying clay unit that may act as a localized confining unit. The true piezometric surface may have a depth less than the recorded depth to groundwater.

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

5) Frozen; no sample collected.

Table 1

Summary of Detected Volatile Organic Compounds in Groundwater and Surface Water at GSI Investigation and Observation Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		2-Butanone[2]	Acetone	1,1-Dichloro-ethane	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Toluene[1]	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
Residential DW Criteria		13,000	730	880	70	100	1,000	200	5.0	2.0
Non-Residential DW Criteria		38,000	2,100	2,500	70	100	1,000	200	5.0	2.0
GSI Criteria		2,200	1,700	740	620	1,500[2]	270	89	200[2]	13[2]
Residential GWSL for Vapor Intrusion		4.3E+06	8.2E+06	4,300	83	360	36,000	17,000	10	2.8
Non-Residential GWSL for Vapor Intrusion		1.8E+07	3.4E+07	18,000	350	1,500	1.5E+05	71,000	41	52
Groundwater Contact Criteria		2.4E+08	3.1E+07	2.4E+06	2.0E+05	2.2E+05	5.3E+05	1.3E+06	13,000[3]	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screen Interval	Sample Collection Date									
MW-22 (25-30')	12/7/2009	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**10**
	3/18/2010	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**8.5**
	5/18/2010	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.0**
	9/10/2010	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.3**
	12/22/2010	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.0**
	2/24/2011	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.3**
	5/11/2011[4]	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**
	7/21/2011	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.8**
	10/4/2011	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.2**
	1/9/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**8.4**
	4/5/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**12**
	7/3/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**13**
	10/3/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**18**
	5/29/2013	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**21**
	3/28/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**29**
	5/22/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**23**
	7/17/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**20**
	11/11/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**24**
	3/23/2015	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**25**
	5/19/2015	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**23**

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

-- = No data

Bold font denotes concentrations detected above laboratory reporting limits

* An asterisk indicates that the observed depth to groundwater intersects or is near an overlaying clay unit that may act as a localized confining unit. The true piezometric surface may have a depth less than the recorded depth to groundwater.

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

5) Frozen; no sample collected.

Table 1

Summary of Detected Volatile Organic Compounds in Groundwater and Surface Water at GSI Investigation and Observation Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		2-Butanone[2]	Acetone	1,1-Dichloro-ethane	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Toluene[1]	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
Residential DW Criteria		13,000	730	880	70	100	1,000	200	5.0	2.0
Non-Residential DW Criteria		38,000	2,100	2,500	70	100	1,000	200	5.0	2.0
GSI Criteria		2,200	1,700	740	620	1,500[2]	270	89	200[2]	13[2]
Residential GWSL for Vapor Intrusion		4.3E+06	8.2E+06	4,300	83	360	36,000	17,000	10	2.8
Non-Residential GWSL for Vapor Intrusion		1.8E+07	3.4E+07	18,000	350	1,500	1.5E+05	71,000	41	52
Groundwater Contact Criteria		2.4E+08	3.1E+07	2.4E+06	2.0E+05	2.2E+05	5.3E+05	1.3E+06	13,000[3]	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screen Interval	Sample Collection Date									
MW-31 (33.3-38.3')	6/18/2010	<5.0	<20	**14**	**19**	**2.2**	<1.0	**20**	**180**	<1.0
	9/17/2010	<10	<40	<2.0	**15**	<2.0	<2.0	**48**	**220**	**2.5**
	12/22/2010[5]	<10	<40	**16**	**29**	**2.9**	<2.0	**27**	**260**	<2.0
	2/24/2011	<10	<40	**16**	**31**	**3.1**	<2.0	**26**	**300**	<2.0
	5/11/2011[4]	<10	<40	**15**	**24**	**3.0**	<2.0	**22**	**250**	<2.0
	7/21/2011	<5.0	<20	**7.4**	**14**	**1.2**	<1.0	**11**	**130**	<1.0
	10/4/2011	<5.0	<20	**18**	**40**	**3.4**	<1.0	**28**	**340**	<1.0
	1/10/2012	<10	<40	**17**	**35**	**3.1**	<2.0	**24**	**290**	<2.0
	4/5/2012	<10	<40	**16**	**36**	**3.1**	<2.0	**24**	**290**	<2.0
	7/17/2012	<20	<80	**16**	**34**	<4.0	<4.0	**23**	**310**	<4.0
	10/3/2012	**16**	<50	**15**	**40**	**3.4**	<2.5	**26**	**340**	<2.5
	3/6/2013	<12	<50	**13**	**32**	**2.9**	<2.5	**23**	**270**	<2.5
	5/29/2013	<12	<50	**15**	**39**	**2.9**	<2.5	**23**	**300**	<2.5
	8/29/2013	<12	<50	**16**	**47**	**2.6**	<2.5	**24**	**320**	<2.5
	3/28/2014	<12	<50	**16**	**34**	<2.5	<2.5	**27**	**300**	<2.5
	5/22/2014	<12	<50	**16**	**34**	<2.5	<2.5	**24**	**280**	<2.5
	7/17/2014	<12	<50	**13**	**33**	<2.5	<2.5	**20**	**260**	<2.5
	11/11/2014	<12	<50	**14**	**40**	<2.5	<2.5	**22**	**310**	<2.5
	3/23/2015	**13**	<50	**16**	**46**	<2.5	<2.5	**25**	**340**	<2.5
	5/19/2015	<12	<50	**15**	**41**	<2.5	<2.5	**22**	**320**	<2.5

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

-- = No data

Bold font denotes concentrations detected above laboratory reporting limits

* An asterisk indicates that the observed depth to groundwater intersects or is near an overlaying clay unit that may act as a localized confining unit. The true piezometric surface may have a depth less than the recorded depth to groundwater.

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

5) Frozen; no sample collected.

Table 1
Summary of Detected Volatile Organic Compounds in Groundwater and Surface Water at GSI Investigation and Observation Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Acetone	1,1-Dichloro-ethane	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Toluene[1]	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
Residential DW Criteria		13,000	730	880	70	100	1,000	200	5.0	2.0
Non-Residential DW Criteria		38,000	2,100	2,500	70	100	1,000	200	5.0	2.0
GSI Criteria		2,200	1,700	740	620	1,500[2]	270	89	200[2]	13[2]
Residential GWSL for Vapor Intrusion		4.3E+06	8.2E+06	4,300	83	360	36,000	17,000	10	2.8
Non-Residential GWSL for Vapor Intrusion		1.8E+07	3.4E+07	18,000	350	1,500	1.5E+05	71,000	41	52
Groundwater Contact Criteria		2.4E+08	3.1E+07	2.4E+06	2.0E+05	2.2E+05	5.3E+05	1.3E+06	13,000[3]	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screen Interval	Sample Collection Date									
SEEP	4/3/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/10/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	6/12/2013	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/12/2013	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/11/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/19/2015	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WL-01	4/6/2010	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	6/18/2010	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/8/2010	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/10/2010[5]	--	--	--	--	--	--	--	--	--
	2/25/2011[5]	--	--	--	--	--	--	--	--	--
	5/11/2011	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/5/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/2/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/3/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/3/2012	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/29/2013	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/28/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/11/2014	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/19/2015	<5.0	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

-- = No data

Bold font denotes concentrations detected above laboratory reporting limits

* An asterisk indicates that the observed depth to groundwater intersects or is near an overlaying clay unit that may act as a localized confining unit. The true piezometric surface may have a depth less than the recorded depth to groundwater.

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

5) Frozen; no sample collected.

Table 2
GSI Investigation Groundwater Elevation Summary
Former Tecumseh Products Company Site
Tecumseh, Michigan

Monitoring Location and Screen Interval	Top of Well Casing (ft MSL)	Static Water Level Measurement	11/30/2015 - 12/1/2015	9/1/2015
B-108 (3-6')	744.11	Depth (ft BTOC)	2.60	--
		Elevation (ft MSL)	741.51	--
B-108 (5.6-8.6') / MW-42d	746.12	Depth (ft BTOC)	4.55	3.88
		Elevation (ft MSL)	741.57	742.24
B-109 (7.4-10.4')[1]	748.23	Depth (ft BTOC)	2.52	2.45
		Elevation (ft MSL)	745.71	745.78
B-110 (7.3-10.3')	749.13	Depth (ft BTOC)	--	3.90
		Elevation (ft MSL)	--	745.23
B-111 (3.3-6.3') / MW-41	752.57	Depth (ft BTOC)	3.35	3.95
		Elevation (ft MSL)	749.22	748.62
B-112 (4.4-7.4')	757.79	Depth (ft BTOC)	--	2.65
		Elevation (ft MSL)	--	755.14
B-113 (2-5')	743.65	Depth (ft BTOC)	2.00	--
		Elevation (ft MSL)	741.65	--
B-113 (5-8')	743.03	Depth (ft BTOC)	0.95	--
		Elevation (ft MSL)	742.08	--
B-114 (4-7')	745.06	Depth (ft BTOC)	4.30	--
		Elevation (ft MSL)	740.76	--
B-114 (7.4-10.4')	745.25	Depth (ft BTOC)	5.47	--
		Elevation (ft MSL)	739.78	--
MW-14d (37.5-42.5')	780.51	Depth (ft BTOC)	30.20	--
		Elevation (ft MSL)	750.31	--
MW-17s (3-8')	754.49	Depth (ft BTOC)	5.41	--
		Elevation (ft MSL)	749.08	--
MW-20s (8-13')	783.16	Depth (ft BTOC)	5.84	--
		Elevation (ft MSL)	777.32	--
MW-21 (28.5-33.5')	780.85	Depth (ft BTOC)	29.66	--
		Elevation (ft MSL)	751.19	--
MW-22 (25-30')	782.62	Depth (ft BTOC)	25.06	--
		Elevation (ft MSL)	757.56	--
MW-27s (7-12')	781.39	Depth (ft BTOC)	3.68	--
		Elevation (ft MSL)	777.71	--
MW-31 (33.3-38.3')	782.36	Depth (ft BTOC)	32.95	--
		Elevation (ft MSL)	749.41	--
MW-36s (16.5-21.5')	793.95	Depth (ft BTOC)	16.03	--
		Elevation (ft MSL)	777.92	--
MW-38d (29-34')	783.55	Depth (ft BTOC)	31.53	--
		Elevation (ft MSL)	752.02	--
MW-39s (15.5-20.5')	792.84	Depth (ft BTOC)	14.95	--
		Elevation (ft MSL)	777.89	--
MW-40s (20-25')	776.49	Depth (ft BTOC)	22.58	--
		Elevation (ft MSL)	753.91	--
PRB-01s (6-11')	784.06	Depth (ft BTOC)	7.04	--
		Elevation (ft MSL)	777.02	--
PRB-02s (6-11')	784.07	Depth (ft BTOC)	7.08	--
		Elevation (ft MSL)	776.99	--

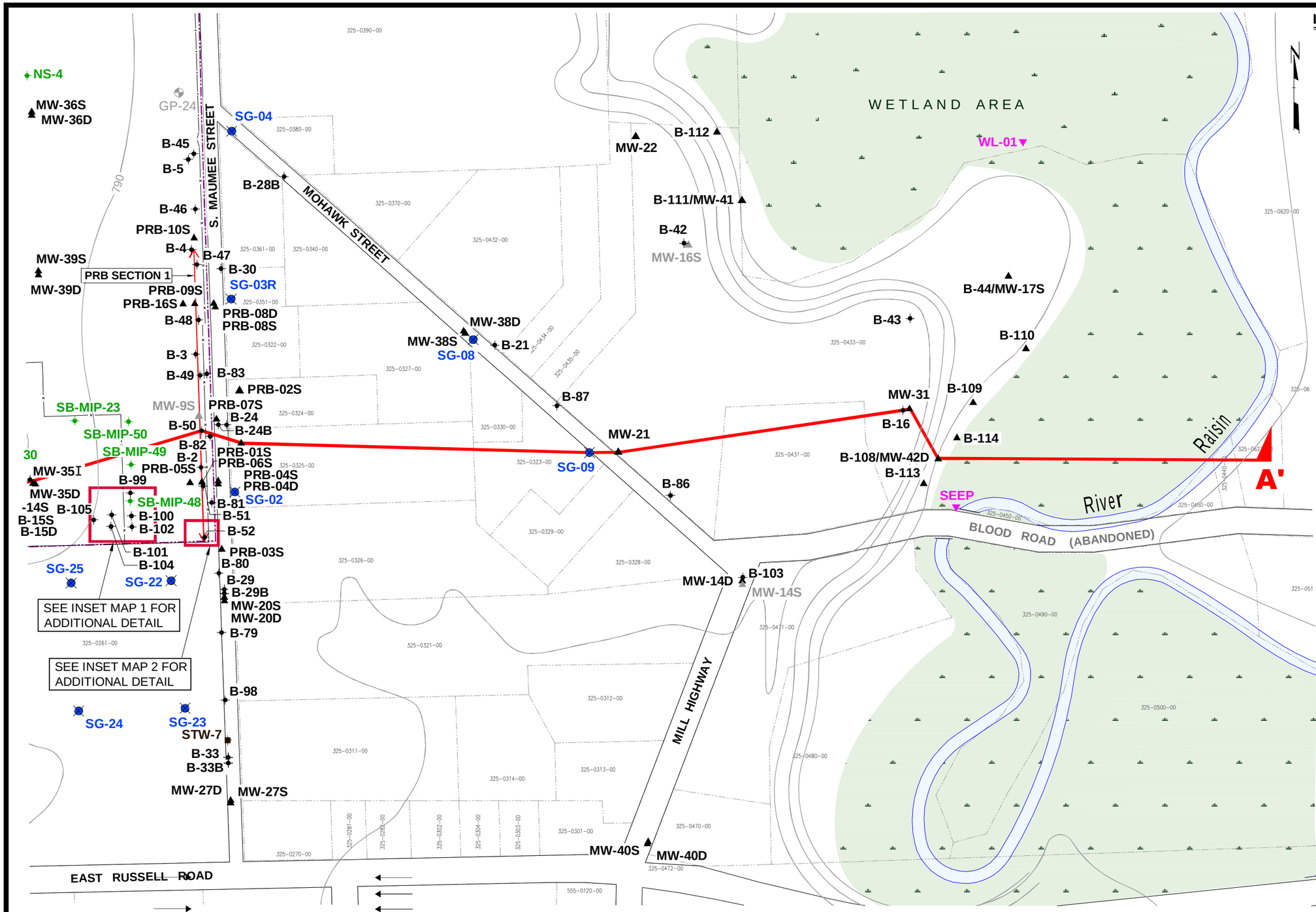
Notes:

Survey conducted to feet Mean Sea Level by Midwestern Consultants, Inc. (2015)

ft MSL - feet above Mean Sea Level, ft BTOC - feet Below Top of Casing

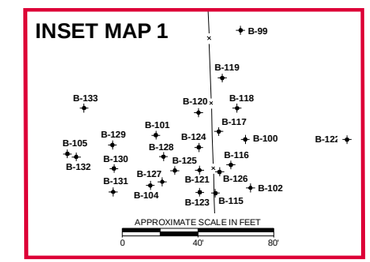
[1] Water level collected during slug test conducted 12/9/2015.

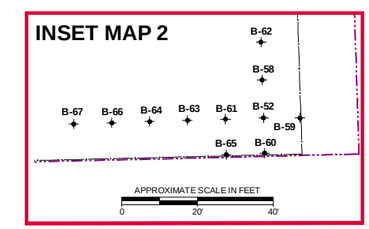
Figures



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE





0 125' 250' 375' 500'
APPROXIMATE SCALE IN FEET

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

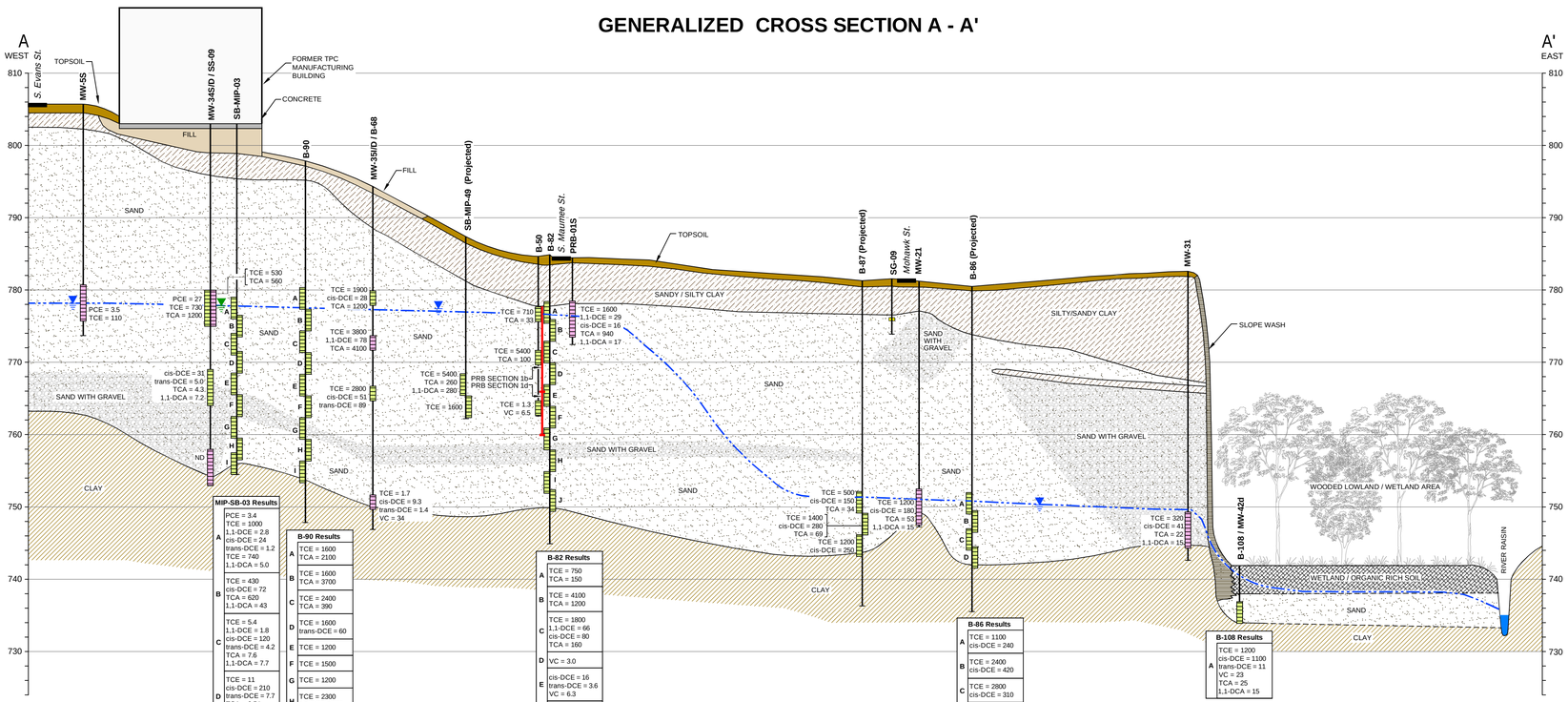
TITLE: SITE LAYOUT AND SAMPLE LOCATIONS

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0001	
CHECKED BY: SBH		FILE NO. 246667.0001.01.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 1	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0001_GSI\246667.0001.01.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.366663
Dwg Size: 1.80 Mb
Plot Date: January 27, 2016
Plot Time: 7:40 AM
Attached Xref's: bm150110 (Filled)
Attached Images: TCE_Pega_1; VOCs;
Layout: FIG01 Site LO & Sample Locs

GENERALIZED CROSS SECTION A - A'



MIP-SB-03 Results

A	TCE = 3.4 TCE = 1000 1,1-DCE = 2.8 cis-DCE = 24 trans-DCE = 1.2 TCE = 740 1,1-DCA = 5.0
B	TCE = 430 cis-DCE = 72 TCA = 620 1,1-DCA = 43
C	TCE = 5.4 1,1-DCE = 1.8 cis-DCE = 120 trans-DCE = 4.2 TCA = 7.6 1,1-DCA = 7.7
D	TCE = 11 cis-DCE = 210 trans-DCE = 7.7 TCA = 0.54 1,1-DCA = 6.5
E	TCE = 6.1 cis-DCE = 150 trans-DCE = 3.8 1,1-DCA = 2.7
F	TCE = 24 cis-DCE = 110 trans-DCE = 3.8 TCA = 0.63 1,1-DCA = 4.2
G	TCE = 140 cis-DCE = 79 trans-DCE = 4.4
H	TCE = 260 cis-DCE = 230 trans-DCE = 6.0
I	TCE = 240 cis-DCE = 260 VC = 61

B-90 Results

A	TCE = 1600 TCA = 2100
B	TCE = 1600 TCA = 3700
C	TCE = 2400 TCA = 390
D	TCE = 1600 trans-DCE = 60
E	TCE = 1200
F	TCE = 1500
G	TCE = 1200
H	TCE = 2300 cis-DCE = 330
I	TCE = 1500 cis-DCE = 420 trans-DCE = 89

B-82 Results

A	TCE = 750 TCA = 150
B	TCE = 4100 TCA = 1200
C	TCE = 1800 1,1-DCE = 66 cis-DCE = 80 TCA = 160
D	VC = 3.0
E	cis-DCE = 16 trans-DCE = 3.6 VC = 6.3
F	cis-DCE = 76 trans-DCE = 71
G	VC = 11
H	VC = 11
I	VC = 11
J	VC = 12

B-86 Results

A	TCE = 1100 cis-DCE = 240
B	TCE = 2400 cis-DCE = 420
C	TCE = 2800 cis-DCE = 310
D	TCE = 2600 cis-DCE = 250 TCA = 140

B-108 Results

A	TCE = 1200 cis-DCE = 1100 trans-DCE = 11 VC = 23 TCA = 25 1,1-DCA = 15

LEGEND

- TOPSOIL
- SAND
- CLAY
- SILTY SAND
- ORGANIC RICH WETLAND SOIL / MUCK
- SANDY / SILTY CLAY
- CONCRETE
- FILL
- COARSE GRAINED SOILS (5)
- SLOPE WASH

- STRATIGRAPHIC BOUNDARY BASED ON NEAREST SOIL BORING OR MONITORING WELL (DASHED WHERE INFERRED)
- APPROXIMATE GROUNDWATER ELEVATION
- PIEZOMETRIC WATER LEVEL INDICATOR (DEEP WELL)
- TEMPORARY WELL SCREEN
- WELL SCREEN
- SOIL GAS SAMPLE POINT SCREEN

PCE	=	TETRACHLOROETHENE
TCE	=	TRICHLOROETHENE
TCA	=	1,1,1-TRICHLOROETHANE
1,1-DCE	=	1,1-DICHLOROETHENE
1,1-DCA	=	1,1-DICHLOROETHANE
cis-DCE	=	1,2-cis-DICHLOROETHENE
trans-DCE	=	1,2-trans-DICHLOROETHENE
VC	=	VINYL CHLORIDE

NOTES

1. GROUND SURFACE AND STRATIGRAPHIC CONTACTS ARE APPROXIMATE AND EXTRAPOLATED FROM NEAREST SOIL BORING DATA.
2. SEE FIGURE 1 FOR LOCATION / ORIENTATION OF THIS GEOLOGIC CROSS SECTION.
3. GROUNDWATER ANALYTICAL DATA AND GROUNDWATER ELEVATIONS FROM SEPTEMBER 2015.
4. DETECTED GROUNDWATER CONCENTRATIONS FOR CONSTITUENTS OF HIGHEST CONCERN ARE PROVIDED IN MICROGRAMS PER LITER.
5. COARSE GRAINED SOILS INCLUDE FINE GRAVEL, GRAVEL WITH SAND, SAND WITH GRAVEL, AND COARSE SAND.

VERTICAL SCALE 0 10' 20'

APPROXIMATE HORIZONTAL SCALE 0 200' 400'

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJECT: **FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN**

TITLE: **CROSS SECTION A - A'**

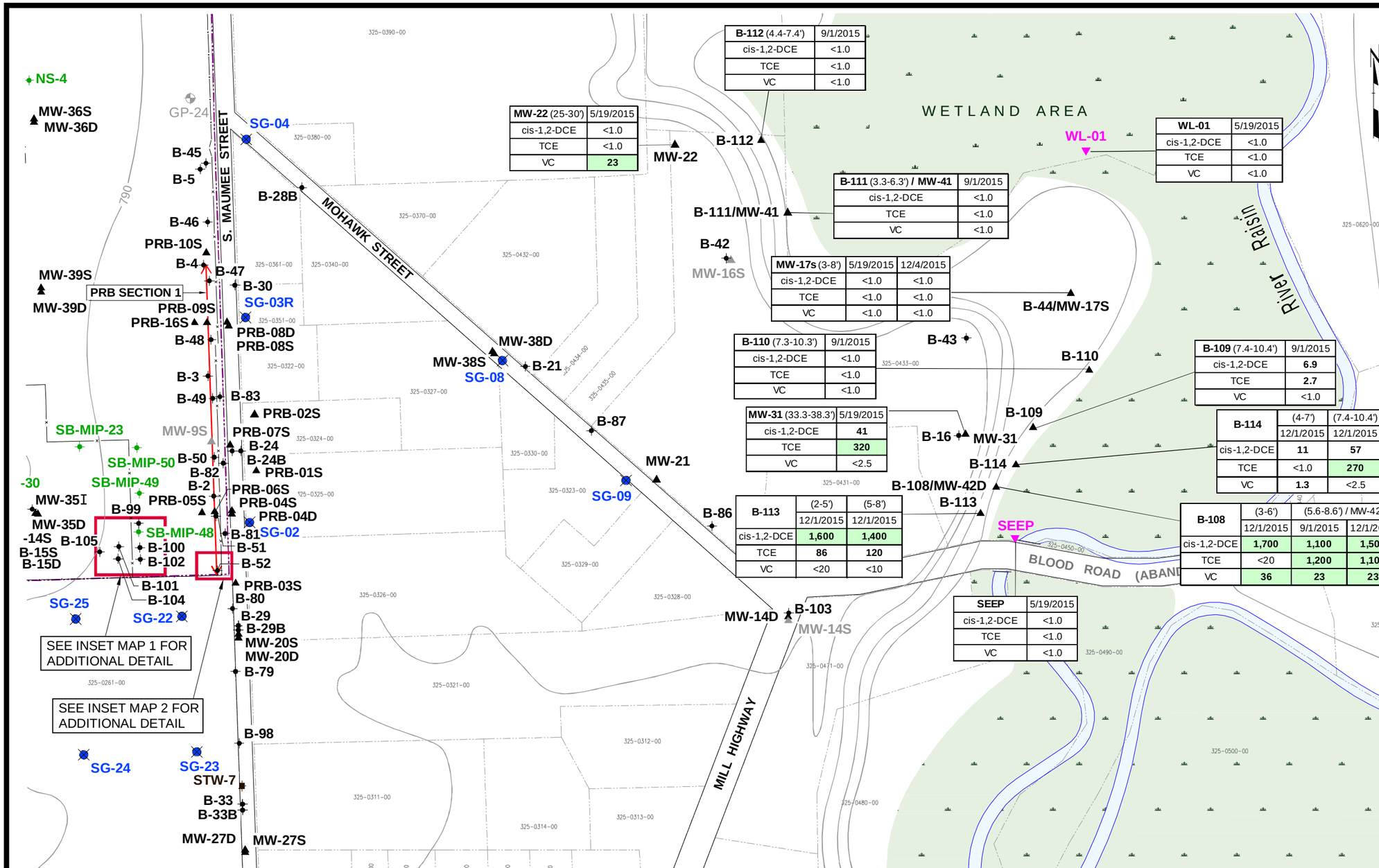
DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0001	
CHECKED BY: SBH		FILE NO. **246667.0001.02.dwg**	
APPROVED BY: GC	DATE PRINTED:	**FIGURE 2**	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667.0001_GIS\246667.0001.02.dwg
Opening Tab: STEHLE, EMMAH
Drawing Plot Scale: 0.000000

Dwg Size: 1.15 Mb
Plot Date: January 27, 2016
Plot Time: 7:01 AM

Attached Xrefs:
Attached Images:
Layers: F0202.15 AA



B-112 (4.4-7.4')	9/1/2015
cis-1,2-DCE	<1.0
TCE	<1.0
VC	<1.0

MW-22 (25-30')	5/19/2015
cis-1,2-DCE	<1.0
TCE	<1.0
VC	23

WL-01	5/19/2015
cis-1,2-DCE	<1.0
TCE	<1.0
VC	<1.0

B-111 (3.3-6.3') / MW-41	9/1/2015
cis-1,2-DCE	<1.0
TCE	<1.0
VC	<1.0

MW-17s (3-8')	5/19/2015	12/4/2015
cis-1,2-DCE	<1.0	<1.0
TCE	<1.0	<1.0
VC	<1.0	<1.0

B-110 (7.3-10.3')	9/1/2015
cis-1,2-DCE	<1.0
TCE	<1.0
VC	<1.0

B-109 (7.4-10.4')	9/1/2015
cis-1,2-DCE	6.9
TCE	2.7
VC	<1.0

MW-31 (33.3-38.3')	5/19/2015
cis-1,2-DCE	41
TCE	320
VC	<2.5

B-114	(4-7')	(7.4-10.4')
	12/1/2015	12/1/2015
cis-1,2-DCE	11	57
TCE	<1.0	270
VC	1.3	<2.5

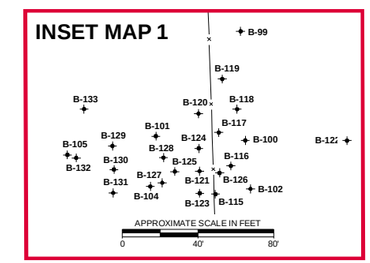
B-113	(2-5')	(5-8')
	12/1/2015	12/1/2015
cis-1,2-DCE	1,600	1,400
TCE	86	120
VC	<20	<10

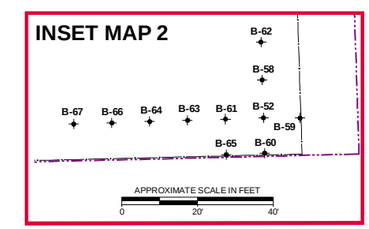
B-108	(3-6')	(5.6-8.6') / MW-42d	
	12/1/2015	9/1/2015	12/1/2015
cis-1,2-DCE	1,700	1,100	1,500
TCE	<20	1,200	1,100
VC	36	23	23

SEEP	5/19/2015
cis-1,2-DCE	<1.0
TCE	<1.0
VC	<1.0

LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE





0 125' 250' 375' 500'
APPROXIMATE SCALE IN FEET

DATA KEY

	B-114	(4-7')	(7.4-10.4')	
SAMPLE LOCATION →				← SAMPLE DEPTH
		12/1/2015	12/1/2015	← DATE SAMPLED
cis-1,2-DICHLOROETHENE →	cis-1,2-DCE	11	57	← SAMPLE RESULTS in ug/L
TRICHLOROETHENE →	TCE	<1.0	270	
VINYL CHLORIDE →	VC	1.3	<2.5	

MICHIGAN PART 201 GSI CRITERIA	
cis-1,2-DCE	620
TCE	200*
VC	13*

* Criteria is not protective for surface water used as a drinking water source.

Green shading denotes concentrations above one or more Michigan Part 201 Cleanup Criteria.
BOLD font denotes concentrations detected above laboratory reporting limits.

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. GROUNDWATER/SURFACE WATER INTERFACE (GSI) CRITERIA FROM MDEQ RRD PART 201 GENERIC CLEANUP CRITERIA/PART 213 RISK BASED CLEANUP LEVELS, DECEMBER 30, 2013.

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

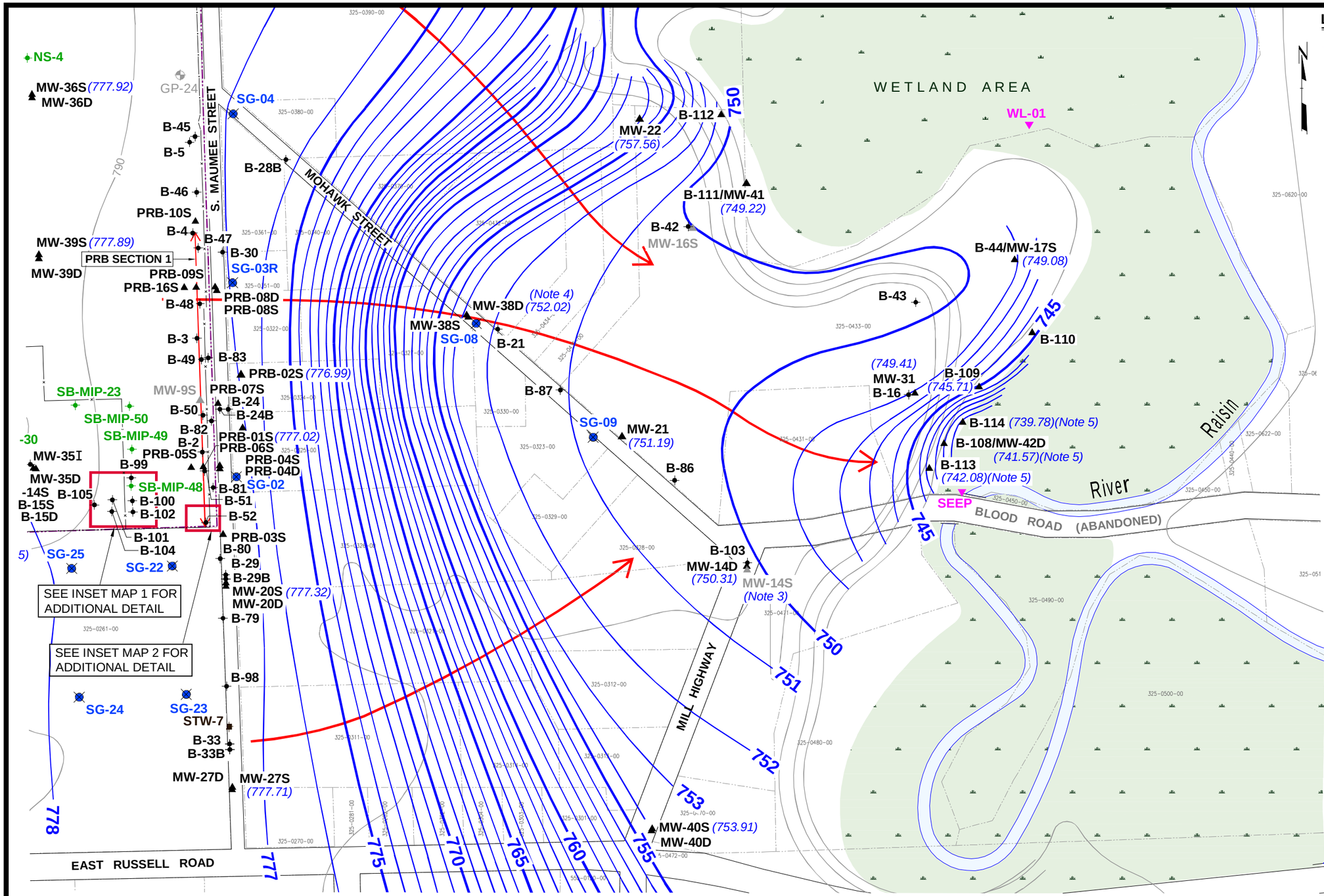
PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: SUMMARY OF VOCs IN GROUNDWATER AT GSI LOCATIONS

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0001	
CHECKED BY: MP		FILE NO. 246667.0001.03.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 3	
DATE: JANUARY 2016			

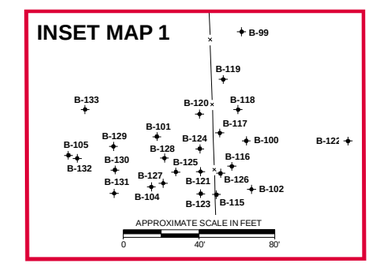
TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

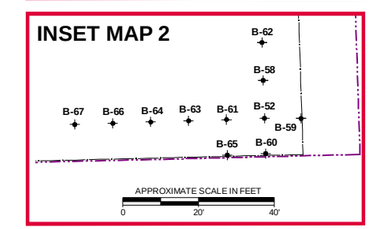
PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0001_GSI\246667.0001.03.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.366663
Dwg Size: 2.40 Mb
Plot Date: January 27, 2016
Plot Time: 7:51 AM
Attached Xref's: bm100110 (Filled)
Attached Images: TCE_Pegs_1; VOCs;
Layout: FIG03 VOC GW at GSI Locs



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- 770 — 5 FOOT GROUNDWATER CONTOUR
- 771 — 1 FOOT GROUNDWATER CONTOUR
- (780.26) — GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION





0 125' 250' 375' 500'
APPROXIMATE SCALE IN FEET

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. THE GROUNDWATER ELEVATION MEASURED AT MW-14D WAS USED TO DEVELOP GROUNDWATER CONTOURS, BECAUSE MW-14D IS SCREENED IN THE DEEPER WATER BEARING UNIT WHICH IS HYDRAULICALLY CONNECTED TO THE SITE. MW-14S WAS SCREENED IN A DIFFERENT, PERCHED, WATER BEARING UNIT THAN THE OTHER SHALLOW MONITORING WELLS ON-SITE AND HAS SINCE BEEN ABANDONED.
4. DUE TO THE PRESENCE OF AN INTERMEDIATE CLAY LAYER UNDERLAIN BY A HIGHLY PERMEABLE SAND AND GRAVEL UNIT, THE AQUIFER ISBIFURCATED AT MONITORING WELL MW-38S/D. BOTH THE SHALLOW AND THE DEEP WELLS ARE HYDRAULICALLY CONNECTED TO THE SITE. THE WATER LEVEL IN THE DEEPER WELL, WHICH IS SCREENED IN THE HIGHER PERMEABILITY UNIT, WAS USED TO ILLUSTRATE GROUNDWATER CONTOURS AND HORIZONTAL GRADIENT ACROSS THIS AREA.
5. DEEP WELLS USED TO DETERMINE GROUNDWATER CONTOURS.

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

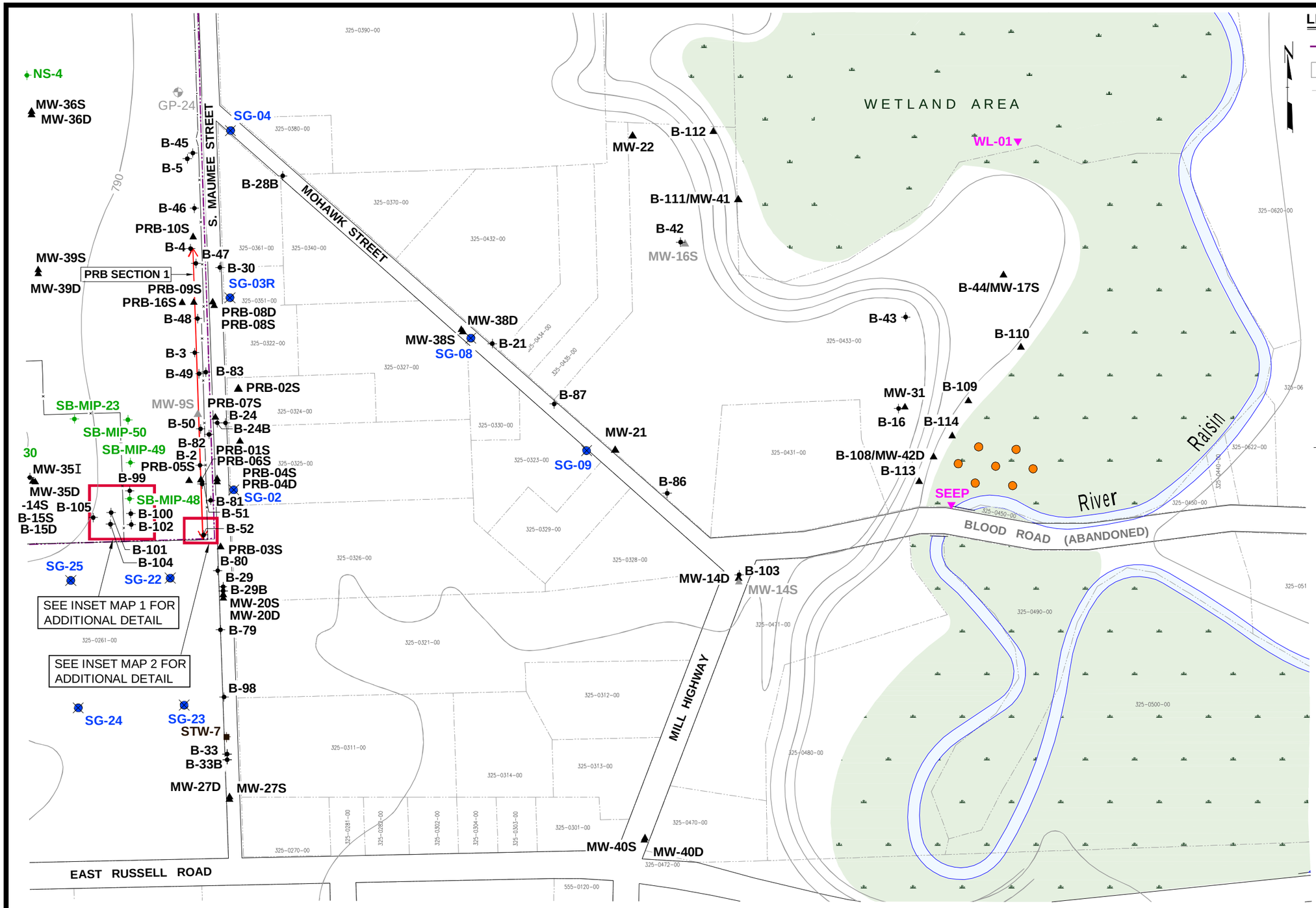
PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: GROUNDWATER CONTOUR MAP
NOVEMBER-DECEMBER 2015

DRAWN BY: DGS	SCALE:	PROJ. NO.	246667.0001
CHECKED BY: SBHUL	AS INDICATED	FILE NO.	246667.0001.04.dwg
APPROVED BY: GC	DATE PRINTED:	FIGURE 4	
DATE: JANUARY 2016			

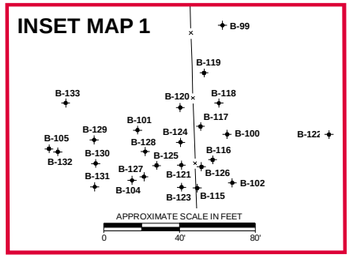
TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

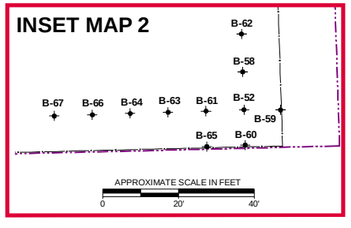
PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0001_GSI\246667.0001.04.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.3869663
Dwg Size: 1.84 Mb
Plot Date: January 27, 2016
Plot Time: 11:03 AM
Attached Xref's: bm100110 (Filled)
Attached Images: TCE_Pega_1; VOCs;
Layout: FIGM GW Contours



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- PROPOSED PORE WATER SAMPLING LOCATION
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE





0 125' 250' 375' 500'
APPROXIMATE SCALE IN FEET

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: PROPOSED PORE WATER SAMPLING LOCATIONS

DRAWN BY: DGS	SCALE:	PROJ. NO. 240003.0001	
CHECKED BY: SBH	AS INDICATED	FILE NO. 246867.0001.05.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 5	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: JA_TRC\Tecumseh Products\Tecumseh MI\0246867\0001_GIS\246867_0001.05.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.3868663
Dwg Size: 1.80 Mb
Plot Date: January 27, 2016
Plot Time: 7:53 AM
Attached Xref's: bm100110 (Filled)
Attached Images: TCE_Pegs_1; VOCs;
Layout: FIG05 Prop Pore Wtr Samples

Attachment 1
Soil Boring Logs and Well Construction Diagrams
(GSI Investigation Area)

SOIL BORING LOG

TRC

BORING NO. B-108s

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC Supplemental GSI	8/25/15	8/25/15	220003.0001

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Hand Auger	741.8	744.11	6.0	3

Boring Location:	Personnel	Drilling Equipment:
N: 180796.22 E: 13241185.14	Logged By - M. Powers Driller - J. Fojtik	Hand Auger

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Tecumseh	Lenawee	MI	While Drilling: Date/Time 11/30/15 00:00 Depth (ft bgs) 0.0 After Drilling: Date/Time 12/1/15 10:55 Depth (ft bgs) 0.18

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 NR	0		2	**SILT** mostly silt, trace fine sand, very dark brown (10YR 2/2), no odor, saturated, very loose, organic rich, roots.	SM		Geology logged at B-108d. Temporary well blind pushed to target depth.
			4	Changes to trace coarse sand, very dark grayish brown (10YR 3/2), medium dense to dense at 4.0 feet.	SP		
				POORLY GRADED SAND mostly fine to medium sand, trace to few silt, trace clay, very dark gray (10YR 3/1), no odor, saturated, dense.			
			6	Stainless steel drive point well hand driven to 6.0 feet.			Temporary well installed to total depth of 6.0 feet.
				End of boring at 6.0 feet.			
			8				
			10				
			12				
			14				
			16				
			18				

Signature:	Firm:	
Mellisa Powers	TRC Environmental Corporation 1540 Eisenhower Place Ann Arbor, MI 48108	(734) 971-7080 Fax (734) 971-9022

WELL CONSTRUCTION LOG

TRC

WELL NO. B-108d/ MW-42d

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC Supplemental GSI	8/25/15	8/25/15	220003.0001

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Hand Auger	742.1	746.12	8.6	3

Boring Location:	Personnel	Drilling Equipment:
N: 180795.57 E: 13241186.74	Logged By - M. Powers Driller - J. Fojtik	Hand Auger

Civil Town/City/or Village:	County:	State:	Water Level Observations:			
Tecumseh	Lenawee	MI	While Drilling:	Date/Time 8/25/15 00:00	Depth (ft bgs)	0.0
			After Drilling:	Date/Time 9/1/15 11:10	Depth (ft bgs)	-0.2

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 HA	100			**SILT** mostly silt, trace fine sand, very dark brown (10YR 2/2), no odor, saturated, very loose, organic rich, roots.				
2 HA	100							
3 HA	100		2		SM			
4 HA	100							
5 HA	75		4	Changes to trace coarse sand, very dark grayish brown (10YR 3/2), medium dense to dense at 4.0 feet.	SP			
				POORLY GRADED SAND mostly fine to medium sand, trace to few silt, trace clay, very dark gray (10YR 3/1), no odor, saturated, dense.				Slough prevented hand auger advancement past 5.0 feet.
6 NR	0		6	Stainless steel drive point well hand driven from approximately 5.0 to 8.6 feet.				
			8					Refusal due to density change at 8.6 feet.
				End of boring at 8.6 feet below ground surface, refusal.				Deep monitoring well installed to total depth of 8.6 feet.
			10					
			12					
			14					
			16					
			18					

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, MI 48108
(734) 971-7080
Fax (734) 971-9022

SOIL BORING LOG

TRC

BORING NO. B-109

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC Supplemental GSI	8/25/15	8/25/15	220003.0001

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Hand Auger	745.7	748.23	10.4	3

Boring Location:	Personnel	Drilling Equipment:
N: 180936.99 E: 13241273.32	Logged By - M. Powers Driller - J. Fojtik	Hand Auger

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 8/25/15 00:00 ▽ Depth (ft bgs) 0.0
After Drilling: Date/Time 9/1/15 10:08 ▼ Depth (ft bgs) -0.1

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 HA	100			**SILT** mostly silt, trace fine sand, very dark brown (10YR 2/2), no odor, saturated, very loose, organic rich, roots.			
2 HA	100		2				
3 HA	100				SM		
4 HA	100		4				
5 HA	100			Changes to dark brown (7.5YR 3/2), moist, dense at 4.0 feet.			
6 HA	75		6	**POORLY GRADED SAND WITH SILT** mostly fine to medium sand, few to little silt, trace clay, very dark gray (10YR 3/1), no odor, saturated, dense.	SP-SM		Slough prevented hand auger advancement past 6.0 feet.
7 NR	0		8	Stainless steel drive point well hand driven from approximately 6.0 to 10.4 feet.			
			10	End of boring at approximately 10.4 feet below ground surface, refusal.			Refusal due to density change at approximately 10 feet. Temporary well installed to total depth of 10.4 feet.
			12				
			14				
			16				
			18				

Signature: Mellissa Powers

Firm: TRC Environmental Corporation (734) 971-7080
1540 Eisenhower Place Ann Arbor, MI 48108 Fax (734) 971-9022

SOIL BORING LOG

TRC

BORING NO. B-110

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC Supplemental GSI	8/25/15	8/25/15	220003.0001

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Hand Auger	746.5	749.13	10.3	3

Boring Location:	Personnel	Drilling Equipment:
N: 181073.72 E: 13241406.79	Logged By - M. Powers Driller - J. Fojtik	Hand Auger

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Tecumseh	Lenawee	MI	While Drilling: Date/Time 8/25/15 00:00 ▽ Depth (ft bgs) 0.0 After Drilling: Date/Time 9/1/15 08:59 ▼ Depth (ft bgs) 1.2

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 HA	100			**SILT** mostly silt, trace fine sand, very dark brown (10YR 2/2), no odor, saturated, very loose, organic rich, roots.	ML		
2 HA	100		2	**SILTY SAND** mostly fine to coarse sand, little to some silt, few coarse angular gravel, very light brown (10YR 6/2), no odor, saturated, very loose, wood fragments, organic rich.	SM		
3 HA	100						
4 HA	100		4				
5 HA	75						
6 HA	50		6	Stainless steel drive point well hand driven from approximately 6.0 to 10.3 feet.			Slough prevented hand auger advancement past 6.0 feet.
7 NR	0		8				
			10	End of boring 10.3' below ground surface, refusal.			Refusal due to density change at 10.0 feet. Temporary well installed to total depth of 10.3 feet.
			12				
			14				
			16				
			18				

SOIL BORING WELL CONSTRUCTION LOG 220003_2015_GSI.GPJ TRC_CORP.GDT 220003.0001 1/26/16

Signature: Mellissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, MI 48108
(734) 971-7080
Fax (734) 971-9022

WELL CONSTRUCTION LOG

TRC

WELL NO. B-111/ MW-41

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC Supplemental GSI	8/26/15	8/26/15	220003.0001

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Hand Auger	749.5	752.57	7.0	3

Boring Location:	Personnel	Drilling Equipment:
N: 181447.58 E: 13240689.35	Logged By - M. Powers Driller - J. Fojtik	Hand Auger

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 8/26/15 00:00 ▽ Depth (ft bgs) 2.28
After Drilling: Date/Time 9/1/15 13:00 ▼ Depth (ft bgs) 0.59

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 HA	100			▼ **SILT** mostly silt, few coarse gravel, trace fine sand, very dark brown (10YR 3/2), no odor, wet, very loose, organic rich, roots.	SM			
2 HA	100							
3 HA	100		2	▽ Changes to saturated at 2.0 feet.				
				WELL GRADED SAND WITH SILT mostly fine to coarse sand, little to some silt, very light brown (10YR 6/2), no odor, saturated, very loose, wood fragments, organic rich.	SW-SM			
4 HA	100				CL			
5 HA	100		4	**LEAN CLAY** mostly lean clay, few coarse sand, trace silt, medium plasticity, very dark gray (10YR 3/1), moist, dense, shells, trace organics.				
6 HA	75			**PEAT** mostly peat, moist.				Slough prevented hand auger advancement past 6.0 feet.
7 NR	0		6	Stainless steel drive point well hand driven from approximately 6.0 to 7.0 feet.				Refusal due to density change at 7.0 feet.
				End of boring 7.0 feet below ground surface.				Monitoring well installed to total depth of 6.3 feet.

8 10 12 14 16 18

SOIL BORING WELL CONSTRUCTION LOG 220003_2015_GSI.GPJ TRC_CORP.GDT 220003.0001 1/26/16

Signature: Mellissa Powers

Firm: TRC Environmental Corporation (734) 971-7080
1540 Eisenhower Place Ann Arbor, MI 48108 Fax (734) 971-9022

SOIL BORING LOG

TRC

BORING NO. B-112

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC Supplemental GSI	8/26/15	8/26/15	220003.0001

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Hand Auger	755.6	757.79	7.4	3

Boring Location:	Personnel	Drilling Equipment:
N: 181620.57 E: 13240626.71	Logged By - M. Powers Driller - J. Fojtik	Hand Auger

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Tecumseh	Lenawee	MI	While Drilling: Date/Time 8/26/15 00:00 ▽ Depth (ft bgs) 0.0 After Drilling: Date/Time 9/1/15 13:37 ▼ Depth (ft bgs) 0.4

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 HA	100			▼ **SILT** mostly silt, trace fine sand, very dark brown (10YR 2/2), no odor, saturated, very loose, organic rich, roots.	SM		
2 HA	100						
3 HA	100		2	**SILTY SAND** mostly fine to coarse sand, little to some silt, few coarse angular gravel, very light brown (10YR 6/2), no odor, saturated, very loose, organic rich.	SM		
4 HA	100			**SILT WITH SAND** mostly silt, little to some fine to medium sand, little clay, trace coarse sand, dark gray (10YR 4/1), no odor, saturated, dense.	ML		
5 HA	100		4	**POORLY GRADED SAND WITH SILT** mostly fine to medium sand, few to little silt, few subrounded to rounded fine to coarse gravel, trace clay, trace coarse sand, very dark grayish brown (10YR 3/2), no odor, saturated, very dense.	SP-SM		
6 HA	100						
7 NR	0		6	Stainless steel drive point well hand driven from approximately 6.0 to 7.4 feet.			Slough prevented hand auger advancement past 6.0 feet.
				End of boring 7.4 feet below ground surface.			Refusal due to density change at 7.4 feet. Temporary well installed to total depth of 7.4 feet.
			8				
			10				
			12				
			14				
			16				
			18				

SOIL BORING WELL CONSTRUCTION LOG 220003_2015_GSI.GPJ TRC_CORP.GDT 220003.0001 1/26/16

Signature: Mellissa Powers

Firm: TRC Environmental Corporation (734) 971-7080
1540 Eisenhower Place Ann Arbor, MI 48108 Fax (734) 971-9022

SOIL BORING LOG

TRC

BORING NO. B-113s

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC Supplemental GSI	11/30/15	11/30/15	220003.0001

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Hand Auger	741.1	743.65	5.0	3

Boring Location:	Personnel	Drilling Equipment:
N: 180731.94 E: 13241148.86	Logged By - M. Powers Driller - J. Fojtik	Hand Auger

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Tecumseh	Lenawee	MI	While Drilling: Date/Time 11/30/15 00:00 ▽ Depth (ft bgs) 0.0 After Drilling: Date/Time 12/1/15 13:14 ▼ Depth (ft bgs) -0.83

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
				SILTY SAND mostly fine to coarse sand, little to some silt, trace to few clay, dark gray (10YR 4/1), no odor, saturated, dense.	SM		Geology logged at B-113d. Temporary well blind pushed to target depth.
1 NR	0		2	**SANDY SILT** mostly silt, some fine sand, trace to few clay, trace medium to coarse sand, very dark grayish brown (10YR 3/2), no odor, saturated, medium dense to dense.	ML		
			4	**WELL GRADED SAND WITH GRAVEL** mostly fine to coarse sand, little to some fine to coarse gravel, few silt, trace clay, dark gray (10YR 4/1), no odor, saturated, medium dense to dense.	SW		
				End of boring at 5.0 feet below ground surface.			Temporary well installed to total depth of 5.0 feet.
			6				
			8				
			10				
			12				
			14				
			16				
			18				

SOIL BORING WELL CONSTRUCTION LOG 220003_2015_GSI.GPJ TRC_CORP.GDT 220003.0001 1/26/16

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, MI 48108
(734) 971-7080
Fax (734) 971-9022

SOIL BORING LOG

TRC

BORING NO. B-113d

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC Supplemental GSI	11/30/15	11/30/15	220003.0001

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Hand Auger	740.8	743.03	8.5	3

Boring Location:	Personnel	Drilling Equipment:
N: 180732.65 E: 13241149.69	Logged By - M. Powers Driller - J. Fojtik	Hand Auger

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Tecumseh	Lenawee	MI	While Drilling: Date/Time 11/30/15 00:00 ▽ Depth (ft bgs) 0.0 After Drilling: Date/Time 12/1/15 12:24 ▼ Depth (ft bgs) -1.13

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 HA	100			**SILTY SAND** mostly fine to coarse sand, little to some silt, trace to few clay, dark gray (10YR 4/1), no odor, saturated, dense.	SM		
2 HA	100			**SANDY SILT** mostly silt, some fine sand, trace to few clay, trace medium to coarse sand, very dark grayish brown (10YR 3/2), no odor, saturated, medium dense to dense.	ML		
3 HA	100		2				
4 HA	100						
5 HA	100		4	**WELL GRADED SAND WITH GRAVEL** mostly fine to coarse sand, little to some fine to coarse gravel, few silt, trace clay, dark gray (10YR 4/1), no odor, saturated, medium dense to dense.	SW		
6 HA	50						Shallow temporary well installed to total depth of 5.0 feet. Slough prevented hand auger advancement past 5.5 feet.
7 NR	0		6	Stainless steel drive point well hand driven from approximately 5.5 to 8.5 feet.			Deep temporary well installed to total depth of 8.0 feet.
			8	End of boring at 8.5 feet below ground surface, refusal.			Refusal due to density change at 8.5 feet.
			10				
			12				
			14				
			16				
			18				

Signature: Mellissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, MI 48108
(734) 971-7080
Fax (734) 971-9022

SOIL BORING LOG

TRC

BORING NO. B-114s

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC Supplemental GSI	11/30/15	11/30/15	220003.0001

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Hand Auger	742.6	745.06	7.0	3

Boring Location:
N: 180847.88 E: 13241231.35

Personnel
Logged By - M. Powers
Driller - J. Fojtik

Drilling Equipment: Hand Auger

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 11/30/15 00:00 ▽ Depth (ft bgs) 0.0
After Drilling: Date/Time 12/1/15 11:31 ▼ Depth (ft bgs) 1.63

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 NR	0		0 ▽	**SILT** mostly silt, trace fine sand, trace to few clay, very dark grayish brown (10YR 3/2), no odor, saturated, dense, organic rich. Changes to no sand at 1.0 foot. ▼	ML		Geology logged at B-114d. Temporary well blind pushed to target depth.
			2				
			4	Changes to few to little clay at 4.0 feet.			
			6	Stainless steel drive point well hand driven to 7.0 feet.			
			8	End of boring at 7.0 feet below ground surface.			Temporary well installed to total depth of 7.0 feet.
			10				
			12				
			14				
			16				
			18				

Signature: Mellissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, MI 48108
(734) 971-7080
Fax (734) 971-9022

SOIL BORING LOG

TRC

BORING NO. B-114d

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC Supplemental GSI	11/30/15	11/30/15	220003.0001

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Hand Auger	742.8	745.25	10.4	3

Boring Location:	Personnel	Drilling Equipment:
N: 180846.90 E: 13241232.31	Logged By - M. Powers Driller - J. Fojtik	Hand Auger

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Tecumseh	Lenawee	MI	While Drilling: Date/Time 11/30/15 00:00 ▽ Depth (ft bgs) 0.0 After Drilling: Date/Time 12/1/15 10:28 ▼ Depth (ft bgs) 2.64

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 HA	100			**SILT** mostly silt, trace fine sand, trace to few clay, very dark grayish brown (10YR 3/2), no odor, saturated, dense, organic rich.			
2 HA	100			Changes to no sand at 1.0 foot.			
3 HA	100		2	▼	ML		
4 HA	100						
5 HA	100		4	Changes to few to little clay at 4.0 feet.			
6 HA	50						
7 NR	0		6	Stainless steel drive point well hand driven from approximately 5.5 to 10.4 feet.			Slough prevented hand auger advancement past 5.5 feet.
			8				Shallow temporary well installed to total depth of 7.0 feet.
			10	End of boring at 10.4 feet below ground surface, refusal			Refusal due to density change at 10.4 feet. Deep temporary well installed to total depth of 10.4 feet.
			12				
			14				
			16				
			18				

Signature: Melissa Powers

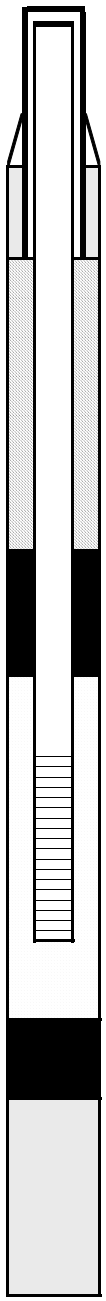
Firm: TRC Environmental Corporation (734) 971-7080
1540 Eisenhower Place Ann Arbor, MI 48108 Fax (734) 971-9022

SOIL BORING WELL CONSTRUCTION LOG 220003_2015_GSI.GPJ TRC_CORP.GDT 220003.0001 1/26/16

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC GSI Well Installation		WELL ID:	**B-108d/ MW-42d**
PROJ. NO: 220003.0001	DATE INSTALLED: 8/25/2015 INSTALLED BY: M. Powers		CHECKED BY: S. Holmstrom

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
746.12	4.0	TOP OF CASING
742.1	0.0	GROUND SURFACE
	NA	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: NA
		GROUT/BACKFILL METHOD: NA
9.6'	NA	GROUT
		BENTONITE SEAL MATERIAL: MEDIUM CHIPS
	4.0	BENTONITE SEAL
736.5	5.6	TOP OF SCREEN
3.0'		FILTER PACK MATERIAL: NATURAL COLLAPSE
733.5	8.6	BOTTOM OF SCREEN
	8.6	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NA
733.5	8.6	HOLE BOTTOM



NOTES:

NO PROTECTIVE COVER INSTALLED.

CASING AND SCREEN DETAILS

TYPE OF RISER: 1-INCH STAINLESS STEEL

PIPE SCHEDULE: NA

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 1-INCH STAINLESS STEEL

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 3 IN. FROM 0 TO 6.0 FT.
1 IN. FROM 6.0 TO 8.6 FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: SURGE AND PUMP

TIME DEVELOPING: 1 HOURS

WATER REMOVED: 5 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: SLIGHTLY TURBID

COLOR BEFORE: LIGHT GRAY

CLARITY AFTER: CLEAR

COLOR AFTER: COLORLESS

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	12.6	T/PVC	8/26/2015	12:45
DTB AFTER DEVELOPING:	12.6	T/PVC	8/26/2015	13:45
SWL BEFORE DEVELOPING:	4.0	T/PVC	8/26/2015	12:45
SWL AFTER DEVELOPING:	4.0	T/PVC	8/26/2015	13:45
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

REVISED 11/2013

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC GSI Well Installation		WELL ID:	**B-111/ MW-41**
PROJ. NO: 220003.0001	DATE INSTALLED: 8/25/2015 INSTALLED BY: M. Powers		CHECKED BY: S. Holmstrom

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
752.57	3.1	TOP OF CASING
749.5	0.0	GROUND SURFACE
	NA	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: NA
		GROUT/BACKFILL METHOD: NA
9.4'		RISER PIPE LENGTH
	NA	GROUT
		BENTONITE SEAL MATERIAL: MEDIUM CHIPS
	2.0	BENTONITE SEAL
746.2	3.3	TOP OF SCREEN
3.0'		SCREEN LENGTH
		FILTER PACK MATERIAL: WASHED SAND & NATURAL COLLAPSE
743.2	6.3	BOTTOM OF SCREEN
	6.3	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NATURAL COLLAPSE
742.5	7.0	HOLE BOTTOM

NOTES:

NO PROTECTIVE COVER INSTALLED.

CASING AND SCREEN DETAILS

TYPE OF RISER: 1-INCH STAINLESS STEEL

PIPE SCHEDULE: NA

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 1-INCH STAINLESS STEEL

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 3 IN. FROM 0 TO 6.0 FT.
1 IN. FROM 6.0 TO 7.0 FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: SURGE AND PUMP

TIME DEVELOPING: 0.75 HOURS

WATER REMOVED: 1 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN

CLARITY AFTER: VERY TURBID

COLOR AFTER: BROWN

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	9.4	T/PVC	8/26/2015	9:15
DTB AFTER DEVELOPING:	9.4	T/PVC	8/26/2015	10:00
SWL BEFORE DEVELOPING:	5.4	T/PVC	8/26/2015	9:15
SWL AFTER DEVELOPING:	7.3	T/PVC	8/26/2015	10:00
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

REVISED 11/2013

Attachment 2
Laboratory Analytical Data

September 14, 2015

TRC Companies. - Ann Arbor Office
Attn: Ms. Stacy Metz
1540 Eisenhower Place
Ann Arbor, MI 48108

Project: Tecumseh Products Groundwater

Dear Ms. Stacy Metz,

Enclosed is a copy of the laboratory report for the following work order(s) received by TriMatrix Laboratories:

Work Order	**Received**	**Description**
1509063	09/02/2015	Laboratory Services

This report relates only to the sample(s) as received. Test results are in compliance with the requirements of the National Environmental Laboratory Accreditation Program (NELAP) and/or one of the following certification programs:

ACLASS DoD-ELAP/ISO17025 (#ADE-1542); Arkansas DEP (#88-0730/13-049-0); Florida DEP (#E87622-24); Georgia EPD (#E87622-24); Illinois DEP (#200026/003329); Kansas DPH (#E-10302); Kentucky DEP (#0021); Louisiana DEP (#103068); Michigan DPH (#0034); Minnesota DPH (#491715); New York ELAP (#11776/48855); North Carolina DNRE (#659); Virginia DCLS (#460153/2592); Wisconsin DNR (#999472650); USDA Soil Import Permit (#P330-12-00236).

Any qualification or narration of results, including sample acceptance requirements and test exceptions to the above referenced programs, is presented in the Statement of Data Qualifications and Project Technical Narrative sections of this report. Estimates of analytical uncertainties and certification documents for the test results contained within this report are available upon request.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Jennifer L. Rice
Project Chemist

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

PROJECT TECHNICAL NARRATIVE(s)

No Project Narrative is associated with this report.

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

STATEMENT OF DATA QUALIFICATIONS

Volatile Organic Compounds by EPA Method 8260B

Qualification: The sample was received at an incorrect preservation pH.

Analysis: USEPA-8260B

Sample: 1509063-01 B-110 (7.3-10.3')

Qualification: The corresponding CCV for this analytical batch had a recovery exceeding the upper control limit of the method. A positive result for this analyte in any associated samples are considered estimated. Non-detectable results are not qualified.

Analysis: USEPA-8260B

Sample/Analyte:		
1509063-01	B-110 (7.3-10.3')	Bromomethane
1509063-01	B-110 (7.3-10.3')	Carbon Disulfide
1509063-02	DUP-01	Bromomethane
1509063-02	DUP-01	Carbon Disulfide
1509063-03	B-109 (7.4-10.4')	Bromomethane
1509063-03	B-109 (7.4-10.4')	Carbon Disulfide
1509063-04	B-108 (5.6-8.6')	Bromomethane
1509063-04	B-108 (5.6-8.6')	Carbon Disulfide
1509063-05	B-111 (3.3-6.3')	Bromomethane
1509063-05	B-111 (3.3-6.3')	Carbon Disulfide
1509063-06	B-112 (4.4-7.4')	Bromomethane
1509063-06	B-112 (4.4-7.4')	Carbon Disulfide
1509063-07	TB-01	Bromomethane
1509063-07	TB-01	Carbon Disulfide

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services
Client Sample ID:	**B-110 (7.3-10.3')**	Sampled:	09/01/15 12:20
Lab Sample ID:	**1509063-01**	Sampled By:	Javier Jasso
Matrix:	Water	Received:	09/02/15 17:35
Unit:	ug/L	Prepared:	09/08/15 08:00 By: BAG
Dilution Factor:	1	Analyzed:	09/08/15 12:22 By: BAG
QC Batch:	1509569	Analytical Batch:	5I09017

*Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	**41**	20
107-13-1	Acrylonitrile	<2.0	2.0
71-43-2	Benzene	<1.0	1.0
108-86-1	Bromobenzene	<1.0	1.0
74-97-5	Bromochloromethane	<1.0	1.0
75-27-4	Bromodichloromethane	<1.0	1.0
75-25-2	Bromoform	<1.0	1.0
*74-83-9	Bromomethane	<5.0	5.0
104-51-8	n-Butylbenzene	<1.0	1.0
135-98-8	sec-Butylbenzene	<1.0	1.0
98-06-6	tert-Butylbenzene	<1.0	1.0
*75-15-0	Carbon Disulfide	<1.0	1.0
56-23-5	Carbon Tetrachloride	<1.0	1.0
108-90-7	Chlorobenzene	<1.0	1.0
75-00-3	Chloroethane	<5.0	5.0
67-66-3	Chloroform	<1.0	1.0
74-87-3	Chloromethane	<5.0	5.0
96-12-8	1,2-Dibromo-3-chloropropane	<5.0	5.0
124-48-1	Dibromochloromethane	<1.0	1.0
106-93-4	1,2-Dibromoethane	<1.0	1.0
74-95-3	Dibromomethane	<1.0	1.0
110-57-6	trans-1,4-Dichloro-2-butene	<1.0	1.0
95-50-1	1,2-Dichlorobenzene	<1.0	1.0
541-73-1	1,3-Dichlorobenzene	<1.0	1.0
106-46-7	1,4-Dichlorobenzene	<1.0	1.0
75-71-8	Dichlorodifluoromethane	<5.0	5.0
75-34-3	1,1-Dichloroethane	<1.0	1.0
107-06-2	1,2-Dichloroethane	<1.0	1.0
75-35-4	1,1-Dichloroethene	<1.0	1.0
156-59-2	cis-1,2-Dichloroethene	<1.0	1.0
156-60-5	trans-1,2-Dichloroethene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-110 (7.3-10.3')**	Sampled:	09/01/15 12:20		
Lab Sample ID:	**1509063-01**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 12:22	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

*Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<1.0	1.0
10061-01-5	cis-1,3-Dichloropropene	<1.0	1.0
10061-02-6	trans-1,3-Dichloropropene	<1.0	1.0
100-41-4	Ethylbenzene	<1.0	1.0
60-29-7	Ethyl Ether	<5.0	5.0
591-78-6	2-Hexanone	<5.0	5.0
74-88-4	Iodomethane	<1.0	1.0
98-82-8	Isopropylbenzene	<1.0	1.0
99-87-6	4-Isopropyltoluene	<5.0	5.0
1634-04-4	Methyl tert-Butyl Ether	<5.0	5.0
75-09-2	Methylene Chloride	<5.0	5.0
78-93-3	2-Butanone (MEK)	<5.0	5.0
91-57-6	2-Methylnaphthalene	<5.0	5.0
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.0	5.0
91-20-3	Naphthalene	<5.0	5.0
103-65-1	n-Propylbenzene	<1.0	1.0
100-42-5	Styrene	<1.0	1.0
630-20-6	1,1,1,2-Tetrachloroethane	<1.0	1.0
79-34-5	1,1,2,2-Tetrachloroethane	<1.0	1.0
127-18-4	Tetrachloroethene	<1.0	1.0
109-99-9	Tetrahydrofuran	<5.0	5.0
108-88-3	Toluene	<1.0	1.0
87-61-6	1,2,3-Trichlorobenzene	<5.0	5.0
120-82-1	1,2,4-Trichlorobenzene	<5.0	5.0
71-55-6	1,1,1-Trichloroethane	<1.0	1.0
79-00-5	1,1,2-Trichloroethane	<1.0	1.0
79-01-6	Trichloroethene	<1.0	1.0
75-69-4	Trichlorofluoromethane	<1.0	1.0
96-18-4	1,2,3-Trichloropropane	<1.0	1.0
95-63-6	1,2,4-Trimethylbenzene	<1.0	1.0
108-67-8	1,3,5-Trimethylbenzene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-110 (7.3-10.3')**	Sampled:	09/01/15 12:20		
Lab Sample ID:	**1509063-01**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 12:22	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

*Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<1.0	1.0
179601-23-1	Xylene, Meta + Para	<2.0	2.0
95-47-6	Xylene, Ortho	<1.0	1.0

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*97*	*85-118*
1,2-Dichloroethane-d4	*100*	*87-122*
Toluene-d8	*100*	*85-113*
4-Bromofluorobenzene	*99*	*82-110*

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**DUP-01**	Sampled:	09/01/15 00:00		
Lab Sample ID:	**1509063-02**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 12:51	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<20	20
107-13-1	Acrylonitrile	<2.0	2.0
71-43-2	Benzene	<1.0	1.0
108-86-1	Bromobenzene	<1.0	1.0
74-97-5	Bromochloromethane	<1.0	1.0
75-27-4	Bromodichloromethane	<1.0	1.0
75-25-2	Bromoform	<1.0	1.0
*74-83-9	Bromomethane	<5.0	5.0
104-51-8	n-Butylbenzene	<1.0	1.0
135-98-8	sec-Butylbenzene	<1.0	1.0
98-06-6	tert-Butylbenzene	<1.0	1.0
*75-15-0	Carbon Disulfide	<1.0	1.0
56-23-5	Carbon Tetrachloride	<1.0	1.0
108-90-7	Chlorobenzene	<1.0	1.0
75-00-3	Chloroethane	<5.0	5.0
67-66-3	Chloroform	<1.0	1.0
74-87-3	Chloromethane	<5.0	5.0
96-12-8	1,2-Dibromo-3-chloropropane	<5.0	5.0
124-48-1	Dibromochloromethane	<1.0	1.0
106-93-4	1,2-Dibromoethane	<1.0	1.0
74-95-3	Dibromomethane	<1.0	1.0
110-57-6	trans-1,4-Dichloro-2-butene	<1.0	1.0
95-50-1	1,2-Dichlorobenzene	<1.0	1.0
541-73-1	1,3-Dichlorobenzene	<1.0	1.0
106-46-7	1,4-Dichlorobenzene	<1.0	1.0
75-71-8	Dichlorodifluoromethane	<5.0	5.0
75-34-3	1,1-Dichloroethane	**6.6**	1.0
107-06-2	1,2-Dichloroethane	<1.0	1.0
75-35-4	1,1-Dichloroethene	<1.0	1.0
156-59-2	cis-1,2-Dichloroethene	**7.1**	1.0
156-60-5	trans-1,2-Dichloroethene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**DUP-01**	Sampled:	09/01/15 00:00		
Lab Sample ID:	**1509063-02**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 12:51	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<1.0	1.0
10061-01-5	cis-1,3-Dichloropropene	<1.0	1.0
10061-02-6	trans-1,3-Dichloropropene	<1.0	1.0
100-41-4	Ethylbenzene	<1.0	1.0
60-29-7	Ethyl Ether	<5.0	5.0
591-78-6	2-Hexanone	<5.0	5.0
74-88-4	Iodomethane	<1.0	1.0
98-82-8	Isopropylbenzene	<1.0	1.0
99-87-6	4-Isopropyltoluene	<5.0	5.0
1634-04-4	Methyl tert-Butyl Ether	<5.0	5.0
75-09-2	Methylene Chloride	<5.0	5.0
78-93-3	2-Butanone (MEK)	<5.0	5.0
91-57-6	2-Methylnaphthalene	<5.0	5.0
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.0	5.0
91-20-3	Naphthalene	<5.0	5.0
103-65-1	n-Propylbenzene	<1.0	1.0
100-42-5	Styrene	<1.0	1.0
630-20-6	1,1,1,2-Tetrachloroethane	<1.0	1.0
79-34-5	1,1,2,2-Tetrachloroethane	<1.0	1.0
127-18-4	Tetrachloroethene	<1.0	1.0
109-99-9	Tetrahydrofuran	<5.0	5.0
108-88-3	Toluene	<1.0	1.0
87-61-6	1,2,3-Trichlorobenzene	<5.0	5.0
120-82-1	1,2,4-Trichlorobenzene	<5.0	5.0
71-55-6	1,1,1-Trichloroethane	<1.0	1.0
79-00-5	1,1,2-Trichloroethane	<1.0	1.0
79-01-6	Trichloroethene	**2.8**	1.0
75-69-4	Trichlorofluoromethane	<1.0	1.0
96-18-4	1,2,3-Trichloropropane	<1.0	1.0
95-63-6	1,2,4-Trimethylbenzene	<1.0	1.0
108-67-8	1,3,5-Trimethylbenzene	<1.0	1.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**DUP-01**	Sampled:	09/01/15 00:00		
Lab Sample ID:	**1509063-02**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 12:51	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<1.0	1.0
179601-23-1	Xylene, Meta + Para	<2.0	2.0
95-47-6	Xylene, Ortho	<1.0	1.0

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*97*	*85-118*
1,2-Dichloroethane-d4	*101*	*87-122*
Toluene-d8	*99*	*85-113*
4-Bromofluorobenzene	*99*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-109 (7.4-10.4')**	Sampled:	09/01/15 10:48		
Lab Sample ID:	**1509063-03**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 13:19	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<20	20
107-13-1	Acrylonitrile	<2.0	2.0
71-43-2	Benzene	<1.0	1.0
108-86-1	Bromobenzene	<1.0	1.0
74-97-5	Bromochloromethane	<1.0	1.0
75-27-4	Bromodichloromethane	<1.0	1.0
75-25-2	Bromoform	<1.0	1.0
*74-83-9	Bromomethane	<5.0	5.0
104-51-8	n-Butylbenzene	<1.0	1.0
135-98-8	sec-Butylbenzene	<1.0	1.0
98-06-6	tert-Butylbenzene	<1.0	1.0
*75-15-0	Carbon Disulfide	<1.0	1.0
56-23-5	Carbon Tetrachloride	<1.0	1.0
108-90-7	Chlorobenzene	<1.0	1.0
75-00-3	Chloroethane	<5.0	5.0
67-66-3	Chloroform	<1.0	1.0
74-87-3	Chloromethane	<5.0	5.0
96-12-8	1,2-Dibromo-3-chloropropane	<5.0	5.0
124-48-1	Dibromochloromethane	<1.0	1.0
106-93-4	1,2-Dibromoethane	<1.0	1.0
74-95-3	Dibromomethane	<1.0	1.0
110-57-6	trans-1,4-Dichloro-2-butene	<1.0	1.0
95-50-1	1,2-Dichlorobenzene	<1.0	1.0
541-73-1	1,3-Dichlorobenzene	<1.0	1.0
106-46-7	1,4-Dichlorobenzene	<1.0	1.0
75-71-8	Dichlorodifluoromethane	<5.0	5.0
75-34-3	1,1-Dichloroethane	**6.5**	1.0
107-06-2	1,2-Dichloroethane	<1.0	1.0
75-35-4	1,1-Dichloroethene	<1.0	1.0
156-59-2	cis-1,2-Dichloroethene	**6.9**	1.0
156-60-5	trans-1,2-Dichloroethene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-109 (7.4-10.4')**	Sampled:	09/01/15 10:48		
Lab Sample ID:	**1509063-03**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 13:19	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<1.0	1.0
10061-01-5	cis-1,3-Dichloropropene	<1.0	1.0
10061-02-6	trans-1,3-Dichloropropene	<1.0	1.0
100-41-4	Ethylbenzene	<1.0	1.0
60-29-7	Ethyl Ether	<5.0	5.0
591-78-6	2-Hexanone	<5.0	5.0
74-88-4	Iodomethane	<1.0	1.0
98-82-8	Isopropylbenzene	<1.0	1.0
99-87-6	4-Isopropyltoluene	<5.0	5.0
1634-04-4	Methyl tert-Butyl Ether	<5.0	5.0
75-09-2	Methylene Chloride	<5.0	5.0
78-93-3	2-Butanone (MEK)	<5.0	5.0
91-57-6	2-Methylnaphthalene	<5.0	5.0
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.0	5.0
91-20-3	Naphthalene	<5.0	5.0
103-65-1	n-Propylbenzene	<1.0	1.0
100-42-5	Styrene	<1.0	1.0
630-20-6	1,1,1,2-Tetrachloroethane	<1.0	1.0
79-34-5	1,1,2,2-Tetrachloroethane	<1.0	1.0
127-18-4	Tetrachloroethene	<1.0	1.0
109-99-9	Tetrahydrofuran	<5.0	5.0
108-88-3	Toluene	<1.0	1.0
87-61-6	1,2,3-Trichlorobenzene	<5.0	5.0
120-82-1	1,2,4-Trichlorobenzene	<5.0	5.0
71-55-6	1,1,1-Trichloroethane	<1.0	1.0
79-00-5	1,1,2-Trichloroethane	<1.0	1.0
79-01-6	Trichloroethene	**2.7**	1.0
75-69-4	Trichlorofluoromethane	<1.0	1.0
96-18-4	1,2,3-Trichloropropane	<1.0	1.0
95-63-6	1,2,4-Trimethylbenzene	<1.0	1.0
108-67-8	1,3,5-Trimethylbenzene	<1.0	1.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-109 (7.4-10.4')**	Sampled:	09/01/15 10:48		
Lab Sample ID:	**1509063-03**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 13:19	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<1.0	1.0
179601-23-1	Xylene, Meta + Para	<2.0	2.0
95-47-6	Xylene, Ortho	<1.0	1.0

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*97*	*85-118*
1,2-Dichloroethane-d4	*101*	*87-122*
Toluene-d8	*100*	*85-113*
4-Bromofluorobenzene	*99*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-108 (5.6-8.6')**	Sampled:	09/01/15 11:50		
Lab Sample ID:	**1509063-04**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	10	Analyzed:	09/08/15 15:59	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<200	200
107-13-1	Acrylonitrile	<20	20
71-43-2	Benzene	<10	10
108-86-1	Bromobenzene	<10	10
74-97-5	Bromochloromethane	<10	10
75-27-4	Bromodichloromethane	<10	10
75-25-2	Bromoform	<10	10
*74-83-9	Bromomethane	<50	50
104-51-8	n-Butylbenzene	<10	10
135-98-8	sec-Butylbenzene	<10	10
98-06-6	tert-Butylbenzene	<10	10
*75-15-0	Carbon Disulfide	<10	10
56-23-5	Carbon Tetrachloride	<10	10
108-90-7	Chlorobenzene	<10	10
75-00-3	Chloroethane	<50	50
67-66-3	Chloroform	<10	10
74-87-3	Chloromethane	<50	50
96-12-8	1,2-Dibromo-3-chloropropane	<50	50
124-48-1	Dibromochloromethane	<10	10
106-93-4	1,2-Dibromoethane	<10	10
74-95-3	Dibromomethane	<10	10
110-57-6	trans-1,4-Dichloro-2-butene	<10	10
95-50-1	1,2-Dichlorobenzene	<10	10
541-73-1	1,3-Dichlorobenzene	<10	10
106-46-7	1,4-Dichlorobenzene	<10	10
75-71-8	Dichlorodifluoromethane	<50	50
75-34-3	1,1-Dichloroethane	**15**	10
107-06-2	1,2-Dichloroethane	<10	10
75-35-4	1,1-Dichloroethene	<10	10
156-59-2	cis-1,2-Dichloroethene	**1100**	10
156-60-5	trans-1,2-Dichloroethene	**11**	10

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-108 (5.6-8.6')**	Sampled:	09/01/15 11:50		
Lab Sample ID:	**1509063-04**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	10	Analyzed:	09/08/15 15:59	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<10	10
10061-01-5	cis-1,3-Dichloropropene	<10	10
10061-02-6	trans-1,3-Dichloropropene	<10	10
100-41-4	Ethylbenzene	<10	10
60-29-7	Ethyl Ether	<50	50
591-78-6	2-Hexanone	<50	50
74-88-4	Iodomethane	<10	10
98-82-8	Isopropylbenzene	<10	10
99-87-6	4-Isopropyltoluene	<50	50
1634-04-4	Methyl tert-Butyl Ether	<50	50
75-09-2	Methylene Chloride	<50	50
78-93-3	2-Butanone (MEK)	<50	50
91-57-6	2-Methylnaphthalene	<50	50
108-10-1	4-Methyl-2-pentanone (MIBK)	<50	50
91-20-3	Naphthalene	<50	50
103-65-1	n-Propylbenzene	<10	10
100-42-5	Styrene	<10	10
630-20-6	1,1,1,2-Tetrachloroethane	<10	10
79-34-5	1,1,2,2-Tetrachloroethane	<10	10
127-18-4	Tetrachloroethene	<10	10
109-99-9	Tetrahydrofuran	<50	50
108-88-3	Toluene	<10	10
87-61-6	1,2,3-Trichlorobenzene	<50	50
120-82-1	1,2,4-Trichlorobenzene	<50	50
71-55-6	1,1,1-Trichloroethane	**25**	10
79-00-5	1,1,2-Trichloroethane	<10	10
79-01-6	Trichloroethene	**1200**	10
75-69-4	Trichlorofluoromethane	<10	10
96-18-4	1,2,3-Trichloropropane	<10	10
95-63-6	1,2,4-Trimethylbenzene	<10	10
108-67-8	1,3,5-Trimethylbenzene	<10	10

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-108 (5.6-8.6')**	Sampled:	09/01/15 11:50		
Lab Sample ID:	**1509063-04**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	10	Analyzed:	09/08/15 15:59	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	**23**	10
179601-23-1	Xylene, Meta + Para	<20	20
95-47-6	Xylene, Ortho	<10	10

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*98*	*85-118*
1,2-Dichloroethane-d4	*101*	*87-122*
Toluene-d8	*100*	*85-113*
4-Bromofluorobenzene	*100*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-111 (3.3-6.3')**	Sampled:	09/01/15 14:25		
Lab Sample ID:	**1509063-05**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 15:31	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<20	20
107-13-1	Acrylonitrile	<2.0	2.0
71-43-2	Benzene	<1.0	1.0
108-86-1	Bromobenzene	<1.0	1.0
74-97-5	Bromochloromethane	<1.0	1.0
75-27-4	Bromodichloromethane	<1.0	1.0
75-25-2	Bromoform	<1.0	1.0
*74-83-9	Bromomethane	<5.0	5.0
104-51-8	n-Butylbenzene	<1.0	1.0
135-98-8	sec-Butylbenzene	<1.0	1.0
98-06-6	tert-Butylbenzene	<1.0	1.0
*75-15-0	Carbon Disulfide	<1.0	1.0
56-23-5	Carbon Tetrachloride	<1.0	1.0
108-90-7	Chlorobenzene	<1.0	1.0
75-00-3	Chloroethane	<5.0	5.0
67-66-3	Chloroform	<1.0	1.0
74-87-3	Chloromethane	<5.0	5.0
96-12-8	1,2-Dibromo-3-chloropropane	<5.0	5.0
124-48-1	Dibromochloromethane	<1.0	1.0
106-93-4	1,2-Dibromoethane	<1.0	1.0
74-95-3	Dibromomethane	<1.0	1.0
110-57-6	trans-1,4-Dichloro-2-butene	<1.0	1.0
95-50-1	1,2-Dichlorobenzene	<1.0	1.0
541-73-1	1,3-Dichlorobenzene	<1.0	1.0
106-46-7	1,4-Dichlorobenzene	<1.0	1.0
75-71-8	Dichlorodifluoromethane	<5.0	5.0
75-34-3	1,1-Dichloroethane	<1.0	1.0
107-06-2	1,2-Dichloroethane	<1.0	1.0
75-35-4	1,1-Dichloroethene	<1.0	1.0
156-59-2	cis-1,2-Dichloroethene	<1.0	1.0
156-60-5	trans-1,2-Dichloroethene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-111 (3.3-6.3')**	Sampled:	09/01/15 14:25		
Lab Sample ID:	**1509063-05**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 15:31	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<1.0	1.0
10061-01-5	cis-1,3-Dichloropropene	<1.0	1.0
10061-02-6	trans-1,3-Dichloropropene	<1.0	1.0
100-41-4	Ethylbenzene	<1.0	1.0
60-29-7	Ethyl Ether	<5.0	5.0
591-78-6	2-Hexanone	<5.0	5.0
74-88-4	Iodomethane	<1.0	1.0
98-82-8	Isopropylbenzene	<1.0	1.0
99-87-6	4-Isopropyltoluene	<5.0	5.0
1634-04-4	Methyl tert-Butyl Ether	<5.0	5.0
75-09-2	Methylene Chloride	<5.0	5.0
78-93-3	2-Butanone (MEK)	<5.0	5.0
91-57-6	2-Methylnaphthalene	<5.0	5.0
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.0	5.0
91-20-3	Naphthalene	<5.0	5.0
103-65-1	n-Propylbenzene	<1.0	1.0
100-42-5	Styrene	<1.0	1.0
630-20-6	1,1,1,2-Tetrachloroethane	<1.0	1.0
79-34-5	1,1,2,2-Tetrachloroethane	<1.0	1.0
127-18-4	Tetrachloroethene	<1.0	1.0
109-99-9	Tetrahydrofuran	<5.0	5.0
108-88-3	Toluene	<1.0	1.0
87-61-6	1,2,3-Trichlorobenzene	<5.0	5.0
120-82-1	1,2,4-Trichlorobenzene	<5.0	5.0
71-55-6	1,1,1-Trichloroethane	<1.0	1.0
79-00-5	1,1,2-Trichloroethane	<1.0	1.0
79-01-6	Trichloroethene	<1.0	1.0
75-69-4	Trichlorofluoromethane	<1.0	1.0
96-18-4	1,2,3-Trichloropropane	<1.0	1.0
95-63-6	1,2,4-Trimethylbenzene	<1.0	1.0
108-67-8	1,3,5-Trimethylbenzene	<1.0	1.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-111 (3.3-6.3')**	Sampled:	09/01/15 14:25		
Lab Sample ID:	**1509063-05**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 15:31	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<1.0	1.0
179601-23-1	Xylene, Meta + Para	<2.0	2.0
95-47-6	Xylene, Ortho	<1.0	1.0

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*99*	*85-118*
1,2-Dichloroethane-d4	*112*	*87-122*
Toluene-d8	*100*	*85-113*
4-Bromofluorobenzene	*105*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-112 (4.4-7.4')**	Sampled:	09/01/15 14:10		
Lab Sample ID:	**1509063-06**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 14:45	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	**25**	20
107-13-1	Acrylonitrile	<2.0	2.0
71-43-2	Benzene	<1.0	1.0
108-86-1	Bromobenzene	<1.0	1.0
74-97-5	Bromochloromethane	<1.0	1.0
75-27-4	Bromodichloromethane	<1.0	1.0
75-25-2	Bromoform	<1.0	1.0
*74-83-9	Bromomethane	<5.0	5.0
104-51-8	n-Butylbenzene	<1.0	1.0
135-98-8	sec-Butylbenzene	<1.0	1.0
98-06-6	tert-Butylbenzene	<1.0	1.0
*75-15-0	Carbon Disulfide	<1.0	1.0
56-23-5	Carbon Tetrachloride	<1.0	1.0
108-90-7	Chlorobenzene	<1.0	1.0
75-00-3	Chloroethane	<5.0	5.0
67-66-3	Chloroform	<1.0	1.0
74-87-3	Chloromethane	<5.0	5.0
96-12-8	1,2-Dibromo-3-chloropropane	<5.0	5.0
124-48-1	Dibromochloromethane	<1.0	1.0
106-93-4	1,2-Dibromoethane	<1.0	1.0
74-95-3	Dibromomethane	<1.0	1.0
110-57-6	trans-1,4-Dichloro-2-butene	<1.0	1.0
95-50-1	1,2-Dichlorobenzene	<1.0	1.0
541-73-1	1,3-Dichlorobenzene	<1.0	1.0
106-46-7	1,4-Dichlorobenzene	<1.0	1.0
75-71-8	Dichlorodifluoromethane	<5.0	5.0
75-34-3	1,1-Dichloroethane	<1.0	1.0
107-06-2	1,2-Dichloroethane	<1.0	1.0
75-35-4	1,1-Dichloroethene	<1.0	1.0
156-59-2	cis-1,2-Dichloroethene	<1.0	1.0
156-60-5	trans-1,2-Dichloroethene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**		
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services		
Client Sample ID:	**B-112 (4.4-7.4')**	Sampled:	09/01/15 14:10		
Lab Sample ID:	**1509063-06**	Sampled By:	Javier Jasso		
Matrix:	Water	Received:	09/02/15 17:35		
Unit:	ug/L	Prepared:	09/08/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	09/08/15 14:45	By:	BAG
QC Batch:	1509569	Analytical Batch:	5I09017		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<1.0	1.0
10061-01-5	cis-1,3-Dichloropropene	<1.0	1.0
10061-02-6	trans-1,3-Dichloropropene	<1.0	1.0
100-41-4	Ethylbenzene	<1.0	1.0
60-29-7	Ethyl Ether	<5.0	5.0
591-78-6	2-Hexanone	<5.0	5.0
74-88-4	Iodomethane	<1.0	1.0
98-82-8	Isopropylbenzene	<1.0	1.0
99-87-6	4-Isopropyltoluene	<5.0	5.0
1634-04-4	Methyl tert-Butyl Ether	<5.0	5.0
75-09-2	Methylene Chloride	<5.0	5.0
78-93-3	2-Butanone (MEK)	<5.0	5.0
91-57-6	2-Methylnaphthalene	<5.0	5.0
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.0	5.0
91-20-3	Naphthalene	<5.0	5.0
103-65-1	n-Propylbenzene	<1.0	1.0
100-42-5	Styrene	<1.0	1.0
630-20-6	1,1,1,2-Tetrachloroethane	<1.0	1.0
79-34-5	1,1,2,2-Tetrachloroethane	<1.0	1.0
127-18-4	Tetrachloroethene	<1.0	1.0
109-99-9	Tetrahydrofuran	<5.0	5.0
108-88-3	Toluene	**1.1**	1.0
87-61-6	1,2,3-Trichlorobenzene	<5.0	5.0
120-82-1	1,2,4-Trichlorobenzene	<5.0	5.0
71-55-6	1,1,1-Trichloroethane	<1.0	1.0
79-00-5	1,1,2-Trichloroethane	<1.0	1.0
79-01-6	Trichloroethene	<1.0	1.0
75-69-4	Trichlorofluoromethane	<1.0	1.0
96-18-4	1,2,3-Trichloropropane	<1.0	1.0
95-63-6	1,2,4-Trimethylbenzene	<1.0	1.0
108-67-8	1,3,5-Trimethylbenzene	<1.0	1.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services
Client Sample ID:	**B-112 (4.4-7.4')**	Sampled:	09/01/15 14:10
Lab Sample ID:	**1509063-06**	Sampled By:	Javier Jasso
Matrix:	Water	Received:	09/02/15 17:35
Unit:	ug/L	Prepared:	09/08/15 08:00 By: BAG
Dilution Factor:	1	Analyzed:	09/08/15 14:45 By: BAG
QC Batch:	1509569	Analytical Batch:	5I09017

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<1.0	1.0
179601-23-1	Xylene, Meta + Para	<2.0	2.0
95-47-6	Xylene, Ortho	<1.0	1.0

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*97*	*85-118*
1,2-Dichloroethane-d4	*101*	*87-122*
Toluene-d8	*100*	*85-113*
4-Bromofluorobenzene	*100*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services
Client Sample ID:	**TB-01**	Sampled:	09/01/15 00:00
Lab Sample ID:	**1509063-07**	Sampled By:	TML
Matrix:	Water	Received:	09/02/15 17:35
Unit:	ug/L	Prepared:	09/08/15 08:00 By: BAG
Dilution Factor:	1	Analyzed:	09/08/15 11:54 By: BAG
QC Batch:	1509569	Analytical Batch:	5I09017

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<20	20
107-13-1	Acrylonitrile	<2.0	2.0
71-43-2	Benzene	<1.0	1.0
108-86-1	Bromobenzene	<1.0	1.0
74-97-5	Bromochloromethane	<1.0	1.0
75-27-4	Bromodichloromethane	<1.0	1.0
75-25-2	Bromoform	<1.0	1.0
*74-83-9	Bromomethane	<5.0	5.0
104-51-8	n-Butylbenzene	<1.0	1.0
135-98-8	sec-Butylbenzene	<1.0	1.0
98-06-6	tert-Butylbenzene	<1.0	1.0
*75-15-0	Carbon Disulfide	<1.0	1.0
56-23-5	Carbon Tetrachloride	<1.0	1.0
108-90-7	Chlorobenzene	<1.0	1.0
75-00-3	Chloroethane	<5.0	5.0
67-66-3	Chloroform	<1.0	1.0
74-87-3	Chloromethane	<5.0	5.0
96-12-8	1,2-Dibromo-3-chloropropane	<5.0	5.0
124-48-1	Dibromochloromethane	<1.0	1.0
106-93-4	1,2-Dibromoethane	<1.0	1.0
74-95-3	Dibromomethane	<1.0	1.0
110-57-6	trans-1,4-Dichloro-2-butene	<1.0	1.0
95-50-1	1,2-Dichlorobenzene	<1.0	1.0
541-73-1	1,3-Dichlorobenzene	<1.0	1.0
106-46-7	1,4-Dichlorobenzene	<1.0	1.0
75-71-8	Dichlorodifluoromethane	<5.0	5.0
75-34-3	1,1-Dichloroethane	<1.0	1.0
107-06-2	1,2-Dichloroethane	<1.0	1.0
75-35-4	1,1-Dichloroethene	<1.0	1.0
156-59-2	cis-1,2-Dichloroethene	<1.0	1.0
156-60-5	trans-1,2-Dichloroethene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services
Client Sample ID:	**TB-01**	Sampled:	09/01/15 00:00
Lab Sample ID:	**1509063-07**	Sampled By:	TML
Matrix:	Water	Received:	09/02/15 17:35
Unit:	ug/L	Prepared:	09/08/15 08:00 By: BAG
Dilution Factor:	1	Analyzed:	09/08/15 11:54 By: BAG
QC Batch:	1509569	Analytical Batch:	5I09017

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<1.0	1.0
10061-01-5	cis-1,3-Dichloropropene	<1.0	1.0
10061-02-6	trans-1,3-Dichloropropene	<1.0	1.0
100-41-4	Ethylbenzene	<1.0	1.0
60-29-7	Ethyl Ether	<5.0	5.0
591-78-6	2-Hexanone	<5.0	5.0
74-88-4	Iodomethane	<1.0	1.0
98-82-8	Isopropylbenzene	<1.0	1.0
99-87-6	4-Isopropyltoluene	<5.0	5.0
1634-04-4	Methyl tert-Butyl Ether	<5.0	5.0
75-09-2	Methylene Chloride	<5.0	5.0
78-93-3	2-Butanone (MEK)	<5.0	5.0
91-57-6	2-Methylnaphthalene	<5.0	5.0
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.0	5.0
91-20-3	Naphthalene	<5.0	5.0
103-65-1	n-Propylbenzene	<1.0	1.0
100-42-5	Styrene	<1.0	1.0
630-20-6	1,1,1,2-Tetrachloroethane	<1.0	1.0
79-34-5	1,1,2,2-Tetrachloroethane	<1.0	1.0
127-18-4	Tetrachloroethene	<1.0	1.0
109-99-9	Tetrahydrofuran	<5.0	5.0
108-88-3	Toluene	<1.0	1.0
87-61-6	1,2,3-Trichlorobenzene	<5.0	5.0
120-82-1	1,2,4-Trichlorobenzene	<5.0	5.0
71-55-6	1,1,1-Trichloroethane	<1.0	1.0
79-00-5	1,1,2-Trichloroethane	<1.0	1.0
79-01-6	Trichloroethene	<1.0	1.0
75-69-4	Trichlorofluoromethane	<1.0	1.0
96-18-4	1,2,3-Trichloropropane	<1.0	1.0
95-63-6	1,2,4-Trimethylbenzene	<1.0	1.0
108-67-8	1,3,5-Trimethylbenzene	<1.0	1.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1509063**
Project:	Tecumseh Products Groundwater	Description:	Laboratory Services
Client Sample ID:	**TB-01**	Sampled:	09/01/15 00:00
Lab Sample ID:	**1509063-07**	Sampled By:	TML
Matrix:	Water	Received:	09/02/15 17:35
Unit:	ug/L	Prepared:	09/08/15 08:00 By: BAG
Dilution Factor:	1	Analyzed:	09/08/15 11:54 By: BAG
QC Batch:	1509569	Analytical Batch:	5I09017

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<1.0	1.0
179601-23-1	Xylene, Meta + Para	<2.0	2.0
95-47-6	Xylene, Ortho	<1.0	1.0

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*97*	*85-118*
1,2-Dichloroethane-d4	*100*	*87-122*
Toluene-d8	*99*	*85-113*
4-Bromofluorobenzene	*99*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 1509569 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank Analyzed: 09/08/2015 By: BAG
Unit: ug/L Analytical Batch: 5I09017

Acetone	<20		20
Acrylonitrile	<2.0		2.0
Benzene	<1.0		1.0
Bromobenzene	<1.0		1.0
Bromochloromethane	<1.0		1.0
Bromodichloromethane	<1.0		1.0
Bromoform	<1.0		1.0
Bromomethane	<5.0	--	5.0
n-Butylbenzene	<1.0	--	1.0
sec-Butylbenzene	<1.0	--	1.0
tert-Butylbenzene	<1.0		1.0
Carbon Disulfide	<1.0	--	1.0
Carbon Tetrachloride	<1.0		1.0
Chlorobenzene	<1.0		1.0
Chloroethane	<5.0		5.0
Chloroform	<1.0		1.0
Chloromethane	<5.0		5.0
1,2-Dibromo-3-chloropropane	<5.0		5.0
Dibromochloromethane	<1.0		1.0
1,2-Dibromoethane	<1.0		1.0
Dibromomethane	<1.0		1.0
trans-1,4-Dichloro-2-butene	<1.0		1.0
1,2-Dichlorobenzene	<1.0		1.0
1,3-Dichlorobenzene	<1.0	--	1.0
1,4-Dichlorobenzene	<1.0	--	1.0
Dichlorodifluoromethane	<5.0		5.0
1,1-Dichloroethane	<1.0		1.0
1,2-Dichloroethane	<1.0		1.0
1,1-Dichloroethene	<1.0		1.0
cis-1,2-Dichloroethene	<1.0		1.0
trans-1,2-Dichloroethene	<1.0		1.0
1,2-Dichloropropane	<1.0		1.0
cis-1,3-Dichloropropene	<1.0		1.0
trans-1,3-Dichloropropene	<1.0		1.0
Ethylbenzene	<1.0		1.0
Ethyl Ether	<5.0		5.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

Volatile Organic Compounds by EPA Method 8260B (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 1509569 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank (Continued) Analyzed: 09/08/2015 By: BAG
Unit: ug/L Analytical Batch: 5I09017

2-Hexanone	<5.0				5.0
Iodomethane	<1.0				1.0
Isopropylbenzene	<1.0				1.0
4-Isopropyltoluene	<5.0			--	5.0
Methyl tert-Butyl Ether	<5.0				5.0
Methylene Chloride	<5.0			--	5.0
2-Butanone (MEK)	<5.0				5.0
2-Methylnaphthalene	<5.0			--	5.0
4-Methyl-2-pentanone (MIBK)	<5.0			--	5.0
Naphthalene	<5.0			--	5.0
n-Propylbenzene	<1.0				1.0
Styrene	<1.0				1.0
1,1,1,2-Tetrachloroethane	<1.0				1.0
1,1,2,2-Tetrachloroethane	<1.0				1.0
Tetrachloroethene	<1.0				1.0
Tetrahydrofuran	<5.0				5.0
Toluene	<1.0				1.0
1,2,3-Trichlorobenzene	<5.0			--	5.0
1,2,4-Trichlorobenzene	<5.0			--	5.0
1,1,1-Trichloroethane	<1.0				1.0
1,1,2-Trichloroethane	<1.0				1.0
Trichloroethene	<1.0				1.0
Trichlorofluoromethane	<1.0				1.0
1,2,3-Trichloropropane	<1.0				1.0
1,2,4-Trimethylbenzene	<1.0			--	1.0
1,3,5-Trimethylbenzene	<1.0				1.0
Vinyl Chloride	<1.0				1.0
Xylene, Meta + Para	<2.0				2.0
Xylene, Ortho	<1.0				1.0
Surrogates:					
Dibromofluoromethane			*97*	*85-118*	
1,2-Dichloroethane-d4			*100*	*87-122*	
Toluene-d8			*99*	*85-113*	

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
QC Batch: 1509569 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B								
Method Blank (Continued)					Analyzed:	09/08/2015	By: BAG	
Unit: ug/L					Analytical Batch:	5I09017		
Surrogates (Continued):								
4-Bromofluorobenzene				*100*	*82-110*			
Laboratory Control Sample					Analyzed:	09/08/2015	By: BAG	
Unit: ug/L					Analytical Batch:	5I09017		
Benzene		40.0	**41.0**	103	84-119	--		1.0
Chlorobenzene		40.0	**40.3**	101	84-118	--		1.0
1,1-Dichloroethene		40.0	**43.0**	108	77-123	--		1.0
Toluene		40.0	**41.0**	103	85-118	--		1.0
Trichloroethene		40.0	**38.8**	97	82-119	--		1.0
Surrogates:								
Dibromofluoromethane				*100*	*85-118*			
1,2-Dichloroethane-d4				*101*	*87-122*			
Toluene-d8				*100*	*85-113*			
4-Bromofluorobenzene				*99*	*82-110*			
Matrix Spike 1509063-06 B-112 (4.4-7.4')					Analyzed:	09/08/2015	By: BAG	
Unit: ug/L					Analytical Batch:	5I09017		
Benzene	<1.0	40.0	**40.9**	102	80-129	--		1.0
Chlorobenzene	<1.0	40.0	**38.9**	97	80-121	--		1.0
1,1-Dichloroethene	<1.0	40.0	**43.6**	109	74-134	--		1.0
Toluene	1.12	40.0	**41.8**	102	79-129	--		1.0
Trichloroethene	0.290	40.0	**37.7**	94	75-127	--		1.0
Surrogates:								
Dibromofluoromethane				*102*	*85-118*			
1,2-Dichloroethane-d4				*101*	*87-122*			
Toluene-d8				*101*	*85-113*			
4-Bromofluorobenzene				*100*	*82-110*			
Matrix Spike Duplicate 1509063-06 B-112 (4.4-7.4')					Analyzed:	09/08/2015	By: BAG	
Unit: ug/L					Analytical Batch:	5I09017		
Benzene	<1.0	40.0	**42.8**	107	80-129	4	9	1.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B (Continued)

QC Batch: 1509569 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B

Matrix Spike Duplicate (Continued) 1509063-06 B-112 (4.4-7.4') Analyzed: 09/08/2015 By: BAG
Unit: ug/L Analytical Batch: 5I09017

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
Chlorobenzene	<1.0	40.0	**41.4**	104	80-121	6	8	1.0
1,1-Dichloroethene	<1.0	40.0	**45.2**	113	74-134	4	11	1.0
Toluene	1.12	40.0	**44.2**	108	79-129	6	9	1.0
Trichloroethene	0.290	40.0	**40.2**	100	75-127	6	10	1.0
Surrogates:								
Dibromofluoromethane				*101*	*85-118*			
1,2-Dichloroethane-d4				*100*	*87-122*			
Toluene-d8				*100*	*85-113*			
4-Bromofluorobenzene				*101*	*82-110*			

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

5560 Corporate Exchange Court SE
Grand Rapids, MI 49512
Phone (616) 975-4500 Fax (616) 942-7463
www.trimatrixlabs.com

Chain of Custody Record

COC No. 151249

Pg. 1 of

For Lab Use Only
Cart: —
VOA Rack/Tray: 326-BLUE
Receipt Log No.: 14-30
Project Chemist: 1509083
Work Order No.: ~~1508003~~

Client Name: TRC
Address: 1540 Eisenhower Place
City, State Zip: Ann Arbor MI 48108
Phone/Fax: 734 971 7080 734 971 9033
Email:

Project Name: T.P.C. (GSI)
Client Project No. / PO No.: 226003.0001
Invoice To: ☑ Client ☐ Other (comments)
Contact/Report To: Stacy Metz

Analyses Requested: VOC 8260 D

Container Type (corresponds to Container Packing List): 1

PRESERVATIVES
A NONE pH~7
B HNO_3 pH<2
C H_2SO_4 pH<2
D 1+1 HCl pH<2
E NaOH pH>12
F ZnAc/NaOH pH>9
G MeOH
H Other (note below)

Schedule	Matrix Code	Sample Number		Field Sample ID	Cooler ID	Sample Date	Sample Time	COMP	GRAB	Matrix	Number of Containers Submitted	Total	Sample Comments
01		01	1	B-110 (7.3-10.3')		9/1/15	1220		✓	GW	✓	2	
		02	2	~~Dup #01~~ DUP-01		9/1/15	—		✓	GW	✓	2	
		03	3	B-109 (7.4-10.4')		9/1/15	1040		✓	GW	✓	2	
		04	4	B-108 (5.6-8.6')		9/1/15	1120		✓	GW	✓	2	
		05	5	B-111 (3.3-6.3')		9/1/15	1425		✓	GW	✓	2	
02		06	6	B-112 (4.4-7.4')		9/1/15	1410		✓	GW	✓	2	
			7	B-112 MS/MSD (4.4-7.4')		9/1/15	1410		✓	GW	✓	3	
03		07	8	~~Trip Blank~~ TB-01						DI	✓	1	
			9										
			10										

Sampled By (print): Javier Jasso
Sampler's Signature: [signature]
Company: TRC

How Shipped? Hand ___ Carrier ___
Tracking No.

Comments: P.O. C 226003.0001

1. Relinquished By	Date	Time	2. Relinquished By	Date	Time	3. Relinquished By	Date	Time
[signature]	9/1/15	1600	[signature]	9/1/15	1600	[signature]	9/2/15	173

1. Received By	Date	Time	2. Received By	Date	Time	3. Received For Lab By	Date	Time
R. Krumm	9/2/15	2:30	[signature]	9/2/15	~~1430~~	[signature]	9/2/15	17

WHITE COPY - REPORT YELLOW COPY - LABORATORY PINK COPY - FIELD

5

SAMPLE RECEIVING / LOG-IN CHECKLIST

1509063

TRIMATRIX LABORATORIES

Client: TRC
Receipt Record Page/Line #: 14-30
Work Order #: 1508
New / Add To
Project Chemist | Sample #s

Recorded by (initials/date): DN 9/2/15
☑ Cooler ☐ Box ☐ Other
Qty Received: 1
Thermometer Used: ☑ IR Gun (#202) ☐ Digital Thermometer (#54) ☐ Other (#_____)
☐ See Additional Cooler Information Form

Cooler #	Time	Custody Seals	Coolant Type	Coolant Location	Temp Blank Present	If Present, Temperature Blank Location is
Buffalo	2003	☑ None ☐ Present / Intact ☐ Present / Not Intact	☑ Loose Ice ☐ Bagged Ice ☐ Blue Ice ☐ None	Dispersed / Top / Middle / Bottom	☐ Yes ☐ No	☐ Representative ☐ Not Representative
		☐ None ☐ Present / Intact ☐ Present / Not Intact	☐ Loose Ice ☐ Bagged Ice ☐ Blue Ice ☐ None	Dispersed / Top / Middle / Bottom	☐ Yes ☐ No	☐ Representative ☐ Not Representative
		☐ None ☐ Present / Intact ☐ Present / Not Intact	☐ Loose Ice ☐ Bagged Ice ☐ Blue Ice ☐ None	Dispersed / Top / Middle / Bottom	☐ Yes ☐ No	☐ Representative ☐ Not Representative
		☐ None ☐ Present / Intact ☐ Present / Not Intact	☐ Loose Ice ☐ Bagged Ice ☐ Blue Ice ☐ None	Dispersed / Top / Middle / Bottom	☐ Yes ☐ No	☐ Representative ☐ Not Representative

	Observed °C	Correction Factor °C	Actual °C
Temp Blank	2.5	0	2.5
Sample 1	5.4	0	5.4
Sample 2	6.0	0	6.0
Sample 3	6.4	0	6.4
3 Sample Average °C	5.9		

☐ Cooler ID on COC?
☑ VOC Trip Blank received?

If any shaded areas checked, complete Sample Receiving Non-Conformance and/or Inventory Form

Paperwork Received

Yes	No	
☐	☐	Chain of Custody record(s)? If No, Initiated By _____
☑		Received for Lab Signed/Date/Time?
☐	☑	Shipping document?
☐	☑	Other _____

COC Information

☑ TriMatrix COC ☐ Other _____
COC ID Numbers: 151249

Check COC for Accuracy

Yes	No	
☑	☐	Analysis Requested?
☑	☐	Sample ID matches COC?
☑	☐	Sample Date and Time matches COC?
☑		Container type completed on COC?
☑	☐	All container types indicated are received?

Check Sample Preservation

N/A	Yes	No	
	☐	☑	Temperature Blank OR average sample temperature, ≥6° C?
☑	☐	☐	If either is ≥6° C, was thermal preservation required?
☑	☐		If "Yes", Project Chemist Approval Initials: _____
☑	☐		If "Yes" Completed Non Con Cooler - Cont Inventory Form?
☑	☐		Completed Sample Preservation Verification Form?
☑	☐		Samples chemically preserved correctly?
☑	☐		If "No", added orange tag?
	☐	☑	Received pre-preserved VOC soils?
	☐		MeOH ☐ Na_2SO_4

Check for Short Hold-Time Prep/Analyses

☐ Bacteriological
☐ Air Bags
☐ EnCores / Methanol Pre-Preserved
☐ Formaldehyde/Aldehyde
☐ Green-tagged containers
☐ Yellow/White-tagged 1 L ambers (SV Prep-Lab)

AFTER HOURS ONLY:
COPIES OF COC TO LAB AREA(S)
☑ NONE RECEIVED
☐ RECEIVED, COCs TO LAB(S)

Sample Condition Summary

N/A	Yes	No	
	☐	☑	Broken containers/lids?
	☐	☑	Missing or incomplete labels?
	☐	☑	Illegible information on labels?
	☐	☑	Low volume received?
	☐	☑	Inappropriate or non-TriMatrix containers received?
☐	☑	☐	VOC vials / TOX containers have headspace?
☑	☐	☐	Extra sample locations / containers not listed on COC?

Notes

☐ Trip Blank received ☐ Trip Blank not listed on COC

Cooler Received (Date/Time)	Paperwork Delivered (Date/Time)	≤1 Hour Goal Met?
DN 9/2/15	9/2/15	Yes / No

December 14, 2015

TRC Companies. - Ann Arbor Office
Attn: Ms. Stacy Metz
1540 Eisenhower Place
Ann Arbor, MI 48108

Project: Tecumseh Products GSI Wells

Dear Ms. Stacy Metz,

Enclosed is a copy of the laboratory report for the following work order(s) received by TriMatrix Laboratories:

Work Order	**Received**	**Description**
1512044	12/02/2015	Laboratory Services

This report relates only to the sample(s) as received. Test results are in compliance with the requirements of the National Environmental Laboratory Accreditation Program (NELAP) and/or one of the following certification programs:

ANAB DoD-ELAP/ISO17025 (#ADE-1542); Arkansas DEP (#88-0730/13-049-0); Florida DEP (#E87622-24); Georgia EPD (#E87622-24); Illinois DEP (#200026/003329); Kentucky DEP (AL123065/#0021); Michigan DPH (#0034); Minnesota DPH (#491715); New York ELAP (#11776/53116); North Carolina DNRE (#659); Virginia DCLS (#460153/7952); Wisconsin DNR (#999472650); USDA Soil Import Permit (#P330-14-00305).

Any qualification or narration of results, including sample acceptance requirements and test exceptions to the above referenced programs, is presented in the Statement of Data Qualifications and Project Technical Narrative sections of this report. Estimates of analytical uncertainties and certification documents for the test results contained within this report are available upon request.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Jennifer L. Rice
Project Chemist

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

PROJECT TECHNICAL NARRATIVE(s)

Volatile Organic Compounds by EPA Method 8260B

Narrative: The corresponding CCV for this analytical batch had a recovery exceeding the upper control limit of the method. Non-detectable results are not qualified.

Analysis: USEPA-8260B

Sample/Analyte: 1512044-04 B-113 (2-5') Bromomethane

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

STATEMENT OF DATA QUALIFICATIONS

Volatile Organic Compounds by EPA Method 8260B

Qualification: The corresponding CCV for this analytical batch had a recovery below the lower control limit of the method. Positive results for this analyte in any associated samples are considered estimated; non-detectable results are considered approximate.

Analysis: USEPA-8260B

Sample/Analyte:	1512044-01	B-114 (7.4-10.4')	Bromoform
	1512044-02	B-114 (4-7')	Bromoform
	1512044-03	B-113 (5-8')	Bromoform
	1512044-04	B-113 (2-5')	Bromoform
	1512044-05	B-108 (3-6')	Bromoform
	1512044-06	B-108 (5.6-8.6')	Bromoform
	1512044-07	DUP-01	Bromoform
	1512044-08	TB-01	Bromoform

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

STATEMENT OF DATA QUALIFICATIONS

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Qualification: The blank nutrient depletion for this BOD batch was 0.33 mg/L.

Analysis: SM 5210 B-2011

Sample/Analyte: 1513434-BLK1 BOD, (5-Day)

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services
Client Sample ID:	**B-114 (7.4-10.4')**	Sampled:	12/01/15 11:15
Lab Sample ID:	**1512044-01**	Sampled By:	J. Jasso
Matrix:	Water	Received:	12/02/15 09:10
Unit:	ug/L	Prepared:	12/04/15 08:00 By: BAG
Dilution Factor:	2.5	Analyzed:	12/04/15 16:31 By: BAG
QC Batch:	1513314	Analytical Batch:	5L04030

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<50	50
107-13-1	Acrylonitrile	<5.0	5.0
71-43-2	Benzene	<2.5	2.5
108-86-1	Bromobenzene	<2.5	2.5
74-97-5	Bromochloromethane	<2.5	2.5
75-27-4	Bromodichloromethane	<2.5	2.5
*75-25-2	Bromoform	<2.5	2.5
74-83-9	Bromomethane	<12	12
104-51-8	n-Butylbenzene	<2.5	2.5
135-98-8	sec-Butylbenzene	<2.5	2.5
98-06-6	tert-Butylbenzene	<2.5	2.5
75-15-0	Carbon Disulfide	<2.5	2.5
56-23-5	Carbon Tetrachloride	<2.5	2.5
108-90-7	Chlorobenzene	<2.5	2.5
75-00-3	Chloroethane	<12	12
67-66-3	Chloroform	<2.5	2.5
74-87-3	Chloromethane	<12	12
96-12-8	1,2-Dibromo-3-chloropropane	<12	12
124-48-1	Dibromochloromethane	<2.5	2.5
106-93-4	1,2-Dibromoethane	<2.5	2.5
74-95-3	Dibromomethane	<2.5	2.5
110-57-6	trans-1,4-Dichloro-2-butene	<2.5	2.5
95-50-1	1,2-Dichlorobenzene	<2.5	2.5
541-73-1	1,3-Dichlorobenzene	<2.5	2.5
106-46-7	1,4-Dichlorobenzene	<2.5	2.5
75-71-8	Dichlorodifluoromethane	<12	12
75-34-3	1,1-Dichloroethane	**25**	2.5
107-06-2	1,2-Dichloroethane	<2.5	2.5
75-35-4	1,1-Dichloroethene	<2.5	2.5
156-59-2	cis-1,2-Dichloroethene	**57**	2.5
156-60-5	trans-1,2-Dichloroethene	<2.5	2.5

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**B-114 (7.4-10.4')**	Sampled:	12/01/15 11:15		
Lab Sample ID:	**1512044-01**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	2.5	Analyzed:	12/04/15 16:31	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<2.5	2.5
10061-01-5	cis-1,3-Dichloropropene	<2.5	2.5
10061-02-6	trans-1,3-Dichloropropene	<2.5	2.5
100-41-4	Ethylbenzene	<2.5	2.5
60-29-7	Ethyl Ether	<12	12
591-78-6	2-Hexanone	<12	12
74-88-4	Iodomethane	<2.5	2.5
98-82-8	Isopropylbenzene	<2.5	2.5
99-87-6	4-Isopropyltoluene	<12	12
1634-04-4	Methyl tert-Butyl Ether	<12	12
75-09-2	Methylene Chloride	<12	12
78-93-3	2-Butanone (MEK)	<12	12
91-57-6	2-Methylnaphthalene	<12	12
108-10-1	4-Methyl-2-pentanone (MIBK)	<12	12
91-20-3	Naphthalene	<12	12
103-65-1	n-Propylbenzene	<2.5	2.5
100-42-5	Styrene	<2.5	2.5
630-20-6	1,1,1,2-Tetrachloroethane	<2.5	2.5
79-34-5	1,1,2,2-Tetrachloroethane	<2.5	2.5
127-18-4	Tetrachloroethene	<2.5	2.5
109-99-9	Tetrahydrofuran	<12	12
108-88-3	Toluene	<2.5	2.5
87-61-6	1,2,3-Trichlorobenzene	<12	12
120-82-1	1,2,4-Trichlorobenzene	<12	12
71-55-6	1,1,1-Trichloroethane	<2.5	2.5
79-00-5	1,1,2-Trichloroethane	<2.5	2.5
79-01-6	Trichloroethene	**270**	2.5
75-69-4	Trichlorofluoromethane	<2.5	2.5
96-18-4	1,2,3-Trichloropropane	<2.5	2.5
95-63-6	1,2,4-Trimethylbenzene	<2.5	2.5
108-67-8	1,3,5-Trimethylbenzene	<2.5	2.5

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**B-114 (7.4-10.4')**	Sampled:	12/01/15 11:15		
Lab Sample ID:	**1512044-01**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	2.5	Analyzed:	12/04/15 16:31	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<2.5	2.5
179601-23-1	Xylene, Meta + Para	<5.0	5.0
95-47-6	Xylene, Ortho	<2.5	2.5

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*96*	*85-118*
1,2-Dichloroethane-d4	*103*	*87-122*
Toluene-d8	*99*	*85-113*
4-Bromofluorobenzene	*98*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**B-114 (4-7')**	Sampled:	12/01/15 12:00		
Lab Sample ID:	**1512044-02**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	12/04/15 16:59	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<20	20
107-13-1	Acrylonitrile	<2.0	2.0
71-43-2	Benzene	<1.0	1.0
108-86-1	Bromobenzene	<1.0	1.0
74-97-5	Bromochloromethane	<1.0	1.0
75-27-4	Bromodichloromethane	<1.0	1.0
*75-25-2	Bromoform	<1.0	1.0
74-83-9	Bromomethane	<5.0	5.0
104-51-8	n-Butylbenzene	<1.0	1.0
135-98-8	sec-Butylbenzene	<1.0	1.0
98-06-6	tert-Butylbenzene	<1.0	1.0
75-15-0	Carbon Disulfide	<1.0	1.0
56-23-5	Carbon Tetrachloride	<1.0	1.0
108-90-7	Chlorobenzene	<1.0	1.0
75-00-3	Chloroethane	<5.0	5.0
67-66-3	Chloroform	<1.0	1.0
74-87-3	Chloromethane	<5.0	5.0
96-12-8	1,2-Dibromo-3-chloropropane	<5.0	5.0
124-48-1	Dibromochloromethane	<1.0	1.0
106-93-4	1,2-Dibromoethane	<1.0	1.0
74-95-3	Dibromomethane	<1.0	1.0
110-57-6	trans-1,4-Dichloro-2-butene	<1.0	1.0
95-50-1	1,2-Dichlorobenzene	<1.0	1.0
541-73-1	1,3-Dichlorobenzene	<1.0	1.0
106-46-7	1,4-Dichlorobenzene	<1.0	1.0
75-71-8	Dichlorodifluoromethane	<5.0	5.0
75-34-3	1,1-Dichloroethane	**15**	1.0
107-06-2	1,2-Dichloroethane	<1.0	1.0
75-35-4	1,1-Dichloroethene	<1.0	1.0
156-59-2	cis-1,2-Dichloroethene	**11**	1.0
156-60-5	trans-1,2-Dichloroethene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**B-114 (4-7')**	Sampled:	12/01/15 12:00		
Lab Sample ID:	**1512044-02**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	12/04/15 16:59	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<1.0	1.0
10061-01-5	cis-1,3-Dichloropropene	<1.0	1.0
10061-02-6	trans-1,3-Dichloropropene	<1.0	1.0
100-41-4	Ethylbenzene	<1.0	1.0
60-29-7	Ethyl Ether	<5.0	5.0
591-78-6	2-Hexanone	<5.0	5.0
74-88-4	Iodomethane	<1.0	1.0
98-82-8	Isopropylbenzene	<1.0	1.0
99-87-6	4-Isopropyltoluene	<5.0	5.0
1634-04-4	Methyl tert-Butyl Ether	<5.0	5.0
75-09-2	Methylene Chloride	<5.0	5.0
78-93-3	2-Butanone (MEK)	<5.0	5.0
91-57-6	2-Methylnaphthalene	<5.0	5.0
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.0	5.0
91-20-3	Naphthalene	<5.0	5.0
103-65-1	n-Propylbenzene	<1.0	1.0
100-42-5	Styrene	<1.0	1.0
630-20-6	1,1,1,2-Tetrachloroethane	<1.0	1.0
79-34-5	1,1,2,2-Tetrachloroethane	<1.0	1.0
127-18-4	Tetrachloroethene	<1.0	1.0
109-99-9	Tetrahydrofuran	<5.0	5.0
108-88-3	Toluene	<1.0	1.0
87-61-6	1,2,3-Trichlorobenzene	<5.0	5.0
120-82-1	1,2,4-Trichlorobenzene	<5.0	5.0
71-55-6	1,1,1-Trichloroethane	<1.0	1.0
79-00-5	1,1,2-Trichloroethane	<1.0	1.0
79-01-6	Trichloroethene	<1.0	1.0
75-69-4	Trichlorofluoromethane	<1.0	1.0
96-18-4	1,2,3-Trichloropropane	<1.0	1.0
95-63-6	1,2,4-Trimethylbenzene	<1.0	1.0
108-67-8	1,3,5-Trimethylbenzene	<1.0	1.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services
Client Sample ID:	**B-114 (4-7')**	Sampled:	12/01/15 12:00
Lab Sample ID:	**1512044-02**	Sampled By:	J. Jasso
Matrix:	Water	Received:	12/02/15 09:10
Unit:	ug/L	Prepared:	12/04/15 08:00 By: BAG
Dilution Factor:	1	Analyzed:	12/04/15 16:59 By: BAG
QC Batch:	1513314	Analytical Batch:	5L04030

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	**1.3**	1.0
179601-23-1	Xylene, Meta + Para	<2.0	2.0
95-47-6	Xylene, Ortho	<1.0	1.0

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*94*	*85-118*
1,2-Dichloroethane-d4	*98*	*87-122*
Toluene-d8	*99*	*85-113*
4-Bromofluorobenzene	*99*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**B-113 (5-8')**	Sampled:	12/01/15 13:09		
Lab Sample ID:	**1512044-03**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	10	Analyzed:	12/04/15 17:28	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<200	200
107-13-1	Acrylonitrile	<20	20
71-43-2	Benzene	<10	10
108-86-1	Bromobenzene	<10	10
74-97-5	Bromochloromethane	<10	10
75-27-4	Bromodichloromethane	<10	10
*75-25-2	Bromoform	<10	10
74-83-9	Bromomethane	<50	50
104-51-8	n-Butylbenzene	<10	10
135-98-8	sec-Butylbenzene	<10	10
98-06-6	tert-Butylbenzene	<10	10
75-15-0	Carbon Disulfide	<10	10
56-23-5	Carbon Tetrachloride	<10	10
108-90-7	Chlorobenzene	<10	10
75-00-3	Chloroethane	<50	50
67-66-3	Chloroform	<10	10
74-87-3	Chloromethane	<50	50
96-12-8	1,2-Dibromo-3-chloropropane	<50	50
124-48-1	Dibromochloromethane	<10	10
106-93-4	1,2-Dibromoethane	<10	10
74-95-3	Dibromomethane	<10	10
110-57-6	trans-1,4-Dichloro-2-butene	<10	10
95-50-1	1,2-Dichlorobenzene	<10	10
541-73-1	1,3-Dichlorobenzene	<10	10
106-46-7	1,4-Dichlorobenzene	<10	10
75-71-8	Dichlorodifluoromethane	<50	50
75-34-3	1,1-Dichloroethane	<10	10
107-06-2	1,2-Dichloroethane	<10	10
75-35-4	1,1-Dichloroethene	<10	10
156-59-2	cis-1,2-Dichloroethene	**1400**	10
156-60-5	trans-1,2-Dichloroethene	**12**	10

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**B-113 (5-8')**	Sampled:	12/01/15 13:09		
Lab Sample ID:	**1512044-03**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	10	Analyzed:	12/04/15 17:28	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<10	10
10061-01-5	cis-1,3-Dichloropropene	<10	10
10061-02-6	trans-1,3-Dichloropropene	<10	10
100-41-4	Ethylbenzene	<10	10
60-29-7	Ethyl Ether	<50	50
591-78-6	2-Hexanone	<50	50
74-88-4	Iodomethane	<10	10
98-82-8	Isopropylbenzene	<10	10
99-87-6	4-Isopropyltoluene	<50	50
1634-04-4	Methyl tert-Butyl Ether	<50	50
75-09-2	Methylene Chloride	<50	50
78-93-3	2-Butanone (MEK)	<50	50
91-57-6	2-Methylnaphthalene	<50	50
108-10-1	4-Methyl-2-pentanone (MIBK)	<50	50
91-20-3	Naphthalene	<50	50
103-65-1	n-Propylbenzene	<10	10
100-42-5	Styrene	<10	10
630-20-6	1,1,1,2-Tetrachloroethane	<10	10
79-34-5	1,1,2,2-Tetrachloroethane	<10	10
127-18-4	Tetrachloroethene	<10	10
109-99-9	Tetrahydrofuran	<50	50
108-88-3	Toluene	<10	10
87-61-6	1,2,3-Trichlorobenzene	<50	50
120-82-1	1,2,4-Trichlorobenzene	<50	50
71-55-6	1,1,1-Trichloroethane	**12**	10
79-00-5	1,1,2-Trichloroethane	<10	10
79-01-6	Trichloroethene	**120**	10
75-69-4	Trichlorofluoromethane	<10	10
96-18-4	1,2,3-Trichloropropane	<10	10
95-63-6	1,2,4-Trimethylbenzene	<10	10
108-67-8	1,3,5-Trimethylbenzene	<10	10

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services
Client Sample ID:	**B-113 (5-8')**	Sampled:	12/01/15 13:09
Lab Sample ID:	**1512044-03**	Sampled By:	J. Jasso
Matrix:	Water	Received:	12/02/15 09:10
Unit:	ug/L	Prepared:	12/04/15 08:00 By: BAG
Dilution Factor:	10	Analyzed:	12/04/15 17:28 By: BAG
QC Batch:	1513314	Analytical Batch:	5L04030

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<10	10
179601-23-1	Xylene, Meta + Para	<20	20
95-47-6	Xylene, Ortho	<10	10

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*96*	*85-118*
1,2-Dichloroethane-d4	*100*	*87-122*
Toluene-d8	*99*	*85-113*
4-Bromofluorobenzene	*99*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services
Client Sample ID:	**B-113 (2-5')**	Sampled:	12/01/15 13:34
Lab Sample ID:	**1512044-04**	Sampled By:	J. Jasso
Matrix:	Water	Received:	12/02/15 09:10
Unit:	ug/L	Prepared:	12/05/15 03:00 By: BAG
Dilution Factor:	20	Analyzed:	12/05/15 08:11 By: BAG
QC Batch:	1513395	Analytical Batch:	5L07018

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<400	400
107-13-1	Acrylonitrile	<40	40
71-43-2	Benzene	<20	20
108-86-1	Bromobenzene	<20	20
74-97-5	Bromochloromethane	<20	20
75-27-4	Bromodichloromethane	<20	20
*75-25-2	Bromoform	<20	20
74-83-9	Bromomethane	<100	100
104-51-8	n-Butylbenzene	<20	20
135-98-8	sec-Butylbenzene	<20	20
98-06-6	tert-Butylbenzene	<20	20
75-15-0	Carbon Disulfide	<20	20
56-23-5	Carbon Tetrachloride	<20	20
108-90-7	Chlorobenzene	<20	20
75-00-3	Chloroethane	<100	100
67-66-3	Chloroform	<20	20
74-87-3	Chloromethane	<100	100
96-12-8	1,2-Dibromo-3-chloropropane	<100	100
124-48-1	Dibromochloromethane	<20	20
106-93-4	1,2-Dibromoethane	<20	20
74-95-3	Dibromomethane	<20	20
110-57-6	trans-1,4-Dichloro-2-butene	<20	20
95-50-1	1,2-Dichlorobenzene	<20	20
541-73-1	1,3-Dichlorobenzene	<20	20
106-46-7	1,4-Dichlorobenzene	<20	20
75-71-8	Dichlorodifluoromethane	<100	100
75-34-3	1,1-Dichloroethane	<20	20
107-06-2	1,2-Dichloroethane	<20	20
75-35-4	1,1-Dichloroethene	<20	20
156-59-2	cis-1,2-Dichloroethene	**1600**	20
156-60-5	trans-1,2-Dichloroethene	<20	20

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**B-113 (2-5')**	Sampled:	12/01/15 13:34		
Lab Sample ID:	**1512044-04**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/05/15 03:00	By:	BAG
Dilution Factor:	20	Analyzed:	12/05/15 08:11	By:	BAG
QC Batch:	1513395	Analytical Batch:	5L07018		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<20	20
10061-01-5	cis-1,3-Dichloropropene	<20	20
10061-02-6	trans-1,3-Dichloropropene	<20	20
100-41-4	Ethylbenzene	<20	20
60-29-7	Ethyl Ether	<100	100
591-78-6	2-Hexanone	<100	100
74-88-4	Iodomethane	<20	20
98-82-8	Isopropylbenzene	<20	20
99-87-6	4-Isopropyltoluene	<100	100
1634-04-4	Methyl tert-Butyl Ether	<100	100
75-09-2	Methylene Chloride	<100	100
78-93-3	2-Butanone (MEK)	<100	100
91-57-6	2-Methylnaphthalene	<100	100
108-10-1	4-Methyl-2-pentanone (MIBK)	<100	100
91-20-3	Naphthalene	<100	100
103-65-1	n-Propylbenzene	<20	20
100-42-5	Styrene	<20	20
630-20-6	1,1,1,2-Tetrachloroethane	<20	20
79-34-5	1,1,2,2-Tetrachloroethane	<20	20
127-18-4	Tetrachloroethene	<20	20
109-99-9	Tetrahydrofuran	<100	100
108-88-3	Toluene	<20	20
87-61-6	1,2,3-Trichlorobenzene	<100	100
120-82-1	1,2,4-Trichlorobenzene	<100	100
71-55-6	1,1,1-Trichloroethane	<20	20
79-00-5	1,1,2-Trichloroethane	<20	20
79-01-6	Trichloroethene	**86**	20
75-69-4	Trichlorofluoromethane	<20	20
96-18-4	1,2,3-Trichloropropane	<20	20
95-63-6	1,2,4-Trimethylbenzene	<20	20
108-67-8	1,3,5-Trimethylbenzene	<20	20

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services
Client Sample ID:	**B-113 (2-5')**	Sampled:	12/01/15 13:34
Lab Sample ID:	**1512044-04**	Sampled By:	J. Jasso
Matrix:	Water	Received:	12/02/15 09:10
Unit:	ug/L	Prepared:	12/05/15 03:00 By: BAG
Dilution Factor:	20	Analyzed:	12/05/15 08:11 By: BAG
QC Batch:	1513395	Analytical Batch:	5L07018

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<20	20
179601-23-1	Xylene, Meta + Para	<40	40
95-47-6	Xylene, Ortho	<20	20

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*96*	*85-118*
1,2-Dichloroethane-d4	*98*	*87-122*
Toluene-d8	*99*	*85-113*
4-Bromofluorobenzene	*100*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**B-108 (3-6')**	Sampled:	12/01/15 12:54		
Lab Sample ID:	**1512044-05**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	20	Analyzed:	12/04/15 18:25	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<400	400
107-13-1	Acrylonitrile	<40	40
71-43-2	Benzene	<20	20
108-86-1	Bromobenzene	<20	20
74-97-5	Bromochloromethane	<20	20
75-27-4	Bromodichloromethane	<20	20
*75-25-2	Bromoform	<20	20
74-83-9	Bromomethane	<100	100
104-51-8	n-Butylbenzene	<20	20
135-98-8	sec-Butylbenzene	<20	20
98-06-6	tert-Butylbenzene	<20	20
75-15-0	Carbon Disulfide	<20	20
56-23-5	Carbon Tetrachloride	<20	20
108-90-7	Chlorobenzene	<20	20
75-00-3	Chloroethane	<100	100
67-66-3	Chloroform	<20	20
74-87-3	Chloromethane	<100	100
96-12-8	1,2-Dibromo-3-chloropropane	<100	100
124-48-1	Dibromochloromethane	<20	20
106-93-4	1,2-Dibromoethane	<20	20
74-95-3	Dibromomethane	<20	20
110-57-6	trans-1,4-Dichloro-2-butene	<20	20
95-50-1	1,2-Dichlorobenzene	<20	20
541-73-1	1,3-Dichlorobenzene	<20	20
106-46-7	1,4-Dichlorobenzene	<20	20
75-71-8	Dichlorodifluoromethane	<100	100
75-34-3	1,1-Dichloroethane	<20	20
107-06-2	1,2-Dichloroethane	<20	20
75-35-4	1,1-Dichloroethene	<20	20
156-59-2	cis-1,2-Dichloroethene	**1700**	20
156-60-5	trans-1,2-Dichloroethene	<20	20

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services
Client Sample ID:	**B-108 (3-6')**	Sampled:	12/01/15 12:54
Lab Sample ID:	**1512044-05**	Sampled By:	J. Jasso
Matrix:	Water	Received:	12/02/15 09:10
Unit:	ug/L	Prepared:	12/04/15 08:00 By: BAG
Dilution Factor:	20	Analyzed:	12/04/15 18:25 By: BAG
QC Batch:	1513314	Analytical Batch:	5L04030

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<20	20
10061-01-5	cis-1,3-Dichloropropene	<20	20
10061-02-6	trans-1,3-Dichloropropene	<20	20
100-41-4	Ethylbenzene	<20	20
60-29-7	Ethyl Ether	<100	100
591-78-6	2-Hexanone	<100	100
74-88-4	Iodomethane	<20	20
98-82-8	Isopropylbenzene	<20	20
99-87-6	4-Isopropyltoluene	<100	100
1634-04-4	Methyl tert-Butyl Ether	<100	100
75-09-2	Methylene Chloride	<100	100
78-93-3	2-Butanone (MEK)	<100	100
91-57-6	2-Methylnaphthalene	<100	100
108-10-1	4-Methyl-2-pentanone (MIBK)	<100	100
91-20-3	Naphthalene	<100	100
103-65-1	n-Propylbenzene	<20	20
100-42-5	Styrene	<20	20
630-20-6	1,1,1,2-Tetrachloroethane	<20	20
79-34-5	1,1,2,2-Tetrachloroethane	<20	20
127-18-4	Tetrachloroethene	<20	20
109-99-9	Tetrahydrofuran	<100	100
108-88-3	Toluene	<20	20
87-61-6	1,2,3-Trichlorobenzene	<100	100
120-82-1	1,2,4-Trichlorobenzene	<100	100
71-55-6	1,1,1-Trichloroethane	<20	20
79-00-5	1,1,2-Trichloroethane	<20	20
79-01-6	Trichloroethene	<20	20
75-69-4	Trichlorofluoromethane	<20	20
96-18-4	1,2,3-Trichloropropane	<20	20
95-63-6	1,2,4-Trimethylbenzene	<20	20
108-67-8	1,3,5-Trimethylbenzene	<20	20

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**B-108 (3-6')**	Sampled:	12/01/15 12:54		
Lab Sample ID:	**1512044-05**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	20	Analyzed:	12/04/15 18:25	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	**36**	20
179601-23-1	Xylene, Meta + Para	<40	40
95-47-6	Xylene, Ortho	<20	20

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*94*	*85-118*
1,2-Dichloroethane-d4	*97*	*87-122*
Toluene-d8	*99*	*85-113*
4-Bromofluorobenzene	*99*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**B-108 (5.6-8.6')**	Sampled:	12/01/15 12:47		
Lab Sample ID:	**1512044-06**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	10	Analyzed:	12/04/15 18:53	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<200	200
107-13-1	Acrylonitrile	<20	20
71-43-2	Benzene	<10	10
108-86-1	Bromobenzene	<10	10
74-97-5	Bromochloromethane	<10	10
75-27-4	Bromodichloromethane	<10	10
*75-25-2	Bromoform	<10	10
74-83-9	Bromomethane	<50	50
104-51-8	n-Butylbenzene	<10	10
135-98-8	sec-Butylbenzene	<10	10
98-06-6	tert-Butylbenzene	<10	10
75-15-0	Carbon Disulfide	<10	10
56-23-5	Carbon Tetrachloride	<10	10
108-90-7	Chlorobenzene	<10	10
75-00-3	Chloroethane	<50	50
67-66-3	Chloroform	<10	10
74-87-3	Chloromethane	<50	50
96-12-8	1,2-Dibromo-3-chloropropane	<50	50
124-48-1	Dibromochloromethane	<10	10
106-93-4	1,2-Dibromoethane	<10	10
74-95-3	Dibromomethane	<10	10
110-57-6	trans-1,4-Dichloro-2-butene	<10	10
95-50-1	1,2-Dichlorobenzene	<10	10
541-73-1	1,3-Dichlorobenzene	<10	10
106-46-7	1,4-Dichlorobenzene	<10	10
75-71-8	Dichlorodifluoromethane	<50	50
75-34-3	1,1-Dichloroethane	**16**	10
107-06-2	1,2-Dichloroethane	<10	10
75-35-4	1,1-Dichloroethene	<10	10
156-59-2	cis-1,2-Dichloroethene	**1500**	10
156-60-5	trans-1,2-Dichloroethene	**14**	10

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**B-108 (5.6-8.6')**	Sampled:	12/01/15 12:47		
Lab Sample ID:	**1512044-06**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	10	Analyzed:	12/04/15 18:53	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<10	10
10061-01-5	cis-1,3-Dichloropropene	<10	10
10061-02-6	trans-1,3-Dichloropropene	<10	10
100-41-4	Ethylbenzene	<10	10
60-29-7	Ethyl Ether	<50	50
591-78-6	2-Hexanone	<50	50
74-88-4	Iodomethane	<10	10
98-82-8	Isopropylbenzene	<10	10
99-87-6	4-Isopropyltoluene	<50	50
1634-04-4	Methyl tert-Butyl Ether	<50	50
75-09-2	Methylene Chloride	<50	50
78-93-3	2-Butanone (MEK)	<50	50
91-57-6	2-Methylnaphthalene	<50	50
108-10-1	4-Methyl-2-pentanone (MIBK)	<50	50
91-20-3	Naphthalene	<50	50
103-65-1	n-Propylbenzene	<10	10
100-42-5	Styrene	<10	10
630-20-6	1,1,1,2-Tetrachloroethane	<10	10
79-34-5	1,1,2,2-Tetrachloroethane	<10	10
127-18-4	Tetrachloroethene	<10	10
109-99-9	Tetrahydrofuran	<50	50
108-88-3	Toluene	<10	10
87-61-6	1,2,3-Trichlorobenzene	<50	50
120-82-1	1,2,4-Trichlorobenzene	<50	50
71-55-6	1,1,1-Trichloroethane	**22**	10
79-00-5	1,1,2-Trichloroethane	<10	10
79-01-6	Trichloroethene	**1100**	10
75-69-4	Trichlorofluoromethane	<10	10
96-18-4	1,2,3-Trichloropropane	<10	10
95-63-6	1,2,4-Trimethylbenzene	<10	10
108-67-8	1,3,5-Trimethylbenzene	<10	10

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services
Client Sample ID:	**B-108 (5.6-8.6')**	Sampled:	12/01/15 12:47
Lab Sample ID:	**1512044-06**	Sampled By:	J. Jasso
Matrix:	Water	Received:	12/02/15 09:10
Unit:	ug/L	Prepared:	12/04/15 08:00 By: BAG
Dilution Factor:	10	Analyzed:	12/04/15 18:53 By: BAG
QC Batch:	1513314	Analytical Batch:	5L04030

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	**23**	10
179601-23-1	Xylene, Meta + Para	<20	20
95-47-6	Xylene, Ortho	<10	10

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*97*	*85-118*
1,2-Dichloroethane-d4	*100*	*87-122*
Toluene-d8	*99*	*85-113*
4-Bromofluorobenzene	*99*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services
Client Sample ID:	**B-108 (5.6-8.6')**	Sampled:	12/01/15 12:47
Lab Sample ID:	**1512044-06**	Sampled By:	J. Jasso
Matrix:	Water	Received:	12/02/15 09:10

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Time Analyzed	By	QC Batch
BOD, (5-Day)	<2.0	2.0	mg/L	1	SM 5210 B-2011	12/02/15 20:10	HLB	1513434
Chemical Oxygen Demand	**5.3**	5.0	mg/L	1	SM 5220 D-2011	12/03/15 14:30	KLA	1513279

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**DUP-01**	Sampled:	12/01/15 00:00		
Lab Sample ID:	**1512044-07**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	10	Analyzed:	12/04/15 19:21	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<200	200
107-13-1	Acrylonitrile	<20	20
71-43-2	Benzene	<10	10
108-86-1	Bromobenzene	<10	10
74-97-5	Bromochloromethane	<10	10
75-27-4	Bromodichloromethane	<10	10
*75-25-2	Bromoform	<10	10
74-83-9	Bromomethane	<50	50
104-51-8	n-Butylbenzene	<10	10
135-98-8	sec-Butylbenzene	<10	10
98-06-6	tert-Butylbenzene	<10	10
75-15-0	Carbon Disulfide	<10	10
56-23-5	Carbon Tetrachloride	<10	10
108-90-7	Chlorobenzene	<10	10
75-00-3	Chloroethane	<50	50
67-66-3	Chloroform	<10	10
74-87-3	Chloromethane	<50	50
96-12-8	1,2-Dibromo-3-chloropropane	<50	50
124-48-1	Dibromochloromethane	<10	10
106-93-4	1,2-Dibromoethane	<10	10
74-95-3	Dibromomethane	<10	10
110-57-6	trans-1,4-Dichloro-2-butene	<10	10
95-50-1	1,2-Dichlorobenzene	<10	10
541-73-1	1,3-Dichlorobenzene	<10	10
106-46-7	1,4-Dichlorobenzene	<10	10
75-71-8	Dichlorodifluoromethane	<50	50
75-34-3	1,1-Dichloroethane	**16**	10
107-06-2	1,2-Dichloroethane	<10	10
75-35-4	1,1-Dichloroethene	<10	10
156-59-2	cis-1,2-Dichloroethene	**1500**	10
156-60-5	trans-1,2-Dichloroethene	**14**	10

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**DUP-01**	Sampled:	12/01/15 00:00		
Lab Sample ID:	**1512044-07**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	10	Analyzed:	12/04/15 19:21	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<10	10
10061-01-5	cis-1,3-Dichloropropene	<10	10
10061-02-6	trans-1,3-Dichloropropene	<10	10
100-41-4	Ethylbenzene	<10	10
60-29-7	Ethyl Ether	<50	50
591-78-6	2-Hexanone	<50	50
74-88-4	Iodomethane	<10	10
98-82-8	Isopropylbenzene	<10	10
99-87-6	4-Isopropyltoluene	<50	50
1634-04-4	Methyl tert-Butyl Ether	<50	50
75-09-2	Methylene Chloride	<50	50
78-93-3	2-Butanone (MEK)	<50	50
91-57-6	2-Methylnaphthalene	<50	50
108-10-1	4-Methyl-2-pentanone (MIBK)	<50	50
91-20-3	Naphthalene	<50	50
103-65-1	n-Propylbenzene	<10	10
100-42-5	Styrene	<10	10
630-20-6	1,1,1,2-Tetrachloroethane	<10	10
79-34-5	1,1,2,2-Tetrachloroethane	<10	10
127-18-4	Tetrachloroethene	<10	10
109-99-9	Tetrahydrofuran	<50	50
108-88-3	Toluene	<10	10
87-61-6	1,2,3-Trichlorobenzene	<50	50
120-82-1	1,2,4-Trichlorobenzene	<50	50
71-55-6	1,1,1-Trichloroethane	**23**	10
79-00-5	1,1,2-Trichloroethane	<10	10
79-01-6	Trichloroethene	**1100**	10
75-69-4	Trichlorofluoromethane	<10	10
96-18-4	1,2,3-Trichloropropane	<10	10
95-63-6	1,2,4-Trimethylbenzene	<10	10
108-67-8	1,3,5-Trimethylbenzene	<10	10

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**DUP-01**	Sampled:	12/01/15 00:00		
Lab Sample ID:	**1512044-07**	Sampled By:	J. Jasso		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	10	Analyzed:	12/04/15 19:21	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<10	10
179601-23-1	Xylene, Meta + Para	<20	20
95-47-6	Xylene, Ortho	<10	10

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*96*	*85-118*
1,2-Dichloroethane-d4	*97*	*87-122*
Toluene-d8	*98*	*85-113*
4-Bromofluorobenzene	*98*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services
Client Sample ID:	**TB-01**	Sampled:	12/01/15 00:00
Lab Sample ID:	**1512044-08**	Sampled By:	TML
Matrix:	Water	Received:	12/02/15 09:10
Unit:	ug/L	Prepared:	12/04/15 08:00 By: BAG
Dilution Factor:	1	Analyzed:	12/04/15 15:34 By: BAG
QC Batch:	1513314	Analytical Batch:	5L04030

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<20	20
107-13-1	Acrylonitrile	<2.0	2.0
71-43-2	Benzene	<1.0	1.0
108-86-1	Bromobenzene	<1.0	1.0
74-97-5	Bromochloromethane	<1.0	1.0
75-27-4	Bromodichloromethane	<1.0	1.0
*75-25-2	Bromoform	<1.0	1.0
74-83-9	Bromomethane	<5.0	5.0
104-51-8	n-Butylbenzene	<1.0	1.0
135-98-8	sec-Butylbenzene	<1.0	1.0
98-06-6	tert-Butylbenzene	<1.0	1.0
75-15-0	Carbon Disulfide	<1.0	1.0
56-23-5	Carbon Tetrachloride	<1.0	1.0
108-90-7	Chlorobenzene	<1.0	1.0
75-00-3	Chloroethane	<5.0	5.0
67-66-3	Chloroform	<1.0	1.0
74-87-3	Chloromethane	<5.0	5.0
96-12-8	1,2-Dibromo-3-chloropropane	<5.0	5.0
124-48-1	Dibromochloromethane	<1.0	1.0
106-93-4	1,2-Dibromoethane	<1.0	1.0
74-95-3	Dibromomethane	<1.0	1.0
110-57-6	trans-1,4-Dichloro-2-butene	<1.0	1.0
95-50-1	1,2-Dichlorobenzene	<1.0	1.0
541-73-1	1,3-Dichlorobenzene	<1.0	1.0
106-46-7	1,4-Dichlorobenzene	<1.0	1.0
75-71-8	Dichlorodifluoromethane	<5.0	5.0
75-34-3	1,1-Dichloroethane	<1.0	1.0
107-06-2	1,2-Dichloroethane	<1.0	1.0
75-35-4	1,1-Dichloroethene	<1.0	1.0
156-59-2	cis-1,2-Dichloroethene	<1.0	1.0
156-60-5	trans-1,2-Dichloroethene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**		
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services		
Client Sample ID:	**TB-01**	Sampled:	12/01/15 00:00		
Lab Sample ID:	**1512044-08**	Sampled By:	TML		
Matrix:	Water	Received:	12/02/15 09:10		
Unit:	ug/L	Prepared:	12/04/15 08:00	By:	BAG
Dilution Factor:	1	Analyzed:	12/04/15 15:34	By:	BAG
QC Batch:	1513314	Analytical Batch:	5L04030		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<1.0	1.0
10061-01-5	cis-1,3-Dichloropropene	<1.0	1.0
10061-02-6	trans-1,3-Dichloropropene	<1.0	1.0
100-41-4	Ethylbenzene	<1.0	1.0
60-29-7	Ethyl Ether	<5.0	5.0
591-78-6	2-Hexanone	<5.0	5.0
74-88-4	Iodomethane	<1.0	1.0
98-82-8	Isopropylbenzene	<1.0	1.0
99-87-6	4-Isopropyltoluene	<5.0	5.0
1634-04-4	Methyl tert-Butyl Ether	<5.0	5.0
75-09-2	Methylene Chloride	<5.0	5.0
78-93-3	2-Butanone (MEK)	<5.0	5.0
91-57-6	2-Methylnaphthalene	<5.0	5.0
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.0	5.0
91-20-3	Naphthalene	<5.0	5.0
103-65-1	n-Propylbenzene	<1.0	1.0
100-42-5	Styrene	<1.0	1.0
630-20-6	1,1,1,2-Tetrachloroethane	<1.0	1.0
79-34-5	1,1,2,2-Tetrachloroethane	<1.0	1.0
127-18-4	Tetrachloroethene	<1.0	1.0
109-99-9	Tetrahydrofuran	<5.0	5.0
108-88-3	Toluene	<1.0	1.0
87-61-6	1,2,3-Trichlorobenzene	<5.0	5.0
120-82-1	1,2,4-Trichlorobenzene	<5.0	5.0
71-55-6	1,1,1-Trichloroethane	<1.0	1.0
79-00-5	1,1,2-Trichloroethane	<1.0	1.0
79-01-6	Trichloroethene	<1.0	1.0
75-69-4	Trichlorofluoromethane	<1.0	1.0
96-18-4	1,2,3-Trichloropropane	<1.0	1.0
95-63-6	1,2,4-Trimethylbenzene	<1.0	1.0
108-67-8	1,3,5-Trimethylbenzene	<1.0	1.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

ANALYTICAL REPORT

Client:	**TRC Companies. - Ann Arbor Office**	Work Order:	**1512044**
Project:	Tecumseh Products GSI Wells	Description:	Laboratory Services
Client Sample ID:	**TB-01**	Sampled:	12/01/15 00:00
Lab Sample ID:	**1512044-08**	Sampled By:	TML
Matrix:	Water	Received:	12/02/15 09:10
Unit:	ug/L	Prepared:	12/04/15 08:00 By: BAG
Dilution Factor:	1	Analyzed:	12/04/15 15:34 By: BAG
QC Batch:	1513314	Analytical Batch:	5L04030

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<1.0	1.0
179601-23-1	Xylene, Meta + Para	<2.0	2.0
95-47-6	Xylene, Ortho	<1.0	1.0

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*96*	*85-118*
1,2-Dichloroethane-d4	*104*	*87-122*
Toluene-d8	*99*	*85-113*
4-Bromofluorobenzene	*99*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 1513314 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank Analyzed: 12/04/2015 By: BAG
Unit: ug/L Analytical Batch: 5L04030

Acetone	<20		20
Acrylonitrile	<2.0		2.0
Benzene	<1.0		1.0
Bromobenzene	<1.0	--	1.0
Bromochloromethane	<1.0		1.0
Bromodichloromethane	<1.0		1.0
Bromoform	<1.0		1.0
Bromomethane	<5.0	--	5.0
n-Butylbenzene	<1.0	--	1.0
sec-Butylbenzene	<1.0	--	1.0
tert-Butylbenzene	<1.0		1.0
Carbon Disulfide	<1.0	--	1.0
Carbon Tetrachloride	<1.0		1.0
Chlorobenzene	<1.0	--	1.0
Chloroethane	<5.0		5.0
Chloroform	<1.0		1.0
Chloromethane	<5.0		5.0
1,2-Dibromo-3-chloropropane	<5.0		5.0
Dibromochloromethane	<1.0		1.0
1,2-Dibromoethane	<1.0		1.0
Dibromomethane	<1.0		1.0
trans-1,4-Dichloro-2-butene	<1.0		1.0
1,2-Dichlorobenzene	<1.0	--	1.0
1,3-Dichlorobenzene	<1.0	--	1.0
1,4-Dichlorobenzene	<1.0	--	1.0
Dichlorodifluoromethane	<5.0		5.0
1,1-Dichloroethane	<1.0		1.0
1,2-Dichloroethane	<1.0		1.0
1,1-Dichloroethene	<1.0		1.0
cis-1,2-Dichloroethene	<1.0		1.0
trans-1,2-Dichloroethene	<1.0		1.0
1,2-Dichloropropane	<1.0		1.0
cis-1,3-Dichloropropene	<1.0		1.0
trans-1,3-Dichloropropene	<1.0		1.0
Ethylbenzene	<1.0		1.0
Ethyl Ether	<5.0		5.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

Volatile Organic Compounds by EPA Method 8260B (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 1513314 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank (Continued) Analyzed: 12/04/2015 By: BAG
Unit: ug/L Analytical Batch: 5L04030

2-Hexanone			<5.0				5.0
Iodomethane			<1.0				1.0
Isopropylbenzene			<1.0				1.0
4-Isopropyltoluene			<5.0			--	5.0
Methyl tert-Butyl Ether			<5.0				5.0
Methylene Chloride			<5.0			--	5.0
2-Butanone (MEK)			<5.0				5.0
2-Methylnaphthalene			<5.0			--	5.0
4-Methyl-2-pentanone (MIBK)			<5.0			--	5.0
Naphthalene			<5.0			--	5.0
n-Propylbenzene			<1.0				1.0
Styrene			<1.0				1.0
1,1,1,2-Tetrachloroethane			<1.0				1.0
1,1,2,2-Tetrachloroethane			<1.0				1.0
Tetrachloroethene			<1.0				1.0
Tetrahydrofuran			<5.0				5.0
Toluene			<1.0				1.0
1,2,3-Trichlorobenzene			<5.0			--	5.0
1,2,4-Trichlorobenzene			<5.0			--	5.0
1,1,1-Trichloroethane			<1.0				1.0
1,1,2-Trichloroethane			<1.0				1.0
Trichloroethene			<1.0				1.0
Trichlorofluoromethane			<1.0				1.0
1,2,3-Trichloropropane			<1.0				1.0
1,2,4-Trimethylbenzene			<1.0			--	1.0
1,3,5-Trimethylbenzene			<1.0				1.0
Vinyl Chloride			<1.0				1.0
Xylene, Meta + Para			<2.0				2.0
Xylene, Ortho			<1.0				1.0
Surrogates:							
Dibromofluoromethane				*96*	*85-118*		
1,2-Dichloroethane-d4				*102*	*87-122*		
Toluene-d8				*99*	*85-113*		

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 1513314 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank (Continued) Analyzed: 12/04/2015 By: BAG
Unit: ug/L Analytical Batch: 5L04030

Surrogates (Continued):							
4-Bromofluorobenzene				*99*	*82-110*		

Laboratory Control Sample Analyzed: 12/04/2015 By: BAG
Unit: ug/L Analytical Batch: 5L04030

Benzene	40.0	**42.2**		106	84-119	--	1.0
Chlorobenzene	40.0	**40.2**		100	84-118	--	1.0
1,1-Dichloroethene	40.0	**44.5**		111	77-123	--	1.0
Toluene	40.0	**41.3**		103	85-118	--	1.0
Trichloroethene	40.0	**45.8**		114	82-119	--	1.0
Surrogates:							
Dibromofluoromethane				*98*	*85-118*		
1,2-Dichloroethane-d4				*94*	*87-122*		
Toluene-d8				*100*	*85-113*		
4-Bromofluorobenzene				*101*	*82-110*		

QC Batch: 1513395 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank Analyzed: 12/05/2015 By: BAG
Unit: ug/L Analytical Batch: 5L07018

Acetone			<20				20
Acrylonitrile			<2.0				2.0
Benzene			<1.0				1.0
Bromobenzene			<1.0			--	1.0
Bromochloromethane			<1.0				1.0
Bromodichloromethane			<1.0				1.0
Bromoform			<1.0				1.0
Bromomethane			<5.0				5.0
n-Butylbenzene			<1.0			--	1.0
sec-Butylbenzene			<1.0			--	1.0
tert-Butylbenzene			<1.0				1.0
Carbon Disulfide			<1.0			--	1.0
Carbon Tetrachloride			<1.0				1.0
Chlorobenzene			<1.0			--	1.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

Volatile Organic Compounds by EPA Method 8260B (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 1513395 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank (Continued) Analyzed: 12/05/2015 By: BAG
Unit: ug/L Analytical Batch: 5L07018

Chloroethane	<5.0		5.0
Chloroform	<1.0		1.0
Chloromethane	<5.0		5.0
1,2-Dibromo-3-chloropropane	<5.0		5.0
Dibromochloromethane	<1.0		1.0
1,2-Dibromoethane	<1.0		1.0
Dibromomethane	<1.0		1.0
trans-1,4-Dichloro-2-butene	<1.0		1.0
1,2-Dichlorobenzene	<1.0	--	1.0
1,3-Dichlorobenzene	<1.0	--	1.0
1,4-Dichlorobenzene	<1.0	--	1.0
Dichlorodifluoromethane	<5.0		5.0
1,1-Dichloroethane	<1.0		1.0
1,2-Dichloroethane	<1.0		1.0
1,1-Dichloroethene	<1.0		1.0
cis-1,2-Dichloroethene	<1.0		1.0
trans-1,2-Dichloroethene	<1.0		1.0
1,2-Dichloropropane	<1.0		1.0
cis-1,3-Dichloropropene	<1.0		1.0
trans-1,3-Dichloropropene	<1.0		1.0
Ethylbenzene	<1.0	--	1.0
Ethyl Ether	<5.0		5.0
2-Hexanone	<5.0		5.0
Iodomethane	<1.0		1.0
Isopropylbenzene	<1.0		1.0
4-Isopropyltoluene	<5.0	--	5.0
Methyl tert-Butyl Ether	<5.0		5.0
Methylene Chloride	<5.0	--	5.0
2-Butanone (MEK)	<5.0		5.0
2-Methylnaphthalene	<5.0	--	5.0
4-Methyl-2-pentanone (MIBK)	<5.0	--	5.0
Naphthalene	<5.0	--	5.0
n-Propylbenzene	<1.0		1.0
Styrene	<1.0	--	1.0
1,1,1,2-Tetrachloroethane	<1.0		1.0
1,1,2,2-Tetrachloroethane	<1.0		1.0

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

Volatile Organic Compounds by EPA Method 8260B (Continued)

QC Batch: 1513395 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank (Continued) Analyzed: 12/05/2015 By: BAG
Unit: ug/L Analytical Batch: 5L07018

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
Tetrachloroethene			<1.0					1.0
Tetrahydrofuran			<5.0					5.0
Toluene			<1.0					1.0
1,2,3-Trichlorobenzene			<5.0			--		5.0
1,2,4-Trichlorobenzene			<5.0			--		5.0
1,1,1-Trichloroethane			<1.0					1.0
1,1,2-Trichloroethane			<1.0					1.0
Trichloroethene			<1.0					1.0
Trichlorofluoromethane			<1.0					1.0
1,2,3-Trichloropropane			<1.0					1.0
1,2,4-Trimethylbenzene			<1.0			--		1.0
1,3,5-Trimethylbenzene			<1.0			--		1.0
Vinyl Chloride			<1.0					1.0
Xylene, Meta + Para			<2.0					2.0
Xylene, Ortho			<1.0					1.0
Surrogates:								
Dibromofluoromethane				*96*	*85-118*			
1,2-Dichloroethane-d4				*97*	*87-122*			
Toluene-d8				*99*	*85-113*			
4-Bromofluorobenzene				*98*	*82-110*			

Laboratory Control Sample Analyzed: 12/05/2015 By: BAG
Unit: ug/L Analytical Batch: 5L07018

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
Benzene		40.0	**41.0**	103	84-119	--		1.0
Chlorobenzene		40.0	**39.6**	99	84-118	--		1.0
1,1-Dichloroethene		40.0	**41.2**	103	77-123	--		1.0
Toluene		40.0	**40.4**	101	85-118	--		1.0
Trichloroethene		40.0	**45.1**	113	82-119	--		1.0
Surrogates:								
Dibromofluoromethane				*98*	*85-118*			

Continued on next page

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.

5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL

QC Batch: 1513395 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B

Laboratory Control Sample (Continued) Analyzed: 12/05/2015 By: BAG
Unit: ug/L Analytical Batch: 5L07018

Surrogates (Continued):

1,2-Dichloroethane-d4	*95*	*87-122*
Toluene-d8	*100*	*85-113*
4-Bromofluorobenzene	*101*	*82-110*

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

QUALITY CONTROL REPORT

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

QC Type	Sample Conc.	Spike Qty.	Result	Unit	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
Analyte: BOD, (5-Day)/SM 5210 B-2011									
QC Batch: 1513434 (Method Specific Preparation)							Analyzed: 12/02/2015		By: HLB
*Method Blank			<2.0	mg/L					2.0
Laboratory Control Sample		198	**194**	mg/L	98	85-115			
Analyte: Chemical Oxygen Demand/SM 5220 D-2011									
QC Batch: 1513279 (5220 D COD Digestion)							Analyzed: 12/03/2015		By: KLA
Method Blank			<5.0	mg/L					5.0
Laboratory Control Sample		20.0	**19.7**	mg/L	98	95-105			5.0

This report shall not be reproduced, except in full, without written authorization of TriMatrix Laboratories, Inc.
Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

TRIMATRIX LABORATORIES

5560 Corporate Exchange Court SE
Grand Rapids, MI 49512
Phone (616) 975-4500 Fax (616) 942-7463
www.trimatrixlabs.com

Chain of Custody Record

COC No. 152921

Pg. 1 of 1

For Lab Use Only

Cart: 3
VOA Rack/Tray: 421 white
Receipt Log No.: 7-6
Project Chemist:
Work Order No.: 1512044

Client Name: TRC Environmental Corp
Address: 1540 Eisenhower Place
City, State Zip: Ann Arbor Mi 48108
Phone/Fax: mpowers@trcsolutions.com
Email: smetz@trcsolutions.com

Project Name: TPC GSF Wells
Client Project No. / P.O. No.: 220003.0001
Invoice To: ☐ Client ☐ Other (comments)
Contact/Report To: Stacy Metz, Mellisa Powers

Analyses Requested: VOCs, BOD, COD

PRESERVATIVES: A NONE pH~7; B HNO_3 pH<2; C H_2SO_4 pH<2; D 1+1 HCl pH<2; E NaOH pH>12; F ZnAc/NaOH pH>9; G MeOH; H Other (note below)

Schedule	Matrix Code	Sample Number	Field Sample ID	Cooler ID	Sample Date	Sample Time	COMP	GRAB	Matrix	Container Type (corresponds to Container Packing List): 1	3	4	Total	Sample Comments
										Number of Containers Submitted				
01		01	MP SB-114(7.4-10.4')		12/1/15	1115		x	GW	2				
		02	MP SB-114(4-7')			1200		x		2				
		03	MP SB-113(5-8')			1309		x		2				
		04	MP SB-113(2-5')			1334		x		2				
		05	MP SB-108(3-6')			1254		x		2				
02		06	B-108(6-9')			1247		x		2	2	2		
01		07	DUP-01			—		x		2				
03		08	TB-01			-				1				
		09												
		10												

Sampled By (print): Mellisa Powers / Javier Jasso
Sampler's Signature: Mellisa Powers
Company: TRC Environmental Corp.

Shipped? Hand ___ Carrier: FedEx
Tracking No.:

Comments: 4 day turn around time requested as per email to Jennifer Rice

	Relinquished By	Date	Time	Received By	Date	Time
1	Mellisa Powers	12/1/15	1520	TRC Sample Storage	12/1/15	1520
2	TRC Sample Storage	12/1/15	1730	FedEx	12/1/15	1730
3				Received for Lab By: [signature]	12/2/15	09[illegible]

WHITE COPY - REPORT YELLOW COPY - LABORATORY PINK COPY - FIELD

SAMPLE RECEIVING / LOG-IN CHECKLIST

TRIMATRIX LABORATORIES

Client: TRC
Receipt Record Page/Line #: 7-6
Work Order #: 1512044
New / Add To
Project Chemist | Sample #s

Recorded by (initials/date): LL 12/2/15
☑ Cooler ☐ Box ☐ Other
Qty Received: 1
Thermometer Used: ☑ IR Gun (#202) ☐ Digital Thermometer (#54) ☐ Other (#_____)
☐ See Additional Cooler Information Form

Cooler # Client | Time 0930

Custody Seals: ☑ None ☐ Present / Intact ☐ Present / Not Intact
Coolant Type: ☐ Loose Ice ☑ Bagged Ice ☐ Blue Ice ☐ None
Coolant Location: Dispersed / (Top) / Middle / Bottom
Temp Blank Present: ☑ Yes ☐ No
If Present, Temperature Blank Location is: ☑ Representative ☐ Not Representative

	Observed °C	Correction Factor °C	Actual °C
Temp Blank:	2.9	–	2.9
Sample 1:	2.1	–	2.1
Sample 2:	4.0	–	4.0
Sample 3:	2.7	–	2.7

3 Sample Average °C: 2.9
☐ Cooler ID on COC?
☑ VOC Trip Blank received?

Cooler # | Time

Custody Seals: ☐ None ☐ Present / Intact ☐ Present / Not Intact
Coolant Type: ☐ Loose Ice ☐ Bagged Ice ☐ Blue Ice ☐ None
Coolant Location: Dispersed / Top / Middle / Bottom
Temp Blank Present: ☐ Yes ☐ No
If Present, Temperature Blank Location is: ☐ Representative ☐ Not Representative

	Observed °C	Correction Factor °C	Actual °C
Temp Blank:			
Sample 1:			
Sample 2:			
Sample 3:			

3 Sample Average °C:
☐ Cooler ID on COC?
☐ VOC Trip Blank received?

Cooler # | Time

Custody Seals: ☐ None ☐ Present / Intact ☐ Present / Not Intact
Coolant Type: ☐ Loose Ice ☐ Bagged Ice ☐ Blue Ice ☐ None
Coolant Location: Dispersed / Top / Middle / Bottom
Temp Blank Present: ☐ Yes ☐ No
If Present, Temperature Blank Location is: ☐ Representative ☐ Not Representative

	Observed °C	Correction Factor °C	Actual °C
Temp Blank:			
Sample 1:			
Sample 2:			
Sample 3:			

3 Sample Average °C:
☐ Cooler ID on COC?
☐ VOC Trip Blank received?

Cooler # | Time

Custody Seals: ☐ None ☐ Present / Intact ☐ Present / Not Intact
Coolant Type: ☐ Loose Ice ☐ Bagged Ice ☐ Blue Ice ☐ None
Coolant Location: Dispersed / Top / Middle / Bottom
Temp Blank Present: ☐ Yes ☐ No
If Present, Temperature Blank Location is: ☐ Representative ☐ Not Representative

	Observed °C	Correction Factor °C	Actual °C
Temp Blank:			
Sample 1:			
Sample 2:			
Sample 3:			

3 Sample Average °C:
☐ Cooler ID on COC?
☐ VOC Trip Blank received?

If any shaded areas checked, complete Sample Receiving Non-Conformance and/or Inventory Form

Paperwork Received

Yes	No	
☑	☐	Chain of Custody record(s)? If No, Initiated By _____
☑		Received for Lab Signed/Date/Time?
☑	☐	Shipping document?
☐	☑	Other _____

COC Information

☑ TriMatrix COC ☐ Other 152921
COC ID Numbers:

Check COC for Accuracy

Yes	No	
☑	☐	Analysis Requested?
☑	☐	Sample ID matches COC?
☑	☐	Sample Date and Time matches COC?
☑		Container type completed on COC?
☑	☐	All container types indicated are received?

Check Sample Preservation

N/A	Yes	No	
	☐	☑	Temperature Blank **OR** average sample temperature, ≥6° C?
☑	☐	☐	If either is ≥6° C, was thermal preservation required?
☑	☐		If "Yes", Project Chemist Approval Initials: _____
☑	☐		If "Yes" Completed Non Con Cooler - Cont Inventory Form?
☐		☑	Completed Sample Preservation Verification Form?
☐		☑	Samples chemically preserved correctly?
☑	☐		If "No", added orange tag?
☐		☑	Received pre-preserved VOC soils?
			☐ MeOH ☐ Na_2SO_4

Check for Short Hold-Time Prep/Analyses

☐ Bacteriological
☐ Air Bags
☐ EnCores / Methanol Pre-Preserved
☐ Formaldehyde/Aldehyde
☑ Green-tagged containers
☐ Yellow/White-tagged 1 L ambers (SV Prep-Lab)

AFTER HOURS ONLY:
COPIES OF COC TO LAB AREA(S)
☐ NONE RECEIVED
☑ RECEIVED, COCs TO LAB(S)

Sample Condition Summary

N/A	Yes	No	
	☐	☑	Broken containers/lids?
	☐	☑	Missing or incomplete labels?
	☐	☑	Illegible information on labels?
	☐	☑	Low volume received?
	☐	☑	Inappropriate or non-TriMatrix containers received?
☐	☐	☑	VOC vials / TOX containers have headspace?
☐	☐	☑	Extra sample locations / containers not listed on COC?

Notes

☐ Trip Blank received ☑ Trip Blank not listed on COC

Cooler Received (Date/Time)	Paperwork Delivered (Date/Time)	≤1 Hour Goal Met?
12/2/15 0910	12/2/15 0942	(Yes) / No

TRIMATRIX LABORATORIES — SAMPLE PRESERVATION VERIFICATION FORM

page ____ of ____

Client: TRC	Work Order #: 1512044
Receipt Log #: T-6	Completed By (initials/date): AR 12/2/15
	Project Chemist:

COC ID #	Adjusted by: ____ Date: ____	DO NOT ADJUST pH FOR THESE CONTAINER TYPES						
152921								
Container Type	5 / 23	4	13		6	15		
Tag Color	Lt. Blue	Blue	Brown		Red	Red Stripe		
Preservative	NaOH	H_2SO_4	H_2SO_4		HNO_3	HNO_3		
Expected pH	>12	<2	<2		<2	<2		
COC Line #1								
COC Line #2								
COC Line #3								
COC Line #4								
COC Line #5								
COC Line #6		✓✓						
COC Line #7								
COC Line #8								
COC Line #9								
COC Line #10								

Comments

COC ID #	Adjusted by: ____ Date: ____	DO NOT ADJUST pH FOR THESE CONTAINER TYPES						
Container Type	5 / 23	4	13		6	15		
Tag Color	Lt. Blue	Blue	Brown		Red	Red Stripe		
Preservative	NaOH	H_2SO_4	H_2SO_4		HNO_3	HNO_3		
Expected pH	>12	<2	<2		<2	<2		
COC Line #1								
COC Line #2								
COC Line #3								
COC Line #4								
COC Line #5								
COC Line #6								
COC Line #7								
COC Line #8								
COC Line #9								
COC Line #10								

Comments

pH Strip Reagent #	
☑	5100128
☐	

Aqueous Samples: For each sample and container type, check the box if pH is acceptable. If pH is not acceptable for any sample container, record pH in box, and note on Sample Receiving Checklist and on Sample Receiving Non-Conformance Form. If approved by Project Chemist, add acid or base to the sample to achieve the correct pH. Add up to, but do not exceed 2x the volume initially added at container prep (see table below for initial volumes used). Add orange pH tag to sample container and record information requested. Record adjusted pH on this form. Do not adjust pH for container types 6 and 15.

Container Size (mL)	Original Vol. of Preservative (mL)
Container Type 5	NaOH
500	2.5
1000	5.0
Container Type 4	H_2SO_4
125	0.5
250	1.0
500	2.0
1000	4.0
Container Type 13	H_2SO_4
500	2.5

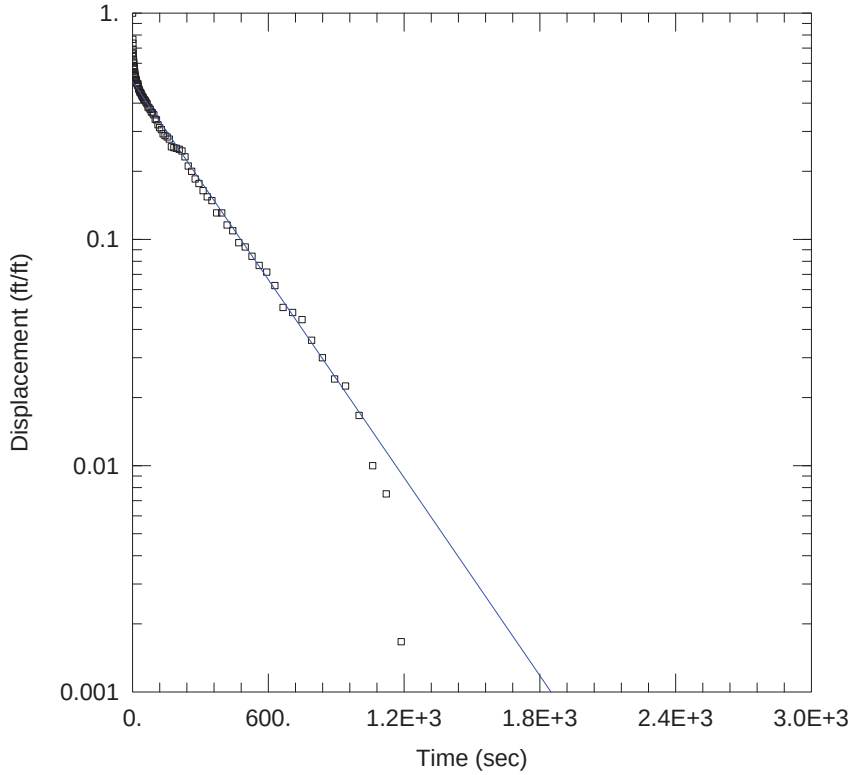
Attachment 3
In-Situ Hydraulic Conductivity Tests

Hydraulic Conductivity Results
Former Tecumseh Products Company Site
Tecumseh, Michigan

Test Location ID	Date Performed	Test Type	Hydraulic Conductivity (K)	
			cm/sec	ft/day
B-108 (3-6')	12/9/2015	Falling Head	6.66E-05	0.19
		Rising Head	8.37E-06	0.02
		Average	**3.75E-05**	**0.11**
B-108 (5.6-8.6')	12/9/2015	Falling Head	1.11E-04	0.31
		Rising Head	9.46E-05	0.27
		Average	**1.03E-04**	**0.29**
B-109 (7.4-10.4')	12/9/2015	Falling Head	1.40E-05	0.04
		Rising Head	1.40E-05	0.04
		Average	**1.40E-05**	**0.04**
B-113 (5-8')	12/9/2015	Falling Head	1.13E-04	0.32
		Rising Head	6.08E-05	0.17
		Average	**8.71E-05**	**0.25**
		Minimum	**8.37E-06**	**0.02**
		Maximum	**1.13E-04**	**0.32**
		Geometric Mean	**4.65E-05**	**0.13**

Conversion

$$\frac{1\text{ cm}}{1\text{ sec}} \times \frac{86{,}400\text{ sec}}{1\text{ day}} \times \frac{1\text{ ft}}{30.48\text{ cm}} = 2.83\text{E+03}\ \frac{\text{ft}}{\text{day}}$$



B-108 (3-6') FALLING HEAD SLUG TEST ANALYSIS

Data Set: P:\...\B-108 (3-6') IN.aqt
Date: 01/13/16 Time: 16:05:50

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: TPC
Project: 220003.0001.0000
Location: Tecumseh, MI
Test Well: B-108 (3-6')
Test Date: 12/9/15

AQUIFER DATA

Saturated Thickness: 7.88 ft Anisotropy Ratio (Kz/Kr): 1.

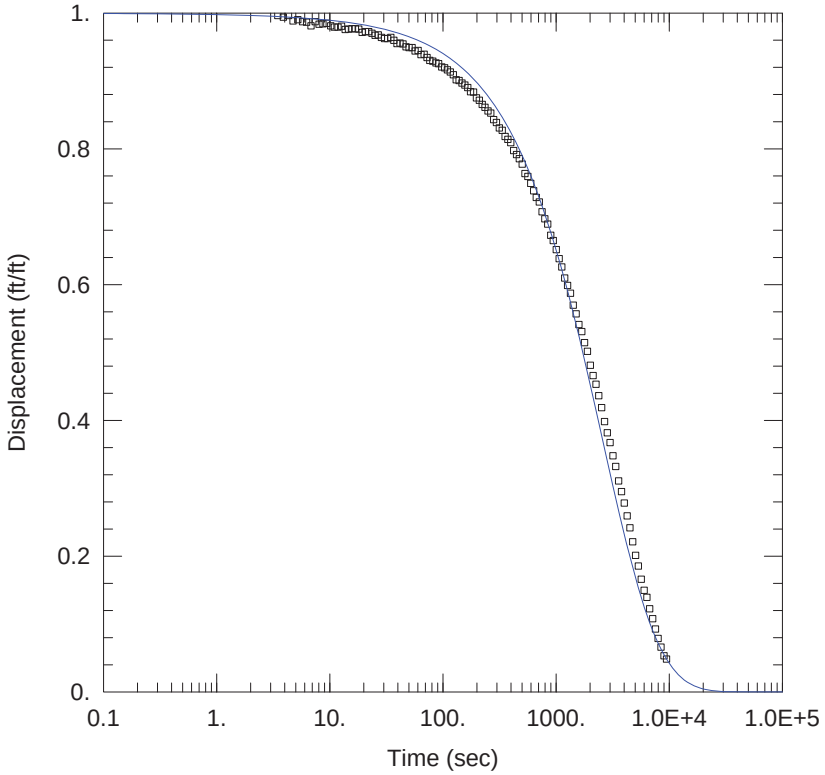
WELL DATA (B-108 (3-6'))

Initial Displacement: 1.2 ft Static Water Column Height: 3.65 ft
Total Well Penetration Depth: 5.75 ft Screen Length: 3. ft
Casing Radius: 0.055 ft Well Radius: 0.055 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 6.664E-5 cm/sec y0 = 0.5974 ft



B-108 (3-6') RISING HEAD SLUG TEST ANALYSIS

Data Set: P:\...\B-108 (3-6') OUT.aqt
Date: 01/14/16 Time: 08:42:55

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: TPC
Project: 220003.0001.0000
Location: Tecumseh, MI
Test Well: B-108 (3-6')
Test Date: 12/10/15

AQUIFER DATA

Saturated Thickness: 7.88 ft

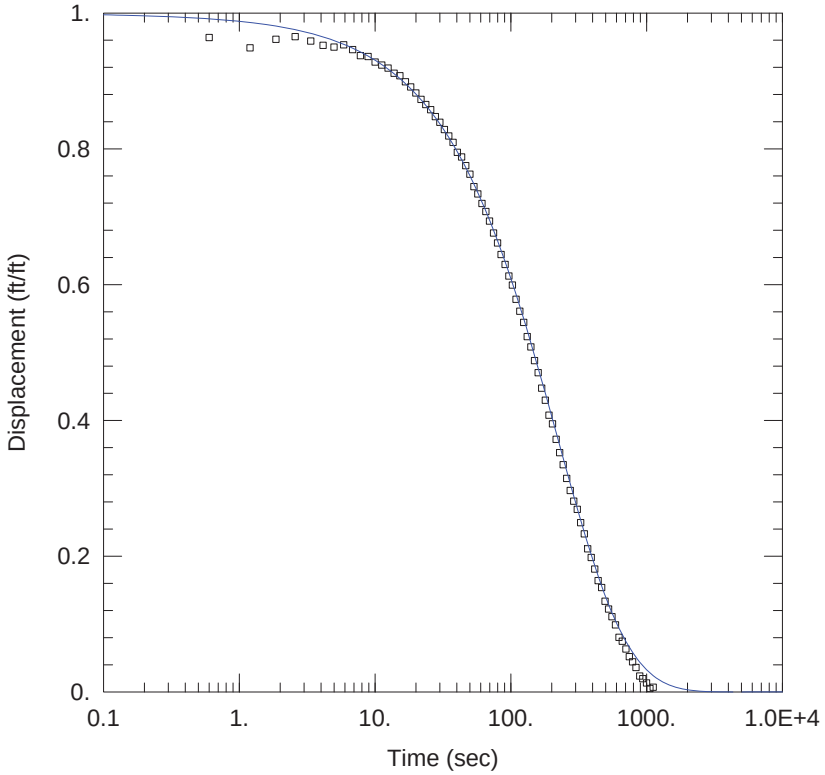
WELL DATA (B-108 (3-6'))

Initial Displacement: 1.65 ft
Total Well Penetration Depth: 5.75 ft
Casing Radius: 0.055 ft
Static Water Column Height: 3.65 ft
Screen Length: 3. ft
Well Radius: 0.055 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 8.371E-6 cm/sec
Kz/Kr = 1.
Ss = 0.0001269 ft^{-1}



B-108 (5.6-8.6') FALLING HEAD SLUG TEST ANALYSIS

Data Set: P:\...\B-108 (5.6-8.6') IN.aqt
Date: 01/13/16 Time: 15:03:21

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: TPC
Project: 220003.0001.0000
Location: Tecumseh, MI
Test Well: B-108 (5.6-8.6') IN
Test Date: 12/9/15

AQUIFER DATA

Saturated Thickness: 8.65 ft

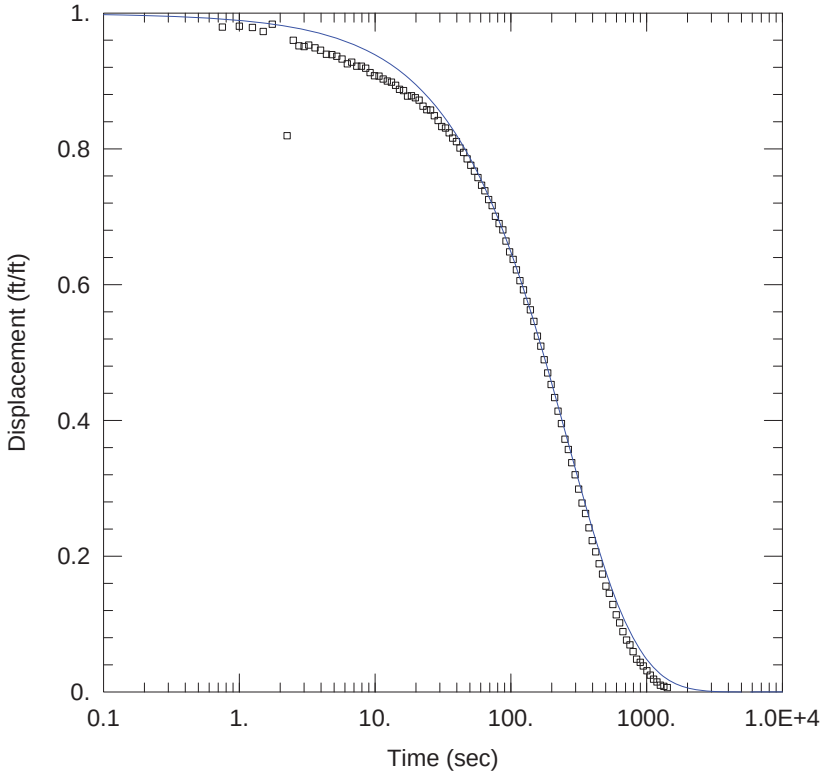
WELL DATA (B-108 (5.6-8.6'))

Initial Displacement: 1.58 ft
Total Well Penetration Depth: 8.7 ft
Casing Radius: 0.055 ft
Static Water Column Height: 4.6 ft
Screen Length: 3. ft
Well Radius: 0.055 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001105 cm/sec
Kz/Kr = 1.
Ss = 0.0001156 ft^{-1}



B-108 (5.6-8.6') RISING HEAD SLUG TEST ANALYSIS

Data Set: P:\...\B-108 (5.6-8.6') OUT.aqt
Date: 01/13/16 Time: 16:06:49

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: TPC
Project: 220003.0001.0000
Location: Tecumseh, MI
Test Well: B-108 (5.6-8.6')
Test Date: 12/9/15

AQUIFER DATA

Saturated Thickness: 8.65 ft

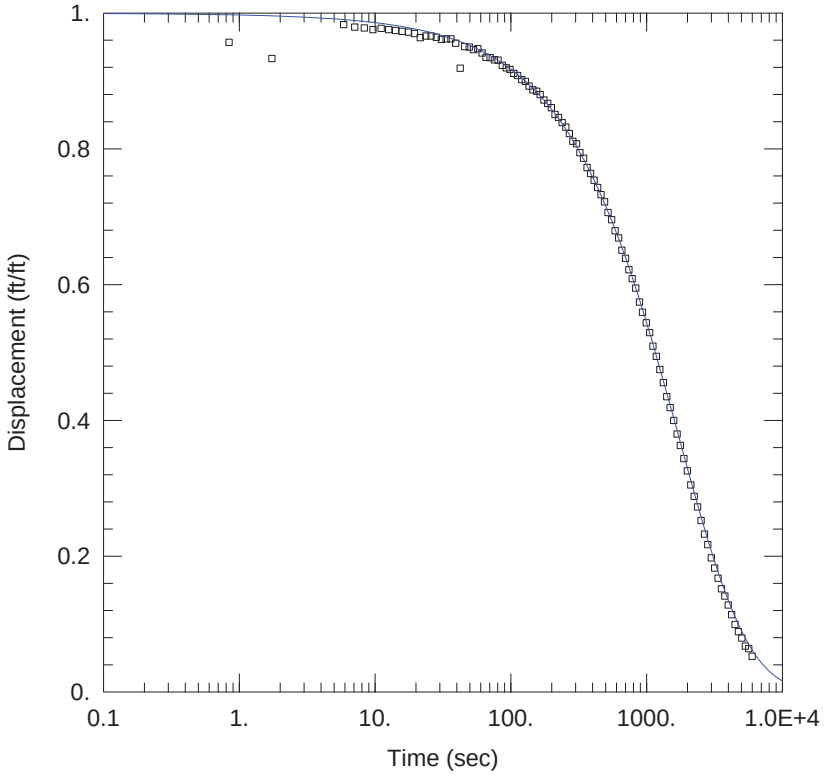
WELL DATA (B-108 (5.6-8.6'))

Initial Displacement: 1.7 ft
Total Well Penetration Depth: 8.7 ft
Casing Radius: 0.055 ft
Static Water Column Height: 4.6 ft
Screen Length: 3. ft
Well Radius: 0.055 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 9.456E-5 cm/sec
Kz/Kr = 1.
Ss = 0.0001156 ft^{-1}



B-109 FALLING HEAD SLUG TEST ANALYSIS

Data Set: P:\...\B-109 IN.aqt
Date: 01/13/16 Time: 16:07:17

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: TPC
Project: 220003.0001.0000
Location: Tecumseh, MI
Test Well: B-109
Test Date: 12/9/15

AQUIFER DATA

Saturated Thickness: 10.21 ft

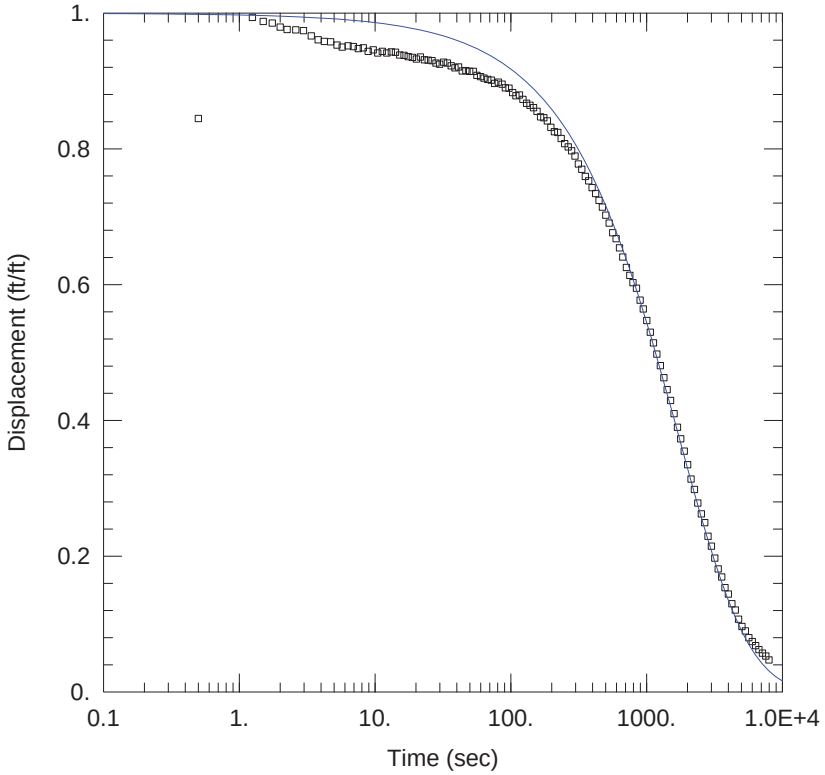
WELL DATA (B-109)

Initial Displacement: 1.6 ft
Total Well Penetration Depth: 10.23 ft
Casing Radius: 0.055 ft
Static Water Column Height: 7.8 ft
Screen Length: 3. ft
Well Radius: 0.055 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.403E-5 cm/sec
Kz/Kr = 1.
Ss = 9.794E-5 ft^{-1}



B-109 RISING HEAD SLUG TEST ANALYSIS

Data Set: P:\...\B-109 OUT.aqt
Date: 01/13/16 Time: 16:07:37

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: TPC
Project: 220003.0001.0000
Location: Tecumseh, MI
Test Well: B-109
Test Date: 12/9/15

AQUIFER DATA

Saturated Thickness: 10.21 ft

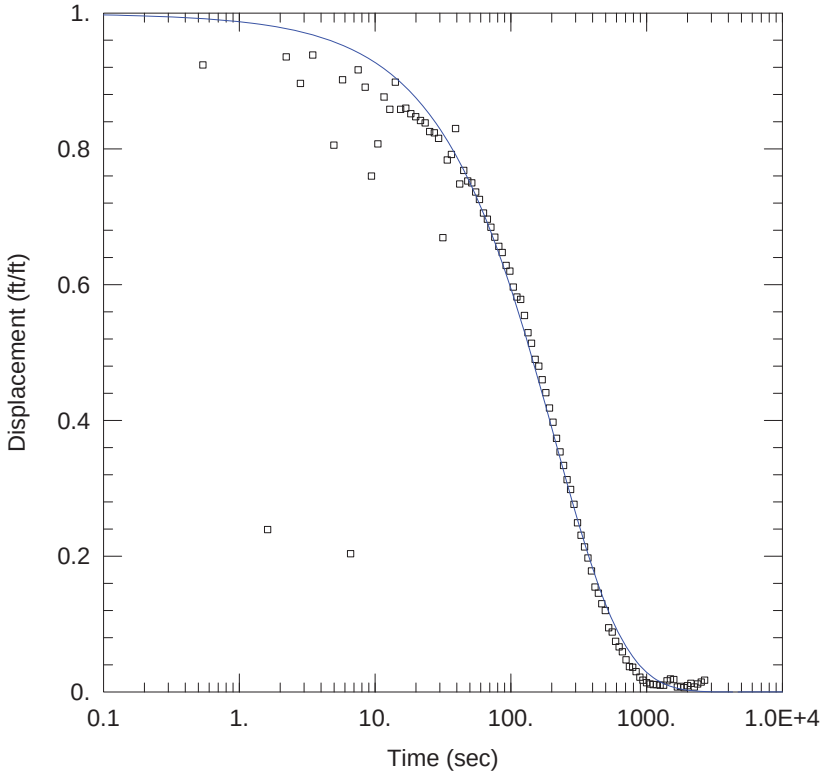
WELL DATA (B-109)

Initial Displacement: 1.7 ft
Total Well Penetration Depth: 10.23 ft
Casing Radius: 0.055 ft
Static Water Column Height: 7.8 ft
Screen Length: 3. ft
Well Radius: 0.055 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.4E-5 cm/sec
Kz/Kr = 1.
Ss = 9.794E-5 ft^{-1}



B-113 (5-8') FALLING HEAD SLUG TEST ANALYSIS

Data Set: P:\...\B-113 (5-8') IN.aqt
Date: 01/13/16 Time: 16:03:35

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: TPC
Project: 220003.0001.0000
Location: Tecumseh, MI
Test Well: B-113 (5-8')
Test Date: 12/9/15

AQUIFER DATA

Saturated Thickness: 8.48 ft

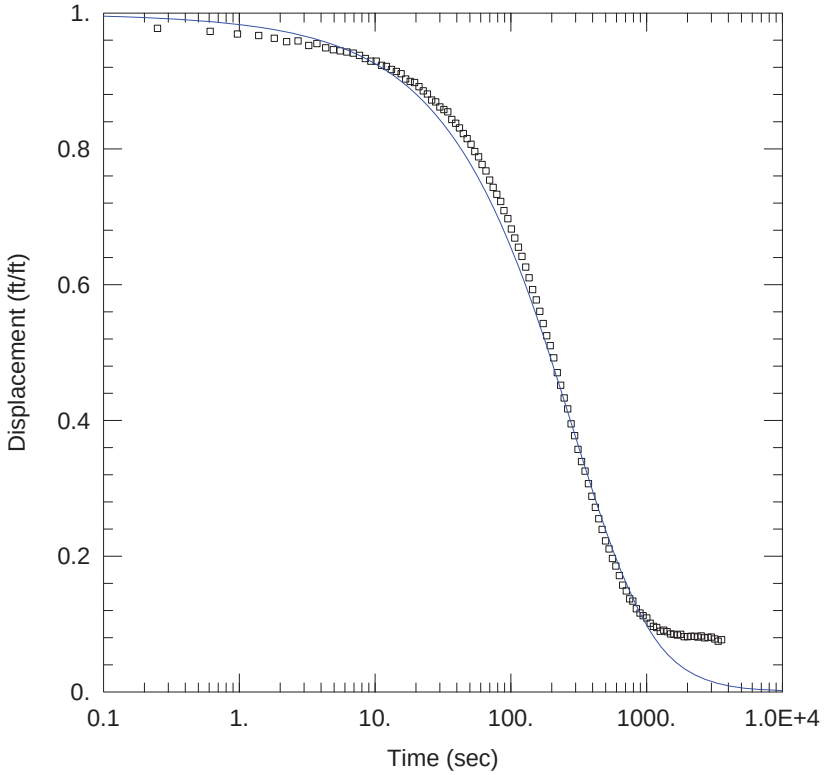
WELL DATA (B-113 (5-8'))

Initial Displacement: 1.1 ft
Total Well Penetration Depth: 8.47 ft
Casing Radius: 0.055 ft
Static Water Column Height: 6.59 ft
Screen Length: 3. ft
Well Radius: 0.055 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001134 cm/sec
Kz/Kr = 1.
Ss = 0.0001179 ft^{-1}



B-113 (5-8') RISING HEAD SLUG TEST ANALYSIS

Data Set: P:\...\B-113 (5-8') OUT.aqt
Date: 01/13/16 Time: 16:04:50

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: TPC
Project: 220003.0001.0000
Location: Tecumseh, MI
Test Well: B-113 (5-8')
Test Date: 12/9/15

AQUIFER DATA

Saturated Thickness: 8.48 ft

WELL DATA (B-113 (5-8'))

Initial Displacement: 1.78 ft
Total Well Penetration Depth: 8.47 ft
Casing Radius: 0.055 ft
Static Water Column Height: 6.59 ft
Screen Length: 3. ft
Well Radius: 0.055 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 6.08E-5 cm/sec
Kz/Kr = 1.
Ss = 0.001 ft^{-1}

Attachment 4
Whole Effluent Toxicity Test Results

Great Lakes Environmental Center, Inc.

Applied Environmental Sciences
www.glec.com

Traverse City Operations
739 Hastings St.
Traverse City
MI 49686

231 941-2230
231 941-2240 fax

Columbus Operations
1295 King Ave.
Columbus
OH 43212

614 487-1040
614 487-1920 fax

January 20, 2016

Ms. Stacy Metz, PE
Project Engineer
TRC Companies, Inc.
1540 Eisenhower Place
Ann Arbor, Michigan 48108

RE: Acute Toxicity Tests, Sample Dates: December 15, 2015
Sample Identification: B-108
TPC- Supplemental GSI Investigation
Tecumseh, Michigan
GLEC Project Number: 2354

Dear Ms. Metz:

Great Lakes Environmental Center, Inc. (GLEC) has completed our analyses of the 48-hour *Ceriodaphnia dubia* (*C. dubia)* and 96-hour fathead minnow acute toxicity tests performed on a groundwater sample that was designated B-108. This groundwater sample was collected by TRC Solutions personnel on December 15, 2015 (GLC Number: 10,819).

The *C. dubia* and fathead minnow toxicity tests were conducted following guidelines in *Methods for Measuring the Acute Toxicity of Effluent to Freshwater and Marine Organisms*, EPA/600/4-90/027F and GLEC's Standard Operating Procedures. Dilute mineral water (DMW) was used as dilution water for the *C. dubia* test and moderately hard reconstituted water (MH) was used as dilution water for the fathead minnow test.

Upon receipt, the water sample had an initial dissolved oxygen level of 17.2 mg/L. The elevated dissolved oxygen level was due to TRC Solutions personnel passively oxygenating the sample by filling a half-liter headspace in the cube container with oxygen prior to overnight shipment of the cube container to GLEC in order to eliminate the need to aerate the sample and minimize the loss of volatile organic compounds (VOCs) during the test. No action was taken to reduce oxygen level prior to conducting the toxicity tests. The groundwater sample was conducted in closed test chambers with limited headspace to reduce the loss of VOCs from the test solutions.

The B-108 water sample (GLC Number: 10,819) was acutely toxic to *C. dubia*. The 48-hour *C. dubia* LC_{50} (median lethal toxicant concentration) estimate was 10.9 percent sample, or 9.2 TU_a (acute toxic units). The B-108 water sample (GLC Number: 10,819) was not acutely toxic to fathead minnows. The 96-hour fathead minnow LC_{50} estimate was greater than 100 percent water sample, or 0 TU_a.

The acute toxicity test report forms are enclosed for your review. Copies of the raw data sheets and standard reference toxicant data for the acute water sample toxicity tests are included with this report in Appendices A and B, respectively.

If you have any questions or comments concerning the results of these toxicity tests, please contact either myself or Dennis McCauley at (231) 941-2230. Thank you for the opportunity to provide this service to TRC Solutions. We look forward to continuing to provide our environmental services to you in the future.

Sincerely,

Mailee W. Garton

Mailee W. Garton
Laboratory Coordinator

MWG:mwg
Enclosures

cc: John Barkach, GLEC

Ceriodaphnia dubia ACUTE TOXICITY TEST REPORT

1. NAME OF FACILITY (on NPDES permit) N/A		2. NPDES PERMIT # M I 0 0
3. RECEIVING WATER (as designated in permit): N/A	4. Sample Identification: **B-108**	5. RECEIVING WATER CONCENTRATION (if known) n/a
6. TEST LAB (Name and Address) Great Lakes Environmental Center, Inc. 739 Hastings Street, Traverse City, MI 49686		7. AGE RANGE OF ORGANISMS AT TEST START <24 hours in house

8. TEST START DATE	9. TEST END DATE	10. TEST SPECIES	11. REPORT DATE
12/16/2015	12/18/2015	*Ceriodaphnia dubia*	1/21/2016

12. NAME OF PERSON CONDUCTING TEST: Maggie Petersen Mitch Mort Kelly Stratton	13. NAME/PHONE # OF PERSON WHO CAN ANSWER QUESTIONS ABOUT THIS REPORT Mailee Garton/Dennis McCauley (231) 941 - 2230

14. SAMPLE COLLECTION DATES	15. DATE RECEIVED	16. ARRIVAL TEMPERATURE (°C)
Sample 1:12/15/2015 11:29	Sample 1: 12/16/2015 GLC# 10,819	Sample 1: 2.6
Sample 2 (if any):	Sample 2 (if any):	Sample 2 (if any):
17. DATE OF FIRST USE	**18. TOTAL RESIDUAL CHLORINE (mg/l)**	**19. AMMONIA (mg/l as N)**
Sample 1: 12/16/2015	Sample 1:NM	Sample 1: ND
Sample 2 (if any):	Sample 2 (if any):	Sample 2 (if any):

20. WAS SAMPLE DECHLORINATED?	21. DESCRIBE DECHLORINATION (if any)
Sample 1: O YES X NO Sample 2: O YES O NO	

22. EFFLUENT SAMPLES WERE COLLECTED (check one) O BEFORE CHLORINATION O AFTER CHLORINATION

O AFTER CHLORINATION, BEFORE DECHLORINATION O AFTER DECHLORINATION X FACILITY DOES NOT CHLORINATE

23. DESCRIBE ANY DEVIATIONS FROM TEST METHODS (For example, pH-controlled test, reduced DO levels in test leading to aeration, sample exceeded holding time.) All test chambers were closed chambers with reduced head space to minimize the loss of volatile organic carbons (VOC).

24. WAS THE EFFLUENT FILTERED?	25. STATE MESH SIZE OF FILTER (if filtered)
O YES X NO	

26. EFFLUENT SAMPLE TYPE (check one type for each sample)	27. IDENTIFY THE DILUENT (O_1) CONTROL: Moderately Hard (Dilute Mineral Water) DMW #2343
Sample 1: O 24-HR COMPOSITE O GRAB/COMPOSITE (give # of grabs)____ X GRAB	IDENTIFY THE SECONDARY (O_2) CONTROL (if used): NA
Sample 2: O 24-HR COMPOSITE O GRAB/COMPOSITE (give # of grabs)____ O GRAB (if any)	

28. SUMMARY OF RESULTS - PERCENT MORTALITY PER CONCENTRATION

	CONTROLS		EFFLUENT CONCENTRATIONS					
DAY	O_1	O_2	6.25 %	12.5 %	25.0%	50.0%	100%	Non adjusted 100%
1	0	0	0	60	100	100	100	90
2	0	0	0	70	100	100	100	100

29. 48-HOUR LC_{50} (for *Daphnia magna* or *Ceriodaphnia dubia* acute tests): **10.9%**	30. 96-HOUR LC_{50} (for fathead minnow acute tests) N/A	31. TU_a (acute toxic units) **9.2**

ND: Non detect NM: Not Measured

* If TU_a is <1.0 (LC50 >100%) a numerical TU_a will be based on a % mortality in the 100% effluent concentration. TU_a = 0.02 x % mortality (when mortality is 10-49%)

EQP5944 (Rev. 6/2007)

Fathead minnow ACUTE TOXICITY TEST REPORT

1. NAME OF FACILITY (on NPDES permit) N/A	2. NPDES PERMIT # M I 0 0
3. RECEIVING WATER (as designated in permit): N/A	4. OUTFALL **B-108** 5. RECEIVING WATER CONCENTRATION (if known) n/a
6. TEST LAB (Name and Address) Great Lakes Environmental Center, Inc. 739 Hastings Street, Traverse City, MI 49686	7. AGE RANGE OF ORGANISMS AT TEST START 5 days in house; 12/11/15 1530
8. TEST START DATE 12/16/2015	9. TEST END DATE 12/20/2015
10. TEST SPECIES Fathead minnow	11. REPORT DATE 1/21/2016
12. NAME O/F PERSON CONDUCTING TEST: Michelle VanDenBrand Mitch Mort Maggie Petersen	13. NAME/PHONE # OF PERSON WHO CAN ANSWER QUESTIONS ABOUT THIS REPORT Mailee Garton/Dennis McCauley (231) 941 - 2230

14. SAMPLE COLLECTION DATES Sample 1: 12/15/2015 11:29 Sample 2 (if any):	15. DATE RECEIVED Sample 1: 12/16/2015 GLC# 10,819 Sample 2 (if any):	16. ARRIVAL TEMPERATURE (°C) Sample 1: 2.6 Sample 2 (if any):
17. DATE OF FIRST USE Sample 1: 12/16/2015 Sample 2 (if any):	18. TOTAL RESIDUAL CHLORINE (mg/l) Sample 1:NM Sample 2 (if any):	19. AMMONIA (mg/l as N) Sample 1: ND Sample 2 (if any):
20. WAS SAMPLE DECHLORINATED? Sample 1: O YES X NO Sample 2: O YES O NO		21. DESCRIBE DECHLORINATION (if any)

22. EFFLUENT SAMPLES WERE COLLECTED (check one) O BEFORE CHLORINATION O AFTER CHLORINATION

O AFTER CHLORINATION, BEFORE DECHLORINATION O AFTER DECHLORINATION X FACILITY DOES NOT CHLORINATE

23. DESCRIBE ANY DEVIATIONS FROM TEST METHODS (For example, pH-controlled test, reduced DO levels in test leading to aeration, sample exceeded holding time.) All test chambers were closed chambers with reduced head space to minimize the loss of volatile organic carbons (VOC).

24. WAS THE EFFLUENT FILTERED? O YES X NO	25. STATE MESH SIZE OF FILTER (if filtered)
26. EFFLUENT SAMPLE TYPE (check one type for each sample) Sample 1: O 24-HR COMPOSITE O GRAB/COMPOSITE (give # of grabs)____ X GRAB Sample 2: O 24-HR COMPOSITE O GRAB/COMPOSITE (give # of grabs)____ O GRAB (if any)	27. IDENTIFY THE DILUENT (O_1) CONTROL: Moderately Hard #2543 and 2544 IDENTIFY THE SECONDARY (O_2) CONTROL (if used): N/A

28. SUMMARY OF RESULTS - PERCENT MORTALITY PER CONCENTRATION

	CONTROLS		EFFLUENT CONCENTRATIONS					
DAY	O_1	O_2	6.25 %	12.5 %	25.0%	50.0%	100%	Non adjusted 100%
1	0	0	0	0	0	0	0	0
2	0	0	5	0	5	5	0	10
3	0	0	5	0	5	5	5	10
4	0	0	10	0	5	5	5	45

29. 48-HOUR LC_{50} (for *Daphnia magna* or *Ceriodaphnia dubia* acute tests): N/A	30. 96-HOUR LC_{50} (for fathead minnow acute tests) **>100%**	31. TU_a (acute toxic units) **0**

ND: Non detect NM: Not Measured

EQP5944 (Rev. 6/2007)

* If TU_a is <1.0 (LC50 >100%) a numerical TU_a will be based on a % mortality in the 100% effluent concentration. TU_a = 0.02 x % mortality (when mortality is 10-49%)

Appendix A

Raw Data Sheets

GLEC

Great Lakes Environmental Center

CHAIN OF CUSTODY RECORD

(To be completed and submitted with samples)

Stacy Metz
SMetz@TRCsolutions.com
1540 Eisenhower Place
Ann Arbor, MI 48108

Page _____ of _____

GLEC
Great Lakes Environmental Center
739 Hastings St.
Traverse City, MI 49686
Phone: 231-941-2230
Fax: 231-941-2240
www.glec.com

Facility: TRC Environmental
Location: Ann Arbor MI

Date: 12/15/15
Contact Person: ~~G. Crockford~~
Email Address: ~~GCrockford@TRCsolutions~~
Phone Number: 734-971-7080
Collector: C. Scieszka

Bottle ID	Date / Time of Sample	Volume Collected	Type of Sample Container	Sample Description (Site information / sample type)	Preservation	Alkalinity	BOD_5	Chloride	Chlorophyll a	Hardness	NH_3-N	NO_3 / NO_2-N	TDS	TKN	TP	TSS	Toxicity		
B-108 (5.6-8.6')	12/15/15 ~~12/15~~ 11:29	2 Gal	cube	Grab	None												X		
	GLC# 108 19																		

Check the requested analysis (see definitions below)

Shipper:	Date/Time:	Receiver:	Date/Time:	Temperature:
1. [signature]	12/15/15 1315	Melissa Powers	12/15/15 1315	
2. Melissa Powers	12/15/15 1915	FedEx	12/15/15 1915	

Definitions

BOD_5 = Biochemical Oxygen Demand-5 day
NH_3-N = Ammonia-Nitrogen
NO_3/NO_2-N = Nitrate/Nitrite-Nitrogen
TDS = Total Dissolve Solids
TKN = Total Kjeldahl Nitrogen
TP = Total Phosphorus
TSS = Total Suspended Solids

Abbreviations for other frequently requested analyses

NO_2-N = Nitrite Nitrogen
NO_3-N = Nitrate Nitrogen
Total N = Total Nitrogen
SRP = Soluble Reactive Phosphorus

Rec 12/16/15 KS Temp 2.6 GLC # 108A19

Great Lakes Environmental Center

Sample
CHECK-IN FORM

CLIENT: TRC PROJECT NUMBER: 2354-00

INITIAL SAMPLE CHEMISTRY (UPON RECEIPT)

					INITIALS
DATE RECEIVED	12/16/15			KS	
SAMPLE ID	B-108				
TYPE (W=water, SED=sediment, M=material)	W				
COLLECTION (G=grab, C=composite)	G				
GLC NUMBER	10819				
COLLECTION DATE	12/15/15				
COLLECTION TIME	1129				
TEMPERATURE (≤6 degrees Celsius[1])	2.6				
SAMPLE DESCRIPTION/OBSERVATIONS (clarity, color, odor)	Clear no odor			KS	

[1] If out of range see project manager

SAMPLE CHEMISTRY AT TEST TEMPERATURES

				Meter ID		INITIALS
GLC NUMBER	10819				KS	
TEMPERATURE (°C)	24.3			236		
pH (s.u.)	7.31			203		
DISSOLVED OXYGEN (mg/L)	17.2*			236		
CONDUCTIVITY (µmhos/cm)	1109			236		
HARDNESS (mg/L)	392					
ALKALINITY (mg/L)	300			203		
TOTAL CHLORINE (mg/L)*	NM					
TOTAL AMMONIA (mg/L)* as N	ND				KS	

*Check with project manager to see if necessary. * High DO ok per Mailee / John

NM: Not Measured, ND: Non-detect

GLC#: 10819	GLC#:	GLC#:	GLC#: 10819	GLC#:	GLC#:
Hardness: 392	Hardness:	Hardness:	Alkalinity: 300	Alkalinity:	Alkalinity:
End mL: 50.6	End mL:	End mL:	End mL: 39.2	End mL:	End mL:
Start mL: 40.7	Start mL:	Start mL:	Start mL: 24.2	Start mL:	Start mL:
mL used: 9.8	mL used:	mL used:	mL used: 15.0	mL used:	mL used:
Sample Volume: 250	Sample Volume:	Sample Volume:	Sample Volume: 500	Sample Volume:	Sample Volume:

Revised: 1/22/2012

GLEC

DAPHNID 48-HOUR STATIC ACUTE TOXICITY TEST

TEST MATERIAL: TRC
PROJECT NUMBER: 2354-00
TEST SPECIES: *C. dubia*
TYPE OF TEST: Regulatory
GLC NUMBER: 10819

INCUBATOR NUMBER: 38
SHELF NUMBER: 4
NUMBER OF DAPHNIDS/CHAMBER: 5
NUMBER OF CHAMBERS: 4 + 1 for chemistries
AGE/SOURCE OF DAPHNIDS: <24 hours; in house: BO 12/4/15

DILUTION WATER: DMW # 2343
2° CONTROL: Non Adjusted DMW # 2343
TEST TEMPERATURE: 25 ± 1°C
LIGHT INTENSITY (ft-c): 900 x.91 = 81.9
PHOTOPERIOD: 16:8

DATE / TIME	TEST DAY	TECH INITIALS	TREATMENT LEVEL / REPLICATE NUMBER	METER ID	DMW Con 1	DMW Con 2	DMW Con 3	DMW Con 4	A 6.25% 1	A 6.25% 2	A 6.25% 3	A 6.25% 4	B 12.5% 1	B 12.5% 2	B 12.5% 3	B 12.5% 4	C 25% 1	C 25% 2	C 25% 3	C 25% 4	D 50% 1	D 50% 2	D 50% 3	D 50% 4	E 100% 1	E 100% 2	E 100% 3	E 100% 4	Non adjusted Control 1	Non adjusted Control 2	Non adjusted Control 3	Non adjusted Control 4	Non adjusted F 100% 1	Non adjusted F 100% 2	Non adjusted F 100% 3	Non adjusted F 100% 4
12/16/15 1300	0	KS	TEMPERATURE (°C)	236	25.0				25.6				25.6				25.5				25.2				24.7				25.0				24.7			
			pH	203	8.08				7.98				7.81				7.66				7.56				7.37				8.08				7.37			
			DO (mg/L)	236	7.6				8.0				8.4				9.6				11.4				17.1				7.6				17.1			
			SP. CONDUCTANCE (µs/cm)	236	175				238				298				428				662				1100				178				1100			
12/17/15 1307	1	MA	NUMBER LIVE		5	5	5	5	5	5	5	5	0	2	3	3	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5	5	2	0	0	0
			OBSERVATIONS																																	
			TEMPERATURE (°C)	40	25.5				25.1				25.0				24.9				24.8				24.5				24.3				24.3			
			pH	203	7.97				8.13				8.23				8.25				8.38				8.42				8.52				8.52			
			DO (mg/L)	236	9.1				8.7				8.2				8.3				8.2				8.3				8.42				8.4			
12/18/15 1415	2	MGM	NUMBER LIVE		5	5	5	5	5	5	5	5		1	2	3													5	5	5	5	0	0	0	0
			OBSERVATIONS																																	
			TEMPERATURE (°C)	40	25.5				25.4				25.4																25.0				24.7			
			pH	203	7.94				8.14				8.28																8.21				8.17			
			DO (mg/L)	236	8.1				8.3				8.2																8.1				8.1			
			SP. CONDUCTANCE (µs/cm)	236	199				249				303				438				659				1099				181				997			

OBSERVATION KEY:
DOB = Dried out on beaker
ERR = Erratic swimming
F = Floater
P = Pale
PM = Particulate matter
FS = Film on surface
I = Immobile
TE = Technician error

REVIEWED BY: [signature]
DATE: 1/7/16

Revised: 11/10/2011

Daphnid Acute Test-48 Hr Survival

Start Date:	12/16/2015	Test ID:	trc1215	Sample ID:	GLC#10819
End Date:	12/18/2015	Lab ID:	-GREAT LAKES ENVIRONM	Sample Type:	
Sample Date:		Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	CD-Ceriodaphnia dubia

Comments: TRC C. dubia acute December 16-18, 2015

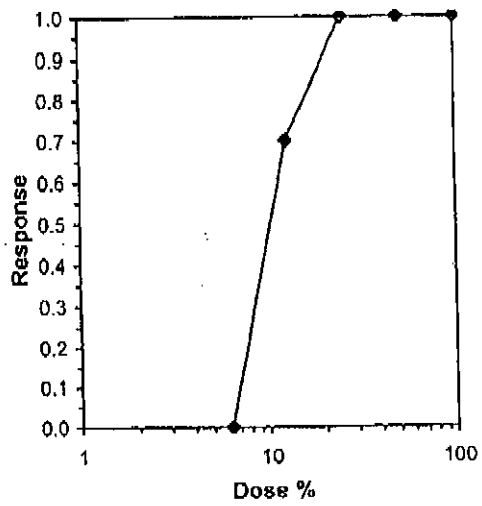
Conc-%	1	2	3	4
con	1.0000	1.0000	1.0000	1.0000
6.25	1.0000	1.0000	1.0000	1.0000
12.5	0.0000	0.2000	0.4000	0.6000
25	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
con	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	0	20
6.25	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	0	20
12.5	0.3000	0.3000	0.5650	0.2255	0.8861	50.368	4	14	20
25	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	20	20
50	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	20	20
100	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	20	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.77947	0.859	-0.1776	3.79102
Equality of variance cannot be confirmed				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	10.882	9.441	12.543
5.0%	10.735	9.184	12.548
10.0%	10.598	8.946	12.556
20.0%	10.368	8.541	12.585
Auto-0.0%	10.882	9.441	12.543



ToxCalc v5.0.32

Reviewed by: DS

GLEC

FATHEAD MINNOW 96-HOUR STATIC ACUTE TOXICITY TEST WITH 48-HOUR RENEWAL

TEST MATERIAL: TRC
PROJECT NUMBER: 2354-00
TEST SPECIES: *P. promelas*
TYPE OF TEST: Regulatory
GLC NUMBER: 10819

INCUBATOR NUMBER: 38
SHELF NUMBER: 1
NUMBER OF FHM/CHAMBER: 10
NUMBER OF CHAMBERS: 2
AGE/SOURCE OF FHM: In house 12/11/15 1530

DILUTION WATER: Mod Hard # 2913
TEST TEMPERATURE: 25 ±1°C
LIGHT INTENSITY (ft-c): DAY 0/ —
PHOTOPERIOD: 16:8

DATE / TIME	TEST DAY	TECH INITIALS	TREATMENT LEVEL / REPLICATE NUMBER	METER ID	Mod Hard Control 1	Mod Hard Control 2	A 6.25% 1	A 6.25% 2	B 12.5% 1	B 12.5% 2	C 25% 1	C 25% 2	D 50% 1	D 50% 2	E 100% 1	E 100% 2	Non adjusted F 100% 1	Non adjusted F 100% 2	Non adjusted Control 1	Non adjusted Control 2
12/16/15 1422	0	M.	TEMPERATURE (°C)	42	24.2		24.1		24.0		24.1		24.2		24.7		24.6		24.6	
			pH	203	7.76		7.69		7.66		7.57		7.46		7.39		7.40		7.89	
			DO (mg/L)	236	8.2		8.3		8.45		9.3		11.3		15.7		15.4		8.3	
			SP. CONDUCTANCE (µs/cm)	236	336		380		423		520		710		1100		1103		331	
12/17/15 1335	1	MR	NUMBER LIVE	[redacted]	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
			OBSERVATIONS					1Err	1Err	1Err	2Err	2Err	4Err	4Err	8Err	8Err	8Err	8Err		
			TEMPERATURE (°C)	40	25.2		24.7		24.5		24.1		24.7		24.7		24.7		24.1	
			pH	203	7.51		7.39		7.61		7.58		7.51		7.46		7.96		7.96	
			DO (mg/L)	236	7.5		7.6		7.7		7.8		8.7		11.3		7.9		9.1	
48-Hour Renewal New Chemistries Time Fed: 8:30am GLC# 10819 MH# 2544		MGM	TEMPERATURE (°C)	40	24.8		24.8		25.0		25.0		25.8		25.1		24.9		24.8	
			pH	203	7.92		7.87		7.84		7.76		7.96		7.42		7.38		7.90	
			DO (mg/L)	236	8.4		8.2		8.5		8.8		9.6		11.8		12.2		8.5	
			SP. CONDUCTANCE (µs/cm)	236	335		373		420		519		730		1111		1106		337	
12/18/15 1516	2	MGM Imp.	NUMBER LIVE	[redacted]	10	10	9	10	10	10	10	9	9	10	10	10	10	8	10	10
			OBSERVATIONS				1Err	1Err	3Err	3Err	1DE	1DE	1DE	1DE	1Err	1DE	1DE	1Imm		
			TEMPERATURE (°C)	40	24.8		24.8		25.0		25.0		25.8		25.1		24.9		24.8	
			pH	203	7.45		7.53		7.58		7.55		7.51		7.52		~~7.77~~ 8.27		7.97	
			DO (mg/L)	236	7.2		7.4		7.5		7.3		7.4		7.8		~~7.6~~ 7.6		7.6	
12/19/15 1518	3	MLV	NUMBER LIVE	[redacted]	10	10	9	10	10	10	10	9	9	10	9	10	10	8	10	10
			OBSERVATIONS				2Err	1Err		1Err			2Err	2Err	2Err	2Err	1Err	3Err		
			TEMPERATURE (°C)	42	24.6		24.5		24.3		24.2		24.4		24.5		24.5		24.6	
			pH	203	7.67		7.53		7.53		7.55		7.46		7.38		7.71		7.70	
			DO (mg/L)	236	7.8		7.7		7.6		7.5		8.0		8.1		8.6		7.8	
12/20/15 1339	4	MLV	NUMBER LIVE	[redacted]	10	10	9	9	10	10	10	9	9	10	9	10	10	1	10	10
			OBSERVATIONS				2Err	2Err		3Err	2Err	3Err	2Err	1Err	4Err	2Err	5Err	1Err		
			TEMPERATURE (°C)	42	24.6		24.5		24.4		24.4		24.6		24.5		24.0		24.6	
			pH	203	7.66		7.60		7.57		7.54		7.54		7.41		8.27		7.80	
			DO (mg/L)	236	7.8		7.6		7.4		7.5		7.6		7.8		7.9		7.9	
			SP. CONDUCTANCE (µs/cm)	236	335		381		427		520		725		1103		1100		341	

MGM ok 12/18/15 MGM

OBSERVATION KEY:
DOB = Dried out on heater
ERR = Excessive winnowing
F = Floater
P = Pale
PM = Particulate matter
FS = Film on surface
IMM = Immobile
TE = Technician error

REVIEWED BY: [signature]
DATE: 1/7/16

Revised. 11/13/2011

GLEC
Great Lakes Environmental Center

GREAT LAKES ENVIRONMENTAL CENTER, INC.

TRAVERSE CITY, MI - LABORATORY
739 Hastings Street
Traverse City, MI 49686

www.glec.com
Phone (231)941-2230
Fax (231)941-2240

CHAIN OF CUSTODY RECORD

GLEC Project = 2302-00

Submitting Company: TRC Environmental Corp.
Report Results To: Stacy Metz
Address: 1540 Eisenhower Place, Ann Arbor MI 48108
Phone: 734-904-3325
E-mail:

Project Name: TPC GSI
Project Number: 220003.0001
P.O.#: 87783
Sampled by: MP Initials
☐ GLEC ____ ☑ Client MP TRC

#	GLEC No.	Sample Identification	Sample Information Date	Time	Matrix	Grab or Composite	Preservative	Sample Containers Type	Size	No.	Requested Analysis: Toxicity Test
1	10813	B-108(6-9')	12-9-15	1105	GW	Com	None	Ziplock Bag		4	✓
2											
3											
4											
5											
6											
7											
8											

Sample not used

Client Notes:

RELEASED BY / ORGANIZATION	DATE	TIME	RECEIVED BY / ORGANIZATION	DATE	TIME
Print Name & Organization: Mellisa Powers - TRC Environmental Corp	12/9/15	1530	Print Name & Organization: TRC Sample Storage	12/9/15	1530
Signature: Mellisa Powers			Signature		
Print Name & Organization: TRC Sample Storage	12/9/15	1800	Print Name & Organization: Fed Ex	12/9/15	1800
Signature	12/10/15	1039	Signature: Maggie Petersen, GLEC	12/10/15	1039

FOR LAB USE ONLY
Temperature of Samples: 0.9 °C
☒ Received on Wet Ice
Notes/Anomalies/Discrepancies: bags all intact, no visible sample.
GLEC may subcontract out analyses that we do not perform.

MATRIX CODES: S = SEDIMENT; SW = SURFACE WATER; E = EFFLUENT; GW = GROUNDWATER; WW = WASTEWATER; BT = BIOLOGICAL TISSUE; SL = SLUDGE; AO = AQUATIC ORGANISM

Great Lakes Environmental Center

CHECK-IN FORM

118116 MLV

CLIENT: TRC

PROJECT NUMBER: 23~~0~~54-00

INITIAL SAMPLE CHEMISTRY (UPON RECEIPT)

					INITIALS
DATE RECEIVED	12/10/15			MP	
SAMPLE ID	B-108 (6-9')				
TYPE (W=water, SED=sediment, M=material)	W				
COLLECTION (G=grab, C=composite)	C				
GLC NUMBER	10813				
COLLECTION DATE	12/9/15				
COLLECTION TIME	1105				
TEMPERATURE (≤6 degrees Celsius[1])	0.9				
SAMPLE DESCRIPTION/OBSERVATIONS (clarity, color, odor)	V/A-bags all ripped- no viable sample.			MP	

[1] If out of range see project manager

SAMPLE CHEMISTRY AT TEST TEMPERATURES

						INITIALS
GLC NUMBER				Meter ID		
TEMPERATURE (°C)						
pH (s.u.)						
DISSOLVED OXYGEN (mg/L)						
CONDUCTIVITY (µmhos/cm)						
HARDNESS (mg/L)						
ALKALINITY (mg/L)						
TOTAL CHLORINE (mg/L)*						
TOTAL AMMONIA (mg/L) as N						

*Check with project manager to see if necessary.

NM: Not Measured, ND: Non-detect

GLC#:	GLC#:	GLC#:	GLC#:	GLC#:	GLC#:
Hardness:	Hardness:	Hardness:	Alkalinity:	Alkalinity:	Alkalinity:
End mL:	End mL:	End mL:	End mL:	End mL:	End mL:
Start mL:	Start mL:	Start mL:	Start mL:	Start mL:	Start mL:
mL used:	mL used:	mL used:	mL used:	mL used:	mL used:
Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:	Sample Volume:

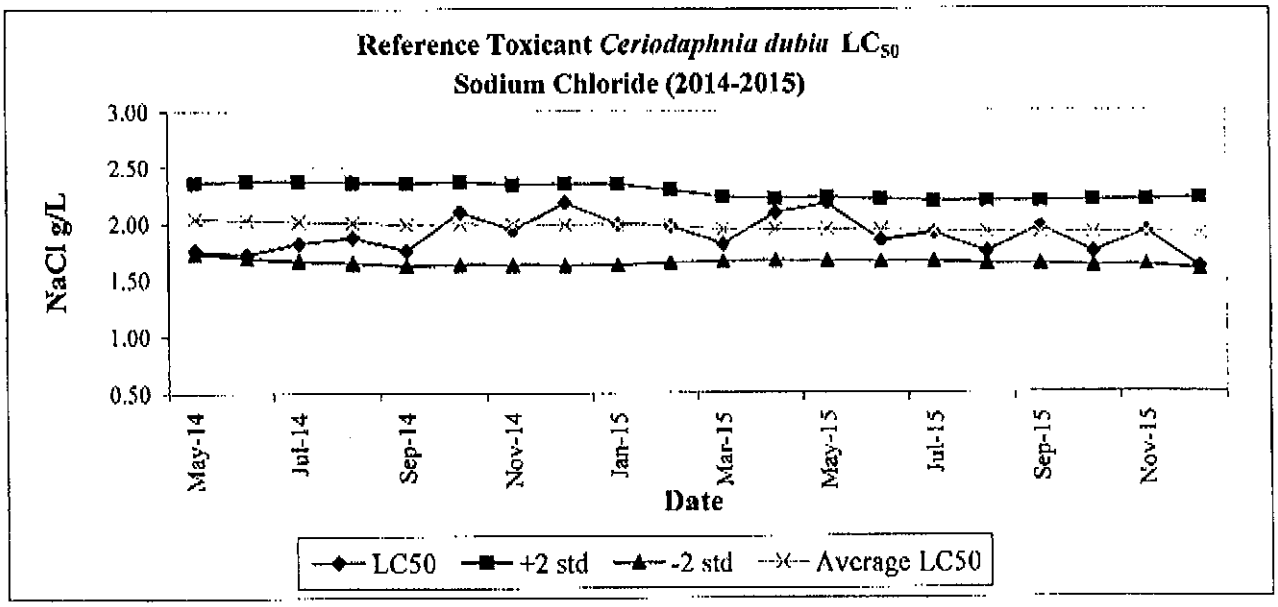
Appendix B

Reference Toxicant Data

GLEC

Great Lakes Environmental Center

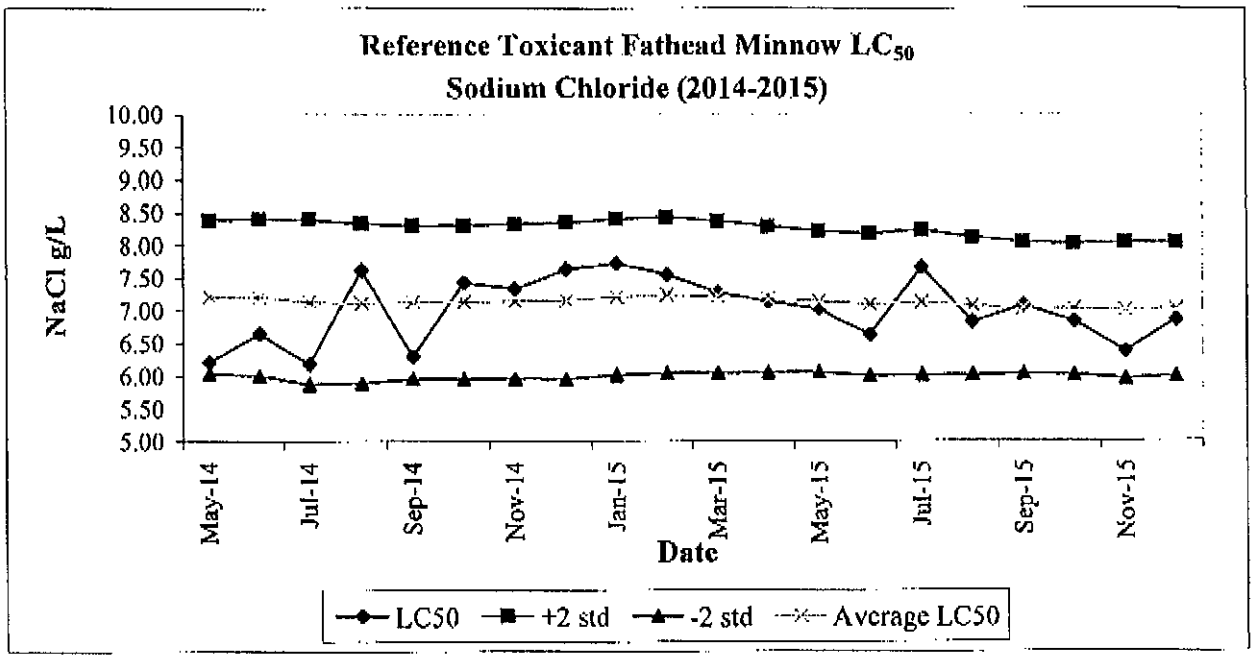
GLEC



48-Hour Acute Toxicity Data for *Ceriodaphnia dubia*

Date	Control Survival (%)	LC_{50} (g/L NaCl)	Average LC_{50} (g/L NaCl)	+2 std	-2 std
August 4, 2015	100.0	1.73	1.91	2.19	1.63
September 1, 2015	100.0	1.96	1.91	2.19	1.63
October 1, 2015	100.0	1.73	1.90	2.19	1.61
November 3, 2015	100.0	1.91	1.90	2.20	1.61
December 1, 2015	100.0	1.60	1.89	2.21	1.57

GLEC



96-Hour Acute Toxicity Data for Fathead Minnow

Date	Control Survival (%)	LC_{50} (g/L NaCl)	Average LC_{50} (g/L NaCl)	+2 std	-2 std
August 3, 2015	100.0	6.819	7.07	8.13	6.01
September 1, 2015	95.0	7.071	7.04	8.04	6.03
October 13, 2015	90.0	6.823	7.02	8.03	6.01
November 2, 2015	95.0	6.369	7.00	8.04	5.95
December 1, 2015	95.0	6.848	7.01	8.04	5.99

Appendix C
Documentation of PCE Source Area Investigation

Technical Memorandum

To:	Joseph Kelly, USEPA
From:	Stacy Metz and Graham Crockford, TRC
Subject:	PCE Source Area Investigation Former Tecumseh Products Company Site in Tecumseh, Michigan (RCRA-05-2010-0012)
Date:	January 28, 2016
cc:	Jason Smith, Tecumseh Products Company Douglas McClure, Conlin, McKenney & Philbrick, PC
Project No.:	220003.0000.0000

Background

Tecumseh Products Company (TPC) retained TRC Environmental Corporation (TRC), to investigate soil and groundwater conditions at the former TPC site located in Tecumseh, Michigan. Between April and June 2015 a High Resolution Site Characterization (HRSC) Investigation was completed to supplement existing data and support the development of the final corrective measures proposal.

- During the HRSC investigation activities, up to 15,000 micrograms per liter (µg/L) of tetrachloroethene (PCE) was identified in groundwater at boring location B-81 located along Maumee Street near the southeast corner of the site. Prior to this investigation, PCE had not been found in groundwater at any other location at significant concentrations.
- Subsequent investigation activities in the area included the installation of borings SB-MIP-48, B-99, B-100, B-101, B-102, B-104, and B-105, and groundwater sample collection for volatile organic compounds (VOCs) analysis at those locations. Based on groundwater data, a likely PCE source area was identified near an interior north-south fence line located immediately west of boring location B-100 (Figure 1).
- PCE concentrations decrease rapidly side gradient (north/south) and up gradient (west) of B-100 indicating that the source is localized. As indicated by elevated PCE concentrations at boring location B-81, groundwater downgradient of this source area is also affected.
- Further localized delineation of PCE-affected soil and groundwater in the area of soil boring B-100 was conducted to more precisely define the nature and extent of PCE in this area and to support decision making related to recommended final corrective measures.

Additionally, in an email dated October 27, 2015, USEPA requested additional work be completed in conjunction with the PCE source area investigation described above. The email included two requests. As outlined below:

- To collect soil samples from 0 to 2 feet near monitoring wells MW-35i/d where photoionization detector (PID) readings were elevated (453 ppm) during well installation activities; and
- To complete vertical profile sampling from the terminus of three previously completed borings (B-101, B-102 and SB-MIP-48) to the underlying clay in order to evaluate the recommended placement for proposed wells MW-50s, MW-51i, MW-52s and MW-52d and the eventual corrective measures. TRC agreed that additional vertical profile sample data would be helpful for the selection and design of groundwater treatment corrective measures and to support selection of appropriate well screen intervals at proposed monitoring well locations. Rather than completing vertical profile sampling at locations that are potentially within the PCE source area, TRC recommended an additional vertical profile sample location be completed approximately 50 feet downgradient of the PCE source area.

Proposed investigation activities to further delineate the PCE source area and to address comments provided by USEPA were documented in the November 12, 2015 Technical Memorandum *PCE Source Area Investigation*. This Technical Memorandum documents those investigation activities.

Summary of Field Activities

TRC completed investigation activities described in the November 12, 2015 Technical Memorandum between December 14, 2015 and December 17, 2015. Following preliminary review of these data, additional step out borings were completed in the PCE source area. Soil borings and temporary wells were installed at these locations on December 28, 2015, and groundwater sampling was completed on January 7, 2016. Investigation activities are outlined below:

- **PCE Source Area Delineation:** A total of 18 soil borings were completed in the vicinity of soil boring B-100 to further delineate the PCE source area. Boring locations included the seven originally proposed boring locations, and 11 step out boring locations. Step out locations were selected based on a combination of field screening with a PID and review of laboratory data from adjacent boring locations when available. Soil borings locations are illustrated on Figure 1. These borings were completed as summarized below:
  - Soil borings were advanced to the target depth by direct-push technology.
  - Soil samples were collected for visual classification to evaluate site geology and depth to groundwater. The borings were terminated at a minimum depth of two feet below the water table, approximately 15-20 feet below ground surface (ft bgs). Soil boring logs are included in Attachment 1.

  - Soils were field screened in approximate 1-foot intervals using a PID to aid in selecting the depth intervals from which samples were collected for VOCs analysis and to aid in verifying the appropriateness of the lateral extent of the investigation area.[1]
  - One or more soil samples were collected for VOC analysis at each boring location to determine the size and magnitude of the PCE soil source. At most locations, the depth interval of 1-2 feet below ground surface was targeted for VOC analysis. The unsaturated depth interval with the highest PID reading was also be targeted for VOC analysis. If PID readings were elevated throughout the unsaturated zone additional samples were collected at a limited number of the borings to evaluate the vertical PCE distribution in the unsaturated soil.
  - Based on existing site data from this area, the highest concentrations of PCE in the saturated zone were expected to be near the water table. At 16 locations, a groundwater sample was collected across the water table to aid in delineating the lateral extent of the PCE source area. Groundwater samples were collected for VOC analysis as described below:
    - At each groundwater sample location, a temporary 1-inch PVC well with a 3-foot screened interval was installed to a total depth approximately 2.5 feet below the water table.
    - Each temporary well was purged and stabilized for turbidity using low-flow sampling techniques prior to collection of a groundwater sample for VOC analysis.
  - All soil and groundwater samples were shipped under chain-of-custody documentation to the analytical laboratory.

- **Soil sampling near monitoring wells MW-35i/d** was completed as described below:
  - Direct push technology was used to collect continuous soil samples from 0 to 5 ft bgs. TRC field staff classified soils using the Unified Soil Classification System (USCS) and field screened soils with a PID. The soil boring log is included in Attachment 1.
  - Based on field screening data, soil samples were collected for VOC analysis from the 1 to 2-foot and 4 to 5-foot depth intervals.
  - Samples were shipped under chain-of-custody documentation to the analytical laboratory.

- **Downgradient Vertical Profile Sampling Location:** Soil boring B-122 was completed as described below. The location of B-122 is illustrated on Figure 1.
  - A soil boring was advanced to the top of the clay confining unit by direct-push technology.
  - Soil samples were collected for visual classification to evaluate site geology, depth to groundwater, and depth to the clay confining unit. The boring was terminated 2.5 feet into the underlying clay confining unit. The soil boring log is included in Attachment 1.

---

[1] The purpose of this investigation was to delineate soil and groundwater concentrations indicative of residual free-phase PCE, not to delineate soil and groundwater to concentrations below Michigan Part 201 criteria.

- Groundwater samples were collected for VOC analysis throughout the water column as described below:
  - A temporary 1-inch PVC well with a 3-foot screened interval was installed at the top of the clay confining unit.
  - At an off-set location approximately 2 feet north of the original location, a second 1-inch temporary well with a 3-foot screened interval was installed to the target depth of 22.5 feet in the intermediate zone of the aquifer.
  - Each temporary well was purged and stabilized for turbidity using low-flow sampling techniques prior to collection of a groundwater sample for VOC analysis.
  - Following sample collection, the temporary well was pulled up approximately 3 feet to the next depth interval.[2] Well stabilization and sampling were repeated until a sample has been collected from each depth interval throughout the aquifer.
  - After the completion of groundwater sampling, the temporary wells were removed and the holes were plugged with bentonite.
  - Samples were shipped under chain-of-custody documentation to the analytical laboratory.

Results and Data Evaluation

A summary of detected VOCs at soil sample locations is provided in Table 1. PCE concentrations at surface soil (1-2 ft bgs) locations are illustrated on Figure 2, and PCE concentrations at sub-surface (>2 ft bgs) soil locations are illustrated on Figure 3. A summary of detected VOCs at groundwater sample locations is provided in Table 2. PCE concentrations in groundwater at the water table are illustrated on Figure 4. Laboratory reports for soil and groundwater analysis are provided in Attachment 2.

Soil Concentrations near MW-35i/d

Soils were collected to a total depth of 5 feet at soil boring B-68, adjacent to monitoring well MW-35i/d. These soils were field screened with a PID, and soil samples were collected from the two depth intervals with the highest PID response. Vinyl chloride was detected in the 4 to 5-foot sample above the drinking water protection criteria. No other constituents of concern (COCs) were detected above Michigan Part 201 criteria at this location.

Surface Soil Concentrations near PCE Source Area

Surface soil samples were collected from 1 to 2 ft bgs at 14 of the PCE source area borings and at soil boring B-122 located downgradient (east) of the PCE source area. PCE was detected in each of these samples, and degradation products of PCE (trichloroethene [TCE] and cis-1,2-dichloroethene [cis-DCE]) were also detected in 8 of the 14 sample locations. As illustrated on

[2] The aquifer is composed of loose flowable sands. As wells are pulled from one depth interval to the next, native material will collapse into the borehole, mitigating the potential for preferential vertical flow within the borehole.

Figure 2, concentrations of PCE in shallow soil exceed the drinking water protection criterion (0.10 milligrams per kilogram [mg/kg]) at 10 locations, and the groundwater-surface water interface protection criterion (1.2 mg/kg) at one location. The highest PCE concentration in surface soil is 6.9 mg/kg. Concentrations of TCE exceed the drinking water protection criterion (0.10 mg/kg) at three locations. The measured concentration of cis-DCE does not exceed any Michigan Part 201 criteria. Although groundwater protection criteria exceedences were observed for PCE and TCE in shallow soil, no risk-based screening levels for non-residential exposure to soil are exceeded in surface soils, nor are soil saturation levels exceeded. As expected, due to the volatile nature of the COCs, high concentrations of PCE and TCE are not persistent in surface soils. Soil treatment or other corrective measures are not required for surface soils in the PCE source area. Moreover these data indicate that there is no potential for off-site soils at adjacent properties to be affected above risk-based screening levels due to the erosion of contaminated surface soil onto off-site properties.

Sub-Surface Soil Concentrations near PCE Source Area

Sub-surface soil samples were collected from each of the PCE source area borings (26 total samples from 18 boring locations) completed in December 2015, from soil HRSC boring MIP-SB-48 (4 samples), and at soil boring B-122 (one sample). PCE was detected in each of these samples, and degradation products of PCE (TCE, cis-DCE, and vinyl chloride) were also detected in 16 of the 26 samples. Additionally trichloroethane (TCA) and/or other non-chlorinated VOCs were detected at a limited number of locations (7 samples at 5 locations). As summarized on Table 2, ethyl benzene, TCA, 1,2,4-trimethylbenezene, 1,3,5-trimethylbenezene, vinyl chloride and total xylenes are detected above generic Michigan Part 201 groundwater protection criteria, but are not detected above any risk-based screening levels for exposure to soil.

PCE and TCE are the only compounds detected above risk-based screening levels for exposure to soil. TCE concentrations exceeded the non-residential soil volatilization to indoor air inhalation criterion at four locations (B-118 [9-10′], B-131 [10-11′], B-132 [10-11′], and B-133 [10-11′]). No other risk-based screening levels for TCE were exceeded, nor were soil saturation levels exceeded. All the detected TCE concentrations are below the site-specific soil remedial goal for TCE (25 mg/kg). Therefore, with the exception of a site-wide institutional control to ensure that construction of new buildings is protective of the volatilization to indoor air migration pathway, corrective measures are not necessary to address the detected concentrations of TCE in soil.

Concentrations of PCE in subsurface soil are illustrated on Figure 3. Detected concentrations of PCE exceed soil saturation levels at five boring locations (B-121, B-125, B-127, B-128, and B-131). The highest sub-surface soil concentration was measured at soil boring B-127 from 10 to 11 ft bgs (520 mg/kg). Surface soils in this area are relatively un-impacted, and the depth to groundwater is shallow, consequently, the soil source thickness is not reasonably expected to exceed 2 meters. Consequently, the non-residential finite volatile soil inhalation (VSI) criteria for a 2 meter source are the applicable VSI criteria for this area (1,100 mg/kg for PCE).

The detected PCE concentrations do not exceed the applicable VSI, direct contact or particulate soil inhalation risk-based screening levels in this area. However, as described below these soil have resulted in leaching to groundwater. Consequently, soil exceeding soil saturation levels will be targeted for soil treatment. The target soil treatment area is outlined on Figure 3. Note that soil samples have not been collected south or west of soil boring B-131. Three additional soil borings are recommended in this area (as illustrated on Figure 3), to define the lateral extent of soils affected above soil saturation levels to the southwest prior to evaluating options to address the soil source.

Shallow Groundwater Concentrations near PCE Source Area

Groundwater samples were collected from at or near the water table at 22 boring locations in the vicinity of the PCE source area, including 7 locations during the April-June 2015 HRSC investigation and 15 locations during the December 2015 Supplemental PCE Source Investigation. Concentrations of PCE and its degradation products (particularly TCE, cis-DCE, and vinyl chloride) are present throughout this area above risk-based groundwater screening levels. Concentrations of PCE through this area are illustrated on Figure 4. Isoconcentration lines on this Figure illustrate the lateral extent of PCE above 2,000 ug/L (1-percent of solubility) and 20,000 ug/L (10-percent of solubility) these concentrations indicate that a portion of the PCE source is present in the saturated zone. The groundwater in this area has been targeted for active groundwater treatment, as described in the Final Corrective Measures Proposal.

Groundwater Profile Sampling at Soil Boring B-122

Groundwater samples were collected from the water table to the underlying clay unit at soil boring B-122. As expected, based on groundwater chemistry data collected at downgradient soil boring B-81, the PCE concentrations decrease rapidly with depth from 27,000 ug/L at the water table (7.5-10.5 ft bgs) to 1,700 ug/L in the 13.5 to 16.5 foot depth interval. In the deepest 4 samples, collected from 25.5 to 38 ft bgs, PCE concentrations-are below all risk-based screening levels. These data confirm that source material associated with the PCE source area is confined to the vadose zone and upper portion of the aquifer. Source material has not reached the underlying clay unit in this area. Concentrations of TCE are above risked based screening levels throughout the aquifer, with the highest concentrations observed in the upper half of the saturated zone (570 to 2,000 ug/L). Between 10.5 and 32 ft bgs TCE concentrations decrease with depth. A modest increase in TCE concentrations (from 6.7 ug/L to 68 ug/L) is observed near the underlying clay surface. Similar trends in concentration are observed for cis-DCE and vinyl chloride. Overall concentrations in the shallow aquifer are very similar to those illustrated in the 2015 High Resolution Site Characterization Report and Updated Conceptual Site Model, and the concentrations at depth are lower than those illustrated on Cross Section C-C' in that report. Minor modifications were made to existing isoconcentration maps and cross sections to reflect these refinements to the nature and extent of COCs.

Recommendations

Data show that soil treatment in this area is necessary to address the residual source of PCE. Recommendations pertaining to that treatment are listed below:

- Incorporate the findings from the investigation of the PCE source area into the Corrective Measures Proposal which will be submitted to USEPA on or before February 1, 2016.
- Complete three additional soil borings and collect soil and groundwater data to verify the extent of area that will be addressed by an interim measure.
- Evaluate the additional soil and groundwater data and determine the volume of soil required to be treated.
- Design a strategy to address the PCE source using the framework outlined in the CMP (i.e., excavation, soil vapor extraction, in situ chemical oxidation [ISCO], in situ thermal desorption [ISTD], enhanced reductive dechlorination [ERD]). Given the soil source is relatively shallow and not obstructed by concrete or a building, direct application of soil amendments (ISCO or ERD) (e.g., soil blending) should be considered as an alternative to injection in this evaluation.
- Implement the chosen interim measure to address this PCE source.

Attachments:

Table 1 – Summary of Detected Volatile Organic Compounds at PCE Source Area Soil Sample Locations

Table 2 – Summary of Detected Volatile Organic Compounds in Groundwater at PCE Source Area Boring Locations

Figure 1 – PCE Source Area Investigation Locations

Figure 2 – PCE Concentrations in Surface Soils

Figure 3 – PCE Concentrations in Subsurface Soils

Figure 4 – PCE Concentrations in Groundwater

Attachment 1 – Soil Boring Logs

Attachment 2 – Laboratory Analytical Data

Tables

Table 1
Summary of Detected Volatile Organic Compounds at PCE Source Area Soil Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		n-Butyl Benzene	cis-1,2-Dichloroethene	Ethylbenzene(1)	Isopropyl-benzene	4-isopropyl-toluene	Naphthalene	n-Propyl Benzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene(1)	1,3,5-Trimethyl-benzene(1)	Vinyl Chloride	Total Xylenes(1)
Residential DWP Criteria		1.6	1.4	1.5	91	NC	35	1.6	0.10	16	4.0	0.10	0.10	2.1	1.8	0.040	5.6
GSIP Criteria		NC	12	0.36	3.2	NC	0.73	NC	1.2(2)	5.4	1.8	6.6(2)	4.0(2)	0.57	1.1	0.26(2)	0.82
Non-Residential DC Criteria		8,000	8,000	71,000	80,000	NC	52,000	8,000	930	160,000	1,000,000	840	660	100,000	100,000	34	1,000,000
Non-Residential SVIAI Criteria		NC	41	460	730	NC	470	NC	21	610	4,600	24	1.9	8,000	4,800	2.8	12,000
Non-Residential Infinite Source VSIC		NC	210	2,400	2,000	NC	350	NC	210	3,300	4,500	57	14	25,000	19,000	29	54,000
Non-Residential Finite VSIC for 5m Source		NC	430	3,100	2,000	NC	350	NC	490	36,000	15,000	57	25	600,000	460,000	170	65,000
Non-Residential Finite VSIC for 2m Source		NC	1,000	6,500	3,000	NC	350	NC	1,100	36,000	31,000	120	58	600,000	460,000	420	130,000
Non-Residential PSI Criteria		880,000	1.0E+06	1.3E+07	2.6E+06	NC	88,000	590,000	1.2E+06	1.2E+07	2.9E+07	250,000	59,000	3.6E+07	3.6E+07	890,000	1.3E+08
Soil Saturation Concentration Screening Levels		10,000	640	140	390	NC	NA	10,000	88	250	460	920	500	110	94	490	150
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
B-68 (1-2')	12/16/2015	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	--	<0.22	<0.022	<0.022	<0.022	<0.022	<0.022
B-68 (4-5')	12/16/2015	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	--	<0.23	<0.023	**0.033**	<0.023	**0.070**	<0.023
B-115 (1-2')	12/14/2015	<0.022	<0.022	<0.022	<0.022	<0.022	<0.22	<0.022	**0.12**	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.066
B-115 (6.5-7.5')	12/14/2015	<2.8	<2.8	<2.8	<2.8	<2.8	<28	<2.8	**78**	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<8.4
B-116 (1-2')	12/14/2015	<0.027	<0.027	<0.027	<0.027	<0.027	<0.27	<0.027	**0.033**	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.080
B-116 (8.5-9.5')	12/14/2015	<0.66	<0.66	<0.66	<0.66	<0.66	< 6.6	<0.66	**34**	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<2.0
B-117 (1-2')	12/14/2015	<0.026	<0.026	<0.026	<0.026	<0.026	<0.26	<0.026	**0.30**	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.078
B-117 (8.5-9.5')	12/14/2015	<0.73	<0.73	<0.73	<0.73	<0.73	<7.3	<0.73	**47**	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<2.2
B-118 (1-2')	12/14/2015	<0.027	<0.027	<0.027	<0.027	<0.027	<0.27	<0.027	**0.070**	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.082
B-118 (9-10')	12/14/2015	<1.4	<1.4	<1.4	<1.4	<1.4	<14	<1.4	**46**	<1.4	<1.4	<1.4	**3.0**	<1.4	<1.4	<1.4	<4.1
B-119 (1-2')	12/14/2015	<0.027	<0.027	<0.027	<0.027	<0.027	<0.27	<0.027	**0.061**	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.081
B-119 (9-10')	12/14/2015	<0.35	<0.35	<0.35	<0.35	<0.35	<3.5	<0.35	**12**	<0.35	<0.35	<0.35	**1.9**	<0.35	<0.35	<0.35	<1.1
B-119 (13-14')	12/14/2015	**0.82**	**0.49**	<0.036	<0.036	<0.036	<0.36	<0.036	**0.20**	<0.036	**0.37**	<0.036	**0.39**	**0.51**	<0.036	<0.036	<0.11
B-120 (1-2')	12/15/2015	<0.033	<0.033	<0.033	<0.033	<0.033	<0.33	<0.033	**0.70**	<0.033	<0.033	<0.033	**0.063**	<0.033	<0.033	<0.033	<0.098
B-120 (7-8')	12/15/2015	<0.68	<0.68	<0.68	<0.68	<0.68	<6.8	<0.68	**27**	<0.68	<0.68	<0.68	**1.2**	<0.68	<0.68	<0.68	<2.0
B-121 (1-2')	12/15/2015	<0.030	<0.030	<0.030	<0.030	<0.030	<0.30	<0.030	**0.71**	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.091
B-121 (6-7')	12/15/2015	<0.55	<0.55	<0.55	<0.55	<0.55	<5.5	<0.55	**25**	<0.55	<0.55	<0.55	<0.55	<0.55	<0.55	<0.55	<1.6
B-121 (8-9')	12/15/2015	<2.6	<2.6	<2.6	<2.6	<2.6	<26	<2.6	**160**	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<7.9
B-122 (1-2')	12/15/2015	<0.026	<0.026	<0.026	<0.026	<0.026	<0.26	<0.026	**0.065**	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.078
B-122 (5-6')	12/15/2015	<0.061	<0.061	<0.061	<0.061	<0.061	<0.61	<0.061	**4.2**	<0.061	<0.061	<0.061	**0.31**	<0.061	<0.061	<0.061	<0.18
B-123 (6-7')	12/16/2015	<0.51	<0.51	<0.51	<0.51	<0.51	<5.1	<0.51	**27**	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<1.5
B-124 (6-7')	12/16/2015	<0.14	<0.14	<0.14	<0.14	<0.14	<1.4	<0.14	**9.6**	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.42
B-125 (3-4')	12/16/2015	<0.57	<0.57	<0.57	<0.57	<0.57	<5.7	<0.57	**2.7**	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<1.7
B-125 (8-9')	12/16/2015	<0.23	<0.23	<0.23	<0.23	<0.23	<2.3	<0.23	**13**	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.69
B-125 (10.5-11.5')	12/16/2015	<3.1	<3.1	<3.1	<3.1	<3.1	<31	<3.1	**130**	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<9.2
B-126 (6-7')	12/16/2015	<1.3	<1.3	<1.3	<1.3	<1.3	<13	<1.3	**52**	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<4.0
B-127 (1-2')	12/16/2015	<0.023	<0.023	<0.023	<0.023	<0.023	<0.23	<0.023	**0.40**	<0.023	<0.023	<0.023	**0.046**	<0.023	<0.023	<0.023	<0.068
B-127 (10-11')	12/16/2015	<13	<13	<13	<13	<13	<130	<13	**520**	<13	<13	<13	<13	<13	<13	<13	<40

Notes:

Residential Drinking Water Protection (DWP) Criteria, Groundwater to Surface Water Interface Protection (GSIP) Criteria, Non-Residential Direct Contact (DC) Criteria, Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria, Non-Residential Infinite and Finite Sources of Volatile Soil Inhalation Criteria (VSIC), Non-Residential Particulate Soil Inhalation (PSI) Criteria, and Soil Saturation Screening Levels from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013.

mg/kg = milligrams per kilogram

NC = No Criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

(1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

(2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1

Table 1
Summary of Detected Volatile Organic Compounds at PCE Source Area Soil Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		n-Butyl Benzene	cis-1,2-Dichloroethene	Ethylbenzene(1)	Isopropyl-benzene	4-isopropyl-toluene	Naphthalene	n-Propyl Benzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene(1)	1,3,5-Trimethyl-benzene(1)	Vinyl Chloride	Total Xylenes(1)
Residential DWP Criteria		1.6	1.4	1.5	91	NC	35	1.6	0.10	16	4.0	0.10	0.10	2.1	1.8	0.040	5.6
GSIP Criteria		NC	12	0.36	3.2	NC	0.73	NC	1.2(2)	5.4	1.8	6.6(2)	4.0(2)	0.57	1.1	0.26(2)	0.82
Non-Residential DC Criteria		8,000	8,000	71,000	80,000	NC	52,000	8,000	930	160,000	1,000,000	840	660	100,000	100,000	34	1,000,000
Non-Residential SVIAI Criteria		NC	41	460	730	NC	470	NC	21	610	4,600	24	1.9	8,000	4,800	2.8	12,000
Non-Residential Infinite Source VSIC		NC	210	2,400	2,000	NC	350	NC	210	3,300	4,500	57	14	25,000	19,000	29	54,000
Non-Residential Finite VSIC for 5m Source		NC	430	3,100	2,000	NC	350	NC	490	36,000	15,000	57	25	600,000	460,000	170	65,000
Non-Residential Finite VSIC for 2m Source		NC	1,000	6,500	3,000	NC	350	NC	1,100	36,000	31,000	120	58	600,000	460,000	420	130,000
Non-Residential PSI Criteria		880,000	1.0E+06	1.3E+07	2.6E+06	NC	88,000	590,000	1.2E+06	1.2E+07	2.9E+07	250,000	59,000	3.6E+07	3.6E+07	890,000	1.3E+08
Soil Saturation Concentration Screening Levels		10,000	640	140	390	NC	NA	10,000	88	250	460	920	500	110	94	490	150
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
B-128 (1-2')	12/16/2015	<0.26	<0.26	<0.26	<0.26	<0.26	<2.6	<0.26	**6.9**	<0.26	<0.26	<0.26	**0.97**	<0.26	<0.26	<0.26	<0.78
B-128 (1-2') (DUP-01)	12/16/2015	<0.27	<0.27	<0.27	<0.27	<0.27	<2.7	<0.27	**9.7**	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.81
B-128 (9-10')	12/16/2015	<2.7	<2.7	<2.7	<2.7	<2.7	<27	<2.7	**150**	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<8.1
B-128 (9-10') (DUP-02)	12/16/2015	<2.8	<2.8	<2.8	<2.8	<2.8	<28	<2.8	**110**	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<8.5
B-129 (1-2')	12/30/2015	<0.028	**0.031**	<0.028	<0.028	<0.028	<0.28	<0.028	**0.092**	<0.028	<0.028	<0.028	**0.053**	<0.028	<0.028	<0.028	<0.083
B-129 (3-4')	12/30/2015	**1.4**	<0.023	**1.3**	**0.23**	**0.59**	**0.32**	**0.84**	**0.13**	**0.025**	<0.023	<0.023	<0.023	**4.9**	**1.8**	**0.21**	**9.4**
B-130 (1-2')	12/30/2015	<0.024	<0.024	<0.024	<0.024	<0.024	<0.24	<0.024	**0.74**	<0.024	<0.024	<0.024	**0.034**	<0.024	<0.024	<0.024	<0.073
B-130 (3-4')	12/30/2015	<0.39	**0.14**	**0.20**	**0.038**	**0.15**	<0.23	**0.15**	**1.4**	<0.023	<0.023	<0.023	**0.072**	**1.3**	**0.38**	**0.041**	**1.2**
B-130 (10-11')	12/30/2015	<2.4	<2.4	<2.4	<2.4	<2.4	<24	<2.4	**86**	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<7.3
B-131 (1-2')	12/30/2015	<0.025	<0.025	<0.025	<0.025	<0.025	<0.25	<0.025	**0.22**	<0.025	<0.025	<0.025	**1.1**	<0.025	<0.025	<0.025	<0.074
B-131 (3-4')	12/30/2015	<0.24	**0.68**	<0.24	<0.24	<0.24	<2.4	<0.24	**8.1**	<0.24	<0.24	<0.24	**1.0**	<0.24	<0.24	<0.24	<0.73
B-131 (10-11')	12/30/2015	<2.4	<2.4	<2.4	<2.4	<2.4	<24	<2.4	**100**	<2.4	<2.4	<2.4	**2.5**	<2.4	<2.4	<2.4	<7.1
B-132 (1-2')	12/30/2015	<0.025	<0.025	<0.025	<0.025	<0.025	<0.25	<0.025	**0.17**	<0.025	<0.025	<0.025	**0.029**	<0.025	<0.025	<0.025	<0.075
B-132 (3-4')	12/30/2015	<0.054	<0.054	<0.054	<0.054	<0.054	<0.54	<0.054	**2.1**	<0.054	<0.054	<0.054	**0.20**	<0.054	<0.054	<0.054	<0.16
B-132 (10-11')	12/30/2015	<1.3	<1.3	<1.3	<1.3	<1.3	<13	<1.3	**38**	<1.3	<1.3	<1.3	**2.4**	<1.3	<1.3	<1.3	<3.9
B-133 (1-2')	12/30/2015	<0.027	<0.027	<0.027	<0.027	<0.027	<0.27	<0.027	**0.86**	<0.027	<0.027	<0.027	**0.48**	<0.027	<0.027	<0.027	<0.080
B-133 (3-4')	12/30/2015	<0.025	<0.025	<0.025	<0.025	<0.025	<0.25	<0.025	**0.66**	<0.025	<0.025	<0.025	**0.14**	<0.025	<0.025	<0.025	<0.075
B-133 (10-11')	12/30/2015	<0.61	<0.61	<0.61	<0.61	<0.61	<6.1	<0.61	**21**	<0.61	<0.61	<0.61	**3.0**	<0.61	<0.61	<0.61	<1.8
SB-MIP-48 (4-5')	5/22/2015	<0.13	<0.13	<0.13	<0.13	<0.13	<1.3	<0.13	**5.0**	<0.13	<0.13	**0.15**	**0.82**	<0.13	<0.13	<0.13	<0.39
SB-MIP-48 (5-6')	5/22/2015	<0.15	<0.15	<0.15	<0.15	<0.15	<1.5	<0.15	**7.0**	<0.15	<0.15	**0.18**	**1.0**	<0.15	<0.15	<0.15	<0.46
SB-MIP-48 (6-7')	5/22/2015	<0.15	<0.15	<0.15	<0.15	<0.15	<1.5	<0.15	**8.7**	<0.15	<0.15	**0.22**	**1.3**	<0.15	<0.15	<0.15	<0.44
SB-MIP-48 (7-8')	5/22/2015	<0.15	<0.15	<0.15	<0.15	<0.15	<1.5	<0.15	**7.2**	<0.15	<0.15	<0.15	**1.1**	<0.15	<0.15	<0.15	<0.44

Notes:

Residential Drinking Water Protection (DWP) Criteria, Groundwater to Surface Water Interface Protection (GSIP) Criteria, Non-Residential Direct Contact (DC) Criteria, Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria, Non-Residential Infinite and Finite Sources of Volatile Soil Inhalation Criteria (VSIC), Non-Residential Particulate Soil Inhalation (PSI) Criteria, and Soil Saturation Screening Levels from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013.

mg/kg = milligrams per kilogram

NC = No Criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

(1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

(2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1

Table 2
Summary of Detected Volatile Organic Compounds in Groundwater at PCE Source Area Boring Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	Tetra-chloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
Residential DW Criteria		880	7.0	70	5.0	200	5.0	2.0
Non-Residential DW Criteria		2500	7.0	70	5.0	200	5.0	2.0
Residential GWSL for Vapor Intrusion		4,300	370	83	94	1.70E+04	10	2.8
Non-Residential GWSL for Vapor Intrusion		18,000	1,600	350	460	7.10E+04	41	52
GSI Criteria		740	130	620	60[1]	89	200[1]	13[1]
Groundwater Contact Criteria		2.40E+06	11,000	2.00E+05	12,000	1.30E+06	13,000[2]	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-99 (10.5-13.5')	6/1/2015	<20	<20	<20	**29**	**230**	**250**	<20
B-99 (13.5-16.5')	6/1/2015	<100	<100	<100	<100	**1,000**	**570**	<100
B-100 (8-11')	6/2/2015	<1,000	<1,000	**3,800**	**32,000**	<1,000	**2,700**	<1,000
B-100 (10-13')	6/1/2015	<1,000	<1,000	**3,100**	**17,000**	<1,000	**2,500**	**1,100**
B-100 (13-16')	6/1/2015	<50	<50	**190**	**1,100**	<50	**1,200**	**150**
B-101 (12-15')	6/3/2015	<200	<200	<200	**3,700**	<200	**560**	<200
B-101 (15-18')	6/3/2015	<13	**19**	**15**	**130**	**71**	**320**	<13
B-101 (18-21')	6/3/2015	<130	<130	<130	<130	**1,200**	**4,500**	<130
B-102 (8-11')	6/3/2015	<500	<500	**3,600**	**9,700**	<500	**560**	**530**
B-102 (11-14')	6/3/2015	<130	<130	**2,300**	**1,200**	<130	**290**	**1,900**
B-102 (14-17')	6/3/2015	<50	<50	**420**	**80**	<50	**1,100**	**700**
B-104 (12-15')	6/9/2015	<100	<100	**170**	**4,000**	<100	**1,300**	<100
B-104 (15-18')	6/9/2015	<20	<20	<20	**190**	**23**	**570**	<20
B-104 (15-18') (DUP-19)	6/9/2015	<20	<20	<20	**190**	**22**	**570**	<20
B-104 (18-21')	6/8/2015	<100	<100	<100	<100	<100	**1,200**	<100
B-105 (13-16')	6/8/2015	<10	<10	<10	**140**	**37**	**170**	<10
B-105 (16-19')	6/8/2015	<100	<100	<100	<100	**360**	**1,700**	<100
B-105 (19-22')	6/8/2015	<100	<100	<100	<100	**170**	**2,900**	<100
B-115 (11-14')	12/17/2015	<50	<50	**1,800**	**1,800**	<50	**480**	**1,500**
B-116 (10-13')	12/17/2015	<500	<500	**8,300**	**34,000**	<500	**2,700**	**970**
B-117 (9.5-12.5')	12/17/2015	<130	<130	**350**	**5,400**	<130	**810**	<130
B-118 (11-14')	12/17/2015	**21**	**5.4**	**84**	**210**	**57**	**290**	**24**
B-119 (11.5-14.5')	12/16/2015	**82**	**34**	**600**	**32**	**250**	**49**	**110**
B-120 (10.5-13.5')	12/17/2015	<25	<25	**230**	**670**	<25	**130**	**420**

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table 2
Summary of Detected Volatile Organic Compounds in Groundwater at PCE Source Area Boring Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	Tetra-chloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
Residential DW Criteria		880	7.0	70	5.0	200	5.0	2.0
Non-Residential DW Criteria		2500	7.0	70	5.0	200	5.0	2.0
Residential GWSL for Vapor Intrusion		4,300	370	83	94	1.70E+04	10	2.8
Non-Residential GWSL for Vapor Intrusion		18,000	1,600	350	460	7.10E+04	41	52
GSI Criteria		740	130	620	60[1]	89	200[1]	13[1]
Groundwater Contact Criteria		2.40E+06	11,000	2.00E+05	12,000	1.30E+06	13,000[2]	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-121 (10.5-13.5')	12/17/2015	<1,300	<1,300	**7,000**	**76,000**	<1,300	**2,000**	<1,300
B-122 (7.5-10.5')	12/16/2015	<500	<500	**2,400**	**27,000**	<500	**990**	**510**
B-122 (10.5-13.5')	12/16/2015	<250	<250	**1,600**	**8,200**	<250	**2,000**	**700**
B-122 (13.5-16.5')	12/16/2015	<50	<50	<50	**1,700**	<50	**1,700**	<50
B-122 (16.5-19.5')	12/16/2015	<25	<25	**27**	**920**	<25	**1,100**	<25
B-122 (19.5-22.5')	12/16/2015	<25	<25	<25	**140**	<25	**570**	<25
B-122 (22.5-25.5')	12/16/2015	<10	<10	**33**	**31**	<10	**290**	<10
B-122 (25.5-28.5')	12/16/2015	<1.0	<1.0	**21**	**1.2**	<1.0	**63**	**1.8**
B-122 (29-32')	12/16/2015	<0.5	<0.5	**11**	**0.88**	<0.5	**6.7**	**2.6**
B-122 (32-35')	12/16/2015	<2.5	<2.5	**65**	<2.5	<2.5	**25**	**3.0**
B-122 (35-38')	12/16/2015	<10	<10	**260**	<10	<10	**68**	<10
B-125 (12-15')	12/17/2015	<500	<500	**6,000**	**41,000**	<500	**1,700**	**1,100**
B-127 (12-15')	12/17/2015	<250	<250	**5,400**	**14,000**	<250	**740**	<250
B-127 (12-15') (DUP-01)	12/17/2015	<250	<250	**5,300**	**13,000**	<250	**770**	<250
B-129 (14-17')	1/7/2016	<5.0	<5.0	**17**	**230**	**26**	**140**	<5.0
B-130 (14-17')	1/7/2016	<5.0	<5.0	<5.0	**250**	**10**	**190**	<5.0
B-131 (14-17')	1/7/2016	<2.5	<2.5	<2.5	**9.4**	**6.2**	**110**	<2.5
B-132 (14-17')	1/7/2016	<10	<10	<10	**100**	**47**	**440**	<10
B-133 (14.5-17.5')	1/7/2016	<25	<25	<25	**29**	**660**	**1,500**	<25
B-133 (14.5-17.5') DUP-01	1/7/2016	<25	<25	<25	**28**	**660**	**1,500**	<25
SB-MIP-48 (9.5-12.5')	5/26/2015	<25	<25	**350**	**1,000**	**170**	**570**	**120**
SB-MIP-48 (15-18')	5/22/2015	**180**	**160**	**740**	<100	**1,900**	**2,700**	<100

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

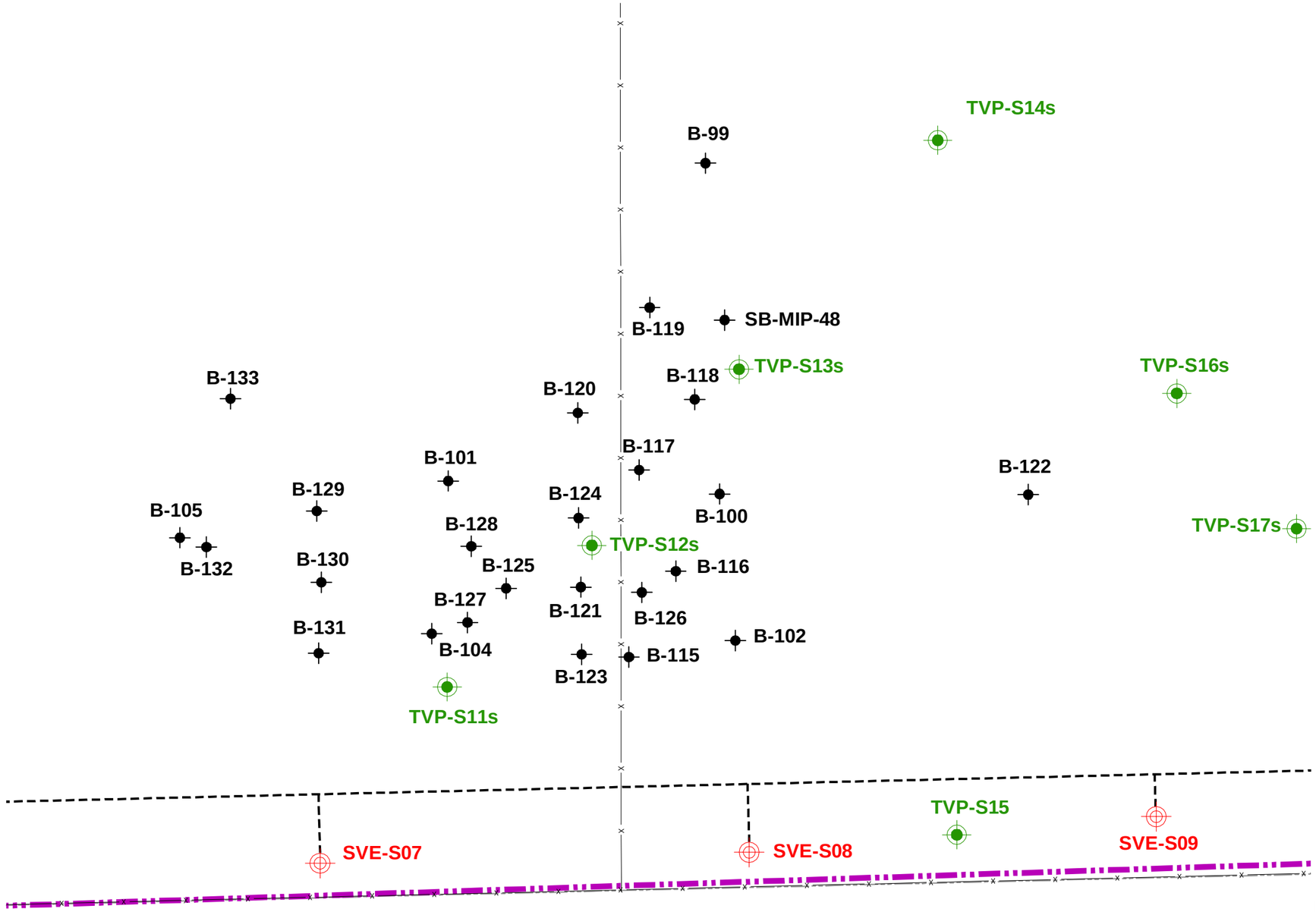
Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Figures



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- FENCE LINE
- SVE CONVEYANCE PIPING (4-INCH)
- B-2 — BORING LOCATION AND NUMBER
- SVE-S08 — SVE EXTRACTION WELL LOCATION
- TVP-S09 — SVE VACUUM MONITORING POINT LOCATION

NOTES

1. BORING LOCATIONS B-115 THROUGH B-133 WERE FIELD LOCATED RELATIVE TO VACUUM MONITORING POINTS FOR SOIL VAPOR EXTRACTION (SVE) SYSTEM.

N

0 20' 40'

APPROXIMATE SCALE IN FEET

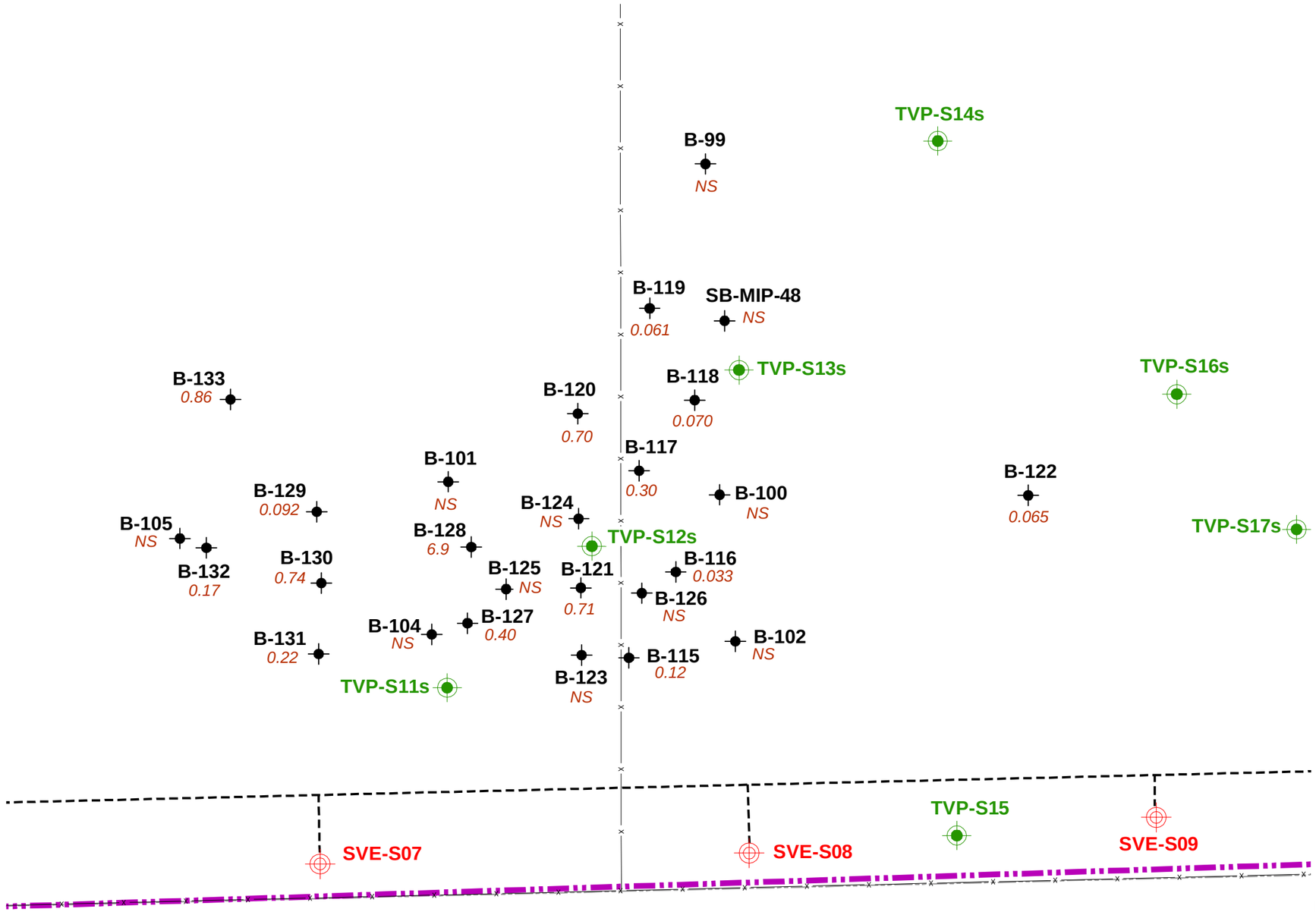
PROJECT:
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:
PCE SOURCE AREA INVESTIGATION LOCATIONS

DRAWN BY: DGS	SCALE:	PROJ. NO. 220003.0000	
CHECKED BY: MP	AS INDICATED	FILE NO. 220003.0000.01.dwg	
APPROVED BY: SEM	DATE PRINTED:	FIGURE 1	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\220003\0000_PCE Investigation\220003.0000.01.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.386863
Dwg Size: 1.86 Mb
Plot Date: January 26, 2016
Plot Time: 6:56 AM
Attached Xref's: bm100110 (Filled)
Attached Images:
Layout: FIG01 PCE Source Area



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- FENCE LINE
- SVE CONVEYANCE PIPING (4-INCH)
- B-2 — BORING LOCATION AND NUMBER
- SVE-S08 — SVE EXTRACTION WELL LOCATION
- TVP-S09 — SVE VACUUM MONITORING POINT LOCATION
- 0.12 — PCE CONCENTRATION IN mg/kg
- NS — NO SURFACE SOIL SAMPLE COLLECTED

NOTES

1. BORING LOCATIONS B-115 THROUGH B-133 WERE FIELD LOCATED RELATIVE TO VACUUM MONITORING POINTS FOR SOIL VAPOR EXTRACTION (SVE) SYSTEM.
2. ALL SURFACE SOIL SAMPLES COLLECTED FROM 1-2 FEET BELOW GROUND SURFACE.

N

0 20' 40'

APPROXIMATE SCALE IN FEET

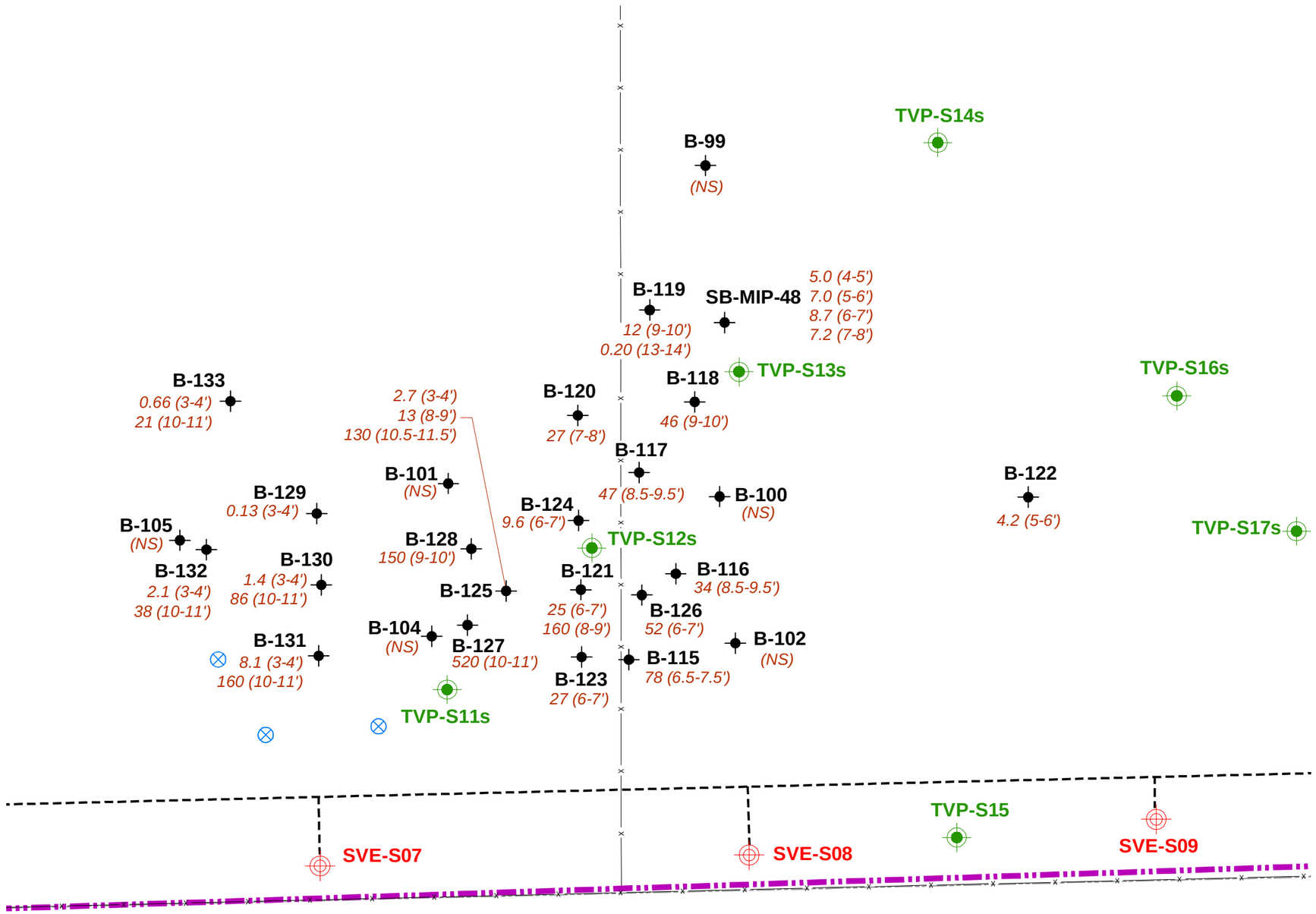
PROJECT:
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:
PCE CONCENTRATIONS IN SURFACE SOILS

DRAWN BY: DGS	SCALE:	PROJ. NO.	220003.0000
CHECKED BY: MP	AS INDICATED	FILE NO.	220003.0000.02.dwg
APPROVED BY: SEM	DATE PRINTED:	FIGURE 2	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\220003\0000_PCE Investigation\220003.0000.02.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.386863
Dwg Size: 1.86 Mb
Plot Date: January 26, 2016
Plot Time: 6:59 AM
Attached Xref's: bm100110 (Filled)
Attached Images:
Layout: FIG02 PCD Surf Soil



LEGEND

	FORMER TECUMSEH PRODUCTS SITE BOUNDARY
	FENCE LINE
	SVE CONVEYANCE PIPING (4-INCH)
B-2	BORING LOCATION AND NUMBER
SVE-S08	SVE EXTRACTION WELL LOCATION
TVP-S09	SVE VACUUM MONITORING POINT LOCATION
	PROPOSED BORING LOCATION
78 (6.5-7.5')	PCE CONCENTRATION IN mg/kg AND SAMPLE DEPTH INTERVAL
(NS)	NO SUBSURFACE SOIL SAMPLE COLLECTED

NOTES

1. BORING LOCATIONS B-115 THROUGH B-133 WERE FIELD LOCATED RELATIVE TO VACUUM MONITORING POINTS FOR SOIL VAPOR EXTRACTION (SVE) SYSTEM.
2. THE DEPTH INTERVALS FOR SUBSURFACE SOIL SAMPLES WERE SELECTED BASED ON FIELD SCREENING WITH A PHOTOIONIZATION DETECTOR.

N

0 20' 40'

APPROXIMATE SCALE IN FEET

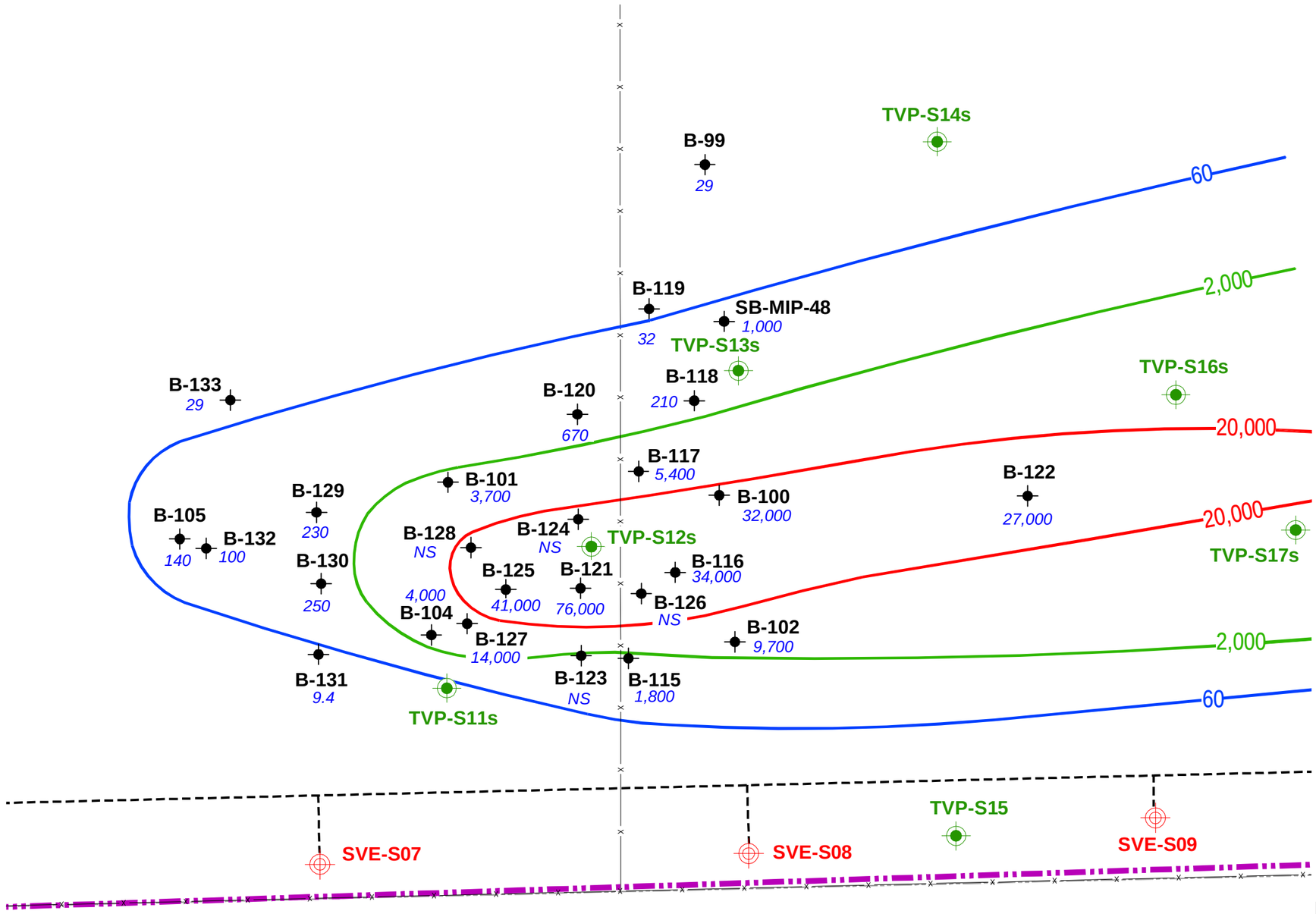
PROJECT:
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:
PCE CONCENTRATIONS IN SUBSURFACE SOILS

DRAWN BY: DGS	SCALE:	PROJ. NO.	220003.0000
CHECKED BY: MP	AS INDICATED	FILE NO.	220003.0000.03.dwg
APPROVED BY: SEM	DATE PRINTED:	FIGURE 3	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\220003\0000_PCE Investigation\220003.0000.03.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.386863
Dwg Size: 1.87 Mb
Plot Date: January 27, 2016
Plot Time: 9:19 AM
Attached Xref's:
Attached Images:
Layout: FIG03 PCE SS Soils



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- FENCE LINE
- SVE CONVEYANCE PIPING (4-INCH)
- B-2 — BORING LOCATION AND NUMBER
- SVE-S08 — SVE EXTRACTION WELL LOCATION
- TVP-S09 — SVE VACUUM MONITORING POINT LOCATION
- 27,000 — PCE CONCENTRATION IN ug/L
- NS — NO GROUNDWATER SAMPLED

KEY

- EXTENT OF PCE ABOVE MICHIGAN PART 201 SURFACE WATER INTERFACE CRITERION (60 ug/L)
- EXTENT OF PCE ABOVE 2,000 ug/L
- EXTENT OF PCE ABOVE 20,000 ug/L

NOTES

1. BORING LOCATIONS B-115 THROUGH B-133 WERE FIELD LOCATED RELATIVE TO VACUUM MONITORING POINTS FOR SOIL VAPOR EXTRACTION (SVE) SYSTEM.
2. ALL DATA POSTED ARE FROM GROUNDWATER SAMPLES COLLECTED AT OR NEAR (WITHIN 2 FEET) THE WATER TABLE. GROUNDWATER DATA FROM VERTICAL PROFILE SAMPLING LOCATIONS INDICATE THAT THE MAXIMUM PCE CONCENTRATIONS IN GROUNDWATER ARE AT THE WATER TABLE.

N

0 20' 40'

APPROXIMATE SCALE IN FEET

PROJECT:
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:
PCE CONCENTRATIONS IN GROUNDWATER

DRAWN BY: DGS	SCALE:	PROJ. NO.	220003.0000
CHECKED BY: MP	AS INDICATED	FILE NO.	220003.0000.04.dwg
APPROVED BY: SEM	DATE PRINTED:		FIGURE 4
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\220003\0000_PCE Investigation\220003.0000.04.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.386663
Dwg Size: 2.37 Mb
Plot Date: January 26, 2016
Plot Time: 7:18 AM
Attached Xref's: bm100110 (Filled)
Attached Images:
Layout: FIG04 PCE GW

Attachment 1
Soil Boring Logs

SOIL BORING LOG

TRC

BORING NO. B-68 (2015)

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/16/15	12/16/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	5.0	2

Boring Location: Adjacent to MW-35i/d

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time Depth (ft bgs)
After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
1 GP	80		2	**GRAVEL** mostly coarse gravel, gray (10yr 5/1), no odor, dry, dense, fill.	GP		<1	
				SANDY SILT mostly silt, some fine sand, dark brown (10YR 3/3), no odor, moist, dense.	ML		<1	Soil sample collected: (1-2') 12/16/15 at 12:37.
				Change to strong brown (7.5YR 5/8) at 0.5 foot.			<1	
				Change to few to little coarse sand, trace fine gravel at 1.0 foot.	SP		<1	
				POORLY GRADED SAND mostly fine sand, trace medium to coarse sand, dark olive green (5Y 3/2), no odor, moist, medium dense.	ML		<1	
			4	**SANDY SILT** mostly silt, some fine sand, dark brown (10YR 3/3), no odor, moist, dense.	SW		<1	Soil sample collected: (4-5') 12/16/15 at 12:40.
				SAND WITH GRAVEL mostly fine to coarse sand, little gravel, trace silt, brown (10YR 4/3), no odor, moist, dense.			<1	
			6	Change to dry, very dense at 3.75 feet.				
				End of boring at 5.0 feet below ground surface.				
			8					
			10					
			12					
			14					
			16					
			18					

Signature: Mellissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-115

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/14/15	12/14/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 41 feet north of the southern perimeter fence and 2.0 feet east of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/14/15 10:30 ▽ Depth (ft bgs) 10.0
After Drilling: Date/Time 12/14/15 11:00 ▼ Depth (ft bgs) 9.69

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			<1	
1 GP	95		2	**SILTY SAND** mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense.			<1	Soil sample collected: (1-2') 12/14/15 at 10:00.
				Change to yellowish brown (10YR 5/8) mottled with grayish brown (10YR 5/2) at 2.0 feet.	SM		<1	
				Change to few to little clay at 2.5 feet.				
			4	Change to grayish brown (10YR 5/2) mottled with yellowish brown (10YR 5/8) and dark grayish brown (10YR 4/2) at 3.0 feet.	SW-SM		<1	
				Grades to few to little medium sand, trace coarse gravel at 3.25 feet.	SM		<1	
2 GP	75		6	**WELL GRADED SAND WITH SILT** mostly fine to coarse sand, few to little fine to coarse gravel, few to little silt, trace clay, dark gray (10YR 4/1), no odor, moist, dense.	SP-SM		1.6	
				SILTY SAND mostly fine sand, some silt, few to little clay, grayish brown (10YR 5/2) mottled with yellowish brown (10YR 5/8) and dark grayish brown (10YR 4/2), no odor, moist, dense.			12.2	Soil sample collected: (6.5-7.5') 12/14/15 at 10:50.
			8	**POORLY GRADED SAND** mostly fine to medium sand, few silt, trace clay, very dark gray (10YR 3/1), moist, no odor, dense.	SP		32.6	
				POORLY GRADED SAND mostly fine to medium sand, trace silt, grayish brown (10YR 5/2), no odor, moist, dense.			32.0	
			10	Change to saturated at 10.0 feet.			30.2	
3 GP	85			**WELL GRADED SAND** mostly fine to coarse sand, trace to few silt, trace to few fine to coarse gravel, grayish brown (10YR 5/2), no odor, saturated, dense.	SW		14.5	
			12				72.7	
							130	
							55.2	Soil sample collected: (12.75-13.75') 12/14/15 at 10:55. Groundwater sample collected: (11-14') 12/17/15 at 11:12.
			14	**POORLY GRADED SAND** mostly fine to medium sand, trace to few silt, trace fine to coarse gravel, grayish brown (10YR 5/2), no odor, saturated, dense.	SP		9.0	
				End of boring at 15.0 feet below ground surface.				Temporary well installed to total depth of 15.0 feet.
			16					
			18					

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING WELL CONSTRUCTION LOG 220003_2015 PCE.GPJ TRC_CORP.GDT 220003.0000 1/26/16

SOIL BORING LOG

TRC

BORING NO. B-116

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/14/15	12/14/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 56 feet north of the southern perimeter fence and 9.5 feet east of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/14/15 13:30 ▽ Depth (ft bgs) 10.0
After Drilling: Date/Time 12/14/15 00:00 ▼ Depth (ft bgs) 9.98

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense, roots.	SM		<1	
				SILTY SAND mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense.	CL		<1	Soil sample collected: (1-2') 12/14/15 at 12:29.
1 GP	90		2	**LEAN CLAY** mostly lean clay, little silt, trace fine sand, low plasticity, grayish brown (10YR 5/2), no odor, moist, stiff.			<1	
				SILTY SAND mostly fine sand, some silt, trace coarse sand, trace clay, yellowish brown (10YR 5/8) mottled with grayish brown (10YR 5/2), no odor, moist, very dense.	SM		3.7	
			4	Change to little to some silt, mottled with strong brown (7.5YR 5/8) at 3.0 feet.	SW-SM		5.6	
				Grades to fine to medium sand, little silt at 3.5 feet. Change to few to little clay at 3.75 feet.			20.1	
			6	**WELL GRADED SAND WITH SILT** mostly fine to coarse sand, few to little fine to coarse gravel, few to little silt, trace clay, dark gray (10YR 4/1), no odor, moist, dense.			35.1	
2 GP	60			**POORLY GRADED SAND WITH SILT** mostly fine sand, few fine to coarse gravel, few to little silt, trace clay, very dark brown (10YR 3/1), no odor, moist, dense.			35.1	
			8	**POORLY GRADED SAND** mostly fine to medium sand, trace silt, grayish brown (10YR 5/2), no odor, moist, dense.			52.7	Soil sample collected: (8.5-9.5') 12/14/15 at 13:00.
							52.6	
			10 ▼	Change to saturated at 10.0 feet.			44.4	Temporary well installed to total depth of 13.0 feet.
					SP		57.1	
			12	Change to few to little coarse sand at 11.5 feet.				
3 GP	85			Change to mostly medium to coarse sand, few fine to coarse gravel at 12.5 feet.			256.0	Groundwater sample collected: (10-13') 12/17/15 at 11:45.
							95.4	
			14				9.2	Soil sample collected: (13-14') 12/14/15 at 13:10.
				End of boring at 15.0 feet below ground surface.				
			16					
			18					

Signature: Mellissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-117

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/14/15	12/14/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 73 feet north of the southern perimeter fence and 3.0 feet east of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/14/15 14:30 ▽ Depth (ft bgs) 9.5
After Drilling: Date/Time 12/14/15 00:00 ▼ Depth (ft bgs) 9.31

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			<1	
1 GP	90		2	**SILTY SAND** mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense. Change to yellowish brown (10YR 5/8) mottled with grayish brown (10YR 5/2) at 1.0 foot. Change to few to little clay at 2.0 feet.	SM		<1 / 1.0	Soil sample collected: (1-2') 12/14/15 at 13:45.
				Change to trace fine to coarse gravel at 2.75 feet.	SW-SM		4.7	
			4	**WELL GRADED SAND WITH SILT** mostly fine to coarse sand, few to little silt, trace to few clay, dark gray (10YR 4/1) no odor, moist, dense.	SW-SC		18.2	
2 GP	80		6	**WELL GRADED SAND WITH CLAY** mostly fine to coarse sand, little clay, trace to few silt, trace fine gravel, dark gray (10YR 4/1) no odor, moist, very dense.			23.6	
			8	**POORLY GRADED SAND** mostly fine to medium sand, trace to few coarse sand, trace silt, grayish brown (10YR 5/2), no odor, moist, medium dense to dense.			23.9 / 18.5	
							30.2	Soil sample collected: (8.5-9.5') 12/14/15 at 14:10.
			10	Change to gray (10YR 4/1), saturated at 9.5 feet. Grades to little to some coarse sand at 10.0 feet.	SP		108.4 / 68.3	Groundwater sample collected: (9.5-12.5') 12/17/15 at 10:02.
				Change to no silt at 11.0 feet.			57.0	
3 GP	90		12	Grades to mostly medium to coarse sand, few to little fine sand at 12.5 feet.			56.3 / 21.1	Temporary well installed to total depth of 13.0 feet.
			14				19.3	
				End of boring at 15.0 feet below ground surface.				
			16					
			18					

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING WELL CONSTRUCTION LOG 220003_2015 PCE.GPJ TRC_CORP.GDT 220003.0000 1/26/16

SOIL BORING LOG

TRC

BORING NO. B-118

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/14/15	12/14/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 85 feet north of the southern perimeter fence and 13 feet east of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/14/15 15:30 ▽ Depth (ft bgs) 10.0
After Drilling: Date/Time 12/14/15 00:00 ▼ Depth (ft bgs) 11.21

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			<1	
1 GP	90		2	**SILTY SAND** mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense. Change to dark grayish brown (10YR 4/2) at 0.75 feet. Grades to yellowish brown (10YR 5/8) mottled with dark grayish brown (10YR 4/2) at 1.25 feet. Changes to few fine to coarse gravel at 2.5 feet.	SM		<1 1.0	Soil sample collected: (1-2') 12/14/15 at 14:39.
			4	**SILTY SAND** mostly fine to medium sand, few to little silt, trace coarse sand, trace fine gravel, dark brown (10YR 3/3), no odor, moist, dense. Change to very dark grayish brown (10YR 3/2) at 4.5 feet.	SM		10.7 19.2	
2 GP	80		6	**WELL GRADED SAND** mostly fine to coarse sand, trace silt, dark grayish brown (10YR 4/2) no odor, moist, medium dense.	SW		14.2 15.7	
			8	**POORLY GRADED SAND** mostly fine to medium sand, trace coarse sand, dark grayish brown (10YR 4/2), no odor, moist, medium dense.	SP		8.6 20.1	
3 GP	90		10 12 14	**WELL GRADED SAND** mostly fine to coarse sand, trace to few fine to coarse gravel, trace to few silt, very dark grayish brown (10YR 3/2), no odor, moist, medium dense to dense. Changes to saturated at 10.0 feet.	SW		48.9 42.1 54.1 22.6 13.2 26.1	Soil sample collected: (9-10') 12/14/15 at 15:10. Groundwater sample collected: (11-14') 12/17/15 at 9:40.
			16 18	End of boring at 15.0 feet below ground surface.				Temporary well installed to total depth of 15.0 feet.

Signature: Mellissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-119

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/14/15	12/14/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 102 feet north of the southern perimeter fence and 5.0 feet east of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/14/15 17:30 ▽ Depth (ft bgs) 10.0
After Drilling: Date/Time 12/14/15 00:00 ▼ Depth (ft bgs) 9.55

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly silt, few to little fine sand, few clay, very dark grayish brown (10YR 3/2), no odor, moist, dense, roots.			1.1	
				SILT WITH SAND mostly silt, few to little fine sand, few clay, very dark grayish brown (10YR 3/2), no odor, moist, dense.	ML		1.1	Soil sample collected: (1-2') 12/14/15 at 15:43.
			2	Grades to yellowish brown (10YR 5/8) mottled with dark grayish brown (10YR 4/2) at 1.0 foot.				
1 GP	90			**SILTY SAND** mostly fine sand, some silt, few clay, yellowish brown (10YR 5/8) mottled with dark grayish brown (10YR 4/2), no odor, moist dense.	SM		1.8	
			4	Change to cobble present at 2.5 feet.			2.7	
				Change to mostly fine to coarse sand, little to some silt, trace fine gravel, dark grayish brown (10YR 4/2) at 4.0 feet.			16.1	
				WELL GRADED SAND mostly fine to coarse sand, few silt, trace fine to coarse gravel, dark gray (10YR 4/1), no odor, moist, dense.	SW		13.2	
			6				10.2	
				POORLY GRADED SAND mostly fine to medium sand, trace silt, few coarse sand, trace fine to coarse gravel, dark grayish brown (10YR 4/2), no odor, moist, dense.			8.6	
2 GP	90		8	Change to no gravel at 7.5 feet.	SP		12.1	
				▼			33.1	Soil sample collected: (9-10') 12/14/15 at 16:30.
			10	▽ Change to saturated at 10.0 feet.			15.5	
							59.5	Groundwater sample collected: (11.5-14.5') 12/16/15 at 17:18.
			12	**WELL GRADED SAND** mostly fine to coarse sand, trace to few fine to coarse gravel, dark grayish brown (10YR 4/2), moderate oil-like odor, saturated, dense.			395.1	Soil sample collected: (12-13') 12/14/15 at 16:19.
3 GP	70			Change to black (10YR 2/1) at 12.0 feet.				
				Change to very dark gray (10YR 3/1) at 13.0 feet.			529.1	Soil sample collected: (13-14') 12/14/15 at 16:25.
			14	Change to black (10YR 2/1) at 13.5 feet.			47.3	
				End of boring at 15.0 feet below ground surface.				Temporary well installed to total depth of 15.0 feet.
			16					
			18					

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING WELL CONSTRUCTION LOG 220003_2015 PCE.GPJ TRC_CORP.GDT 220003.0000 1/26/16

SOIL BORING LOG

TRC

BORING NO. B-120

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/15/15	12/15/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 83 feet north of the southern perimeter fence and 8.0 feet west of the interior north-south fence .

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/15/15 14:30 ▽ Depth (ft bgs) 10.5
After Drilling: Date/Time 12/16/15 00:00 ▼ Depth (ft bgs) 11.0

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly silt, little to some fine sand, few clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			<1	
				SILT WITH SAND mostly silt, little to some fine sand, few clay, dark brown (10YR 3/3), no odor, moist, dense.			<1	Soil sample collected: (1-2') 12/15/15 at 12:17.
1 GP	90		2	Change to yellowish brown (10YR 5/8) at 2.0 feet.			<1	
				CLAY mostly clay, little silt, few to little fine to medium sand, yellowish brown (10YR 5/8), no odor, moist, very dense.	CL		<1	
			4	**WELL GRADED SAND WITH CLAY** mostly fine to coarse sand, little clay, trace to few silt, trace fine gravel, dark yellowish brown (10YR 4/6), no odor, moist, dense to very dense.	SW-SC		2.1	
				WELL GRADED SAND WITH SILT mostly fine to coarse sand, few to little silt, trace clay, dark brown (10YR 3/3), no odor, moist, medium dense to dense.	SP-SM		1.9	
			6	**WELL GRADED SAND** mostly fine to coarse sand, trace silt, brown (10YR 4/3), no odor, moist, medium dense.	SW		6.7	
2 GP	80						7.6	Soil sample collected: (7-8') 12/15/15 at 13:02.
			8	**POORLY GRADED SAND** mostly fine to medium sand, trace coarse sand, brown (10YR 4/3), no odor, slightly moist, medium dense.			9.2	
				Change to brown (10YR 5/3) at 9.0 feet.				
				Change to dry to moist at 9.5 feet.			11.1	
			10	▽ ▼ Change to saturated at 10.5 feet.	SP		12.7	Groundwater sample collected: (10.5-13.5') 12/17/15 at 15:34.
			12	Change to trace fine to coarse gravel, brown (10YR 4/3) at 11.5 feet.			15.6	
3 GP	80						6.8	
				WELL GRADED SAND mostly fine to coarse sand, trace to few silt, trace fine to coarse gravel, dark yellowish brown (10YR 3/6), no odor, saturated, medium dense.			16.3	Temporary well installed to total depth of 13.5 feet.
			14	Change to few fine to coarse gravel, dark grayish brown (10YR 4/2) at 13.5 feet.			2.6	
				Change to dark yellowish brown (10YR 3/6) at 14.0 feet.				
				End of boring at 15.0 feet below ground surface.				
			16					
			18					

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-121

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/15/15	12/15/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 53 feet north of the southern perimeter fence and 7.0 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/15/15 12:30 ▽ Depth (ft bgs) 10.0
After Drilling: Date/Time 12/15/15 00:00 ▼ Depth (ft bgs) 10.64

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
1 GP	90		0	**TOPSOIL** mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			<1	
			2	**SILTY SAND** mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense. Change to brown (10YR 4/3) at 1.5 feet. Change to mottled with yellowish brown (10YR 5/8) at 2.0 feet.	SM		1.1	Soil sample collected: (1-2') 12/15/15 at 10:55.
							<1	
			4	Change to trace fine to coarse gravel, trace coarse sand, mottled with dark grayish brown (10YR 4/2) at 3.5 feet.			1.1	
2 GP	80			**WELL GRADED SAND** mostly fine to coarse sand, few silt, trace clay, trace fine to coarse gravel, grayish brown (10YR 5/2) mottled with yellowish brown (10YR 5/8), no odor, moist, dense to very dense.	SW		3.5	
			6	**WELL GRADED SAND WITH SILT** mostly fine to coarse sand, few to little silt, trace clay, dark grayish brown (10YR 4/2), no odor, very moist, dense.	SW-SM		6.2	
							97.1	Soil sample collected: (6-7') 12/15/15 at 11:22.
			8	**WELL GRADED SAND** mostly fine to coarse sand, trace to few silt, trace fine gravel, very dark grayish brown (10YR 3/2), no odor, very moist, dense to very dense. Change to grayish brown (10YR 5/2), moist at 8.5 feet.	SW		111.4	
							267.5	Soil sample collected: (8-9') 12/15/15 at 11:30.
							237.4	Soil sample collected: (10-11) 12/15/15 at 11:40.
3 GP	80		10	▽ ▼ Change to trace silt, very strong solvent-like odor, saturated at 10.0 feet.			355.1	Groundwater sample collected: (10.5-13.5') 12/17/15 at 15:26.
							>15,000	Soil sample collected: (11-12') 12/15/15 at 11:43.
			12				>15,000	Soil sample collected: (12-13') 12/15/15 at 11:53.
			14	**POORLY GRADED SAND** mostly medium to coarse sand, few fine gravel, trace silt, grayish brown (10YR 5/2), very strong solvent-like odor, saturated, dense to very dense.	SP		3056	Soil sample collected: (13-14') 12/15/15 at 12:00.
							46.2	Temporary well installed at total depth of 14.5 feet.
				End of boring at 15.0 feet below ground surface.				
			16					
			18					

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-122

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/15/15	12/15/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	40.0	2

Boring Location: 68 feet north of the southern perimeter fence and 71 feet east of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/15/15 17:30 ▽ Depth (ft bgs) 8.0
After Drilling: Date/Time 12/16/15 00:00 ▼ Depth (ft bgs) 8.55

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			<1	
1 GP	95		2	**SILTY SAND** mostly fine sand, some silt, trace clay, dark brown (10YR 3/3), no odor, moist, dense. Change to little silt, trace coarse sand, pale brown (10YR 6/3) at 1.0 foot. Change to yellowish brown (10YR 5/8) mottled with pale brown (10YR 6/3) at 1.75 feet.	SM		<1 <1 <1	Soil sample collected: (1-2') 12/15/15 at 17:30.
			4	**WELL GRADED SAND WITH SILT** mostly fine to coarse sand, few silt, few clay, yellowish brown (10YR 5/8) mottled with dark gray (10YR 4/1), no odor, moist, dense to very dense. Change to trace clay, dry to moist at 4.0 feet. Change to dark yellowish brown (10YR 4/4) at 4.5 feet.	SW-SM		2.8	Soil sample collected: (5-6') 12/15/15 at 17:04.
2 GP	80		6	**POORLY GRADED SAND** mostly fine to medium sand, trace coarse sand, trace silt, yellowish brown (10YR 5/8), no odor, dry to moist, medium dense. Change to grayish brown (10YR 5/2) at 6.0 feet.	SP		4.1	
			8	▽ ▼ **WELL GRADED SAND** mostly fine to coarse sand, trace silt, grayish brown (10YR 5/2), no odor, dry to moist, medium dense. Change to trace fine to coarse gravel, saturated at 8.0 feet. Change to trace to few silt, yellowish brown (10YR 5/8) at 9.0 feet. Change to very dark gray (10YR 3/1) at 9.5 feet.	SW		30 74.7	Groundwater sample collected: (7.5-10.5') 12/16/15 at 16:20.
3 GP	80		10 12 14	**POORLY GRADED SAND** mostly fine to medium sand, trace to few silt, trace fine to coarse gravel, trace coarse sand, very dark brown (10YR 3/1), no odor, saturated, medium dense. Change to mostly medium to coarse sand, trace fine sand at 13.0 feet. Change to mostly fine to medium sand, no coarse sand at 14.0 feet. Change to dark yellowish brown (10YR 3/4) at 15.0 feet. Change to no silt at 15.5 feet.	SP		74.2 39.2 16.3	Groundwater sample collected: (10.5-13.5') 12/16/15 at 14:35. Groundwater sample collected: (13.5-16.5) 12/16/15 at 12:07.
4 GP	80		16 18	**WELL GRADED SAND** mostly fine to coarse sand, trace to few fine gravel, dark gray (10YR 4/1), no odor, saturated, medium dense. Change to trace fine gravel at 19.5 feet.	SW		15.4 39.0 15.6	Groundwater sample collected: (16.5-19.5') 12/16/15 at 10:55. Groundwater sample

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-122

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
5 GP	75		22	**POORLY GRADED SAND** mostly fine to medium sand, dark gray (10YR 3/1), no odor, saturated, medium dense.	SP		4.5 5.1	collected: (19.5-22.5') 12/16/15 at 09:33. Groundwater sample collected: (22.5-25.5') 12/16/15 at 15:18. Shallow temporary well installed to a total depth of 22.5 feet at step out location 2.0 feet north of original boring.
			24	**WELL GRADED SAND** mostly fine to coarse sand, trace to few fine to coarse gravel, dark gray (10YR 3/1), no odor, saturated, medium dense.	SW		2.9	
6 GP	100		26 28 30	**POORLY GRADED SAND** mostly fine to medium sand, trace to few fine to coarse gravel, trace coarse sand, dark gray (10YR 3/1), no odor, saturated, medium dense.	SP		4.9 3.1 <1 <1	Groundwater sample collected: (25.5-28.5') 12/16/15 at 14:12. Groundwater sample collected: (29-32') 12/16/15 at 12:00.
7 GP	100		32 34	**WELL GRADED SAND** mostly fine to coarse sand, trace fine gravel, dark gray (10YR 3/1), no odor, saturated, medium dense. Change to trace to few fine to coarse gravel at 33.0 feet. Change to few to little silt at 34.5 feet.	SW		<1 <1	Groundwater sample collected: (32-35') 12/16/15 at 10:57.
8 GP	95		36 38	Change to mostly medium to coarse sand, trace fine sand, no silt, at 35.5 feet. Change to few to little fine to coarse gravel, trace cobble at 36.0 feet. **LEAN CLAY** mostly lean clay, trace coarse sand, medium plasticity, dark gray (10YR 4/1), no odor, moist to saturated, stiff. Change to no coarse sand, medium to high plasticity, medium stiff at 38.0 feet. Change to low to medium plasticity, stiff at 38.5 feet.	CL		2.1 2.8	Groundwater sample collected: (35-38') 12/16/15 at 09:45. Deep temporary well installed to total depth of 38.5 feet at original boring.
			40 42 44 46	End of boring at 40.0 feet below ground surface.				

SOIL BORING LOG

TRC

BORING NO. B-123

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/16/15	12/16/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 41 feet north of the southern perimeter fence and 7.0 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/16/15 10:00 ▽ Depth (ft bgs) 10.0
After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
1 GP	90		0–2	**TOPSOIL** mostly silt, some fine sand, trace to few clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			<1	
			2–4	**SANDY SILT** mostly silt, some fine sand, trace to few clay, dark brown (10YR 3/3), no odor, moist, dense. Change to concrete present from 1.0 to 1.17 feet. Change to little to some fine sand, few to little clay, yellowish brown (10YR 5/8) mottled with grayish brown (10YR 5/2) at 2.5 feet.	ML		<1 <1 <1	
			4–6	Grades to some fine sand, trace to few clay, grayish brown (10YR 5/2) mottled with yellowish brown (10YR 5/8) at 3.0 feet.			1.0	
2 GP	75		6–8	**SILTY SAND** mostly fine to medium sand, little to some silt, few clay, trace coarse sand, trace fine to coarse gravel, grayish brown (10YR 5/2) mottled with yellowish brown (10YR 5/8), no odor, moist, dense. Change to little to some silt, dark grayish brown (10YR 4/2) at 5.0 feet.	SM		2.0 6.7	Soil sample collected: (6-7') 12/16/15 at 9:15.
			8–10	**POORLY GRADED SAND WITH SILT** mostly fine to medium sand, few to little silt, few coarse sand, trace fine to coarse gravel, trace clay, dark gray (10YR 4/1), no odor, moist, medium dense. Change to few fine to coarse gravel at 7.5 feet.	SP-SM		45.0 44.0	
3 GP	80		10–12	▽ **POORLY GRADED SAND** mostly fine to medium sand, trace coarse sand, trace silt, brown (10YR 4/3), no odor, moist, medium dense. Change to 2.0 inch seem of **LEAN CLAY** mostly clay, trace fine sand, medium plasticity, yellowish brown (10YR 5/6), no odor, moist, medium stiff at 9.8 feet. Change to saturated at 10.0 feet.	SP		91.2 19.2 50.0	
			12–14	**WELL GRADED SAND** mostly fine to coarse sand, trace silt, brown (10YR 4/3), no odor, saturated, medium dense Change to dark yellowish brown (10YR 4/4) at 11.5 feet. Change to few fine to coarse gravel, very dark grayish brown (10YR 3/2) at 12.5 feet.	SW		51.1 84.3 164.7	
			14–16	Change to very dark gray (10YR 3/1), slight solvent-like odor at 14.0 feet. End of boring at 15.0 feet below ground surface.				
			16–18					

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING WELL CONSTRUCTION LOG 220003_2015 PCE.GPJ TRC_CORP.GDT 220003.0000 1/26/16

SOIL BORING LOG

TRC

BORING NO. B-124

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/16/15	12/16/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 65 feet north of the southern perimeter fence and 7.5 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/16/15 10:30 ▽ Depth (ft bgs) 10.0
After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly silt, some fine sand, trace to few clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			<1	
1 GP	90		2	**SANDY SILT** mostly silt, some fine sand, trace to few clay, dark brown (10YR 3/3), no odor, moist, dense. Change to dark yellowish brown (10YR 4/6) at 2.0 feet. Change to yellowish brown (10YR 5/6) mottled with dark grayish brown (10YR 4/2) at 2.5 feet. Change to grayish brown (10YR 5/2) at 3.5 feet.	ML		1.1 <1 <1	
			4	**SILTY SAND** mostly fine to medium sand, little to some silt, few clay, trace fine to coarse gravel, trace coarse sand, grayish brown (10YR 5/2) mottled with strong brown (7.5YR 5/8), no odor, moist, medium dense to dense.	SM		4.2 4.6	
2 GP	80		6				10.2	Soil sample collected: (6-7') 12/16/15 at 10:08.
			8	**POORLY GRADED SAND** mostly fine to medium sand, trace coarse sand, trace silt, very dark grayish brown (10YR 3/3), no odor, moist, medium dense to dense. Change to dark yellowish brown (10YR 4/4) at 7.5 feet. Change to dark yellowish brown (10YR 4/6) at 8.0 feet. Change to brown (10YR 4/3) at 8.5 feet.	SP		11.7 10.8 6.5	
3 GP	90		10	▽ Change to mostly fine sand, few silt, saturated at 10.0 feet. Change to mostly fine to medium sand, trace to few coarse sand, trace fine gravel, trace silt, at 10.5 feet.			20.0 67.2 31.0	
			12					
			14	**WELL GRADED SAND** mostly fine to coarse sand, trace fine gravel, brown (10YR 4/3), no odor, saturated, medium dense to dense.	SW SP		7.4	
			16	**POORLY GRADED SAND** mostly fine to medium sand, few coarse sand, trace fine gravel, brown (10YR 4/3), no odor, saturated, medium dense to dense. **WELL GRADED SAND** mostly fine to coarse sand, trace fine gravel, brown (10YR 4/3), no odor, saturated, medium dense to dense.	SW		5.8	
			18	End of boring at 15.0 feet below ground surface.				

Signature: Mellissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-125

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/16/15	12/16/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 53 feet north of the southern perimeter fence and 20 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/16/15 14:45 ▽ Depth (ft bgs) 12.5
After Drilling: Date/Time 12/17/15 00:00 ▼ Depth (ft bgs) 11.5

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, trace to few clay, dark brown (10YR 3/3), no odor, moist, dense, roots.		<1	
			2	**WELL GRADED SAND** mostly fine to coarse sand, trace to few fine to coarse gravel, trace silt, dark yellowish brown (10YR 4/3), no odor, dry, dense.	SW	<1	
1 GP	80					3.3	
			4	**SANDY SILT** mostly silt, some fine sand, trace to few clay, dark yellowish brown (10YR 4/6) mottled with grayish brown (10YR 5/2), no odor, moist, dense.	SM	1.3	Soil sample collected: (3-4') 12/16/15 at 10:55.
				Change to trace to coarse sand, mottled with dark grayish brown (10YR 4/2) at 4.5 feet.		<1	
			6	**POORLY GRADED SAND WITH SILT** mostly fine to medium sand, few to little silt, few coarse sand, trace clay, trace fine to coarse gravel, yellowish brown (10YR 5/8) mottled with dark grayish brown (10YR 4/2), no odor, moist, dense.	SP-SM	2.4	
						8.3	
2 GP	80			Change to dark grayish brown (10YR 4/2) mottled with strong brown (7.5YR 5/8) at 6.0 feet.		71.7	
			8	**POORLY GRADED SAND** mostly fine to medium sand, trace coarse sand, trace silt, very dark gray (10YR 3/1), slight solvent-like odor, moist, medium dense to dense.	SP	1010	Soil sample collected: (8-9') 12/16/15 at 11:00.
						805.3	
			10	Change to no silt, brown (10YR 5/2) at 10.0 feet.		405.8	Soil sample collected: (10.5-11.5') 12/16/15 at 11:10.
				▼		763.2	
			12	▽ Change to dark grayish brown (10YR 4/2), saturated at 12.5 feet.		3384	Groundwater sample collected: (12-15') 12/17/15 at 14:07.
3 GP	85					5555	
			14	**WELL GRADED SAND** mostly fine to coarse sand, trace fine to coarse gravel, dark grayish brown (10YR 4/2), slight solvent-like odor, saturated, medium dense to dense.	SW	562.9	
				Change to few to little fine to coarse gravel, dark yellowish brown (10YR 4/6) at 13.5 feet.			Temporary well installed to total depth of 15.0 feet.
			16	Change to dark grayish brown (10YR 4/2) at 14.0 feet.			
				End of boring at 15.0 feet below ground surface.			
			18				

Signature: Mellisa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING WELL CONSTRUCTION LOG 220003 2015 PCE.GPJ TRC_CORP.GDT 220003.0000 1/26/16

SOIL BORING LOG

TRC

BORING NO. B-126

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/16/15	12/16/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 52 feet north of the southern perimeter fence and 4.0 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/16/15 14:55 ▽ Depth (ft bgs) 9.75
After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense to very dense, roots.			<1	
1 GP	85		2	**SILTY SAND** mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense. Change to yellowish brown (10YR 5/8) mottled with grayish brown (10YR 5/2) at 1.0 foot. Change to strong brown (7.5YR 5/8) mottled with grayish brown (10YR 5/2), very dense at 1.5 feet.	SM		<1 <1 <1	
			4	**POORLY GRADED SAND WITH SILT** mostly fine to medium sand, few to little silt, few clay, trace coarse sand, trace fine gravel, grayish brown (10YR 5/2) mottled with yellowish brown (10YR 5/8), no odor, moist, medium dense. Change to trace to few fine to coarse gravel, dark grayish brown (10YR 4/2) with no mottles at 4.0 feet. Change to trace fine to coarse gravel, very dark grayish brown (10YR 3/2) at 5.0 feet.	SP-SM		8.8 13.4 38.6	Soil sample collected: (6-7') 12/16/15 at 14:05.
2 GP	80		6 8	**POORLY GRADED SAND** mostly fine to medium sand, trace coarse sand, trace silt, dark grayish brown (10YR 4/2), no odor, moist to very moist, medium dense.	SP		26.7 52.1	
			10	▽ Change to saturated at 9.75 feet.			122.5 32.6 26.7	
3 GP	90		12	**WELL GRADED SAND WITH GRAVEL** mostly fine to coarse sand, little fine to coarse gravel, trace silt, dark grayish brown (10YR 4/2), no odor, saturated, dense.	SW		226.1 65.8	
			14	**WELL GRADED SAND** mostly fine to coarse sand, few fine to coarse gravel, trace silt, dark grayish brown (10YR 4/2), no odor, saturated, dense. Change to trace gravel at 14.5 feet.	SW		13.4	
			16 18	End of boring at 15.0 feet below ground surface.				

Signature: Mellisa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-127

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/16/15	12/16/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 48 feet north of the southern perimeter fence and 22 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/16/15 16:30 ▽ Depth (ft bgs) 12.5
After Drilling: Date/Time 12/17/15 00:00 ▼ Depth (ft bgs) 12.90

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			1.0	
1 GP	50		2	**WELL GRADED SAND** mostly fine to coarse sand, trace to few fine to coarse gravel (10YR 4/3), no odor, moist, dense to very dense, fill.	SW		<1 1.0	Soil sample collected: (1-2') 12/16/15 at 15:52.
				CONCRETE			1.8	
			4	**SILTY SAND** mostly fine sand, some silt, few medium to coarse sand, few clay, trace fine to coarse gravel, yellowish brown (10YR 5/8), no odor, moist, dense to very dense.			1.7	
2 GP	50		6	Change to dark grayish brown (10YR 4/2) mottled with yellowish brown (10YR 5/8), medium dense at 5.5 feet.	SM		1.1 1.0	
			8	Change to dense to very dense at 7.5 feet.			<1 <1	
			10	**POORLY GRADED SAND** mostly fine to medium sand, trace to few silt, brown (10YR 4/3), no odor, moist, dense.			34.5	
				Change to few coarse sand at 10.5 feet.			244.5	Soil sample collected: (10-11') 12/16/15 at 15:54.
			12		SP		1548	
3 GP	50			▽ ▼ Change to slight odor, saturated at 12.5 feet.			5591	Groundwater sample collected: (12-15') 12/17/15 at 14:15.
				Change to slight petroleum-like odor at 13.0 feet.			488.9	
			14	Change to very dark gray (10YR 3/1), strong petroleum-like odor at 14.0 feet.			400.8	
				End of boring at 15.0 feet below ground surface.				Temporary well installed to total depth of 15.0 feet.
			16					
			18					

Signature: Mellisa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING WELL CONSTRUCTION LOG 220003_2015 PCE.GPJ TRC_CORP.GDT 220003.0000 1/26/16

SOIL BORING LOG

TRC

BORING NO. B-128

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/16/15	12/16/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	15.0	2

Boring Location: 60 feet north of the southern perimeter fence and 26 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - R. Christensen

Drilling Equipment: Geoprobe 6620DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/16/15 15:20 ▽ Depth (ft bgs) 13.0
After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
1 GP	80			**TOPSOIL** mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense to very dense, roots.			<1	
			2	**WELL GRADED SAND** mostly fine to coarse sand, few fine to coarse gravel, trace silt, brown (10YR 4/3), no odor, moist, dense, slag, fill.	SW		<1 2.5	Soil sample collected: (1-2')/ DUP-01 12/16/15 at 15:00.
			4	**SILT WITH SAND** mostly silt, little to some fine sand, few clay, very dark grayish brown (10YR 3/2), no odor, moist, medium dense to dense. Change to yellowish brown (10YR 5/4) at 4.0 feet.	ML		3.8 2.6	
2 GP	90		6	Change to trace to few medium to coarse sand, trace fine to coarse gravel, yellowish brown (10YR 5/8) mottled with dark grayish brown (10YR 4/2) at 4.5 feet. **SILTY SAND** mostly fine sand, some silt, few medium to coarse sand, trace clay, strong brown (10YR 5/8) mottled with dark grayish brown (10YR 4/2), no odor, moist, dense to very dense.	SM		1.5 4.2 32.8	
			8	Change to dark grayish brown (10YR 4/2) at 6.5 feet. **POORLY GRADED SAND** mostly fine to medium sand, trace coarse sand, trace silt, dark grayish brown (10YR 4/2), no odor, moist, medium dense. Change to brown (10YR 4/3) at 8.5 feet.	SP		104.3 137.4	Soil sample collected: (9-10')/ DUP-02 12/16/15 at 14:56.
3 GP	80		10	Change to dark gray (10YR 4/1) at 10.0 feet. Change to dark yellowish brown (10YR 4/6) at 11.0 feet.			36.1 85.2	
			12	▽ Change to dark yellowish brown (10YR 3/4), saturated at 13.0 feet.			57.0 473.2	
			14	Change to trace fine to coarse gravel at 13.25 feet. **WELL GRADED SAND** mostly fine to coarse sand, trace fine to coarse gravel, trace silt, dark yellowish brown (10YR 3/4), no odor, saturated, medium dense.	SW		182.0	
			16	End of boring at 15.0 feet below ground surface.				
			18					

SOIL BORING WELL CONSTRUCTION LOG 220003_2015 PCE.GPJ TRC_CORP.GDT 220003.0000 1/26/16

Signature: Mellissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-129

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/30/15	12/30/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	20.0	2

Boring Location: 67 feet north of the southern perimeter fence and 53 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - M. Hefferan

Drilling Equipment: Geoprobe 7822DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/30/15 10:30 ▽ Depth (ft bgs) 14.0
After Drilling: Date/Time 1/7/16 12:00 ▼ Depth (ft bgs) 12.9

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			<1	
			2	**WELL GRADED SAND WITH GRAVEL** mostly fine to coarse sand, little to some fine to coarse gravel, few to little silt, dark yellowish brown (10YR 4/4), no odor, moist, dense.	SW		<1	Soil sample collected: (1-2') 12/30/15 at 11:00.
1 GP	75			**POORLY GRADED SAND** mostly fine sand, few silt, dark yellowish brown (10YR 4/4), no odor, moist, dense.	SP		<1	
			4	**WELL GRADED SAND WITH SILT AND GRAVEL** mostly fine to coarse sand, little fine to coarse gravel, little silt, trace clay, dark yellowish brown (10YR 4/4), no odor, very moist, dense.	SW-SM ML		55.9 9.6	Soil sample collected: (3-4') 12/30/15 at 11:05.
			6	**SILT** mostly silt, few clay, very dark gray (10YR 3/1), strong odor, moist, very dense. Change to dark gray (10YR 4/1) slight to moderate odor at 4.0 feet. Change to few fine to coarse sand, trace fine gravel, yellowish brown (10YR 5/8) at 4.5 feet.	SW SW-SM		19.4 9.4	
2 GP	65		8	**SAND WITH GRAVEL** mostly fine to coarse sand, little gravel, few silt, dark yellowish brown (10YR 4/4), slight odor, moist, dense.	SW		12.8 15.2	
			10	**SILTY SAND** mostly fine to coarse sand, little silt, few to little fine gravel, yellowish brown (10YR 5/8), slight odor, moist, very dense. Grades to few to little clay at 6.5 feet. Grades to little clay at 7.0 feet.			11.1 18.6 9.8	
3 GP	65		12	**WELL GRADED SAND** mostly fine to coarse sand,trace fine to coarse gravel, trace silt, gray (10YR 5/1), no odor, dry, medium dense to dense.	SP		7.9	
			14	**POORLY GRADED SAND** mostly fine to medium sand, trace fine to coarse gravel, trace coarse sand, trace silt, brown (10YR 5/3), no odor, dry, medium dense to dense. Change to no gravel at 9.0 feet. Change to saturated at 14.0 feet.			13.9 5.9 6.6 2.3	Groundwater sample collected: (14-17') 1/7/16 at 13:00.
4 GP	100		18	**WELL GRADED SAND** mostly fine to coarse sand, trace silt, brown (10YR 5/3), no odor, saturated, medium dense to dense.	SW		<1 4.2 13.3	Temporary well installed to total depth of 17.0 feet.
			20	End of boring at 20.0 feet below ground surface.				

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-130

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/30/15	12/30/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	20.0	2

Boring Location: 55 feet north of the southern perimeter fence and 52 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - M. Hefferan

Drilling Equipment: Geoprobe 7822DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/30/15 11:30 ▽ Depth (ft bgs) 14.0
After Drilling: Date/Time 1/7/16 09:40 ▼ Depth (ft bgs) 12.80

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			<1	
1 GP	60		2	**WELL GRADED SAND WITH GRAVEL** mostly fine to coarse sand, little to some fine to coarse gravel, few to little silt, dark yellowish brown (10YR 4/4), no odor, moist, dense.	SW		<1 13.5	Soil sample collected: (1-2') 12/30/15 at 11:50.
			4	**SILT** mostly silt, few clay, trace fine sand, dark brown (7.5YR 3/4), moderate odor, very moist, medium dense. Change to few medium to coarse sand, trace fine gravel, strong odor at 3.5 feet.	ML		11.1 10.4	Soil sample collected: (3-4') 12/30/15 at 12:00.
2 GP	90		6	Change to no gravel, no sand, very dark gray (10YR 3/1), moist, very dense at 3.75 feet. Change to gray (10YR 5/1), moderate odor at 4.25 feet. Change to yellowish brown (10YR 5/8) at 4.5 feet.	SW-SM		9.5 19.1	
			8	**SILTY SAND WITH GRAVEL** mostly fine to coarse sand, little fine to coarse gravel, little silt, dark yellowish brown (10YR 4/6), no odor, moist, dense. Change to dark brown (7.5YR 3/2) at 5.5 feet.	SW-SM		15.5	
				SILTY SAND mostly fine to coarse sand, little silt, few fine to coarse gravel, dark yellowish brown (10YR 4/6), no odor, moist, dense to very dense.	SW		17.2 26.6	
3 GP	75		10	**WELL GRADED SAND** mostly fine to coarse sand, trace silt, few fine to coarse gravel, grayish brown (10YR 5/2), no odor, moist, dense.			35.5	Soil sample collected: (10-11') 12/30/15 at 12:30.
			12	**POORLY GRADED SAND** mostly fine to medium sand, trace fine gravel, trace silt, yellowish brown (10YR 5/8), no odor, moist, dense. ▼ Change to grayish brown (10YR 5/2) at 13.0 feet.	SP		10.2 10.4 8.7	
			14	▽ **WELL GRADED SAND** mostly fine to coarse sand, trace fine gravel, trace silt, grayish brown (10YR 5/2), no odor, saturated, dense.	SW		1.7 4.8 2.3	Groundwater sample collected: (14-17') 1/7/16 at 10:35.
4 GP	100		16					Temporary well installed to total depth of 17.0 feet.
			18	**POORLY GRADED SAND** mostly fine to medium sand, trace fine gravel, trace silt, grayish brown (10YR 5/2), no odor, saturated, dense.	SP		1.1 3.2 3.4	
			20	End of boring at 20.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 220003_2015 PCE.GPJ TRC_CORP.GDT 220003.0000 1/26/16

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-131

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/30/15	12/30/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	20.0	2

Boring Location: 42 feet north of the southern perimeter fence and 53 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - M. Hefferan

Drilling Equipment: Geoprobe 7822DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/30/15 14:50 ▽ Depth (ft bgs) 15.0
After Drilling: Date/Time 1/7/16 09:10 ▼ Depth (ft bgs) 12.62

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense, roots.	SM		<1	
				SILTY SAND mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense.	SW-SM		<1	Soil sample collected: (1-2') 12/30/15 at 14:30.
1 GP	80		2	**SILTY SAND WITH GRAVEL** mostly fine to coarse sand, little fine to coarse gravel, little silt, few clay, dark brown (10YR 3/3), no odor, dense to very dense, moist, glass fragment present.	ML		<1	Soil sample collected: (3-4') 12/30/15 at 14:35
			4	**SILT** mostly silt, few fine sand, few clay, trace medium to coarse sand, trace fine to coarse gravel, brown (7.5YR 4/3), no odor, moist, very dense. Change to little to some clay at 3.0 feet.	SW ML		9.8 1.8	
			6	**WELL GRADED SAND** mostly fine to coarse sand, few fine to coarse gravel, trace silt, brown (7.5YR 4/3), no odor, moist, dense to very dense.	SW-SM		4.9	
				SILT mostly silt, few fine sand, dark yellowish brown (10YR 4/4), no odor, moist, dense to very dense.			7.7	
2 GP	80		8	**WELL GRADED SAND WITH SILT** mostly fine to coarse sand, few to little silt, trace clay, trace fine gravel, yellowish brown (10YR 5/4) mottled with yellowish brown (10YR 5/8), no odor, moist, dense. Change to few to little clay, few fine to coarse gravel at 6.5 feet.	SM		6.2 13.0	
			10	**SILTY SAND** mostly fine to coarse sand, little silt, few fine to coarse gravel, few clay, grayish brown (10YR 5/2), no odor, moist, dense.	SW		16.1 16.7	Soil sample collected: (10-11') 12/30/15 at 14:40.
			12	**WELL GRADED SAND** mostly fine to coarse sand, few to little fine to coarse gravel, trace to few silt, dark gray (10YR 4/1), no odor, moist, dense.	SP		7.9	
3 GP	80			**POORLY GRADED SAND** mostly fine to medium sand, trace to few silt, trace coarse sand, trace fine to coarse gravel, grayish brown (10YR 5/2), no odor, moist, dense.			11.8 13.0	
			14	Change to dark yellowish brown (10YR 5/4) at 12.5 feet. Change to brown (10YR 5/3) at 13.5 feet.			3.1	Groundwater sample collected: (14-17') 1/7/16 at 10:00.
			16	**WELL GRADED SAND** mostly fine to coarse sand, trace to few silt, trace fine to coarse gravel, brown (10YR 5/3), no odor, moist, dense. Change to saturated at 15.0 feet. Change to no gravel at 15.5 feet.	SW		10.9 8.5	
4 GP	100						<1	Temporary well installed to total depth of 17.5 feet.
			18	**POORLY GRADED SAND** mostly fine to medium sand, trace to few silt, brown (10YR 5/3), no odor, saturated, dense.	SP		1.1 1.7	
			20	End of boring at 20.0 feet below ground surface.				

Signature: Mellisa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-132

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/30/15	12/30/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	20.0	2

Boring Location: 62 feet north of the southern perimeter fence and 72 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - M. Hefferan

Drilling Equipment: Geoprobe 7822DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/30/15 15:30 ▽ Depth (ft bgs) 15.0
After Drilling: Date/Time 1/7/16 12:17 ▼ Depth (ft bgs) 12.85

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense, roots.	SM		<1	
				SILTY SAND mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense.			<1	Soil sample collected: (1-2') 12/30/15 at 15:50.
1 GP	75		2	**WELL GRADED SAND WITH GRAVEL** mostly fine to coarse sand, little to some fine to coarse gravel, few to little silt, dark brown (10YR 3/3), no odor, moist, dense. Change to few clay at 2.5 feet.	SW		<1	Soil sample collected: (3-4') 12/30/15 at 15:55.
			4	**SILT** mostly silt, few clay, trace fine to coarse sand, trace fine to coarse gravel, very dark grayish brown (10YR 3/2), no odor, moist, dense. Change to dark yellowish brown (10YR 4/6) at 4.0 feet.	ML		1.6 2.0	
2 GP	80		6	**SILTY SAND** mostly fine to coarse sand, little silt, trace clay, trace fine to coarse gravel, dark yellowish brown (10YR 4/8), no odor, moist, dense.	SW-SM		1.0 1.9	
			8	**WELL GRADED SAND** mostly fine to coarse sand, few fine to coarse gravel, few silt, grayish brown (10YR 5/2), no odor, moist, medium dense. Change to trace fine to coarse gravel, trace silt, dark yellowish brown (10YR 5/6) at 7.5 feet.	SW		2.6 4.6	
			10	**POORLY GRADED SAND** mostly fine to medium sand, trace fine to coarse gravel, trace silt, dark yellowish brown (10YR 5/6), no odor, moist, medium dense. Change to no gravel at 9.0 feet,	SP		3.6 5.2 2.2	Soil sample collected: (10-11') 12/30/15 at 16:00.
3 GP	80		12	▼			5.1 4.2	
			14	▽ Change to brown (10YR 4/3), saturated at 15.0 feet.			17.2 3.9	Groundwater sample collected: (14-17') 1/7/16 at 13:02.
4 GP	100		16				1.4 4.7	
			18				5.6 6.9	Temporary well installed to total depth of 18.0 feet.
			20	End of boring at 20.0 feet below ground surface.				

Signature: Melissa Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING LOG

TRC

BORING NO. B-133

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
TPC PCE Investigation	12/30/15	12/30/15	220003.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Direct Push	---	---	20.0	2

Boring Location: 87 feet north of the southern perimeter fence and 68 feet west of the interior north-south fence

Personnel
Logged By - M. Powers
Driller - M. Hefferan

Drilling Equipment: Geoprobe 7822DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	MI

Water Level Observations:
While Drilling: Date/Time 12/30/15 16:55 ▽ Depth (ft bgs) 14.0
After Drilling: Date/Time 1/7/16 13:35 ▼ Depth (ft bgs) 13.20

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	PID (PPM)	COMMENTS
				TOPSOIL mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense, roots.			<1	
				SILTY SAND mostly fine sand, some silt, few clay, dark brown (10YR 3/3), no odor, moist, dense.	SM		<1	Soil sample collected: (1-2') 12/30/15 at 16:40.
1 GP	60		2	**WELL GRADED SAND WITH SILT AND GRAVEL** mostly fine to coarse sand. little to some fine to coarse gravel, few to little silt, dark brown (10YR 3/3), no odor, moist, dense.	SW		<1	
				SILT mostly silt, few clay, trace fine to coarse sand, dark grayish brown (10YR 4/2), no odor, moist, dense to very dense. Change to yellowish brown (10YR 5/8) at 2.5 feet.	ML		<1	Soil sample collected: (3-4') 12/30/15 at 16:45.
			4		ML		<1	
				SILT WITH SAND mostly silt, little to some fine to coarse sand, yellowish brown (10YR 5/8), no odor, moist, dense to very dense.			1.4	
			6	**POORLY GRADED SAND** mostly fine to medium sand. brown (10YR 4/3), no odor, dry, loose to medium dense.			1.8	
2 GP	75		8	Change to trace fine to coarse gravel, trace coarse sand at 7.5 feet.			2.3	
							3.3	
					SP		2.5	
			10				6.3	Soil sample collected: (10-11') 12/30/15 at 16:50.
							7.8	
			12				4.7	
3 GP	95						5.3	
			14	**WELL GRADED SAND** mostly fine to coarse sand, trace fine to coarse gravel, dark brown (10YR 3/3), no odor, saturated, loose to medium dense.	SW		3.0	Groundwater sample collected: (14.5-17.5') 1/7/16 at 14:35.
				POORLY GRADED SAND mostly fine to medium sand, trace fine to coarse gravel, dark brown (10YR 3/3), no odor, saturated, loose to medium dense. Change to few coarse sand at 16.0 feet.			2.1	
			16				<1	
4 GP	100				SP		4.2	Temporary well installed to total depth of 17.5 feet.
			18	Change to dark gray (10YR 4/1) at 18.0 feet.			4.1	
							8.9	
			20	End of boring at 20.0 feet below ground surface.				

Signature: Mellisa Powers
Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor MI 48108
734.971.7080
Fax 734.971.9022

SOIL BORING WELL CONSTRUCTION LOG 220003_2015 PCE.GPJ TRC_CORP.GDT 220003.0000 1/26/16

Attachment 2
Laboratory Analytical Data

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

December 17, 2015

Stacy Metz
TRC Solutions
1540 Eisenhower Place
Ann Arbor, MI 48108

RE: TPC PCE Investigation - Tecumseh, MI

Enclosed are the analytical results for the samples received by the laboratory on 12/15/2015.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. These results are in compliance with the 2009 NELAC Standards and the appropriate agencies listed below, unless otherwise noted in the case narrative. This analytical report should be reproduced in its entirety.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jessica Esser For Nick Nigro

President

Certification List			Expires
DODELAP	DOD ELAP Accreditation (A2LA)	3269.01	03/31/2016
FDOH	Florida Secondary NELAP Accreditation	E871093	06/30/2016
ILEPA	Illinois Secondary NELAP Accreditation	003174	04/30/2016
KDHE	Kansas Secondary NELAP Accreditation	E-10384	01/31/2016
LELAP	Louisiana Primary NELAP Accreditation	04165	06/30/2016
NJDEP	New Jersey Secondary NELAP Accreditation	WI004	06/30/2016
ODEQ	Oklahoma Department of Environmental Quality Accreditation	2014-153	08/31/2016
WDNR	Wisconsin Certification under NR 149	113289110	08/31/2016

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B-115 (1-2')	A155102-01	Soil	12/14/2015	12/15/2015
B-115 (6.5-7.5')	A155102-02	Soil	12/14/2015	12/15/2015
B-116 (1-2')	A155102-06	Soil	12/14/2015	12/15/2015
B-116 (8.5-9.5')	A155102-07	Soil	12/14/2015	12/15/2015
B-117 (1-2')	A155102-09	Soil	12/14/2015	12/15/2015
B-117 (8.5-9.5')	A155102-10	Soil	12/14/2015	12/15/2015
B-118 (1-2')	A155102-11	Soil	12/14/2015	12/15/2015
B-118 (9-10')	A155102-12	Soil	12/14/2015	12/15/2015
B-119 (1-2')	A155102-13	Soil	12/14/2015	12/15/2015
B-119 (9-10')	A155102-14	Soil	12/14/2015	12/15/2015
B-119 (13-14')	A155102-15	Soil	12/14/2015	12/15/2015
MeOH Blank	A155102-17	Soil	12/14/2015	12/15/2015

CASE NARRATIVE

Sample Receipt Information:
17 samples were received on 12/15/2015. Samples were received at 0.3 degrees Celsius. Samples were received in acceptable condition.

Sample volume for total solid analysis was received on 12/16/2015.

Please see the chain of custody (COC) document at the end of this report for additional information.

Continuing Calibration Verification (CCV):
CCV indicates a potential high bias for chloroethane and/or vinyl chloride for samples A155102-02, A155102-07, A155102-10, A155102-12, A155102-14 and A155102-17. Samples were less than the reporting limit for these analytes so no further action is required.

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-115 (1-2')

A155102-01 (Soil)

Date Sampled
12/14/2015 10:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	880	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Benzene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
2-Butanone	ND	880	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
1,1-Dichloroethane	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
1,2-Dichloroethane	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
trans-1,2-Dichloroethene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
cis-1,2-Dichloroethene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
1,1-Dichloroethene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Ethylbenzene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Tetrachloroethene	**120**	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Toluene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
1,1,1-Trichloroethane	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
1,1,2-Trichloroethane	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Trichloroethene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
1,3,5-Trimethylbenzene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
1,2,4-Trimethylbenzene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Vinyl chloride	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
m,p-Xylene	ND	44	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
o-Xylene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Xylenes, total	ND	66	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
n-Butyl Benzene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
sec-Butyl Benzene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Carbon disulfide	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Chloroethane	ND	220	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Chloroform	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Dichlorodifluoromethane	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Isopropylbenzene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
p-Isopropyltoluene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Naphthalene	ND	220	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
n-Propyl Benzene	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Trichlorofluoromethane	ND	22	ug/kg dry	1	12/15/2015	12/15/2015 15:42	EPA 8260B	
Surrogate: Dibromofluoromethane		*105 %*	*84.7-120*		*12/15/2015*	*12/15/2015 15:42*	*EPA 8260B*	
Surrogate: Toluene-d8		*112 %*	*90.5-108*		*12/15/2015*	*12/15/2015 15:42*	*EPA 8260B*	*S*
Surrogate: 4-Bromofluorobenzene		*104 %*	*88.3-113*		*12/15/2015*	*12/15/2015 15:42*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-115 (1-2')

A155102-01 (Soil)

Date Sampled
12/14/2015 10:00

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512032**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**84.9**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-115 (6.5-7.5')

A155102-02 (Soil)

Date Sampled
12/14/2015 10:50

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	110000	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Benzene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
2-Butanone	ND	110000	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
1,1-Dichloroethane	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
1,2-Dichloroethane	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
trans-1,2-Dichloroethene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
cis-1,2-Dichloroethene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
1,1-Dichloroethene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Ethylbenzene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Tetrachloroethene	**78000**	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	D
Toluene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
1,1,1-Trichloroethane	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
1,1,2-Trichloroethane	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Trichloroethene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
1,3,5-Trimethylbenzene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
1,2,4-Trimethylbenzene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Vinyl chloride	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
m,p-Xylene	ND	5600	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
o-Xylene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Xylenes, total	ND	8400	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
n-Butyl Benzene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
sec-Butyl Benzene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Carbon disulfide	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Chloroethane	ND	28000	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Chloroform	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Dichlorodifluoromethane	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Isopropylbenzene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
p-Isopropyltoluene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Naphthalene	ND	28000	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
n-Propyl Benzene	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Trichlorofluoromethane	ND	2800	ug/kg dry	100	12/15/2015	12/16/2015 14:50	EPA 8260B	
Surrogate: Dibromofluoromethane		*101 %*	*84.7-120*		*12/15/2015*	*12/16/2015 14:50*	*EPA 8260B*	
Surrogate: Toluene-d8		*100 %*	*90.5-108*		*12/15/2015*	*12/16/2015 14:50*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.8 %*	*88.3-113*		*12/15/2015*	*12/16/2015 14:50*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-115 (6.5-7.5')

A155102-02 (Soil)

Date Sampled
12/14/2015 10:50

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512032**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**90.3**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-116 (1-2')

A155102-06 (Soil)

Date Sampled
12/14/2015 12:29

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1100	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
2-Butanone	ND	1100	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
1,1-Dichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
1,2-Dichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
trans-1,2-Dichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
cis-1,2-Dichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
1,1-Dichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Ethylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Tetrachloroethene	**33**	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Toluene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
1,1,1-Trichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
1,1,2-Trichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Trichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
1,3,5-Trimethylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
1,2,4-Trimethylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Vinyl chloride	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
m,p-Xylene	ND	53	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
o-Xylene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Xylenes, total	ND	80	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
n-Butyl Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
sec-Butyl Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Carbon disulfide	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Chloroethane	ND	270	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Chloroform	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Dichlorodifluoromethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Isopropylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
p-Isopropyltoluene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Naphthalene	ND	270	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
n-Propyl Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Trichlorofluoromethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 16:27	EPA 8260B	
Surrogate: Dibromofluoromethane		*100 %*	*84.7-120*		*12/15/2015*	*12/15/2015 16:27*	*EPA 8260B*	
Surrogate: Toluene-d8		*103 %*	*90.5-108*		*12/15/2015*	*12/15/2015 16:27*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*101 %*	*88.3-113*		*12/15/2015*	*12/15/2015 16:27*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-116 (1-2')

A155102-06 (Soil)

Date Sampled
12/14/2015 12:29

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512032**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**85.7**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-116 (8.5-9.5')

A155102-07 (Soil)

Date Sampled
12/14/2015 13:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	26000	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Benzene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
2-Butanone	ND	26000	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
1,1-Dichloroethane	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
1,2-Dichloroethane	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
trans-1,2-Dichloroethene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
cis-1,2-Dichloroethene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
1,1-Dichloroethene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Ethylbenzene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Tetrachloroethene	**34000**	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	D
Toluene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
1,1,1-Trichloroethane	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
1,1,2-Trichloroethane	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Trichloroethene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
1,3,5-Trimethylbenzene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
1,2,4-Trimethylbenzene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Vinyl chloride	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
m,p-Xylene	ND	1300	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
o-Xylene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Xylenes, total	ND	2000	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
n-Butyl Benzene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
sec-Butyl Benzene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Carbon disulfide	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Chloroethane	ND	6600	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Chloroform	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Dichlorodifluoromethane	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Isopropylbenzene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
p-Isopropyltoluene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Naphthalene	ND	6600	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
n-Propyl Benzene	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Trichlorofluoromethane	ND	660	ug/kg dry	20	12/15/2015	12/16/2015 15:12	EPA 8260B	
Surrogate: Dibromofluoromethane		*99.5 %*		*84.7-120*	*12/15/2015*	*12/16/2015 15:12*	*EPA 8260B*	
Surrogate: Toluene-d8		*114 %*		*90.5-108*	*12/15/2015*	*12/16/2015 15:12*	*EPA 8260B*	*S*
Surrogate: 4-Bromofluorobenzene		*100 %*		*88.3-113*	*12/15/2015*	*12/16/2015 15:12*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-116 (8.5-9.5')

A155102-07 (Soil)

Date Sampled
12/14/2015 13:00

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512032**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**87.2**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-117 (1-2')

A155102-09 (Soil)

Date Sampled
12/14/2015 13:45

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Benzene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
2-Butanone	ND	1000	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
1,1-Dichloroethane	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
1,2-Dichloroethane	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
trans-1,2-Dichloroethene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
cis-1,2-Dichloroethene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
1,1-Dichloroethene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Ethylbenzene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Tetrachloroethene	**300**	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Toluene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
1,1,1-Trichloroethane	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
1,1,2-Trichloroethane	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Trichloroethene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
1,3,5-Trimethylbenzene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
1,2,4-Trimethylbenzene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Vinyl chloride	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
m,p-Xylene	ND	52	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
o-Xylene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Xylenes, total	ND	78	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
n-Butyl Benzene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
sec-Butyl Benzene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Carbon disulfide	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Chloroethane	ND	260	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Chloroform	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Dichlorodifluoromethane	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Isopropylbenzene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
p-Isopropyltoluene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Naphthalene	ND	260	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
n-Propyl Benzene	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Trichlorofluoromethane	ND	26	ug/kg dry	1	12/15/2015	12/15/2015 17:12	EPA 8260B	
Surrogate: Dibromofluoromethane		*99.1 %*		*84.7-120*	*12/15/2015*	*12/15/2015 17:12*	*EPA 8260B*	
Surrogate: Toluene-d8		*108 %*		*90.5-108*	*12/15/2015*	*12/15/2015 17:12*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.6 %*		*88.3-113*	*12/15/2015*	*12/15/2015 17:12*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-117 (1-2')

A155102-09 (Soil)

Date Sampled
12/14/2015 13:45

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512032**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**87.0**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-117 (8.5-9.5')

A155102-10 (Soil)

Date Sampled
12/14/2015 14:10

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	29000	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Benzene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
2-Butanone	ND	29000	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
1,1-Dichloroethane	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
1,2-Dichloroethane	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
trans-1,2-Dichloroethene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
cis-1,2-Dichloroethene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
1,1-Dichloroethene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Ethylbenzene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Tetrachloroethene	**47000**	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	D
Toluene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
1,1,1-Trichloroethane	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
1,1,2-Trichloroethane	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Trichloroethene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
1,3,5-Trimethylbenzene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
1,2,4-Trimethylbenzene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Vinyl chloride	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
m,p-Xylene	ND	1500	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
o-Xylene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Xylenes, total	ND	2200	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
n-Butyl Benzene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
sec-Butyl Benzene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Carbon disulfide	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Chloroethane	ND	7300	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Chloroform	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Dichlorodifluoromethane	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Isopropylbenzene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
p-Isopropyltoluene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Naphthalene	ND	7300	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
n-Propyl Benzene	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Trichlorofluoromethane	ND	730	ug/kg dry	25	12/15/2015	12/16/2015 15:34	EPA 8260B	
Surrogate: Dibromofluoromethane		*98.9 %*		*84.7-120*	*12/15/2015*	*12/16/2015 15:34*	*EPA 8260B*	
Surrogate: Toluene-d8		*99.4 %*		*90.5-108*	*12/15/2015*	*12/16/2015 15:34*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.2 %*		*88.3-113*	*12/15/2015*	*12/16/2015 15:34*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-117 (8.5-9.5')

A155102-10 (Soil)

Date Sampled
12/14/2015 14:10

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
ECCS								
Classical Chemistry Parameters					**Preparation Batch: A512032**			
% Solids	**89.3**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-118 (1-2')

A155102-11 (Soil)

Date Sampled
12/14/2015 14:39

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1100	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
2-Butanone	ND	1100	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
1,1-Dichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
1,2-Dichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
trans-1,2-Dichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
cis-1,2-Dichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
1,1-Dichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Ethylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Tetrachloroethene	**70**	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Toluene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
1,1,1-Trichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
1,1,2-Trichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Trichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
1,3,5-Trimethylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
1,2,4-Trimethylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Vinyl chloride	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
m,p-Xylene	ND	54	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
o-Xylene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Xylenes, total	ND	82	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
n-Butyl Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
sec-Butyl Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Carbon disulfide	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Chloroethane	ND	270	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Chloroform	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Dichlorodifluoromethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Isopropylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
p-Isopropyltoluene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Naphthalene	ND	270	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
n-Propyl Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Trichlorofluoromethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 17:56	EPA 8260B	
Surrogate: Dibromofluoromethane		*98.0 %*		*84.7-120*	*12/15/2015*	*12/15/2015 17:56*	*EPA 8260B*	
Surrogate: Toluene-d8		*105 %*		*90.5-108*	*12/15/2015*	*12/15/2015 17:56*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*100 %*		*88.3-113*	*12/15/2015*	*12/15/2015 17:56*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-118 (1-2')

A155102-11 (Soil)

Date Sampled
12/14/2015 14:39

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512032**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**87.1**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-118 (9-10')

A155102-12 (Soil)

Date Sampled
12/14/2015 15:10

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	55000	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Benzene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
2-Butanone	ND	55000	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
1,1-Dichloroethane	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
1,2-Dichloroethane	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
trans-1,2-Dichloroethene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
cis-1,2-Dichloroethene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
1,1-Dichloroethene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Ethylbenzene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Tetrachloroethene	**46000**	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	D
Toluene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
1,1,1-Trichloroethane	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
1,1,2-Trichloroethane	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Trichloroethene	**3000**	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
1,2,4-Trimethylbenzene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Vinyl chloride	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
m,p-Xylene	ND	2700	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
o-Xylene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Xylenes, total	ND	4100	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
n-Butyl Benzene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
sec-Butyl Benzene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Carbon disulfide	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Chloroethane	ND	14000	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Chloroform	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Dichlorodifluoromethane	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Isopropylbenzene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
p-Isopropyltoluene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Naphthalene	ND	14000	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
n-Propyl Benzene	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Trichlorofluoromethane	ND	1400	ug/kg dry	50	12/15/2015	12/16/2015 15:56	EPA 8260B	
Surrogate: Dibromofluoromethane		*95.2 %*		*84.7-120*	*12/15/2015*	*12/16/2015 15:56*	*EPA 8260B*	
Surrogate: Toluene-d8		*108 %*		*90.5-108*	*12/15/2015*	*12/16/2015 15:56*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.3 %*		*88.3-113*	*12/15/2015*	*12/16/2015 15:56*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-118 (9-10')

A155102-12 (Soil)

Date Sampled
12/14/2015 15:10

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
ECCS								
Classical Chemistry Parameters					**Preparation Batch: A512032**			
% Solids	**87.4**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-119 (1-2')

A155102-13 (Soil)

Date Sampled
12/14/2015 15:43

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1100	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
2-Butanone	ND	1100	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
1,1-Dichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
1,2-Dichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
trans-1,2-Dichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
cis-1,2-Dichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
1,1-Dichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Ethylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Tetrachloroethene	**61**	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Toluene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
1,1,1-Trichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
1,1,2-Trichloroethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Trichloroethene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
1,3,5-Trimethylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
1,2,4-Trimethylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Vinyl chloride	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
m,p-Xylene	ND	54	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
o-Xylene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Xylenes, total	ND	81	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
n-Butyl Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
sec-Butyl Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Carbon disulfide	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Chloroethane	ND	270	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Chloroform	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Dichlorodifluoromethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Isopropylbenzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
p-Isopropyltoluene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Naphthalene	ND	270	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
n-Propyl Benzene	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Trichlorofluoromethane	ND	27	ug/kg dry	1	12/15/2015	12/15/2015 18:41	EPA 8260B	
Surrogate: Dibromofluoromethane		*99.3 %*		*84.7-120*	*12/15/2015*	*12/15/2015 18:41*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*		*90.5-108*	*12/15/2015*	*12/15/2015 18:41*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.7 %*		*88.3-113*	*12/15/2015*	*12/15/2015 18:41*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-119 (1-2')

A155102-13 (Soil)

Date Sampled
12/14/2015 15:43

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512033**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**86.2**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-119 (9-10')

A155102-14 (Soil)

Date Sampled
12/14/2015 16:30

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	14000	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Benzene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
2-Butanone	ND	14000	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
1,1-Dichloroethane	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
1,2-Dichloroethane	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
trans-1,2-Dichloroethene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
cis-1,2-Dichloroethene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
1,1-Dichloroethene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Ethylbenzene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Tetrachloroethene	**12000**	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	D
Toluene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
1,1,1-Trichloroethane	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
1,1,2-Trichloroethane	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Trichloroethene	**1900**	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
1,2,4-Trimethylbenzene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Vinyl chloride	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
m,p-Xylene	ND	700	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
o-Xylene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Xylenes, total	ND	1100	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
n-Butyl Benzene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
sec-Butyl Benzene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Carbon disulfide	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Chloroethane	ND	3500	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Chloroform	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Dichlorodifluoromethane	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Isopropylbenzene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
p-Isopropyltoluene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Naphthalene	ND	3500	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
n-Propyl Benzene	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Trichlorofluoromethane	ND	350	ug/kg dry	10	12/15/2015	12/16/2015 16:18	EPA 8260B	
Surrogate: Dibromofluoromethane		*99.7 %*	*84.7-120*		*12/15/2015*	*12/16/2015 16:18*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*	*90.5-108*		*12/15/2015*	*12/16/2015 16:18*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.7 %*	*88.3-113*		*12/15/2015*	*12/16/2015 16:18*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-119 (9-10')

A155102-14 (Soil)

Date Sampled
12/14/2015 16:30

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
ECCS								
Classical Chemistry Parameters					**Preparation Batch: A512033**			
% Solids	**85.0**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-119 (13-14')

A155102-15 (Soil)

Date Sampled
12/14/2015 16:19

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1400	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Benzene	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
2-Butanone	ND	1400	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
1,1-Dichloroethane	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
1,2-Dichloroethane	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
trans-1,2-Dichloroethene	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
cis-1,2-Dichloroethene	**490**	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
1,1-Dichloroethene	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Ethylbenzene	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Tetrachloroethene	**200**	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Toluene	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
1,1,1-Trichloroethane	**370**	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
1,1,2-Trichloroethane	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Trichloroethene	**390**	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
1,3,5-Trimethylbenzene	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
1,2,4-Trimethylbenzene	**51**	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Vinyl chloride	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
m,p-Xylene	ND	71	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
o-Xylene	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Xylenes, total	ND	110	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
n-Butyl Benzene	**820**	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
sec-Butyl Benzene	**540**	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Carbon disulfide	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Chloroethane	ND	360	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Chloroform	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Dichlorodifluoromethane	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Isopropylbenzene	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
p-Isopropyltoluene	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Naphthalene	ND	360	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
n-Propyl Benzene	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Trichlorofluoromethane	ND	36	ug/kg dry	1	12/15/2015	12/15/2015 20:09	EPA 8260B	
Surrogate: Dibromofluoromethane		*92.5 %*	*84.7-120*		*12/15/2015*	*12/15/2015 20:09*	*EPA 8260B*	
Surrogate: Toluene-d8		*107 %*	*90.5-108*		*12/15/2015*	*12/15/2015 20:09*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*138 %*	*88.3-113*		*12/15/2015*	*12/15/2015 20:09*	*EPA 8260B*	*S*

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-119 (13-14')

A155102-15 (Soil)

Date Sampled
12/14/2015 16:19

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
ECCS								
Classical Chemistry Parameters					**Preparation Batch: A512033**			
% Solids	**82.3**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

MeOH Blank

A155102-17 (Soil)

Date Sampled
12/14/2015 00:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512027**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Benzene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
2-Butanone	ND	1000	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
1,1-Dichloroethane	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
cis-1,2-Dichloroethene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
1,1-Dichloroethene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Ethylbenzene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Tetrachloroethene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Toluene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
1,1,1-Trichloroethane	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
1,1,2-Trichloroethane	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Trichloroethene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
1,3,5-Trimethylbenzene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Vinyl chloride	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
m,p-Xylene	ND	50	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
o-Xylene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Xylenes, total	ND	75	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
n-Butyl Benzene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Carbon disulfide	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Chloroethane	ND	250	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Chloroform	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Isopropylbenzene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Naphthalene	ND	250	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
n-Propyl Benzene	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/kg wet	1	12/15/2015	12/15/2015 15:20	EPA 8260B	
Surrogate: Dibromofluoromethane		*98.5 %*	*84.7-120*		*12/15/2015*	*12/15/2015 15:20*	*EPA 8260B*	
Surrogate: Toluene-d8		*99.5 %*	*90.5-108*		*12/15/2015*	*12/15/2015 15:20*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.0 %*	*88.3-113*		*12/15/2015*	*12/15/2015 15:20*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512027 - EPA 5030B										
Blank (A512027-BLK1)				Prepared: 12/15/2015 Analyzed: 12/15/2015 13:43						
Acetone	ND	1000	ug/kg wet							
Benzene	ND	25	ug/kg wet							
2-Butanone	ND	1000	ug/kg wet							
1,1-Dichloroethane	ND	25	ug/kg wet							
1,2-Dichloroethane	ND	25	ug/kg wet							
trans-1,2-Dichloroethene	ND	25	ug/kg wet							
cis-1,2-Dichloroethene	ND	25	ug/kg wet							
1,1-Dichloroethene	ND	25	ug/kg wet							
Ethylbenzene	ND	25	ug/kg wet							
Tetrachloroethene	ND	25	ug/kg wet							
Toluene	ND	25	ug/kg wet							
1,1,1-Trichloroethane	ND	25	ug/kg wet							
1,1,2-Trichloroethane	ND	25	ug/kg wet							
Trichloroethene	ND	25	ug/kg wet							
1,3,5-Trimethylbenzene	ND	25	ug/kg wet							
1,2,4-Trimethylbenzene	ND	25	ug/kg wet							
Vinyl chloride	ND	25	ug/kg wet							
m,p-Xylene	ND	50	ug/kg wet							
o-Xylene	ND	25	ug/kg wet							
Xylenes, total	ND	75	ug/kg wet							
n-Butyl Benzene	ND	25	ug/kg wet							
sec-Butyl Benzene	ND	25	ug/kg wet							
Carbon disulfide	ND	25	ug/kg wet							
Chloroethane	ND	250	ug/kg wet							
Chloroform	ND	25	ug/kg wet							
Dichlorodifluoromethane	ND	25	ug/kg wet							
Isopropylbenzene	ND	25	ug/kg wet							
p-Isopropyltoluene	ND	25	ug/kg wet							
Naphthalene	ND	250	ug/kg wet							
n-Propyl Benzene	ND	25	ug/kg wet							
Trichlorofluoromethane	ND	25	ug/kg wet							
Surrogate: Dibromofluoromethane	*24.5*		*ug/L*	*25.00*		*98.1*	*84.7-120*			
Surrogate: Toluene-d8	*25.0*		*ug/L*	*25.00*		*99.8*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*24.0*		*ug/L*	*25.00*		*96.0*	*88.3-113*			
LCS (A512027-BS1)				Prepared: 12/15/2015 Analyzed: 12/15/2015 21:38						
Acetone	51.8		ug/L	50.00		104	42.3-174			
Benzene	5.04		ug/L	5.000		101	80.5-123			
2-Butanone	50.2		ug/L	50.00		100	51.2-152			
1,1-Dichloroethane	5.13		ug/L	5.000		103	80.9-127			
1,2-Dichloroethane	5.02		ug/L	5.000		100	72.8-138			
trans-1,2-Dichloroethene	5.03		ug/L	5.000		101	71.3-128			
cis-1,2-Dichloroethene	4.89		ug/L	5.000		97.8	81.9-121			
1,1-Dichloroethene	4.91		ug/L	5.000		98.2	66.8-129			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512027 - EPA 5030B										
LCS (A512027-BS1)				Prepared: 12/15/2015 Analyzed: 12/15/2015 21:38						
Ethylbenzene	5.10		ug/L	5.000		102	89.9-113			
Tetrachloroethene	5.15		ug/L	5.000		103	85.1-116			
Toluene	5.17		ug/L	5.000		103	78.8-117			
1,1,1-Trichloroethane	5.02		ug/L	5.000		100	82.3-123			
1,1,2-Trichloroethane	4.86		ug/L	5.000		97.2	74.9-130			
Trichloroethene	5.26		ug/L	5.000		105	83.1-118			
1,3,5-Trimethylbenzene	4.89		ug/L	5.000		97.8	85.2-120			
1,2,4-Trimethylbenzene	4.80		ug/L	5.000		96.0	86.8-118			
Vinyl chloride	5.23		ug/L	5.000		105	60.9-137			
m,p-Xylene	10.4		ug/L	10.00		104	90.1-114			
o-Xylene	5.12		ug/L	5.000		102	85.8-113			
n-Butyl Benzene	4.83		ug/L	5.000		96.6	88.2-119			
sec-Butyl Benzene	5.08		ug/L	5.000		102	89.9-118			
Carbon disulfide	5.02		ug/L	5.000		100	72.2-127			
Chloroethane	5.11		ug/L	5.000		102	14.6-199			
Chloroform	4.96		ug/L	5.000		99.2	77.9-125			
Dichlorodifluoromethane	5.45		ug/L	5.000		109	67.8-137			
Isopropylbenzene	5.06		ug/L	5.000		101	92.8-112			
p-Isopropyltoluene	5.00		ug/L	5.000		100	89.8-118			
Naphthalene	4.11		ug/L	5.000		82.2	72.9-122			
n-Propyl Benzene	5.07		ug/L	5.000		101	87.3-119			
Trichlorofluoromethane	5.34		ug/L	5.000		107	40.3-174			
Surrogate: Dibromofluoromethane	*24.8*		*ug/L*	*25.00*		*99.1*	*84.7-120*			
Surrogate: Toluene-d8	*26.2*		*ug/L*	*25.00*		*105*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*25.2*		*ug/L*	*25.00*		*101*	*88.3-113*			
Matrix Spike (A512027-MS1)		**Source: A155102-01**		Prepared: 12/15/2015 Analyzed: 12/15/2015 22:00						
Acetone	54.4		ug/L	50.00	ND	109	37.5-179			
Benzene	5.16		ug/L	5.000	ND	103	77-128			
2-Butanone	52.2		ug/L	50.00	ND	104	54.7-159			
1,1-Dichloroethane	5.17		ug/L	5.000	ND	103	77.3-131			
1,2-Dichloroethane	5.37		ug/L	5.000	ND	107	73.7-139			
trans-1,2-Dichloroethene	5.18		ug/L	5.000	ND	104	68.9-132			
cis-1,2-Dichloroethene	5.20		ug/L	5.000	ND	104	80-124			
1,1-Dichloroethene	5.49		ug/L	5.000	ND	110	60.7-145			
Ethylbenzene	5.09		ug/L	5.000	ND	102	85.7-117			
Tetrachloroethene	7.93		ug/L	5.000	2.68	105	80.7-123			
Toluene	5.21		ug/L	5.000	ND	104	72.1-124			
1,1,1-Trichloroethane	5.18		ug/L	5.000	ND	104	80.2-124			
1,1,2-Trichloroethane	5.33		ug/L	5.000	ND	107	73.9-137			
Trichloroethene	5.34		ug/L	5.000	ND	107	81.5-119			
1,3,5-Trimethylbenzene	4.98		ug/L	5.000	ND	99.6	82-122			
1,2,4-Trimethylbenzene	5.01		ug/L	5.000	ND	100	80.4-122			
Vinyl chloride	5.13		ug/L	5.000	ND	103	75.5-134			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512027 - EPA 5030B										
Matrix Spike (A512027-MS1)		**Source: A155102-01**		Prepared: 12/15/2015 Analyzed: 12/15/2015 22:00						
m,p-Xylene	10.1		ug/L	10.00	ND	101	87.9-115			
o-Xylene	5.03		ug/L	5.000	ND	101	82.9-116			
n-Butyl Benzene	4.96		ug/L	5.000	ND	99.2	87.5-118			
sec-Butyl Benzene	5.01		ug/L	5.000	ND	100	85.3-121			
Carbon disulfide	5.21		ug/L	5.000	ND	104	69.4-131			
Chloroethane	9.48		ug/L	5.000	ND	190	25.1-230			
Chloroform	5.08		ug/L	5.000	ND	102	76.4-128			
Dichlorodifluoromethane	5.55		ug/L	5.000	ND	111	69.4-138			
Isopropylbenzene	5.08		ug/L	5.000	ND	102	90.3-116			
p-Isopropyltoluene	4.95		ug/L	5.000	ND	99.0	82-126			
Naphthalene	4.59		ug/L	5.000	ND	91.8	66.1-137			
n-Propyl Benzene	5.03		ug/L	5.000	ND	101	85.2-121			
Trichlorofluoromethane	6.14		ug/L	5.000	ND	123	17-192			
Surrogate: Dibromofluoromethane	*25.8*		*ug/L*	*25.00*		*103*	*84.7-120*			
Surrogate: Toluene-d8	*25.5*		*ug/L*	*25.00*		*102*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*25.2*		*ug/L*	*25.00*		*101*	*88.3-113*			
Matrix Spike Dup (A512027-MSD1)		**Source: A155102-01**		Prepared: 12/15/2015 Analyzed: 12/15/2015 22:22						
Acetone	51.9		ug/L	50.00	ND	104	37.5-179	4.72	20	
Benzene	5.34		ug/L	5.000	ND	107	77-128	3.43	20	
2-Butanone	50.6		ug/L	50.00	ND	101	54.7-159	3.00	20	
1,1-Dichloroethane	5.24		ug/L	5.000	ND	105	77.3-131	1.34	20	
1,2-Dichloroethane	5.02		ug/L	5.000	ND	100	73.7-139	6.74	20	
trans-1,2-Dichloroethene	5.08		ug/L	5.000	ND	102	68.9-132	1.95	20	
cis-1,2-Dichloroethene	4.93		ug/L	5.000	ND	98.6	80-124	5.33	20	
1,1-Dichloroethene	5.03		ug/L	5.000	ND	101	60.7-145	8.75	20	
Ethylbenzene	5.23		ug/L	5.000	ND	105	85.7-117	2.71	20	
Tetrachloroethene	8.05		ug/L	5.000	2.68	107	80.7-123	2.26	20	
Toluene	5.17		ug/L	5.000	ND	103	72.1-124	0.771	20	
1,1,1-Trichloroethane	5.36		ug/L	5.000	ND	107	80.2-124	3.42	20	
1,1,2-Trichloroethane	5.03		ug/L	5.000	ND	101	73.9-137	5.79	20	
Trichloroethene	5.54		ug/L	5.000	ND	111	81.5-119	3.68	20	
1,3,5-Trimethylbenzene	5.11		ug/L	5.000	ND	102	82-122	2.58	20	
1,2,4-Trimethylbenzene	4.98		ug/L	5.000	ND	99.6	80.4-122	0.601	20	
Vinyl chloride	5.18		ug/L	5.000	ND	104	75.5-134	0.970	20	
m,p-Xylene	10.6		ug/L	10.00	ND	106	87.9-115	4.65	20	
o-Xylene	5.31		ug/L	5.000	ND	106	82.9-116	5.42	20	
n-Butyl Benzene	5.10		ug/L	5.000	ND	102	87.5-118	2.78	20	
sec-Butyl Benzene	5.21		ug/L	5.000	ND	104	85.3-121	3.91	20	
Carbon disulfide	5.17		ug/L	5.000	ND	103	69.4-131	0.771	20	
Chloroethane	6.67		ug/L	5.000	ND	133	25.1-230	34.8	20	X
Chloroform	5.03		ug/L	5.000	ND	101	76.4-128	0.989	20	
Dichlorodifluoromethane	5.53		ug/L	5.000	ND	111	69.4-138	0.361	20	
Isopropylbenzene	5.23		ug/L	5.000	ND	105	90.3-116	2.91	20	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512027 - EPA 5030B										
Matrix Spike Dup (A512027-MSD1)		**Source: A155102-01**		Prepared: 12/15/2015 Analyzed: 12/15/2015 22:22						
p-Isopropyltoluene	5.20		ug/L	5.000	ND	104	82-126	4.93	20	
Naphthalene	4.20		ug/L	5.000	ND	84.0	66.1-137	8.87	20	
n-Propyl Benzene	5.20		ug/L	5.000	ND	104	85.2-121	3.32	20	
Trichlorofluoromethane	5.60		ug/L	5.000	ND	112	17-192	9.20	20	
Surrogate: Dibromofluoromethane	*25.2*		*ug/L*	*25.00*		*101*	*84.7-120*			
Surrogate: Toluene-d8	*25.7*		*ug/L*	*25.00*		*103*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*25.6*		*ug/L*	*25.00*		*102*	*88.3-113*			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Classical Chemistry Parameters - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512032 - % Solids										
Duplicate (A512032-DUP1)		**Source: A155107-05**		Prepared: 12/16/2015 Analyzed: 12/17/2015 09:20						
% Solids	83.4	0.00	% by Weight		82.7			0.742	20	
Batch A512033 - % Solids										
Duplicate (A512033-DUP1)		**Source: A155102-15**		Prepared: 12/16/2015 Analyzed: 12/17/2015 09:20						
% Solids	82.0	0.00	% by Weight		82.3			0.446	20	

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Notes and Definitions

X	Precision for the matrix spike duplicate, laboratory control sample duplicate or lab duplicate was outside of control limits.
S	Surrogate recovery was outside of laboratory control limits due to an apparent matrix effect.
D	Data reported from a dilution
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. If the word 'dry' does not appear after the units, results are reported on an as-is basis.
RPD	Relative Percent Difference

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

CHAIN OF CUSTODY

Lab Work Order #: A155102

Mail Report To: Stacy Metz
Company: TRC Environmental Corp
Address: 1540 Eisenhower Place
Ann Arbor Mi 48108
E-mail Address: SMetz@trcsolutions.com
Invoice To: Stacy Metz
Company: TRC Environmental Corp
Address: Same As Above

Project Number: 220003.0000
Project Name: TPC PCE Investigation
Project Location: Tecumseh, Mi
Turn Around (circle one): Normal (Rush)
If Rush, Report Due Date: 2 days per 11-23-15 email sent at 8:46 EST to Nick Nigro
Sampled By (Print): Mellisa Powers, Emily Sokol

Analyses Requested / Preservation Codes: F

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOCs						Comments	Lab ID	Lab Receipt Time
B-115 (1-2')	12/14/15	1000	S	1	✓							01	
B-115 (6.5-7.5')		1050	S	1	✓						For Analysis	02	
B-115 (6.5-7.5')		1640	S	1	✓						For Pre-screen	03	
B-115 (12.75-13.75')		1055	S	1	~~✓~~ same						HOLD	04	
B-115 (12.75-13.75')		1649	S	1							Pre-Screen - HOLD	05	
B-116 (1-2')		1229	S	1	✓							06	
B-116 (8.5-9.5')		1300	S	1	✓							07	
B-116 (13-14')		1310	S	1							HOLD	08	
B-117 (1-2')		1345	S	1	✓							09	
B-117 (8.5-9.5')		1410	S	1	✓							10	

Preservation Codes: A=None B=HCL C=H_2SO_4 D=HNO_3 E=EnCore F=Methanol G=NaOH O=Other (Indicate)

Matrix Codes: A=Air S=Soil W=Water O=Other

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Mellisa Powers	12/14/15	1915	FedEx	12/14/15	1915
			Jessica Gomez	12-15-15	1015

Custody Seal: (Present) Absent (Intact) Not Intact Seal #'s
Shipped Via: FedEx
Receipt Temp: 0.3°C SIN150250900
Temp Blank (Y) N Exp. 03-26-17

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

CHAIN OF CUSTODY

Lab Work Order #: A155102

Project Number: 220003.0000
Project Name: TPC PCE Investigation
Project Location: Tecumseh Mi
Turn Around (circle one): Normal (Rush)
If Rush, Report Due Date: 2 days per 11/23/15 email sent at 8:46 EST to Nick Nagro
Sampled By (Print): Mellisa Powers, Emily Sokol

Mail Report To: Stacy Metz
Company: TRC Environmental Corp
Address: 1540 Eisenhower Place, Ann Arbor Mi 48108
E-mail Address: SMetz@trcsolutions.com
Invoice To: Stacy Metz
Company: TRC Environmental Corp
Address: Same As above

Analyses Requested / Preservation Codes: F

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOCs						Comments	Lab ID	Lab Receipt Time
B-118 (1-2')	12/14/15	1439	S	1	✓							11	
B-118 (9-10')		1510	S	1	✓							12	
B-119 (1-2')		1543	S	1	✓							13	
B-119 (9-10')		1630	S	2	✓							14	
~~B-119 (12.75-13.75')~~ mp			~~S~~	~~2~~									
B-119 ~~(11-12')~~ mp (13-14')		1619	S	2	✓							15	
B-119 (12-13')		1625	S	2							HOLD	~~16~~	
MeOH Blank	—	—	~~S~~ LQ mp		✓							17	
Temperature Blank													

Preservation Codes: A=None B=HCL C=H_2SO_4 D=HNO_3 E=EnCore F=Methanol G=NaOH O=Other (Indicate)

Matrix Codes: A=Air S=Soil W=Water O=Other

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Mellisa Powers	12/14/15	1915	FedEx	12/14/15	1915
Relinquished By:	Date:	Time:	Received By: Jessica Cruz	12-15-15	1015

Custody Seal (Present) Absent (Intact) Not Intact Seal #'s
Shipped Via: FedEx
Receipt Temp 0.3°C
Temp Blank (Y) N

Download this form at www.eccsmobilelab.com. WHITE - REPORT COPY YELLOW - LABORATORY COPY PINK - SAMPLER/SUBMITTER Rev. 11/08

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

December 18, 2015

Stacy Metz
TRC Solutions
1540 Eisenhower Place
Ann Arbor, MI 48108

RE: TPC PCE Investigation - Tecumseh, MI

Enclosed are the analytical results for the samples received by the laboratory on 12/16/2015.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. These results are in compliance with the 2009 NELAC Standards and the appropriate agencies listed below, unless otherwise noted in the case narrative. This analytical report should be reproduced in its entirety.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jessica Esser For Nick Nigro

President

Certification List			Expires
DODELAP	DOD ELAP Accreditation (A2LA)	3269.01	03/31/2016
FDOH	Florida Secondary NELAP Accreditation	E871093	06/30/2016
ILEPA	Illinois Secondary NELAP Accreditation	003174	04/30/2016
KDHE	Kansas Secondary NELAP Accreditation	E-10384	01/31/2016
LELAP	Louisiana Primary NELAP Accreditation	04165	06/30/2016
NJDEP	New Jersey Secondary NELAP Accreditation	WI004	06/30/2016
ODEQ	Oklahoma Department of Environmental Quality Accreditation	2014-153	08/31/2016
TCEQ	Texas Secondary NELAP Accreditation	T104704504-15-6	11/30/2016
WDNR	Wisconsin Certification under NR 149	113289110	08/31/2016

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B-121 (1-2')	A155106-10	Soil	12/15/2015	12/16/2015
B-121 (6-7')	A155106-11	Soil	12/15/2015	12/16/2015
B-121 (8-9')	A155106-12	Soil	12/15/2015	12/16/2015
B-120 (1-2')	A155106-16	Soil	12/15/2015	12/16/2015
B-120 (7-8')	A155106-17	Soil	12/15/2015	12/16/2015
B-122 (5-6')	A155106-18	Soil	12/15/2015	12/16/2015
B-122 (1-2')	A155106-19	Soil	12/15/2015	12/16/2015
MeOH Blank	A155106-21	Soil	12/15/2015	12/16/2015

CASE NARRATIVE

Sample Receipt Information:
26 samples were received on 12/16/2015. Samples were received at 0.8 degrees Celsius.

Sample A155106-19 had a discrepancy between the collection time on the chain of custody (COC) and the collection time on the sample container. Per the client, the COC collection time is correct.

Some samples received in this shipment were additional sample volume for samples received on 12/15/2015.

Please see the chain of custody (COC) document at the end of this report for additional information.

Continuing Calibration Verification (CCV):
CCV indicates a potential high bias for chloroethane and/or vinyl chloride for samples A155106-11, A155106-12 and A155106-16 through A155106-19. Samples were less than the reporting limit for these analytes so no further action is required.

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-121 (1-2')

A155106-10 (Soil)

Date Sampled
12/15/2015 10:55

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512031**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1200	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Benzene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
2-Butanone	ND	1200	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
1,1-Dichloroethane	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
1,2-Dichloroethane	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
trans-1,2-Dichloroethene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
cis-1,2-Dichloroethene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
1,1-Dichloroethene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Ethylbenzene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Tetrachloroethene	**710**	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Toluene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
1,1,1-Trichloroethane	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
1,1,2-Trichloroethane	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Trichloroethene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
1,3,5-Trimethylbenzene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
1,2,4-Trimethylbenzene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Vinyl chloride	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
m,p-Xylene	ND	61	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
o-Xylene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Xylenes, total	ND	91	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
n-Butyl Benzene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
sec-Butyl Benzene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Carbon disulfide	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Chloroethane	ND	300	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Chloroform	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Dichlorodifluoromethane	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Isopropylbenzene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
p-Isopropyltoluene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Naphthalene	ND	300	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
n-Propyl Benzene	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Trichlorofluoromethane	ND	30	ug/kg dry	1	12/16/2015	12/16/2015 16:40	EPA 8260B	
Surrogate: Dibromofluoromethane		*100 %*	*84.7-120*		*12/16/2015*	*12/16/2015 16:40*	*EPA 8260B*	
Surrogate: Toluene-d8		*106 %*	*90.5-108*		*12/16/2015*	*12/16/2015 16:40*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.8 %*	*88.3-113*		*12/16/2015*	*12/16/2015 16:40*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-121 (1-2')

A155106-10 (Soil)

Date Sampled
12/15/2015 10:55

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512032**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**85.8**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-121 (6-7')

A155106-11 (Soil)

Date Sampled
12/15/2015 11:22

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512031**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	22000	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Benzene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
2-Butanone	ND	22000	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
1,1-Dichloroethane	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
1,2-Dichloroethane	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
trans-1,2-Dichloroethene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
cis-1,2-Dichloroethene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
1,1-Dichloroethene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Ethylbenzene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Tetrachloroethene	**25000**	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	D
Toluene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
1,1,1-Trichloroethane	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
1,1,2-Trichloroethane	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Trichloroethene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
1,3,5-Trimethylbenzene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
1,2,4-Trimethylbenzene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Vinyl chloride	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
m,p-Xylene	ND	1100	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
o-Xylene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Xylenes, total	ND	1600	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
n-Butyl Benzene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
sec-Butyl Benzene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Carbon disulfide	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Chloroethane	ND	5500	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Chloroform	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Dichlorodifluoromethane	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Isopropylbenzene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
p-Isopropyltoluene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Naphthalene	ND	5500	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
n-Propyl Benzene	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Trichlorofluoromethane	ND	550	ug/kg dry	20	12/16/2015	12/16/2015 17:02	EPA 8260B	
Surrogate: Dibromofluoromethane		*101 %*		*84.7-120*	*12/16/2015*	*12/16/2015 17:02*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*		*90.5-108*	*12/16/2015*	*12/16/2015 17:02*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.2 %*		*88.3-113*	*12/16/2015*	*12/16/2015 17:02*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

B-121 (6-7')

A155106-11 (Soil)

Date Sampled
12/15/2015 11:22

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512032**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**86.2**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-121 (8-9')

A155106-12 (Soil)

Date Sampled
12/15/2015 11:30

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap **Preparation Batch: A512031**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	110000	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Benzene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
2-Butanone	ND	110000	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
1,1-Dichloroethane	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
1,2-Dichloroethane	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
trans-1,2-Dichloroethene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
cis-1,2-Dichloroethene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
1,1-Dichloroethene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Ethylbenzene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Tetrachloroethene	**160000**	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	D
Toluene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
1,1,1-Trichloroethane	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
1,1,2-Trichloroethane	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Trichloroethene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
1,3,5-Trimethylbenzene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
1,2,4-Trimethylbenzene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Vinyl chloride	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
m,p-Xylene	ND	5300	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
o-Xylene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Xylenes, total	ND	7900	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
n-Butyl Benzene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
sec-Butyl Benzene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Carbon disulfide	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Chloroethane	ND	26000	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Chloroform	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Dichlorodifluoromethane	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Isopropylbenzene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
p-Isopropyltoluene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Naphthalene	ND	26000	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
n-Propyl Benzene	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Trichlorofluoromethane	ND	2600	ug/kg dry	100	12/16/2015	12/16/2015 17:24	EPA 8260B	
Surrogate: Dibromofluoromethane		*100 %*	*84.7-120*		*12/16/2015*	*12/16/2015 17:24*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*	*90.5-108*		*12/16/2015*	*12/16/2015 17:24*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*100 %*	*88.3-113*		*12/16/2015*	*12/16/2015 17:24*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-121 (8-9')

A155106-12 (Soil)

Date Sampled
12/15/2015 11:30

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
ECCS								
Classical Chemistry Parameters					**Preparation Batch: A512032**			
% Solids	**90.7**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-120 (1-2')

A155106-16 (Soil)

Date Sampled
12/15/2015 12:17

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512031**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1300	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Benzene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
2-Butanone	ND	1300	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
1,1-Dichloroethane	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
1,2-Dichloroethane	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
trans-1,2-Dichloroethene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
cis-1,2-Dichloroethene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
1,1-Dichloroethene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Ethylbenzene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Tetrachloroethene	**700**	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Toluene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
1,1,1-Trichloroethane	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
1,1,2-Trichloroethane	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Trichloroethene	**63**	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
1,3,5-Trimethylbenzene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
1,2,4-Trimethylbenzene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Vinyl chloride	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
m,p-Xylene	ND	65	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
o-Xylene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Xylenes, total	ND	98	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
n-Butyl Benzene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
sec-Butyl Benzene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Carbon disulfide	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Chloroethane	ND	330	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Chloroform	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Dichlorodifluoromethane	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Isopropylbenzene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
p-Isopropyltoluene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Naphthalene	ND	330	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
n-Propyl Benzene	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Trichlorofluoromethane	ND	33	ug/kg dry	1	12/16/2015	12/16/2015 17:46	EPA 8260B	
Surrogate: Dibromofluoromethane		*103 %*	*84.7-120*		*12/16/2015*	*12/16/2015 17:46*	*EPA 8260B*	
Surrogate: Toluene-d8		*99.7 %*	*90.5-108*		*12/16/2015*	*12/16/2015 17:46*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.8 %*	*88.3-113*		*12/16/2015*	*12/16/2015 17:46*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-120 (1-2')

A155106-16 (Soil)

Date Sampled
12/15/2015 12:17

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512032**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**88.2**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-120 (7-8')

A155106-17 (Soil)

Date Sampled
12/15/2015 13:02

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512031**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	27000	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Benzene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
2-Butanone	ND	27000	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
1,1-Dichloroethane	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
1,2-Dichloroethane	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
trans-1,2-Dichloroethene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
cis-1,2-Dichloroethene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
1,1-Dichloroethene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Ethylbenzene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Tetrachloroethene	**27000**	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	D
Toluene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
1,1,1-Trichloroethane	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
1,1,2-Trichloroethane	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Trichloroethene	**1200**	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
1,2,4-Trimethylbenzene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Vinyl chloride	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
m,p-Xylene	ND	1400	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
o-Xylene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Xylenes, total	ND	2000	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
n-Butyl Benzene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
sec-Butyl Benzene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Carbon disulfide	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Chloroethane	ND	6800	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Chloroform	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Dichlorodifluoromethane	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Isopropylbenzene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
p-Isopropyltoluene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Naphthalene	ND	6800	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
n-Propyl Benzene	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Trichlorofluoromethane	ND	680	ug/kg dry	20	12/16/2015	12/16/2015 18:08	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*	*84.7-120*		*12/16/2015*	*12/16/2015 18:08*	*EPA 8260B*	
Surrogate: Toluene-d8		*100 %*	*90.5-108*		*12/16/2015*	*12/16/2015 18:08*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*102 %*	*88.3-113*		*12/16/2015*	*12/16/2015 18:08*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-120 (7-8')

A155106-17 (Soil)

Date Sampled
12/15/2015 13:02

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512032**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**93.7**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (5-6')

A155106-18 (Soil)

Date Sampled
12/15/2015 15:04

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512031**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	2500	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Benzene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
2-Butanone	ND	2500	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
1,1-Dichloroethane	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
1,2-Dichloroethane	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
trans-1,2-Dichloroethene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
cis-1,2-Dichloroethene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
1,1-Dichloroethene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Ethylbenzene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Tetrachloroethene	**4200**	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	D
Toluene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
1,1,1-Trichloroethane	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
1,1,2-Trichloroethane	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Trichloroethene	**310**	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
1,2,4-Trimethylbenzene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Vinyl chloride	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
m,p-Xylene	ND	120	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
o-Xylene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Xylenes, total	ND	180	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
n-Butyl Benzene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
sec-Butyl Benzene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Carbon disulfide	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Chloroethane	ND	610	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Chloroform	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Dichlorodifluoromethane	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Isopropylbenzene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
p-Isopropyltoluene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Naphthalene	ND	610	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
n-Propyl Benzene	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Trichlorofluoromethane	ND	61	ug/kg dry	2	12/16/2015	12/16/2015 18:31	EPA 8260B	
Surrogate: Dibromofluoromethane		*102 %*	*84.7-120*		*12/16/2015*	*12/16/2015 18:31*	*EPA 8260B*	
Surrogate: Toluene-d8		*99.8 %*	*90.5-108*		*12/16/2015*	*12/16/2015 18:31*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*100 %*	*88.3-113*		*12/16/2015*	*12/16/2015 18:31*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (5-6')

A155106-18 (Soil)

Date Sampled
12/15/2015 15:04

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
ECCS								
Classical Chemistry Parameters					**Preparation Batch: A512032**			
% Solids	**92.8**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (1-2')

A155106-19 (Soil)

Date Sampled
12/15/2015 17:30

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512031**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Benzene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
2-Butanone	ND	1000	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
1,1-Dichloroethane	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
1,2-Dichloroethane	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
trans-1,2-Dichloroethene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
cis-1,2-Dichloroethene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
1,1-Dichloroethene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Ethylbenzene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Tetrachloroethene	**65**	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Toluene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
1,1,1-Trichloroethane	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
1,1,2-Trichloroethane	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Trichloroethene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
1,3,5-Trimethylbenzene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
1,2,4-Trimethylbenzene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Vinyl chloride	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
m,p-Xylene	ND	52	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
o-Xylene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Xylenes, total	ND	78	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
n-Butyl Benzene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
sec-Butyl Benzene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Carbon disulfide	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Chloroethane	ND	260	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Chloroform	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Dichlorodifluoromethane	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Isopropylbenzene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
p-Isopropyltoluene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Naphthalene	ND	260	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
n-Propyl Benzene	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Trichlorofluoromethane	ND	26	ug/kg dry	1	12/16/2015	12/16/2015 18:53	EPA 8260B	
Surrogate: Dibromofluoromethane		*100 %*	*84.7-120*		*12/16/2015*	*12/16/2015 18:53*	*EPA 8260B*	
Surrogate: Toluene-d8		*104 %*	*90.5-108*		*12/16/2015*	*12/16/2015 18:53*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*100 %*	*88.3-113*		*12/16/2015*	*12/16/2015 18:53*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (1-2')

A155106-19 (Soil)

Date Sampled
12/15/2015 17:30

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
ECCS								
Classical Chemistry Parameters					**Preparation Batch: A512032**			
% Solids	**88.1**	0.00	% by Weight	1	12/16/2015	12/17/2015 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

MeOH Blank

A155106-21 (Soil)

Date Sampled
12/15/2015 00:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512031**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Benzene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
2-Butanone	ND	1000	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
1,1-Dichloroethane	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
cis-1,2-Dichloroethene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
1,1-Dichloroethene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Ethylbenzene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Tetrachloroethene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Toluene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
1,1,1-Trichloroethane	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
1,1,2-Trichloroethane	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Trichloroethene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
1,3,5-Trimethylbenzene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Vinyl chloride	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
m,p-Xylene	ND	50	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
o-Xylene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Xylenes, total	ND	75	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
n-Butyl Benzene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Carbon disulfide	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Chloroethane	ND	250	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Chloroform	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Isopropylbenzene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Naphthalene	ND	250	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
n-Propyl Benzene	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/kg wet	1	12/16/2015	12/16/2015 14:18	EPA 8260B	
Surrogate: Dibromofluoromethane		*95.9 %*		*84.7-120*	*12/16/2015*	*12/16/2015 14:18*	*EPA 8260B*	
Surrogate: Toluene-d8		*104 %*		*90.5-108*	*12/16/2015*	*12/16/2015 14:18*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*106 %*		*88.3-113*	*12/16/2015*	*12/16/2015 14:18*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512031 - EPA 5030B										
Blank (A512031-BLK1)				Prepared: 12/16/2015 Analyzed: 12/16/2015 13:54						
Acetone	ND	1000	ug/kg wet							
Benzene	ND	25	ug/kg wet							
2-Butanone	ND	1000	ug/kg wet							
1,1-Dichloroethane	ND	25	ug/kg wet							
1,2-Dichloroethane	ND	25	ug/kg wet							
trans-1,2-Dichloroethene	ND	25	ug/kg wet							
cis-1,2-Dichloroethene	ND	25	ug/kg wet							
1,1-Dichloroethene	ND	25	ug/kg wet							
Ethylbenzene	ND	25	ug/kg wet							
Tetrachloroethene	ND	25	ug/kg wet							
Toluene	ND	25	ug/kg wet							
1,1,1-Trichloroethane	ND	25	ug/kg wet							
1,1,2-Trichloroethane	ND	25	ug/kg wet							
Trichloroethene	ND	25	ug/kg wet							
1,3,5-Trimethylbenzene	ND	25	ug/kg wet							
1,2,4-Trimethylbenzene	ND	25	ug/kg wet							
Vinyl chloride	ND	25	ug/kg wet							
m,p-Xylene	ND	50	ug/kg wet							
o-Xylene	ND	25	ug/kg wet							
Xylenes, total	ND	75	ug/kg wet							
n-Butyl Benzene	ND	25	ug/kg wet							
sec-Butyl Benzene	ND	25	ug/kg wet							
Carbon disulfide	ND	25	ug/kg wet							
Chloroethane	ND	250	ug/kg wet							
Chloroform	ND	25	ug/kg wet							
Dichlorodifluoromethane	ND	25	ug/kg wet							
Isopropylbenzene	ND	25	ug/kg wet							
p-Isopropyltoluene	ND	25	ug/kg wet							
Naphthalene	ND	250	ug/kg wet							
n-Propyl Benzene	ND	25	ug/kg wet							
Trichlorofluoromethane	ND	25	ug/kg wet							
Surrogate: Dibromofluoromethane	*24.7*		*ug/L*	*25.00*		*98.9*	*84.7-120*			
Surrogate: Toluene-d8	*25.2*		*ug/L*	*25.00*		*101*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*24.7*		*ug/L*	*25.00*		*98.9*	*88.3-113*			
LCS (A512031-BS1)				Prepared: 12/16/2015 Analyzed: 12/16/2015 19:15						
Acetone	46.2		ug/L	50.00		92.3	42.3-174			
Benzene	5.00		ug/L	5.000		100	80.5-123			
2-Butanone	44.9		ug/L	50.00		89.9	51.2-152			
1,1-Dichloroethane	5.00		ug/L	5.000		100	80.9-127			
1,2-Dichloroethane	5.00		ug/L	5.000		100	72.8-138			
trans-1,2-Dichloroethene	4.94		ug/L	5.000		98.8	71.3-128			
cis-1,2-Dichloroethene	4.85		ug/L	5.000		97.0	81.9-121			
1,1-Dichloroethene	5.07		ug/L	5.000		101	66.8-129			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512031 - EPA 5030B										
LCS (A512031-BS1)				Prepared: 12/16/2015 Analyzed: 12/16/2015 19:15						
Ethylbenzene	4.81		ug/L	5.000		96.2	89.9-113			
Tetrachloroethene	5.29		ug/L	5.000		106	85.1-116			
Toluene	4.82		ug/L	5.000		96.4	78.8-117			
1,1,1-Trichloroethane	4.98		ug/L	5.000		99.6	82.3-123			
1,1,2-Trichloroethane	4.69		ug/L	5.000		93.8	74.9-130			
Trichloroethene	4.92		ug/L	5.000		98.4	83.1-118			
1,3,5-Trimethylbenzene	4.58		ug/L	5.000		91.6	85.2-120			
1,2,4-Trimethylbenzene	4.54		ug/L	5.000		90.8	86.8-118			
Vinyl chloride	5.01		ug/L	5.000		100	60.9-137			
m,p-Xylene	9.70		ug/L	10.00		97.0	90.1-114			
o-Xylene	4.71		ug/L	5.000		94.2	85.8-113			
n-Butyl Benzene	4.55		ug/L	5.000		91.0	88.2-119			
sec-Butyl Benzene	4.58		ug/L	5.000		91.6	89.9-118			
Carbon disulfide	4.94		ug/L	5.000		98.8	72.2-127			
Chloroethane	9.16		ug/L	5.000		183	14.6-199			
Chloroform	4.88		ug/L	5.000		97.6	77.9-125			
Dichlorodifluoromethane	5.36		ug/L	5.000		107	67.8-137			
Isopropylbenzene	4.79		ug/L	5.000		95.8	92.8-112			
p-Isopropyltoluene	4.63		ug/L	5.000		92.6	89.8-118			
Naphthalene	3.70		ug/L	5.000		74.0	72.9-122			
n-Propyl Benzene	4.65		ug/L	5.000		93.0	87.3-119			
Trichlorofluoromethane	5.47		ug/L	5.000		109	40.3-174			
Surrogate: Dibromofluoromethane	*26.0*		*ug/L*	*25.00*		*104*	*84.7-120*			
Surrogate: Toluene-d8	*25.4*		*ug/L*	*25.00*		*102*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*25.3*		*ug/L*	*25.00*		*101*	*88.3-113*			
Matrix Spike (A512031-MS1)		**Source: A155106-10**		Prepared: 12/16/2015 Analyzed: 12/16/2015 19:37						
Acetone	46.9		ug/L	50.00	ND	93.8	37.5-179			
Benzene	5.26		ug/L	5.000	ND	105	77-128			
2-Butanone	43.5		ug/L	50.00	ND	87.0	54.7-159			
1,1-Dichloroethane	5.09		ug/L	5.000	ND	102	77.3-131			
1,2-Dichloroethane	4.99		ug/L	5.000	ND	99.8	73.7-139			
trans-1,2-Dichloroethene	5.04		ug/L	5.000	ND	101	68.9-132			
cis-1,2-Dichloroethene	4.88		ug/L	5.000	ND	97.6	80-124			
1,1-Dichloroethene	4.83		ug/L	5.000	ND	96.6	60.7-145			
Ethylbenzene	5.23		ug/L	5.000	ND	105	85.7-117			
Tetrachloroethene	17.3		ug/L	5.000	11.6	113	80.7-123			
Toluene	5.37		ug/L	5.000	ND	107	72.1-124			
1,1,1-Trichloroethane	5.31		ug/L	5.000	ND	106	80.2-124			
1,1,2-Trichloroethane	5.56		ug/L	5.000	ND	111	73.9-137			
Trichloroethene	5.90		ug/L	5.000	0.220	114	81.5-119			
1,3,5-Trimethylbenzene	5.02		ug/L	5.000	ND	100	82-122			
1,2,4-Trimethylbenzene	4.84		ug/L	5.000	ND	96.8	80.4-122			
Vinyl chloride	5.40		ug/L	5.000	ND	108	75.5-134			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512031 - EPA 5030B										
Matrix Spike (A512031-MS1)		**Source: A155106-10**		Prepared: 12/16/2015 Analyzed: 12/16/2015 19:37						
m,p-Xylene	10.3		ug/L	10.00	ND	103	87.9-115			
o-Xylene	5.25		ug/L	5.000	ND	105	82.9-116			
n-Butyl Benzene	4.86		ug/L	5.000	ND	97.2	87.5-118			
sec-Butyl Benzene	5.05		ug/L	5.000	ND	101	85.3-121			
Carbon disulfide	4.89		ug/L	5.000	ND	97.8	69.4-131			
Chloroethane	7.51		ug/L	5.000	ND	150	25.1-230			
Chloroform	5.06		ug/L	5.000	ND	101	76.4-128			
Dichlorodifluoromethane	5.37		ug/L	5.000	ND	107	69.4-138			
Isopropylbenzene	5.23		ug/L	5.000	ND	105	90.3-116			
p-Isopropyltoluene	5.06		ug/L	5.000	ND	101	82-126			
Naphthalene	3.62		ug/L	5.000	ND	72.4	66.1-137			
n-Propyl Benzene	5.07		ug/L	5.000	ND	101	85.2-121			
Trichlorofluoromethane	5.68		ug/L	5.000	ND	114	17-192			
Surrogate: Dibromofluoromethane	*24.6*		*ug/L*	*25.00*		*98.4*	*84.7-120*			
Surrogate: Toluene-d8	*26.8*		*ug/L*	*25.00*		*107*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*25.1*		*ug/L*	*25.00*		*100*	*88.3-113*			
Matrix Spike Dup (A512031-MSD1)		**Source: A155106-10**		Prepared: 12/16/2015 Analyzed: 12/16/2015 19:58						
Acetone	54.6		ug/L	50.00	ND	109	37.5-179	15.3	20	
Benzene	5.13		ug/L	5.000	ND	103	77-128	2.50	20	
2-Butanone	53.2		ug/L	50.00	ND	106	54.7-159	20.0	20	
1,1-Dichloroethane	5.21		ug/L	5.000	ND	104	77.3-131	2.33	20	
1,2-Dichloroethane	5.40		ug/L	5.000	ND	108	73.7-139	7.89	20	
trans-1,2-Dichloroethene	5.06		ug/L	5.000	ND	101	68.9-132	0.396	20	
cis-1,2-Dichloroethene	5.06		ug/L	5.000	ND	101	80-124	3.62	20	
1,1-Dichloroethene	4.69		ug/L	5.000	ND	93.8	60.7-145	2.94	20	
Ethylbenzene	5.16		ug/L	5.000	ND	103	85.7-117	1.35	20	
Tetrachloroethene	16.7		ug/L	5.000	11.6	101	80.7-123	10.5	20	
Toluene	5.14		ug/L	5.000	ND	103	72.1-124	4.38	20	
1,1,1-Trichloroethane	5.17		ug/L	5.000	ND	103	80.2-124	2.67	20	
1,1,2-Trichloroethane	5.70		ug/L	5.000	ND	114	73.9-137	2.49	20	
Trichloroethene	5.31		ug/L	5.000	0.220	102	81.5-119	11.0	20	
1,3,5-Trimethylbenzene	5.03		ug/L	5.000	ND	101	82-122	0.199	20	
1,2,4-Trimethylbenzene	4.95		ug/L	5.000	ND	99.0	80.4-122	2.25	20	
Vinyl chloride	5.04		ug/L	5.000	ND	101	75.5-134	6.90	20	
m,p-Xylene	10.5		ug/L	10.00	ND	105	87.9-115	1.92	20	
o-Xylene	5.04		ug/L	5.000	ND	101	82.9-116	4.08	20	
n-Butyl Benzene	5.13		ug/L	5.000	ND	103	87.5-118	5.41	20	
sec-Butyl Benzene	5.06		ug/L	5.000	ND	101	85.3-121	0.198	20	
Carbon disulfide	5.16		ug/L	5.000	ND	103	69.4-131	5.37	20	
Chloroethane	8.76		ug/L	5.000	ND	175	25.1-230	15.4	20	
Chloroform	5.14		ug/L	5.000	ND	103	76.4-128	1.57	20	
Dichlorodifluoromethane	5.64		ug/L	5.000	ND	113	69.4-138	4.90	20	
Isopropylbenzene	5.28		ug/L	5.000	ND	106	90.3-116	0.951	20	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512031 - EPA 5030B										
Matrix Spike Dup (A512031-MSD1)		**Source: A155106-10**		Prepared: 12/16/2015 Analyzed: 12/16/2015 19:58						
p-Isopropyltoluene	5.05		ug/L	5.000	ND	101	82-126	0.198	20	
Naphthalene	4.84		ug/L	5.000	ND	96.8	66.1-137	28.8	20	X
n-Propyl Benzene	5.02		ug/L	5.000	ND	100	85.2-121	0.991	20	
Trichlorofluoromethane	6.41		ug/L	5.000	ND	128	17-192	12.1	20	
Surrogate: Dibromofluoromethane	*25.9*		*ug/L*	*25.00*		*104*	*84.7-120*			
Surrogate: Toluene-d8	*25.2*		*ug/L*	*25.00*		*101*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*25.9*		*ug/L*	*25.00*		*104*	*88.3-113*			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Classical Chemistry Parameters - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512032 - % Solids										
Duplicate (A512032-DUP1)		**Source: A155107-05**		Prepared: 12/16/2015 Analyzed: 12/17/2015 09:20						
% Solids	83.4	0.00	% by Weight		82.7			0.742	20	

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions		Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place		Project Number:	220003.0000
Ann Arbor MI, 48108		Project Manager:	Stacy Metz

Notes and Definitions

X	Precision for the matrix spike duplicate, laboratory control sample duplicate or lab duplicate was outside of control limits.
D	Data reported from a dilution
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. If the word 'dry' does not appear after the units, results are reported on an as-is basis.
RPD	Relative Percent Difference

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

EST. 1991

CHAIN OF CUSTODY

Lab Work Order #: A155106

Project Number: 220003.0000
Project Name: TPC PCE Investigation
Project Location: Tecumseh Mi.
Turn Around (circle one): Normal (Rush)
If Rush, Report Due Date: 2 days
Sampled By (Print): Mellisa Powers, Emily Sokol

Mail Report To: Stacy Metz
Company: TRC
Address: 1540 Eisenhower Place, Ann Arbor Mi 48108
E-mail Address: SMetz@trcsolutions.com
Invoice To: Same As Above
Company:
Address:

Analyses Requested / Preservation Codes

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOCs ~~+ 8260 Totals~~	~~% Dry Weight~~					Comments	Lab ID	Lab Receipt Time
B-115 (1-2')	12/15/15	0855	S	2	1	1					Hold (additional volume)	01	
B-115 (6.5-7.5')	12/15/15	0845	S	1		1						—	
B-115 (12.75-13.75)	12/15/15	0850	S	1		1						—	
B-116 (1-2')	12/15/15	0903	S	2	1	1						02	
B-116 (8.5-9.5')	12/15/15	0907	S	2	1	1						03	
B-116 (13-14')	12/15/15	0915	S	2							HOLD	04	
B-117 (1-2')	12/15/15	0926	S	2	1	1					Hold (additional volume)	05	
B-117 (8.5-9.5')	12/15/15	0935	S	2	1	1						06	
B-118 (1-2')	12/15/15	0951	S	2	1	1						07	
B-118 (9-10')	12/15/15	0958	S	2	1	1						08	

Preservation Codes
A=None B=HCL C=H_2SO_4
D=HNO_3 E=EnCore F=Methanol
G=NaOH O=Other (Indicate)

Relinquished By: Mellisa Powers — Date: 12/15/15 — Time: 1915
Relinquished By: — Date: — Time:

Received By: FedEx — Date: 12/15/15 — Time: 1915
Received By: Jessica Esposo — Date: 12-16-15 — Time: 0900

Matrix Codes
A=Air S=Soil W=Water O=Other

Custody Seal: Present/Absent (Intact/Not Intact) Seal #'s
Shipped Via: FedEx

Receipt Temp: 0.8°C SIN 150256900
Temp Blank (Y) N Exp. 03-26-17

Download this form at www.eccsmobilelab.com.

WHITE - REPORT COPY YELLOW - LABORATORY COPY PINK - SAMPLER/SUBMITTER Rev. 11/08

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

CHAIN OF CUSTODY

Lab Work Order #: A155106

Project Number: 220003.0000
Project Name: TPC PCE Investigation
Project Location: Tecumseh Mi
Turn Around (circle one): Normal (Rush)
If Rush, Report Due Date: 2 days
Sampled By (Print): Mellisa Powers, Emily Sokol

Mail Report To: Stacy Metz
Company: TRC
Address: 1540 Eisenhower Place, Ann Arbor Mi 48108
E-mail Address: SMetz@trcsolutions.com
Invoice To: SAME AS ABOVE
Company:
Address:

Analyses Requested / Preservation Codes

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOCs	Dry weight Percent solids					Comments	Lab ID	Lab Receipt Time
B-119 (1-2')	12/15/15	1008	S	2	1	1					Hold (additional volume)	09	
B-119 (9-10')	12/15/15	1012		1		1						—	
B-119 (12-13')	12/15/15	1021		1							HOLD	—	
B-119 (13-14')	12/15/15	1022		1							HOLD	—	
B-121 (1-2')	12/15/15	1055		3	2	1					~~Hold (additional volume)~~ Analyze	10	
B-121 (6-7')	12/15/15	1122		3	2	1					↓	11	
B-121 (8-9')	12/15/15	1130		3	2	1					↓	12	
B-121 (10-11')	12/15/15	1140		3							HOLD	13	
B-121 (11-12')	12/15/15	1143		3							HOLD	14	
B-121 (12-13')	12/15/15	1153		3							HOLD	15	

Preservation Codes
A=None B=HCL C=H_2SO_4
D=HNO_3 E=EnCore F=Methanol
G=NaOH O=Other (Indicate)

Matrix Codes
A=Air S=Soil W=Water O=Other

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Mellisa Powers	12/15/15	1915	FedEx	12/15/15	1915
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
			[illegible]	12-16-15	0900

Custody Seal: (Present) Absent (Intact) Not Intact Seal #'s
Shipped Via: FedEx
Receipt Temp: 0.8°C
Temp Blank (Y) N

Download this form at www.eccsmobilelab.com. WHITE - REPORT COPY YELLOW - LABORATORY COPY PINK - SAMPLER/SUBMITTER Rev. 11/08

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

EST. 1991

CHAIN OF CUSTODY

Lab Work Order #: A155106

Project Number: 220003.0000
Project Name: TPC PCE Investigation
Project Location: Tecumseh Mi

Turn Around (circle one): Normal (Rush)
If Rush, Report Due Date: 2 days
Sampled By (Print): Mellisa Powers, Emily Sokol

Analyses Requested / Preservation Codes

Mail Report To: Stacy Metz
Company: TRC Environmental
Address: 1540 Eisenhower Place, Ann Arbor Mi 48108
E-mail Address: SMetz@trcsolutions.com
Invoice To: Same As Above
Company:
Address:

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOCs	Dry Weight ~~Percent Solids~~					Comments	Lab ID	Lab Receipt Time
B-120 (1-2')	12/15/15	1217	S	3	2	1						16	
B-120 (7-8')	12/15/15	~~1255~~ 1302	S	3	2	1						17	
B-122 (5-6')	12/15/15	1504	S	3	2	1						18	
B-122 (1-2')	12/15/15	1730	S	3	2	1					time labeled 1530	19	
B-121 (13-14')	12/15/15	1200	S	3							HOLD	20	
MeOH blank			O	1	1							21	
Temp Blank			O	~~2~~ 1							~~1 per cooler shipped~~ MP		

Preservation Codes
A=None B=HCL C=H_2SO_4
D=HNO_3 E=EnCore F=Methanol
G=NaOH O=Other (Indicate)

Matrix Codes
A=Air S=Soil W=Water O=Other

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Mellisa Powers	12/15/15	1915	FedEx	12/15/15	1915
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
			[illegible]	12-16-15	0900

Custody Seal: Present/Absent (Intact/Not Intact) Seal #'s
Shipped Via: FedEx
Receipt Temp: 0.8°C
Temp Blank (Y) N

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

December 22, 2015

Stacy Metz
TRC Solutions
1540 Eisenhower Place
Ann Arbor, MI 48108

RE: TPC PCE Investigation - Tecumseh, MI

Enclosed are the analytical results for the samples received by the laboratory on 12/17/2015.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. These results are in compliance with the 2009 NELAC Standards and the appropriate agencies listed below, unless otherwise noted in the case narrative. This analytical report should be reproduced in its entirety.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jessica Esser For Nick Nigro

President

Certification List			Expires
DODELAP	DOD ELAP Accreditation (A2LA)	3269.01	03/31/2016
FDOH	Florida Secondary NELAP Accreditation	E871093	06/30/2016
ILEPA	Illinois Secondary NELAP Accreditation	003174	04/30/2016
KDHE	Kansas Secondary NELAP Accreditation	E-10384	01/31/2016
LELAP	Louisiana Primary NELAP Accreditation	04165	06/30/2016
NJDEP	New Jersey Secondary NELAP Accreditation	WI004	06/30/2016
ODEQ	Oklahoma Department of Environmental Quality Accreditation	2014-153	08/31/2016
TCEQ	Texas Secondary NELAP Accreditation	T104704504-15-6	11/30/2016
WDNR	Wisconsin Certification under NR 149	113289110	08/31/2016

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B-122 (35-38')	A155109-01	Water	12/16/2015	12/17/2015
B-122 (32-35')	A155109-02	Water	12/16/2015	12/17/2015
B-122 (29-32')	A155109-03	Water	12/16/2015	12/17/2015
B-122 (25.5-28.5')	A155109-04	Water	12/16/2015	12/17/2015
B-122 (22.5-25.5')	A155109-05	Water	12/16/2015	12/17/2015
B-122 (19.5-22.5')	A155109-06	Water	12/16/2015	12/17/2015
B-122 (16.5-19.5')	A155109-07	Water	12/16/2015	12/17/2015
B-122 (13.5-16.5')	A155109-08	Water	12/16/2015	12/17/2015
B-122 (10.5-13.5')	A155109-09	Water	12/16/2015	12/17/2015
B-122 (7.5-10.5')	A155109-10	Water	12/16/2015	12/17/2015
B-119 (11.5-14.5')	A155109-11	Water	12/16/2015	12/17/2015
Trip Blank	A155109-12	Water	12/16/2015	12/17/2015
B-123 (6-7')	A155109-13	Soil	12/16/2015	12/17/2015
B-124 (6-7')	A155109-14	Soil	12/16/2015	12/17/2015
B-125 (3-4')	A155109-15	Soil	12/16/2015	12/17/2015
B-125 (8-9')	A155109-16	Soil	12/16/2015	12/17/2015
B-125 (10.5-11.5')	A155109-17	Soil	12/16/2015	12/17/2015
B-126 (6-7')	A155109-20	Soil	12/16/2015	12/17/2015
Dup-01	A155109-21	Soil	12/16/2015	12/17/2015
Dup-02	A155109-22	Soil	12/16/2015	12/17/2015
B-128 (9-10')	A155109-23	Soil	12/16/2015	12/17/2015
B-128 (1-2')	A155109-24	Soil	12/16/2015	12/17/2015
B-127 (1-2')	A155109-25	Soil	12/16/2015	12/17/2015
B-127 (10-11')	A155109-26	Soil	12/16/2015	12/17/2015
B-68 (1-2')	A155109-27	Soil	12/16/2015	12/17/2015
B-68 (4-5')	A155109-28	Soil	12/16/2015	12/17/2015
MeOH Blank	A155109-29	Soil	12/16/2015	12/17/2015

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

CASE NARRATIVE

Sample Receipt Information:
29 samples were received on 12/17/2015. Samples were received at 1.5 degrees Celsius.

Sample A155109-02 had a discrepancy between the sample description on the chain of custody (COC) and the sample description on the container. Per the client, the container description is correct.

Samples A155109-13 through A155109-17, A155109-20, A155109-27 and A155109-28 had visible evidence of methanol leakage as noted on the COC.

Please see the COC document at the end of this report for additional information.

Continuing Calibration Verification (CCV):
The LC footnote on samples A155109-01 through A155109-12 and A155109-29 states that there were low CCV recoveries for 2-butanone or naphthalene. The lower control limit is 70% and the lowest recoveries were 68.9% and 62.6%, respectively.

The LC footnote on samples A155109-14, A155109-16, A155109-20, A155109-22, A155109-24, A155109-26 and A155109-28 states that there were low CCV recoveries for acetone, 2-butanone and naphthalene. The lower control limit is 70% and the lowest recoveries were 68.9%, 66.2% and 64.4%, respectively.

CCV also indicates a potential high bias for chloroethane for samples A155109-13 through A155109-17 and A155109-20 through A155109-28. Samples were less than the reporting limit for this analyte so no further action is required.

Laboratory Control Samples (LCS):
The LCS recovery indicates a potential high bias for chloroethane for samples A155109-13 through A155109-17 and A155109-20 through A155109-29. Samples were less than the reporting limit for this analyte so no further action is required.

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (35-38')

A155109-01 (Water)

Date Sampled
12/16/2015 09:45

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	400	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Benzene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
2-Butanone	ND	400	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	LC
1,1-Dichloroethane	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
1,2-Dichloroethane	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
trans-1,2-Dichloroethene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
cis-1,2-Dichloroethene	**260**	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	D
1,1-Dichloroethene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Ethylbenzene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Tetrachloroethene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Toluene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
1,1,1-Trichloroethane	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
1,1,2-Trichloroethane	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Trichloroethene	**68**	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
1,2,4-Trimethylbenzene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Vinyl chloride	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
m,p-Xylene	ND	20	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
o-Xylene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Xylenes, total	ND	30	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
n-Butyl Benzene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
sec-Butyl Benzene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Carbon disulfide	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Chloroethane	ND	100	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Chloroform	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Dichlorodifluoromethane	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Isopropylbenzene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
p-Isopropyltoluene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Naphthalene	ND	100	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
n-Propyl Benzene	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Trichlorofluoromethane	ND	10	ug/L	20	12/18/2015	12/18/2015 14:02	EPA 8260B	
Surrogate: Dibromofluoromethane		*102 %*		*81.3-129*	*12/18/2015*	*12/18/2015 14:02*	*EPA 8260B*	
Surrogate: Toluene-d8		*118 %*		*87.3-110*	*12/18/2015*	*12/18/2015 14:02*	*EPA 8260B*	*S*
Surrogate: 4-Bromofluorobenzene		*99.7 %*		*86.7-110*	*12/18/2015*	*12/18/2015 14:02*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (32-35')

A155109-02 (Water)

Date Sampled
12/16/2015 10:57

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	100	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Benzene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
2-Butanone	ND	100	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
1,1-Dichloroethane	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
1,2-Dichloroethane	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
trans-1,2-Dichloroethene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
cis-1,2-Dichloroethene	**65**	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	D
1,1-Dichloroethene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Ethylbenzene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Tetrachloroethene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Toluene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
1,1,1-Trichloroethane	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
1,1,2-Trichloroethane	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Trichloroethene	**25**	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
1,2,4-Trimethylbenzene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Vinyl chloride	**3.0**	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	D
m,p-Xylene	ND	5.0	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
o-Xylene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Xylenes, total	ND	7.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
n-Butyl Benzene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
sec-Butyl Benzene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Carbon disulfide	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Chloroethane	ND	25	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Chloroform	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Dichlorodifluoromethane	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Isopropylbenzene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
p-Isopropyltoluene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Naphthalene	ND	25	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	LC
n-Propyl Benzene	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Trichlorofluoromethane	ND	2.5	ug/L	5	12/18/2015	12/18/2015 14:24	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*		*81.3-129*	*12/18/2015*	*12/18/2015 14:24*	*EPA 8260B*	
Surrogate: Toluene-d8		*103 %*		*87.3-110*	*12/18/2015*	*12/18/2015 14:24*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.6 %*		*86.7-110*	*12/18/2015*	*12/18/2015 14:24*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (29-32')

A155109-03 (Water)

Date Sampled
12/16/2015 12:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	20	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Benzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
2-Butanone	ND	20	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	LC
1,1-Dichloroethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
1,2-Dichloroethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
trans-1,2-Dichloroethene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
cis-1,2-Dichloroethene	**11**	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
1,1-Dichloroethene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Ethylbenzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Tetrachloroethene	**0.88**	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Toluene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
1,1,1-Trichloroethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
1,1,2-Trichloroethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Trichloroethene	**6.7**	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
1,3,5-Trimethylbenzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
1,2,4-Trimethylbenzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Vinyl chloride	**2.6**	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
m,p-Xylene	ND	1.0	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
o-Xylene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Xylenes, total	ND	1.5	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
n-Butyl Benzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
sec-Butyl Benzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Carbon disulfide	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Chloroethane	ND	5.0	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Chloroform	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Dichlorodifluoromethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Isopropylbenzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
p-Isopropyltoluene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Naphthalene	ND	5.0	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
n-Propyl Benzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Trichlorofluoromethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 14:46	EPA 8260B	
Surrogate: Dibromofluoromethane		*106 %*		*81.3-129*	*12/18/2015*	*12/18/2015 14:46*	*EPA 8260B*	
Surrogate: Toluene-d8		*104 %*		*87.3-110*	*12/18/2015*	*12/18/2015 14:46*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.0 %*		*86.7-110*	*12/18/2015*	*12/18/2015 14:46*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (25.5-28.5')

A155109-04 (Water)

Date Sampled
12/16/2015 14:12

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	40	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Benzene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
2-Butanone	ND	40	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
1,1-Dichloroethane	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
1,2-Dichloroethane	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
trans-1,2-Dichloroethene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
cis-1,2-Dichloroethene	**21**	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	D
1,1-Dichloroethene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Ethylbenzene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Tetrachloroethene	**1.2**	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	D
Toluene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
1,1,1-Trichloroethane	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
1,1,2-Trichloroethane	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Trichloroethene	**63**	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
1,2,4-Trimethylbenzene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Vinyl chloride	**1.8**	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	D
m,p-Xylene	ND	2.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
o-Xylene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Xylenes, total	ND	3.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
n-Butyl Benzene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
sec-Butyl Benzene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Carbon disulfide	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Chloroethane	ND	10	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Chloroform	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Dichlorodifluoromethane	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Isopropylbenzene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
p-Isopropyltoluene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Naphthalene	ND	10	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	LC
n-Propyl Benzene	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Trichlorofluoromethane	ND	1.0	ug/L	2	12/18/2015	12/18/2015 15:08	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*		*81.3-129*	*12/18/2015*	*12/18/2015 15:08*	*EPA 8260B*	
Surrogate: Toluene-d8		*102 %*		*87.3-110*	*12/18/2015*	*12/18/2015 15:08*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.3 %*		*86.7-110*	*12/18/2015*	*12/18/2015 15:08*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (22.5-25.5')

A155109-05 (Water)

Date Sampled
12/16/2015 15:18

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	400	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Benzene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
2-Butanone	ND	400	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	LC
1,1-Dichloroethane	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
1,2-Dichloroethane	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
trans-1,2-Dichloroethene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
cis-1,2-Dichloroethene	**33**	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	D
1,1-Dichloroethene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Ethylbenzene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Tetrachloroethene	**31**	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	D
Toluene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
1,1,1-Trichloroethane	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
1,1,2-Trichloroethane	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Trichloroethene	**290**	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
1,2,4-Trimethylbenzene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Vinyl chloride	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
m,p-Xylene	ND	20	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
o-Xylene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Xylenes, total	ND	30	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
n-Butyl Benzene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
sec-Butyl Benzene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Carbon disulfide	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Chloroethane	ND	100	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Chloroform	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Dichlorodifluoromethane	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Isopropylbenzene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
p-Isopropyltoluene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Naphthalene	ND	100	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
n-Propyl Benzene	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Trichlorofluoromethane	ND	10	ug/L	20	12/18/2015	12/18/2015 15:30	EPA 8260B	
Surrogate: Dibromofluoromethane		*103 %*		*81.3-129*	*12/18/2015*	*12/18/2015 15:30*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*		*87.3-110*	*12/18/2015*	*12/18/2015 15:30*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*95.0 %*		*86.7-110*	*12/18/2015*	*12/18/2015 15:30*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (19.5-22.5')

A155109-06 (Water)

Date Sampled
12/16/2015 09:33

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
2-Butanone	ND	1000	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
1,1-Dichloroethane	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
cis-1,2-Dichloroethene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
1,1-Dichloroethene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Ethylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Tetrachloroethene	**140**	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	D
Toluene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
1,1,1-Trichloroethane	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
1,1,2-Trichloroethane	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Trichloroethene	**570**	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Vinyl chloride	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
m,p-Xylene	ND	50	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
o-Xylene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Xylenes, total	ND	75	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
n-Butyl Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Carbon disulfide	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Chloroethane	ND	250	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Chloroform	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Isopropylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Naphthalene	ND	250	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	LC
n-Propyl Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/L	50	12/18/2015	12/18/2015 15:52	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*		*81.3-129*	*12/18/2015*	*12/18/2015 15:52*	*EPA 8260B*	
Surrogate: Toluene-d8		*103 %*		*87.3-110*	*12/18/2015*	*12/18/2015 15:52*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.7 %*		*86.7-110*	*12/18/2015*	*12/18/2015 15:52*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (16.5-19.5')

A155109-07 (Water)

Date Sampled
12/16/2015 10:55

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
2-Butanone	ND	1000	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	LC
1,1-Dichloroethane	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
cis-1,2-Dichloroethene	**27**	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	D
1,1-Dichloroethene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Ethylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Tetrachloroethene	**920**	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	D
Toluene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
1,1,1-Trichloroethane	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
1,1,2-Trichloroethane	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Trichloroethene	**1100**	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Vinyl chloride	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
m,p-Xylene	ND	50	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
o-Xylene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Xylenes, total	ND	75	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
n-Butyl Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Carbon disulfide	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Chloroethane	ND	250	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Chloroform	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Isopropylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Naphthalene	ND	250	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
n-Propyl Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/L	50	12/18/2015	12/18/2015 16:14	EPA 8260B	
Surrogate: Dibromofluoromethane		*108 %*		*81.3-129*	*12/18/2015*	*12/18/2015 16:14*	*EPA 8260B*	
Surrogate: Toluene-d8		*106 %*		*87.3-110*	*12/18/2015*	*12/18/2015 16:14*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.2 %*		*86.7-110*	*12/18/2015*	*12/18/2015 16:14*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (13.5-16.5')

A155109-08 (Water)

Date Sampled
12/16/2015 12:07

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	2000	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Benzene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
2-Butanone	ND	2000	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
1,1-Dichloroethane	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
1,2-Dichloroethane	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
trans-1,2-Dichloroethene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
cis-1,2-Dichloroethene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
1,1-Dichloroethene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Ethylbenzene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Tetrachloroethene	**1700**	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	D
Toluene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
1,1,1-Trichloroethane	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
1,1,2-Trichloroethane	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Trichloroethene	**1700**	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
1,2,4-Trimethylbenzene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Vinyl chloride	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
m,p-Xylene	ND	100	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
o-Xylene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Xylenes, total	ND	150	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
n-Butyl Benzene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
sec-Butyl Benzene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Carbon disulfide	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Chloroethane	ND	500	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Chloroform	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Dichlorodifluoromethane	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Isopropylbenzene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
p-Isopropyltoluene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Naphthalene	ND	500	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	LC
n-Propyl Benzene	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Trichlorofluoromethane	ND	50	ug/L	100	12/18/2015	12/18/2015 16:36	EPA 8260B	
Surrogate: Dibromofluoromethane		*105 %*		*81.3-129*	*12/18/2015*	*12/18/2015 16:36*	*EPA 8260B*	
Surrogate: Toluene-d8		*104 %*		*87.3-110*	*12/18/2015*	*12/18/2015 16:36*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.2 %*		*86.7-110*	*12/18/2015*	*12/18/2015 16:36*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (10.5-13.5')

A155109-09 (Water)

Date Sampled
12/16/2015 14:35

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	10000	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Benzene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
2-Butanone	ND	10000	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	LC
1,1-Dichloroethane	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
1,2-Dichloroethane	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
trans-1,2-Dichloroethene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
cis-1,2-Dichloroethene	**1600**	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	D
1,1-Dichloroethene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Ethylbenzene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Tetrachloroethene	**8200**	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	D
Toluene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
1,1,1-Trichloroethane	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
1,1,2-Trichloroethane	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Trichloroethene	**2000**	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
1,2,4-Trimethylbenzene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Vinyl chloride	**700**	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	D
m,p-Xylene	ND	500	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
o-Xylene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Xylenes, total	ND	750	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
n-Butyl Benzene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
sec-Butyl Benzene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Carbon disulfide	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Chloroethane	ND	2500	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Chloroform	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Dichlorodifluoromethane	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Isopropylbenzene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
p-Isopropyltoluene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Naphthalene	ND	2500	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
n-Propyl Benzene	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Trichlorofluoromethane	ND	250	ug/L	500	12/18/2015	12/18/2015 16:57	EPA 8260B	
Surrogate: Dibromofluoromethane		*102 %*		*81.3-129*	*12/18/2015*	*12/18/2015 16:57*	*EPA 8260B*	
Surrogate: Toluene-d8		*104 %*		*87.3-110*	*12/18/2015*	*12/18/2015 16:57*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*95.8 %*		*86.7-110*	*12/18/2015*	*12/18/2015 16:57*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-122 (7.5-10.5')

A155109-10 (Water)

Date Sampled
12/16/2015 16:20

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	20000	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Benzene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
2-Butanone	ND	20000	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
1,1-Dichloroethane	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
1,2-Dichloroethane	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
trans-1,2-Dichloroethene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
cis-1,2-Dichloroethene	**2400**	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	D
1,1-Dichloroethene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Ethylbenzene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Tetrachloroethene	**27000**	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	D
Toluene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
1,1,1-Trichloroethane	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
1,1,2-Trichloroethane	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Trichloroethene	**990**	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
1,2,4-Trimethylbenzene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Vinyl chloride	**510**	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	D
m,p-Xylene	ND	1000	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
o-Xylene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Xylenes, total	ND	1500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
n-Butyl Benzene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
sec-Butyl Benzene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Carbon disulfide	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Chloroethane	ND	5000	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Chloroform	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Dichlorodifluoromethane	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Isopropylbenzene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
p-Isopropyltoluene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Naphthalene	ND	5000	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	LC
n-Propyl Benzene	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Trichlorofluoromethane	ND	500	ug/L	1000	12/18/2015	12/18/2015 17:19	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*		*81.3-129*	*12/18/2015*	*12/18/2015 17:19*	*EPA 8260B*	
Surrogate: Toluene-d8		*105 %*		*87.3-110*	*12/18/2015*	*12/18/2015 17:19*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.8 %*		*86.7-110*	*12/18/2015*	*12/18/2015 17:19*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-119 (11.5-14.5')

A155109-11 (Water)

Date Sampled
12/16/2015 17:18

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
2-Butanone	ND	1000	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	LC
1,1-Dichloroethane	**82**	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	D
1,2-Dichloroethane	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
cis-1,2-Dichloroethene	**600**	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	D
1,1-Dichloroethene	**34**	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	D
Ethylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Tetrachloroethene	**32**	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	D
Toluene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
1,1,1-Trichloroethane	**250**	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	D
1,1,2-Trichloroethane	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Trichloroethene	**49**	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Vinyl chloride	**110**	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	D
m,p-Xylene	ND	50	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
o-Xylene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Xylenes, total	ND	75	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
n-Butyl Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Carbon disulfide	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Chloroethane	ND	250	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Chloroform	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Isopropylbenzene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Naphthalene	ND	250	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
n-Propyl Benzene	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/L	50	12/18/2015	12/18/2015 17:41	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*		*81.3-129*	*12/18/2015*	*12/18/2015 17:41*	*EPA 8260B*	
Surrogate: Toluene-d8		*102 %*		*87.3-110*	*12/18/2015*	*12/18/2015 17:41*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.9 %*		*86.7-110*	*12/18/2015*	*12/18/2015 17:41*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Trip Blank

A155109-12 (Water)

Date Sampled
12/16/2015 00:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512040**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	20	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Benzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
2-Butanone	ND	20	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
1,1-Dichloroethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
1,2-Dichloroethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
trans-1,2-Dichloroethene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
cis-1,2-Dichloroethene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
1,1-Dichloroethene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Ethylbenzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Tetrachloroethene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Toluene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
1,1,1-Trichloroethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
1,1,2-Trichloroethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Trichloroethene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
1,3,5-Trimethylbenzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
1,2,4-Trimethylbenzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Vinyl chloride	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
m,p-Xylene	ND	1.0	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
o-Xylene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Xylenes, total	ND	1.5	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
n-Butyl Benzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
sec-Butyl Benzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Carbon disulfide	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Chloroethane	ND	5.0	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Chloroform	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Dichlorodifluoromethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Isopropylbenzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
p-Isopropyltoluene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Naphthalene	ND	5.0	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	LC
n-Propyl Benzene	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Trichlorofluoromethane	ND	0.50	ug/L	1	12/18/2015	12/18/2015 13:40	EPA 8260B	
Surrogate: Dibromofluoromethane		*103 %*		*81.3-129*	*12/18/2015*	*12/18/2015 13:40*	*EPA 8260B*	
Surrogate: Toluene-d8		*104 %*		*87.3-110*	*12/18/2015*	*12/18/2015 13:40*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.8 %*		*86.7-110*	*12/18/2015*	*12/18/2015 13:40*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-123 (6-7')

A155109-13 (Soil)

Date Sampled
12/16/2015 09:15

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	20000	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Benzene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
2-Butanone	ND	20000	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
1,1-Dichloroethane	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
1,2-Dichloroethane	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
trans-1,2-Dichloroethene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
cis-1,2-Dichloroethene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
1,1-Dichloroethene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Ethylbenzene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Tetrachloroethene	**27000**	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	D
Toluene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
1,1,1-Trichloroethane	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
1,1,2-Trichloroethane	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Trichloroethene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
1,3,5-Trimethylbenzene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
1,2,4-Trimethylbenzene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Vinyl chloride	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
m,p-Xylene	ND	1000	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
o-Xylene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Xylenes, total	ND	1500	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
n-Butyl Benzene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
sec-Butyl Benzene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Carbon disulfide	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Chloroethane	ND	5100	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Chloroform	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Dichlorodifluoromethane	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Isopropylbenzene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
p-Isopropyltoluene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Naphthalene	ND	5100	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
n-Propyl Benzene	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Trichlorofluoromethane	ND	510	ug/kg dry	20	12/17/2015	12/17/2015 15:02	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*		*84.7-120*	*12/17/2015*	*12/17/2015 15:02*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*		*90.5-108*	*12/17/2015*	*12/17/2015 15:02*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.3 %*		*88.3-113*	*12/17/2015*	*12/17/2015 15:02*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

B-123 (6-7')

A155109-13 (Soil)

Date Sampled
12/16/2015 09:15

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512036**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**85.6**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-124 (6-7')

A155109-14 (Soil)

Date Sampled
12/16/2015 10:08

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	5600	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	LC
Benzene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
2-Butanone	ND	5600	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	LC
1,1-Dichloroethane	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
1,2-Dichloroethane	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
trans-1,2-Dichloroethene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
cis-1,2-Dichloroethene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
1,1-Dichloroethene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Ethylbenzene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Tetrachloroethene	**9600**	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	D
Toluene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
1,1,1-Trichloroethane	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
1,1,2-Trichloroethane	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Trichloroethene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
1,3,5-Trimethylbenzene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
1,2,4-Trimethylbenzene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Vinyl chloride	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
m,p-Xylene	ND	280	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
o-Xylene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Xylenes, total	ND	420	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
n-Butyl Benzene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
sec-Butyl Benzene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Carbon disulfide	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Chloroethane	ND	1400	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Chloroform	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Dichlorodifluoromethane	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Isopropylbenzene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
p-Isopropyltoluene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Naphthalene	ND	1400	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	LC
n-Propyl Benzene	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Trichlorofluoromethane	ND	140	ug/kg dry	10	12/17/2015	12/17/2015 15:24	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*	*84.7-120*		*12/17/2015*	*12/17/2015 15:24*	*EPA 8260B*	
Surrogate: Toluene-d8		*104 %*	*90.5-108*		*12/17/2015*	*12/17/2015 15:24*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*101 %*	*88.3-113*		*12/17/2015*	*12/17/2015 15:24*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-124 (6-7')

A155109-14 (Soil)

Date Sampled
12/16/2015 10:08

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512036**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**88.7**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-125 (3-4')

A155109-15 (Soil)

Date Sampled
12/16/2015 10:55

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	23000	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Benzene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
2-Butanone	ND	23000	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
1,1-Dichloroethane	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
1,2-Dichloroethane	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
trans-1,2-Dichloroethene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
cis-1,2-Dichloroethene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
1,1-Dichloroethene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Ethylbenzene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Tetrachloroethene	**2700**	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	D
Toluene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
1,1,1-Trichloroethane	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
1,1,2-Trichloroethane	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Trichloroethene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
1,3,5-Trimethylbenzene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
1,2,4-Trimethylbenzene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Vinyl chloride	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
m,p-Xylene	ND	1100	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
o-Xylene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Xylenes, total	ND	1700	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
n-Butyl Benzene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
sec-Butyl Benzene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Carbon disulfide	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Chloroethane	ND	5700	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Chloroform	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Dichlorodifluoromethane	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Isopropylbenzene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
p-Isopropyltoluene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Naphthalene	ND	5700	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
n-Propyl Benzene	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Trichlorofluoromethane	ND	570	ug/kg dry	20	12/17/2015	12/17/2015 15:46	EPA 8260B	
Surrogate: Dibromofluoromethane		*103 %*	*84.7-120*		*12/17/2015*	*12/17/2015 15:46*	*EPA 8260B*	
Surrogate: Toluene-d8		*100 %*	*90.5-108*		*12/17/2015*	*12/17/2015 15:46*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.2 %*	*88.3-113*		*12/17/2015*	*12/17/2015 15:46*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-125 (3-4')

A155109-15 (Soil)

Date Sampled
12/16/2015 10:55

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512036**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**84.7**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-125 (8-9')

A155109-16 (Soil)

Date Sampled
12/16/2015 11:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	9300	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	LC
Benzene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
2-Butanone	ND	9300	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	LC
1,1-Dichloroethane	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
1,2-Dichloroethane	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
trans-1,2-Dichloroethene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
cis-1,2-Dichloroethene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
1,1-Dichloroethene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Ethylbenzene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Tetrachloroethene	**13000**	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	D
Toluene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
1,1,1-Trichloroethane	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
1,1,2-Trichloroethane	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Trichloroethene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
1,3,5-Trimethylbenzene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
1,2,4-Trimethylbenzene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Vinyl chloride	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
m,p-Xylene	ND	460	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
o-Xylene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Xylenes, total	ND	690	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
n-Butyl Benzene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
sec-Butyl Benzene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Carbon disulfide	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Chloroethane	ND	2300	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Chloroform	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Dichlorodifluoromethane	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Isopropylbenzene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
p-Isopropyltoluene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Naphthalene	ND	2300	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	LC
n-Propyl Benzene	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Trichlorofluoromethane	ND	230	ug/kg dry	10	12/17/2015	12/17/2015 16:08	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*	*84.7-120*		*12/17/2015*	*12/17/2015 16:08*	*EPA 8260B*	
Surrogate: Toluene-d8		*105 %*	*90.5-108*		*12/17/2015*	*12/17/2015 16:08*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*103 %*	*88.3-113*		*12/17/2015*	*12/17/2015 16:08*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-125 (8-9')

A155109-16 (Soil)

Date Sampled
12/16/2015 11:00

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512036**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**89.6**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-125 (10.5-11.5')

A155109-17 (Soil)

Date Sampled
12/16/2015 11:10

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	120000	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Benzene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
2-Butanone	ND	120000	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
1,1-Dichloroethane	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
1,2-Dichloroethane	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
trans-1,2-Dichloroethene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
cis-1,2-Dichloroethene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
1,1-Dichloroethene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Ethylbenzene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Tetrachloroethene	**130000**	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	D
Toluene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
1,1,1-Trichloroethane	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
1,1,2-Trichloroethane	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Trichloroethene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
1,3,5-Trimethylbenzene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
1,2,4-Trimethylbenzene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Vinyl chloride	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
m,p-Xylene	ND	6100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
o-Xylene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Xylenes, total	ND	9200	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
n-Butyl Benzene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
sec-Butyl Benzene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Carbon disulfide	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Chloroethane	ND	31000	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Chloroform	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Dichlorodifluoromethane	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Isopropylbenzene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
p-Isopropyltoluene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Naphthalene	ND	31000	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
n-Propyl Benzene	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Trichlorofluoromethane	ND	3100	ug/kg dry	100	12/17/2015	12/17/2015 16:30	EPA 8260B	
Surrogate: Dibromofluoromethane		*101 %*	*84.7-120*		*12/17/2015*	*12/17/2015 16:30*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*	*90.5-108*		*12/17/2015*	*12/17/2015 16:30*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.6 %*	*88.3-113*		*12/17/2015*	*12/17/2015 16:30*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-125 (10.5-11.5')

A155109-17 (Soil)

Date Sampled
12/16/2015 11:10

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
ECCS								
Classical Chemistry Parameters					**Preparation Batch: A512036**			
% Solids	**93.8**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-126 (6-7')

A155109-20 (Soil)

Date Sampled
12/16/2015 14:05

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	53000	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	LC
Benzene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
2-Butanone	ND	53000	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	LC
1,1-Dichloroethane	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
1,2-Dichloroethane	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
trans-1,2-Dichloroethene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
cis-1,2-Dichloroethene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
1,1-Dichloroethene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Ethylbenzene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Tetrachloroethene	**52000**	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	D
Toluene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
1,1,1-Trichloroethane	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
1,1,2-Trichloroethane	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Trichloroethene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
1,3,5-Trimethylbenzene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
1,2,4-Trimethylbenzene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Vinyl chloride	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
m,p-Xylene	ND	2600	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
o-Xylene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Xylenes, total	ND	4000	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
n-Butyl Benzene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
sec-Butyl Benzene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Carbon disulfide	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Chloroethane	ND	13000	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Chloroform	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Dichlorodifluoromethane	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Isopropylbenzene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
p-Isopropyltoluene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Naphthalene	ND	13000	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	LC
n-Propyl Benzene	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Trichlorofluoromethane	ND	1300	ug/kg dry	50	12/17/2015	12/17/2015 16:53	EPA 8260B	
Surrogate: Dibromofluoromethane		*105 %*	*84.7-120*		*12/17/2015*	*12/17/2015 16:53*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*	*90.5-108*		*12/17/2015*	*12/17/2015 16:53*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*102 %*	*88.3-113*		*12/17/2015*	*12/17/2015 16:53*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-126 (6-7')

A155109-20 (Soil)

Date Sampled
12/16/2015 14:05

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512036**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**85.8**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Dup-01

A155109-21 (Soil)

Date Sampled
12/16/2015 00:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	11000	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Benzene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
2-Butanone	ND	11000	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
1,1-Dichloroethane	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
1,2-Dichloroethane	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
trans-1,2-Dichloroethene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
cis-1,2-Dichloroethene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
1,1-Dichloroethene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Ethylbenzene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Tetrachloroethene	**9700**	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	D
Toluene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
1,1,1-Trichloroethane	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
1,1,2-Trichloroethane	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Trichloroethene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
1,3,5-Trimethylbenzene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
1,2,4-Trimethylbenzene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Vinyl chloride	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
m,p-Xylene	ND	540	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
o-Xylene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Xylenes, total	ND	810	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
n-Butyl Benzene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
sec-Butyl Benzene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Carbon disulfide	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Chloroethane	ND	2700	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Chloroform	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Dichlorodifluoromethane	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Isopropylbenzene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
p-Isopropyltoluene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Naphthalene	ND	2700	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
n-Propyl Benzene	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Trichlorofluoromethane	ND	270	ug/kg dry	10	12/17/2015	12/17/2015 17:15	EPA 8260B	
Surrogate: Dibromofluoromethane		*103 %*	*84.7-120*		*12/17/2015*	*12/17/2015 17:15*	*EPA 8260B*	
Surrogate: Toluene-d8		*100 %*	*90.5-108*		*12/17/2015*	*12/17/2015 17:15*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.0 %*	*88.3-113*		*12/17/2015*	*12/17/2015 17:15*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Dup-01

A155109-21 (Soil)

Date Sampled
12/16/2015 00:00

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512036**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**89.1**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Dup-02

A155109-22 (Soil)

Date Sampled
12/16/2015 00:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	110000	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	LC
Benzene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
2-Butanone	ND	110000	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	LC
1,1-Dichloroethane	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
1,2-Dichloroethane	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
trans-1,2-Dichloroethene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
cis-1,2-Dichloroethene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
1,1-Dichloroethene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Ethylbenzene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Tetrachloroethene	**110000**	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	D
Toluene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
1,1,1-Trichloroethane	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
1,1,2-Trichloroethane	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Trichloroethene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
1,3,5-Trimethylbenzene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
1,2,4-Trimethylbenzene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Vinyl chloride	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
m,p-Xylene	ND	5700	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
o-Xylene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Xylenes, total	ND	8500	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
n-Butyl Benzene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
sec-Butyl Benzene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Carbon disulfide	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Chloroethane	ND	28000	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Chloroform	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Dichlorodifluoromethane	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Isopropylbenzene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
p-Isopropyltoluene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Naphthalene	ND	28000	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	LC
n-Propyl Benzene	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Trichlorofluoromethane	ND	2800	ug/kg dry	100	12/17/2015	12/17/2015 17:37	EPA 8260B	
Surrogate: Dibromofluoromethane		*108 %*	*84.7-120*		*12/17/2015*	*12/17/2015 17:37*	*EPA 8260B*	
Surrogate: Toluene-d8		*103 %*	*90.5-108*		*12/17/2015*	*12/17/2015 17:37*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*102 %*	*88.3-113*		*12/17/2015*	*12/17/2015 17:37*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Dup-02

A155109-22 (Soil)

Date Sampled
12/16/2015 00:00

ECCS

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Classical Chemistry Parameters						**Preparation Batch: A512036**		
% Solids	**94.0**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-128 (9-10')

A155109-23 (Soil)

Date Sampled
12/16/2015 14:56

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	110000	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Benzene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
2-Butanone	ND	110000	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
1,1-Dichloroethane	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
1,2-Dichloroethane	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
trans-1,2-Dichloroethene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
cis-1,2-Dichloroethene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
1,1-Dichloroethene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Ethylbenzene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Tetrachloroethene	**150000**	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	D
Toluene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
1,1,1-Trichloroethane	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
1,1,2-Trichloroethane	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Trichloroethene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
1,3,5-Trimethylbenzene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
1,2,4-Trimethylbenzene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Vinyl chloride	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
m,p-Xylene	ND	5400	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
o-Xylene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Xylenes, total	ND	8100	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
n-Butyl Benzene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
sec-Butyl Benzene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Carbon disulfide	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Chloroethane	ND	27000	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Chloroform	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Dichlorodifluoromethane	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Isopropylbenzene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
p-Isopropyltoluene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Naphthalene	ND	27000	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
n-Propyl Benzene	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Trichlorofluoromethane	ND	2700	ug/kg dry	100	12/17/2015	12/17/2015 17:59	EPA 8260B	
Surrogate: Dibromofluoromethane		*102 %*	*84.7-120*		*12/17/2015*	*12/17/2015 17:59*	*EPA 8260B*	
Surrogate: Toluene-d8		*99.5 %*	*90.5-108*		*12/17/2015*	*12/17/2015 17:59*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.9 %*	*88.3-113*		*12/17/2015*	*12/17/2015 17:59*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

B-128 (9-10')

A155109-23 (Soil)

Date Sampled
12/16/2015 14:56

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512036**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**92.2**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-128 (1-2')

A155109-24 (Soil)

Date Sampled
12/16/2015 15:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	10000	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	LC
Benzene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
2-Butanone	ND	10000	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	LC
1,1-Dichloroethane	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
1,2-Dichloroethane	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
trans-1,2-Dichloroethene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
cis-1,2-Dichloroethene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
1,1-Dichloroethene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Ethylbenzene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Tetrachloroethene	**6900**	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	D
Toluene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
1,1,1-Trichloroethane	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
1,1,2-Trichloroethane	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Trichloroethene	**970**	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
1,2,4-Trimethylbenzene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Vinyl chloride	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
m,p-Xylene	ND	520	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
o-Xylene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Xylenes, total	ND	780	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
n-Butyl Benzene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
sec-Butyl Benzene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Carbon disulfide	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Chloroethane	ND	2600	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Chloroform	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Dichlorodifluoromethane	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Isopropylbenzene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
p-Isopropyltoluene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Naphthalene	ND	2600	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	LC
n-Propyl Benzene	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	
Trichlorofluoromethane	ND	260	ug/kg dry	10	12/17/2015	12/17/2015 18:21	EPA 8260B	

Surrogate: Dibromofluoromethane	*101 %*	*84.7-120*	*12/17/2015*	*12/17/2015 18:21*	*EPA 8260B*
Surrogate: Toluene-d8	*107 %*	*90.5-108*	*12/17/2015*	*12/17/2015 18:21*	*EPA 8260B*
Surrogate: 4-Bromofluorobenzene	*97.4 %*	*88.3-113*	*12/17/2015*	*12/17/2015 18:21*	*EPA 8260B*

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-128 (1-2')

A155109-24 (Soil)

Date Sampled
12/16/2015 15:00

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
ECCS								
Classical Chemistry Parameters					**Preparation Batch: A512036**			
% Solids	**92.2**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-127 (1-2')

A155109-25 (Soil)

Date Sampled
12/16/2015 15:52

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	910	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Benzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
2-Butanone	ND	910	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
1,1-Dichloroethane	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
1,2-Dichloroethane	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
trans-1,2-Dichloroethene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
cis-1,2-Dichloroethene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
1,1-Dichloroethene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Ethylbenzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Tetrachloroethene	**400**	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Toluene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
1,1,1-Trichloroethane	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
1,1,2-Trichloroethane	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Trichloroethene	**46**	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
1,3,5-Trimethylbenzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
1,2,4-Trimethylbenzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Vinyl chloride	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
m,p-Xylene	ND	46	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
o-Xylene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Xylenes, total	ND	68	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
n-Butyl Benzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
sec-Butyl Benzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Carbon disulfide	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Chloroethane	ND	230	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Chloroform	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Dichlorodifluoromethane	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Isopropylbenzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
p-Isopropyltoluene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Naphthalene	ND	230	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
n-Propyl Benzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Trichlorofluoromethane	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 18:43	EPA 8260B	
Surrogate: Dibromofluoromethane		*103 %*	*84.7-120*		*12/17/2015*	*12/17/2015 18:43*	*EPA 8260B*	
Surrogate: Toluene-d8		*99.9 %*	*90.5-108*		*12/17/2015*	*12/17/2015 18:43*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.3 %*	*88.3-113*		*12/17/2015*	*12/17/2015 18:43*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

B-127 (1-2')

A155109-25 (Soil)

Date Sampled
12/16/2015 15:52

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512036**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**92.2**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-127 (10-11')

A155109-26 (Soil)

Date Sampled
12/16/2015 15:54

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	530000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	LC
Benzene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
2-Butanone	ND	530000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	LC
1,1-Dichloroethane	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
1,2-Dichloroethane	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
trans-1,2-Dichloroethene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
cis-1,2-Dichloroethene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
1,1-Dichloroethene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Ethylbenzene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Tetrachloroethene	**520000**	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	D
Toluene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
1,1,1-Trichloroethane	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
1,1,2-Trichloroethane	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Trichloroethene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
1,3,5-Trimethylbenzene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
1,2,4-Trimethylbenzene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Vinyl chloride	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
m,p-Xylene	ND	27000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
o-Xylene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Xylenes, total	ND	40000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
n-Butyl Benzene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
sec-Butyl Benzene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Carbon disulfide	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Chloroethane	ND	130000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Chloroform	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Dichlorodifluoromethane	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Isopropylbenzene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
p-Isopropyltoluene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Naphthalene	ND	130000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	LC
n-Propyl Benzene	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Trichlorofluoromethane	ND	13000	ug/kg dry	500	12/17/2015	12/17/2015 19:05	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*		*84.7-120*	*12/17/2015*	*12/17/2015 19:05*	*EPA 8260B*	
Surrogate: Toluene-d8		*102 %*		*90.5-108*	*12/17/2015*	*12/17/2015 19:05*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.1 %*		*88.3-113*	*12/17/2015*	*12/17/2015 19:05*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-127 (10-11')

A155109-26 (Soil)

Date Sampled
12/16/2015 15:54

ECCS

Classical Chemistry Parameters — **Preparation Batch: A512036**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**90.2**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-68 (1-2')

A155109-27 (Soil)

Date Sampled
12/16/2015 12:37

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	900	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Benzene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
2-Butanone	ND	900	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
1,1-Dichloroethane	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
1,2-Dichloroethane	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
trans-1,2-Dichloroethene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
cis-1,2-Dichloroethene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
1,1-Dichloroethene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Ethylbenzene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Tetrachloroethene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Toluene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
1,1,1-Trichloroethane	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
1,1,2-Trichloroethane	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Trichloroethene	**48**	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
1,3,5-Trimethylbenzene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
1,2,4-Trimethylbenzene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Vinyl chloride	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
m,p-Xylene	ND	45	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
o-Xylene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Xylenes, total	ND	67	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
n-Butyl Benzene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
sec-Butyl Benzene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Carbon disulfide	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Chloroethane	ND	220	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Chloroform	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Dichlorodifluoromethane	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Isopropylbenzene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
p-Isopropyltoluene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Naphthalene	ND	220	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
n-Propyl Benzene	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Trichlorofluoromethane	ND	22	ug/kg dry	1	12/17/2015	12/17/2015 19:27	EPA 8260B	
Surrogate: Dibromofluoromethane		*106 %*	*84.7-120*		*12/17/2015*	*12/17/2015 19:27*	*EPA 8260B*	
Surrogate: Toluene-d8		*100 %*	*90.5-108*		*12/17/2015*	*12/17/2015 19:27*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*100 %*	*88.3-113*		*12/17/2015*	*12/17/2015 19:27*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-68 (1-2')

A155109-27 (Soil)

Date Sampled
12/16/2015 12:37

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
ECCS								
Classical Chemistry Parameters					**Preparation Batch: A512036**			
% Solids	**86.9**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-68 (4-5')

A155109-28 (Soil)

Date Sampled
12/16/2015 12:40

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	900	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	LC
Benzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
2-Butanone	ND	900	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	LC
1,1-Dichloroethane	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
1,2-Dichloroethane	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
trans-1,2-Dichloroethene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
cis-1,2-Dichloroethene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
1,1-Dichloroethene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Ethylbenzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Tetrachloroethene	**33**	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Toluene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
1,1,1-Trichloroethane	**66**	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
1,1,2-Trichloroethane	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Trichloroethene	**540**	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
1,3,5-Trimethylbenzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
1,2,4-Trimethylbenzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Vinyl chloride	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
m,p-Xylene	ND	45	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
o-Xylene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Xylenes, total	ND	68	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
n-Butyl Benzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
sec-Butyl Benzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Carbon disulfide	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Chloroethane	ND	230	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Chloroform	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Dichlorodifluoromethane	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Isopropylbenzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
p-Isopropyltoluene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Naphthalene	ND	230	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	LC
n-Propyl Benzene	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Trichlorofluoromethane	ND	23	ug/kg dry	1	12/17/2015	12/17/2015 19:48	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*	*84.7-120*		*12/17/2015*	*12/17/2015 19:48*	*EPA 8260B*	
Surrogate: Toluene-d8		*105 %*	*90.5-108*		*12/17/2015*	*12/17/2015 19:48*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*101 %*	*88.3-113*		*12/17/2015*	*12/17/2015 19:48*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-68 (4-5')

A155109-28 (Soil)

Date Sampled
12/16/2015 12:40

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
ECCS								
Classical Chemistry Parameters					**Preparation Batch: A512036**			
% Solids	**95.4**	0.00	% by Weight	1	12/17/2015	12/18/2015 12:10	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

MeOH Blank

A155109-29 (Soil)

Date Sampled
12/16/2015 00:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512037**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Benzene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
2-Butanone	ND	1000	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
1,1-Dichloroethane	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
cis-1,2-Dichloroethene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
1,1-Dichloroethene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Ethylbenzene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Tetrachloroethene	**26**	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Toluene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
1,1,1-Trichloroethane	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
1,1,2-Trichloroethane	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Trichloroethene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
1,3,5-Trimethylbenzene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Vinyl chloride	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
m,p-Xylene	ND	50	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
o-Xylene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Xylenes, total	ND	75	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
n-Butyl Benzene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Carbon disulfide	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Chloroethane	ND	250	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Chloroform	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Isopropylbenzene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Naphthalene	ND	250	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	LC
n-Propyl Benzene	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/kg wet	1	12/17/2015	12/18/2015 11:57	EPA 8260B	
Surrogate: Dibromofluoromethane		*99.4 %*	*84.7-120*		*12/17/2015*	*12/18/2015 11:57*	*EPA 8260B*	
Surrogate: Toluene-d8		*102 %*	*90.5-108*		*12/17/2015*	*12/18/2015 11:57*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.6 %*	*88.3-113*		*12/17/2015*	*12/18/2015 11:57*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512037 - EPA 5030B										
Blank (A512037-BLK1)				Prepared: 12/17/2015 Analyzed: 12/17/2015 14:18						
Acetone	ND	1000	ug/kg wet							
Benzene	ND	25	ug/kg wet							
2-Butanone	ND	1000	ug/kg wet							
1,1-Dichloroethane	ND	25	ug/kg wet							
1,2-Dichloroethane	ND	25	ug/kg wet							
trans-1,2-Dichloroethene	ND	25	ug/kg wet							
cis-1,2-Dichloroethene	ND	25	ug/kg wet							
1,1-Dichloroethene	ND	25	ug/kg wet							
Ethylbenzene	ND	25	ug/kg wet							
Tetrachloroethene	ND	25	ug/kg wet							
Toluene	ND	25	ug/kg wet							
1,1,1-Trichloroethane	ND	25	ug/kg wet							
1,1,2-Trichloroethane	ND	25	ug/kg wet							
Trichloroethene	ND	25	ug/kg wet							
1,3,5-Trimethylbenzene	ND	25	ug/kg wet							
1,2,4-Trimethylbenzene	ND	25	ug/kg wet							
Vinyl chloride	ND	25	ug/kg wet							
m,p-Xylene	ND	50	ug/kg wet							
o-Xylene	ND	25	ug/kg wet							
Xylenes, total	ND	75	ug/kg wet							
n-Butyl Benzene	ND	25	ug/kg wet							
sec-Butyl Benzene	ND	25	ug/kg wet							
Carbon disulfide	ND	25	ug/kg wet							
Chloroethane	ND	250	ug/kg wet							
Chloroform	ND	25	ug/kg wet							
Dichlorodifluoromethane	ND	25	ug/kg wet							
Isopropylbenzene	ND	25	ug/kg wet							
p-Isopropyltoluene	ND	25	ug/kg wet							
Naphthalene	ND	250	ug/kg wet							
n-Propyl Benzene	ND	25	ug/kg wet							
Trichlorofluoromethane	ND	25	ug/kg wet							
Surrogate: Dibromofluoromethane	*25.3*		*ug/L*	*25.00*		*101*	*84.7-120*			
Surrogate: Toluene-d8	*24.7*		*ug/L*	*25.00*		*98.7*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*24.5*		*ug/L*	*25.00*		*98.1*	*88.3-113*			
LCS (A512037-BS1)				Prepared: 12/17/2015 Analyzed: 12/17/2015 20:10						
Acetone	44.0		ug/L	50.00		88.1	42.3-174			
Benzene	5.30		ug/L	5.000		106	80.5-123			
2-Butanone	42.8		ug/L	50.00		85.6	51.2-152			
1,1-Dichloroethane	5.50		ug/L	5.000		110	80.9-127			
1,2-Dichloroethane	5.22		ug/L	5.000		104	72.8-138			
trans-1,2-Dichloroethene	5.26		ug/L	5.000		105	71.3-128			
cis-1,2-Dichloroethene	5.07		ug/L	5.000		101	81.9-121			
1,1-Dichloroethene	5.34		ug/L	5.000		107	66.8-129			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512037 - EPA 5030B										
LCS (A512037-BS1)				Prepared: 12/17/2015 Analyzed: 12/17/2015 20:10						
Ethylbenzene	5.06		ug/L	5.000		101	89.9-113			
Tetrachloroethene	5.19		ug/L	5.000		104	85.1-116			
Toluene	5.10		ug/L	5.000		102	78.8-117			
1,1,1-Trichloroethane	5.29		ug/L	5.000		106	82.3-123			
1,1,2-Trichloroethane	4.93		ug/L	5.000		98.6	74.9-130			
Trichloroethene	5.07		ug/L	5.000		101	83.1-118			
1,3,5-Trimethylbenzene	4.85		ug/L	5.000		97.0	85.2-120			
1,2,4-Trimethylbenzene	4.92		ug/L	5.000		98.4	86.8-118			
Vinyl chloride	5.50		ug/L	5.000		110	60.9-137			
m,p-Xylene	10.2		ug/L	10.00		102	90.1-114			
o-Xylene	4.98		ug/L	5.000		99.6	85.8-113			
n-Butyl Benzene	4.79		ug/L	5.000		95.8	88.2-119			
sec-Butyl Benzene	4.93		ug/L	5.000		98.6	89.9-118			
Carbon disulfide	5.27		ug/L	5.000		105	72.2-127			
Chloroethane	12.4		ug/L	5.000		247	14.6-199			
Chloroform	5.25		ug/L	5.000		105	77.9-125			
Dichlorodifluoromethane	5.71		ug/L	5.000		114	67.8-137			
Isopropylbenzene	5.08		ug/L	5.000		102	92.8-112			
p-Isopropyltoluene	4.89		ug/L	5.000		97.8	89.8-118			
Naphthalene	3.67		ug/L	5.000		73.4	72.9-122			
n-Propyl Benzene	4.97		ug/L	5.000		99.4	87.3-119			
Trichlorofluoromethane	7.37		ug/L	5.000		147	40.3-174			
Surrogate: Dibromofluoromethane	*26.5*		*ug/L*	*25.00*		*106*	*84.7-120*			
Surrogate: Toluene-d8	*25.3*		*ug/L*	*25.00*		*101*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*25.8*		*ug/L*	*25.00*		*103*	*88.3-113*			
Matrix Spike (A512037-MS1)		**Source: A155109-28**		Prepared: 12/17/2015 Analyzed: 12/17/2015 20:31						
Acetone	38.5		ug/L	50.00	ND	77.0	37.5-179			
Benzene	4.93		ug/L	5.000	ND	98.6	77-128			
2-Butanone	34.4		ug/L	50.00	ND	68.8	54.7-159			
1,1-Dichloroethane	5.32		ug/L	5.000	ND	106	77.3-131			
1,2-Dichloroethane	4.75		ug/L	5.000	ND	95.0	73.7-139			
trans-1,2-Dichloroethene	4.97		ug/L	5.000	ND	99.4	68.9-132			
cis-1,2-Dichloroethene	4.89		ug/L	5.000	ND	97.8	80-124			
1,1-Dichloroethene	4.80		ug/L	5.000	ND	96.0	60.7-145			
Ethylbenzene	5.33		ug/L	5.000	ND	107	85.7-117			
Tetrachloroethene	5.90		ug/L	5.000	0.740	103	80.7-123			
Toluene	5.65		ug/L	5.000	0.0500	112	72.1-124			
1,1,1-Trichloroethane	6.59		ug/L	5.000	1.46	103	80.2-124			
1,1,2-Trichloroethane	4.42		ug/L	5.000	ND	88.4	73.9-137			
Trichloroethene	17.0		ug/L	5.000	12.0	100	81.5-119			
1,3,5-Trimethylbenzene	4.98		ug/L	5.000	ND	99.6	82-122			
1,2,4-Trimethylbenzene	4.92		ug/L	5.000	ND	98.4	80.4-122			
Vinyl chloride	5.98		ug/L	5.000	ND	120	75.5-134			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512037 - EPA 5030B										
Matrix Spike (A512037-MS1)		**Source: A155109-28**		Prepared: 12/17/2015 Analyzed: 12/17/2015 20:31						
m,p-Xylene	11.0		ug/L	10.00	ND	110	87.9-115			
o-Xylene	5.25		ug/L	5.000	ND	105	82.9-116			
n-Butyl Benzene	4.97		ug/L	5.000	ND	99.4	87.5-118			
sec-Butyl Benzene	5.31		ug/L	5.000	ND	106	85.3-121			
Carbon disulfide	4.84		ug/L	5.000	ND	96.8	69.4-131			
Chloroethane	9.16		ug/L	5.000	ND	183	25.1-230			
Chloroform	5.11		ug/L	5.000	ND	102	76.4-128			
Dichlorodifluoromethane	5.75		ug/L	5.000	ND	115	69.4-138			
Isopropylbenzene	5.25		ug/L	5.000	ND	105	90.3-116			
p-Isopropyltoluene	5.19		ug/L	5.000	ND	104	82-126			
Naphthalene	3.22		ug/L	5.000	ND	64.4	66.1-137			M
n-Propyl Benzene	5.31		ug/L	5.000	ND	106	85.2-121			
Trichlorofluoromethane	6.42		ug/L	5.000	ND	128	17-192			
Surrogate: Dibromofluoromethane	*24.8*		*ug/L*	*25.00*		*99.4*	*84.7-120*			
Surrogate: Toluene-d8	*27.2*		*ug/L*	*25.00*		*109*	*90.5-108*			*S*
Surrogate: 4-Bromofluorobenzene	*25.6*		*ug/L*	*25.00*		*102*	*88.3-113*			
Matrix Spike Dup (A512037-MSD1)		**Source: A155109-28**		Prepared: 12/17/2015 Analyzed: 12/17/2015 20:52						
Acetone	39.1		ug/L	50.00	ND	78.1	37.5-179	1.44	20	
Benzene	5.27		ug/L	5.000	ND	105	77-128	6.67	20	
2-Butanone	36.6		ug/L	50.00	ND	73.3	54.7-159	6.25	20	
1,1-Dichloroethane	5.56		ug/L	5.000	ND	111	77.3-131	4.41	20	
1,2-Dichloroethane	5.22		ug/L	5.000	ND	104	73.7-139	9.43	20	
trans-1,2-Dichloroethene	5.32		ug/L	5.000	ND	106	68.9-132	6.80	20	
cis-1,2-Dichloroethene	5.24		ug/L	5.000	ND	105	80-124	6.91	20	
1,1-Dichloroethene	5.49		ug/L	5.000	ND	110	60.7-145	13.4	20	
Ethylbenzene	5.16		ug/L	5.000	ND	103	85.7-117	3.24	20	
Tetrachloroethene	5.93		ug/L	5.000	0.740	104	80.7-123	0.580	20	
Toluene	5.13		ug/L	5.000	0.0500	102	72.1-124	9.74	20	
1,1,1-Trichloroethane	6.85		ug/L	5.000	1.46	108	80.2-124	4.94	20	
1,1,2-Trichloroethane	4.65		ug/L	5.000	ND	93.0	73.9-137	5.07	20	
Trichloroethene	16.9		ug/L	5.000	12.0	99.0	81.5-119	1.01	20	
1,3,5-Trimethylbenzene	5.06		ug/L	5.000	ND	101	82-122	1.59	20	
1,2,4-Trimethylbenzene	4.97		ug/L	5.000	ND	99.4	80.4-122	1.01	20	
Vinyl chloride	5.82		ug/L	5.000	ND	116	75.5-134	2.71	20	
m,p-Xylene	10.3		ug/L	10.00	ND	103	87.9-115	6.66	20	
o-Xylene	5.10		ug/L	5.000	ND	102	82.9-116	2.90	20	
n-Butyl Benzene	4.98		ug/L	5.000	ND	99.6	87.5-118	0.201	20	
sec-Butyl Benzene	5.14		ug/L	5.000	ND	103	85.3-121	3.25	20	
Carbon disulfide	5.30		ug/L	5.000	ND	106	69.4-131	9.07	20	
Chloroethane	14.7		ug/L	5.000	ND	294	25.1-230	46.4	20	M, X
Chloroform	5.19		ug/L	5.000	ND	104	76.4-128	1.55	20	
Dichlorodifluoromethane	5.94		ug/L	5.000	ND	119	69.4-138	3.25	20	
Isopropylbenzene	5.23		ug/L	5.000	ND	105	90.3-116	0.382	20	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512037 - EPA 5030B										
Matrix Spike Dup (A512037-MSD1)		**Source: A155109-28**		Prepared: 12/17/2015 Analyzed: 12/17/2015 20:52						
p-Isopropyltoluene	5.12		ug/L	5.000	ND	102	82-126	1.36	20	
Naphthalene	3.58		ug/L	5.000	ND	71.6	66.1-137	10.6	20	
n-Propyl Benzene	5.11		ug/L	5.000	ND	102	85.2-121	3.84	20	
Trichlorofluoromethane	7.97		ug/L	5.000	ND	159	17-192	21.5	20	X
Surrogate: Dibromofluoromethane	*26.7*		*ug/L*	*25.00*		*107*	*84.7-120*			
Surrogate: Toluene-d8	*25.3*		*ug/L*	*25.00*		*101*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*26.0*		*ug/L*	*25.00*		*104*	*88.3-113*			
Batch A512040 - EPA 5030B										
Blank (A512040-BLK1)				Prepared: 12/18/2015 Analyzed: 12/18/2015 12:26						
Acetone	ND	20	ug/L							
Benzene	ND	0.50	ug/L							
2-Butanone	ND	20	ug/L							
1,1-Dichloroethane	ND	0.50	ug/L							
1,2-Dichloroethane	ND	0.50	ug/L							
trans-1,2-Dichloroethene	ND	0.50	ug/L							
cis-1,2-Dichloroethene	ND	0.50	ug/L							
1,1-Dichloroethene	ND	0.50	ug/L							
Ethylbenzene	ND	0.50	ug/L							
Tetrachloroethene	ND	0.50	ug/L							
Toluene	ND	0.50	ug/L							
1,1,1-Trichloroethane	ND	0.50	ug/L							
1,1,2-Trichloroethane	ND	0.50	ug/L							
Trichloroethene	ND	0.50	ug/L							
1,3,5-Trimethylbenzene	ND	0.50	ug/L							
1,2,4-Trimethylbenzene	ND	0.50	ug/L							
Vinyl chloride	ND	0.50	ug/L							
m,p-Xylene	ND	1.0	ug/L							
o-Xylene	ND	0.50	ug/L							
Xylenes, total	ND	1.5	ug/L							
n-Butyl Benzene	ND	0.50	ug/L							
sec-Butyl Benzene	ND	0.50	ug/L							
Carbon disulfide	ND	0.50	ug/L							
Chloroethane	ND	5.0	ug/L							
Chloroform	ND	0.50	ug/L							
Dichlorodifluoromethane	ND	0.50	ug/L							
Isopropylbenzene	ND	0.50	ug/L							
p-Isopropyltoluene	ND	0.50	ug/L							
Naphthalene	ND	5.0	ug/L							
n-Propyl Benzene	ND	0.50	ug/L							
Trichlorofluoromethane	ND	0.50	ug/L							
Surrogate: Dibromofluoromethane	*25.3*		*ug/L*	*25.00*		*101*	*81.3-129*			
Surrogate: Toluene-d8	*26.7*		*ug/L*	*25.00*		*107*	*87.3-110*			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512040 - EPA 5030B										
Blank (A512040-BLK1)				Prepared: 12/18/2015 Analyzed: 12/18/2015 12:26						
Surrogate: 4-Bromofluorobenzene	*26.0*		*ug/L*	*25.00*		*104*	*86.7-110*			
LCS (A512040-BS1)				Prepared: 12/18/2015 Analyzed: 12/18/2015 18:25						
Acetone	42.1		ug/L	50.00		84.3	45-165			
Benzene	4.92		ug/L	5.000		98.4	82.5-123			
2-Butanone	37.3		ug/L	50.00		74.6	63-135			
1,1-Dichloroethane	5.09		ug/L	5.000		102	80-133			
1,2-Dichloroethane	4.93		ug/L	5.000		98.6	76.1-139			
trans-1,2-Dichloroethene	5.00		ug/L	5.000		100	84.9-121			
cis-1,2-Dichloroethene	4.79		ug/L	5.000		95.8	79.1-122			
1,1-Dichloroethene	5.28		ug/L	5.000		106	72.2-135			
Ethylbenzene	4.99		ug/L	5.000		99.8	86.1-115			
Tetrachloroethene	5.23		ug/L	5.000		105	83.8-117			
Toluene	5.10		ug/L	5.000		102	80.6-115			
1,1,1-Trichloroethane	5.01		ug/L	5.000		100	81.2-133			
1,1,2-Trichloroethane	4.83		ug/L	5.000		96.6	79.1-125			
Trichloroethene	5.00		ug/L	5.000		100	81.2-118			
1,3,5-Trimethylbenzene	4.80		ug/L	5.000		96.0	82-121			
1,2,4-Trimethylbenzene	4.84		ug/L	5.000		96.8	79.5-123			
Vinyl chloride	5.43		ug/L	5.000		109	71.5-144			
m,p-Xylene	10.3		ug/L	10.00		103	84-118			
o-Xylene	4.84		ug/L	5.000		96.8	76.6-121			
n-Butyl Benzene	4.87		ug/L	5.000		97.4	78.9-124			
sec-Butyl Benzene	4.91		ug/L	5.000		98.2	81.1-123			
Carbon disulfide	5.26		ug/L	5.000		105	80-121			
Chloroethane	5.62		ug/L	5.000		112	31.6-195			
Chloroform	5.04		ug/L	5.000		101	79.7-131			
Dichlorodifluoromethane	5.52		ug/L	5.000		110	68.4-148			
Isopropylbenzene	4.89		ug/L	5.000		97.8	85.5-118			
p-Isopropyltoluene	4.85		ug/L	5.000		97.0	81.6-123			
Naphthalene	3.69		ug/L	5.000		73.8	63.4-117			
n-Propyl Benzene	4.95		ug/L	5.000		99.0	81.7-122			
Trichlorofluoromethane	6.06		ug/L	5.000		121	58.5-171			
Surrogate: Dibromofluoromethane	*25.3*		*ug/L*	*25.00*		*101*	*81.3-129*			
Surrogate: Toluene-d8	*26.5*		*ug/L*	*25.00*		*106*	*87.3-110*			
Surrogate: 4-Bromofluorobenzene	*24.7*		*ug/L*	*25.00*		*98.7*	*86.7-110*			
Matrix Spike (A512040-MS1)		**Source: A155109-03**		Prepared: 12/18/2015 Analyzed: 12/21/2015 21:38						
Acetone	36.6		ug/L	50.00	ND	73.2	40.7-161			
Benzene	5.18		ug/L	5.000	ND	104	79.9-126			
2-Butanone	33.9		ug/L	50.00	ND	67.9	55-146			
1,1-Dichloroethane	5.34		ug/L	5.000	ND	107	71.8-142			
1,2-Dichloroethane	5.07		ug/L	5.000	ND	101	72.2-142			
trans-1,2-Dichloroethene	5.19		ug/L	5.000	0.160	101	76.7-131			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512040 - EPA 5030B										
Matrix Spike (A512040-MS1)		**Source: A155109-03**		Prepared: 12/18/2015 Analyzed: 12/21/2015 21:38						
cis-1,2-Dichloroethene	16.0		ug/L	5.000	11.2	96.4	71.4-129			
1,1-Dichloroethene	5.18		ug/L	5.000	ND	104	63.9-148			
Ethylbenzene	5.11		ug/L	5.000	ND	102	83.1-118			
Tetrachloroethene	6.11		ug/L	5.000	0.880	105	65.9-132			
Toluene	5.03		ug/L	5.000	ND	101	78-117			
1,1,1-Trichloroethane	5.22		ug/L	5.000	ND	104	70-142			
1,1,2-Trichloroethane	4.66		ug/L	5.000	ND	93.2	74.1-132			
Trichloroethene	12.2		ug/L	5.000	6.74	110	75.7-125			
1,3,5-Trimethylbenzene	4.85		ug/L	5.000	ND	97.0	75.9-125			
1,2,4-Trimethylbenzene	4.83		ug/L	5.000	ND	96.6	71.5-127			
Vinyl chloride	8.92		ug/L	5.000	2.57	127	67.4-149			
m,p-Xylene	10.2		ug/L	10.00	ND	102	81-118			
o-Xylene	4.92		ug/L	5.000	ND	98.4	80.6-114			
n-Butyl Benzene	4.79		ug/L	5.000	ND	95.8	80.3-126			
sec-Butyl Benzene	4.90		ug/L	5.000	ND	98.0	82-123			
Carbon disulfide	5.37		ug/L	5.000	ND	107	73.5-128			
Chloroethane	5.84		ug/L	5.000	ND	117	13.8-195			
Chloroform	5.02		ug/L	5.000	ND	100	73.4-138			
Dichlorodifluoromethane	0.430		ug/L	5.000	ND	8.60	13.6-185			M
Isopropylbenzene	5.05		ug/L	5.000	ND	101	86.6-118			
p-Isopropyltoluene	4.85		ug/L	5.000	ND	97.0	81.1-123			
Naphthalene	3.14		ug/L	5.000	ND	62.8	56.6-128			
n-Propyl Benzene	4.91		ug/L	5.000	ND	98.2	81-123			
Trichlorofluoromethane	6.51		ug/L	5.000	ND	130	41.6-189			
Surrogate: Dibromofluoromethane	*26.7*		*ug/L*	*25.00*		*107*	*81.3-129*			
Surrogate: Toluene-d8	*26.1*		*ug/L*	*25.00*		*104*	*87.3-110*			
Surrogate: 4-Bromofluorobenzene	*25.7*		*ug/L*	*25.00*		*103*	*86.7-110*			
Matrix Spike Dup (A512040-MSD1)		**Source: A155109-03**		Prepared: 12/18/2015 Analyzed: 12/18/2015 19:08						
Acetone	37.1		ug/L	50.00	ND	74.3	40.7-161	1.49	20	
Benzene	4.67		ug/L	5.000	ND	93.4	79.9-126	10.4	20	
2-Butanone	36.4		ug/L	50.00	ND	72.9	55-146	7.08	20	
1,1-Dichloroethane	4.87		ug/L	5.000	ND	97.4	71.8-142	9.21	20	
1,2-Dichloroethane	4.86		ug/L	5.000	ND	97.2	72.2-142	4.23	20	
trans-1,2-Dichloroethene	4.93		ug/L	5.000	0.160	95.4	76.7-131	5.31	20	
cis-1,2-Dichloroethene	15.4		ug/L	5.000	11.2	85.0	71.4-129	12.6	20	
1,1-Dichloroethene	4.74		ug/L	5.000	ND	94.8	63.9-148	8.87	20	
Ethylbenzene	4.82		ug/L	5.000	ND	96.4	83.1-118	5.84	20	
Tetrachloroethene	5.91		ug/L	5.000	0.880	101	65.9-132	3.90	20	
Toluene	5.03		ug/L	5.000	ND	101	78-117	0.00	20	
1,1,1-Trichloroethane	4.91		ug/L	5.000	ND	98.2	70-142	6.12	20	
1,1,2-Trichloroethane	4.71		ug/L	5.000	ND	94.2	74.1-132	1.07	20	
Trichloroethene	11.2		ug/L	5.000	6.74	88.2	75.7-125	21.8	20	X
1,3,5-Trimethylbenzene	4.36		ug/L	5.000	ND	87.2	75.9-125	10.6	20	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512040 - EPA 5030B										
Matrix Spike Dup (A512040-MSD1)		**Source: A155109-03**		Prepared: 12/18/2015 Analyzed: 12/18/2015 19:08						
1,2,4-Trimethylbenzene	4.33		ug/L	5.000	ND	86.6	71.5-127	10.9	20	
Vinyl chloride	7.52		ug/L	5.000	2.57	99.0	67.4-149	24.8	20	X
m,p-Xylene	9.78		ug/L	10.00	ND	97.8	81-118	3.71	20	
o-Xylene	4.64		ug/L	5.000	ND	92.8	80.6-114	5.86	20	
n-Butyl Benzene	4.43		ug/L	5.000	ND	88.6	80.3-126	7.81	20	
sec-Butyl Benzene	4.64		ug/L	5.000	ND	92.8	82-123	5.45	20	
Carbon disulfide	4.92		ug/L	5.000	ND	98.4	73.5-128	8.75	20	
Chloroethane	5.57		ug/L	5.000	ND	111	13.8-195	4.73	20	
Chloroform	4.75		ug/L	5.000	ND	95.0	73.4-138	5.53	20	
Dichlorodifluoromethane	5.14		ug/L	5.000	ND	103	13.6-185	169	20	X
Isopropylbenzene	4.81		ug/L	5.000	ND	96.2	86.6-118	4.87	20	
p-Isopropyltoluene	4.47		ug/L	5.000	ND	89.4	81.1-123	8.15	20	
Naphthalene	3.69		ug/L	5.000	ND	73.8	56.6-128	16.1	20	
n-Propyl Benzene	4.72		ug/L	5.000	ND	94.4	81-123	3.95	20	
Trichlorofluoromethane	5.68		ug/L	5.000	ND	114	41.6-189	13.6	20	
Surrogate: Dibromofluoromethane	*25.7*		*ug/L*	*25.00*		*103*	*81.3-129*			
Surrogate: Toluene-d8	*26.6*		*ug/L*	*25.00*		*106*	*87.3-110*			
Surrogate: 4-Bromofluorobenzene	*25.4*		*ug/L*	*25.00*		*102*	*86.7-110*			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Classical Chemistry Parameters - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512036 - % Solids										
Duplicate (A512036-DUP1)		**Source: A155110-01**		Prepared: 12/17/2015 Analyzed: 12/18/2015 12:10						
% Solids	84.4	0.00	% by Weight		84.1			0.459	20	

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Notes and Definitions

X	Precision for the matrix spike duplicate, laboratory control sample duplicate or lab duplicate was outside of control limits.
S	Surrogate recovery was outside of laboratory control limits due to an apparent matrix effect.
M	The matrix spike and/or matrix spike duplicate recovery was outside of the laboratory control limits.
LC	Resuts may be biased low because of low continuing calibration verification (CCV).
D	Data reported from a dilution
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. If the word 'dry' does not appear after the units, results are reported on an as-is basis.
RPD	Relative Percent Difference

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

EST. 1991

CHAIN OF CUSTODY

Lab Work Order #: A155109

Project Number: 220003.0001.0000
Project Name: TPC
Project Location: Tecumseh, MI
Turn Around (circle one): Normal Rush - 2 Day
If Rush, Report Due Date:
Sampled By (Print): Chris Sciesza

Mail Report To: S. Metz
Company: TRC
Address: 1540 Eisenhower Place, Ann Arbor, MI 48108
E-mail Address: SMetz@trcsolutions.com
Invoice To: Same
Company:
Address:

Analyses Requested / Preservation Codes: B (VOC)

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOC						Comments	Lab ID	Lab Receipt Time
B-122 (35-38')	12/16/15	0945	GW	3	X							01	
B-122 (32-25')		1057									vials read 32-35'	02	
B-122 (29-32')		1200										03	
B-122 (25.5-28.5')		1412										04	
B-122 (22.5-25.5')		1518										05	
B-122 (19.5-22.5')		0933										06	
B-122 (16.5-19.5')		1055										07	
B-122 (13.5-16.5')		1207										08	
B-122 (10.5-13.5')		1435										09	
B-122 (7.5-10.5')		1620										10	

Preservation Codes
A=None B=HCL C=H_2SO_4
D=HNO_3 E=EnCore F=Methanol
G=NaOH O=Other (Indicate)

Matrix Codes
A=Air S=Soil W=Water O=Other

Relinquished By	Date	Time	Received By	Date	Time
[signature]	12/16/15	1835	Fed Ex	12/16/15	1835
Relinquished By:	Date:	Time:	Received By: Kari-Ann Kelly	12/17/15	0845

Custody Seal: Present/Absent Intact/Not Intact Seal #'s
Shipped Via: Fed Ex

Receipt Temp:
Temp Blank (Y) N 1.5°C SN 1502 5200 exp 3-26-17

Download this form at www.eccsmobilelab.com.

WHITE - REPORT COPY YELLOW - LABORATORY COPY PINK - SAMPLER/SUBMITTER

Rev. 11/08

Midwest Analytical Services, Inc.
2905 Hilton Road • Ferndale, MI 48220
Phone: (888) 801-4MAS
(248) 591-6660
Fax: (248) 591-6668
A2LA #0381-01

Chain of Custody Record & Sample Analysis Request

A155109

COC №: 37165

Order ID: _____

REPORTS TO:
Company Name: TRC
Contact: S. Metz
Address: 1540 Eisenhower Place
City, State, Zip: Ann Arbor, MI 48108
Phone: 734-971-7080
Fax: 734-971-9022

BILL TO: Same as Reports ☑
Company Name:
Contact:
Address:
City, State, Zip:
Quote # _____ P.O. # _____
Project/Job #

QC LEVEL I II III

Page ___ Of ___
Normal ___
Rush ___
Needed By ___

CONTAINER LEGEND

TYPE: P = Plastic, G = Glass, M = Metal

PRESERVATIVE: 1 = Non Preserved, 2 = HCl, 3 = HNO_3, 4 = NaOH, 5 = Hexane, 6 = H_2SO_4, 7 = Methanol

Report Delivery: ☐ Fax ☐ Drop Off ☐ USPS ☑ E-Mail SMetz@TRCsolutions.com

ITEM	SAMPLE ID & LOCATION	FIELD INFO Hot? / PID	TIME ZONE: E C M P Date	Time	MATRIX	ANALYSIS: VOCs METHOD: DL:	ANALYSIS: METHOD: DL:	ANALYSIS: METHOD: DL:	ANALYSIS: METHOD: DL:	ANALYSIS: METHOD: DL:	ANALYSIS: METHOD: DL:	CONTAINERS Type	Size	Preservative	LAB USE ONLY MAS #
	B-119 (11.5-14.5')	—	12/16/15	1718	GW	X						3G	40ml	2	11
	TRIP-BLANK	—	—	—	DI	X									12
									SN 150256900						
											exp 3-26-17				

Sampled By: (Signature) [signature] Print Name: Chris Sciesza Date: 12/16/15

Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Date/Time
[signature]	12/16/15 1835	FedEx	12/16/15 1835
		Received for Lab By:	

LAB USE ONLY
Status of Sample(s) Received:
Transport Temperature 1.5°C On Ice yes
Sealed ___ Not Sealed ___
Received by:
Mail ___ Drop Off ___

FIELD CHARGES
Field Hours: ___
Set Up: ___
Pick Up ___ Of ___
C ___ NC ___

Comments:

WHITE - Midwest Copy

PINK - Client Copy

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

CHAIN OF CUSTODY

Lab Work Order #: A155109

Project Number: 220003.0000
Project Name: TPC PCE Investigation
Project Location: Tecumseh, MI
Turn Around (circle one): Normal (Rush)
If Rush, Report Due Date: 2 days
Sampled By (Print): Mellisa Powers, Emily Solsol

Mail Report To: Stacy Metz
Company: TRC
Address: 1540 Eisenhower Place, Ann Arbor, MI, 48108
E-mail Address: smetz@trcsolutions.com
Invoice To: Same as above
Company:
Address:

Analyses Requested / Preservation Codes

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOCs	Dry Weight					Comments	Lab ID	Lab Receipt Time
B-123 (6-7')	12/16/15	0915		3	2	1					Shipped upside down (A)	13	
B-124 (6-7')	12/16/15	1008		3	2	1					(A)	14	
B-125 (3-4')	12/16/15	1055		3	2	1					(A)	15	
B-125 (8-9')	12/16/15	1100		3	2	1					(A)	16	
B-125 (10.5-11.5')	12/16/15	1110		3	2	1					(A)	17	
~~B-127 (1-2')~~	~~12/16/15~~	~~1237~~		~~3~~							(A)	18	
~~B-127 (4-5')~~	~~12/16/15~~	~~1240~~		~~3~~							(A)	19	
B-126 (6-7')	12/16/15	1405		3	2	1					(A)	20	
Dup-01	12/16/15			3	2	1					ok	21	
Dup-02	12/16/15			3	2	1					ok	22	

Preservation Codes
A=None B=HCL C=H_2SO_4
D=HNO_3 E=EnCore F=Methanol
G=NaOH O=Other (Indicate)

Matrix Codes
A=Air S=Soil W=Water O=Other

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Mellisa Powers	12/16/15	1815	FedEX	12/16/15	1815
			Kari-Ann Kellin	12/17/15	0845

Custody Seal: Present/Absent Intact/Not Intact Seal #'s
Shipped Via: Fed Ex
Receipt Temp:
Temp Blank (Y) N 1.5°C SW 150256900 exp 3-26-17

Download this form at www.eccsmobilelab.com.
WHITE - REPORT COPY YELLOW - LABORATORY COPY PINK - SAMPLER/SUBMITTER
Rev. 11/08

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

CHAIN OF CUSTODY

Lab Work Order #: A155109

Project Number: 22000033.0000
Project Name: ~~TRC~~ TPC PCE Investigation
Project Location: Tecumseh, MI
Turn Around (circle one): Normal Rush
If Rush, Report Due Date: 2 days
Sampled By (Print): Mellisa Powers, Emily Sokol

Mail Report To: Stacy Metz
Company: TRC
Address: 1540 Eisenhower Place, Ann Arbor, MI 48108
E-mail Address: smetz@trcsolutions.com
Invoice To: Same as above
Company:
Address:

Analyses Requested / Preservation Codes

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOCs	Dry Weight					Comments	Lab ID	Lab Receipt Time
B-128 (9-10')	12/16/15	1456		3	2	1					ok	23	
B-128 (1-2')	12/16/15	1500		3	2	1					ok	24	
B-127 (1-2')	12/16/15	1552		3	2	1					ok	25	
B-127 (10-11')	12/16/15	1554		3	2	1					ok	26	
B-68 (1-2')	12/16/15	1237		3	2	1				X	Vial B upside down Vial A shipped upright	27	
B-68 (4-5')	12/16/15 ~~1240~~	1240		3	2	1				X	(A) see previous page	28	
Methanol Blank											ok	29	
Temperature Blank												—	
											X client added label to	voa vials	

Preservation Codes
A=None B=HCL C=H_2SO_4
D=HNO_3 E=EnCore F=Methanol
G=NaOH O=Other (Indicate)

Matrix Codes
A=Air S=Soil W=Water O=Other

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Mellisa Powers	12/16/15	1815	FedEx	12/16/15	1815
			Kari-Ann Killian	12/17/15	0845

Custody Seal: Present/Absent Intact/Not Intact Seal #'s
Shipped Via: Fed Ex
Receipt Temp:
Temp Blank (Y) N 1.5°C SW 150256900 exp 3-26-17

Download this form at www.eccsmobilelab.com.
WHITE - REPORT COPY YELLOW - LABORATORY COPY PINK - SAMPLER/SUBMITTER Rev. 11/08

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

December 22, 2015

Stacy Metz
TRC Solutions
1540 Eisenhower Place
Ann Arbor, MI 48108

RE: TPC PCE Investigation - Tecumseh, MI

Enclosed are the analytical results for the samples received by the laboratory on 12/18/2015.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. These results are in compliance with the 2009 NELAC Standards and the appropriate agencies listed below, unless otherwise noted in the case narrative. This analytical report should be reproduced in its entirety.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jessica Esser For Nick Nigro

President

Certification List			Expires
DODELAP	DOD ELAP Accreditation (A2LA)	3269.01	03/31/2016
FDOH	Florida Secondary NELAP Accreditation	E871093	06/30/2016
ILEPA	Illinois Secondary NELAP Accreditation	003174	04/30/2016
KDHE	Kansas Secondary NELAP Accreditation	E-10384	01/31/2016
LELAP	Louisiana Primary NELAP Accreditation	04165	06/30/2016
NJDEP	New Jersey Secondary NELAP Accreditation	WI004	06/30/2016
ODEQ	Oklahoma Department of Environmental Quality Accreditation	2014-153	08/31/2016
TCEQ	Texas Secondary NELAP Accreditation	T104704504-15-6	11/30/2016
WDNR	Wisconsin Certification under NR 149	113289110	08/31/2016

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions		Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place		Project Number:	220003.0000
Ann Arbor MI, 48108		Project Manager:	Stacy Metz

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B-118 (11-14')	A155114-01	Water	12/17/2015	12/18/2015
B-117 (9.5-12.5')	A155114-02	Water	12/17/2015	12/18/2015
B-115 (11-14')	A155114-03	Water	12/17/2015	12/18/2015
B-116 (10-13')	A155114-04	Water	12/17/2015	12/18/2015
DUP-01	A155114-05	Water	12/17/2015	12/18/2015
B-127 (12-15')	A155114-06	Water	12/17/2015	12/18/2015
B-125 (12-15')	A155114-07	Water	12/17/2015	12/18/2015
B-120 (10.5-13.5')	A155114-08	Water	12/17/2015	12/18/2015
B-121 (10.5-13.5')	A155114-09	Water	12/17/2015	12/18/2015
Trip Blank	A155114-10	Water	12/17/2015	12/18/2015

CASE NARRATIVE

Sample Receipt Information:
10 samples were received on 12/18/2015. Samples were received at 1.1 degrees Celsius.

Two samples labeled B-127 (12-15') were received. Samples were differentiated, using the time collected, into B-127 (12-15') and B-125 (12-15').

Sample A155114-08 had a discrepancy between the collection time on the chain of custody (COC) and the collection time on the sample container. Per the client, the sample container collection time is correct.

Please see the COC document at the end of this report for additional information.

Continuing Calibration Verification (CCV):
The LC footnote on samples A155114-01 through A155114-10 states that there were low CCV recoveries for 2-butanone or naphthalene. The lower control limit is 70% and the recoveries were 65.2% and 66.8%, respectively.

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-118 (11-14')

A155114-01 (Water)

Date Sampled
12/17/2015 09:40

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512046**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	200	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Benzene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
2-Butanone	ND	200	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
1,1-Dichloroethane	**21**	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	D
1,2-Dichloroethane	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
trans-1,2-Dichloroethene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
cis-1,2-Dichloroethene	**84**	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	D
1,1-Dichloroethene	**5.4**	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	D
Ethylbenzene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Tetrachloroethene	**210**	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	D
Toluene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
1,1,1-Trichloroethane	**57**	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	D
1,1,2-Trichloroethane	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Trichloroethene	**290**	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
1,2,4-Trimethylbenzene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Vinyl chloride	**24**	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	D
m,p-Xylene	ND	10	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
o-Xylene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Xylenes, total	ND	15	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
n-Butyl Benzene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
sec-Butyl Benzene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Carbon disulfide	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Chloroethane	ND	50	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Chloroform	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Dichlorodifluoromethane	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Isopropylbenzene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
p-Isopropyltoluene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Naphthalene	ND	50	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	LC
n-Propyl Benzene	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Trichlorofluoromethane	ND	5.0	ug/L	10	12/21/2015	12/21/2015 17:17	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*		*81.3-129*	*12/21/2015*	*12/21/2015 17:17*	*EPA 8260B*	
Surrogate: Toluene-d8		*102 %*		*87.3-110*	*12/21/2015*	*12/21/2015 17:17*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.9 %*		*86.7-110*	*12/21/2015*	*12/21/2015 17:17*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-117 (9.5-12.5')

A155114-02 (Water)

Date Sampled
12/17/2015 10:02

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512046**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	5000	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Benzene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
2-Butanone	ND	5000	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	LC
1,1-Dichloroethane	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
1,2-Dichloroethane	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
trans-1,2-Dichloroethene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
cis-1,2-Dichloroethene	**350**	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	D
1,1-Dichloroethene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Ethylbenzene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Tetrachloroethene	**5400**	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	D
Toluene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
1,1,1-Trichloroethane	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
1,1,2-Trichloroethane	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Trichloroethene	**810**	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
1,2,4-Trimethylbenzene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Vinyl chloride	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
m,p-Xylene	ND	250	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
o-Xylene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Xylenes, total	ND	380	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
n-Butyl Benzene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
sec-Butyl Benzene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Carbon disulfide	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Chloroethane	ND	1300	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Chloroform	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Dichlorodifluoromethane	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Isopropylbenzene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
p-Isopropyltoluene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Naphthalene	ND	1300	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
n-Propyl Benzene	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Trichlorofluoromethane	ND	130	ug/L	250	12/21/2015	12/21/2015 17:39	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*		*81.3-129*	*12/21/2015*	*12/21/2015 17:39*	*EPA 8260B*	
Surrogate: Toluene-d8		*99.1 %*		*87.3-110*	*12/21/2015*	*12/21/2015 17:39*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.7 %*		*86.7-110*	*12/21/2015*	*12/21/2015 17:39*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-115 (11-14')

A155114-03 (Water)

Date Sampled
12/17/2015 11:12

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512046**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	2000	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Benzene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
2-Butanone	ND	2000	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
1,1-Dichloroethane	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
1,2-Dichloroethane	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
trans-1,2-Dichloroethene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
cis-1,2-Dichloroethene	**1800**	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	D
1,1-Dichloroethene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Ethylbenzene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Tetrachloroethene	**1800**	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	D
Toluene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
1,1,1-Trichloroethane	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
1,1,2-Trichloroethane	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Trichloroethene	**480**	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
1,2,4-Trimethylbenzene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Vinyl chloride	**1500**	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	D
m,p-Xylene	ND	100	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
o-Xylene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Xylenes, total	ND	150	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
n-Butyl Benzene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
sec-Butyl Benzene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Carbon disulfide	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Chloroethane	ND	500	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Chloroform	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Dichlorodifluoromethane	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Isopropylbenzene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
p-Isopropyltoluene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Naphthalene	ND	500	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	LC
n-Propyl Benzene	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Trichlorofluoromethane	ND	50	ug/L	100	12/21/2015	12/21/2015 18:01	EPA 8260B	
Surrogate: Dibromofluoromethane		*101 %*		*81.3-129*	*12/21/2015*	*12/21/2015 18:01*	*EPA 8260B*	
Surrogate: Toluene-d8		*102 %*		*87.3-110*	*12/21/2015*	*12/21/2015 18:01*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.0 %*		*86.7-110*	*12/21/2015*	*12/21/2015 18:01*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-116 (10-13')

A155114-04 (Water)

Date Sampled
12/17/2015 11:45

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512046**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	20000	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Benzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
2-Butanone	ND	20000	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	LC
1,1-Dichloroethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
1,2-Dichloroethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
trans-1,2-Dichloroethene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
cis-1,2-Dichloroethene	**8300**	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	D
1,1-Dichloroethene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Ethylbenzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Tetrachloroethene	**34000**	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	D
Toluene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
1,1,1-Trichloroethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
1,1,2-Trichloroethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Trichloroethene	**2700**	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
1,2,4-Trimethylbenzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Vinyl chloride	**970**	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	D
m,p-Xylene	ND	1000	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
o-Xylene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Xylenes, total	ND	1500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
n-Butyl Benzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
sec-Butyl Benzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Carbon disulfide	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Chloroethane	ND	5000	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Chloroform	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Dichlorodifluoromethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Isopropylbenzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
p-Isopropyltoluene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Naphthalene	ND	5000	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
n-Propyl Benzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Trichlorofluoromethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 18:23	EPA 8260B	
Surrogate: Dibromofluoromethane		*105 %*		*81.3-129*	*12/21/2015*	*12/21/2015 18:23*	*EPA 8260B*	
Surrogate: Toluene-d8		*99.4 %*		*87.3-110*	*12/21/2015*	*12/21/2015 18:23*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*101 %*		*86.7-110*	*12/21/2015*	*12/21/2015 18:23*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

DUP-01

A155114-05 (Water)

Date Sampled
12/17/2015 00:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512046**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	10000	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Benzene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
2-Butanone	ND	10000	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
1,1-Dichloroethane	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
1,2-Dichloroethane	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
trans-1,2-Dichloroethene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
cis-1,2-Dichloroethene	**5300**	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	D
1,1-Dichloroethene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Ethylbenzene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Tetrachloroethene	**13000**	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	D
Toluene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
1,1,1-Trichloroethane	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
1,1,2-Trichloroethane	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Trichloroethene	**770**	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
1,2,4-Trimethylbenzene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Vinyl chloride	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
m,p-Xylene	ND	500	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
o-Xylene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Xylenes, total	ND	750	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
n-Butyl Benzene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
sec-Butyl Benzene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Carbon disulfide	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Chloroethane	ND	2500	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Chloroform	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Dichlorodifluoromethane	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Isopropylbenzene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
p-Isopropyltoluene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Naphthalene	ND	2500	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	LC
n-Propyl Benzene	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Trichlorofluoromethane	ND	250	ug/L	500	12/21/2015	12/21/2015 18:45	EPA 8260B	
Surrogate: Dibromofluoromethane		*105 %*		*81.3-129*	*12/21/2015*	*12/21/2015 18:45*	*EPA 8260B*	
Surrogate: Toluene-d8		*103 %*		*87.3-110*	*12/21/2015*	*12/21/2015 18:45*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.6 %*		*86.7-110*	*12/21/2015*	*12/21/2015 18:45*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-127 (12-15')

A155114-06 (Water)

Date Sampled
12/17/2015 14:15

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512046**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	10000	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Benzene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
2-Butanone	ND	10000	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	LC
1,1-Dichloroethane	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
1,2-Dichloroethane	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
trans-1,2-Dichloroethene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
cis-1,2-Dichloroethene	**5400**	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	D
1,1-Dichloroethene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Ethylbenzene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Tetrachloroethene	**14000**	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	D
Toluene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
1,1,1-Trichloroethane	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
1,1,2-Trichloroethane	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Trichloroethene	**740**	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
1,2,4-Trimethylbenzene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Vinyl chloride	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
m,p-Xylene	ND	500	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
o-Xylene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Xylenes, total	ND	750	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
n-Butyl Benzene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
sec-Butyl Benzene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Carbon disulfide	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Chloroethane	ND	2500	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Chloroform	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Dichlorodifluoromethane	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Isopropylbenzene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
p-Isopropyltoluene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Naphthalene	ND	2500	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
n-Propyl Benzene	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Trichlorofluoromethane	ND	250	ug/L	500	12/21/2015	12/21/2015 19:07	EPA 8260B	
Surrogate: Dibromofluoromethane		*104 %*		*81.3-129*	*12/21/2015*	*12/21/2015 19:07*	*EPA 8260B*	
Surrogate: Toluene-d8		*98.2 %*		*87.3-110*	*12/21/2015*	*12/21/2015 19:07*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.8 %*		*86.7-110*	*12/21/2015*	*12/21/2015 19:07*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-125 (12-15')

A155114-07 (Water)

Date Sampled
12/17/2015 14:07

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512046**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	20000	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Benzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
2-Butanone	ND	20000	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
1,1-Dichloroethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
1,2-Dichloroethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
trans-1,2-Dichloroethene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
cis-1,2-Dichloroethene	**6000**	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	D
1,1-Dichloroethene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Ethylbenzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Tetrachloroethene	**41000**	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	D
Toluene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
1,1,1-Trichloroethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
1,1,2-Trichloroethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Trichloroethene	**1700**	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
1,2,4-Trimethylbenzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Vinyl chloride	**1100**	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	D
m,p-Xylene	ND	1000	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
o-Xylene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Xylenes, total	ND	1500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
n-Butyl Benzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
sec-Butyl Benzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Carbon disulfide	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Chloroethane	ND	5000	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Chloroform	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Dichlorodifluoromethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Isopropylbenzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
p-Isopropyltoluene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Naphthalene	ND	5000	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	LC
n-Propyl Benzene	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Trichlorofluoromethane	ND	500	ug/L	1000	12/21/2015	12/21/2015 19:29	EPA 8260B	
Surrogate: Dibromofluoromethane		*103 %*		*81.3-129*	*12/21/2015*	*12/21/2015 19:29*	*EPA 8260B*	
Surrogate: Toluene-d8		*102 %*		*87.3-110*	*12/21/2015*	*12/21/2015 19:29*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.8 %*		*86.7-110*	*12/21/2015*	*12/21/2015 19:29*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-120 (10.5-13.5')

A155114-08 (Water)

Date Sampled
12/17/2015 15:34

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512046**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Benzene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
2-Butanone	ND	1000	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	LC
1,1-Dichloroethane	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
cis-1,2-Dichloroethene	**230**	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	D
1,1-Dichloroethene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Ethylbenzene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Tetrachloroethene	**670**	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	D
Toluene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
1,1,1-Trichloroethane	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
1,1,2-Trichloroethane	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Trichloroethene	**130**	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Vinyl chloride	**420**	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	D
m,p-Xylene	ND	50	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
o-Xylene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Xylenes, total	ND	75	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
n-Butyl Benzene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Carbon disulfide	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Chloroethane	ND	250	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Chloroform	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Isopropylbenzene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Naphthalene	ND	250	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
n-Propyl Benzene	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/L	50	12/21/2015	12/21/2015 19:51	EPA 8260B	
Surrogate: Dibromofluoromethane		*108 %*		*81.3-129*	*12/21/2015*	*12/21/2015 19:51*	*EPA 8260B*	
Surrogate: Toluene-d8		*103 %*		*87.3-110*	*12/21/2015*	*12/21/2015 19:51*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*103 %*		*86.7-110*	*12/21/2015*	*12/21/2015 19:51*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-121 (10.5-13.5')

A155114-09 (Water)

Date Sampled
12/17/2015 15:26

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512046**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	50000	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Benzene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
2-Butanone	ND	50000	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
1,1-Dichloroethane	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
1,2-Dichloroethane	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
trans-1,2-Dichloroethene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
cis-1,2-Dichloroethene	**7000**	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	D
1,1-Dichloroethene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Ethylbenzene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Tetrachloroethene	**76000**	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	D
Toluene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
1,1,1-Trichloroethane	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
1,1,2-Trichloroethane	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Trichloroethene	**2000**	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
1,2,4-Trimethylbenzene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Vinyl chloride	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
m,p-Xylene	ND	2500	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
o-Xylene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Xylenes, total	ND	3800	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
n-Butyl Benzene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
sec-Butyl Benzene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Carbon disulfide	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Chloroethane	ND	13000	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Chloroform	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Dichlorodifluoromethane	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Isopropylbenzene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
p-Isopropyltoluene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Naphthalene	ND	13000	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	LC
n-Propyl Benzene	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Trichlorofluoromethane	ND	1300	ug/L	2500	12/21/2015	12/21/2015 20:12	EPA 8260B	
Surrogate: Dibromofluoromethane		*106 %*		*81.3-129*	*12/21/2015*	*12/21/2015 20:12*	*EPA 8260B*	
Surrogate: Toluene-d8		*102 %*		*87.3-110*	*12/21/2015*	*12/21/2015 20:12*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*101 %*		*86.7-110*	*12/21/2015*	*12/21/2015 20:12*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Trip Blank

A155114-10 (Water)

Date Sampled
12/17/2015 00:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A512046**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	20	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Benzene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
2-Butanone	ND	20	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	LC
1,1-Dichloroethane	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
1,2-Dichloroethane	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
trans-1,2-Dichloroethene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
cis-1,2-Dichloroethene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
1,1-Dichloroethene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Ethylbenzene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Tetrachloroethene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Toluene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
1,1,1-Trichloroethane	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
1,1,2-Trichloroethane	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Trichloroethene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
1,3,5-Trimethylbenzene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
1,2,4-Trimethylbenzene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Vinyl chloride	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
m,p-Xylene	ND	1.0	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
o-Xylene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Xylenes, total	ND	1.5	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
n-Butyl Benzene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
sec-Butyl Benzene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Carbon disulfide	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Chloroethane	ND	5.0	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Chloroform	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Dichlorodifluoromethane	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Isopropylbenzene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
p-Isopropyltoluene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Naphthalene	ND	5.0	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
n-Propyl Benzene	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Trichlorofluoromethane	ND	0.50	ug/L	1	12/21/2015	12/21/2015 16:55	EPA 8260B	
Surrogate: Dibromofluoromethane		*102 %*		*81.3-129*	*12/21/2015*	*12/21/2015 16:55*	*EPA 8260B*	
Surrogate: Toluene-d8		*110 %*		*87.3-110*	*12/21/2015*	*12/21/2015 16:55*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*104 %*		*86.7-110*	*12/21/2015*	*12/21/2015 16:55*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512046 - EPA 5030B										
Blank (A512046-BLK1)				Prepared: 12/21/2015 Analyzed: 12/21/2015 16:33						
Acetone	ND	20	ug/L							
Benzene	ND	0.50	ug/L							
2-Butanone	ND	20	ug/L							
1,1-Dichloroethane	ND	0.50	ug/L							
1,2-Dichloroethane	ND	0.50	ug/L							
trans-1,2-Dichloroethene	ND	0.50	ug/L							
cis-1,2-Dichloroethene	ND	0.50	ug/L							
1,1-Dichloroethene	ND	0.50	ug/L							
Ethylbenzene	ND	0.50	ug/L							
Tetrachloroethene	ND	0.50	ug/L							
Toluene	ND	0.50	ug/L							
1,1,1-Trichloroethane	ND	0.50	ug/L							
1,1,2-Trichloroethane	ND	0.50	ug/L							
Trichloroethene	ND	0.50	ug/L							
1,3,5-Trimethylbenzene	ND	0.50	ug/L							
1,2,4-Trimethylbenzene	ND	0.50	ug/L							
Vinyl chloride	ND	0.50	ug/L							
m,p-Xylene	ND	1.0	ug/L							
o-Xylene	ND	0.50	ug/L							
Xylenes, total	ND	1.5	ug/L							
n-Butyl Benzene	ND	0.50	ug/L							
sec-Butyl Benzene	ND	0.50	ug/L							
Carbon disulfide	ND	0.50	ug/L							
Chloroethane	ND	5.0	ug/L							
Chloroform	ND	0.50	ug/L							
Dichlorodifluoromethane	ND	0.50	ug/L							
Isopropylbenzene	ND	0.50	ug/L							
p-Isopropyltoluene	ND	0.50	ug/L							
Naphthalene	ND	5.0	ug/L							
n-Propyl Benzene	ND	0.50	ug/L							
Trichlorofluoromethane	ND	0.50	ug/L							
Surrogate: Dibromofluoromethane	*24.8*		*ug/L*	*25.00*		*99.0*	*81.3-129*			
Surrogate: Toluene-d8	*25.6*		*ug/L*	*25.00*		*102*	*87.3-110*			
Surrogate: 4-Bromofluorobenzene	*24.9*		*ug/L*	*25.00*		*99.4*	*86.7-110*			
LCS (A512046-BS1)				Prepared: 12/21/2015 Analyzed: 12/21/2015 20:33						
Acetone	37.9		ug/L	50.00		75.8	45-165			
Benzene	4.78		ug/L	5.000		95.6	82.5-123			
2-Butanone	35.5		ug/L	50.00		70.9	63-135			
1,1-Dichloroethane	5.16		ug/L	5.000		103	80-133			
1,2-Dichloroethane	4.75		ug/L	5.000		95.0	76.1-139			
trans-1,2-Dichloroethene	4.94		ug/L	5.000		98.8	84.9-121			
cis-1,2-Dichloroethene	4.65		ug/L	5.000		93.0	79.1-122			
1,1-Dichloroethene	5.02		ug/L	5.000		100	72.2-135			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512046 - EPA 5030B										
LCS (A512046-BS1)				Prepared: 12/21/2015 Analyzed: 12/21/2015 20:33						
Ethylbenzene	4.86		ug/L	5.000		97.2	86.1-115			
Tetrachloroethene	5.12		ug/L	5.000		102	83.8-117			
Toluene	4.88		ug/L	5.000		97.6	80.6-115			
1,1,1-Trichloroethane	5.06		ug/L	5.000		101	81.2-133			
1,1,2-Trichloroethane	4.37		ug/L	5.000		87.4	79.1-125			
Trichloroethene	4.81		ug/L	5.000		96.2	81.2-118			
1,3,5-Trimethylbenzene	4.78		ug/L	5.000		95.6	82-121			
1,2,4-Trimethylbenzene	4.75		ug/L	5.000		95.0	79.5-123			
Vinyl chloride	5.74		ug/L	5.000		115	71.5-144			
m,p-Xylene	10.4		ug/L	10.00		104	84-118			
o-Xylene	4.90		ug/L	5.000		98.0	76.6-121			
n-Butyl Benzene	4.66		ug/L	5.000		93.2	78.9-124			
sec-Butyl Benzene	4.77		ug/L	5.000		95.4	81.1-123			
Carbon disulfide	4.92		ug/L	5.000		98.4	80-121			
Chloroethane	5.93		ug/L	5.000		119	31.6-195			
Chloroform	4.97		ug/L	5.000		99.4	79.7-131			
Dichlorodifluoromethane	5.02		ug/L	5.000		100	68.4-148			
Isopropylbenzene	4.87		ug/L	5.000		97.4	85.5-118			
p-Isopropyltoluene	4.77		ug/L	5.000		95.4	81.6-123			
Naphthalene	3.26		ug/L	5.000		65.2	63.4-117			
n-Propyl Benzene	4.92		ug/L	5.000		98.4	81.7-122			
Trichlorofluoromethane	6.29		ug/L	5.000		126	58.5-171			
Surrogate: Dibromofluoromethane	*25.8*		*ug/L*	*25.00*		*103*	*81.3-129*			
Surrogate: Toluene-d8	*25.8*		*ug/L*	*25.00*		*103*	*87.3-110*			
Surrogate: 4-Bromofluorobenzene	*25.5*		*ug/L*	*25.00*		*102*	*86.7-110*			
Matrix Spike (A512046-MS1)		**Source: A155114-01**		Prepared: 12/21/2015 Analyzed: 12/21/2015 20:55						
Acetone	36.1		ug/L	50.00	ND	72.1	40.7-161			
Benzene	5.02		ug/L	5.000	ND	100	79.9-126			
2-Butanone	32.9		ug/L	50.00	ND	65.8	55-146			
1,1-Dichloroethane	7.37		ug/L	5.000	2.10	105	71.8-142			
1,2-Dichloroethane	5.03		ug/L	5.000	ND	101	72.2-142			
trans-1,2-Dichloroethene	5.08		ug/L	5.000	0.140	98.8	76.7-131			
cis-1,2-Dichloroethene	12.9		ug/L	5.000	8.40	90.6	71.4-129			
1,1-Dichloroethene	5.41		ug/L	5.000	0.540	97.4	63.9-148			
Ethylbenzene	5.04		ug/L	5.000	ND	101	83.1-118			
Tetrachloroethene	25.5		ug/L	5.000	20.7	97.0	65.9-132			
Toluene	4.77		ug/L	5.000	ND	95.4	78-117			
1,1,1-Trichloroethane	10.9		ug/L	5.000	5.69	103	70-142			
1,1,2-Trichloroethane	5.13		ug/L	5.000	ND	103	74.1-132			
Trichloroethene	34.1		ug/L	5.000	29.4	93.6	75.7-125			
1,3,5-Trimethylbenzene	4.87		ug/L	5.000	ND	97.4	75.9-125			
1,2,4-Trimethylbenzene	4.86		ug/L	5.000	ND	97.2	71.5-127			
Vinyl chloride	8.74		ug/L	5.000	2.42	126	67.4-149			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512046 - EPA 5030B										
Matrix Spike (A512046-MS1)		**Source: A155114-01**		Prepared: 12/21/2015 Analyzed: 12/21/2015 20:55						
m,p-Xylene	9.84		ug/L	10.00	ND	98.4	81-118			
o-Xylene	4.86		ug/L	5.000	ND	97.2	80.6-114			
n-Butyl Benzene	4.76		ug/L	5.000	ND	95.2	80.3-126			
sec-Butyl Benzene	4.84		ug/L	5.000	ND	96.8	82-123			
Carbon disulfide	5.15		ug/L	5.000	ND	103	73.5-128			
Chloroethane	5.85		ug/L	5.000	ND	117	13.8-195			
Chloroform	5.01		ug/L	5.000	ND	100	73.4-138			
Dichlorodifluoromethane	5.34		ug/L	5.000	ND	107	13.6-185			
Isopropylbenzene	4.90		ug/L	5.000	ND	98.0	86.6-118			
p-Isopropyltoluene	4.82		ug/L	5.000	ND	96.4	81.1-123			
Naphthalene	2.93		ug/L	5.000	ND	58.6	56.6-128			
n-Propyl Benzene	4.90		ug/L	5.000	ND	98.0	81-123			
Trichlorofluoromethane	6.26		ug/L	5.000	ND	125	41.6-189			
Surrogate: Dibromofluoromethane	*26.1*		*ug/L*	*25.00*		*104*	*81.3-129*			
Surrogate: Toluene-d8	*25.8*		*ug/L*	*25.00*		*103*	*87.3-110*			
Surrogate: 4-Bromofluorobenzene	*26.0*		*ug/L*	*25.00*		*104*	*86.7-110*			
Matrix Spike Dup (A512046-MSD1)		**Source: A155114-01**		Prepared: 12/21/2015 Analyzed: 12/21/2015 21:16						
Acetone	34.8		ug/L	50.00	ND	69.6	40.7-161	3.56	20	
Benzene	4.99		ug/L	5.000	ND	99.8	79.9-126	0.599	20	
2-Butanone	31.2		ug/L	50.00	ND	62.5	55-146	5.24	20	
1,1-Dichloroethane	7.39		ug/L	5.000	2.10	106	71.8-142	0.379	20	
1,2-Dichloroethane	4.90		ug/L	5.000	ND	98.0	72.2-142	2.62	20	
trans-1,2-Dichloroethene	5.22		ug/L	5.000	0.140	102	76.7-131	2.79	20	
cis-1,2-Dichloroethene	13.6		ug/L	5.000	8.40	105	71.4-129	14.3	20	
1,1-Dichloroethene	5.69		ug/L	5.000	0.540	103	63.9-148	5.59	20	
Ethylbenzene	5.10		ug/L	5.000	ND	102	83.1-118	1.18	20	
Tetrachloroethene	26.4		ug/L	5.000	20.7	116	65.9-132	17.5	20	
Toluene	5.02		ug/L	5.000	ND	100	78-117	5.11	20	
1,1,1-Trichloroethane	11.4		ug/L	5.000	5.69	114	70-142	9.75	20	
1,1,2-Trichloroethane	5.32		ug/L	5.000	ND	106	74.1-132	3.64	20	
Trichloroethene	33.8		ug/L	5.000	29.4	87.6	75.7-125	6.62	20	
1,3,5-Trimethylbenzene	5.15		ug/L	5.000	ND	103	75.9-125	5.59	20	
1,2,4-Trimethylbenzene	5.14		ug/L	5.000	ND	103	71.5-127	5.60	20	
Vinyl chloride	8.75		ug/L	5.000	2.42	127	67.4-149	0.158	20	
m,p-Xylene	10.7		ug/L	10.00	ND	107	81-118	8.47	20	
o-Xylene	5.10		ug/L	5.000	ND	102	80.6-114	4.82	20	
n-Butyl Benzene	5.00		ug/L	5.000	ND	100	80.3-126	4.92	20	
sec-Butyl Benzene	5.12		ug/L	5.000	ND	102	82-123	5.62	20	
Carbon disulfide	5.25		ug/L	5.000	ND	105	73.5-128	1.92	20	
Chloroethane	6.16		ug/L	5.000	ND	123	13.8-195	5.16	20	
Chloroform	5.20		ug/L	5.000	ND	104	73.4-138	3.72	20	
Dichlorodifluoromethane	5.22		ug/L	5.000	ND	104	13.6-185	2.27	20	
Isopropylbenzene	5.09		ug/L	5.000	ND	102	86.6-118	3.80	20	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A512046 - EPA 5030B										
Matrix Spike Dup (A512046-MSD1)		**Source: A155114-01**		Prepared: 12/21/2015 Analyzed: 12/21/2015 21:16						
p-Isopropyltoluene	5.06		ug/L	5.000	ND	101	81.1-123	4.86	20	
Naphthalene	3.37		ug/L	5.000	ND	67.4	56.6-128	14.0	20	
n-Propyl Benzene	5.27		ug/L	5.000	ND	105	81-123	7.28	20	
Trichlorofluoromethane	6.53		ug/L	5.000	ND	131	41.6-189	4.22	20	
Surrogate: Dibromofluoromethane	*25.7*		*ug/L*	*25.00*		*103*	*81.3-129*			
Surrogate: Toluene-d8	*25.4*		*ug/L*	*25.00*		*101*	*87.3-110*			
Surrogate: 4-Bromofluorobenzene	*25.2*		*ug/L*	*25.00*		*101*	*86.7-110*			

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Notes and Definitions

LC	Resuts may be biased low because of low continuing calibration verification (CCV).
D	Data reported from a dilution
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. If the word 'dry' does not appear after the units, results are reported on an as-is basis.
RPD	Relative Percent Difference

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

CHAIN OF CUSTODY

Lab Work Order #: A155114

Project Number: 220003.0000
Project Name: TPC PCE Investigation
Project Location: Tecumseh MI
Turn Around (circle one): Normal (Rush)
If Rush, Report Due Date: 2 days
Sampled By (Print): Mellisa Powers

Mail Report To: Stacy Metz
Company: TRC Environmental
Address: 1540 Eisenhower Place Ann Arbor Mi 48108
E-mail Address: SMetz@trcsolutions.com
Invoice To: Same As Above
Company:
Address:

Analyses Requested / Preservation Codes

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOCs						Comments	Lab ID	Lab Receipt Time
B-118 (11-14')	12/17/15	0940	GW	3	X							01	
B-117 (9.5-12.5')		1002	GW	3	X							02	
B-115 (11-14')		1112	GW	3	X							03	
B-116 (10-13')		1145	GW	3	X							04	
DUP-01		—	GW	3	X							05	
B-127 (12-15')		1415	GW	3	X							06	
B-125 (12-15')		1407	GW	3	X						labeled B-127 (12-15') time 1410	07	
B-120 (10.5-13.5)		1504	GW	3	X						time 1534 on bottles	08	
B-121 (10.5-13.5)		1526	GW	3	X							09	
Trip Blank		—		3	X							10	

Preservation Codes
A=None B=HCL C=H_2SO_4
D=HNO_3 E=EnCore F=Methanol
G=NaOH O=Other (Indicate)

Matrix Codes
A=Air S=Soil W=Water O=Other

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Mellisa Powers	12/17/15	1800	FedEx	12/17/15	1800
Relinquished By:	Date:	Time:	Received By: [signature]	12-18-15	0900

Custody Seal: Present/Absent Intact/Not Intact Seal #'s
Shipped Via: FedEx

Receipt Temp: 1.1°C S/N 1502560900
Temp Blank (Y) N Exp. 03-26-17

Download this form at www.eccsmobilelab.com.

WHITE - REPORT COPY YELLOW - LABORATORY COPY PINK - SAMPLER/SUBMITTER Rev. 11/08

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

January 05, 2016

Stacy Metz
TRC Solutions
1540 Eisenhower Place
Ann Arbor, MI 48108

RE: TPC PCE Investigation - Tecumseh, MI

Enclosed are the analytical results for the samples received by the laboratory on 12/31/2015.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. These results are in compliance with the 2009 NELAC Standards and the appropriate agencies listed below, unless otherwise noted in the case narrative. This analytical report should be reproduced in its entirety.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jessica Esser For Nick Nigro

President

Certification List			Expires
DODELAP	DOD ELAP Accreditation (A2LA)	3269.01	03/31/2016
FDOH	Florida Secondary NELAP Accreditation	E871093	06/30/2016
ILEPA	Illinois Secondary NELAP Accreditation	003174	04/30/2016
KDHE	Kansas Secondary NELAP Accreditation	E-10384	01/31/2016
LELAP	Louisiana Primary NELAP Accreditation	04165	06/30/2016
NJDEP	New Jersey Secondary NELAP Accreditation	WI004	06/30/2016
ODEQ	Oklahoma Department of Environmental Quality Accreditation	2014-153	08/31/2016
TCEQ	Texas Secondary NELAP Accreditation	T104704504-15-6	11/30/2016
WDNR	Wisconsin Certification under NR 149	113289110	08/31/2016

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MeOH Blank	A155305-01	Soil	12/30/2015	12/31/2015
B-129 (1-2')	A155305-02	Soil	12/30/2015	12/31/2015
B-129 (3-4')	A155305-03	Soil	12/30/2015	12/31/2015
B-130 (1-2')	A155305-04	Soil	12/30/2015	12/31/2015
B-130 (3-4')	A155305-05	Soil	12/30/2015	12/31/2015
B-130 (10-11')	A155305-06	Soil	12/30/2015	12/31/2015
B-131 (1-2')	A155305-07	Soil	12/30/2015	12/31/2015
B-131 (3-4')	A155305-08	Soil	12/30/2015	12/31/2015
B-131 (10-11')	A155305-09	Soil	12/30/2015	12/31/2015
B-132 (1-2')	A155305-10	Soil	12/30/2015	12/31/2015
B-132 (3-4')	A155305-11	Soil	12/30/2015	12/31/2015
B-132 (10-11')	A155305-12	Soil	12/30/2015	12/31/2015
B-133 (1-2')	A155305-13	Soil	12/30/2015	12/31/2015
B-133 (3-4')	A155305-14	Soil	12/30/2015	12/31/2015
B-133 (10-11')	A155305-15	Soil	12/30/2015	12/31/2015

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

CASE NARRATIVE

Sample Receipt Information:
15 samples were received on 12/31/2015. Samples were received at 1.9 degrees Celsius.

The methanol vial for sample A155305-11 had a discrepancy between the sample description on the chain of custody (COC) and the sample description on the container. The COC sample description was used for the report.

Please see the COC document at the end of this report for additional information.

Continuing Calibration Verification (CCV):
The LC footnote on samples A155305-01 through A155305-15 states that there were low CCV recoveries for 2-butanone and/or naphthalene. The lower control limit is 70% and the lowest recoveries were 64.7% and 66.0%, respectively.

CCV indicates a potential high bias for vinyl chloride for samples A155305-01, A155305-03, A155305-05, A155305-07, A155305-09, A155305-11, A155305-13 and A155305-15. The upper control limit is 120% and the recovery was 127%. Any detections are footnoted with an HC. For the samples where results were less than the reporting limit no further action is required.

CCV also indicates a potential high bias for chloroethane, dichlorodifluoromethane and/or trichlorofluoromethane for samples A155305-01 through A155305-15. Samples were less than the reporting limit for these analytes so no further action is required.

Laboratory Control Samples (LCS):
The E1 footnote on samples A155305-01 through A155305-15 indicates that there were quality control sample exceedances for naphthalene. The LCS recovery was below acceptable limits. Please see the quality control section of the report for more information.

The LCS recovery also indicates a potential high bias for dichlorodifluoromethane and trichlorofluoromethane for samples A155305-01 through A155305-15. Samples were less than the reporting limit for these analytes so no further action is required.

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

MeOH Blank

A155305-01 (Soil)

Date Sampled
12/30/2015 00:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Benzene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
2-Butanone	ND	1000	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	LC
1,1-Dichloroethane	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
cis-1,2-Dichloroethene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
1,1-Dichloroethene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Ethylbenzene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Tetrachloroethene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Toluene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
1,1,1-Trichloroethane	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
1,1,2-Trichloroethane	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Trichloroethene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
1,3,5-Trimethylbenzene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Vinyl chloride	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
m,p-Xylene	ND	50	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
o-Xylene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Xylenes, total	ND	75	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
n-Butyl Benzene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Carbon disulfide	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Chloroethane	ND	250	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Chloroform	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Isopropylbenzene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Naphthalene	ND	250	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	E1, LC
n-Propyl Benzene	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/kg wet	1	01/04/2016	01/04/2016 14:47	EPA 8260B	
Surrogate: Dibromofluoromethane		*99.0 %*	*84.7-120*		*01/04/2016*	*01/04/2016 14:47*	*EPA 8260B*	
Surrogate: Toluene-d8		*125 %*	*90.5-108*		*01/04/2016*	*01/04/2016 14:47*	*EPA 8260B*	*S*
Surrogate: 4-Bromofluorobenzene		*104 %*	*88.3-113*		*01/04/2016*	*01/04/2016 14:47*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-129 (1-2')

A155305-02 (Soil)

Date Sampled
12/30/2015 11:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1100	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Benzene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
2-Butanone	ND	1100	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
1,1-Dichloroethane	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
1,2-Dichloroethane	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
trans-1,2-Dichloroethene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
cis-1,2-Dichloroethene	**31**	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
1,1-Dichloroethene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Ethylbenzene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Tetrachloroethene	**92**	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Toluene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
1,1,1-Trichloroethane	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
1,1,2-Trichloroethane	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Trichloroethene	**53**	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
1,3,5-Trimethylbenzene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
1,2,4-Trimethylbenzene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Vinyl chloride	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
m,p-Xylene	ND	55	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
o-Xylene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Xylenes, total	ND	83	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
n-Butyl Benzene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
sec-Butyl Benzene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Carbon disulfide	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Chloroethane	ND	280	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Chloroform	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Dichlorodifluoromethane	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Isopropylbenzene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
p-Isopropyltoluene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Naphthalene	ND	280	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	E1, LC
n-Propyl Benzene	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Trichlorofluoromethane	ND	28	ug/kg dry	1	01/04/2016	01/04/2016 15:09	EPA 8260B	
Surrogate: Dibromofluoromethane		*96.8 %*	*84.7-120*		*01/04/2016*	*01/04/2016 15:09*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*	*90.5-108*		*01/04/2016*	*01/04/2016 15:09*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.3 %*	*88.3-113*		*01/04/2016*	*01/04/2016 15:09*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-129 (1-2')

A155305-02 (Soil)

Date Sampled
12/30/2015 11:00

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**91.6**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-129 (3-4')

A155305-03 (Soil)

Date Sampled
12/30/2015 11:05

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	930	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Benzene	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
2-Butanone	ND	930	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	LC
1,1-Dichloroethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
1,2-Dichloroethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
trans-1,2-Dichloroethene	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
cis-1,2-Dichloroethene	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
1,1-Dichloroethene	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Ethylbenzene	**1300**	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Tetrachloroethene	**130**	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Toluene	**25**	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
1,1,1-Trichloroethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
1,1,2-Trichloroethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Trichloroethene	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
1,3,5-Trimethylbenzene	**1800**	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
1,2,4-Trimethylbenzene	**4900**	230	ug/kg dry	10	01/04/2016	01/05/2016 10:27	EPA 8260B	D
Vinyl chloride	**210**	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	HC
m,p-Xylene	**7600**	460	ug/kg dry	10	01/04/2016	01/05/2016 10:27	EPA 8260B	D
o-Xylene	**1100**	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Xylenes, total	**9400**	69	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
n-Butyl Benzene	**1400**	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
sec-Butyl Benzene	**600**	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Carbon disulfide	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Chloroethane	ND	230	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Chloroform	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Dichlorodifluoromethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Isopropylbenzene	**230**	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
p-Isopropyltoluene	**590**	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Naphthalene	**320**	230	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	E1, LC
n-Propyl Benzene	**840**	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Trichlorofluoromethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 15:31	EPA 8260B	
Surrogate: Dibromofluoromethane		*86.2 %*		*84.7-120*	*01/04/2016*	*01/04/2016 15:31*	*EPA 8260B*	
Surrogate: Toluene-d8		*117 %*		*90.5-108*	*01/04/2016*	*01/04/2016 15:31*	*EPA 8260B*	*S*
Surrogate: 4-Bromofluorobenzene		*121 %*		*88.3-113*	*01/04/2016*	*01/04/2016 15:31*	*EPA 8260B*	*S*

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-129 (3-4')

A155305-03 (Soil)

Date Sampled
12/30/2015 11:05

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**86.3**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-130 (1-2')

A155305-04 (Soil)

Date Sampled
12/30/2015 11:50

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	970	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Benzene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
2-Butanone	ND	970	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
1,1-Dichloroethane	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
1,2-Dichloroethane	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
trans-1,2-Dichloroethene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
cis-1,2-Dichloroethene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
1,1-Dichloroethene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Ethylbenzene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Tetrachloroethene	**740**	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Toluene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
1,1,1-Trichloroethane	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
1,1,2-Trichloroethane	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Trichloroethene	**34**	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
1,3,5-Trimethylbenzene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
1,2,4-Trimethylbenzene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Vinyl chloride	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
m,p-Xylene	ND	48	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
o-Xylene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Xylenes, total	ND	73	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
n-Butyl Benzene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
sec-Butyl Benzene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Carbon disulfide	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Chloroethane	ND	240	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Chloroform	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Dichlorodifluoromethane	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Isopropylbenzene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
p-Isopropyltoluene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Naphthalene	ND	240	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	E1, LC
n-Propyl Benzene	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Trichlorofluoromethane	ND	24	ug/kg dry	1	01/04/2016	01/04/2016 15:53	EPA 8260B	
Surrogate: Dibromofluoromethane		*96.6 %*		*84.7-120*	*01/04/2016*	*01/04/2016 15:53*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*		*90.5-108*	*01/04/2016*	*01/04/2016 15:53*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.1 %*		*88.3-113*	*01/04/2016*	*01/04/2016 15:53*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-130 (1-2')

A155305-04 (Soil)

Date Sampled
12/30/2015 11:50

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**89.1**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-130 (3-4')

A155305-05 (Soil)

Date Sampled
12/30/2015 12:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	930	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Benzene	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
2-Butanone	ND	930	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	LC
1,1-Dichloroethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
1,2-Dichloroethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
trans-1,2-Dichloroethene	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
cis-1,2-Dichloroethene	**140**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
1,1-Dichloroethene	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Ethylbenzene	**200**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Tetrachloroethene	**1400**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Toluene	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
1,1,1-Trichloroethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
1,1,2-Trichloroethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Trichloroethene	**72**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
1,3,5-Trimethylbenzene	**380**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
1,2,4-Trimethylbenzene	**1300**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Vinyl chloride	**41**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	HC
m,p-Xylene	**900**	47	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
o-Xylene	**260**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Xylenes, total	**1200**	70	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
n-Butyl Benzene	**390**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
sec-Butyl Benzene	**190**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Carbon disulfide	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Chloroethane	ND	230	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Chloroform	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Dichlorodifluoromethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Isopropylbenzene	**38**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
p-Isopropyltoluene	**150**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Naphthalene	ND	230	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	E1, LC
n-Propyl Benzene	**150**	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Trichlorofluoromethane	ND	23	ug/kg dry	1	01/04/2016	01/04/2016 16:14	EPA 8260B	
Surrogate: Dibromofluoromethane		*88.9 %*		*84.7-120*	*01/04/2016*	*01/04/2016 16:14*	*EPA 8260B*	
Surrogate: Toluene-d8		*114 %*		*90.5-108*	*01/04/2016*	*01/04/2016 16:14*	*EPA 8260B*	*S*
Surrogate: 4-Bromofluorobenzene		*126 %*		*88.3-113*	*01/04/2016*	*01/04/2016 16:14*	*EPA 8260B*	*S*

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-130 (3-4')

A155305-05 (Soil)

Date Sampled
12/30/2015 12:00

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**85.7**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-130 (10-11')

A155305-06 (Soil)

Date Sampled
12/30/2015 12:30

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	97000	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Benzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
2-Butanone	ND	97000	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
1,1-Dichloroethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
1,2-Dichloroethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
trans-1,2-Dichloroethene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
cis-1,2-Dichloroethene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
1,1-Dichloroethene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Ethylbenzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Tetrachloroethene	**86000**	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	D
Toluene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
1,1,1-Trichloroethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
1,1,2-Trichloroethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Trichloroethene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
1,3,5-Trimethylbenzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
1,2,4-Trimethylbenzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Vinyl chloride	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
m,p-Xylene	ND	4800	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
o-Xylene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Xylenes, total	ND	7300	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
n-Butyl Benzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
sec-Butyl Benzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Carbon disulfide	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Chloroethane	ND	24000	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Chloroform	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Dichlorodifluoromethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Isopropylbenzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
p-Isopropyltoluene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Naphthalene	ND	24000	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	E1, LC
n-Propyl Benzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Trichlorofluoromethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 16:36	EPA 8260B	
Surrogate: Dibromofluoromethane		*97.8 %*		*84.7-120*	*01/04/2016*	*01/04/2016 16:36*	*EPA 8260B*	
Surrogate: Toluene-d8		*102 %*		*90.5-108*	*01/04/2016*	*01/04/2016 16:36*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.4 %*		*88.3-113*	*01/04/2016*	*01/04/2016 16:36*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-130 (10-11')

A155305-06 (Soil)

Date Sampled
12/30/2015 12:30

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**89.8**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-131 (1-2')

A155305-07 (Soil)

Date Sampled
12/30/2015 14:30

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	990	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
2-Butanone	ND	990	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	LC
1,1-Dichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
cis-1,2-Dichloroethene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
1,1-Dichloroethene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Ethylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Tetrachloroethene	**220**	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Toluene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
1,1,1-Trichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
1,1,2-Trichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Trichloroethene	**1100**	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
1,3,5-Trimethylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Vinyl chloride	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
m,p-Xylene	ND	49	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
o-Xylene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Xylenes, total	ND	74	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
n-Butyl Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Carbon disulfide	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Chloroethane	ND	250	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Chloroform	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Isopropylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Naphthalene	ND	250	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	E1, LC
n-Propyl Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 16:58	EPA 8260B	
Surrogate: Dibromofluoromethane		*98.4 %*	*84.7-120*		*01/04/2016*	*01/04/2016 16:58*	*EPA 8260B*	
Surrogate: Toluene-d8		*107 %*	*90.5-108*		*01/04/2016*	*01/04/2016 16:58*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.6 %*	*88.3-113*		*01/04/2016*	*01/04/2016 16:58*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-131 (1-2')

A155305-07 (Soil)

Date Sampled
12/30/2015 14:30

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**90.7**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-131 (3-4')

A155305-08 (Soil)

Date Sampled
12/30/2015 14:35

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	9700	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Benzene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
2-Butanone	ND	9700	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
1,1-Dichloroethane	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
1,2-Dichloroethane	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
trans-1,2-Dichloroethene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
cis-1,2-Dichloroethene	**680**	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	D
1,1-Dichloroethene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Ethylbenzene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Tetrachloroethene	**8100**	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	D
Toluene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
1,1,1-Trichloroethane	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
1,1,2-Trichloroethane	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Trichloroethene	**1000**	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
1,2,4-Trimethylbenzene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Vinyl chloride	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
m,p-Xylene	ND	490	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
o-Xylene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Xylenes, total	ND	730	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
n-Butyl Benzene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
sec-Butyl Benzene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Carbon disulfide	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Chloroethane	ND	2400	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Chloroform	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Dichlorodifluoromethane	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Isopropylbenzene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
p-Isopropyltoluene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Naphthalene	ND	2400	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	E1, LC
n-Propyl Benzene	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Trichlorofluoromethane	ND	240	ug/kg dry	10	01/04/2016	01/04/2016 17:19	EPA 8260B	
Surrogate: Dibromofluoromethane		*97.3 %*	*84.7-120*		*01/04/2016*	*01/04/2016 17:19*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*	*90.5-108*		*01/04/2016*	*01/04/2016 17:19*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*96.7 %*	*88.3-113*		*01/04/2016*	*01/04/2016 17:19*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-131 (3-4')

A155305-08 (Soil)

Date Sampled
12/30/2015 14:35

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**86.4**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-131 (10-11')

A155305-09 (Soil)

Date Sampled
12/30/2015 14:40

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	95000	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Benzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
2-Butanone	ND	95000	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	LC
1,1-Dichloroethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
1,2-Dichloroethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
trans-1,2-Dichloroethene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
cis-1,2-Dichloroethene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
1,1-Dichloroethene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Ethylbenzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Tetrachloroethene	**100000**	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	D
Toluene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
1,1,1-Trichloroethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
1,1,2-Trichloroethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Trichloroethene	**2500**	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
1,2,4-Trimethylbenzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Vinyl chloride	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
m,p-Xylene	ND	4800	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
o-Xylene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Xylenes, total	ND	7100	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
n-Butyl Benzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
sec-Butyl Benzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Carbon disulfide	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Chloroethane	ND	24000	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Chloroform	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Dichlorodifluoromethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Isopropylbenzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
p-Isopropyltoluene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Naphthalene	ND	24000	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	E1, LC
n-Propyl Benzene	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Trichlorofluoromethane	ND	2400	ug/kg dry	100	01/04/2016	01/04/2016 17:41	EPA 8260B	
Surrogate: Dibromofluoromethane		*101 %*	*84.7-120*		*01/04/2016*	*01/04/2016 17:41*	*EPA 8260B*	
Surrogate: Toluene-d8		*106 %*	*90.5-108*		*01/04/2016*	*01/04/2016 17:41*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.9 %*	*88.3-113*		*01/04/2016*	*01/04/2016 17:41*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-131 (10-11')

A155305-09 (Soil)

Date Sampled
12/30/2015 14:40

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**89.5**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-132 (1-2')

A155305-10 (Soil)

Date Sampled
12/30/2015 15:50

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
2-Butanone	ND	1000	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
1,1-Dichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
cis-1,2-Dichloroethene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
1,1-Dichloroethene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Ethylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Tetrachloroethene	**170**	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Toluene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
1,1,1-Trichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
1,1,2-Trichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Trichloroethene	**29**	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
1,3,5-Trimethylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Vinyl chloride	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
m,p-Xylene	ND	50	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
o-Xylene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Xylenes, total	ND	75	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
n-Butyl Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Carbon disulfide	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Chloroethane	ND	250	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Chloroform	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Isopropylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Naphthalene	ND	250	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	E1, LC
n-Propyl Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 18:03	EPA 8260B	
Surrogate: Dibromofluoromethane		*99.7 %*	*84.7-120*		*01/04/2016*	*01/04/2016 18:03*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*	*90.5-108*		*01/04/2016*	*01/04/2016 18:03*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*98.4 %*	*88.3-113*		*01/04/2016*	*01/04/2016 18:03*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-132 (1-2')

A155305-10 (Soil)

Date Sampled
12/30/2015 15:50

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**90.8**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-132 (3-4')

A155305-11 (Soil)

Date Sampled
12/30/2015 15:55

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	2200	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Benzene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
2-Butanone	ND	2200	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	LC
1,1-Dichloroethane	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
1,2-Dichloroethane	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
trans-1,2-Dichloroethene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
cis-1,2-Dichloroethene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
1,1-Dichloroethene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Ethylbenzene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Tetrachloroethene	**2100**	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	D
Toluene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
1,1,1-Trichloroethane	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
1,1,2-Trichloroethane	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Trichloroethene	**200**	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
1,2,4-Trimethylbenzene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Vinyl chloride	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
m,p-Xylene	ND	110	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
o-Xylene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Xylenes, total	ND	160	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
n-Butyl Benzene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
sec-Butyl Benzene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Carbon disulfide	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Chloroethane	ND	540	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Chloroform	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Dichlorodifluoromethane	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Isopropylbenzene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
p-Isopropyltoluene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Naphthalene	ND	540	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	E1, LC
n-Propyl Benzene	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Trichlorofluoromethane	ND	54	ug/kg dry	2	01/04/2016	01/04/2016 18:24	EPA 8260B	
Surrogate: Dibromofluoromethane		*98.2 %*		*84.7-120*	*01/04/2016*	*01/04/2016 18:24*	*EPA 8260B*	
Surrogate: Toluene-d8		*106 %*		*90.5-108*	*01/04/2016*	*01/04/2016 18:24*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.4 %*		*88.3-113*	*01/04/2016*	*01/04/2016 18:24*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-132 (3-4')

A155305-11 (Soil)

Date Sampled
12/30/2015 15:55

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**86.1**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-132 (10-11')

A155305-12 (Soil)

Date Sampled
12/30/2015 16:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	52000	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Benzene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
2-Butanone	ND	52000	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
1,1-Dichloroethane	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
1,2-Dichloroethane	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
trans-1,2-Dichloroethene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
cis-1,2-Dichloroethene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
1,1-Dichloroethene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Ethylbenzene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Tetrachloroethene	**38000**	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	D
Toluene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
1,1,1-Trichloroethane	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
1,1,2-Trichloroethane	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Trichloroethene	**2400**	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
1,2,4-Trimethylbenzene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Vinyl chloride	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
m,p-Xylene	ND	2600	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
o-Xylene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Xylenes, total	ND	3900	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
n-Butyl Benzene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
sec-Butyl Benzene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Carbon disulfide	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Chloroethane	ND	13000	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Chloroform	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Dichlorodifluoromethane	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Isopropylbenzene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
p-Isopropyltoluene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Naphthalene	ND	13000	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	E1, LC
n-Propyl Benzene	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Trichlorofluoromethane	ND	1300	ug/kg dry	50	01/04/2016	01/04/2016 18:46	EPA 8260B	
Surrogate: Dibromofluoromethane		*98.8 %*	*84.7-120*		*01/04/2016*	*01/04/2016 18:46*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*	*90.5-108*		*01/04/2016*	*01/04/2016 18:46*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.6 %*	*88.3-113*		*01/04/2016*	*01/04/2016 18:46*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-132 (10-11')

A155305-12 (Soil)

Date Sampled
12/30/2015 16:00

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**93.0**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-133 (1-2')

A155305-13 (Soil)

Date Sampled
12/30/2015 16:40

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1100	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Benzene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
2-Butanone	ND	1100	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	LC
1,1-Dichloroethane	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
1,2-Dichloroethane	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
trans-1,2-Dichloroethene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
cis-1,2-Dichloroethene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
1,1-Dichloroethene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Ethylbenzene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Tetrachloroethene	**860**	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Toluene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
1,1,1-Trichloroethane	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
1,1,2-Trichloroethane	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Trichloroethene	**480**	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
1,3,5-Trimethylbenzene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
1,2,4-Trimethylbenzene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Vinyl chloride	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
m,p-Xylene	ND	53	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
o-Xylene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Xylenes, total	ND	80	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
n-Butyl Benzene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
sec-Butyl Benzene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Carbon disulfide	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Chloroethane	ND	270	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Chloroform	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Dichlorodifluoromethane	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Isopropylbenzene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
p-Isopropyltoluene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Naphthalene	ND	270	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	E1, LC
n-Propyl Benzene	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Trichlorofluoromethane	ND	27	ug/kg dry	1	01/04/2016	01/04/2016 19:07	EPA 8260B	
Surrogate: Dibromofluoromethane		*97.6 %*		*84.7-120*	*01/04/2016*	*01/04/2016 19:07*	*EPA 8260B*	
Surrogate: Toluene-d8		*107 %*		*90.5-108*	*01/04/2016*	*01/04/2016 19:07*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*99.0 %*		*88.3-113*	*01/04/2016*	*01/04/2016 19:07*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-133 (1-2')

A155305-13 (Soil)

Date Sampled
12/30/2015 16:40

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**88.7**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-133 (3-4')

A155305-14 (Soil)

Date Sampled
12/30/2015 16:45

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
2-Butanone	ND	1000	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
1,1-Dichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
cis-1,2-Dichloroethene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
1,1-Dichloroethene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Ethylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Tetrachloroethene	**660**	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Toluene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
1,1,1-Trichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
1,1,2-Trichloroethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Trichloroethene	**140**	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
1,3,5-Trimethylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Vinyl chloride	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
m,p-Xylene	ND	50	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
o-Xylene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Xylenes, total	ND	75	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
n-Butyl Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Carbon disulfide	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Chloroethane	ND	250	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Chloroform	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Isopropylbenzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Naphthalene	ND	250	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	E1, LC
n-Propyl Benzene	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/kg dry	1	01/04/2016	01/04/2016 19:29	EPA 8260B	
Surrogate: Dibromofluoromethane		*97.5 %*		*84.7-120*	*01/04/2016*	*01/04/2016 19:29*	*EPA 8260B*	
Surrogate: Toluene-d8		*101 %*		*90.5-108*	*01/04/2016*	*01/04/2016 19:29*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.9 %*		*88.3-113*	*01/04/2016*	*01/04/2016 19:29*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-133 (3-4')

A155305-14 (Soil)

Date Sampled
12/30/2015 16:45

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**84.5**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-133 (10-11')

A155305-15 (Soil)

Date Sampled
12/30/2015 16:50

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601003**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	24000	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Benzene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
2-Butanone	ND	24000	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	LC
1,1-Dichloroethane	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
1,2-Dichloroethane	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
trans-1,2-Dichloroethene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
cis-1,2-Dichloroethene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
1,1-Dichloroethene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Ethylbenzene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Tetrachloroethene	**21000**	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	D
Toluene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
1,1,1-Trichloroethane	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
1,1,2-Trichloroethane	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Trichloroethene	**3000**	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
1,2,4-Trimethylbenzene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Vinyl chloride	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
m,p-Xylene	ND	1200	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
o-Xylene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Xylenes, total	ND	1800	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
n-Butyl Benzene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
sec-Butyl Benzene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Carbon disulfide	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Chloroethane	ND	6100	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Chloroform	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Dichlorodifluoromethane	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Isopropylbenzene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
p-Isopropyltoluene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Naphthalene	ND	6100	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	E1, LC
n-Propyl Benzene	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Trichlorofluoromethane	ND	610	ug/kg dry	25	01/04/2016	01/04/2016 19:50	EPA 8260B	
Surrogate: Dibromofluoromethane		*98.6 %*		*84.7-120*	*01/04/2016*	*01/04/2016 19:50*	*EPA 8260B*	
Surrogate: Toluene-d8		*105 %*		*90.5-108*	*01/04/2016*	*01/04/2016 19:50*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*97.6 %*		*88.3-113*	*01/04/2016*	*01/04/2016 19:50*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-133 (10-11')

A155305-15 (Soil)

Date Sampled
12/30/2015 16:50

ECCS

Classical Chemistry Parameters — **Preparation Batch: A601004**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
% Solids	**94.6**	0.00	% by Weight	1	01/04/2016	01/05/2016 09:20	SM 2540B	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A601003 - EPA 5030B										
Blank (A601003-BLK1)				Prepared: 01/04/2016 Analyzed: 01/04/2016 14:26						
Acetone	ND	1000	ug/kg wet							
Benzene	ND	25	ug/kg wet							
2-Butanone	ND	1000	ug/kg wet							
1,1-Dichloroethane	ND	25	ug/kg wet							
1,2-Dichloroethane	ND	25	ug/kg wet							
trans-1,2-Dichloroethene	ND	25	ug/kg wet							
cis-1,2-Dichloroethene	ND	25	ug/kg wet							
1,1-Dichloroethene	ND	25	ug/kg wet							
Ethylbenzene	ND	25	ug/kg wet							
Tetrachloroethene	ND	25	ug/kg wet							
Toluene	ND	25	ug/kg wet							
1,1,1-Trichloroethane	ND	25	ug/kg wet							
1,1,2-Trichloroethane	ND	25	ug/kg wet							
Trichloroethene	ND	25	ug/kg wet							
1,3,5-Trimethylbenzene	ND	25	ug/kg wet							
1,2,4-Trimethylbenzene	ND	25	ug/kg wet							
Vinyl chloride	ND	25	ug/kg wet							
m,p-Xylene	ND	50	ug/kg wet							
o-Xylene	ND	25	ug/kg wet							
Xylenes, total	ND	75	ug/kg wet							
n-Butyl Benzene	ND	25	ug/kg wet							
sec-Butyl Benzene	ND	25	ug/kg wet							
Carbon disulfide	ND	25	ug/kg wet							
Chloroethane	ND	250	ug/kg wet							
Chloroform	ND	25	ug/kg wet							
Dichlorodifluoromethane	ND	25	ug/kg wet							
Isopropylbenzene	ND	25	ug/kg wet							
p-Isopropyltoluene	ND	25	ug/kg wet							
Naphthalene	ND	250	ug/kg wet							
n-Propyl Benzene	ND	25	ug/kg wet							
Trichlorofluoromethane	ND	25	ug/kg wet							
Surrogate: Dibromofluoromethane	*24.0*		*ug/L*	*25.00*		*95.8*	*84.7-120*			
Surrogate: Toluene-d8	*25.3*		*ug/L*	*25.00*		*101*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*24.3*		*ug/L*	*25.00*		*97.4*	*88.3-113*			
LCS (A601003-BS1)				Prepared: 01/04/2016 Analyzed: 01/04/2016 20:33						
Acetone	32.0		ug/L	50.00		64.0	42.3-174			
Benzene	4.91		ug/L	5.000		98.2	80.5-123			
2-Butanone	30.4		ug/L	50.00		60.8	51.2-152			
1,1-Dichloroethane	4.94		ug/L	5.000		98.8	80.9-127			
1,2-Dichloroethane	4.49		ug/L	5.000		89.8	72.8-138			
trans-1,2-Dichloroethene	4.96		ug/L	5.000		99.2	71.3-128			
cis-1,2-Dichloroethene	4.59		ug/L	5.000		91.8	81.9-121			
1,1-Dichloroethene	4.70		ug/L	5.000		94.0	66.8-129			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A601003 - EPA 5030B										
LCS (A601003-BS1)				Prepared: 01/04/2016 Analyzed: 01/04/2016 20:33						
Ethylbenzene	5.24		ug/L	5.000		105	89.9-113			
Tetrachloroethene	5.26		ug/L	5.000		105	85.1-116			
Toluene	5.34		ug/L	5.000		107	78.8-117			
1,1,1-Trichloroethane	5.05		ug/L	5.000		101	82.3-123			
1,1,2-Trichloroethane	4.28		ug/L	5.000		85.6	74.9-130			
Trichloroethene	5.23		ug/L	5.000		105	83.1-118			
1,3,5-Trimethylbenzene	4.95		ug/L	5.000		99.0	85.2-120			
1,2,4-Trimethylbenzene	4.99		ug/L	5.000		99.8	86.8-118			
Vinyl chloride	6.24		ug/L	5.000		125	60.9-137			
m,p-Xylene	10.8		ug/L	10.00		108	90.1-114			
o-Xylene	5.11		ug/L	5.000		102	85.8-113			
n-Butyl Benzene	4.98		ug/L	5.000		99.6	88.2-119			
sec-Butyl Benzene	5.25		ug/L	5.000		105	89.9-118			
Carbon disulfide	4.97		ug/L	5.000		99.4	72.2-127			
Chloroethane	9.71		ug/L	5.000		194	14.6-199			
Chloroform	4.73		ug/L	5.000		94.6	77.9-125			
Dichlorodifluoromethane	7.00		ug/L	5.000		140	67.8-137			
Isopropylbenzene	5.18		ug/L	5.000		104	92.8-112			
p-Isopropyltoluene	5.09		ug/L	5.000		102	89.8-118			
Naphthalene	3.07		ug/L	5.000		61.4	72.9-122			
n-Propyl Benzene	5.23		ug/L	5.000		105	87.3-119			
Trichlorofluoromethane	9.58		ug/L	5.000		192	40.3-174			
Surrogate: Dibromofluoromethane	*24.1*		*ug/L*	*25.00*		*96.2*	*84.7-120*			
Surrogate: Toluene-d8	*27.1*		*ug/L*	*25.00*		*108*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*24.9*		*ug/L*	*25.00*		*99.7*	*88.3-113*			
Matrix Spike (A601003-MS1)		**Source: A155305-02**		Prepared: 01/04/2016 Analyzed: 01/04/2016 20:54						
Acetone	36.4		ug/L	50.00	ND	72.8	37.5-179			
Benzene	4.78		ug/L	5.000	ND	95.6	77-128			
2-Butanone	33.2		ug/L	50.00	ND	66.4	54.7-159			
1,1-Dichloroethane	5.04		ug/L	5.000	ND	101	77.3-131			
1,2-Dichloroethane	4.63		ug/L	5.000	ND	92.6	73.7-139			
trans-1,2-Dichloroethene	5.07		ug/L	5.000	ND	101	68.9-132			
cis-1,2-Dichloroethene	5.24		ug/L	5.000	0.560	93.6	80-124			
1,1-Dichloroethene	5.25		ug/L	5.000	ND	105	60.7-145			
Ethylbenzene	4.88		ug/L	5.000	0.0600	96.4	85.7-117			
Tetrachloroethene	6.67		ug/L	5.000	1.66	100	80.7-123			
Toluene	4.91		ug/L	5.000	0.130	95.6	72.1-124			
1,1,1-Trichloroethane	4.91		ug/L	5.000	ND	98.2	80.2-124			
1,1,2-Trichloroethane	4.38		ug/L	5.000	ND	87.6	73.9-137			
Trichloroethene	5.87		ug/L	5.000	0.960	98.2	81.5-119			
1,3,5-Trimethylbenzene	4.73		ug/L	5.000	ND	94.6	82-122			
1,2,4-Trimethylbenzene	4.94		ug/L	5.000	0.200	94.8	80.4-122			
Vinyl chloride	5.77		ug/L	5.000	ND	115	75.5-134			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A601003 - EPA 5030B										
Matrix Spike (A601003-MS1)		**Source: A155305-02**		Prepared: 01/04/2016 Analyzed: 01/04/2016 20:54						
m,p-Xylene	10.0		ug/L	10.00	0.210	98.0	87.9-115			
o-Xylene	4.99		ug/L	5.000	0.180	96.2	82.9-116			
n-Butyl Benzene	4.85		ug/L	5.000	ND	97.0	87.5-118			
sec-Butyl Benzene	4.87		ug/L	5.000	ND	97.4	85.3-121			
Carbon disulfide	5.29		ug/L	5.000	ND	106	69.4-131			
Chloroethane	17.5		ug/L	5.000	ND	351	25.1-230			M
Chloroform	4.80		ug/L	5.000	0.0800	94.4	76.4-128			
Dichlorodifluoromethane	7.12		ug/L	5.000	ND	142	69.4-138			M
Isopropylbenzene	4.95		ug/L	5.000	ND	99.0	90.3-116			
p-Isopropyltoluene	4.90		ug/L	5.000	ND	98.0	82-126			
Naphthalene	3.50		ug/L	5.000	0.340	63.2	66.1-137			M
n-Propyl Benzene	4.87		ug/L	5.000	ND	97.4	85.2-121			
Trichlorofluoromethane	7.59		ug/L	5.000	ND	152	17-192			
Surrogate: Dibromofluoromethane	*25.2*		*ug/L*	*25.00*		*101*	*84.7-120*			
Surrogate: Toluene-d8	*25.6*		*ug/L*	*25.00*		*102*	*90.5-108*			
Surrogate: 4-Bromofluorobenzene	*25.2*		*ug/L*	*25.00*		*101*	*88.3-113*			
Matrix Spike Dup (A601003-MSD1)		**Source: A155305-02**		Prepared: 01/04/2016 Analyzed: 01/04/2016 21:15						
Acetone	32.0		ug/L	50.00	ND	63.9	37.5-179	13.0	20	
Benzene	4.84		ug/L	5.000	ND	96.8	77-128	1.25	20	
2-Butanone	30.8		ug/L	50.00	ND	61.6	54.7-159	7.56	20	
1,1-Dichloroethane	4.92		ug/L	5.000	ND	98.4	77.3-131	2.41	20	
1,2-Dichloroethane	4.40		ug/L	5.000	ND	88.0	73.7-139	5.09	20	
trans-1,2-Dichloroethene	4.77		ug/L	5.000	ND	95.4	68.9-132	6.10	20	
cis-1,2-Dichloroethene	5.21		ug/L	5.000	0.560	93.0	80-124	0.643	20	
1,1-Dichloroethene	4.71		ug/L	5.000	ND	94.2	60.7-145	10.8	20	
Ethylbenzene	5.20		ug/L	5.000	0.0600	103	85.7-117	6.43	20	
Tetrachloroethene	6.83		ug/L	5.000	1.66	103	80.7-123	3.14	20	
Toluene	5.37		ug/L	5.000	0.130	105	72.1-124	9.18	20	
1,1,1-Trichloroethane	5.01		ug/L	5.000	ND	100	80.2-124	2.02	20	
1,1,2-Trichloroethane	4.32		ug/L	5.000	ND	86.4	73.9-137	1.38	20	
Trichloroethene	6.05		ug/L	5.000	0.960	102	81.5-119	3.60	20	
1,3,5-Trimethylbenzene	4.96		ug/L	5.000	ND	99.2	82-122	4.75	20	
1,2,4-Trimethylbenzene	5.22		ug/L	5.000	0.200	100	80.4-122	5.74	20	
Vinyl chloride	6.10		ug/L	5.000	ND	122	75.5-134	5.56	20	
m,p-Xylene	10.8		ug/L	10.00	0.210	105	87.9-115	7.28	20	
o-Xylene	5.28		ug/L	5.000	0.180	102	82.9-116	5.85	20	
n-Butyl Benzene	4.96		ug/L	5.000	ND	99.2	87.5-118	2.24	20	
sec-Butyl Benzene	5.16		ug/L	5.000	ND	103	85.3-121	5.78	20	
Carbon disulfide	4.79		ug/L	5.000	ND	95.8	69.4-131	9.92	20	
Chloroethane	9.86		ug/L	5.000	ND	197	25.1-230	56.0	20	X
Chloroform	4.64		ug/L	5.000	0.0800	91.2	76.4-128	3.45	20	
Dichlorodifluoromethane	6.96		ug/L	5.000	ND	139	69.4-138	2.27	20	M
Isopropylbenzene	5.10		ug/L	5.000	ND	102	90.3-116	2.99	20	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A601003 - EPA 5030B										
Matrix Spike Dup (A601003-MSD1)		**Source: A155305-02**		Prepared: 01/04/2016 Analyzed: 01/04/2016 21:15						
p-Isopropyltoluene	5.01		ug/L	5.000	ND	100	82-126	2.22	20	
Naphthalene	3.47		ug/L	5.000	0.340	62.6	66.1-137	0.954	20	M
n-Propyl Benzene	5.21		ug/L	5.000	ND	104	85.2-121	6.75	20	
Trichlorofluoromethane	9.57		ug/L	5.000	ND	191	17-192	23.1	20	X
Surrogate: Dibromofluoromethane	*23.5*		*ug/L*	*25.00*		*93.8*	*84.7-120*			
Surrogate: Toluene-d8	*27.3*		*ug/L*	*25.00*		*109*	*90.5-108*			*S*
Surrogate: 4-Bromofluorobenzene	*24.5*		*ug/L*	*25.00*		*97.9*	*88.3-113*			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Classical Chemistry Parameters - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A601004 - % Solids										
Duplicate (A601004-DUP1)		**Source: A160201-09**		Prepared: 01/04/2016 Analyzed: 01/05/2016 09:20						
% Solids	85.4	0.00	% by Weight		86.4			1.16	20	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Notes and Definitions

X	Precision for the matrix spike duplicate, laboratory control sample duplicate or lab duplicate was outside of control limits.
S	Surrogate recovery was outside of laboratory control limits due to an apparent matrix effect.
M	The matrix spike and/or matrix spike duplicate recovery was outside of the laboratory control limits.
LC	Resuts may be biased low because of low continuing calibration verification (CCV).
HC	Results may be biased high because of high continuing calibration verification (CCV).
E1	Estimated value because of quality control sample exceedances.
D	Data reported from a dilution
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. If the word 'dry' does not appear after the units, results are reported on an as-is basis.
RPD	Relative Percent Difference

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

CHAIN OF CUSTODY

Lab Work Order #: A155305

Mail Report To: Stacy Metz
Company: TRC Environmental Corp
Address: 1540 Eisenhower Place
Ann Arbor, MI 48108
E-mail Address: smetz@trcsolutions.com
Invoice To: Stacy Metz
Company: TRC Environmental Corp
Address:
cc: MPowers@trcsolutions.com

Project Number: 220003.0000
Project Name: TPC PCE
Project Location: Tecumseh MI
Turn Around (check one): ☐ Normal ☐ 5 BDs ☐ 3 BDs ☐ 2 BDs ☐ 24 hrs
If Rush, Report Due Date:
Sampled By (Print): Mellisa Powers

Preservation Codes: F
Analyses Requested: VOCs, Dry Weight

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOCs	Dry Weight					Comments	Lab ID	Lab Receipt Time
Methanol Blank	12/30/2015		O	1	☒	☐	☐	☐	☐	☐		01	
Temp Blank	12/30/2015		O	1	☐	☐	☐	☐	☐	☐		—	
B-129(1-2')	12/30/2015	11:00	S	3	☒	☒	☐	☐	☐	☐		02	
B-129(3-4')	12/30/2015	11:05	S	3	☒	☒	☐	☐	☐	☐	One meoh vial had extra label	03	
B-130(1-2')	12/30/2015	11:50	S	3	☒	☒	☐	☐	☐	☐		04	
B-130(3-4')	12/30/2015	12:00	S	3	☒	☒	☐	☐	☐	☐		05	
B-130(10-11')	12/30/2015	12:30	S	3	☒	☒	☐	☐	☐	☐		06	
B-131(1-2')	12/30/2015	14:30	S	2	☒	☒	☐	☐	☐	☐		07	
B-131(3-4')	12/30/2015	14:35	S	2	☒	☒	☐	☐	☐	☐		08	
B-131(10-11')	12/30/2015	14:40	S	2	☒	☒	☐	☐	☐	☐		09	

Preservation Codes
A=None B=HCL C=H_2SO_4
D=HNO_3 E=EnCore F=Methanol
G=NaOH O=Other (Indicate)

Matrix Codes
A=Air S=Soil W=Water O=Other

Rush TAT Multipliers
5 Business Days = 1.5x
3 Business Days = 2x
2 Business Days = 2.25x
24 Hours = 2.5x
must be pre-arranged

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Mellisa Powers Mellisa Powers	12/30/2015	1910	FedEx	12/30/2015	1910
			Jessica [illegible]	12-31-15	0945

Custody Seal: ☐ Present ☒ Absent ☐ Intact ☐ Not Intact
Seal #s:
Shipped Via: FedEx
Receipt Temp: 1.9°C
Temp Blank: ☒ Y ☐ N

Download this form at www.eccsmobilelab.com
WHITE - REPORT COPY YELLOW - LABORATORY COPY PINK - SAMPLER/SUBMITTER Rev. 5/11

SIN150256900
Exp. 03-26-17

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

CHAIN OF CUSTODY

Lab Work Order #: A155305

Project Number: 220003.0000
Project Name: TPC PCE
Project Location: Tecumseh MI
Turn Around (check one): ☐ Normal ☐ 5 BDs ☐ 3 BDs ☐ 2 BDs ☐ 24 hrs
If Rush, Report Due Date:
Sampled By (Print): Mellisa Powers

Preservation Codes
Analyses Requested: F

Mail Report To: Stacy Metz
Company: TRC Environmental Corp
Address: 1540 Eisenhower Place
Ann Arbor, MI 48108
E-mail Address: smetz@trcsolutions.com
Invoice To: Stacy Metz
Company: TRC Environmental Corp
Address:
cc: mpowers@trcsolutions.com

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOCs	Dry Weight					Comments	Lab ID	Lab Receipt Time
B-132(1-2')	12/30/2015	1550	S	2	☒	☒	☐	☐	☐	☐		10	
B-132(3-4')	12/30/2015	1555	S		☒	☒	☐	☐	☐	☐	~~VOA~~ MeOH vial labeled B-123(3-4')	11	
B-132(10-11')	12/30/2015	1600	S		☒	☒	☐	☐	☐	☐		12	
B-133(1-2')	12/30/2015	1640	S		☒	☒	☐	☐	☐	☐		13	
B-133(3-4')	12/30/2015	1645	S		☒	☒	☐	☐	☐	☐		14	
B-133(10-11')	12/30/2015	1650	S		☒	☒	☐	☐	☐	☐	meOH vial had extra label added.	15	
	12/30/2015		S		☒	☒	☐	☐	☐	☐			
	12/30/2015		S		☒	☒	☐	☐	☐	☐			
	12/30/2015		S		☒	☒	☐	☐	☐	☐			
	12/30/2015		S		☒	☒	☐	☐	☐	☐			

Preservation Codes
A=None B=HCL C=H_2SO_4
D=HNO_3 E=EnCore F=Methanol
G=NaOH O=Other (Indicate)

Matrix Codes
A=Air S=Soil W=Water O=Other

Rush TAT Multipliers
5 Business Days = 1.5x
3 Business Days = 2x
2 Business Days = 2.25x
24 Hours = 2.5x
must be pre-arranged

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Mellisa Powers	12/30/2015	1910	FedEx	12/30/2015	1910
				12-31-15	0945

Custody Seal: ☐ Present ☒ Absent ☐ Intact ☐ Not Intact
Seal #s:
Shipped Via: FedEx
Receipt Temp: 1.9°C
Temp Blank: ☒ Y ☐ N

Download this form at www.eccsmobilelab.com
WHITE - REPORT COPY YELLOW - LABORATORY COPY PINK - SAMPLER/SUBMITTER Rev. 5/11

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

January 12, 2016

Stacy Metz
TRC Solutions
1540 Eisenhower Place
Ann Arbor, MI 48108

RE: TPC PCE Investigation - Tecumseh, MI

Enclosed are the analytical results for the samples received by the laboratory on 01/09/2016.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. These results are in compliance with the 2009 NELAC Standards and the appropriate agencies listed below, unless otherwise noted in the case narrative. This analytical report should be reproduced in its entirety.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jessica Esser For Nick Nigro

President

Certification List			Expires
DODELAP	DOD ELAP Accreditation (A2LA)	3269.01	03/31/2016
FDOH	Florida Secondary NELAP Accreditation	E871093	06/30/2016
ILEPA	Illinois Secondary NELAP Accreditation	003174	04/30/2016
KDHE	Kansas Secondary NELAP Accreditation	E-10384	01/31/2016
LELAP	Louisiana Primary NELAP Accreditation	04165	06/30/2016
NJDEP	New Jersey Secondary NELAP Accreditation	WI004	06/30/2016
ODEQ	Oklahoma Department of Environmental Quality Accreditation	2014-153	08/31/2016
TCEQ	Texas Secondary NELAP Accreditation	T104704504-15-6	11/30/2016
WDNR	Wisconsin Certification under NR 149	113289110	08/31/2016

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions		Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place		Project Number:	220003.0000
Ann Arbor MI, 48108		Project Manager:	Stacy Metz

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Trip Blank	A160217-01	Water	01/07/2016	01/09/2016
B-131 (14-17')	A160217-02	Water	01/07/2016	01/09/2016
B-130 (14-17')	A160217-03	Water	01/07/2016	01/09/2016
B-129 (14-17')	A160217-04	Water	01/07/2016	01/09/2016
B-132 (14-17')	A160217-05	Water	01/07/2016	01/09/2016
B-133 (14.5-17.5')	A160217-06	Water	01/07/2016	01/09/2016
Dup-01	A160217-07	Water	01/07/2016	01/09/2016

CASE NARRATIVE

Sample Receipt Information:
7 samples were received on 01/09/2016. Samples were received at 0.3 degrees Celsius. Samples were received in acceptable condition.

Please see the chain of custody (COC) document at the end of this report for additional information.

Continuing Calibration Verification (CCV):
The LC footnote on samples A160217-01 through A160217-07 states that there were low CCV recoveries for 2-butanone and naphthalene. The lower control limit is 70% and the recoveries were 66.3% and 64.8%, respectively.

CCV also indicates a potential high bias for trichlorofluoromethane for samples A160217-01 through A160217-07. Samples were less than the reporting limit for this analyte so no further action is required.

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Trip Blank

A160217-01 (Water)

Date Sampled
01/07/2016 00:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601028**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	20	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Benzene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
2-Butanone	ND	20	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	LC
1,1-Dichloroethane	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
1,2-Dichloroethane	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
trans-1,2-Dichloroethene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
cis-1,2-Dichloroethene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
1,1-Dichloroethene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Ethylbenzene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Tetrachloroethene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Toluene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
1,1,1-Trichloroethane	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
1,1,2-Trichloroethane	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Trichloroethene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
1,3,5-Trimethylbenzene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
1,2,4-Trimethylbenzene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Vinyl chloride	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
m,p-Xylene	ND	1.0	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
o-Xylene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Xylenes, total	ND	1.5	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
n-Butyl Benzene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
sec-Butyl Benzene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Carbon disulfide	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Chloroethane	ND	5.0	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Chloroform	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Dichlorodifluoromethane	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Isopropylbenzene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
p-Isopropyltoluene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Naphthalene	ND	5.0	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	LC
n-Propyl Benzene	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Trichlorofluoromethane	ND	0.50	ug/L	1	01/11/2016	01/11/2016 15:40	EPA 8260B	
Surrogate: Dibromofluoromethane		*97.8 %*		*81.3-129*	*01/11/2016*	*01/11/2016 15:40*	*EPA 8260B*	
Surrogate: Toluene-d8		*89.9 %*		*87.3-110*	*01/11/2016*	*01/11/2016 15:40*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*90.3 %*		*86.7-110*	*01/11/2016*	*01/11/2016 15:40*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-131 (14-17')

A160217-02 (Water)

Date Sampled
01/07/2016 10:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601028**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	100	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Benzene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
2-Butanone	ND	100	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	LC
1,1-Dichloroethane	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
1,2-Dichloroethane	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
trans-1,2-Dichloroethene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
cis-1,2-Dichloroethene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
1,1-Dichloroethene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Ethylbenzene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Tetrachloroethene	**9.4**	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	D
Toluene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
1,1,1-Trichloroethane	**6.2**	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	D
1,1,2-Trichloroethane	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Trichloroethene	**110**	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
1,2,4-Trimethylbenzene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Vinyl chloride	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
m,p-Xylene	ND	5.0	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
o-Xylene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Xylenes, total	ND	7.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
n-Butyl Benzene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
sec-Butyl Benzene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Carbon disulfide	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Chloroethane	ND	25	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Chloroform	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Dichlorodifluoromethane	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Isopropylbenzene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
p-Isopropyltoluene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Naphthalene	ND	25	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	LC
n-Propyl Benzene	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Trichlorofluoromethane	ND	2.5	ug/L	5	01/11/2016	01/11/2016 16:40	EPA 8260B	
Surrogate: Dibromofluoromethane		*102 %*		*81.3-129*	*01/11/2016*	*01/11/2016 16:40*	*EPA 8260B*	
Surrogate: Toluene-d8		*95.4 %*		*87.3-110*	*01/11/2016*	*01/11/2016 16:40*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*96.2 %*		*86.7-110*	*01/11/2016*	*01/11/2016 16:40*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-130 (14-17')

A160217-03 (Water)

Date Sampled
01/07/2016 10:35

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601028**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	200	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Benzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
2-Butanone	ND	200	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	LC
1,1-Dichloroethane	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
1,2-Dichloroethane	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
trans-1,2-Dichloroethene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
cis-1,2-Dichloroethene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
1,1-Dichloroethene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Ethylbenzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Tetrachloroethene	**250**	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	D
Toluene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
1,1,1-Trichloroethane	**10**	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	D
1,1,2-Trichloroethane	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Trichloroethene	**190**	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
1,2,4-Trimethylbenzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Vinyl chloride	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
m,p-Xylene	ND	10	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
o-Xylene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Xylenes, total	ND	15	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
n-Butyl Benzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
sec-Butyl Benzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Carbon disulfide	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Chloroethane	ND	50	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Chloroform	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Dichlorodifluoromethane	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Isopropylbenzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
p-Isopropyltoluene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Naphthalene	ND	50	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	LC
n-Propyl Benzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Trichlorofluoromethane	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:09	EPA 8260B	
Surrogate: Dibromofluoromethane		*100 %*		*81.3-129*	*01/11/2016*	*01/11/2016 17:09*	*EPA 8260B*	
Surrogate: Toluene-d8		*91.7 %*		*87.3-110*	*01/11/2016*	*01/11/2016 17:09*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*89.6 %*		*86.7-110*	*01/11/2016*	*01/11/2016 17:09*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-129 (14-17')

A160217-04 (Water)

Date Sampled
01/07/2016 13:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601028**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	200	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Benzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
2-Butanone	ND	200	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	LC
1,1-Dichloroethane	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
1,2-Dichloroethane	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
trans-1,2-Dichloroethene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
cis-1,2-Dichloroethene	**17**	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	D
1,1-Dichloroethene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Ethylbenzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Tetrachloroethene	**230**	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	D
Toluene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
1,1,1-Trichloroethane	**26**	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	D
1,1,2-Trichloroethane	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Trichloroethene	**140**	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
1,2,4-Trimethylbenzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Vinyl chloride	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
m,p-Xylene	ND	10	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
o-Xylene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Xylenes, total	ND	15	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
n-Butyl Benzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
sec-Butyl Benzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Carbon disulfide	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Chloroethane	ND	50	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Chloroform	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Dichlorodifluoromethane	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Isopropylbenzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
p-Isopropyltoluene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Naphthalene	ND	50	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	LC
n-Propyl Benzene	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Trichlorofluoromethane	ND	5.0	ug/L	10	01/11/2016	01/11/2016 17:39	EPA 8260B	
Surrogate: Dibromofluoromethane		*98.1 %*		*81.3-129*	*01/11/2016*	*01/11/2016 17:39*	*EPA 8260B*	
Surrogate: Toluene-d8		*91.2 %*		*87.3-110*	*01/11/2016*	*01/11/2016 17:39*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*89.3 %*		*86.7-110*	*01/11/2016*	*01/11/2016 17:39*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-132 (14-17')

A160217-05 (Water)

Date Sampled
01/07/2016 13:02

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601028**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	400	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Benzene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
2-Butanone	ND	400	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	LC
1,1-Dichloroethane	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
1,2-Dichloroethane	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
trans-1,2-Dichloroethene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
cis-1,2-Dichloroethene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
1,1-Dichloroethene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Ethylbenzene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Tetrachloroethene	**100**	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	D
Toluene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
1,1,1-Trichloroethane	**47**	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	D
1,1,2-Trichloroethane	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Trichloroethene	**440**	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
1,2,4-Trimethylbenzene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Vinyl chloride	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
m,p-Xylene	ND	20	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
o-Xylene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Xylenes, total	ND	30	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
n-Butyl Benzene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
sec-Butyl Benzene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Carbon disulfide	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Chloroethane	ND	100	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Chloroform	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Dichlorodifluoromethane	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Isopropylbenzene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
p-Isopropyltoluene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Naphthalene	ND	100	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	LC
n-Propyl Benzene	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Trichlorofluoromethane	ND	10	ug/L	20	01/11/2016	01/11/2016 18:08	EPA 8260B	
Surrogate: Dibromofluoromethane		*98.3 %*		*81.3-129*	*01/11/2016*	*01/11/2016 18:08*	*EPA 8260B*	
Surrogate: Toluene-d8		*91.8 %*		*87.3-110*	*01/11/2016*	*01/11/2016 18:08*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*89.6 %*		*86.7-110*	*01/11/2016*	*01/11/2016 18:08*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

B-133 (14.5-17.5')

A160217-06 (Water)

Date Sampled
01/07/2016 14:35

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601028**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Benzene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
2-Butanone	ND	1000	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	LC
1,1-Dichloroethane	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
cis-1,2-Dichloroethene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
1,1-Dichloroethene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Ethylbenzene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Tetrachloroethene	**29**	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	D
Toluene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
1,1,1-Trichloroethane	**660**	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	D
1,1,2-Trichloroethane	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Trichloroethene	**1500**	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Vinyl chloride	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
m,p-Xylene	ND	50	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
o-Xylene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Xylenes, total	ND	75	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
n-Butyl Benzene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Carbon disulfide	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Chloroethane	ND	250	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Chloroform	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Isopropylbenzene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Naphthalene	ND	250	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	LC
n-Propyl Benzene	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/L	50	01/11/2016	01/11/2016 18:38	EPA 8260B	
Surrogate: Dibromofluoromethane		*103 %*		*81.3-129*	*01/11/2016*	*01/11/2016 18:38*	*EPA 8260B*	
Surrogate: Toluene-d8		*92.2 %*		*87.3-110*	*01/11/2016*	*01/11/2016 18:38*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*89.2 %*		*86.7-110*	*01/11/2016*	*01/11/2016 18:38*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Dup-01

A160217-07 (Water)

Date Sampled
01/07/2016 00:00

ECCS

Volatile Organic Compounds by Method 8260 - Purge and Trap — **Preparation Batch: A601028**

Analyte	Result	Reporting Limit	Units	Dilution	Prepared	Analyzed	Method	Qualifiers
Acetone	ND	1000	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Benzene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
2-Butanone	ND	1000	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	LC
1,1-Dichloroethane	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
1,2-Dichloroethane	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
trans-1,2-Dichloroethene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
cis-1,2-Dichloroethene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
1,1-Dichloroethene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Ethylbenzene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Tetrachloroethene	**28**	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	D
Toluene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
1,1,1-Trichloroethane	**660**	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	D
1,1,2-Trichloroethane	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Trichloroethene	**1500**	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	D
1,3,5-Trimethylbenzene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
1,2,4-Trimethylbenzene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Vinyl chloride	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
m,p-Xylene	ND	50	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
o-Xylene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Xylenes, total	ND	75	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
n-Butyl Benzene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
sec-Butyl Benzene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Carbon disulfide	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Chloroethane	ND	250	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Chloroform	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Dichlorodifluoromethane	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Isopropylbenzene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
p-Isopropyltoluene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Naphthalene	ND	250	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	LC
n-Propyl Benzene	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Trichlorofluoromethane	ND	25	ug/L	50	01/11/2016	01/11/2016 19:08	EPA 8260B	
Surrogate: Dibromofluoromethane		*101 %*		*81.3-129*	*01/11/2016*	*01/11/2016 19:08*	*EPA 8260B*	
Surrogate: Toluene-d8		*90.9 %*		*87.3-110*	*01/11/2016*	*01/11/2016 19:08*	*EPA 8260B*	
Surrogate: 4-Bromofluorobenzene		*87.4 %*		*86.7-110*	*01/11/2016*	*01/11/2016 19:08*	*EPA 8260B*	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A601028 - EPA 5030B										
Blank (A601028-BLK1)				Prepared: 01/11/2016 Analyzed: 01/11/2016 14:30						
Acetone	ND	20	ug/L							
Benzene	ND	0.50	ug/L							
2-Butanone	ND	20	ug/L							
1,1-Dichloroethane	ND	0.50	ug/L							
1,2-Dichloroethane	ND	0.50	ug/L							
trans-1,2-Dichloroethene	ND	0.50	ug/L							
cis-1,2-Dichloroethene	ND	0.50	ug/L							
1,1-Dichloroethene	ND	0.50	ug/L							
Ethylbenzene	ND	0.50	ug/L							
Tetrachloroethene	ND	0.50	ug/L							
Toluene	ND	0.50	ug/L							
1,1,1-Trichloroethane	ND	0.50	ug/L							
1,1,2-Trichloroethane	ND	0.50	ug/L							
Trichloroethene	ND	0.50	ug/L							
1,3,5-Trimethylbenzene	ND	0.50	ug/L							
1,2,4-Trimethylbenzene	ND	0.50	ug/L							
Vinyl chloride	ND	0.50	ug/L							
m,p-Xylene	ND	1.0	ug/L							
o-Xylene	ND	0.50	ug/L							
Xylenes, total	ND	1.5	ug/L							
n-Butyl Benzene	ND	0.50	ug/L							
sec-Butyl Benzene	ND	0.50	ug/L							
Carbon disulfide	ND	0.50	ug/L							
Chloroethane	ND	5.0	ug/L							
Chloroform	ND	0.50	ug/L							
Dichlorodifluoromethane	ND	0.50	ug/L							
Isopropylbenzene	ND	0.50	ug/L							
p-Isopropyltoluene	ND	0.50	ug/L							
Naphthalene	ND	5.0	ug/L							
n-Propyl Benzene	ND	0.50	ug/L							
Trichlorofluoromethane	ND	0.50	ug/L							
Surrogate: Dibromofluoromethane	*9.54*		*ug/L*	*10.00*		*95.4*	*81.3-129*			
Surrogate: Toluene-d8	*9.05*		*ug/L*	*10.00*		*90.5*	*87.3-110*			
Surrogate: 4-Bromofluorobenzene	*8.93*		*ug/L*	*10.00*		*89.3*	*86.7-110*			
LCS (A601028-BS1)				Prepared: 01/11/2016 Analyzed: 01/11/2016 20:36						
Acetone	39.8	20	ug/L	50.00		79.7	45-165			
Benzene	5.11	0.50	ug/L	5.000		102	82.5-123			
2-Butanone	36.6	20	ug/L	50.00		73.2	63-135			
1,1-Dichloroethane	5.23	0.50	ug/L	5.000		105	80-133			
1,2-Dichloroethane	4.74	0.50	ug/L	5.000		94.8	76.1-139			
trans-1,2-Dichloroethene	5.19	0.50	ug/L	5.000		104	84.9-121			
cis-1,2-Dichloroethene	5.04	0.50	ug/L	5.000		101	79.1-122			
1,1-Dichloroethene	5.07	0.50	ug/L	5.000		101	72.2-135			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A601028 - EPA 5030B										
LCS (A601028-BS1)				Prepared: 01/11/2016 Analyzed: 01/11/2016 20:36						
Ethylbenzene	5.06	0.50	ug/L	5.000		101	86.1-115			
Tetrachloroethene	4.97	0.50	ug/L	5.000		99.4	83.8-117			
Toluene	4.86	0.50	ug/L	5.000		97.2	80.6-115			
1,1,1-Trichloroethane	5.22	0.50	ug/L	5.000		104	81.2-133			
1,1,2-Trichloroethane	4.32	0.50	ug/L	5.000		86.4	79.1-125			
Trichloroethene	5.08	0.50	ug/L	5.000		102	81.2-118			
1,3,5-Trimethylbenzene	5.25	0.50	ug/L	5.000		105	82-121			
1,2,4-Trimethylbenzene	5.18	0.50	ug/L	5.000		104	79.5-123			
Vinyl chloride	5.49	0.50	ug/L	5.000		110	71.5-144			
m,p-Xylene	9.86	1.0	ug/L	10.00		98.6	84-118			
o-Xylene	4.74	0.50	ug/L	5.000		94.8	76.6-121			
n-Butyl Benzene	5.22	0.50	ug/L	5.000		104	78.9-124			
sec-Butyl Benzene	5.31	0.50	ug/L	5.000		106	81.1-123			
Carbon disulfide	5.33	0.50	ug/L	5.000		107	80-121			
Chloroethane	5.80	5.0	ug/L	5.000		116	31.6-195			
Chloroform	5.04	0.50	ug/L	5.000		101	79.7-131			
Dichlorodifluoromethane	5.27	0.50	ug/L	5.000		105	68.4-148			
Isopropylbenzene	4.83	0.50	ug/L	5.000		96.6	85.5-118			
p-Isopropyltoluene	5.21	0.50	ug/L	5.000		104	81.6-123			
Naphthalene	3.95	5.0	ug/L	5.000		79.0	63.4-117			
n-Propyl Benzene	5.38	0.50	ug/L	5.000		108	81.7-122			
Trichlorofluoromethane	8.05	0.50	ug/L	5.000		161	58.5-171			
Surrogate: Dibromofluoromethane	*5.15*		*ug/L*	*5.000*		*103*	*81.3-129*			
Surrogate: Toluene-d8	*4.83*		*ug/L*	*5.000*		*96.6*	*87.3-110*			
Surrogate: 4-Bromofluorobenzene	*4.80*		*ug/L*	*5.000*		*96.0*	*86.7-110*			
Matrix Spike (A601028-MS1)		**Source: A160211-18**		Prepared: 01/11/2016 Analyzed: 01/11/2016 21:06						
Acetone	41.3	20	ug/L	50.00	ND	82.6	40.7-161			
Benzene	5.15	0.50	ug/L	5.000	ND	103	79.9-126			
2-Butanone	37.1	20	ug/L	50.00	ND	74.1	55-146			
1,1-Dichloroethane	5.39	0.50	ug/L	5.000	ND	108	71.8-142			
1,2-Dichloroethane	4.80	0.50	ug/L	5.000	ND	96.0	72.2-142			
trans-1,2-Dichloroethene	5.20	0.50	ug/L	5.000	ND	104	76.7-131			
cis-1,2-Dichloroethene	5.21	0.50	ug/L	5.000	ND	104	71.4-129			
1,1-Dichloroethene	5.09	0.50	ug/L	5.000	ND	102	63.9-148			
Ethylbenzene	4.99	0.50	ug/L	5.000	ND	99.8	83.1-118			
Tetrachloroethene	5.06	0.50	ug/L	5.000	ND	101	65.9-132			
Toluene	4.83	0.50	ug/L	5.000	ND	96.6	78-117			
1,1,1-Trichloroethane	5.16	0.50	ug/L	5.000	ND	103	70-142			
1,1,2-Trichloroethane	4.30	0.50	ug/L	5.000	ND	86.0	74.1-132			
Trichloroethene	5.04	0.50	ug/L	5.000	ND	101	75.7-125			
1,3,5-Trimethylbenzene	5.12	0.50	ug/L	5.000	ND	102	75.9-125			
1,2,4-Trimethylbenzene	5.08	0.50	ug/L	5.000	ND	102	71.5-127			
Vinyl chloride	5.70	0.50	ug/L	5.000	ND	114	67.4-149			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project: TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number: 220003.0000
Ann Arbor MI, 48108	Project Manager: Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A601028 - EPA 5030B										
Matrix Spike (A601028-MS1)		**Source: A160211-18**		Prepared: 01/11/2016 Analyzed: 01/11/2016 21:06						
m,p-Xylene	9.82	1.0	ug/L	10.00	ND	98.2	81-118			
o-Xylene	4.62	0.50	ug/L	5.000	ND	92.4	80.6-114			
n-Butyl Benzene	5.16	0.50	ug/L	5.000	ND	103	80.3-126			
sec-Butyl Benzene	5.02	0.50	ug/L	5.000	ND	100	82-123			
Carbon disulfide	5.48	0.50	ug/L	5.000	ND	110	73.5-128			
Chloroethane	5.80	5.0	ug/L	5.000	ND	116	13.8-195			
Chloroform	5.15	0.50	ug/L	5.000	ND	103	73.4-138			
Dichlorodifluoromethane	0.350	0.50	ug/L	5.000	ND	7.00	13.6-185			M
Isopropylbenzene	4.75	0.50	ug/L	5.000	ND	95.0	86.6-118			
p-Isopropyltoluene	5.09	0.50	ug/L	5.000	ND	102	81.1-123			
Naphthalene	3.62	5.0	ug/L	5.000	ND	72.4	56.6-128			
n-Propyl Benzene	5.23	0.50	ug/L	5.000	ND	105	81-123			
Trichlorofluoromethane	8.91	0.50	ug/L	5.000	ND	178	41.6-189			
Surrogate: Dibromofluoromethane	*5.32*		*ug/L*	*5.000*		*106*	*81.3-129*			
Surrogate: Toluene-d8	*4.78*		*ug/L*	*5.000*		*95.6*	*87.3-110*			
Surrogate: 4-Bromofluorobenzene	*4.78*		*ug/L*	*5.000*		*95.6*	*86.7-110*			
Matrix Spike Dup (A601028-MSD1)		**Source: A160211-18**		Prepared: 01/11/2016 Analyzed: 01/11/2016 21:36						
Acetone	41.4	20	ug/L	50.00	ND	82.8	40.7-161	0.266	20	
Benzene	5.10	0.50	ug/L	5.000	ND	102	79.9-126	0.976	20	
2-Butanone	38.1	20	ug/L	50.00	ND	76.3	55-146	2.90	20	
1,1-Dichloroethane	5.14	0.50	ug/L	5.000	ND	103	71.8-142	4.75	20	
1,2-Dichloroethane	4.84	0.50	ug/L	5.000	ND	96.8	72.2-142	0.830	20	
trans-1,2-Dichloroethene	5.16	0.50	ug/L	5.000	ND	103	76.7-131	0.772	20	
cis-1,2-Dichloroethene	5.07	0.50	ug/L	5.000	ND	101	71.4-129	2.72	20	
1,1-Dichloroethene	5.00	0.50	ug/L	5.000	ND	100	63.9-148	1.78	20	
Ethylbenzene	4.94	0.50	ug/L	5.000	ND	98.8	83.1-118	1.01	20	
Tetrachloroethene	4.83	0.50	ug/L	5.000	ND	96.6	65.9-132	4.65	20	
Toluene	4.84	0.50	ug/L	5.000	ND	96.8	78-117	0.207	20	
1,1,1-Trichloroethane	5.18	0.50	ug/L	5.000	ND	104	70-142	0.387	20	
1,1,2-Trichloroethane	4.42	0.50	ug/L	5.000	ND	88.4	74.1-132	2.75	20	
Trichloroethene	5.08	0.50	ug/L	5.000	ND	102	75.7-125	0.791	20	
1,3,5-Trimethylbenzene	5.09	0.50	ug/L	5.000	ND	102	75.9-125	0.588	20	
1,2,4-Trimethylbenzene	4.93	0.50	ug/L	5.000	ND	98.6	71.5-127	3.00	20	
Vinyl chloride	5.62	0.50	ug/L	5.000	ND	112	67.4-149	1.41	20	
m,p-Xylene	9.86	1.0	ug/L	10.00	ND	98.6	81-118	0.407	20	
o-Xylene	4.67	0.50	ug/L	5.000	ND	93.4	80.6-114	1.08	20	
n-Butyl Benzene	5.10	0.50	ug/L	5.000	ND	102	80.3-126	1.17	20	
sec-Butyl Benzene	5.06	0.50	ug/L	5.000	ND	101	82-123	0.794	20	
Carbon disulfide	5.27	0.50	ug/L	5.000	ND	105	73.5-128	3.91	20	
Chloroethane	5.54	5.0	ug/L	5.000	ND	111	13.8-195	4.59	20	
Chloroform	5.03	0.50	ug/L	5.000	ND	101	73.4-138	2.36	20	
Dichlorodifluoromethane	0.340	0.50	ug/L	5.000	ND	6.80	13.6-185	2.90	20	M
Isopropylbenzene	4.67	0.50	ug/L	5.000	ND	93.4	86.6-118	1.70	20	

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions	Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place	Project Number:	220003.0000
Ann Arbor MI, 48108	Project Manager:	Stacy Metz

Volatile Organic Compounds by Method 8260 - Purge and Trap - Quality Control

ECCS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch A601028 - EPA 5030B										
Matrix Spike Dup (A601028-MSD1)		**Source: A160211-18**		Prepared: 01/11/2016 Analyzed: 01/11/2016 21:36						
p-Isopropyltoluene	5.09	0.50	ug/L	5.000	ND	102	81.1-123	0.00	20	
Naphthalene	3.69	5.0	ug/L	5.000	ND	73.8	56.6-128	1.92	20	
n-Propyl Benzene	5.28	0.50	ug/L	5.000	ND	106	81-123	0.951	20	
Trichlorofluoromethane	8.60	0.50	ug/L	5.000	ND	172	41.6-189	3.54	20	
Surrogate: Dibromofluoromethane	*5.05*		*ug/L*	*5.000*		*101*	*81.3-129*			
Surrogate: Toluene-d8	*4.87*		*ug/L*	*5.000*		*97.4*	*87.3-110*			
Surrogate: 4-Bromofluorobenzene	*4.70*		*ug/L*	*5.000*		*94.0*	*86.7-110*			

Pace Analytical®
ECCS Mobile Lab Services

2525 Advance Road
Madison, WI 53718
608.221.8700 Phone
608.221.4889 Fax

TRC Solutions		Project:	TPC PCE Investigation - Tecumseh, MI
1540 Eisenhower Place		Project Number:	220003.0000
Ann Arbor MI, 48108		Project Manager:	Stacy Metz

Notes and Definitions

M	The matrix spike and/or matrix spike duplicate recovery was outside of the laboratory control limits.
LC	Resuts may be biased low because of low continuing calibration verification (CCV).
D	Data reported from a dilution
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. If the word 'dry' does not appear after the units, results are reported on an as-is basis.
RPD	Relative Percent Difference

Environmental Chemistry Consulting Services, Inc.
2525 Advance Road
Madison, WI 53718
608-221-8700 (phone)
608-221-4889 (fax)

CHAIN OF CUSTODY

40126947

Lab Work Order #: A160217

Mail Report To: Stacy Metz
Company: TRC Environmental
Address: 1540 Eisenhower Place
Ann Arbor Mi 48108
E-mail Address: SMetz@trcsolutions.com
Invoice To: Same As Above
Company:
Address:

Project Number: 220003.0000
Project Name: TPC PCE Investigation
Project Location: Tecumseh Mi
Turn Around (check one): ☐ Normal ☐ 5 BDs ☐ 3 BDs ☑ 2 BDs ☐ 24 hrs
If Rush, Report Due Date:
Sampled By (Print): Mellisa Powers

Preservation Codes: HCl
Analyses Requested: VOCs

Sample Description	Collection Date	Collection Time	Matrix	Total # of Containers	VOCs						Comments	Lab ID	Lab Receipt Time
Trip Blank 001			W	2	☑	☐	☐	☐	☐	☐	2-40mlVB	01	
Temp Blank			W	1	☐	☐	☐	☐	☐	☐		—	
B-131(14-17') 002	1-7-16	1000	W	3	☑	☐	☐	☐	☐	☐	3-40mlVB	02	
B-130(14-17') 003	1-7-16	1035	W	3	☑	☐	☐	☐	☐	☐		03	
B-129(14-17') 004	1-7-16	1300	W	3	☑	☐	☐	☐	☐	☐		04	
B-132(14-17') 005	1-7-16	~~1300~~ 1302 MP	W	3	☑	☐	☐	☐	☐	☐		05	
B-133(14.5-17.5') 006	1-7-16	1435	W	3	☑	☐	☐	☐	☐	☐		06	
DUP-01 007	1-7-16	—	W	3	☑	☐	☐	☐	☐	☐		07	
					☐	☐	☐	☐	☐	☐			
					☐	☐	☐	☐	☐	☐			

Preservation Codes
A=None B=HCL C=H_2SO_4
D=HNO_3 E=EnCore F=Methanol
G=NaOH O=Other (Indicate)

Matrix Codes
A=Air S=Soil W=Water O=Other

Rush TAT Multipliers
5 Business Days = 1.5x
3 Business Days = 2x
2 Business Days = 2.25x
24 Hours = 2.5x
must be pre-arranged

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Mellisa Powers	1-7-15	1800	FedEx	1-7-15	1800
FedEx	1-8-16	10:30	[illegible]	1-8-16	10:30

Custody Seal: ☐ Present ☒ Absent ☐ Intact ☐ Not Intact
Seal #s:
Shipped Via:
Receipt Temp: 5
Temp Blank: ☒ Y ☐ N

Download this form at www.eccsmobilelab.com
WHITE - REPORT COPY YELLOW - LABORATORY COPY PINK - SAMPLER/SUBMITTER
Rev. 5/11

S/N150256900 Exp. 03-26-17 Thermometer

Rec'd [illegible] 01-09-16 1000
Rec at 0.3°C

Appendix D
Analytical Data Tables Summarizing COCs in Potentially Affected Media

Table D1
Summary of Detected Volatile Organic Compounds at On-Site Soil Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		n-Butyl Benzene	sec-Butylbenzene	1,1-Dichloro-ethane	1,1-Dichloro-ethene(1)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene(1)	Isopropyl-benzene	4-Isopropyl-toluene	2-Methyl-naphthalene	Naphthalene	n-Propyl Benzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene(1)	1,3,5-Trimethyl-benzene(1)	Vinyl Chloride	Total Xylenes(1)
Residential DWP Criteria		1.6	1.6	18	0.14	1.4	2.0	1.5	91	NC	57	35	1.6	0.10	16	4.0	0.10	0.10	2.1	1.8	0.040	5.6
GSIP Criteria		NC	NC	15	2.6	12	30(2)	0.36	3.2	NC	4.2	0.73	NC	1.2(2)	5.4	1.8	6.6(2)	4.0(2)	0.57	1.1	0.26(2)	0.82
Non-Residential DC Criteria		8,000	8,000	87,000	660	8,000	12,000	71,000	80,000	NC	26,000	52,000	8,000	930	160,000	1,000,000	840	660	100,000	100,000	34	1,000,000
Non-Residential SVIAI Criteria		NC	NC	430	0.33	41	43	460	730	NC	4,900	470	NC	21	610	4,600	24	1.9	8,000	4,800	2.8	12,000
Non-Residential Infinite Source VSIC		NC	NC	2,500	3.7	210	330	2,400	2,000	NC	1,800	350	NC	210	3,300	4,500	57	14	25,000	19,000	29	54,000
Non-Residential Finite VSIC for 5m Source		NC	NC	6,000	15	430	840	3,100	2,000	NC	1,800	350	NC	490	36,000	15,000	57	25	600,000	460,000	170	65,000
Non-Residential Finite VSIC for 2m Source		NC	NC	14,000	37	1,000	2,000	6,500	3,000	NC	1,800	350	NC	1,100	36,000	31,000	120	58	600,000	460,000	420	130,000
Non-Residential PSI Criteria		880,000	180,000	1.5E+07	78,000	1.0E+06	2.1E+06	1.3E+07	2.6E+06	NC	290,000	88,000	590,000	1.2E+06	1.2E+07	2.9E+07	250,000	59,000	3.6E+07	3.6E+07	890,000	1.3E+08
Soil Saturation Concentration Screening Levels		10,000	10,000	890	570	640	1,400	140	390	NC	NA	NA	10,000	88	250	460	920	500	110	94	490	150
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
B-58 (3-4')	4/1/2011	--	--	<0.059	<0.059	<0.059	<0.059	<0.059	<0.059	--	--	--	--	<0.059	<0.059	<0.059	<0.059	<0.059	--	--	<0.059	<0.18
B-58 (6-7')	4/1/2011	--	--	<0.055	<0.055	<0.055	<0.055	<0.055	<0.055	--	--	--	--	<0.055	<0.055	**0.12**	<0.055	**0.066**	--	--	<0.055	<0.17
B-59 (3-4')	4/1/2011	--	--	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	--	--	--	--	<0.057	<0.057	<0.057	<0.057	<0.057	--	--	<0.057	<0.17
B-59 (6-7')	4/1/2011	--	--	**0.18**	<0.055	<0.055	<0.055	<0.055	<0.055	--	--	--	--	<0.055	<0.055	**0.12**	<0.055	**0.067**	--	--	<0.055	<0.16
B-60 (3-4')	4/1/2011	--	--	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	--	--	--	--	<0.057	<0.057	<0.057	<0.057	<0.057	--	--	<0.057	<0.17
B-60 (6-7')	4/1/2011	--	--	**0.31**	<0.054	**0.26**	<0.054	<0.054	<0.054	--	--	--	--	<0.054	<0.054	**0.57**	<0.054	**0.30**	--	--	<0.054	<0.16
B-61 (3-4')	4/1/2011	--	--	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	--	--	--	--	<0.056	<0.056	**0.073**	<0.056	**0.071**	--	--	<0.056	<0.17
B-61 (6-7')	4/1/2011	--	--	**0.13**	<0.049	**0.052**	<0.049	<0.049	<0.049	--	--	--	--	<0.049	**0.18**	**0.39**	<0.049	**0.34**	--	--	<0.049	**0.43**
B-62 (1-2')	4/1/2011	--	--	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	--	--	--	--	<0.049	**0.14**	<0.049	<0.049	<0.049	--	--	<0.049	<0.15
B-62 (3-4')	4/1/2011	--	--	<0.055	<0.055	<0.055	<0.055	<0.055	<0.055	--	--	--	--	<0.055	<0.055	<0.055	<0.055	<0.055	--	--	<0.055	<0.16
B-63 (3-4')	4/1/2011	--	--	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	--	--	--	--	<0.051	<0.051	**0.21**	<0.051	**0.26**	--	--	<0.051	<0.15
B-63 (6-7')	4/1/2011	--	--	**0.46**	<0.054	**0.52**	<0.054	<0.054	<0.054	--	--	--	--	<0.054	<0.054	**3.2**	<0.054	**2.6**	--	--	<0.054	<0.16
B-68 (1-2')	12/16/2015	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	--	<0.22	<0.022	<0.022	<0.022	<0.022	<0.022	**0.048**	<0.022	<0.022	<0.022	<0.067
B-68 (4-5')	12/16/2015	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	--	<0.23	<0.023	**0.033**	<0.023	**0.066**	<0.023	**0.54**	<0.023	<0.023	<0.023	<0.068
B-115 (1-2')	12/14/2015	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	--	<0.22	<0.022	**0.12**	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.066
B-115 (6.5-7.5')	12/14/2015	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	--	<28	<2.8	**78**	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<8.4
B-116 (1-2')	12/14/2015	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	--	<0.27	<0.027	**0.033**	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.080
B-116 (8.5-9.5')	12/14/2015	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	--	< 6.6	<0.66	**34**	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<2.0
B-117 (1-2')	12/14/2015	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	--	<0.26	<0.026	**0.30**	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.078
B-117 (8.5-9.5')	12/14/2015	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	--	<7.3	<0.73	**47**	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<2.2
B-118 (1-2')	12/14/2015	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	--	<0.27	<0.027	**0.070**	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.082
B-118 (9-10')	12/14/2015	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	--	<14	<1.4	**46**	<1.4	<1.4	<1.4	**3.0**	<1.4	<1.4	<1.4	<4.1
B-119 (1-2')	12/14/2015	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	--	<0.27	<0.027	**0.061**	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.081
B-119 (9-10')	12/14/2015	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	--	<3.5	<0.35	**12**	<0.35	<0.35	<0.35	**1.9**	<0.35	<0.35	<0.35	<1.1
B-119 (13-14')	12/14/2015	**0.82**	<0.036	<0.036	<0.036	**0.49**	<0.036	<0.036	<0.036	<0.036	--	<0.36	<0.036	**0.20**	<0.036	**0.37**	<0.036	**0.39**	**0.51**	<0.036	<0.036	<0.11
B-120 (1-2')	12/15/2015	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	--	<0.33	<0.033	**0.70**	<0.033	<0.033	<0.033	**0.063**	<0.033	<0.033	<0.033	<0.098
B-120 (7-8')	12/15/2015	<0.68	<0.68	<0.68	<0.68	<0.68	<0.68	<0.68	<0.68	<0.68	--	<6.8	<0.68	**27**	<0.68	<0.68	<0.68	**1.2**	<0.68	<0.68	<0.68	<2.0
B-121 (1-2')	12/15/2015	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	--	<0.30	<0.030	**0.71**	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.091
B-121 (6-7')	12/15/2015	<0.55	<0.55	<0.55	<0.55	<0.55	<0.55	<0.55	<0.55	<0.55	--	<5.5	<0.55	**25**	<0.55	<0.55	<0.55	<0.55	<0.55	<0.55	<0.55	<1.6
B-121 (8-9')	12/15/2015	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	--	<26	<2.6	**160**	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<7.9

Notes:

Residential Drinking Water Protection (DWP) Criteria, Groundwater to Surface Water Interface Protection (GSIP) Criteria, Non-Residential Direct Contact (DC) Criteria, Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria, Non-Residential Infinite and Finite Sources of Volatile Soil Inhalation Criteria (VSIC), Non-Residential Particulate Soil Inhalation (PSI) Criteria, and Soil Saturation Screening Levels from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013.

mg/kg = milligrams per kilogram

NC = No Criteria

-- = Not Analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

Denotes saturated soil samples which are representative of groundwater conditions and are not used to evaluate the nature and extent of constituents of concern in soil. Soil collected from approximately 1-foot above the high water table (capillary fringe) and deeper are considered saturated.

(1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

(2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1

Table D1
Summary of Detected Volatile Organic Compounds at On-Site Soil Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		n-Butyl Benzene	sec-Butylbenzene	1,1-Dichloro-ethane	1,1-Dichloro-ethene(1)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene(1)	Isopropyl-benzene	4-Isopropyl-toluene	2-Methyl-naphthalene	Naphthalene	n-Propyl Benzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene(1)	1,3,5-Trimethyl-benzene(1)	Vinyl Chloride	Total Xylenes(1)
Residential DWP Criteria		1.6	1.6	18	0.14	1.4	2.0	1.5	91	NC	57	35	1.6	0.10	16	4.0	0.10	0.10	2.1	1.8	0.040	5.6
GSIP Criteria		NC	NC	15	2.6	12	30(2)	0.36	3.2	NC	4.2	0.73	NC	1.2(2)	5.4	1.8	6.6(2)	4.0(2)	0.57	1.1	0.26(2)	0.82
Non-Residential DC Criteria		8,000	8,000	87,000	660	8,000	12,000	71,000	80,000	NC	26,000	52,000	8,000	930	160,000	1,000,000	840	660	100,000	100,000	34	1,000,000
Non-Residential SVIAI Criteria		NC	NC	430	0.33	41	43	460	730	NC	4,900	470	NC	21	610	4,600	24	1.9	8,000	4,800	2.8	12,000
Non-Residential Infinite Source VSIC		NC	NC	2,500	3.7	210	330	2,400	2,000	NC	1,800	350	NC	210	3,300	4,500	57	14	25,000	19,000	29	54,000
Non-Residential Finite VSIC for 5m Source		NC	NC	6,000	15	430	840	3,100	2,000	NC	1,800	350	NC	490	36,000	15,000	57	25	600,000	460,000	170	65,000
Non-Residential Finite VSIC for 2m Source		NC	NC	14,000	37	1,000	2,000	6,500	3,000	NC	1,800	350	NC	1,100	36,000	31,000	120	58	600,000	460,000	420	130,000
Non-Residential PSI Criteria		880,000	180,000	1.5E+07	78,000	1.0E+06	2.1E+06	1.3E+07	2.6E+06	NC	290,000	88,000	590,000	1.2E+06	1.2E+07	2.9E+07	250,000	59,000	3.6E+07	3.6E+07	890,000	1.3E+08
Soil Saturation Concentration Screening Levels		10,000	10,000	890	570	640	1,400	140	390	NC	NA	NA	10,000	88	250	460	920	500	110	94	490	150
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
B-122 (1-2')	12/15/2015	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	--	<0.26	<0.026	**0.065**	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.078
B-122 (5-6')	12/15/2015	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	--	<0.61	<0.061	**4.2**	<0.061	<0.061	<0.061	**0.31**	<0.061	<0.061	<0.061	<0.18
B-123 (6-7')	12/16/2015	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	--	<5.1	<0.51	**27**	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<0.51	<1.5
B-124 (6-7')	12/16/2015	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	--	<1.4	<0.14	**9.6**	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.42
B-125 (3-4')	12/16/2015	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	--	<5.7	<0.57	**2.7**	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<0.57	<1.7
B-125 (8-9')	12/16/2015	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	--	<2.3	<0.23	**13**	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.69
B-125 (10.5-11.5')	12/16/2015	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	--	<31	<3.1	**130**	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<9.2
B-126 (6-7')	12/16/2015	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	--	<13	<1.3	**52**	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<4.0
B-127 (1-2')	12/16/2015	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	--	<0.23	<0.023	**0.40**	<0.023	<0.023	<0.023	**0.046**	<0.023	<0.023	<0.023	<0.068
B-127 (10-11')	12/16/2015	<13	<13	<13	<13	<13	<13	<13	<13	<13	--	<130	<13	**520**	<13	<13	<13	<13	<13	<13	<13	<40
B-128 (1-2')	12/16/2015	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	--	<2.6	<0.26	**6.9**	<0.26	<0.26	<0.26	**0.97**	<0.26	<0.26	<0.26	<0.78
B-128 (1-2') (DUP-01)	12/16/2015	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	--	<2.7	<0.27	**9.7**	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.81
B-128 (9-10')	12/16/2015	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	--	<27	<2.7	**150**	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<8.1
B-128 (9-10') (DUP-02)	12/16/2015	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	--	<28	<2.8	**110**	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<8.5
B-129 (1-2')	12/30/2015	<0.028	<0.028	<0.028	<0.028	**0.031**	<0.028	<0.028	<0.028	<0.028	--	<0.28	<0.028	**0.092**	<0.028	<0.028	<0.028	**0.053**	<0.028	<0.028	<0.028	<0.083
B-129 (3-4')	12/30/2015	**1.4**	<0.023	<0.023	<0.023	<0.023	<0.023	**1.3**	**0.23**	**0.59**	--	**0.32**	**0.84**	**0.13**	**0.025**	<0.023	<0.023	<0.023	**4.9**	**1.8**	**0.21**	**9.4**
B-130 (1-2')	12/30/2015	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	--	<0.24	<0.024	**0.74**	<0.024	<0.024	<0.024	**0.034**	<0.024	<0.024	<0.024	<0.073
B-130 (3-4')	12/30/2015	<0.39	<0.23	<0.023	<0.023	**0.14**	<0.23	**0.20**	**0.038**	**0.15**	--	<0.23	**0.15**	**1.4**	<0.023	<0.023	<0.023	**0.072**	**1.3**	**0.38**	**0.041**	**1.2**
B-130 (10-11')	12/30/2015	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	--	<24	<2.4	**86**	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<7.3
B-131 (1-2')	12/30/2015	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	--	<0.25	<0.025	**0.22**	<0.025	<0.025	<0.025	**1.1**	<0.025	<0.025	<0.025	<0.074
B-131 (3-4')	12/30/2015	<0.24	<0.24	<0.24	<0.24	**0.68**	<0.24	<0.24	<0.24	<0.24	--	<2.4	<0.24	**8.1**	<0.24	<0.24	<0.24	**1.0**	<0.24	<0.24	<0.24	<0.73
B-131 (10-11')	12/30/2015	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	--	<24	<2.4	**100**	<2.4	<2.4	<2.4	**2.5**	<2.4	<2.4	<2.4	<7.1
B-132 (1-2')	12/30/2015	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	--	<0.25	<0.025	**0.17**	<0.025	<0.025	<0.025	**0.029**	<0.025	<0.025	<0.025	<0.075
B-132 (3-4')	12/30/2015	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	--	<0.54	<0.054	**2.1**	<0.054	<0.054	<0.054	**0.2**	<0.054	<0.054	<0.054	<0.16
B-132 (10-11')	12/30/2015	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	--	<13	<1.3	**38**	<1.3	<1.3	<1.3	**2.4**	<1.3	<1.3	<1.3	<3.9
B-133 (1-2')	12/30/2015	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	--	<0.27	<0.027	**0.86**	<0.027	<0.027	<0.027	**0.48**	<0.027	<0.027	<0.027	<0.080
B-133 (3-4')	12/30/2015	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	--	<0.25	<0.025	**0.66**	<0.025	<0.025	<0.025	**0.14**	<0.025	<0.025	<0.025	<0.075
B-133 (10-11')	12/30/2015	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	--	<6.1	<0.61	**21**	<0.61	<0.61	<0.61	**3.0**	<0.61	<0.61	<0.61	<1.8

Notes:

Residential Drinking Water Protection (DWP) Criteria, Groundwater to Surface Water Interface Protection (GSIP) Criteria, Non-Residential Direct Contact (DC) Criteria, Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria, Non-Residential Infinite and Finite Sources of Volatile Soil Inhalation Criteria (VSIC), Non-Residential Particulate Soil Inhalation (PSI) Criteria, and Soil Saturation Screening Levels from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013.

mg/kg = milligrams per kilogram

NC = No Criteria

-- = Not Analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

Denotes saturated soil samples which are representative of groundwater conditions and are not used to evaluate the nature and extent of constituents of concern in soil. Soil collected from approximately 1-foot above the high water table (capillary fringe) and deeper are considered saturated.

(1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

(2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1

Table D1
Summary of Detected Volatile Organic Compounds at On-Site Soil Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		n-Butyl Benzene	sec-Butylbenzene	1,1-Dichloro-ethane	1,1-Dichloro-ethene(1)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene(1)	Isopropyl-benzene	4-Isopropyl-toluene	2-Methyl-naphthalene	Naphthalene	n-Propyl Benzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene(1)	1,3,5-Trimethyl-benzene(1)	Vinyl Chloride	Total Xylenes(1)
Residential DWP Criteria		1.6	1.6	18	0.14	1.4	2.0	1.5	91	NC	57	35	1.6	0.10	16	4.0	0.10	0.10	2.1	1.8	0.040	5.6
GSIP Criteria		NC	NC	15	2.6	12	30(2)	0.36	3.2	NC	4.2	0.73	NC	1.2(2)	5.4	1.8	6.6(2)	4.0(2)	0.57	1.1	0.26(2)	0.82
Non-Residential DC Criteria		8,000	8,000	87,000	660	8,000	12,000	71,000	80,000	NC	26,000	52,000	8,000	930	160,000	1,000,000	840	660	100,000	100,000	34	1,000,000
Non-Residential SVIAI Criteria		NC	NC	430	0.33	41	43	460	730	NC	4,900	470	NC	21	610	4,600	24	1.9	8,000	4,800	2.8	12,000
Non-Residential Infinite Source VSIC		NC	NC	2,500	3.7	210	330	2,400	2,000	NC	1,800	350	NC	210	3,300	4,500	57	14	25,000	19,000	29	54,000
Non-Residential Finite VSIC for 5m Source		NC	NC	6,000	15	430	840	3,100	2,000	NC	1,800	350	NC	490	36,000	15,000	57	25	600,000	460,000	170	65,000
Non-Residential Finite VSIC for 2m Source		NC	NC	14,000	37	1,000	2,000	6,500	3,000	NC	1,800	350	NC	1,100	36,000	31,000	120	58	600,000	460,000	420	130,000
Non-Residential PSI Criteria		880,000	180,000	1.5E+07	78,000	1.0E+06	2.1E+06	1.3E+07	2.6E+06	NC	290,000	88,000	590,000	1.2E+06	1.2E+07	2.9E+07	250,000	59,000	3.6E+07	3.6E+07	890,000	1.3E+08
Soil Saturation Concentration Screening Levels		10,000	10,000	890	570	640	1,400	140	390	NC	NA	NA	10,000	88	250	460	920	500	110	94	490	150
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
GP-01 (3-5')	12/17/2008	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	<0.10	<0.040	<0.15
GP-03 (6-8')	12/17/2008	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	**0.26**	<0.10	<0.10	<0.040	<0.15
GP-04 (4-6')	12/17/2008	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	<0.10	<0.040	<0.15
GP-06 (3-5')	12/17/2008	<0.050	<0.050	<0.050	<0.050	**0.15**	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	**4.3**	<0.10	<0.10	<0.040	<0.15
GP-07 (2-4')	12/17/2008	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	**4.1**	<0.10	<0.10	<0.040	<0.15
GP-09 (5-7')	12/17/2008	<0.050	<0.050	<0.050	**0.24**	**0.66**	<0.050	**0.092**	<0.10	--	<0.33	<0.33	<0.10	**0.077**	**0.12**	<0.050	<0.050	**3.2**	<0.10	<0.10	<0.040	**0.22**
GP-10 (2-4')	12/17/2008	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	**0.50**	<0.10	<0.10	<0.040	<0.15
GP-12 (5-7')	12/17/2008	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	**0.35**	<0.10	<0.10	<0.040	<0.15
GP-14 (1-3')	12/28/2008	**0.16**	<0.050	<0.050	**0.090**	**0.23**	<0.050	**0.17**	<0.10	--	<0.33	<0.33	**0.30**	**5.9**	**0.31**	**3.8**	<0.050	**43**	**0.89**	**0.19**	<0.040	**1.5**
GP-15 (3-5')	12/28/2008	<0.050	<0.050	<0.050	**0.36**	**1.3**	<0.050	<0.050	<0.10	--	**1.1**	**1.8**	<0.10	**1.2**	**0.11**	**8.8**	<0.050	**38**	**0.22**	<0.10	<0.040	**0.93**
GP-16 (1-3')	12/28/2008	<0.050	<0.050	<0.050	<0.050	**0.41**	**0.067**	<0.050	<0.10	--	**1.4**	**1.5**	<0.10	**3.3**	**0.078**	<0.050	<0.050	**7.6**	<0.10	<0.10	<0.040	**0.31**
GP-17 (3-5')	12/28/2008	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	**1.3**	<0.10	<0.10	<0.040	<0.15
GP-21 (3-5')	1/19/2009	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	**0.075**	<0.050	**4.6**	<0.050	**1.6**	<0.10	<0.10	<0.040	<0.15
GP-22 (8-10')	1/19/2009	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	**4.0**	<0.050	**5.2**	<0.10	<0.10	<0.040	<0.15
GP-23 (3-5')	1/19/2009	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	**0.26**	<0.050	**1.7**	<0.10	<0.10	<0.040	<0.15
GP-25 (1-2')	1/19/2009	<0.050	<0.050	<0.050	<0.050	**3.4**	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	**8.6**	<0.10	<0.10	<0.040	<0.15
GP-26 (3-5')	1/19/2009	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	<0.10	<0.050	<0.15
GP-27 (1-3')	1/19/2009	<0.050	<0.050	<0.050	<0.050	**0.20**	<0.050	**0.064**	<0.10	--	--	--	<0.10	**0.20**	**0.23**	**0.54**	<0.050	**4.5**	<0.10	<0.10	<0.040	**0.44**
GP-28 (21-23')	1/19/2009	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	**0.23**	<0.050	**2.9**	<0.050	**0.94**	<0.10	<0.10	<0.040	<0.15
GP-29 (3-5')	1/19/2009	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	<0.10	<0.040	<0.15
HB-31 (0-0.5')	2/4/2009	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	--	<0.33	<0.33	<0.10	<0.050	<0.050	<0.050	<0.050	<0.050	<0.10	<0.10	<0.050	<0.15
MW-32S (0.5-1.5')	9/15/2010	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.29	<0.12	<0.38	<0.38	<0.12	<0.058	<0.12	**0.092**	<0.058	**1.2**	<0.12	<0.12	<0.046	--
MW-32S (22-24')	9/15/2010	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<1.2	<0.46	<1.5	<1.5	<0.46	**0.49**	<0.46	**1.8**	<0.23	**26**	<0.46	<0.46	<0.18	--
MW-33S (1-3')	9/15/2010	**1.8**	**0.49**	<0.053	<0.053	**7.5**	**0.59**	<0.053	<0.27	**0.53**	**4.5**	**2.6**	**0.53**	**0.82**	<0.11	<0.053	**0.30**	**5.7**	**3.9**	**1.2**	**0.41**	--
MW-33S (19-22')	9/15/2010	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<1.2	<0.49	<1.6	<1.6	<0.49	**0.47**	<0.49	<0.24	<0.24	**19**	<0.49	<0.49	<0.20	--
MW-34S (0.5-2.5')	9/16/2010	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.24	<0.097	<0.32	<0.32	<0.097	<0.049	<0.097	**0.74**	<0.049	**1.2**	<0.097	<0.097	<0.039	--
MW-34S (21-23')	9/16/2010	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.64	<0.26	<0.85	<0.85	<0.26	**0.33**	<0.26	**9.6**	<0.13	**14**	<0.26	<0.26	<0.10	--
NS-01 (0-4')	4/17/2009	<0.039	--	<0.039	<0.039	<0.039	--	<0.039	--	--	--	**0.48**	<0.039	<0.039	<0.039	<0.039	<0.039	**1.9**	<0.039	<0.039	<0.039	--

Notes:

Residential Drinking Water Protection (DWP) Criteria, Groundwater to Surface Water Interface Protection (GSIP) Criteria, Non-Residential Direct Contact (DC) Criteria, Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria, Non-Residential Infinite and Finite Sources of Volatile Soil Inhalation Criteria (VSIC), Non-Residential Particulate Soil Inhalation (PSI) Criteria, and Soil Saturation Screening Levels from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013.

mg/kg = milligrams per kilogram

NC = No Criteria

-- = Not Analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

Denotes saturated soil samples which are representative of groundwater conditions and are not used to evaluate the nature and extent of constituents of concern in soil. Soil collected from approximately 1-foot above the high water table (capillary fringe) and deeper are considered saturated.

(1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

(2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1

Table D1
Summary of Detected Volatile Organic Compounds at On-Site Soil Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		n-Butyl Benzene	sec-Butylbenzene	1,1-Dichloro-ethane	1,1-Dichloro-ethene(1)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene(1)	Isopropyl-benzene	4-Isopropyl-toluene	2-Methyl-naphthalene	Naphthalene	n-Propyl Benzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene(1)	1,3,5-Trimethyl-benzene(1)	Vinyl Chloride	Total Xylenes(1)
Residential DWP Criteria		1.6	1.6	18	0.14	1.4	2.0	1.5	91	NC	57	35	1.6	0.10	16	4.0	0.10	0.10	2.1	1.8	0.040	5.6
GSIP Criteria		NC	NC	15	2.6	12	30(2)	0.36	3.2	NC	4.2	0.73	NC	1.2(2)	5.4	1.8	6.6(2)	4.0(2)	0.57	1.1	0.26(2)	0.82
Non-Residential DC Criteria		8,000	8,000	87,000	660	8,000	12,000	71,000	80,000	NC	26,000	52,000	8,000	930	160,000	1,000,000	840	660	100,000	100,000	34	1,000,000
Non-Residential SVIAI Criteria		NC	NC	430	0.33	41	43	460	730	NC	4,900	470	NC	21	610	4,600	24	1.9	8,000	4,800	2.8	12,000
Non-Residential Infinite Source VSIC		NC	NC	2,500	3.7	210	330	2,400	2,000	NC	1,800	350	NC	210	3,300	4,500	57	14	25,000	19,000	29	54,000
Non-Residential Finite VSIC for 5m Source		NC	NC	6,000	15	430	840	3,100	2,000	NC	1,800	350	NC	490	36,000	15,000	57	25	600,000	460,000	170	65,000
Non-Residential Finite VSIC for 2m Source		NC	NC	14,000	37	1,000	2,000	6,500	3,000	NC	1,800	350	NC	1,100	36,000	31,000	120	58	600,000	460,000	420	130,000
Non-Residential PSI Criteria		880,000	180,000	1.5E+07	78,000	1.0E+06	2.1E+06	1.3E+07	2.6E+06	NC	290,000	88,000	590,000	1.2E+06	1.2E+07	2.9E+07	250,000	59,000	3.6E+07	3.6E+07	890,000	1.3E+08
Soil Saturation Concentration Screening Levels		10,000	10,000	890	570	640	1,400	140	390	NC	NA	NA	10,000	88	250	460	920	500	110	94	490	150
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
NS-01 (16-20')	4/17/2009	<0.025	--	<0.025	<0.025	<0.025	--	<0.025	--	--	--	<0.25	<0.025	<0.025	<0.025	<0.025	<0.025	**0.51**	<0.025	<0.025	<0.025	--
NS-02 (0-4')	4/16/2009	<0.027	--	<0.027	<0.027	<0.027	<0.027	<0.027	--	--	--	<0.27	<0.027	<0.027	<0.027	<0.027	<0.027	**0.35**	<0.027	<0.027	<0.027	--
NS-02 (8-12')	4/16/2009	<0.027	--	<0.027	<0.027	<0.027	<0.027	<0.027	--	--	--	<0.27	<0.027	<0.027	<0.027	<0.027	<0.027	**0.75**	<0.027	<0.027	<0.027	--
NS-04 (8-12')	4/16/2009	<0.029	--	<0.029	<0.029	<0.029	<0.029	<0.029	--	--	--	<0.29	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	--
NS-05 (12-14')	4/20/2009	<0.033	--	<0.033	<0.033	**0.058**	<0.033	<0.033	--	--	--	<0.33	<0.033	**0.040**	<0.033	**0.033**	<0.033	**4.5**	<0.033	<0.033	<0.033	--
NS-06 (2-3')	4/20/2009	<0.026	--	<0.026	<0.026	**9.6**	**0.23**	**0.14**	--	--	--	**0.31**	**0.43**	**0.51**	**0.082**	<0.026	<0.026	**5.2**	**4.0**	**1.4**	**0.14**	--
NS-06 (23-24')	4/20/2009	<0.030	--	<0.030	<0.030	<0.030	<0.030	<0.030	--	--	--	<0.30	<0.030	<0.030	<0.030	<0.030	<0.030	**0.52**	<0.030	<0.030	<0.030	--
NS-07 (10-11')	4/21/2009	<0.029	--	<0.029	<0.029	<0.029	<0.029	<0.029	--	--	--	<0.29	<0.029	**0.34**	<0.029	<0.029	<0.029	**1.5**	<0.029	<0.029	<0.029	--
NS-08 (15-16')	4/21/2009	<0.063	--	<0.063	<0.063	<0.063	<0.063	<0.063	--	--	--	<0.63	<0.063	**0.83**	<0.063	<0.063	<0.063	**4.3**	<0.063	<0.063	<0.063	--
NS-09 (2-3')	4/21/2009	**1.2**	--	<0.030	<0.030	**4.9**	**0.077**	**0.088**	--	--	--	**1.2**	**0.37**	<0.030	**0.086**	<0.030	<0.030	**0.31**	**5.4**	**1.9**	**0.48**	--
NS-10 (8-9')	4/21/2009	**9.1**	--	<0.43	<0.43	**0.88**	<0.43	**1.2**	--	--	--	**14**	**4.0**	**0.45**	**0.92**	<0.43	<0.43	<0.43	**34**	**9.7**	<0.43	--
NS-10 (10-11')	4/21/2009	**0.91**	--	<0.027	<0.027	**0.34**	<0.027	**0.11**	--	--	--	**1.5**	**0.36**	**0.028**	**0.090**	<0.027	<0.027	**0.061**	**3.1**	**0.98**	**0.072**	--
NS-11 (0-4')	9/15/2010	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.29	<0.12	<0.38	<0.38	<0.12	**0.059**	<0.12	<0.058	<0.058	**0.77**	<0.12	<0.12	<0.047	<0.18
NS-11 (22-23')	9/15/2010	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.29	<0.10	<0.34	<0.34	<0.10	**0.31**	<0.10	<0.051	<0.051	**4.1**	<0.10	<0.10	<0.041	<0.15
NS-12 (0-2')	9/15/2010	**0.15**	**0.10**	<0.053	<0.053	<0.053	<0.053	<0.053	<0.26	<0.11	<0.35	<0.35	<0.11	**0.19**	<0.11	<0.053	<0.053	**0.88**	<0.11	<0.11	<0.042	<0.16
NS-12 (22-24')	9/15/2010	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.26	<0.10	<0.34	<0.34	<0.10	**0.12**	<0.10	<0.052	<0.052	**2.0**	<0.10	<0.10	<0.042	<0.15
NS-13 (0.5-4')	9/16/2010	<0.055	<0.055	<0.055	<0.056	<0.055	<0.055	<0.055	<0.26	<0.11	<0.36	<0.36	<0.11	<0.055	<0.11	<0.055	<0.055	**1.9**	<0.11	<0.11	<0.044	<0.17
NS-13 (21-23')	9/16/2010	<0.14	<0.14	<0.14	<0.14	**0.17**	<0.14	<0.14	<0.70	<0.28	<0.92	<0.92	<0.28	<0.14	<0.28	**0.20**	<0.14	**17**	<0.28	<0.28	<0.11	<0.42
NS-14 (0.5-3.5')	9/17/2010	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.29	<0.12	<0.38	<0.38	<0.12	<0.058	<0.12	**0.063**	<0.058	**0.64**	<0.12	<0.12	<0.047	<0.18
NS-14 (22-23')	9/17/2010	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<1.3	<0.52	<1.7	<1.7	<0.52	<0.26	<0.52	**2.3**	<0.26	**18**	<0.52	<0.52	<0.21	<0.78
NS-15 (2-4')	9/17/2010	**1.4**	**1.1**	<0.10	<0.10	**6.7**	<0.57	<0.57	<0.52	<1.1	<3.7	<3.7	<1.1	**0.63**	<1.1	<0.57	<0.57	**72**	<1.1	<1.1	<0.45	<1.7
NS-15 (19-20')	9/17/2010	<0.10	<0.10	<0.57	<0.57	**0.35**	<0.10	<0.10	<2.8	<0.21	<0.68	<0.68	<0.21	**0.13**	<0.21	<0.10	<0.10	**18**	<0.21	<0.21	<0.083	<0.31
NS-16 (2-4')	9/17/2010	<0.057	<0.057	<0.26	<0.26	<0.057	<0.057	<0.057	<1.3	<0.11	<0.38	<0.38	<0.11	<0.057	<0.11	<0.057	<0.057	**1.7**	<0.11	<0.11	<0.046	<0.17
NS-16 (19-20')	9/17/2010	<0.26	<0.26	<0.057	<0.057	**0.47**	<0.26	<0.26	<0.29	<0.52	<1.7	<1.7	<0.52	<0.26	<0.52	<0.26	<0.26	**33**	<0.52	<0.52	<0.21	<0.78
NS-17 (0.5-2.0')	9/17/2010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.2	<2.1	<6.9	<6.9	<2.1	<1.0	<2.1	<1.0	<1.0	**100**	<2.1	<2.1	<0.84	<3.1
NS-17 (22-23')	9/17/2010	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.26	<0.10	<0.34	<0.34	<0.10	**0.24**	<0.10	**0.23**	<0.052	**2.1**	<0.10	<0.10	<0.041	<0.15
NS-18 (20-25')	7/24/2012	<0.29	<0.29	<0.29	<0.29	**0.45**	<0.29	<0.29	<1.5	<0.58	<1.9	<1.9	<0.58	**0.45**	<0.58	**0.37**	<0.29	**30**	<0.58	<0.58	<0.23	<0.87
NS-18 (30-35')	7/25/2012	<0.61	<0.61	<0.61	<0.61	**1.9**	<0.61	<0.61	<3.1	<1.2	<4.1	<4.1	<1.2	<0.61	<1.2	<0.61	<0.61	**53**	<1.2	<1.2	<0.49	<1.8

Notes:

Residential Drinking Water Protection (DWP) Criteria, Groundwater to Surface Water Interface Protection (GSIP) Criteria, Non-Residential Direct Contact (DC) Criteria, Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria, Non-Residential Infinite and Finite Sources of Volatile Soil Inhalation Criteria (VSIC), Non-Residential Particulate Soil Inhalation (PSI) Criteria, and Soil Saturation Screening Levels from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013.

mg/kg = milligrams per kilogram

NC = No Criteria

-- = Not Analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

Denotes saturated soil samples which are representative of groundwater conditions and are not used to evaluate the nature and extent of constituents of concern in soil. Soil collected from approximately 1-foot above the high water table (capillary fringe) and deeper are considered saturated.

(1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

(2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1

Table D1
Summary of Detected Volatile Organic Compounds at On-Site Soil Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		n-Butyl Benzene	sec-Butylbenzene	1,1-Dichloro-ethane	1,1-Dichloro-ethene(1)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene(1)	Isopropyl-benzene	4-Isopropyl-toluene	2-Methyl-naphthalene	Naphthalene	n-Propyl Benzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene(1)	1,3,5-Trimethyl-benzene(1)	Vinyl Chloride	Total Xylenes(1)
Residential DWP Criteria		1.6	1.6	18	0.14	1.4	2.0	1.5	91	NC	57	35	1.6	0.10	16	4.0	0.10	0.10	2.1	1.8	0.040	5.6
GSIP Criteria		NC	NC	15	2.6	12	30(2)	0.36	3.2	NC	4.2	0.73	NC	1.2(2)	5.4	1.8	6.6(2)	4.0(2)	0.57	1.1	0.26(2)	0.82
Non-Residential DC Criteria		8,000	8,000	87,000	660	8,000	12,000	71,000	80,000	NC	26,000	52,000	8,000	930	160,000	1,000,000	840	660	100,000	100,000	34	1,000,000
Non-Residential SVIAI Criteria		NC	NC	430	0.33	41	43	460	730	NC	4,900	470	NC	21	610	4,600	24	1.9	8,000	4,800	2.8	12,000
Non-Residential Infinite Source VSIC		NC	NC	2,500	3.7	210	330	2,400	2,000	NC	1,800	350	NC	210	3,300	4,500	57	14	25,000	19,000	29	54,000
Non-Residential Finite VSIC for 5m Source		NC	NC	6,000	15	430	840	3,100	2,000	NC	1,800	350	NC	490	36,000	15,000	57	25	600,000	460,000	170	65,000
Non-Residential Finite VSIC for 2m Source		NC	NC	14,000	37	1,000	2,000	6,500	3,000	NC	1,800	350	NC	1,100	36,000	31,000	120	58	600,000	460,000	420	130,000
Non-Residential PSI Criteria		880,000	180,000	1.5E+07	78,000	1.0E+06	2.1E+06	1.3E+07	2.6E+06	NC	290,000	88,000	590,000	1.2E+06	1.2E+07	2.9E+07	250,000	59,000	3.6E+07	3.6E+07	890,000	1.3E+08
Soil Saturation Concentration Screening Levels		10,000	10,000	890	570	640	1,400	140	390	NC	NA	NA	10,000	88	250	460	920	500	110	94	490	150
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
NS-18 (40-43')	7/25/2012	<0.12	<0.12	<0.12	<0.12	**4.2**	**0.55**	<0.12	<0.59	<0.24	<0.78	<0.78	<0.24	<0.12	<0.24	<0.12	<0.12	**11**	<0.24	<0.24	<0.094	<0.36
NS-19 (25-30')	7/26/2012	**0.092**	<0.060	<0.060	<0.060	**0.17**	<0.060	<0.060	<0.30	<0.12	<0.39	<0.39	<0.12	<0.060	<0.12	<0.060	<0.060	**2.6**	<0.12	<0.12	**0.085**	<0.18
NS-19 (35-38')	7/26/2012	<0.32	<0.32	<0.32	<0.32	**0.62**	<0.32	<0.32	<1.6	<0.63	<2.1	<2.1	<0.63	<0.32	<0.63	<0.32	<0.32	**45**	<0.63	<0.63	<0.25	<0.95
NS-19 (45-47')	7/26/2012	<0.058	<0.058	<0.058	<0.058	**0.068**	**0.14**	<0.058	<0.29	<0.12	<0.38	<0.38	<0.12	<0.058	<0.12	<0.058	<0.058	**11**	<0.12	<0.12	<0.047	<0.18
NS-20 (23-28')	7/27/2012	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<0.24	<1.2	<0.49	<1.6	<1.6	<0.49	**0.38**	<0.49	**5.0**	<0.24	**26**	<0.49	<0.49	<0.19	<0.73
NS-20 (29-30')	7/27/2012	**0.11**	**0.13**	**0.75**	<0.059	<0.059	<0.059	<0.059	<0.30	<0.12	<0.39	<0.39	<0.12	**0.10**	<0.12	<0.059	<0.059	**0.43**	<0.12	<0.12	**0.55**	<0.18
NS-20 (35-40')	7/30/2012	<0.056	<0.056	<0.056	<0.056	<0.056	**0.066**	<0.056	<0.28	<0.11	<0.37	<0.37	<0.11	<0.056	<0.11	<0.056	<0.056	**8.7**	<0.11	<0.11	<0.045	<0.17
SS-01 (1.0-1.5')	4/15/2009	<0.032	--	<0.032	<0.032	<0.032	<0.032	<0.032	--	--	--	<0.32	<0.032	<0.032	<0.032	**0.84**	<0.032	**1.9**	<0.032	<0.032	<0.032	--
SS-02 (8-12')	4/16/2009	<0.029	--	<0.029	<0.029	<0.029	<0.029	<0.029	--	--	--	<0.29	<0.029	**0.069**	<0.029	**0.81**	<0.029	**0.97**	<0.029	<0.029	<0.029	--
SS-02 (16-20')	4/16/2009	<0.029	--	<0.029	<0.029	<0.029	<0.029	<0.029	--	--	--	<0.29	<0.029	**0.11**	<0.029	**1.3**	<0.029	**1.5**	<0.029	<0.029	<0.029	--
SS-02 (16-20') (DUP-01)	4/16/2009	<0.032	--	<0.032	<0.032	<0.032	<0.032	<0.032	--	--	--	<0.032	<0.032	**0.16**	<0.032	**1.9**	<0.032	**2.3**	<0.032	<0.032	<0.032	--
SS-03 (8-12')	4/16/2009	<0.030	--	<0.030	<0.030	<0.030	<0.030	<0.030	--	--	--	<0.30	<0.030	**1.1**	<0.030	**1.2**	<0.030	**0.90**	<0.030	<0.030	<0.030	--
SS-03 (16-20')	4/16/2009	<0.035	--	<0.035	<0.035	<0.035	<0.035	<0.035	--	--	--	<0.35	<0.035	**3.9**	<0.035	**3.5**	<0.035	**2.8**	<0.035	<0.035	<0.035	--
SS-04 (8-12')	4/17/2009	<0.12	--	<0.12	<0.12	<0.12	<0.12	<0.12	--	--	--	<1.2	<0.12	**0.49**	<0.12	**8.2**	<0.12	**4.4**	<0.12	<0.12	<0.12	--
SS-04 (12-16')	4/17/2009	<0.030	--	<0.030	<0.030	<0.030	<0.030	<0.030	--	--	--	<0.30	<0.030	**0.23**	<0.030	**3.5**	<0.030	**1.8**	<0.030	<0.030	<0.030	--
SS-05 (3-4')	4/17/2009	<0.13	--	<0.13	<0.13	<0.13	<0.13	<0.13	--	--	--	<1.3	<0.13	**0.24**	<0.13	**13**	<0.13	**11**	<0.13	<0.13	<0.13	--
SS-05 (12-13')	4/17/2009	<0.030	--	<0.030	<0.030	<0.030	<0.030	<0.030	--	--	--	<0.30	<0.030	**0.13**	<0.030	**4.4**	<0.030	**3.3**	<0.030	<0.030	<0.030	--
SS-05 (20-21')	4/17/2009	<0.026	--	<0.026	<0.026	<0.026	<0.026	<0.026	--	--	--	<0.26	<0.026	**0.18**	<0.026	**7.7**	<0.026	**5.5**	<0.026	<0.026	<0.026	--
SS-06 (5-7')	4/17/2009	<0.034	--	<0.034	<0.034	<0.034	<0.034	<0.034	--	--	--	<0.34	<0.034	<0.034	<0.034	**0.23**	<0.034	**0.12**	<0.034	<0.034	<0.034	--
SS-07 (21-22')	4/20/2009	<0.035	--	<0.035	<0.035	<0.035	<0.035	<0.035	--	--	--	<0.35	<0.035	<0.035	<0.035	**1.6**	<0.035	**5.0**	<0.035	<0.035	<0.035	--
SS-08 (19-20')	4/21/2009	<0.13	--	<0.13	<0.13	<0.13	<0.13	<0.13	--	--	--	<1.3	<0.13	**0.25**	<0.13	**7.3**	<0.13	**8.6**	<0.13	<0.13	<0.13	--
SS-09 (23-28')	7/31/2012	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.66	<0.26	<0.87	<0.87	<0.26	**0.65**	<0.26	**17**	<0.13	**13**	<0.26	<0.26	<0.11	<0.39
SS-09 (34-39')	7/31/2012	<0.055	<0.055	**0.26**	<0.055	**1.1**	**0.20**	<0.055	<0.28	<0.11	<0.36	<0.36	<0.11	<0.055	<0.11	<0.055	<0.055	<0.055	<0.11	<0.11	<0.044	<0.17
SS-09 (45-50')	7/31/2012	**0.39**	**0.27**	<0.049	<0.049	<0.049	<0.049	<0.049	<0.25	<0.098	<0.32	<0.32	**0.14**	<0.049	<0.098	<0.049	<0.049	**0.38**	**0.23**	<0.098	<0.039	<0.15
SS-10 (22.5-27.5')	8/1/2012	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.29	<0.12	<0.39	<0.39	<0.12	<0.058	<0.12	**1.1**	<0.058	**11**	<0.12	<0.12	<0.047	<0.18
SS-10 (30-35')	8/1/2012	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.68	<0.27	<0.90	<0.90	<0.27	<0.14	<0.27	**0.79**	<0.14	**16**	<0.27	<0.27	<0.11	<0.41
SS-10 (50-55')	8/1/2012	<0.052	<0.052	<0.052	<0.052	**0.29**	<0.052	<0.052	<0.26	<0.10	<0.34	<0.34	<0.10	<0.052	<0.10	<0.052	<0.052	<0.052	<0.10	<0.10	<0.042	<0.15
SVE-01 (3-5')	4/4/2012	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	<0.054	<0.27	<0.11	<0.36	<0.36	<0.11	**0.063**	<0.11	<0.054	<0.054	**0.16**	<0.11	<0.11	<0.043	<0.16

Notes:

Residential Drinking Water Protection (DWP) Criteria, Groundwater to Surface Water Interface Protection (GSIP) Criteria, Non-Residential Direct Contact (DC) Criteria, Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria, Non-Residential Infinite and Finite Sources of Volatile Soil Inhalation Criteria (VSIC), Non-Residential Particulate Soil Inhalation (PSI) Criteria, and Soil Saturation Screening Levels from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013.

mg/kg = milligrams per kilogram

NC = No Criteria

-- = Not Analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

Denotes saturated soil samples which are representative of groundwater conditions and are not used to evaluate the nature and extent of constituents of concern in soil. Soil collected from approximately 1-foot above the high water table (capillary fringe) and deeper are considered saturated.

(1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

(2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1

Table D1
Summary of Detected Volatile Organic Compounds at On-Site Soil Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		n-Butyl Benzene	sec-Butylbenzene	1,1-Dichloro-ethane	1,1-Dichloro-ethene(1)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene(1)	Isopropyl-benzene	4-Isopropyl-toluene	2-Methyl-naphthalene	Naphthalene	n-Propyl Benzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene(1)	1,3,5-Trimethyl-benzene(1)	Vinyl Chloride	Total Xylenes(1)
Residential DWP Criteria		1.6	1.6	18	0.14	1.4	2.0	1.5	91	NC	57	35	1.6	0.10	16	4.0	0.10	0.10	2.1	1.8	0.040	5.6
GSIP Criteria		NC	NC	15	2.6	12	30(2)	0.36	3.2	NC	4.2	0.73	NC	1.2(2)	5.4	1.8	6.6(2)	4.0(2)	0.57	1.1	0.26(2)	0.82
Non-Residential DC Criteria		8,000	8,000	87,000	660	8,000	12,000	71,000	80,000	NC	26,000	52,000	8,000	930	160,000	1,000,000	840	660	100,000	100,000	34	1,000,000
Non-Residential SVIAI Criteria		NC	NC	430	0.33	41	43	460	730	NC	4,900	470	NC	21	610	4,600	24	1.9	8,000	4,800	2.8	12,000
Non-Residential Infinite Source VSIC		NC	NC	2,500	3.7	210	330	2,400	2,000	NC	1,800	350	NC	210	3,300	4,500	57	14	25,000	19,000	29	54,000
Non-Residential Finite VSIC for 5m Source		NC	NC	6,000	15	430	840	3,100	2,000	NC	1,800	350	NC	490	36,000	15,000	57	25	600,000	460,000	170	65,000
Non-Residential Finite VSIC for 2m Source		NC	NC	14,000	37	1,000	2,000	6,500	3,000	NC	1,800	350	NC	1,100	36,000	31,000	120	58	600,000	460,000	420	130,000
Non-Residential PSI Criteria		880,000	180,000	1.5E+07	78,000	1.0E+06	2.1E+06	1.3E+07	2.6E+06	NC	290,000	88,000	590,000	1.2E+06	1.2E+07	2.9E+07	250,000	59,000	3.6E+07	3.6E+07	890,000	1.3E+08
Soil Saturation Concentration Screening Levels		10,000	10,000	890	570	640	1,400	140	390	NC	NA	NA	10,000	88	250	460	920	500	110	94	490	150
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SVE-01 (16-18')	4/4/2012	<0.059	<0.059	<0.059	<0.059	<0.059	<0.059	<0.059	<0.29	<0.12	<0.39	<0.39	<0.12	**0.20**	<0.12	<0.059	<0.059	**0.63**	<0.12	<0.12	<0.047	<0.18
SVE-02 (4-6')	4/4/2012	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.25	<0.10	<0.33	<0.33	<0.10	**0.10**	<0.10	<0.050	<0.050	**0.50**	<0.10	<0.10	<0.040	<0.15
SVE-02 (16-18')	4/5/2012	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.068	<0.34	<0.14	<0.45	<0.45	<0.14	**0.28**	<0.14	<0.068	<0.068	**1.5**	<0.14	<0.14	<0.054	<0.21
SVE-03 (4-6')	4/3/2012	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.28	<0.11	<0.37	<0.37	<0.11	<0.057	<0.11	<0.057	<0.057	**0.62**	<0.11	<0.11	<0.045	<0.17
SVE-03 (16-18')	4/4/2012	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	<0.26	<0.10	<0.35	<0.35	<0.10	<0.052	<0.10	<0.052	<0.052	**0.96**	<0.10	<0.10	<0.042	<0.15
SVE-04 (4-6')	4/3/2012	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.52	<0.21	<0.68	<0.68	<0.21	<0.10	<0.21	<0.10	<0.10	**0.58**	<0.21	<0.21	<0.083	<0.31
SVE-04 (16-18')	4/3/2012	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	<0.061	<0.30	<0.12	<0.40	<0.40	<0.12	<0.061	<0.12	<0.061	<0.061	**1.7**	<0.12	<0.12	<0.049	<0.18
SB-MIP-01 (1-2')	6/19/2014	<0.0038	<0.0038	<0.011	**0.034**	**2.8**	**0.18**	<0.0025	<0.0028	<0.0038	--	<0.038	<0.0041	<0.0068	<0.0048	**0.33**	<0.0076	**92**	**0.032**	<0.0029	<0.0070	<0.0073
SB-MIP-01 (2.25-2.75')	6/23/2014	<0.0032	<0.0032	<0.0093	<0.0073	<0.0080	<0.0045	<0.028	<0.0023	<0.0032	--	<0.032	<0.0034	<0.0057	<0.053	**0.11**	<0.083	**0.63**	<0.0035	<0.0024	<0.0058	<0.0061
SB-MIP-01 (3-4')	6/19/2014	<0.042	<0.042	<0.12	<0.097	<0.11	<0.060	<0.0027	<0.030	<0.042	--	<0.42	<0.045	<0.075	<0.0052	**0.35**	<0.0081	**2.1**	<0.046	<0.032	<0.077	<0.081
SB-MIP-01 (4-5')	6/19/2014	<0.0041	<0.0041	<0.012	<0.0094	<0.010	<0.0058	<0.0027	<0.0030	<0.0041	--	<0.041	<0.0044	<0.0074	<0.0051	**0.30**	<0.0080	**2.4**	<0.0045	<0.0031	<0.0075	<0.0079
SB-MIP-01 (4-5') (DUP-01)	6/19/2014	<0.0041	<0.0041	<0.012	<0.0093	<0.010	<0.0057	<0.0026	<0.0029	<0.0041	--	<0.041	<0.0043	<0.0073	<0.0050	**0.67**	<0.0078	**2.1**	<0.0045	<0.0031	<0.0074	<0.0078
SB-MIP-01 (6-8')	6/19/2014	<0.0040	<0.0040	<0.012	<0.0090	<0.0099	<0.0056	<0.0024	<0.0029	<0.0040	--	<0.040	<0.0042	<0.0071	<0.0047	**0.12**	<0.0073	**0.67**	<0.0043	<0.0030	<0.0072	<0.0076
SB-MIP-01 (8-9')	6/19/2014	<0.0037	<0.0037	<0.011	<0.0085	<0.0093	<0.0052	<0.0026	<0.0027	<0.0037	--	<0.037	<0.0040	<0.0066	<0.0049	**0.84**	<0.0077	**2.8**	<0.0041	<0.0028	<0.0068	<0.0071
SB-MIP-01 (11-12')	6/19/2014	<0.0039	<0.0039	<0.011	<0.0089	<0.0098	<0.0055	<0.0021	<0.0028	<0.0039	--	<0.039	<0.0042	<0.0070	<0.0040	**0.39**	<0.0063	**1.2**	<0.0043	<0.0029	<0.0071	<0.0074
SB-MIP-01 (12-13')	6/19/2014	<0.0043	<0.0043	<0.013	<0.0098	<0.011	<0.0061	<0.0028	<0.0031	<0.0043	--	<0.043	<0.0046	<0.0077	<0.0054	**0.67**	<0.0085	**2.0**	<0.0047	<0.0032	<0.0078	<0.0082
SB-MIP-01 (14-15')	6/19/2014	<0.0037	<0.0037	<0.011	<0.0084	<0.0092	<0.0052	<0.0024	<0.0027	<0.0037	--	<0.037	<0.0039	<0.0066	<0.0046	**0.71**	<0.0073	**2.1**	<0.0040	<0.0028	<0.0067	<0.0070
SB-MIP-01 (16-18')	6/19/2014	<0.0043	<0.0043	<0.013	<0.0099	<0.011	<0.0061	<0.0028	<0.0031	<0.0043	--	<0.043	<0.0046	<0.0077	<0.0054	**0.45**	<0.0085	**1.5**	<0.0047	<0.0033	<0.0079	<0.0083
SB-MIP-01 (18-20')	6/19/2014	<0.0039	<0.0039	<0.011	<0.0090	<0.0098	<0.0055	<0.0026	<0.0028	<0.0039	--	<0.039	<0.0042	<0.0070	<0.0049	**0.68**	<0.0077	**2.2**	<0.0043	<0.0030	<0.0071	<0.0075
SB-MIP-01 (20-22')	6/19/2014	<0.0040	<0.0040	<0.012	<0.0091	<0.010	<0.0056	<0.0026	<0.0029	<0.0040	--	<0.040	<0.0042	**0.034**	<0.0050	**1.1**	<0.0079	**3.1**	<0.0044	<0.0030	<0.0072	<0.0076
SB-MIP-01 (22-24')	6/19/2014	<0.0091	<0.0091	<0.027	<0.021	<0.023	<0.013	<0.0060	<0.0066	<0.0091	--	<0.091	<0.0097	<0.016	<0.011	**2.4**	<0.018	**4.1**	<0.010	<0.0069	<0.017	<0.017
SB-MIP-01 (47-48')	6/19/2014	<0.0028	<0.0028	<0.0083	<0.0065	<0.0071	<0.0040	<0.0019	<0.0020	<0.0028	--	<0.028	<0.0030	<0.0051	<0.0036	<0.0065	<0.0056	<0.0036	<0.0031	<0.0021	<0.0051	<0.0054
SB-MIP-01 (49-49.5')	6/19/2014	<0.0034	<0.0034	<0.0098	<0.0077	<0.0084	<0.0047	<0.0022	<0.0024	<0.0034	--	<0.034	<0.0036	<0.0060	<0.0042	<0.0077	<0.0066	<0.0043	<0.0037	<0.0025	<0.0061	<0.0064
SB-MIP-03 (0-2')	6/20/2014	<0.0043	<0.0043	<0.012	<0.0098	<0.011	<0.0060	<0.0028	<0.0031	<0.0043	--	<0.043	<0.0045	<0.0076	<0.0054	**0.047**	<0.0084	**0.36**	<0.0047	<0.0032	<0.0078	<0.0082
SB-MIP-03 (2-3')	6/20/2014	<0.0050	<0.0050	<0.014	<0.011	<0.012	<0.0070	<0.0033	<0.0036	<0.0050	--	<0.050	<0.0053	<0.0089	<0.0062	**0.42**	<0.0098	**2.5**	<0.0054	<0.0037	<0.0090	<0.0095
SB-MIP-03 (4-5')	6/20/2014	<0.0041	<0.0041	<0.012	<0.0093	<0.010	<0.0057	<0.0027	<0.0029	<0.0041	--	<0.041	<0.0043	<0.0073	<0.0051	**0.44**	<0.0080	**1.6**	<0.0045	<0.0031	<0.0074	<0.0078
SB-MIP-03 (4-5') (DUP-02)	6/20/2014	<0.0037	<0.0037	<0.011	<0.0083	<0.0091	<0.0051	<0.0024	<0.0026	<0.0037	--	<0.037	<0.0039	<0.0065	<0.0046	**0.26**	<0.0072	**1.9**	<0.0040	<0.0027	<0.0066	<0.0070
SB-MIP-03 (5-6')	6/20/2014	<0.039	<0.039	<0.11	<0.088	<0.097	<0.054	<0.025	<0.028	<0.039	--	<0.39	<0.041	<0.069	<0.048	<0.088	<0.076	**0.84**	<0.042	<0.029	<0.070	<0.074

Notes:

Residential Drinking Water Protection (DWP) Criteria, Groundwater to Surface Water Interface Protection (GSIP) Criteria, Non-Residential Direct Contact (DC) Criteria, Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria, Non-Residential Infinite and Finite Sources of Volatile Soil Inhalation Criteria (VSIC), Non-Residential Particulate Soil Inhalation (PSI) Criteria, and Soil Saturation Screening Levels from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013.

mg/kg = milligrams per kilogram

NC = No Criteria

-- = Not Analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

Denotes saturated soil samples which are representative of groundwater conditions and are not used to evaluate the nature and extent of constituents of concern in soil. Soil collected from approximately 1-foot above the high water table (capillary fringe) and deeper are considered saturated.

(1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

(2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1

Table D1
Summary of Detected Volatile Organic Compounds at On-Site Soil Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		n-Butyl Benzene	sec-Butylbenzene	1,1-Dichloro-ethane	1,1-Dichloro-ethene(1)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene(1)	Isopropyl-benzene	4-Isopropyl-toluene	2-Methyl-naphthalene	Naphthalene	n-Propyl Benzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene(1)	1,3,5-Trimethyl-benzene(1)	Vinyl Chloride	Total Xylenes(1)
Residential DWP Criteria		1.6	1.6	18	0.14	1.4	2.0	1.5	91	NC	57	35	1.6	0.10	16	4.0	0.10	0.10	2.1	1.8	0.040	5.6
GSIP Criteria		NC	NC	15	2.6	12	30(2)	0.36	3.2	NC	4.2	0.73	NC	1.2(2)	5.4	1.8	6.6(2)	4.0(2)	0.57	1.1	0.26(2)	0.82
Non-Residential DC Criteria		8,000	8,000	87,000	660	8,000	12,000	71,000	80,000	NC	26,000	52,000	8,000	930	160,000	1,000,000	840	660	100,000	100,000	34	1,000,000
Non-Residential SVIAI Criteria		NC	NC	430	0.33	41	43	460	730	NC	4,900	470	NC	21	610	4,600	24	1.9	8,000	4,800	2.8	12,000
Non-Residential Infinite Source VSIC		NC	NC	2,500	3.7	210	330	2,400	2,000	NC	1,800	350	NC	210	3,300	4,500	57	14	25,000	19,000	29	54,000
Non-Residential Finite VSIC for 5m Source		NC	NC	6,000	15	430	840	3,100	2,000	NC	1,800	350	NC	490	36,000	15,000	57	25	600,000	460,000	170	65,000
Non-Residential Finite VSIC for 2m Source		NC	NC	14,000	37	1,000	2,000	6,500	3,000	NC	1,800	350	NC	1,100	36,000	31,000	120	58	600,000	460,000	420	130,000
Non-Residential PSI Criteria		880,000	180,000	1.5E+07	78,000	1.0E+06	2.1E+06	1.3E+07	2.6E+06	NC	290,000	88,000	590,000	1.2E+06	1.2E+07	2.9E+07	250,000	59,000	3.6E+07	3.6E+07	890,000	1.3E+08
Soil Saturation Concentration Screening Levels		10,000	10,000	890	570	640	1,400	140	390	NC	NA	NA	10,000	88	250	460	920	500	110	94	490	150
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SB-MIP-03 (7-8')	6/20/2014	<0.0038	<0.0038	<0.011	<0.0087	<0.0096	<0.0054	<0.0025	<0.0028	<0.0038	--	<0.038	<0.0041	**0.043**	<0.0048	**1.7**	<0.0075	**8.4**	<0.0042	<0.0029	<0.0069	<0.0073
SB-MIP-03 (8-9')	6/20/2014	<0.0037	<0.0037	<0.011	<0.0085	<0.0094	<0.0053	<0.0025	<0.0027	<0.0037	--	<0.037	<0.0040	**0.038**	<0.0047	**1.5**	<0.0074	**7.3**	<0.0041	<0.0028	<0.0068	<0.0071
SB-MIP-03 (10-12')	6/20/2014	<0.0042	<0.0042	<0.012	<0.0096	<0.010	<0.0059	<0.0028	<0.0030	<0.0042	--	<0.042	<0.0045	**0.047**	<0.0052	**2.0**	<0.0083	**9.4**	<0.0046	<0.0031	<0.0076	<0.0080
SB-MIP-03 (12-13')	6/20/2014	<0.0041	<0.0041	<0.012	<0.0094	<0.010	<0.0058	<0.0027	<0.0030	<0.0041	--	<0.041	<0.0044	**0.034**	<0.0052	**1.3**	<0.0081	**6.1**	<0.0045	<0.0031	<0.0075	<0.0079
SB-MIP-03 (14-15')	6/20/2014	<0.0041	<0.0041	<0.012	<0.0094	<0.010	<0.0058	<0.0027	<0.0029	<0.0041	--	<0.041	<0.0044	**0.056**	<0.0051	**2.1**	<0.0081	**9.3**	<0.0045	<0.0031	<0.0074	<0.0078
SB-MIP-03 (17-18')	6/20/2014	<0.0057	<0.0057	<0.017	<0.013	<0.014	<0.0080	<0.0037	<0.0041	<0.0057	--	<0.057	<0.0060	<0.010	<0.0071	**0.59**	<0.011	**2.9**	<0.0062	<0.0043	<0.010	<0.011
SB-MIP-03 (19-20')	6/20/2014	<0.0042	<0.0042	<0.012	<0.0095	**0.042**	<0.0059	<0.0027	<0.0030	<0.0042	--	<0.042	<0.0044	**0.11**	<0.0052	**3.5**	<0.0082	**16**	<0.0046	<0.0031	<0.0076	<0.0080
SB-MIP-03 (20-21')	6/20/2014	<0.0045	<0.0045	<0.013	<0.010	**0.046**	<0.0063	<0.0030	<0.0032	<0.0045	--	<0.045	<0.0048	**0.15**	<0.0056	**4.4**	<0.0089	**20**	<0.0049	<0.0034	<0.0082	<0.0086
SB-MIP-03 (24-28')	6/20/2014	**2.7**	**4.0**	<0.13	<0.098	<0.11	<0.061	<0.028	**3.1**	**9.1**	--	<3.4	**8.3**	<0.077	<0.054	**1.2**	<0.085	<0.055	**33**	**2.2**	<0.078	<0.082
SB-MIP-03 (28-32')	6/20/2014	<0.0040	<0.0040	**0.050**	<0.0092	**3.2**	**0.080**	<0.0027	<0.0029	<0.0040	--	<0.040	<0.0043	<0.0072	<0.0051	<0.0092	<0.0080	**0.61**	<0.0044	<0.0030	**0.086**	<0.0077
SB-MIP-03 (47-48')	6/20/2014	<0.33	<0.33	<0.95	<0.75	<0.82	<0.46	<0.22	<0.24	<0.33	--	<3.3	<0.35	<0.58	<0.41	<0.75	<0.65	**52**	<0.36	<0.25	<0.59	<0.63
SB-MIP-05 (1.5-2.5')	5/27/2015	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	<0.067	--	<0.67	<0.067	<0.067	<0.067	<0.067	<0.067	**3.6**	<0.067	<0.067	<0.067	<0.20
SB-MIP-05 (6-7')	5/27/2015	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	--	<1.4	<0.14	<0.14	<0.14	<0.14	<0.14	**4.9**	<0.14	<0.14	<0.14	<0.42
SB-MIP-05 (14-15')	5/27/2015	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	--	<0.60	<0.060	<0.060	<0.060	<0.060	<0.060	**2.4**	<0.060	<0.060	<0.060	<0.18
SB-MIP-05 (14-15') (DUP-03)	5/27/2015	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	--	<0.30	<0.030	<0.030	<0.030	<0.030	<0.030	**1.7**	<0.030	<0.030	<0.030	<0.091
SB-MIP-05 (49.5-50')	5/27/2015	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	--	<0.25	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.074
SB-MIP-05 (50-51.5')	5/27/2015	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	--	<0.23	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	**0.028**	<0.023	<0.023	<0.070
SB-MIP-14 (3-4')	5/20/2015	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	--	<0.46	<0.046	<0.046	<0.046	**0.11**	<0.046	**3.1**	<0.046	<0.046	<0.046	<0.14
SB-MIP-14 (4-5')	5/20/2015	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	--	<0.26	<0.026	<0.026	<0.026	**0.029**	<0.026	**0.58**	<0.026	<0.026	<0.026	<0.078
SB-MIP-14 (4-5') (DUP-02)	5/20/2015	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	--	<0.27	<0.027	<0.027	<0.027	**0.059**	<0.027	**1.0**	<0.027	<0.027	<0.027	<0.080
SB-MIP-23 (44-45')	6/2/2015	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	--	<0.22	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.067
SB-MIP-23 (45-46')	6/2/2015	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	--	<0.23	<0.023	<0.023	<0.023	<0.023	<0.023	**0.030**	<0.023	<0.023	<0.023	<0.070
SB-MIP-23 (45-46') (DUP-04)	6/2/2015	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	--	<0.23	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.069
SB-MIP-25 (2.5-3.5')	6/1/2015	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.025	<0.057	<0.057	--	<0.57	<0.057	<0.057	<0.025	<0.057	<0.025	**0.72**	<0.057	<0.057	<0.057	<0.17
SB-MIP-25 (3.5-4.5')	6/1/2015	<0.092	<0.092	<0.092	<0.092	<0.092	<0.092	<0.057	<0.092	<0.092	--	<0.92	<0.092	<0.092	<0.057	**0.85**	<0.057	**4.2**	<0.092	<0.092	<0.092	<0.28
SB-MIP-25 (4.5-5.5')	6/1/2015	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.092	<0.025	<0.025	--	<0.25	<0.025	<0.025	<0.092	**0.11**	<0.092	**0.78**	<0.025	<0.025	<0.025	<0.074
SB-MIP-25 (5.25-6.25')	6/1/2015	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	--	<0.27	<0.027	<0.027	<0.027	**0.16**	<0.027	**1.2**	<0.027	<0.027	<0.027	<0.080
SB-MIP-25 (6.25-7.25')	6/1/2015	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	--	<0.23	<0.023	<0.023	<0.023	**0.23**	<0.023	**1.3**	<0.023	<0.023	<0.023	<0.069
SB-MIP-25 (7.25-8.25')	6/1/2015	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	--	<0.66	<0.066	<0.066	<0.066	**0.26**	<0.066	**1.4**	<0.066	<0.066	<0.066	<0.20
SB-MIP-25 (11.5-12.5')	6/1/2015	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	--	<0.58	<0.058	<0.058	<0.058	**0.51**	<0.058	**2.2**	<0.058	<0.058	<0.058	<0.17
SB-MIP-25 (15.75-16.75')	6/1/2015	<0.073	<0.073	<0.073	<0.073	<0.073	<0.073	<0.073	<0.073	<0.073	--	<0.73	<0.073	<0.073	<0.073	**0.65**	<0.073	**2.5**	<0.073	<0.073	<0.073	<0.22
SB-MIP-25 (19.5-20.5')	6/1/2015	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	--	<1.1	<0.11	<0.11	<0.11	**0.88**	<0.11	**3.5**	<0.11	<0.11	<0.11	<0.34

Notes:

Residential Drinking Water Protection (DWP) Criteria, Groundwater to Surface Water Interface Protection (GSIP) Criteria, Non-Residential Direct Contact (DC) Criteria, Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria, Non-Residential Infinite and Finite Sources of Volatile Soil Inhalation Criteria (VSIC), Non-Residential Particulate Soil Inhalation (PSI) Criteria, and Soil Saturation Screening Levels from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013.

mg/kg = milligrams per kilogram

NC = No Criteria

-- = Not Analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

Denotes saturated soil samples which are representative of groundwater conditions and are not used to evaluate the nature and extent of constituents of concern in soil. Soil collected from approximately 1-foot above the high water table (capillary fringe) and deeper are considered saturated.

(1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

(2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1

Table D1
Summary of Detected Volatile Organic Compounds at On-Site Soil Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		n-Butyl Benzene	sec-Butylbenzene	1,1-Dichloro-ethane	1,1-Dichloro-ethene(1)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene(1)	Isopropyl-benzene	4-Isopropyl-toluene	2-Methyl-naphthalene	Naphthalene	n-Propyl Benzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene(1)	1,3,5-Trimethyl-benzene(1)	Vinyl Chloride	Total Xylenes(1)
Residential DWP Criteria		1.6	1.6	18	0.14	1.4	2.0	1.5	91	NC	57	35	1.6	0.10	16	4.0	0.10	0.10	2.1	1.8	0.040	5.6
GSIP Criteria		NC	NC	15	2.6	12	30(2)	0.36	3.2	NC	4.2	0.73	NC	1.2(2)	5.4	1.8	6.6(2)	4.0(2)	0.57	1.1	0.26(2)	0.82
Non-Residential DC Criteria		8,000	8,000	87,000	660	8,000	12,000	71,000	80,000	NC	26,000	52,000	8,000	930	160,000	1,000,000	840	660	100,000	100,000	34	1,000,000
Non-Residential SVIAI Criteria		NC	NC	430	0.33	41	43	460	730	NC	4,900	470	NC	21	610	4,600	24	1.9	8,000	4,800	2.8	12,000
Non-Residential Infinite Source VSIC		NC	NC	2,500	3.7	210	330	2,400	2,000	NC	1,800	350	NC	210	3,300	4,500	57	14	25,000	19,000	29	54,000
Non-Residential Finite VSIC for 5m Source		NC	NC	6,000	15	430	840	3,100	2,000	NC	1,800	350	NC	490	36,000	15,000	57	25	600,000	460,000	170	65,000
Non-Residential Finite VSIC for 2m Source		NC	NC	14,000	37	1,000	2,000	6,500	3,000	NC	1,800	350	NC	1,100	36,000	31,000	120	58	600,000	460,000	420	130,000
Non-Residential PSI Criteria		880,000	180,000	1.5E+07	78,000	1.0E+06	2.1E+06	1.3E+07	2.6E+06	NC	290,000	88,000	590,000	1.2E+06	1.2E+07	2.9E+07	250,000	59,000	3.6E+07	3.6E+07	890,000	1.3E+08
Soil Saturation Concentration Screening Levels		10,000	10,000	890	570	640	1,400	140	390	NC	NA	NA	10,000	88	250	460	920	500	110	94	490	150
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SB-MIP-25 (21.5-22.5')	6/1/2015	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	--	<1.4	<0.14	<0.14	<0.14	**1.2**	<0.14	**4.5**	<0.14	<0.14	<0.14	<0.43
SB-MIP-25 (47.5-48.5')	6/1/2015	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	--	<11	<1.1	<1.1	<1.1	<1.1	<1.1	**35**	<1.1	<1.1	<1.1	<3.2
SB-MIP-25 (50-51')	6/1/2015	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	--	<0.22	<0.022	<0.022	<0.022	<0.022	<0.022	**0.044**	<0.022	<0.022	<0.022	<0.067
SB-MIP-25 (52.5-53.5')	6/1/2015	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	--	<0.22	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.065
SB-MIP-25 (53.5-54.5')	6/1/2015	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	--	<0.23	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.070
SB-MIP-30 (7-8')	6/3/2015	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	--	<0.29	<0.029	**0.048**	<0.029	<0.029	<0.029	**1.6**	<0.029	<0.029	<0.029	<0.086
SB-MIP-30 (11-12')	6/3/2015	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	--	<0.28	<0.028	<0.028	<0.028	<0.028	<0.028	**0.034**	<0.028	<0.028	<0.028	<0.084
SB-MIP-30 (44.5-45.5')	6/3/2015	<0.11	<0.11	<0.11	<0.11	**2.2**	**0.62**	<0.11	<0.11	<0.11	--	<1.1	<0.11	<0.11	<0.11	<0.11	<0.11	**0.73**	<0.11	<0.11	<0.11	<0.34
SB-MIP-30 (46-47')	6/3/2015	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	--	<0.26	<0.026	<0.026	<0.026	<0.026	<0.026	**0.086**	<0.026	<0.026	<0.026	<0.077
SB-MIP-35 (1-2')	5/19/2015	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	--	<0.32	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	<0.095
SB-MIP-35 (2-3')	5/19/2015	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	--	<0.31	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	<0.092
SB-MIP-35 (3-4')	5/19/2015	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	--	<0.33	<0.033	**0.050**	<0.033	<0.033	<0.033	**0.057**	<0.033	<0.033	<0.033	<0.099
SB-MIP-35 (14-15')	5/19/2015	<0.034	<0.034	<0.034	<0.034	<0.034	<0.034	<0.034	<0.034	<0.034	--	<0.34	<0.034	**0.20**	<0.034	**0.043**	<0.034	**1.1**	<0.034	<0.034	<0.034	<0.10
SB-MIP-35 (20.5-21.5')	5/19/2015	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	--	<0.56	<0.056	**0.24**	<0.056	**0.14**	<0.056	**2.3**	<0.056	<0.056	<0.056	<0.17
SB-MIP-38 (1.5-3.5')	5/18/2015	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	--	<0.25	<0.025	<0.025	<0.025	<0.025	<0.025	**0.12**	<0.025	<0.025	<0.025	<0.075
SB-MIP-40 (1-2')	5/20/2015	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	--	<0.24	<0.024	<0.024	<0.024	**0.052**	<0.024	**0.34**	<0.024	<0.024	<0.024	<0.073
SB-MIP-40 (2-3')	5/20/2015	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	--	<0.26	<0.026	**0.032**	<0.026	**0.17**	<0.026	**0.77**	<0.026	<0.026	<0.026	<0.077
SB-MIP-40 (6-7')	5/20/2015	<0.055	<0.055	<0.055	<0.055	<0.055	<0.055	<0.055	<0.055	<0.055	--	<0.55	<0.055	<0.055	<0.055	**0.082**	<0.055	**1.1**	<0.055	<0.055	<0.055	<0.16
SB-MIP-40 (9-10')	5/20/2015	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	--	<2.6	<0.26	<0.26	<0.26	**0.58**	<0.26	**7.0**	<0.26	<0.26	<0.26	<0.78
SB-MIP-40 (12-13')	5/20/2015	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	--	<3.0	<0.30	**0.41**	<0.30	**1.5**	<0.30	**16**	<0.30	<0.30	<0.30	<0.90
SB-MIP-40 (15-16')	5/20/2015	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	--	<2.8	<0.28	**0.31**	<0.28	**1.2**	<0.28	**12**	<0.28	<0.28	<0.28	<0.85
SB-MIP-40 (16.5-17.5')	5/20/2015	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	--	<3.0	<0.30	**0.43**	<0.30	**2.1**	<0.30	**20**	<0.30	<0.30	<0.30	<0.89
SB-MIP-40 (18-19')	5/20/2015	<0.62	<0.62	<0.62	<0.62	<0.62	<0.62	<0.62	<0.62	<0.62	--	<6.2	<0.62	**0.62**	<0.62	**3.1**	<0.62	**27**	<0.62	<0.62	<0.62	<1.9
SB-MIP-40 (20-21')	5/20/2015	<0.68	<0.68	<0.68	<0.68	<0.68	<0.68	<0.68	<0.68	<0.68	--	<6.8	<0.68	**0.72**	<0.68	**3.5**	<0.68	**29**	<0.68	<0.68	<0.68	<2.0
SB-MIP-40 (21-22')	5/20/2015	<0.56	<0.56	<0.56	<0.56	<0.56	<0.56	<0.56	<0.56	<0.56	--	<5.6	<0.56	<0.56	<0.56	**2.0**	<0.56	**18**	<0.56	<0.56	<0.56	<1.7
SB-MIP-40 (22-23')	5/20/2015	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	--	<12	<1.2	<1.2	<1.2	**3.6**	<1.2	**28**	<1.2	<1.2	<1.2	<3.5
SB-MIP-41 (4.4-5.4')	5/21/2015	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	--	<0.24	<0.024	<0.024	<0.024	**0.029**	<0.024	**0.68**	<0.024	<0.024	<0.024	<0.073
SB-MIP-41 (5.4-6.6')	5/21/2015	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	<0.031	--	<0.31	<0.031	<0.031	<0.031	<0.031	<0.031	**0.14**	<0.031	<0.031	<0.031	<0.092

Notes:

Residential Drinking Water Protection (DWP) Criteria, Groundwater to Surface Water Interface Protection (GSIP) Criteria, Non-Residential Direct Contact (DC) Criteria, Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria, Non-Residential Infinite and Finite Sources of Volatile Soil Inhalation Criteria (VSIC), Non-Residential Particulate Soil Inhalation (PSI) Criteria, and Soil Saturation Screening Levels from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013.

mg/kg = milligrams per kilogram

NC = No Criteria

-- = Not Analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

Denotes saturated soil samples which are representative of groundwater conditions and are not used to evaluate the nature and extent of constituents of concern in soil. Soil collected from approximately 1-foot above the high water table (capillary fringe) and deeper are considered saturated.

(1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

(2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1

Table D1
Summary of Detected Volatile Organic Compounds at On-Site Soil Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		n-Butyl Benzene	sec-Butylbenzene	1,1-Dichloro-ethane	1,1-Dichloro-ethene(1)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene(1)	Isopropyl-benzene	4-Isopropyl-toluene	2-Methyl-naphthalene	Naphthalene	n-Propyl Benzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene(1)	1,3,5-Trimethyl-benzene(1)	Vinyl Chloride	Total Xylenes(1)
Residential DWP Criteria		1.6	1.6	18	0.14	1.4	2.0	1.5	91	NC	57	35	1.6	0.10	16	4.0	0.10	0.10	2.1	1.8	0.040	5.6
GSIP Criteria		NC	NC	15	2.6	12	30(2)	0.36	3.2	NC	4.2	0.73	NC	1.2(2)	5.4	1.8	6.6(2)	4.0(2)	0.57	1.1	0.26(2)	0.82
Non-Residential DC Criteria		8,000	8,000	87,000	660	8,000	12,000	71,000	80,000	NC	26,000	52,000	8,000	930	160,000	1,000,000	840	660	100,000	100,000	34	1,000,000
Non-Residential SVIAI Criteria		NC	NC	430	0.33	41	43	460	730	NC	4,900	470	NC	21	610	4,600	24	1.9	8,000	4,800	2.8	12,000
Non-Residential Infinite Source VSIC		NC	NC	2,500	3.7	210	330	2,400	2,000	NC	1,800	350	NC	210	3,300	4,500	57	14	25,000	19,000	29	54,000
Non-Residential Finite VSIC for 5m Source		NC	NC	6,000	15	430	840	3,100	2,000	NC	1,800	350	NC	490	36,000	15,000	57	25	600,000	460,000	170	65,000
Non-Residential Finite VSIC for 2m Source		NC	NC	14,000	37	1,000	2,000	6,500	3,000	NC	1,800	350	NC	1,100	36,000	31,000	120	58	600,000	460,000	420	130,000
Non-Residential PSI Criteria		880,000	180,000	1.5E+07	78,000	1.0E+06	2.1E+06	1.3E+07	2.6E+06	NC	290,000	88,000	590,000	1.2E+06	1.2E+07	2.9E+07	250,000	59,000	3.6E+07	3.6E+07	890,000	1.3E+08
Soil Saturation Concentration Screening Levels		10,000	10,000	890	570	640	1,400	140	390	NC	NA	NA	10,000	88	250	460	920	500	110	94	490	150
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SB-MIP-41 (6.8-7.8')	5/21/2015	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	--	<0.29	<0.029	<0.029	<0.029	**0.060**	<0.029	**0.56**	<0.029	<0.029	<0.029	<0.086
SB-MIP-41 (12.5-13.5')	5/21/2015	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	--	<0.28	<0.028	**0.045**	<0.028	**0.14**	<0.028	**0.93**	<0.028	<0.028	<0.028	<0.085
SB-MIP-41 (18.5-19.5')	5/21/2015	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	<0.028	--	<0.28	<0.028	**0.079**	<0.028	**0.34**	<0.028	**2.3**	<0.028	<0.028	<0.028	<0.084
SB-MIP-41 (20.5-21.5')	5/21/2015	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	--	<1.5	<0.15	**0.18**	<0.15	**0.80**	<0.15	**5.8**	<0.15	<0.15	<0.15	<0.45
SB-MIP-41 (21.5-22.5')	5/21/2015	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	--	<1.1	<0.11	**0.12**	<0.11	**0.57**	<0.11	**4.1**	<0.11	<0.11	<0.11	<0.32
SB-MIP-41 (22.5-23.5')	5/21/2015	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	--	<1.4	<0.14	**0.15**	<0.14	**0.60**	<0.14	**4.5**	<0.14	<0.14	<0.14	<0.42
SB-MIP-44 (4.5-5.5')	5/21/2015	<1.7	<1.7	<1.7	<1.7	**27**	<1.7	<1.7	<1.7	<1.7	--	<17	<1.7	<1.7	<1.7	<1.7	<1.7	**80**	<1.7	<1.7	<1.7	<5.2
SB-MIP-44 (5.5-6.5')	5/21/2015	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	--	<0.27	<0.027	**0.070**	<0.027	<0.027	<0.027	**0.84**	<0.027	<0.027	<0.027	<0.080
SB-MIP-44 (6.5-7.5')	5/21/2015	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	--	<0.26	<0.026	<0.026	<0.026	<0.026	<0.026	**0.12**	<0.026	<0.026	<0.026	<0.078
SB-MIP-44 (18-19')	5/21/2015	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	--	<1.2	<0.12	**0.15**	<0.12	**0.13**	<0.12	**3.5**	<0.12	<0.12	<0.12	<0.36
SB-MIP-44 (19.5-20.5')	5/21/2015	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	--	<1.1	<0.11	**0.14**	<0.11	**0.15**	<0.11	**3.4**	<0.11	<0.11	<0.11	<0.34
SB-MIP-44 (21.5-22.5')	5/21/2015	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	<0.058	--	<0.58	<0.058	**0.081**	<0.058	**0.097**	<0.058	**2.4**	<0.058	<0.058	<0.058	<0.17
SB-MIP-46 (0.5-1.5')	5/19/2015	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	<11	<1.0	**9.1**	<1.0	<1.0	<1.0	**58**	<1.0	<1.0	<1.0	<3.0
SB-MIP-46 (1.5-2.5')	5/19/2015	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	--	<1.4	<0.14	**0.54**	<0.14	<0.14	<0.14	**7.0**	<0.14	<0.14	<0.14	<0.42
SB-MIP-46 (2.5-3.5')	5/19/2015	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	--	<0.51	<0.051	<0.051	<0.051	<0.051	<0.051	**0.12**	<0.051	<0.051	<0.051	<0.15
SB-MIP-46 (7-8')	5/19/2015	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	--	<0.33	<0.033	<0.033	<0.033	<0.033	<0.033	**0.052**	<0.033	<0.033	<0.033	<0.098
SB-MIP-46 (21-22')	5/19/2015	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	--	<0.29	<0.029	**0.14**	<0.029	**0.23**	<0.029	**0.70**	<0.029	<0.029	<0.029	<0.087
SB-MIP-46 (21-22') (DUP-01)	5/19/2015	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	--	<0.26	<0.026	**0.078**	<0.026	**0.14**	<0.026	**0.40**	<0.026	<0.026	<0.026	<0.079
SB-MIP-48 (4-5')	5/22/2015	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	--	<1.3	<0.13	**5.0**	<0.13	<0.13	**0.15**	**0.82**	<0.13	<0.13	<0.13	<0.39
SB-MIP-48 (5-6')	5/22/2015	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	--	<1.5	<0.15	**7.0**	<0.15	<0.15	**0.18**	**1.0**	<0.15	<0.15	<0.15	<0.46
SB-MIP-48 (6-7')	5/22/2015	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	--	<1.5	<0.15	**8.7**	<0.15	<0.15	**0.22**	**1.3**	<0.15	<0.15	<0.15	<0.44
SB-MIP-48 (7-8')	5/22/2015	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	--	<1.5	<0.15	**7.2**	<0.15	<0.15	<0.15	**1.1**	<0.15	<0.15	<0.15	<0.44
SB-MIP-50 (39.7-40')	5/27/2015	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	--	<0.21	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.063
SB-MIP-60 (8.5-9.5')	5/22/2015	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	--	<0.30	<0.030	**0.14**	<0.030	<0.030	<0.030	**0.35**	<0.030	<0.030	<0.030	<0.089
SB-MIP-60 (13.5-14.5')	5/22/2015	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	<0.074	--	<0.74	<0.074	**0.36**	<0.074	<0.074	<0.074	**2.7**	<0.074	<0.074	<0.074	<0.22

Notes:

Residential Drinking Water Protection (DWP) Criteria, Groundwater to Surface Water Interface Protection (GSIP) Criteria, Non-Residential Direct Contact (DC) Criteria, Non-Residential Soil Volatilization to Indoor Air Inhalation (SVIAI) Criteria, Non-Residential Infinite and Finite Sources of Volatile Soil Inhalation Criteria (VSIC), Non-Residential Particulate Soil Inhalation (PSI) Criteria, and Soil Saturation Screening Levels from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013.

mg/kg = milligrams per kilogram

NC = No Criteria

-- = Not Analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

Denotes saturated soil samples which are representative of groundwater conditions and are not used to evaluate the nature and extent of constituents of concern in soil. Soil collected from approximately 1-foot above the high water table (capillary fringe) and deeper are considered saturated.

(1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

(2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1

Table D2

Summary of Detected Volatile Organic Compounds in Groundwater at On-Site, Near Source Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Benzene[1]	n-Butyl-benzene	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane[1]	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	n-Propyl-benzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene[1]	1,3,5-Trimethyl-benzene[1]	Vinyl Chloride	Total Xylenes
Health-Based Residential DW Criteria		5.0	80	430	80	880	5.0	7.0	70	100	700	80	5.0	1,000	200	5.0	5.0	1,000	1,000	2.0	10,000
Health-Based Non-Residential DW Criteria		5.0	230	1,700	80	2,500	5.0	7.0	70	100	700	230	5.0	1,000	200	5.0	5.0	2,900	2,900	2.0	10,000
GSI Criteria		200[2]	NC	1,100[2]	350	740	360[2]	130	620	1,500[2]	18	NC	60[2]	270	89	330[2]	200[2]	17	45	13[2]	41
Residential GWSL for Vapor Intrusion		27	91	44,000	140	4,300	41	370	83	360	700	92	94	36,000	17,000	96	10	1,700	1,200	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		140	380	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	390	460	1.5E+05	71,000	480	41	7,300	5,100	52	10,000
Groundwater Contact Criteria		11,000	5,900	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	56,000	61,000	1,000	1.90E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screened Interval	Sample Collection Date																				
B-22 (18-23')	4/14/2009	<20	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**53**	<20	**190**	<20	<20	<20	<40
B-22 (40-44')	4/14/2009	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**13**	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	**3.0**	<1.0	<1.0	<1.0	<2.0
B-68 (14.5-16.5')	7/24/2012	<20	<20	<100	<20	<20	<20	<20	**28**	<20	<20	<20	<20	<20	**1,200**	<20	**1,900**	<20	<20	<20	<60
B-68 (20.7-22.7')	7/24/2012	<50	<50	<250	<50	<50	<50	**130**	<50	<50	<50	<50	<50	<50	**5,300**	<50	**4,200**	<50	<50	<50	<150
B-68 (27.7-29.7')	7/24/2012	<25	<25	<120	<25	<25	<25	<25	**51**	**89**	<25	<25	<25	<25	<25	<25	**2,800**	<25	<25	<25	<75
B-90 (17.5-20.5')	5/19/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**2,100**	<100	**1,600**	<100	<100	<100	<300
B-90 (20.5-23.5')	5/19/2015	<130	<130	<1,300	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	**3,700**	<130	**1,600**	<130	<130	<130	<380
B-90 (23.5-26.5')	5/19/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**390**	<100	**2,400**	<100	<100	<100	<300
B-90 (26.5-29.5')	5/19/2015	<50	<50	<500	<50	<50	<50	<50	<50	**60**	<50	<50	<50	<50	<50	<50	**1,600**	<50	<50	<50	<150
B-90 (29.5-32.5')	5/15/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,200**	<100	<100	<100	<300
B-90 (32.5-35.5')	5/19/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,500**	<100	<100	<100	<300
B-90 (35.5-38.5')	5/19/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,200**	<100	<100	<100	<300
B-90 (38.5-41.5')	5/19/2015	<100	<100	<1,000	<100	<100	<100	<100	**330**	<100	<100	<100	<100	<100	<100	<100	**2,300**	<100	<100	<100	<300
B-90 (41.5-44.5')	5/15/2015	<80	<80	<800	<80	<80	<80	<80	**420**	**89**	<80	<80	<80	<80	<80	<80	**1,500**	<80	<80	<80	<240
B-99 (10.5-13.5')	6/1/2015	<20	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	**29**	<20	**230**	<20	**250**	<20	<20	<20	<60
B-99 (13.5-16.5')	6/1/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,000**	<100	**570**	<100	<100	<100	<300
B-100 (8-11')	6/2/2015	<1,000	<1,000	<10,000	<1,000	<1,000	<1,000	<1,000	**3,800**	<1,000	<1,000	<1,000	**32,000**	<1,000	<1,000	<1,000	**2,700**	<1,000	<1,000	<1,000	<3,000
B-100 (10-13')	6/1/2015	<1,000	<1,000	<10,000	<1,000	<1,000	<1,000	<1,000	**3,100**	<1,000	<1,000	<1,000	**17,000**	<1,000	<1,000	<1,000	**2,500**	<1,000	<1,000	**1,100**	<3,000
B-100 (13-16')	6/1/2015	<50	<50	<500	<50	<50	<50	<50	**190**	<50	<50	<50	**1,100**	<50	<50	<50	**1,200**	<50	<50	**150**	<150
B-101 (12-15')	6/3/2015	<200	<200	<2,000	<200	<200	<200	<200	<200	<200	<200	<200	**3,700**	<200	<200	<200	**560**	<200	<200	<200	<600
B-101 (15-18')	6/3/2015	<13	<13	<130	<13	<13	<13	**19**	**15**	<13	<13	<13	**130**	<13	**71**	<13	**320**	<13	<13	<13	<38
B-101 (18-21')	6/3/2015	<130	<130	<1,300	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	**1,200**	<130	**4,500**	<130	<130	<130	<380
B-102 (8-11')	6/3/2015	<500	<500	<5,000	<500	<500	<500	<500	**3,600**	<500	<500	<500	**9,700**	<500	<500	<500	**560**	<500	<500	**530**	<1,500
B-102 (11-14')	6/3/2015	<130	<130	<1,300	<130	<130	<130	<130	**2,300**	<130	<130	<130	**1,200**	<130	<130	<130	**290**	<130	<130	**1,900**	<380
B-102 (14-17')	6/3/2015	<50	<50	<500	<50	<50	<50	<50	**420**	<50	<50	<50	**80**	<50	<50	<50	**1,100**	<50	<50	**700**	<150
B-104 (12-15')	6/9/2015	<100	<100	<1,000	<100	<100	<100	<100	**170**	<100	<100	<100	**4,000**	<100	<100	<100	**1,300**	<100	<100	<100	<300
B-104 (15-18')	6/9/2015	<20	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	**190**	<20	**23**	<20	**570**	<20	<20	<20	<60
B-104 (15-18') (DUP-19)	6/9/2015	<20	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	**190**	<20	**22**	<20	**570**	<20	<20	<20	<60

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D2
Summary of Detected Volatile Organic Compounds in Groundwater at On-Site, Near Source Boring Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Benzene[1]	n-Butyl-benzene	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane[1]	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	n-Propyl-benzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene[1]	1,3,5-Trimethyl-benzene[1]	Vinyl Chloride	Total Xylenes
Health-Based Residential DW Criteria		5.0	80	430	80	880	5.0	7.0	70	100	700	80	5.0	1,000	200	5.0	5.0	1,000	1,000	2.0	10,000
Health-Based Non-Residential DW Criteria		5.0	230	1,700	80	2,500	5.0	7.0	70	100	700	230	5.0	1,000	200	5.0	5.0	2,900	2,900	2.0	10,000
GSI Criteria		200[2]	NC	1,100[2]	350	740	360[2]	130	620	1,500[2]	18	NC	60[2]	270	89	330[2]	200[2]	17	45	13[2]	41
Residential GWSL for Vapor Intrusion		27	91	44,000	140	4,300	41	370	83	360	700	92	94	36,000	17,000	96	10	1,700	1,200	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		140	380	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	390	460	1.5E+05	71,000	480	41	7,300	5,100	52	10,000
Groundwater Contact Criteria		11,000	5,900	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	56,000	61,000	1,000	1.90E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screened Interval	Sample Collection Date																				
B-104 (18-21')	6/8/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,200**	<100	<100	<100	<300
B-105 (13-16')	6/8/2015	<10	<10	<100	<10	<10	<10	<10	<10	<10	<10	<10	**140**	<10	**37**	<10	**170**	<10	<10	<10	<30
B-105 (16-19')	6/8/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**360**	<100	**1,700**	<100	<100	<100	<300
B-105 (19-22')	6/8/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**170**	<100	**2,900**	<100	<100	<100	<300
B-115 (11-14')	12/17/2015	<50	<50	<500	<50	<50	<50	<50	**1,800**	<50	<50	<50	**1,800**	<50	<50	<50	**480**	<50	<50	**1,500**	<150
B-116 (10-13')	12/17/2015	<500	<500	<5,000	<500	<500	<500	<500	**8,300**	<500	<500	<500	**34,000**	<500	<500	<500	**2,700**	<500	<500	**970**	<1,500
B-117 (9.5-12.5')	12/17/2015	<130	<130	<1,300	<130	<130	<130	<130	**350**	<130	<130	<130	**5,400**	<130	<130	<130	**810**	<130	<130	<130	<380
B-118 (11-14')	12/17/2015	<5.0	<5.0	<50	<5.0	**21**	<5.0	**5.4**	**84**	<5.0	<5.0	<5.0	**210**	<5.0	**57**	<5.0	**290**	<5.0	<5.0	**24**	<15
B-119 (11.5-14.5')	12/16/2015	<25	<25	<250	<25	**82**	<25	**34**	**600**	<25	<25	<25	**32**	<25	**250**	<25	**49**	<25	<25	**110**	<75
B-120 (10.5-13.5')	12/17/2015	<25	<25	<250	<25	<25	<25	<25	**230**	<25	<25	<25	**670**	<25	<25	<25	**130**	<25	<25	**420**	<75
B-121 (10.5-13.5')	12/17/2015	<1,300	<1,300	<13,000	<1,300	<1,300	<1,300	<1,300	**7,000**	<1,300	<1,300	<1,300	**76,000**	<1,300	<1,300	<1,300	**2,000**	<1,300	<1,300	<1,300	<3,800
B-122 (7.5-10.5')	12/16/2015	<500	<500	<5,000	<500	<500	<500	<500	**2,400**	<500	<500	<500	**27,000**	<500	<500	<500	**990**	<500	<500	**510**	<1,500
B-122 (10.5-13.5')	12/16/2015	<250	<250	<2,500	<250	<250	<250	<250	**1,600**	<250	<250	<250	**8,200**	<250	<250	<250	**2,000**	<250	<250	**700**	<750
B-122 (13.5-16.5')	12/16/2015	<50	<50	<500	<50	<50	<50	<50	<50	<50	<50	<50	**1,700**	<50	<50	<50	**1,700**	<50	<50	<50	<150
B-122 (16.5-19.5')	12/16/2015	<25	<25	<250	<25	<25	<25	<25	**27**	<25	<25	<25	**920**	<25	<25	<25	**1,100**	<25	<25	<25	<75
B-122 (19.5-22.5')	12/16/2015	<25	<25	<250	<25	<25	<25	<25	<25	<25	<25	<25	**140**	<25	<25	<25	**570**	<25	<25	<25	<75
B-122 (22.5-25.5')	12/16/2015	<10	<10	<100	<10	<10	<10	<10	**33**	<10	<10	<10	**31**	<10	<10	<10	**290**	<10	<10	<10	<30
B-122 (25.5-28.5')	12/16/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**21**	<1.0	<1.0	<1.0	**1.2**	<1.0	<1.0	<1.0	**63**	<1.0	<1.0	**1.8**	<3.0
B-122 (29-32')	12/16/2015	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	**11**	<0.50	<0.50	<0.50	**0.88**	<0.50	<0.50	<0.50	**6.7**	<0.50	<0.50	**2.6**	<1.5
B-122 (32-35')	12/16/2015	<2.5	<2.5	<25	<2.5	<2.5	<2.5	<2.5	**65**	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**25**	<2.5	<2.5	**3.0**	<7.5
B-122 (35-38')	12/16/2015	<10	<10	<100	<10	<10	<10	<10	**260**	<10	<10	<10	<10	<10	<10	<10	**68**	<10	<10	<10	<30
B-125 (12-15')	12/17/2015	<500	<500	<5,000	<500	<500	<500	<500	**6,000**	<500	<500	<500	**41,000**	<500	<500	<500	**1,700**	<500	<500	**1,100**	<1,500
B-127 (12-15')	12/17/2015	<250	<250	<2,500	<250	<250	<250	<250	**5,400**	<250	<250	<250	**14,000**	<250	<250	<250	**740**	<250	<250	<250	<750
B-127 (12-15') (DUP-01)	12/17/2015	<250	<250	<2,500	<250	<250	<250	<250	**5,300**	<250	<250	<250	**13,000**	<250	<250	<250	**770**	<250	<250	<250	<750
B-129 (14-17')	1/7/2016	<5.0	<5.0	<50	<5.0	<5.0	<5.0	<5.0	**17**	<5.0	<5.0	<5.0	**230**	<5.0	**26**	<5.0	**140**	<5.0	<5.0	<5.0	<15
B-130 (14-17')	1/7/2016	<5.0	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**250**	<5.0	**10**	<5.0	**190**	<5.0	<5.0	<5.0	<15
B-131 (14-17')	1/7/2016	<2.5	<2.5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**9.4**	<2.5	**6.2**	<2.5	**110**	<2.5	<2.5	<2.5	<7.5
B-132 (14-17')	1/7/2016	<10	<10	<100	<10	<10	<10	<10	<10	<10	<10	<10	**100**	<10	**47**	<10	**440**	<10	<10	<10	<30

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D2
Summary of Detected Volatile Organic Compounds in Groundwater at On-Site, Near Source Boring Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Benzene[1]	n-Butyl-benzene	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane[1]	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	n-Propyl-benzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene[1]	1,3,5-Trimethyl-benzene[1]	Vinyl Chloride	Total Xylenes
Health-Based Residential DW Criteria		5.0	80	430	80	880	5.0	7.0	70	100	700	80	5.0	1,000	200	5.0	5.0	1,000	1,000	2.0	10,000
Health-Based Non-Residential DW Criteria		5.0	230	1,700	80	2,500	5.0	7.0	70	100	700	230	5.0	1,000	200	5.0	5.0	2,900	2,900	2.0	10,000
GSI Criteria		200[2]	NC	1,100[2]	350	740	360[2]	130	620	1,500[2]	18	NC	60[2]	270	89	330[2]	200[2]	17	45	13[2]	41
Residential GWSL for Vapor Intrusion		27	91	44,000	140	4,300	41	370	83	360	700	92	94	36,000	17,000	96	10	1,700	1,200	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		140	380	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	390	460	1.5E+05	71,000	480	41	7,300	5,100	52	10,000
Groundwater Contact Criteria		11,000	5,900	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	56,000	61,000	1,000	1.90E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screened Interval	Sample Collection Date																				
B-133 (14.5-17.5')	1/7/2016	<25	<25	<250	<25	<25	<25	<25	<25	<25	<25	<25	**29**	<25	**660**	<25	**1,500**	<25	<25	<25	<75
B-133 (14.5-17.5') DUP-01	1/7/2016	<25	<25	<250	<25	<25	<25	<25	<25	<25	<25	<25	**28**	<25	**660**	<25	**1,500**	<25	<25	<25	<75
GP-02 (20-24')	12/15/2008	<1	<1	<1	<1	**11**	<1	**17**	**210**	**4**	<1	<1	**2**	<1	**16**	<1	**920**	<1	<1	<1	<3
GP-03 (20-24')	12/15/2008	<1	<1	**43**	<1	**25**	<1	**2**	**760**	**27**	<1	<1	<1	<1	<1	<1	**510**	<1	<1	<1	<3
GP-04 (25-29')	12/15/2008	<1	<1	**9**	<1	**18**	<1	**4**	**240**	**22**	<1	<1	<1	<1	<1	<1	**320**	<1	<1	<1	<3
GP-05 (25-29')	12/15/2008	<1	<1	**23**	<1	**160**	<1	**10**	**510**	**12**	<1	<1	<1	<1	<1	<1	**660**	<1	<1	<1	<3
GP-06 (25-29')	12/15/2008	**3**	<1	**11**	<1	**84**	<1	**70**	**120**	**1**	<1	<1	<1	<1	**60**	<1	**550**	<1	<1	<1	<3
GP-07 (25-29')	12/16/2008	<1	<1	**5**	<1	<1	<1	**3**	**4**	<1	<1	<1	<1	<1	**3**	<1	**300**	<1	<1	<1	<3
GP-08 (26-30')	12/16/2008	<1	<1	<1	<1	**9**	<1	<1	**160**	**11**	<1	<1	<1	<1	<1	<1	**49**	<1	<1	<1	<3
GP-09 (25-29')	12/16/2008	<1	<1	<1	<1	**89**	<1	**26**	**9**	**2**	<1	<1	<1	<1	**31**	<1	**540**	<1	<1	<1	<3
GP-10 (20-24')	12/16/2008	<1	<1	<1	**1**	**3**	<1	**76**	**36**	<1	<1	<1	<1	<1	**34**	**4**	**370**	<1	<1	<1	<3
GP-11 (20-24')	12/16/2008	<1	**3**	<1	<1	<1	<1	**3**	**15**	<1	**3**	**7**	<1	<1	**4**	<1	**100**	**64**	**35**	<1	<3
GP-12 (20-24')	12/16/2008	<1	<1	<1	**3**	**3**	<1	**320**	**7**	<1	<1	<1	<1	<1	**390**	<1	**530**	<1	<1	<1	<3
GP-13 (25-29')	12/16/2008	<1	<1	<1	<1	<1	<1	**6**	**1**	<1	<1	<1	<1	<1	**6**	<1	**210**	<1	<1	<1	<3
GP-14 (25-29')	12/22/2008	<1	<1	<1	<1	**8**	<1	**31**	<1	<1	<1	<1	**12**	<1	**260**	**1**	**190**	<1	<1	<1	<3
GP-15 (20-24')	12/22/2008	<1	<1	<1	<1	**31**	<1	**12**	**120**	**3**	<1	<1	**3**	<1	**150**	<1	**450**	<1	<1	<1	<3
GP-16 (25-29')	12/22/2008	**9**	<1	<1	<1	**30**	<1	**2**	**3**	**1**	**3**	<1	<1	**3**	**16**	**2**	**8**	**4**	**1**	<1	**10**
GP-17 (25-29')	12/22/2008	<1	<1	<1	<1	**47**	<1	**18**	<1	<1	<1	<1	**1**	<1	**200**	<1	**200**	<1	<1	<1	<3
GP-18 (20-24')	12/22/2008	<1	<1	<1	<1	<1	<1	<1	**1**	<1	<1	<1	**1**	<1	**3**	<1	**190**	<1	<1	<1	<3
GP-19 (25-29')	12/22/2008	<1	<1	<1	<1	<1	<1	**11**	<1	<1	<1	<1	<1	<1	**71**	<1	**86**	<1	<1	<1	<3
GP-21 (20-24')	1/14/2009	<20	<20	<20	<20	**47**	<20	**920**	<20	<20	<20	<20	<20	<20	**8,500**	<20	**1,700**	<20	<20	<20	<60
GP-22 (22-26')	1/14/2009	<20	<20	<20	<20	**160**	<20	**210**	**160**	<20	<20	<20	<20	<20	**3,500**	<20	**1,600**	<20	<20	<20	<30
GP-22 (41-45')	1/14/2009	<1	<1	<1	<1	**6**	<1	**10**	**81**	**21**	<1	<1	<1	<1	**38**	<1	**560**	<1	<1	<1	<3
GP-23 (22-26')	1/14/2009	<1	<1	<1	<1	**32**	<1	<1	**430**	**27**	<1	<1	<1	<1	<1	<1	**300**	<1	<1	<1	<3
GP-23 (31-35')	1/14/2009	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<3

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D2
Summary of Detected Volatile Organic Compounds in Groundwater at On-Site, Near Source Boring Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Benzene[1]	n-Butyl-benzene	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane[1]	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	n-Propyl-benzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene[1]	1,3,5-Trimethyl-benzene[1]	Vinyl Chloride	Total Xylenes
Health-Based Residential DW Criteria		5.0	80	430	80	880	5.0	7.0	70	100	700	80	5.0	1,000	200	5.0	5.0	1,000	1,000	2.0	10,000
Health-Based Non-Residential DW Criteria		5.0	230	1,700	80	2,500	5.0	7.0	70	100	700	230	5.0	1,000	200	5.0	5.0	2,900	2,900	2.0	10,000
GSI Criteria		200[2]	NC	1,100[2]	350	740	360[2]	130	620	1,500[2]	18	NC	60[2]	270	89	330[2]	200[2]	17	45	13[2]	41
Residential GWSL for Vapor Intrusion		27	91	44,000	140	4,300	41	370	83	360	700	92	94	36,000	17,000	96	10	1,700	1,200	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		140	380	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	390	460	1.5E+05	71,000	480	41	7,300	5,100	52	10,000
Groundwater Contact Criteria		11,000	5,900	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	56,000	61,000	1,000	1.90E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screened Interval	Sample Collection Date																				
GP-24 (10-14')	1/14/2009	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**48**	<1	<1	<1	<3
GP-25 (25-29')	1/15/2009	<1	<1	<1	<1	**87**	<1	<1	**170**	**10**	<1	<1	<1	<1	<1	<1	**240**	<1	<1	<1	<3
GP-26 (25-29')	1/15/2009	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<3
GP-27 (25-29')	1/15/2009	<1	<1	<1	<1	<1	<1	**14**	<1	<1	<1	<1	<1	<1	**120**	<1	**170**	<1	<1	<1	<3
GP-28 (22-26')	1/15/2009	<1	<1	<1	<1	**23**	<1	**36**	<1	<1	<1	<1	**5**	<1	**540**	<1	**110**	<1	<1	<1	<3
GP-28 (41-45')	1/15/2009	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<3
GP-29 (22-26')	1/15/2009	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**34**	<1	<1	<1	<3
NS-01 (20-24')	4/17/2009	<20	<20	<100	<20	<20	<20	<20	**260**	<20	<20	<20	<20	<20	<20	<20	**830**	<20	<20	<20	<40
NS-02 (20-24')	4/17/2009	<50	<50	<250	<50	<50	<50	<50	**590**	<50	<50	<50	<50	<50	<50	<50	**1,700**	<50	<50	**430**	<100
NS-03 (16-20')	4/15/2009	<4.0	<4.0	<20	<4.0	<4.0	<4.0	<4.0	**23**	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	**45**	<4.0	<4.0	**41**	<8.0
NS-03 (37-41')	4/15/2009	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**9.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**19**	<1.0	<1.0	**480**	<2.0
NS-04 (14-18')	4/16/2009	<1.0	<1.0	<5.0	<1.0	**1.4**	<1.0	<1.0	**11**	**1.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
NS-04 (32-36')	4/16/2009	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**5.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
NS-05 (20-24')	4/20/2009	<200	<200	<1,000	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	**2,900**	<200	<200	<200	<400
NS-06 (22-26')	4/20/2009	<100	<100	<500	<100	<100	<100	<100	**220**	<100	<100	<100	<100	<100	**100**	<100	**4,500**	<100	<100	<100	<200
NS-07 (20-24')	4/21/2009	<20	<20	<100	<20	<20	<20	<20	**34**	<20	<20	<20	**30**	<20	<20	<20	**710**	<20	<20	<20	<40
NS-08 (20-24')	4/21/2009	<20	<20	<100	<20	**21**	<20	<20	**100**	<20	<20	<20	**28**	<20	<20	<20	**960**	<20	<20	**27**	<40
NS-08 (20-24') DUP-09	4/21/2009	<20	<20	<100	<20	**22**	<20	<20	**100**	<20	<20	<20	**29**	<20	<20	<20	**950**	<20	<20	**30**	<40
NS-09 (20-24')	4/21/2009	<1.0	<1.0	**5.8**	**1.1**	**46**	<1.0	<1.0	**110**	**5.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**16**	**1.3**	<1.0	**140**	<2.0
NS-10 (21-25')	4/21/2009	<10	<10	<50	<10	**26**	<10	<10	**380**	**13**	<10	<10	<10	<10	<10	<10	<10	**17**	<10	**45**	<20
NS-11 (23-28')	9/15/2010	<10	<10	<50	<10	<10	<10	<10	**13**	<10	<10	<10	<10	<10	**15**	<10	**1,500**	<10	<10	<10	<30
NS-12 (23-28')	9/15/2010	<10	<10	<50	<10	**31**	<10	**14**	**330**	<10	<10	<10	<10	<10	<10	<10	**720**	<10	<10	**120**	<30
NS-13 (23-28')	9/16/2010	<10	<10	<50	<10	<10	<10	<10	**71**	<10	<10	<10	<10	<10	**13**	<10	**980**	<10	<10	<10	<30
NS-13 (23-28') DUP-02	9/16/2010	<1.0	<1.0	<50	<10	<10	<10	<10	**69**	<10	<1.0	<1.0	<10	<1.0	**12**	<1.0	**970**	<10	<1.0	<10	<2.0
NS-14 (23-28')	9/17/2010	<10	<10	<50	<10	**28**	<10	<10	**120**	<10	<10	<10	<10	<10	**280**	<10	**1,300**	<10	<10	<10	<30
NS-15 (22-27')	9/17/2010	<10	<10	<50	<10	**57**	<10	<10	**1,300**	**62**	<10	<10	<10	<10	<10	<10	**87**	<10	<10	**660**	<30
NS-16 (19-24')	9/17/2010	<5.0	<5.0	<25	<5.0	**25**	<5.0	<5.0	**150**	**6.2**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**530**	<5.0	<5.0	**210**	<15
NS-17 (23-28')	9/17/2010	<1.0	<1.0	**7.0**	<1.0	**19**	<1.0	<1.0	**2.2**	<1.0	<1.0	<1.0	**1.6**	<1.0	**35**	<1.0	**120**	<1.0	<1.0	<1.0	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D2
Summary of Detected Volatile Organic Compounds in Groundwater at On-Site, Near Source Boring Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Benzene[1]	n-Butyl-benzene	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane[1]	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	n-Propyl-benzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene[1]	1,3,5-Trimethyl-benzene[1]	Vinyl Chloride	Total Xylenes
Health-Based Residential DW Criteria		5.0	80	430	80	880	5.0	7.0	70	100	700	80	5.0	1,000	200	5.0	5.0	1,000	1,000	2.0	10,000
Health-Based Non-Residential DW Criteria		5.0	230	1,700	80	2,500	5.0	7.0	70	100	700	230	5.0	1,000	200	5.0	5.0	2,900	2,900	2.0	10,000
GSI Criteria		200[2]	NC	1,100[2]	350	740	360[2]	130	620	1,500[2]	18	NC	60[2]	270	89	330[2]	200[2]	17	45	13[2]	41
Residential GWSL for Vapor Intrusion		27	91	44,000	140	4,300	41	370	83	360	700	92	94	36,000	17,000	96	10	1,700	1,200	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		140	380	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	390	460	1.5E+05	71,000	480	41	7,300	5,100	52	10,000
Groundwater Contact Criteria		11,000	5,900	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	56,000	61,000	1,000	1.90E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screened Interval	Sample Collection Date																				
NS-18s (20-25')	7/25/2012	<10	<10	<50	<10	**19**	<10	<10	**58**	<10	<10	<10	<10	<10	**11**	<10	**900**	<10	<10	<10	<30
NS-18i (30-35')	7/25/2012	<25	<25	<120	<25	<25	<25	<25	**600**	**140**	<25	<25	<25	<25	<25	<25	**2,600**	<25	<25	**26**	<75
NS-18i (30-35') DUP-01	7/25/2012	<25	<25	<120	<25	<25	<25	<25	**610**	**140**	<25	<25	<25	<25	<25	<25	**2,600**	<25	<25	**26**	<75
NS-18d (39-44')	7/25/2012	<2.0	<2.0	<10	<2.0	<2.0	<2.0	<2.0	**200**	**30**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**33**	<2.0	<2.0	<2.0	<6.0
NS-19s (24-29)	7/27/2012	<10	<10	<50	<10	<10	<10	<10	**69**	<10	<10	<10	<10	<10	**30**	<10	**900**	<10	<10	**53**	<30
NS-19i (34-39)	7/27/2012	<5.0	<5.0	<25	<5.0	<5.0	<5.0	<5.0	**91**	**26**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**630**	<5.0	<5.0	<5.0	<15
NS-19d (43.5-48.5)	7/27/2012	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**27**	<1.0	<1.0	<1.0	<3.0
NS-20s (23-28)	7/31/2012	<25	<25	<120	<25	<25	<25	<25	**120**	<25	<25	<25	<25	<25	**830**	<25	**2,600**	<25	<25	<25	<75
NS-20i (29-34')	7/31/2012	<1.0	<1.0	<5.0	<1.0	**22**	<1.0	**2.3**	**17**	**1.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**18**	<1.0	<1.0	**130**	<3.0
NS-20d (35-40')	7/31/2012	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.6**	**2.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**59**	<1.0	<1.0	<1.0	<3.0
SS-01 (24-28')	4/15/2009	<200	<200	<1,000	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	**1,500**	<200	**1,500**	<200	<200	<200	<400
SS-01 (45-49')	4/15/2009	<1.0	<1.0	<5.0	<1.0	**2.5**	<1.0	<1.0	**9.9**	<1.0	<1.0	<1.0	<1.0	<1.0	**2.7**	<1.0	**5.8**	<1.0	<1.0	<1.0	<2.0
SS-02 (20-24')	4/16/2009	<100	<100	<500	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**2,200**	<100	**1,000**	<100	<100	<100	<200
SS-02 (42-46')	4/16/2009	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.5**	<1.0	**5.3**	<1.0	<1.0	<1.0	<2.0
SS-03 (20-24')	4/16/2009	<50	<50	<250	<50	<50	<50	<50	<50	<50	<50	<50	**120**	<50	**600**	<50	**430**	<50	<50	<50	<100
SS-04 (22-24')	4/17/2009	<100	<100	<500	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**2,500**	<100	**1,100**	<100	<100	<100	<200
SS-05 (22-26')	4/17/2009	<100	<100	<500	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**2,200**	<100	**1,300**	<100	<100	<100	<200
SS-06 (23-27')	4/17/2009	<200	<200	<1,000	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	**2,600**	<200	**1,100**	<200	<200	<200	<400
SS-07 (22-26')	4/20/2009	<100	<100	<500	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,300**	<100	**1,400**	<100	<100	<100	<200
SS-08 (23-27')	4/21/2009	<100	<100	<500	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**4,100**	<100	**2,300**	<100	<100	<100	<200
SS-09s (23-28')	8/2/2012	<10	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	**11**	<10	**790**	<10	**560**	<10	<10	<10	<30
SS-09i (34-39')	8/2/2012	<1.0	<1.0	<5.0	<1.0	**8.0**	<1.0	<1.0	**37**	**5.4**	<1.0	<1.0	<1.0	<1.0	**2.6**	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SS-09d (45-50')	8/2/2012	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SS-10s (22.5-27.5')	8/2/2012	<10	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**160**	<10	**770**	<10	<10	<10	<30
SS-10i (33-38')	8/2/2012	<1.0	<1.0	<5.0	<1.0	**8.2**	<1.0	<1.0	**24**	**1.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**78**	<1.0	<1.0	<1.0	<3.0
SS-10d (50-55')	8/3/2012	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**15**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SB-MIP-01 (22-25')	6/23/2014	<0.50	<0.50	<5.0	<0.50	**1.9**	<0.50	**3.0**	**0.67**	<0.50	<0.50	<0.50	<0.50	<0.50	**430**	<0.50	**210**	<0.50	<0.50	<0.50	<1.5
SB-MIP-01 (25-28')	6/23/2014	<5.0	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**240**	<5.0	**220**	<5.0	<5.0	<5.0	<1.5

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D2
Summary of Detected Volatile Organic Compounds in Groundwater at On-Site, Near Source Boring Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Benzene[1]	n-Butyl-benzene	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane[1]	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	n-Propyl-benzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene[1]	1,3,5-Trimethyl-benzene[1]	Vinyl Chloride	Total Xylenes
Health-Based Residential DW Criteria		5.0	80	430	80	880	5.0	7.0	70	100	700	80	5.0	1,000	200	5.0	5.0	1,000	1,000	2.0	10,000
Health-Based Non-Residential DW Criteria		5.0	230	1,700	80	2,500	5.0	7.0	70	100	700	230	5.0	1,000	200	5.0	5.0	2,900	2,900	2.0	10,000
GSI Criteria		200[2]	NC	1,100[2]	350	740	360[2]	130	620	1,500[2]	18	NC	60[2]	270	89	330[2]	200[2]	17	45	13[2]	41
Residential GWSL for Vapor Intrusion		27	91	44,000	140	4,300	41	370	83	360	700	92	94	36,000	17,000	96	10	1,700	1,200	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		140	380	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	390	460	1.5E+05	71,000	480	41	7,300	5,100	52	10,000
Groundwater Contact Criteria		11,000	5,900	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	56,000	61,000	1,000	1.90E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screened Interval	Sample Collection Date																				
SB-MIP-01 (28-31')	6/23/2014	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**3.2**	<0.50	**26**	<0.50	<0.50	<0.50	<1.5
SB-MIP-01 (31-34')	6/23/2014	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**2.3**	<0.50	<0.50	<0.50	<1.5
SB-MIP-01 (34-37')	6/23/2014	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**0.84**	<0.50	**1.5**	<0.50	<0.50	<0.50	<1.5
SB-MIP-01 (37.5-40.5')	6/23/2014	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**0.63**	<0.50	**1.0**	<0.50	<0.50	<0.50	<1.5
SB-MIP-01 (41-44')	6/23/2014	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**0.76**	<0.50	**1.6**	<0.50	<0.50	<0.50	<1.5
SB-MIP-01 (44-47')	6/23/2014	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**1.8**	<0.50	**3.9**	<0.50	<0.50	<0.50	<1.5
SB-MIP-03 (24-27')	6/24/2014	<0.50	<0.50	<5.0	<0.50	**5.0**	**0.67**	**2.8**	**24**	**1.2**	<0.50	<0.50	**3.4**	<0.50	**740**	**3.0**	**1,000**	**0.82**	<0.50	**5.1**	<0.12
SB-MIP-03 (24-27') (DUP-03)	6/24/2014	<0.50	<0.50	<5.0	<0.50	**4.9**	**0.63**	**2.9**	**24**	**1.2**	<0.50	<0.50	**3.4**	<0.50	**780**	**3.0**	**1,000**	**0.80**	<0.50	**5.1**	<1.5
SB-MIP-03 (26.5-29.5')	6/23/2014	<10	<10	<100	<10	**43**	<10	<10	**72**	<10	<10	<10	<10	<10	**620**	<10	**430**	**44**	<10	**140**	<0.12
SB-MIP-03 (29-32')	6/23/2014	<0.50	<0.50	<5.0	<0.50	**7.7**	<0.50	**1.8**	**120**	**4.2**	<0.50	<0.50	<0.50	<0.50	**7.6**	<0.50	**5.4**	**2.6**	<0.50	**74**	<0.12
SB-MIP-03 (31.5-34.5')	6/23/2014	<0.50	<0.50	<5.0	<0.50	**6.5**	**0.80**	<0.50	**210**	**7.7**	<0.50	<0.50	<0.50	<0.50	**0.54**	<0.50	**11**	<0.50	<0.50	**27**	<0.12
SB-MIP-03 (34.5-37.5')	6/24/2014	<0.50	<0.50	<5.0	<0.50	**2.7**	<0.50	<0.50	**150**	**3.8**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**6.1**	<0.50	<0.50	**26**	<0.12
SB-MIP-03 (37.5-40.5')	6/24/2014	<0.50	<0.50	<5.0	<0.50	**4.2**	<0.50	<0.50	**110**	**3.8**	<0.50	<0.50	<0.50	<0.50	**0.63**	<0.50	**24**	<0.50	<0.50	**5.4**	<0.12
SB-MIP-03 (40.5-43.5')	6/24/2014	<0.50	<0.50	<5.0	<0.50	<0.50	<0.50	<0.50	**79**	**4.4**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**140**	<0.50	<0.50	**7.4**	<0.12
SB-MIP-03 (43.5-46.5')	6/23/2014	<5.0	<5.0	<50	<5.0	<5.0	<5.0	<5.0	**230**	**6.0**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**260**	<5.0	<5.0	**46**	<0.12
SB-MIP-03 (45.5-48.5')	5/28/2015	<10	<10	<100	<10	<10	<10	<10	**260**	<10	<10	<10	<10	<10	<10	<10	**240**	<10	<10	**61**	<30
SB-MIP-05 (44-47')	5/28/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**3.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SB-MIP-05 (47-50')	5/28/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.2**	<3.0
SB-MIP-05 (47-50') (DUP-14)	5/28/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.3**	<3.0
SB-MIP-10 (30-33')	5/20/2015	<200	<200	<2,000	<200	<200	<200	<200	**850**	**270**	<200	<200	<200	<200	<200	<200	**3,300**	<200	<200	<200	<600
SB-MIP-14 (26-29')	5/26/2015	<50	<50	<500	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**120**	<50	**920**	<50	<50	<50	<150
SB-MIP-23 (13-16')	6/4/2015	<5.0	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<5.0	**84**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**120**	<5.0	<5.0	<5.0	<15
SB-MIP-23 (16-19')	6/4/2015	<40	<40	<400	<40	<40	<40	<40	<40	**83**	<40	<40	<40	**62**	**54**	<40	**630**	<40	<40	<40	<120
SB-MIP-23 (19-22')	6/4/2015	<130	<130	<1,300	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	**600**	<130	**2,500**	<130	<130	<130	<380
SB-MIP-23 (21.5-24.5')	6/4/2015	<400	<400	<4,000	<400	<400	<400	<400	<400	<400	<400	<400	<400	<400	**1,000**	<400	**3,100**	<400	<400	<400	<1,200
SB-MIP-23 (24.5-27.5')	6/4/2015	<250	<250	<2,500	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	**380**	<250	**2,600**	<250	<250	<250	<750
SB-MIP-23 (27.5-30.5')	6/4/2015	<25	<25	<250	<25	**32**	<25	**29**	<25	<25	<25	<25	<25	<25	<25	<25	**390**	<25	<25	<25	<75
SB-MIP-23 (30.5-33.5')	6/4/2015	<8.0	<8.0	<80	<8.0	<8.0	<8.0	<8.0	**17**	**17**	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	**140**	<8.0	<8.0	<8.0	<24

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D2
Summary of Detected Volatile Organic Compounds in Groundwater at On-Site, Near Source Boring Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Benzene[1]	n-Butyl-benzene	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane[1]	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	n-Propyl-benzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene[1]	1,3,5-Trimethyl-benzene[1]	Vinyl Chloride	Total Xylenes
Health-Based Residential DW Criteria		5.0	80	430	80	880	5.0	7.0	70	100	700	80	5.0	1,000	200	5.0	5.0	1,000	1,000	2.0	10,000
Health-Based Non-Residential DW Criteria		5.0	230	1,700	80	2,500	5.0	7.0	70	100	700	230	5.0	1,000	200	5.0	5.0	2,900	2,900	2.0	10,000
GSI Criteria		200[2]	NC	1,100[2]	350	740	360[2]	130	620	1,500[2]	18	NC	60[2]	270	89	330[2]	200[2]	17	45	13[2]	41
Residential GWSL for Vapor Intrusion		27	91	44,000	140	4,300	41	370	83	360	700	92	94	36,000	17,000	96	10	1,700	1,200	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		140	380	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	390	460	1.5E+05	71,000	480	41	7,300	5,100	52	10,000
Groundwater Contact Criteria		11,000	5,900	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	56,000	61,000	1,000	1.90E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screened Interval	Sample Collection Date																				
SB-MIP-23 (33.5-36.5')	6/4/2015	<25	<25	<250	<25	<25	<25	<25	**32**	**82**	<25	<25	<25	<25	<25	<25	**510**	<25	<25	<25	<75
SB-MIP-23 (36.5-39.5')	6/4/2015	<250	<250	<2,500	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	**2,500**	<250	<250	<250	<750
SB-MIP-23 (39.5-42.5')	6/4/2015	<40	<40	<400	<40	<40	<40	<40	**110**	**200**	<40	<40	<40	<40	<40	<40	**520**	<40	<40	<40	<120
SB-MIP-23 (42.5-45.5')	6/4/2015	<13	<13	<130	<13	<13	<13	<13	**76**	**110**	<13	<13	<13	<13	<13	<13	**200**	<13	<13	**20**	<38
SB-MIP-25 (23-26')	6/3/2015	<25	<25	<250	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	**530**	<25	**670**	<25	<25	<25	<75
SB-MIP-25 (25-28')	6/3/2015	<50	<50	<500	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**1,000**	<50	**640**	<50	<50	<50	<150
SB-MIP-25 (27.5-30.5')	6/2/2015	<25	<25	<250	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	**390**	<25	**440**	<25	<25	<25	<75
SB-MIP-25 (30.5-33.5')	6/2/2015	<5.0	<5.0	<50	<5.0	**5.3**	<5.0	<5.0	**30**	**5.5**	<5.0	<5.0	<5.0	<5.0	**10**	<5.0	**110**	<5.0	<5.0	<5.0	<15
SB-MIP-25 (33.5-36.5')	6/2/2015	<1.0	<1.0	<10	<1.0	**5.5**	<1.0	<1.0	**37**	**4.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.0**	<1.0	<1.0	<1.0	<3.0
SB-MIP-25 (37-40')	6/3/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**4.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.6**	<1.0	<1.0	<1.0	<3.0
SB-MIP-25 (40.5-43.5')	6/2/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**2.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**22**	<1.0	<1.0	<1.0	<3.0
SB-MIP-25 (40.5-43.5') (DUP-16)	6/2/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**2.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**25**	<1.0	<1.0	<1.0	<3.0
SB-MIP-25 (44-47')	6/2/2015	<2.5	<2.5	<25	<2.5	<2.5	<2.5	<2.5	**2.5**	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**67**	<2.5	<2.5	<2.5	<7.5
SB-MIP-25 (46-49')	6/2/2015	<10	<10	<100	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**210**	<10	<10	<10	<30
SB-MIP-30 (17.5-20.5')	6/9/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**810**	<100	**1,700**	<100	<100	<100	<300
SB-MIP-30 (20.5-23.5')	6/9/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**190**	<100	**1,300**	<100	<100	<100	<300
SB-MIP-30 (24-27')	6/9/2015	<20	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**460**	<20	<20	<20	<60
SB-MIP-30 (27.5-30.5')	6/9/2015	<25	<25	<250	<25	<25	<25	<25	<25	**30**	<25	<25	<25	<25	<25	<25	**550**	<25	<25	<25	<75
SB-MIP-30 (31-34')	6/9/2015	<25	<25	<250	<25	<25	<25	<25	<25	**37**	<25	<25	<25	<25	<25	<25	**740**	<25	<25	<25	<75
SB-MIP-30 (34-37')	6/9/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,000**	<100	<100	<100	<300
SB-MIP-30 (34-37') (DUP-20)	6/9/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**970**	<100	<100	<100	<300
SB-MIP-30 (37-40')	6/9/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,400**	<100	<100	<100	<300
SB-MIP-30 (40-43')	6/9/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,500**	<100	<100	<100	<300
SB-MIP-30 (43-46')	6/9/2015	<50	<50	<500	<50	<50	<50	<50	**320**	**99**	<50	<50	<50	<50	<50	<50	**1,000**	<50	<50	<50	<150
SB-MIP-35 (23.5-26.5')	5/20/2015	<25	<25	<250	<25	**30**	<25	<25	<25	<25	<25	<25	<25	<25	**420**	<25	**520**	<25	<25	<25	<75
SB-MIP-35 (25.5-28.5')	5/20/2015	<50	<50	<500	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**720**	<50	**920**	<50	<50	<50	<150
SB-MIP-35 (28-31')	5/20/2015	<40	<40	<400	<40	<40	<40	<40	**110**	<40	<40	<40	<40	<40	**230**	<40	**810**	<40	<40	**220**	<120
SB-MIP-35 (30.5-33.5')	5/20/2015	<20	<20	<200	<20	<20	<20	<20	**69**	<20	<20	<20	<20	<20	<20	<20	**480**	<20	<20	**130**	<60

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D2

Summary of Detected Volatile Organic Compounds in Groundwater at On-Site, Near Source Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Benzene[1]	n-Butyl-benzene	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane[1]	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	n-Propyl-benzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene[1]	1,3,5-Trimethyl-benzene[1]	Vinyl Chloride	Total Xylenes
Health-Based Residential DW Criteria		5.0	80	430	80	880	5.0	7.0	70	100	700	80	5.0	1,000	200	5.0	5.0	1,000	1,000	2.0	10,000
Health-Based Non-Residential DW Criteria		5.0	230	1,700	80	2,500	5.0	7.0	70	100	700	230	5.0	1,000	200	5.0	5.0	2,900	2,900	2.0	10,000
GSI Criteria		200[2]	NC	1,100[2]	350	740	360[2]	130	620	1,500[2]	18	NC	60[2]	270	89	330[2]	200[2]	17	45	13[2]	41
Residential GWSL for Vapor Intrusion		27	91	44,000	140	4,300	41	370	83	360	700	92	94	36,000	17,000	96	10	1,700	1,200	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		140	380	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	390	460	1.5E+05	71,000	480	41	7,300	5,100	52	10,000
Groundwater Contact Criteria		11,000	5,900	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	56,000	61,000	1,000	1.90E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screened Interval	Sample Collection Date																				
SB-MIP-35 (34-37')	5/20/2015	<25	<25	<250	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	**460**	<25	<25	<25	<75
SB-MIP-35 (37.5-40.5')	5/20/2015	<10	<10	<100	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**210**	<10	<10	<10	<30
SB-MIP-35 (40.5-43.5')	5/20/2015	<4.0	<4.0	<40	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	**75**	<4.0	<4.0	<4.0	<12
SB-MIP-35 (44-47')	5/20/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**22**	<1.0	<1.0	<1.0	<3.0
SB-MIP-38 (20-23')	5/19/2015	<100	<100	<1,000	<100	<100	<100	<100	**190**	<100	<100	<100	<100	<100	<100	<100	**1,800**	<100	<100	<100	<300
SB-MIP-38 (23-26')	5/19/2015	<200	<200	<2,000	<200	<200	<200	<200	**200**	<200	<200	<200	<200	<200	<200	<200	**5,200**	<200	<200	<200	<600
SB-MIP-38 (23-26') (DUP-11)	5/19/2015	<200	<200	<2,000	<200	<200	<200	<200	**200**	<200	<200	<200	<200	<200	<200	<200	**4,900**	<200	<200	<200	<600
SB-MIP-38 (26.5-29.5')	5/19/2015	<200	<200	<2,000	<200	<200	<200	<200	**800**	**250**	<200	<200	<200	<200	<200	<200	**9,100**	<200	<200	<200	<600
SB-MIP-38 (30.5-33.5')	5/19/2015	<100	<100	<1,000	<100	<100	<100	<100	**610**	**130**	<100	<100	<100	<100	<100	<100	**2,500**	<100	<100	<100	<300
SB-MIP-38 (34-37')	5/19/2015	<25	<25	<250	<25	<25	<25	<25	**720**	**140**	<25	<25	<25	<25	<25	<25	**600**	<25	<25	<25	<75
SB-MIP-38 (37-40')	5/19/2015	<20	<20	<200	<20	<20	<20	<20	**600**	**110**	<20	<20	<20	<20	<20	<20	**140**	<20	<20	<20	<60
SB-MIP-38 (39.5-42.5')	5/19/2015	<20	<20	<200	<20	<20	<20	<20	**500**	**78**	<20	<20	<20	<20	<20	<20	**150**	<20	<20	<20	<60
SB-MIP-38 (41.5-44.5')	5/19/2015	<20	<20	<200	<20	<20	<20	<20	**420**	**53**	<20	<20	<20	<20	<20	<20	**100**	<20	<20	<20	<60
SB-MIP-39 (26-29')	5/18/2015	<200	<200	<2,000	<200	<200	<200	<200	**1,300**	<200	<200	<200	<200	<200	<200	<200	**4,000**	<200	<200	<200	<600
SB-MIP-39 (26-29') (DUP-10)	5/18/2015	<200	<200	<2,000	<200	<200	<200	<200	**1,200**	<200	<200	<200	<200	<200	<200	<200	**3,900**	<200	<200	<200	<600
SB-MIP-40 (23.5-26.5')	5/21/2015	<25	<25	<250	<25	<25	<25	<25	**640**	<25	<25	<25	<25	<25	**250**	<25	**590**	<25	<25	**200**	<75
SB-MIP-40 (26.5-29.5')	5/21/2015	<10	<10	<100	<10	<10	<10	<10	**290**	<10	<10	<10	<10	<10	**62**	<10	**180**	<10	<10	**71**	<30
SB-MIP-40 (29.5-32.5')	5/21/2015	<1.0	<1.0	<10	<1.0	**1.3**	<1.0	<1.0	**1.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**31**	<3.0
SB-MIP-40 (32.5-35.5')	5/21/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	**1.2**	**11**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.4**	<1.0	<1.0	**22**	<3.0
SB-MIP-40 (35-38')	5/21/2015	<2.0	<2.0	<20	<2.0	<2.0	<2.0	<2.0	**11**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**56**	<2.0	<2.0	**4.7**	<6.0
SB-MIP-40 (35-38') (DUP-12)	5/21/2015	<2.0	<2.0	<20	<2.0	<2.0	<2.0	<2.0	**11**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**53**	<2.0	<2.0	**4.7**	<6.0
SB-MIP-40 (37.5-40.5')	5/21/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**34**	<1.0	<1.0	<1.0	<3.0
SB-MIP-41 (24-27')	5/26/2015	<20	<20	<200	<20	**89**	<20	<20	**21**	<20	<20	<20	<20	<20	**27**	<20	**310**	<20	<20	<20	<60
SB-MIP-41 (27.5-30.5')	5/26/2015	<10	<10	<100	<10	**86**	<10	<10	**20**	<10	<10	<10	<10	<10	<10	<10	**240**	<10	<10	**14**	<30
SB-MIP-41 (31.75-34.75')	5/26/2015	<20	<20	<200	<20	<20	<20	<20	**31**	<20	<20	<20	<20	<20	<20	<20	**320**	<20	<20	<20	<60
SB-MIP-41 (35-38')	5/26/2015	<5.0	<5.0	<50	<5.0	<5.0	<5.0	<5.0	**55**	**18**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**110**	<5.0	<5.0	<5.0	<15
SB-MIP-41 (38.5-41.5')	5/26/2015	<5.0	<5.0	<50	<5.0	<5.0	<5.0	<5.0	**67**	**22**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**100**	<5.0	<5.0	<5.0	<15
SB-MIP-44 (23-26')	5/26/2015	<10	<10	<100	<10	**110**	<10	<10	**40**	<10	<10	<10	<10	<10	<10	<10	**43**	<10	<10	**170**	<30

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D2
Summary of Detected Volatile Organic Compounds in Groundwater at On-Site, Near Source Boring Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Benzene[1]	n-Butyl-benzene	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane[1]	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	n-Propyl-benzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene[1]	1,3,5-Trimethyl-benzene[1]	Vinyl Chloride	Total Xylenes
Health-Based Residential DW Criteria		5.0	80	430	80	880	5.0	7.0	70	100	700	80	5.0	1,000	200	5.0	5.0	1,000	1,000	2.0	10,000
Health-Based Non-Residential DW Criteria		5.0	230	1,700	80	2,500	5.0	7.0	70	100	700	230	5.0	1,000	200	5.0	5.0	2,900	2,900	2.0	10,000
GSI Criteria		200[2]	NC	1,100[2]	350	740	360[2]	130	620	1,500[2]	18	NC	60[2]	270	89	330[2]	200[2]	17	45	13[2]	41
Residential GWSL for Vapor Intrusion		27	91	44,000	140	4,300	41	370	83	360	700	92	94	36,000	17,000	96	10	1,700	1,200	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		140	380	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	390	460	1.5E+05	71,000	480	41	7,300	5,100	52	10,000
Groundwater Contact Criteria		11,000	5,900	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	56,000	61,000	1,000	1.90E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screened Interval	Sample Collection Date																				
SB-MIP-44 (26.5-29.5')	5/26/2015	<1.0	**2.7**	**35**	<1.0	**11**	<1.0	<1.0	**10**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.8**	**2.5**	<1.0	**73**	<3.0
SB-MIP-44 (29-32')	5/26/2015	<20	<20	<200	<20	<20	<20	<20	**250**	**40**	<20	<20	<20	<20	<20	<20	**410**	<20	<20	**53**	<60
SB-MIP-44 (31.5-34.5')	5/26/2015	<25	<25	<250	<25	<25	<25	<25	**250**	**45**	<25	<25	<25	<25	<25	<25	**520**	<25	<25	<25	<75
SB-MIP-44 (35.5-38.5')	5/26/2015	<40	<40	<400	<40	<40	<40	<40	**200**	**44**	<40	<40	<40	<40	<40	<40	**500**	<40	<40	<40	<120
SB-MIP-44 (38.5-41.5')	5/26/2015	<20	<20	<200	<20	<20	<20	<20	**350**	**61**	<20	<20	<20	<20	<20	<20	**170**	<20	<20	<20	<60
SB-MIP-46 (23.9-26.9')	5/21/2015	<25	<25	<250	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	**590**	<25	**760**	<25	<25	<25	<75
SB-MIP-46 (26.9-29.9')	5/20/2015	<50	<50	<500	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**1,300**	<50	<50	<50	<150
SB-MIP-46 (29.9-32.9')	5/20/2015	<2.0	<2.0	<20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**59**	<2.0	<2.0	<2.0	<6.0
SB-MIP-46 (33-36')	5/20/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SB-MIP-46 (37.5-40.5')	5/20/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SB-MIP-46 (41.9-44.9')	5/20/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SB-MIP-46 (44.9-47.9')	5/20/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SB-MIP-48 (9.5-12.5')	5/26/2015	<25	<25	<250	<25	<25	<25	<25	**350**	<25	<25	<25	**1,000**	<25	**170**	**31**	**570**	<25	<25	**120**	<75
SB-MIP-48 (15-18')	5/22/2015	<100	<100	<1,000	<100	**180**	<100	**160**	**740**	<100	<100	<100	<100	<100	**1,900**	<100	**2,700**	<100	<100	<100	<300
SB-MIP-49 (18.5-21.5')	5/22/2015	<250	<250	<2,500	<250	**280**	<250	<250	<250	<250	<250	<250	<250	<250	**260**	<250	**5,400**	<250	<250	<250	<750
SB-MIP-49 (21.5-24.5')	5/22/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,600**	<100	<100	<100	<300
SB-MIP-50 (9.5-12.5')	5/28/2015	<10	<10	<100	<10	<10	<10	<10	<10	<10	<10	<10	**19**	<10	<10	<10	**140**	<10	<10	<10	<30
SB-MIP-50 (15-18')	5/27/2015	<200	<200	<2,000	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	**450**	<200	**3,600**	<200	<200	<200	<600
SB-MIP-50 (18-21')	5/27/2015	<250	<250	<2,500	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	**530**	<250	**3,800**	<250	<250	<250	<750
SB-MIP-50 (21-24')	5/27/2015	<250	<250	<2,500	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	**4,700**	<250	<250	<250	<750
SB-MIP-50 (22.5-25.5')	5/27/2015	<200	<200	<2,000	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	**4,200**	<200	<200	<200	<600
SB-MIP-50 (27.5-30.5')	5/27/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**2,200**	<100	<100	<100	<300
SB-MIP-50 (31.5-34.5')	5/27/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**2,200**	<100	<100	<100	<300
SB-MIP-50 (34.5-37.5')	5/27/2015	<40	<40	<400	<40	<40	<40	<40	**60**	**120**	<40	<40	<40	<40	<40	<40	**700**	<40	<40	<40	<120
SB-MIP-50 (36.5-39.5')	5/27/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**20**	**35**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**34**	<1.0	<1.0	**4.7**	<3.0
SB-MIP-50 (36.5-39.5') (DUP-13)	5/27/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**21**	**36**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**35**	<1.0	<1.0	**4.9**	<3.0
SB-MIP-54 (26-29')	5/22/2015	<25	<25	<250	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	**69**	<25	**520**	<25	<25	<25	<75
SB-MIP-55 (15.5-18.5')	6/2/2015	<100	<100	<1,000	<100	<100	<100	<100	**200**	<100	<100	<100	<100	<100	<100	<100	**1,600**	<100	<100	<100	<300

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D2
Summary of Detected Volatile Organic Compounds in Groundwater at On-Site, Near Source Boring Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Benzene[1]	n-Butyl-benzene	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane[1]	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	n-Propyl-benzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	1,2,4-Trimethyl-benzene[1]	1,3,5-Trimethyl-benzene[1]	Vinyl Chloride	Total Xylenes
Health-Based Residential DW Criteria		5.0	80	430	80	880	5.0	7.0	70	100	700	80	5.0	1,000	200	5.0	5.0	1,000	1,000	2.0	10,000
Health-Based Non-Residential DW Criteria		5.0	230	1,700	80	2,500	5.0	7.0	70	100	700	230	5.0	1,000	200	5.0	5.0	2,900	2,900	2.0	10,000
GSI Criteria		200[2]	NC	1,100[2]	350	740	360[2]	130	620	1,500[2]	18	NC	60[2]	270	89	330[2]	200[2]	17	45	13[2]	41
Residential GWSL for Vapor Intrusion		27	91	44,000	140	4,300	41	370	83	360	700	92	94	36,000	17,000	96	10	1,700	1,200	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		140	380	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	390	460	1.5E+05	71,000	480	41	7,300	5,100	52	10,000
Groundwater Contact Criteria		11,000	5,900	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	56,000	61,000	1,000	1.90E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Location and Screened Interval	Sample Collection Date																				
SB-MIP-55 (19-22')	6/2/2015	<500	<500	<5,000	<500	<500	<500	<500	**1,400**	<500	<500	<500	<500	<500	<500	<500	**8,400**	<500	<500	<500	<1,500
SB-MIP-55 (22-25')	6/2/2015	<500	<500	<5,000	<500	<500	<500	<500	**2,300**	<500	<500	<500	<500	<500	<500	<500	**8,900**	<500	<500	<500	<1,500
SB-MIP-55 (25-28')	6/2/2015	<400	<400	<4,000	<400	<400	<400	<400	**2,200**	<400	<400	<400	<400	<400	<400	<400	**5,700**	<400	<400	<400	<1,200
SB-MIP-55 (28-31')	6/2/2015	<250	<250	<2,500	<250	<250	<250	<250	**2,600**	<250	<250	<250	<250	<250	<250	<250	**4,200**	<250	<250	<250	<750
SB-MIP-55 (31-34')	6/2/2015	<100	<100	<1,000	<100	<100	<100	<100	**3,000**	**100**	<100	<100	<100	<100	<100	<100	**360**	<100	<100	<100	<300
SB-MIP-55 (32.5-35.5')	6/2/2015	<100	<100	<1,000	<100	<100	<100	<100	**2,300**	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<300
SB-MIP-57 (18-21')	5/28/2015	<500	<500	<5,000	<500	<500	<500	<500	**3,600**	<500	<500	<500	<500	<500	<500	<500	**10,000**	<500	<500	<500	<1,500
SB-MIP-57 (21-24')	5/28/2015	<800	<800	<8,000	<800	<800	<800	<800	**3,500**	<800	<800	<800	<800	<800	<800	<800	**12,000**	<800	<800	<800	<2,400
SB-MIP-57 (24-27')	5/28/2015	<200	<200	<2,000	<200	<200	<200	<200	**6,000**	<200	<200	<200	<200	<200	<200	<200	**4,000**	<200	<200	<200	<600
SB-MIP-58 (24-27')	6/1/2015	<250	<250	<2,500	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	**2,400**	<250	<250	<250	<750
SB-MIP-58 (27-30')	6/1/2015	<1,000	<1,000	<10,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	**7,300**	<1,000	<1,000	<1,000	<3,000
SB-MIP-58 (30-33')	6/1/2015	<500	<500	<5,000	<500	<500	<500	<500	**1,100**	<500	<500	<500	<500	<500	<500	<500	**6,000**	<500	<500	<500	<1,500
SB-MIP-58 (33-36')	6/1/2015	<100	<100	<1,000	<100	<100	<100	<100	**1,900**	**190**	<100	<100	<100	<100	<100	<100	**1,200**	<100	<100	<100	<300
SB-MIP-58 (33-36') (DUP-15)	6/1/2015	<100	<100	<1,000	<100	<100	<100	<100	**2,000**	**200**	<100	<100	<100	<100	<100	<100	**1,300**	<100	<100	<100	<300
SB-MIP-64 (22.5-25.5')	6/4/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**10**	<1.0	<1.0	<1.0	**27**	<1.0	<1.0	<1.0	<3.0
SB-MIP-64 (26-29')	6/4/2015	<13	<13	<130	<13	<13	<13	<13	<13	<13	<13	<13	**15**	<13	<13	<13	**180**	<13	<13	<13	<38
SB-MIP-64 (26-29') (DUP-17)	6/4/2015	<10	<10	<100	<10	<10	<10	<10	<10	<10	<10	<10	**16**	<10	<10	<10	**180**	<10	<10	<10	<30
SB-MIP-64 (29.5-32.5')	6/4/2015	<50	<50	<500	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**610**	<50	<50	<50	<150
SB-MIP-64 (32.5-35.5')	6/4/2015	<100	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**710**	<100	<100	<100	<300
SB-MIP-64 (35.5-38.5')	6/4/2015	<10	<10	<100	<10	<10	<10	<10	**93**	**16**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<30
SB-MIP-64 (39-42')	6/4/2015	<2.5	<2.5	<25	<2.5	<2.5	<2.5	<2.5	**62**	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<7.5
SB-MIP-64 (42-45')	6/4/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**2.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SB-MIP-66 (39-42')	5/21/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SB-MIP-66 (42-45')	5/21/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SB-MIP-66 (45-48')	5/21/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SB-MIP-66 (48-51')	5/21/2015	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

1) Compound may exhibit characteristic ignita Denotes concentrations above one or more criteria

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D3
Predicted TCE Concentrations at MIP Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Boring Location and Sample Depth (feet)	Maximum Electronic Capture Detector Response (Volts)	Calculated Upper Bound 90th Percentile Trichloroethene Concentration (ug/L)
MIP-02 (23-28')	516,373	230
MIP-02 (28-35')	1,022,752	450
MIP-02 (35-49')	467,925	<220
MIP-04 (23-28')	1,220,740	530
MIP-04 (28-42')	1,025,422	450
MIP-04 (42-60')	312,510	<220
MIP-05 (18-24')	1,254,921	550
MIP-05 (24-30')	1,215,857	530
MIP-05 (30-44')	346,690	<220
MIP-06 (21-25')	1,093,783	480
MIP-06 (25-28')	1,796,930	790
MIP-06 (28-31')	5,390,790	2,360
MIP-06 (31-38')	1,718,802	750
MIP-07 (23-26')	1,093,783	480
MIP-07 (26-30')	2,812,586	1,230
MIP-07 (30-35')	2,500,076	1,100
MIP-07 (35-38')	1,171,911	510
MIP-07 (38-46')	360,729	<220
MIP-08 (22-26')	1,658,376	730
MIP-08 (26-45')	340,587	<220
MIP-09 (23-26')	4,564,958	2,000
MIP-09 (26-28')	849,635	370
MIP-09 (28-31')	278,329	<220
MIP-09 (31-35')	2,133,854	930
MIP-09 (35-39')	1,718,802	750
MIP-09 (39-42')	585,955	260
MIP-10 (19-27')	453,505	<220
MIP-10 (27-30')	4,990,386	2,190
MIP-10 (33-36')	5,166,174	2,260
MIP-10 (36-39')	3,955,199	1,730
MIP-11 (19-22')	920,438	400
MIP-11 (22-26')	1,955,626	860
MIP-11 (26-29')	622,578	270
MIP-11 (29-33')	253,914	<220
MIP-12 (19-23')	1,223,182	540
MIP-12 (23-25')	817,896	360
MIP-12 (25-28')	276,498	<220
MIP-12 (28-30')	1,217,688	530
MIP-12 (30-38')	429,090	<220
MIP-13 (15-20')	445,570	<220
MIP-13 (20-25')	663,472	290
MIP-13 (25-35')	271,615	<220
MIP-14 (23-26')	2,327,952	1,020
MIP-14 (29-32')	1,280,557	560

Table D3
Predicted TCE Concentrations at MIP Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Boring Location and Sample Depth (feet)	Maximum Electronic Capture Detector Response (Volts)	Calculated Upper Bound 90th Percentile Trichloroethene Concentration (ug/L)
MIP-14 (32-38')	622,578	270
MIP-14 (38-53')	284,432	<220
MIP-15 (23-27')	15,746,330	6,900
MIP-15 (27-34')	1,632,130	710
MIP-15 (34-38')	1,364,788	600
MIP-15 (38-46')	526,139	230
MIP-16 (23-27')	15,745,110	6,900
MIP-16 (27-29')	3,552,354	1,560
MIP-16 (29-34')	2,175,359	950
MIP-16 (34-39')	321,055	<220
MIP-16 (39-43')	2,963,958	1,300
MIP-16 (43-47')	1,223,182	540
MIP-16 (47-60')	374,767	<220
MIP-17 (23-25')	4,641,255	2,030
MIP-17 (25-28')	1,420,942	620
MIP-17 (28-32')	571,306	250
MIP-17 (32-48')	141,606	<220
MIP-18 (16-38')	390,637	<220
MIP-19 (14-18')	791,421	350
MIP-19 (18-21')	5,572,680	2,440
MIP-19 (21-24')	15,762,199	6,900
MIP-19 (24-27')	14,687,948	6,430
MIP-19 (27-30')	10,000,305	4,380
MIP-19 (30-33')	4,140,751	1,810
MIP-19 (33-36')	4,140,751	1,810
MIP-19 (36-39')	15,625,477	6,840
MIP-19 (39-42')	3,593,860	1,570
MIP-19 (42-45')	703,146	310
MIP-20 (23-25')	1,831,111	800
MIP-20 (25-28')	11,470,077	5,020
MIP-20 (28-31')	5,050,203	2,210
MIP-20 (31-34')	583,514	260
MIP-20 (34-60')	263,680	<220
MIP-21 (24-44')	145,268	<220
MIP-22 (12-17')	328,379	<220
MIP-22 (17-20')	2,353,588	1,030
MIP-22 (20-24')	3,977,172	1,740
MIP-22 (24-27')	1,367,229	600
MIP-22 (27-47')	369,884	<220
MIP-24 (12-16')	325,938	<220
MIP-24 (16-20')	556,047	240
MIP-24 (20-24')	995,514	440
MIP-24 (24-27')	3,877,682	1,700
MIP-24 (27-32')	1,739,555	760

Table D3
Predicted TCE Concentrations at MIP Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Boring Location and Sample Depth (feet)	Maximum Electronic Capture Detector Response (Volts)	Calculated Upper Bound 90th Percentile Trichloroethene Concentration (ug/L)
MIP-24 (32-36')	2,482,986	1,090
MIP-24 (36-40')	2,118,595	930
MIP-26 (22-25')	3,411,970	1,490
MIP-26 (25-28')	1,934,874	850
MIP-26 (28-31')	2,606,281	1,140
MIP-26 (31-35')	826,441	360
MIP-26 (35-58')	371,105	<220
MIP-27 (22-26')	412,610	<220
MIP-27 (26-30')	3,206,885	1,400
MIP-27 (30-34')	568,865	250
MIP-27 (34-49')	185,553	<220
MIP-28 (17-25')	1,682,180	740
MIP-28 (25-34')	809,351	350
MIP-28 (34-37')	946,074	410
MIP-28 (37-43')	5,114,902	2,240
MIP-28 (43-47')	1,297,647	570
MIP-29 (17-21')	1,052,278	460
MIP-29 (21-24')	7,380,596	3,230
MIP-29 (24-29')	2,631,916	1,150
MIP-29 (29-33')	1,868,954	820
MIP-29 (33-37')	2,970,061	1,300
MIP-29 (37-40')	6,624,958	2,900
MIP-29 (40-43')	4,914,701	2,150
MIP-29 (43-46')	2,716,148	1,190
MIP-29 (46-50')	781,274	340
MIP-31 (20-24')	523,698	230
MIP-31 (24-28')	2,314,524	1,010
MIP-31 (28-32')	4,122,440	1,810
MIP-31 (32-36')	1,745,659	760
MIP-31 (36-40')	479,751	<220
MIP-32 (20-24')	816,675	360
MIP-32 (24-29')	4,343,394	1,900
MIP-32 (29-34')	12,629,780	5,530
MIP-32 (34-38')	6,908,170	3,030
MIP-32 (38-41')	628,681	280
MIP-33 (20-23')	244,148	<220
MIP-33 (23-28')	2,806,482	1,230
MIP-33 (28-31')	5,168,615	2,260
MIP-33 (31-34')	6,268,502	2,750
MIP-33 (34-40')	1,105,991	480
MIP-34 (23-31')	1,064,486	470
MIP-34 (31-36')	3,830,683	1,680
MIP-34 (36-42')	4,781,640	2,090
MIP-34 (42-47')	3,164,159	1,390

Table D3
Predicted TCE Concentrations at MIP Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Boring Location and Sample Depth (feet)	Maximum Electronic Capture Detector Response (Volts)	Calculated Upper Bound 90th Percentile Trichloroethene Concentration (ug/L)
MIP-36 (15-19')	4,359,264	1,910
MIP-36 (19-25')	15,757,317	6,900
MIP-36 (25-28')	4,615,619	2,020
MIP-36 (28-33')	312,510	<220
MIP-37 (15-20')	1,094,317	480
MIP-37 (20-23')	10,063,784	4,410
MIP-37 (23-27')	5,907,162	2,590
MIP-37 (27-32')	273,446	<220
MIP-39 (20-23')	3,825,800	1,680
MIP-39 (23-26')	8,329,112	3,650
MIP-39 (29-34')	8,766,137	3,840
MIP-39 (34-37')	4,699,850	2,060
MIP-39 (37-41')	1,369,671	600
MIP-42 (23-28')	6,866,664	3,010
MIP-42 (28-35')	4,051,637	1,770
MIP-42 (35-42')	677,511	300
MIP-43 (23-27')	3,381,451	1,480
MIP-43 (27-31')	253,914	<220
MIP-43 (31-36')	4,050,416	1,770
MIP-43 (36-41')	480,972	<220
MIP-45 (23-26')	562,761	250
MIP-45 (26-31')	2,232,734	980
MIP-45 (31-35')	679,952	300
MIP-45 (35-51')	81,790	<220
MIP-47 (12-19')	942,106	410
MIP-47 (19-27')	4,919,584	2,150
MIP-47 (27-43')	382,092	<220
MIP-48 (7-10')	2,757,652	1,210
MIP-48 (12-15')	7,575,915	3,320
MIP-48 (18-21')	4,249,398	1,860
MIP-48 (21-25')	1,521,042	670
MIP-48 (25-39')	430,921	<220
MIP-49 (8-13')	708,029	310
MIP-49 (13-18')	6,239,204	2,730
MIP-49 (25-29')	4,592,426	2,010
MIP-49 (29-40')	288,095	<220
MIP-51 (24-29')	2,014,222	880
MIP-51 (29-32')	567,644	250
MIP-51 (32-46')	122,074	<220
MIP-52 (24-28')	1,585,742	690
MIP-52 (28-45')	399,182	<220
MIP-53 (24-30')	711,692	310
MIP-53 (30-33')	2,911,466	1,280
MIP-53 (33-37')	681,173	300

Table D3
Predicted TCE Concentrations at MIP Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Boring Location and Sample Depth (feet)	Maximum Electronic Capture Detector Response (Volts)	Calculated Upper Bound 90th Percentile Trichloroethene Concentration (ug/L)
MIP-53 (37-50')	133,061	<220
MIP-54 (22-26')	1,076,693	470
MIP-54 (29-32')	947,295	410
MIP-54 (32-45')	161,138	<220
MIP-56 (15-18')	150,151	<220
MIP-56 (18-22')	10,028,382	4,390
MIP-56 (22-25')	971,709	430
MIP-56 (25-35')	147,710	<220
MIP-57 (14-18')	2,033,753	890
MIP-57 (27-32')	3,339,946	1,460
MIP-58 (18-24')	704,367	310
MIP-58 (36-40')	1,652,882	720
MIP-59 (19-25')	824,000	360
MIP-59 (25-30')	4,616,840	2,020
MIP-59 (30-34')	2,325,510	1,020
MIP-59 (34-38')	698,264	310
MIP-59 (38-42')	346,690	<220
MIP-60 (14-23')	1,422,162	620
MIP-60 (23-50')	220,954	<220
MIP-61 (17-23')	540,788	240
MIP-61 (23-30')	1,204,871	530
MIP-61 (30-54')	155,034	<220
MIP-62 (18-25')	253,914	<220
MIP-62 (25-28')	1,939,756	850
MIP-62 (28-31')	3,999,146	1,750
MIP-62 (31-44')	167,241	<220
MIP-63 (9-26')	211,188	<220
MIP-65 (23-27')	1,145,054	500
MIP-65 (27-34')	1,452,681	640
MIP-65 (34-53')	241,707	<220
MIP-66 (23-27')	690,939	300
MIP-66 (27-34')	623,798	270
MIP-66 (34-39')	356,456	<220
MIP-67 (23-31')	972,930	430
MIP-67 (31-48')	235,603	<220
MIP-68 (23-28')	1,461,226	640
MIP-68 (28-33')	2,371,899	1,040
MIP-68 (33-38')	1,499,069	660
MIP-68 (38-48')	300,302	<220

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene(1)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes(1)
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100(2)	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360(2)	130	620	1,500(2)	18	60(2)	270	89	330(2)	200(2)	13(2)	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000(3)	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-01 (26-30')	3/9/2009	<20	<1.0	<5.0	<1.0	**26**	**1.0**	**5.9**	**120**	**12**	<1.0	<1.0	**5.3**	<1.0	<1.0	**200**	<1.0	<3.0
B-01 (46-50')	3/9/2009	<20	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.2**	<1.0	<1.0	**6.8**	**5.0**	<3.0
B-02 (22-26')	3/10/2009	<20	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.8**	**27**	<3.0
B-02 (33-37')	3/10/2009	<20	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.0**	**16**	<3.0
B-03 (26-30')	3/9/2009	<20	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.6**	<1.0	<1.0	<1.0	**1.4**	<3.0
B-03 (38-42')	3/9/2009	<20	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.2**	<1.0	<1.0	<1.0	<1.0	<3.0
B-04 (19-23')	3/10/2009	<20	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**12**	<3.0
B-04 (19-23') (DUP-01)	3/10/2009	<21	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**12**	<3.0
B-04 (29-33')	3/10/2009	<20	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-05 (14-18')	3/10/2009	<20	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**	<3.0
B-05 (22-26')	3/10/2009	<20	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.7**	<3.0
B-06 (44-48')	3/13/2009	<20	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.5**	<1.0	<1.0	<1.0	<1.0	<3.0
B-07 (44-48')	3/16/2009	<20	**3.5**	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-08 (44-48')	3/13/2009	<20	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-10 (24-28')	4/16/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**57**	<1.0	<2.0
B-11 (29-33')	4/16/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-12 (24-28')	4/16/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.5**	<1.0	<2.0
B-12 (24-28') (DUP-05)	4/16/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.2**	<1.0	<2.0
B-13 (29-33')	4/17/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-13 (46-50')	4/16/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-14 (16-20')	4/14/2009	--	--	<500	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,100**	<100	<200
B-14 (36-40')	4/14/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.4**	<1.0	<2.0
B-15 (24-28')	4/20/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.5**	<1.0	**9.9**	<1.0	**2.8**	<1.0	<2.0
B-15 (44-48')	4/20/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**8.7**	<1.0	<2.0
B-17 (24-28')	4/20/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-18 (22-26')	4/14/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	**2.3**	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<1.0	<1.0	<2.0
B-18 (32-36')	4/14/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<1.0	<1.0	<2.0
B-19 (12-16')	4/15/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**	<2.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-19 (29-33')	4/15/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.0**	<1.0	<1.0	<1.0	**10**	<2.0
B-20 (8-12')	4/15/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-20 (18-22')	4/15/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-21 (6-10')	4/15/2009	--	--	<5.0	--	**3.3**	<1.0	<1.0	**3.6**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.9**	**1.0**	<2.0
B-21 (13-17')	4/15/2009	--	--	<5.0	--	**8.1**	<1.0	<1.0	**13**	**2.2**	<1.0	<1.0	<1.0	**3.6**	<1.0	**30**	**58**	<2.0
B-22 (18-23')	4/14/2009	--	--	<100	--	<20	<20	<20	<20	<20	<20	<20	<20	**53**	<20	**190**	<20	<40
B-22 (40-44')	4/14/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	**13**	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	**3.0**	<1.0	<2.0
B-23 (14-18')	4/13/2009	--	--	<20	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**4.8**	<2.0	<2.0	**23**	<2.0	<6.0
B-23 (14-18') (DUP 01)	4/13/2009	--	--	<20	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**5.0**	<2.0	<2.0	**26**	<2.0	<6.0
B-23 (30-34')	4/13/2009	--	--	<2,500	--	<250	<250	<250	**5,500**	<250	<250	<250	<250	<250	<250	**1,700**	<250	<750
B-23b (14-16') [4]	4/15/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.7**	<1.0	<1.0	<1.0	**8.9**	<1.0	<2.0
B-24 (6-10')	4/13/2009	--	--	<50	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**150**	<5.0	<15
B-24 (28-32')	4/13/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	**6.7**	<2.0
B-24b (5-7') [4]	4/16/2009	--	--	<100	--	<20	<20	<20	<20	<20	<20	<20	<20	**29**	<20	**740**	<20	<40
B-24b (5-7') (DUP-04)	4/16/2009	--	--	<100	--	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**770**	<50	<100
B-25 (7-11')	4/17/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-25 (7-11') (DUP-06)	4/17/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-25 (31-35')	4/17/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-26 (16-20')	4/14/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	**3.2**	<1.0	<1.0	<1.0	**1.2**	<1.0	<1.0	<1.0	**3.1**	<2.0
B-26 (29-33')	4/14/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	**7.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**140**	<2.0
B-27b (8-10') [4]	4/15/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**9.2**	<1.0	<2.0
B-28b (16-18') [4]	4/16/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.7**	<2.0
B-29 (8-12')	4/13/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-29 (38-42')	4/13/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	**1.1**
B-29b [4]	11/24/2009	<40	<2.0	<10	<10	**27**	<2.0	<2.0	**6.2**	<2.0	<2.0	**210**	<2.0	**77**	<2.0	**76**	<2.0	<6.0
B-30 (6-11')	4/14/2009	--	--	<5.0	--	**2.4**	<1.0	<1.0	**36**	**4.2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-30 (30-34')	4/14/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**
B-30 (30-34') (DUP-02)	4/14/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-31 (10-14')	4/13/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**7.4**	<1.0	<1.0	<1.0	**8.1**	<2.0
B-31 (25-29')	4/13/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.7**	<1.0	<1.0	<1.0	**390**	<2.0
B-32 (10-14')	4/14/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	**13**	<1.0	<1.0	<1.0	**1.6**	<1.0	<1.0	<1.0	**430**	<2.0
B-32 (25-29')	4/14/2009	--	--	<500	--	<100	<100	<100	**1,200**	<100	<100	<100	<100	<100	<100	<100	**360**	<200
B-32b (8.5-10.5') [4]	4/15/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	**3.4**	<1.0	<1.0	**1.7**	<1.0	**2.1**	<1.0	**13**	**1.6**	<2.0
B-33 (4-8')	4/15/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-33 (4-8') (DUP-03)	4/15/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-33 (17-21')	4/15/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-33b [4]	11/24/2009	<20	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.7**	<1.0	<3.0
B-34 (14-18')	4/20/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-34 (41-45')	4/20/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
B-35 (5-9')	4/20/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<2.0
B-35 (5-9') (DUP-07)	4/20/2009	--	--	<5.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<2.0
B-35 (11-16')	9/17/2010	<20	<1.0	<5.0	<5.0	**1.1**	<1.0	<1.0	**69**	**5.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-35 (30-34')	4/20/2009	--	--	<50	--	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**450**	<20
B-36 (12-16')	5/13/2009	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-36 (16-20')	5/13/2009	--	<1.0	<1.0	**1.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-36 (16-20') (DUP-01)	5/13/2009	--	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-37 (38.5-42.5')	5/12/2009	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	<1.0	<1.0	<1.0	<1.0	<3.0
B-38 (15-19')	5/13/2009	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0	<3.0
B-38 (36-40')	5/13/2009	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-39 (15-19')	5/13/2009	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-40 (16-20')	5/15/2009	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-40 (42-46')	5/15/2009	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-45 (10-12')	2/22/2011	<20	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-45 (14-16')	2/22/2011	<20	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**33**	<3.0
B-45 (22-24')	2/22/2011	<20	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.1**	<3.0
B-46 (8-10')	2/22/2011	<20	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	**8.2**	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-46 (14-16')	2/22/2011	<20	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.1**	<3.0
B-46 (21-23')	2/22/2011	<20	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.9**	<3.0
B-47 (7.75-9.75')	2/22/2011	<20	<1.0	<1.0	<5.0	**15**	<1.0	**1.1**	**73**	**6.7**	<1.0	<1.0	<1.0	<1.0	**6.4**	**100**	<1.0	**2.3**
B-47 (7.75-9.75') (DUP-01)	2/22/2011	<20	<1.0	<1.0	<5.0	**14**	<1.0	<1.0	**71**	**6.9**	<1.0	<1.0	<1.0	<1.0	**6.8**	**97**	<1.0	<3.0
B-47 (14-16')	2/22/2011	<20	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**23**	<3.0
B-47 (21-23')	2/22/2011	<20	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**28**	<3.0
B-48 (7-9')	2/22/2011	<20	<1.0	<1.0	<5.0	**6.2**	<1.0	<1.0	**34**	**2.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-48 (13-15')	2/22/2011	<20	<1.0	<1.0	<5.0	**16**	<1.0	**2.1**	**110**	**11**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**32**	<3.0
B-48 (19.5-21.5')	2/22/2011	<20	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**47**	<3.0
B-49 (13-15')	2/22/2011	<100	<5.0	<25	<25	**8.2**	<5.0	<5.0	**33**	<5.0	<5.0	<5.0	<5.0	**9.0**	<5.0	**760**	<5.0	<15
B-49 (19.5-21.5')	2/22/2011	<200	<10	<50	<50	<10	<10	<10	**31**	<10	<10	<10	<10	**49**	<10	**1,600**	<10	<30
B-50 (7-9')	2/23/2011	<100	<5.0	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**33**	<5.0	**710**	<5.0	<15
B-50 (13-15')	2/23/2011	<1,000	<50	<250	<250	<50	<50	<50	<50	<50	<50	<50	<50	**100**	<50	**5,400**	<50	<150
B-50 (20-22')	2/23/2011	<20	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	**6.5**	<3.0
B-50 (20-22') (DUP-02)	2/23/2011	<20	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	**7.0**	<3.0
B-51 (7-9')	2/23/2011	<100	<5.0	<25	<25	<5.0	<5.0	<5.0	**13**	<5.0	<5.0	<5.0	<5.0	**25**	<5.0	**580**	<5.0	<15
B-51 (13-15')	2/23/2011	<200	<10	<50	<50	**36**	<10	**140**	**87**	<10	<10	<10	<10	**260**	<10	**1,600**	<10	<30
B-51 (20-22')	2/23/2011	<200	<10	<50	<50	<10	<10	<10	**23**	**24**	<10	<10	<10	<10	<10	**970**	**62**	<30
B-52 (7-9')	2/23/2011	<10,000	<500	<2,500	<2,500	**930**	<500	<500	**520**	<500	**4,400**	<500	**85,000**	**2,900**	<500	**2,900**	<500	**43,000**
B-52 (13-15')	2/23/2011	<200	<10	<50	<50	**57**	<10	<10	**71**	<10	**430**	<10	**120**	<10	<10	**30**	**270**	**1,300**
B-52 (20-22')	2/23/2011	<100	<5.0	<25	<25	<5.0	<5.0	<5.0	**140**	**16**	<5.0	<5.0	<5.0	<5.0	<5.0	**440**	<5.0	<15
B-53 (18-20')	2/23/2011	<20	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**120**	<1.0	<3.0
B-53 (24-26')	2/23/2011	<20	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-54 (18-20')	2/23/2011	<20	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	<3.0
B-54 (26-28')	2/23/2011	<20	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-58 (7-12')	4/1/2011	<50	<50	<10	<10	**66**	<10	<10	**46**	<10	**620**	<10	**16**	**84**	<10	**90**	<10	**5,300**
B-59 (7-12')	4/1/2011	<1,200	<1,200	**970**	<250	**680**	<250	<250	**580**	<250	**2,500**	<250	**41,000**	**1,400**	<250	**960**	<250	**24,000**
B-60 (7-12')	4/1/2011	<2,500	<2,500	**1,300**	<500	**2,100**	<500	<500	**1,500**	<500	**4,700**	<500	**55,000**	**4,900**	<500	**1,900**	<500	**48,000**

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-61 (7-12')	4/1/2011	<2,500	<2,500	<500	<500	<500	<500	<500	<500	<500	**5,200**	<500	**61,000**	**1,000**	<500	**1,200**	<500	**41,000**
B-62 (7-12')	4/1/2011	<5.0	<5.0	<1.0	<1.0	**13**	<1.0	**2.5**	**46**	**1.2**	**1.4**	<1.0	<1.0	**190**	<1.0	**590**	<1.0	<3.0
B-63 (7-12')	4/1/2011	<1,000	<1,000	<200	<200	<200	<200	<200	<200	<200	**3,800**	<200	**21,000**	<200	<200	**210**	<200	**30,000**
B-63 (7-12') (DUP-01)	4/1/2011	<1,200	<1,000	<200	<200	<200	<200	<200	<200	<200	**3,800**	<200	**21,000**	<200	<200	<200	<200	**31,000**
B-64 (7-12')	4/1/2011	<250	<1,200	<250	<250	**1,000**	<250	<250	**450**	<250	**9,300**	<250	**18,000**	**1,200**	<250	**570**	<250	**59,000**
B-65 (7-12')	4/1/2011	<250	<250	<50	<50	<50	<50	<50	**140**	<50	**3,200**	<50	**90**	<50	<50	<50	**56**	**23,000**
B-66 (7-12')	4/1/2011	<25	<250	<50	<50	**110**	<50	<50	<50	<50	**2,500**	<50	<50	<50	<50	<50	<50	**28,000**
B-67 (7-12')	4/1/2011	<400	<25	<5.0	<5.0	**34**	<5.0	<5.0	**83**	<5.0	**140**	<5.0	<5.0	**75**	<5.0	**58**	**9.6**	**1,300**
B-68 (14.5-16.5')	7/24/2012	<1,000	<20	<100	<100	<20	<20	<20	**28**	<20	<20	<20	<20	**1,200**	<20	**1,900**	<20	--
B-68 (20.7-22.7')	7/24/2012	<1,000	<50	<250	<250	<50	<50	**130**	<50	<50	<50	<50	<50	**5,300**	<50	**4,200**	<50	<150
B-68 (27.7-29.7')	7/24/2012	<500	<25	<250	<125	<25	<25	<25	**51**	**89**	<25	<25	<25	<25	<25	**2,800**	<25	<75
B-70 (14-17')	4/28/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**60**	**6.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**18**	<3.0
B-70 (17.5-20.5')	4/28/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**55**	**5.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**27**	<3.0
B-70 (21-24')	4/28/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**31**	**3.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**14**	<3.0
B-70 (24-27')	4/28/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**4.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**7.8**	<3.0
B-70 (27-30')	4/28/2015	<80	<2.0	<20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**53**	<6.0
B-70 (30-33')	4/28/2015	<200	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**67**	<15
B-70 (33-36')	4/28/2015	<400	<10	<100	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**320**	<30
B-70 (36-39')	4/28/2015	<400	<10	<100	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**330**	<30
B-71 (14-17')	4/29/2015	<80	<2.0	<20	<2.0	<2.0	<2.0	<2.0	**44**	**4.9**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<6.0
B-71 (17-20')	4/29/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<3.0
B-71 (20.5-23.5')	4/29/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**27**	<3.0
B-71 (23.5-26.5')	4/29/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,200**	<300
B-71 (26.5-29.5')	4/29/2015	<200	**5.0**	<50	**5.0**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**1,200**	<15
B-71 (29.5-32.5')	4/29/2015	<800	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**600**	<60
B-71 (32.5-35.5')	4/29/2015	<800	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**520**	<60
B-72 (12.5-15.5')	4/30/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**15**	**2.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-72 (16-19')	4/30/2015	<80	<2.0	<20	<2.0	<2.0	<2.0	<2.0	**11**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**34**	<6.0
B-72 (19.5-22.5')	4/29/2015	<800	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**660**	<60
B-72 (19.5-22.5') (DUP-01)	4/29/2015	<800	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**720**	<60
B-72 (22.5-25.5')	4/29/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,300**	<300
B-72 (25.5-28.5')	4/30/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,300**	<300
B-72 (28.5-31.5')	4/29/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,400**	<300
B-72 (31.5-34.5')	4/29/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,400**	<300
B-73 (14-17')	4/30/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**4.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-73 (17-20')	4/30/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**3.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-73 (20-23')	4/30/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**1.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.9**	<3.0
B-73 (23-26')	4/30/2015	<800	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**830**	<60
B-73 (26-29')	4/30/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**2,600**	<300
B-73 (29-32')	4/30/2015	<200	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**170**	<15
B-73 (32-35')	4/30/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-74 (14-17')	5/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-74 (17.5-20.5')	5/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-74 (21-24')	5/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-74 (24-27')	5/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-74 (27-30')	5/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-74 (30-33')	5/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.7**	<3.0
B-74 (33-36')	5/1/2015	<400	<10	<100	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**390**	<30
B-74 (36-39')	5/1/2015	<800	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**950**	<60
B-75 (14-17')	5/4/2015	<800	<20	<200	<20	<20	<20	<20	**550**	**63**	<20	<20	<20	<20	<20	<20	<20	<60
B-75 (17-20')	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**1,900**	**170**	<100	<100	<100	<100	<100	<100	<100	<300
B-75 (20.5-23.5')	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**3,000**	<100	<100	<100	<100	<100	<100	<100	<100	<300
B-75 (23.5-26.5')	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**6,500**	<100	<100	<100	<100	<100	<100	<100	**110**	<300
B-75 (26.5-29.5')	5/4/2015	<800	<20	<200	<20	<20	<20	<20	**350**	<20	<20	<20	<20	<20	<20	<20	**490**	<60
B-75 (29.5-32.5')	5/4/2015	<800	<20	<200	<20	<20	<20	<20	**690**	<20	<20	<20	<20	<20	<20	<20	**670**	<60

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-75 (32.5-35.5')	5/4/2015	<8000	<200	<2,000	<200	<200	<200	<200	**5,900**	<200	<200	<200	<200	<200	<200	<200	**470**	<600
B-76 (14-17')	5/4/2015	<800	<20	<200	<20	<20	<20	<20	**150**	<20	<20	<20	<20	**24**	<20	**660**	<20	<60
B-76 (17-20')	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**450**	<100	<100	<100	<100	<100	<100	**970**	<100	<300
B-76 (20.5-23.5')	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**1,700**	**120**	<100	<100	<100	<100	<100	<100	<100	<300
B-76 (23.5-26.5')	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**3,600**	**190**	<100	<100	<100	<100	<100	<100	<100	<300
B-76 (26.5-29.5')	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**3,900**	**220**	<100	<100	<100	<100	<100	<100	**210**	<300
B-76 (29.5-32.5')	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**4,600**	**240**	<100	<100	<100	<100	<100	<100	**240**	<300
B-76 (29.5-32.5') (DUP-02)	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**4,600**	**230**	<100	<100	<100	<100	<100	<100	**220**	<300
B-76 (32.5-35.5')	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**3,600**	**170**	<100	<100	<100	<100	<100	<100	**240**	<300
B-76 (35.5-38.5')	5/4/2015	<8000	<200	<2,000	<200	<200	<200	<200	**4,000**	<200	<200	<200	<200	<200	<200	<200	<200	<600
B-76 (38.5-41.5')	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**4,500**	<100	<100	<100	<100	<100	<100	<100	<100	<300
B-76 (41.5-44.5')	5/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**3,600**	<100	<100	<100	<100	<100	<100	<100	<100	<300
B-77 (17-20')	5/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-77 (20.5-23.5')	5/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**4.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.3**	<3.0
B-77 (24-27')	5/5/2015	<80	<2.0	<20	<2.0	<2.0	<2.0	<2.0	**12**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**41**	<6.0
B-77 (27-30')	5/5/2015	<200	<5.0	<50	<5.0	<5.0	<5.0	<5.0	**5.6**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**61**	<15
B-77 (27-30') (DUP-03)	5/5/2015	<200	<5.0	<50	<5.0	<5.0	<5.0	<5.0	**6.0**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**66**	<15
B-77 (30-33')	5/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<3.0
B-77 (33-36')	5/5/2015	<200	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**74**	<15
B-77 (36-39')	5/5/2015	<80	<2.0	<20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**39**	<6.0
B-77 (39-42')	5/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**9.5**	<3.0
B-77 (42.1-45.1')	5/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**7.6**	<3.0
B-78 (19-22')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-78 (21.5-24.5')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-78 (24.5-27.5')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-78 (27.5-30.5')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-78 (30.5-33.5')	5/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-78 (33.5-36.5')	5/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-78 (36.5-39.5')	5/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.0**	<3.0
B-78 (39.5-42.5')	5/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<3.0
B-78 (42.5-45.5')	5/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-79 (6.5-9.5')	5/7/2015	<40	<2.0	<20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**81**	<2.0	**20**	<2.0	<6.0
B-79 (9-12')	5/7/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**33**	<1.0	**15**	<1.0	<3.0
B-79 (12-15')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-79 (15-18')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.7**	<3.0
B-79 (18-21')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**7.0**	<3.0
B-79 (21-24')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.1**	<3.0
B-79 (24-27')	5/7/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.2**	<3.0
B-79 (27-30')	5/7/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.1**	<3.0
B-79 (30-33')	5/7/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.3**	<3.0
B-79 (33-36')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.4**	<3.0
B-79 (36-39')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.8**	<3.0
B-79 (39-42')	5/6/2015	<80	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**1.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**7.2**	<3.0
B-79 (41.5-44.5')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**5.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**13**	<3.0
B-80 (6-9')	5/7/2015	<40	<1.0	<10	<1.0	**2.3**	<1.0	<1.0	**1.2**	<1.0	<1.0	**19**	<1.0	**130**	<1.0	**160**	<1.0	<3.0
B-80 (9-12')	5/7/2015	<800	<20	<200	<20	<20	<20	<20	<20	<20	<20	**69**	<20	**74**	<20	**900**	<20	<60
B-80 (12-15')	5/7/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**280**	<100	<100	<100	<100	**230**	<100	**1,600**	<100	<300
B-80 (15-18')	5/6/2015	<400	<10	<100	<10	<10	<10	<10	**360**	**38**	<10	<10	<10	<10	<10	<10	<10	<30
B-80 (18-21')	5/6/2015	<400	<10	<100	<10	<10	<10	<10	**180**	**11**	<10	<10	<10	<10	<10	<10	<10	<30
B-80 (21-24')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**31**	**1.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-80 (24-27')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	<3.0
B-80 (27-30')	5/7/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.1**	<3.0
B-80 (30-33')	5/6/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**4.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.6**	<3.0
B-80 (33-36')	5/6/2015	<800	<20	<200	<20	<20	<20	<20	**650**	<20	<20	<20	<20	<20	<20	**40**	<20	<60
B-80 (36-39')	5/6/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**2,100**	<100	<100	<100	<100	<100	<100	**660**	<100	<300
B-80 (36-39') (DUP-04)	5/6/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**2,200**	<100	<100	<100	<100	<100	<100	**800**	<100	<300

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-80 (39-42')	5/6/2015	<400	<10	<100	<10	<10	<10	<10	**3,000**	**21**	<10	<10	<10	<10	<10	**910**	**41**	<30
B-80 (41.5-44.5')	5/6/2015	<400	<10	<100	<10	<10	<10	<10	**2,900**	**22**	<10	<10	<10	<10	<10	**840**	**43**	<30
B-81 (6.5-9.5')	5/7/2015	<2,000	<50	<500	<50	<50	<50	**50**	**1,800**	<50	<50	**50**	<50	<50	<50	**50**	**1,200**	<150
B-81 (9-12')	5/7/2015	<8000	<200	<2,000	<200	<200	<200	<200	**7,200**	<200	<200	**15,000**	<200	<200	<200	**8,900**	**990**	<600
B-81 (12-15')	5/7/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**1,500**	<100	<100	**15,000**	<100	<100	<100	**4,500**	**970**	<300
B-81 (15-18')	5/7/2015	<2,000	<50	<500	<50	<50	<50	<50	**1,500**	<50	<50	**57**	<50	<50	<50	**2,600**	**72**	<150
B-81 (18-21')	5/7/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**2,900**	<100	<100	<100	<100	<100	<100	**100**	**130**	<300
B-81 (21-24')	5/7/2015	<2,000	<50	<500	<50	<50	<50	<50	**1,100**	<50	<50	<50	<50	<50	<50	**540**	<50	<150
B-81 (24-27')	5/7/2015	<400	<10	<100	<10	<10	<10	<10	**350**	**32**	<10	<10	<10	<10	<10	**750**	<10	<30
B-81 (27-30')	5/7/2015	<2,000	<50	<500	<50	<50	<50	<50	**740**	<50	<50	<50	<50	<50	<50	**1,500**	<50	<150
B-81 (30-33')	5/7/2015	<2,000	<50	<500	<50	<50	<50	<50	**1,600**	<50	<50	<50	<50	<50	<50	**940**	<50	<150
B-81 (32.5-35.5')	5/7/2015	<800	<20	<200	<20	<20	<20	<20	**850**	**27**	<20	<20	<20	<20	<20	**980**	<20	<60
B-81 (32.5-35.5') (DUP-05)	5/7/2015	<800	<20	<200	<20	<20	<20	<20	**850**	**28**	<20	<20	<20	<20	<20	**950**	<20	<60
B-82 (6.5-9.5')	5/7/2015	<800	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	<20	**150**	<20	**750**	<20	<60
B-82 (9-12')	5/7/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,200**	<100	**4,100**	<100	<300
B-82 (12-15')	5/7/2015	<2,000	<50	<500	<50	<50	<50	**66**	**80**	<50	<50	<50	<50	**160**	<50	**1,800**	<50	<150
B-82 (15-18')	5/7/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.0**	<3.0
B-82 (18-21')	5/7/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**16**	**3.6**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.3**	<3.0
B-82 (21-24')	5/7/2015	<800	<20	<200	<20	<20	<20	<20	**76**	**71**	<20	<20	<20	<20	<20	<20	<20	<60
B-82 (24-27')	5/7/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**	<3.0
B-82 (27-30')	5/7/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**	<3.0
B-82 (30-33')	5/7/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**	<3.0
B-82 (32.5-35.5')	5/7/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**12**	<3.0
B-83 (6.5-9.5')	5/12/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**6.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**16**	**1.8**	<3.0
B-83 (9.5-12.5')	5/12/2015	<200	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**170**	<5.0	<15
B-83 (12.5-15.5')	5/12/2015	<400	<20	<200	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**650**	<20	<60
B-83 (15.5-18.5')	5/12/2015	<200	<50	<500	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**1,100**	**75**	<150
B-83 (18.5-21.5')	5/12/2015	<40	<10	<100	<10	**24**	<10	<10	**39**	<10	<10	<10	<10	**18**	<10	**210**	**170**	<30

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-83 (21.5-24.5')	5/12/2015	<200	<5.0	<50	<5.0	<5.0	<5.0	<5.0	**71**	**130**	<5.0	<5.0	<5.0	<5.0	<5.0	**19**	**29**	<15
B-83 (24.5-27.5')	5/12/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**8.8**	**13**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.9**	<3.0
B-83 (27.5-30.5')	5/12/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.7**	<3.0
B-83 (27.5-30.5') (DUP-07)	5/12/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.6**	<3.0
B-83 (30.5-33.5')	5/12/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.1**	<3.0
B-84 (14-17')	5/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-84 (17-20')	5/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-84 (20-23')	5/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-84 (23-26')	5/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-84 (26-29')	5/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-84 (29-32')	5/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-84 (32-35')	5/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-84 (35-38')	5/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-84 (37.3-40.3')	5/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-84 (37.3-40.3') (DUP-06)	5/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-85 (14-17')	5/11/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-85 (17.5-20.5')	5/11/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-85 (21-24')	5/11/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-85 (24-27')	5/11/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-85 (27-30')	5/11/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-85 (30-33')	5/11/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-85 (33-36')	5/11/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-85 (36-39')	5/11/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-85 (39-42')	5/11/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-85 (42-45')	5/11/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-86 (28.5-31.5')	5/14/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**240**	<100	<100	<100	<100	<100	<100	**1,100**	<100	<300
B-86 (31-34')	5/14/2015	<5,000	<130	<1,300	<130	<130	<130	<130	**420**	<130	<130	<130	<130	<130	<130	**2,400**	<130	<380
B-86 (33.5-36.5')	5/14/2015	<8000	<200	<2,000	<200	<200	<200	<200	**310**	<200	<200	<200	<200	<200	<200	**2,800**	<200	<600

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-86 (36-39')	5/14/2015	<5,000	<130	<1,300	<130	<130	<130	<130	**250**	<130	<130	<130	<130	**140**	<130	**2,600**	<130	<380
B-87 (29-32')	5/15/2015	<800	<20	<200	<20	<20	<20	<20	**150**	<20	<20	<20	<20	**34**	<20	**500**	<20	<60
B-87 (32-35')	5/15/2015	<2,000	<50	<500	<50	<50	<50	<50	**280**	<50	<50	<50	<50	**69**	<50	**1,400**	<50	<150
B-87 (35-38')	5/15/2015	<2,000	<50	<500	<50	<50	<50	<50	**250**	<50	<50	<50	<50	<50	<50	**1,200**	<50	<150
B-87 (35-38') (DUP-09)	5/15/2015	<400	<10	<100	<10	**15**	<10	<10	**270**	<10	<10	<10	<10	**50**	<10	**1,200**	<10	<30
B-88 (25.5-28.5')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-88 (29-32')	5/12/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-88 (32-35')	5/12/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**2.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-88 (35-38')	5/12/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-88 (38-41')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-88 (41-44')	5/12/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-88 (44-47')	5/12/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-88 (47-50')	5/12/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-89 (23-26')	5/13/2015	<200	<5.0	<50	<5.0	<5.0	<5.0	<5.0	**160**	**26**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<15
B-89 (24.5-27.5')	5/13/2015	<400	<10	<100	<10	<10	<10	<10	**290**	**45**	<10	<10	<10	<10	<10	<10	<10	<30
B-89 (27.5-30.5')	5/13/2015	<400	<10	<100	<10	<10	<10	<10	**430**	**20**	<10	<10	<10	<10	<10	<10	<10	<30
B-89 (30.5-33.5')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**26**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-89 (30.5-33.5') (DUP-08)	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**26**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-89 (33.5-36.5')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**4.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-89 (36.5-39.5')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-89 (39.5-42.5')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-89 (42.5-45.5')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-90 (17.5-20.5')	5/19/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	**2,100**	<100	**1,600**	<100	<300
B-90 (20.5-23.5')	5/19/2015	<5,000	<130	<1,300	<130	<130	<130	<130	<130	<130	<130	<130	<130	**3,700**	<130	**1,600**	<130	<380
B-90 (23.5-26.5')	5/19/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	**390**	<100	**2,400**	<100	<300
B-90 (26.5-29.5')	5/19/2015	<2,000	<50	<500	<50	<50	<50	<50	<50	**60**	<50	<50	<50	<50	<50	**1,600**	<50	<150
B-90 (29.5-32.5')	5/15/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,200**	<100	<300
B-90 (32.5-35.5')	5/19/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,500**	<100	<300

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene(1)	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene(1)	Tetra-chloroethene	Toluene(1)	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes(1)
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100(2)	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360(2)	130	620	1,500(2)	18	60(2)	270	89	330(2)	200(2)	13(2)	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000(3)	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-90 (35.5-38.5')	5/19/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,200**	<100	<300
B-90 (38.5-41.5')	5/19/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**330**	<100	<100	<100	<100	<100	<100	**2,300**	<100	<300
B-90 (41.5-44.5')	5/15/2015	<3200	<80	<800	<80	<80	<80	<80	**420**	**89**	<80	<80	<80	<80	<80	**1,500**	<80	<240
B-91 (10.5-13.5')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-91 (13-16')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-91 (16.5-19.5')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-91 (19.75-22.75')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-91 (22.75-25.75')	5/13/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-92 (10.5-13.5')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.5**	<3.0
B-92 (13-16')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**20**	<3.0
B-92 (15.5-18.5')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-92 (19.5-22.5')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-92 (22-25')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-92 (24.75-27.75')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-93 (17-20')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-93 (19.5-22.5')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.2**	<3.0
B-93 (22-25')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**8.6**	<3.0
B-93 (25-28')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-93 (28.5-31.5')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-93 (32-35')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-93 (33.5-36.5')	5/14/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-94 (14.5-17.5')	5/18/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**17**	<3.0
B-94 (17-20')	5/18/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**15**	<3.0
B-94 (19.5-22.5')	5/18/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.1**	<3.0
B-94 (22.5-25.5')	5/18/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-94 (25.25-38.25')	5/18/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-94 (28-31')	5/15/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-94 (31.25-34.25')	5/15/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-94 (37-40')	5/18/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-94 (39-42')	5/15/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-94 (42-45')	5/15/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-95 (13-16')	5/18/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-95 (16.5-19.5')	5/18/2015	<200	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**95**	<15
B-95 (20-23')	5/18/2015	<400	<10	<100	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**230**	<30
B-95 (23-26')	5/18/2015	<80	<2.0	**48**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**44**	<6.0
B-95 (26-29')	5/18/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.4**	<3.0
B-95 (38-41')	5/15/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (18-21')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (21-24')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (24-27')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (27-30')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (30-33')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (33-36')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (36-39')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (39-42')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (42-45')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (45-48')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (48.5-51.5')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-96 (51.5-54.5')	5/27/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-97 (15.5-18.5')	5/29/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-97 (22.5-25.5')	6/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-97 (25.5-28.5')	6/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-97 (28.5-31.5')	6/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-97 (32-35')	6/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-97 (35.5-38.5')	5/29/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-97 (39-42')	5/29/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-97 (43-46')	6/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-97 (46.5-49.5')	5/29/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-97 (49-52')	5/29/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-98 (5-8')	6/2/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-98 (8-11')	6/2/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-98 (21.5-24.5')	6/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-98 (25-28')	6/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-98 (28-31')	6/1/2015	<80	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-98 (31-34')	6/1/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.0**	<3.0
B-98 (34.5-37.5')	6/1/2015	<40	<2.0	<20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<6.0
B-99 (10.5-13.5')	6/1/2015	<800	<20	<200	<20	<20	<20	<20	<20	<20	<20	**29**	<20	**230**	<20	**250**	<20	<60
B-99 (13.5-16.5')	6/1/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,000**	<100	**570**	<100	<300
B-100 (8-11')	6/2/2015	<40000	<1,000	<10,000	<1,000	<1,000	<1,000	<1,000	**3,800**	<1,000	<1,000	**32,000**	<1,000	<1,000	<1,000	**2,700**	<1,000	<3,000
B-100 (10-13')	6/1/2015	<40000	<1,000	<10,000	<1,000	<1,000	<1,000	<1,000	**3,100**	<1,000	<1,000	**17,000**	<1,000	<1,000	<1,000	**2,500**	**1,100**	<3,000
B-100 (13-16')	6/1/2015	<2,000	<50	<500	<50	<50	<50	<50	**190**	<50	<50	**1,100**	<50	<50	<50	**1,200**	**150**	<150
B-101 (12-15')	6/3/2015	<8000	<200	<2,000	<200	<200	<200	<200	<200	<200	<200	**3,700**	<200	<200	<200	**560**	<200	<600
B-101 (15-18')	6/3/2015	<500	<13	<130	<13	<13	<13	**19**	**15**	<13	<13	**130**	<13	**71**	<13	**320**	<13	<38
B-101 (18-21')	6/3/2015	<5,000	<130	<1,300	<130	<130	<130	<130	<130	<130	<130	<130	<130	**1,200**	<130	**4,500**	<130	<380
B-102 (8-11')	6/3/2015	<20,000	<500	<5,000	<500	<500	<500	<500	**3,600**	<500	<500	**9,700**	<500	<500	<500	**560**	**530**	<1,500
B-102 (11-14')	6/3/2015	<5,000	<130	<1,300	<130	<130	<130	<130	**2,300**	<130	<130	**1,200**	<130	<130	<130	**290**	**1,900**	<380
B-102 (14-17')	6/3/2015	<2,000	<50	<500	<50	<50	<50	<50	**420**	<50	<50	**80**	<50	<50	<50	**1,100**	**700**	<150
B-103 (29.5-32.5')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-103 (32.5-35.5')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-103 (35.5-38.5')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-104 (12-15')	6/9/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**170**	<100	<100	**4,000**	<100	<100	<100	**1,300**	<100	<300
B-104 (15-18')	6/9/2015	<800	<20	<200	<20	<20	<20	<20	<20	<20	<20	**190**	<20	**23**	<20	**570**	<20	<60
B-104 (15-18') (DUP-19)	6/9/2015	<800	<20	<200	<20	<20	<20	<20	<20	<20	<20	**190**	<20	**22**	<20	**570**	<20	<60
B-104 (18-21')	6/8/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,200**	<100	<300

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-105 (13-16')	6/8/2015	<400	<10	<100	<10	<10	<10	<10	<10	<10	<10	**140**	<10	**37**	<10	**170**	<10	<30
B-105 (16-19')	6/8/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	**360**	<100	**1,700**	<100	<300
B-105 (19-22')	6/8/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	**170**	<100	**2,900**	<100	<300
B-106 (16.5-19.5')	6/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-106 (19.5-22.5')	6/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-106 (22.5-25.5')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-106 (25.5-28.5')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-106 (29-32')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-106 (29-32')	6/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-106 (32-35')	6/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-106 (32-35') (DUP-18)	6/8/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-106 (35-38')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-106 (38-41')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-107 (18-21')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<3.0
B-107 (25-28')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-107 (28-31')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.7**	<3.0
B-107 (31-34')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-107 (34-37')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-107 (37-40')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-107 (40.5-43.5')	6/5/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-108 (3-6')	12/1/2015	<400	<20	<100	<100	<20	<20	<20	**1,700**	<20	<20	<20	<20	<20	<20	<20	**36**	<60
B-108 (5.6-8.6')	9/1/2015	<200	<10	<50	<50	**15**	<10	<10	**1,100**	**11**	<10	<10	<10	**25**	<10	**1,200**	**23**	<30
B-108 (5.6-8.6')	12/1/2015	<200	<10	<50	<50	**16**	<10	<10	**1,500**	**14**	<10	<10	<10	**22**	<10	**1,100**	**23**	<30
B-109 (7.4-10.4')	9/1/2015	<20	<1.0	<5.0	<5.0	**6.5**	<1.0	<1.0	**6.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.7**	<1.0	<3.0
B-109 (7.4-10.4') (DUP-01)	9/1/2015	<20	<1.0	<5.0	<5.0	**6.6**	<1.0	<1.0	**7.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.8**	<1.0	<3.0
B-110 (7.3-10.3')	9/1/2015	**41**	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-111 (3.3-6.3')	9/1/2015	<20	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
B-112 (4.4-7.4')	9/1/2015	**25**	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0	<3.0
B-113 (2-5')	12/1/2015	<400	<20	<100	<100	<20	<20	<20	**1,600**	<20	<20	<20	<20	<20	<20	**86**	<20	<60
B-113 (5-8')	12/1/2015	<200	<10	<50	<50	<10	<10	<10	**1,400**	**12**	<10	<10	<10	**12**	<10	**120**	<10	<30
B-114 (4-7')	12/1/2015	<20	<1.0	<5.0	<5.0	**15**	<1.0	<1.0	**11**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	<3.0
B-114 (7.4-10.4')	12/1/2015	<50	<2.5	<12	<12	**25**	<2.5	<2.5	**57**	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**270**	<2.5	<7.5

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
B-115 (11-14')	12/17/2015	<2,000	<50	<500	<50	<50	<50	<50	**1,800**	<50	<50	**1,800**	<50	<50	<50	**480**	**1,500**	<150
B-116 (10-13')	12/17/2015	<20,000	<500	<5,000	<500	<500	<500	<500	**8,300**	<500	<500	**34,000**	<500	<500	<500	**2,700**	**970**	<1,500
B-117 (9.5-12.5')	12/17/2015	<5,000	<130	<1,300	<130	<130	<130	<130	**350**	<130	<130	**5,400**	<130	<130	<130	**810**	<130	<380
B-118 (11-14')	12/17/2015	<200	<5.0	<50	<5.0	**21**	<5.0	**5.4**	**84**	<5.0	<5.0	**210**	<5.0	**57**	<5.0	**290**	**24**	<15
B-119 (11.5-14.5')	12/16/2015	<1,000	<25	<250	<25	**82**	<25	**34**	**600**	<25	<25	**32**	<25	**250**	<25	**49**	**110**	<75
B-120 (10.5-13.5')	12/17/2015	<1,000	<25	<250	<25	<25	<25	<25	**230**	<25	<25	**670**	<25	<25	<25	**130**	**420**	<75
B-121 (10.5-13.5')	12/17/2015	<50,000	<1,300	<13,000	<1,300	<1,300	<1,300	<1,300	**7,000**	<1,300	<1,300	**76,000**	<1,300	<1,300	<1,300	**2,000**	<1,300	<3,800
B-122 (7.5-10.5')	12/16/2015	<20,000	<500	<5,000	<500	<500	<500	<500	**2,400**	<500	<500	**27,000**	<500	<500	<500	**990**	**510**	<1,500
B-122 (10.5-13.5')	12/16/2015	<10,000	<250	<2,500	<250	<250	<250	<250	**1,600**	<250	<250	**8,200**	<250	<250	<250	**2,000**	**700**	<750
B-122 (13.5-16.5')	12/16/2015	<2,000	<50	<500	<50	<50	<50	<50	<50	<50	<50	**1,700**	<50	<50	<50	**1,700**	<50	<150
B-122 (16.5-19.5')	12/16/2015	<1,000	<25	<250	<25	<25	<25	<25	**27**	<25	<25	**920**	<25	<25	<25	**1,100**	<25	<75
B-122 (19.5-22.5')	12/16/2015	<1,000	<25	<250	<25	<25	<25	<25	<25	<25	<25	**140**	<25	<25	<25	**570**	<25	<75
B-122 (22.5-25.5')	12/16/2015	<400	<10	<100	<10	<10	<10	<10	**33**	<10	<10	**31**	<10	<10	<10	**290**	<10	<30
B-122 (25.5-28.5')	12/16/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**21**	<1.0	<1.0	**1.2**	<1.0	<1.0	<1.0	**63**	**1.8**	<3.0
B-122 (29-32')	12/16/2015	<20	<0.5	<5.0	<0.5	<0.5	<0.5	<0.5	**11**	<0.5	<0.5	**0.88**	<0.5	<0.5	<0.5	**6.7**	**2.6**	<1.5
B-122 (32-35')	12/16/2015	<100	<2.5	<25	<2.5	<2.5	<2.5	<2.5	**65**	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**25**	**3.0**	<7.5
B-122 (35-38')	12/16/2015	<400	<10	<100	<10	<10	<10	<10	**260**	<10	<10	<10	<10	<10	<10	**68**	<10	<30
B-125 (12-15')	12/17/2015	<20,000	<500	<5,000	<500	<500	<500	<500	**6,000**	<500	<500	**41,000**	<500	<500	<500	**1,700**	**1,100**	<1,500
B-127 (12-15')	12/17/2015	<10,000	<250	<2,500	<250	<250	<250	<250	**5,400**	<250	<250	**14,000**	<250	<250	<250	**740**	<250	<750
B-127 (12-15') (DUP-01)	12/17/2015	<10,000	<250	<2,500	<250	<250	<250	<250	**5,300**	<250	<250	**13,000**	<250	<250	<250	**770**	<250	<750
B-129 (14-17')	1/7/2016	<200	<5.0	<50	<5.0	<5.0	<5.0	<5.0	**17**	<5.0	<5.0	**230**	<5.0	**26**	<5.0	**140**	<5.0	<15
B-130 (14-17')	1/7/2016	<200	<5.0	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**250**	<5.0	**10**	<5.0	**190**	<5.0	<15
B-131 (14-17')	1/7/2016	<100	<2.5	<25	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**9.4**	<2.5	**6.2**	<2.5	**110**	<2.5	<7.5
B-132 (14-17')	1/7/2016	<400	<10	<100	<10	<10	<10	<10	<10	<10	<10	**100**	<10	**47**	<10	**440**	<10	<30
B-133 (14.5-17.5')	1/7/2016	<1,000	<25	<250	<25	<25	<25	<25	<25	<25	<25	**29**	<25	**660**	<25	**1,500**	<25	<75
B-133 (14.5-17.5') DUP-01	1/7/2016	<1,000	<25	<250	<25	<25	<25	<25	<25	<25	<25	**28**	<25	**660**	<25	**1,500**	<25	<75
GP-01 (26-30')	12/17/2008	--	--	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
GP-24 (10-14')	1/19/2009	--	--	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**48**	<1.0	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D4

Summary of Detected Volatile Organic Compounds in Groundwater at Perimeter and Off-Site Boring Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		Acetone	Carbon Disulfide	Chloroethane	Dichloro-di-fluoromethane	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Ethylbenzene[1]	Tetra-chloroethene	Toluene[1]	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Vinyl Chloride	Total Xylenes[1]
Residential DW Criteria		730	800	430	1,700	880	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Non-Residential DW Criteria		2,100	2,300	1,700	4,800	2,500	5.0	7.0	70	100	700	5.0	1,000	200	5.0	5.0	2.0	10,000
Residential GWSL for Vapor Intrusion		8.20E+06	2,400	1,100[2]	7,000	4,300	41	370	83	360	700	94	36,000	17,000	96	10	2.8	10,000
Non-Residential GWSL for Vapor Intrusion		3.40E+07	9,900	4.4E+04	29,000	18,000	210	1,600	350	1,500	2,600	460	1.5E+05	71,000	480	41	52	10,000
GSI Criteria		1,700	NC	1.8E+05	NC	740	360[2]	130	620	1,500[2]	18	60[2]	270	89	330[2]	200[2]	13[2]	41
Groundwater Contact Criteria		3.10E+07	1.2E+06	4.4E+05	3.0E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
GP-26 (25-29')	1/19/2009	--	--	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
MW-25 (46-51')	12/1/2009	<20	<1.0	<10	<5.0	<1.0	<1.0	<1.0	**37**	**1.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
SB-MIP-55 (15.5-18.5')	6/2/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**200**	<100	<100	<100	<100	<100	<100	**1,600**	<100	<300
SB-MIP-55 (19-22')	6/2/2015	<20,000	<500	<5,000	<500	<500	<500	<500	**1,400**	<500	<500	<500	<500	<500	<500	**8,400**	<500	<1,500
SB-MIP-55 (22-25')	6/2/2015	<20,000	<500	<5,000	<500	<500	<500	<500	**2,300**	<500	<500	<500	<500	<500	<500	**8,900**	<500	<1,500
SB-MIP-55 (25-28')	6/2/2015	<16,000	<400	<4,000	<400	<400	<400	<400	**2,200**	<400	<400	<400	<400	<400	<400	**5,700**	<400	<1,200
SB-MIP-55 (28-31')	6/2/2015	<10,000	<250	<2,500	<250	<250	<250	<250	**2,600**	<250	<250	<250	<250	<250	<250	**4,200**	<250	<750
SB-MIP-55 (31-34')	6/2/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**3,000**	**100**	<100	<100	<100	<100	<100	**360**	<100	<300
SB-MIP-55 (32.5-35.5')	6/2/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**2,300**	<100	<100	<100	<100	<100	<100	<100	<100	<300
SB-MIP-57 (18-21')	5/28/2015	<20,000	<500	<5,000	<500	<500	<500	<500	**3,600**	<500	<500	<500	<500	<500	<500	**10,000**	<500	<1,500
SB-MIP-57 (21-24')	5/28/2015	<32,000	<800	<8,000	<800	<800	<800	<800	**3,500**	<800	<800	<800	<800	<800	<800	**12,000**	<800	<2,400
SB-MIP-57 (24-27')	5/28/2015	<8,000	<200	<2,000	<200	<200	<200	<200	**6,000**	<200	<200	<200	<200	<200	<200	**4,000**	<200	<600
SB-MIP-58 (24-27')	6/1/2015	<10,000	<250	<2,500	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	**2,400**	<250	<750
SB-MIP-58 (27-30')	6/1/2015	<40,000	<1,000	<10,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	**7,300**	<1,000	<3,000
SB-MIP-58 (30-33')	6/1/2015	<20,000	<500	<5,000	<500	<500	<500	<500	**1,100**	<500	<500	<500	<500	<500	<500	**6,000**	<500	<1,500
SB-MIP-58 (33-36')	6/1/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**1,900**	**190**	<100	<100	<100	<100	<100	**1,200**	<100	<300
SB-MIP-58 (33-36') (DUP-15)	6/1/2015	<4,000	<100	<1,000	<100	<100	<100	<100	**2,000**	**200**	<100	<100	<100	<100	<100	**1,300**	<100	<300
SB-MIP-64 (22.5-25.5')	6/4/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**10**	<1.0	<1.0	<1.0	**27**	<1.0	<3.0
SB-MIP-64 (26-29')	6/4/2015	<500	<13	<130	<13	<13	<13	<13	<13	<13	<13	**15**	<13	<13	<13	**180**	<13	<38
SB-MIP-64 (26-29') (DUP-17)	6/4/2015	<400	<10	<100	<10	<10	<10	<10	<10	<10	<10	**16**	<10	<10	<10	**180**	<10	<30
SB-MIP-64 (29.5-32.5')	6/4/2015	<2,000	<50	<500	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**610**	<50	<150
SB-MIP-64 (32.5-35.5')	6/4/2015	<4,000	<100	<1,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**710**	<100	<300
SB-MIP-64 (35.5-38.5')	6/4/2015	<400	<10	<100	<10	<10	<10	<10	**93**	**16**	<10	<10	<10	<10	<10	<10	<10	<30
SB-MIP-64 (39-42')	6/4/2015	<100	<2.5	<25	<2.5	<2.5	<2.5	<2.5	**62**	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<7.5
SB-MIP-64 (42-45')	6/4/2015	<40	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**2.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

-- = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21

2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

3) At the request of USEPA, a site-specific groundwater contact criterion for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

4) Sample locations designated with a "b" following the boring location number, for example B-27b, were collected from the utility corridor.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-01s (16-21') Depth to Groundwater Approx. 16 - 19'	3/13/2009	<100	<100	<20	<20	<20	<20	<20	**750**	<20	**2,700**	<20	<20
	4/20/2009	NA	<500	<100	<100	<100	<100	<100	**1,100**	<100	**2,200**	NA	<100
	12/9/2009	<100	<100	<20	<20	<20	<20	<20	**1,000**	<20	**3,400**	<20	<20
	3/17/2010	<100	<100	<20	<20	<20	<20	<20	**1,400**	<20	**2,500**	<20	<20
	5/18/2010	<100	<100	<20	<20	<20	<20	<20	**1,000**	<20	**2,700**	<20	<20
	9/10/2010	<100	<100	<20	<20	<20	<20	<20	**750**	<20	**2,400**	<20	<20
	12/28/2010	<100	<100	<20	<20	<20	<20	<20	**1,100**	<20	**2,500**	<20	<20
	2/25/2011	<50	<50	<10	<10	<10	<10	<10	**560**	<10	**1,300**	<10	<10
	5/11/2011[4]	<50	<50	<10	<10	<10	<10	<10	**860**	<10	**1,900**	<10	<10
	7/28/2011	<100	<100	<20	<20	<20	<20	<20	**500**	<20	**1,900**	<20	<20
	10/6/2011	<100	<100	<20	<20	<20	<20	<20	**540**	<20	**2,000**	<20	<20
	1/9/2012	<100	<100	<20	<20	**31**	<20	<20	**530**	<20	**2,000**	<20	<20
	4/4/2012	<100	<100	<20	<20	**38**	<20	<20	**480**	<20	**1,900**	<20	<20
	7/11/2012	<100	<100	<20	<20	<20	<20	<20	**560**	<20	**2,100**	<20	<20
	10/8/2012	<100	<100	<20	<20	<20	<20	<20	**650**	<20	**2,000**	<20	<20
	6/11/2013	<100	<100	<20	<20	<20	<20	<20	**470**	<20	**1,400**	<20	<20
	11/12/2013	<100	<100	<20	<20	<20	<20	<20	**660**	<20	**1,800**	<20	<20
	5/21/2014	<50	<50	<10	<10	<10	<10	<10	**370**	<10	**1,500**	<10	<10
	11/26/2014	<100	<100	<20	<20	<20	<20	<20	**340**	<20	**2,000**	<20	<20
	5/21/2015	<50	<50	<10	<10	**11**	<10	<10	**370**	<10	**1,900**	<10	<10
DUP-01 (MW-01s)	3/13/2009	<20	<20	<20	<20	<20	<20	<20	**720**	<20	**2,700**	<20	<20
MW-02s (23-28') Depth to Groundwater Approx. 22 - 24'	3/13/2009	<10	<10	<2.0	<2.0	**2.4**	<2.0	**2.2**	**2.5**	<2.0	**280**	<2.0	<2.0
	4/20/2009	NA	<50	<10	<10	<10	<10	<10	<10	<10	**130**	NA	<10
	12/9/2009	<10	<10	<2.0	<2.0	**3.7**	<2.0	**2.7**	**2.9**	<2.0	**250**	<2.0	<2.0
	3/17/2010	**13**	<10	<2.0	<2.0	**4.1**	<2.0	**2.3**	**3.1**	<2.0	**290**	<2.0	<2.0
	5/18/2010	<10	<10	<2.0	<2.0	**2.3**	<2.0	**2.4**	**2.6**	<2.0	**210**	<2.0	<2.0
	9/10/2010	<10	<10	<2.0	<2.0	**2.3**	<2.0	**2.3**	**2.3**	<2.0	**220**	<2.0	<2.0
	12/22/2010	<10	<10	<2.0	<2.0	**2.4**	<2.0	**2.3**	**3.1**	<2.0	**240**	<2.0	<2.0
	2/24/2011	<10	<10	<2.0	<2.0	**2.0**	<2.0	<2.0	**2.6**	<2.0	**240**	<2.0	<2.0
	5/10/2011[4]	<10	<10	<2.0	<2.0	<2.0	<2.0	<2.0	**2.3**	<2.0	**250**	<2.0	<2.0
	7/28/2011[5]	<10	<10	<2.0	<2.0	**2.0**	<2.0	**2.2**	**2.4**	<2.0	**280**	<2.0	<2.0
	10/7/2011	<10	<10	<2.0	<2.0	<2.0	<2.0	**2.5**	**2.5**	<2.0	**220**	<2.0	<2.0
	1/10/2012	<10	<10	<2.0	<2.0	<2.0	<2.0	**2.8**	**2.5**	<2.0	**190**	<2.0	<2.0
	4/5/2012	<10	<10	<2.0	<2.0	**2.7**	<2.0	**3.5**	**3.4**	<2.0	**210**	<2.0	<2.0
	7/11/2012	<10	<10	<2.0	<2.0	**2.2**	<2.0	**2.5**	**3.5**	<2.0	**330**	<2.0	<2.0
	10/25/2012	<10	<10	<2.0	<2.0	<2.0	<2.0	<2.0	**2.6**	<2.0	**270**	<2.0	<2.0
	6/11/2013	<10	<10	<2.0	<2.0	<2.0	<2.0	<2.0	**2.8**	<2.0	**300**	<2.0	<2.0
	11/12/2013	<12	<12	<2.5	<2.5	**2.8**	<2.5	<2.5	**4.4**	<2.5	**410**	<2.5	<2.5
	5/19/2014	<12	<12	<2.5	<2.5	<2.5	<2.5	<2.5	**3.1**	<2.5	**280**	<2.5	<2.5
	11/26/2014	<12	<12	<2.5	<2.5	<2.5	<2.5	<2.5	**3.1**	<2.5	**380**	<2.5	<2.5
	5/21/2015	<10	<10	<2.0	<2.0	<2.0	<2.0	<2.0	**2.4**	<2.0	**330**	<2.0	<2.0
	12/4/2015	<12	<12	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**290**	<2.5	<2.5

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-03s (9-14') Depth to Groundwater Approx. 8 - 10'	3/13/2009	<10	<10	**9.1**	<2.0	**240**	**9.1**	<2.0	<2.0	<2.0	<2.0	<2.0	**140**
	4/20/2009	NA	<50	**18**	<10	**490**	**18**	<10	<10	<10	<10	NA	**210**
	12/8/2009	<120	<120	**46**	<25	**2,200**	**83**	<25	<25	<25	<25	<25	**130**
	3/17/2010	<25	<25	**11**	<5.0	**460**	**17**	<5.0	<5.0	<5.0	<5.0	<5.0	**42**
	5/18/2010	<25	<25	**14**	<5.0	**630**	**24**	<5.0	<5.0	<5.0	<5.0	<5.0	**34**
	9/10/2010	<50	<50	**29**	<10	**1,600**	**63**	<10	<10	<10	<10	<10	**83**
	12/22/2010	<50	<50	**32**	<10	**1,800**	**82**	<10	<10	<10	<10	<10	**70**
	2/25/2011	<100	<100	**33**	<20	**2,200**	**110**	<20	<20	<20	<20	<20	**75**
	5/10/2011[4]	<100	<100	**25**	<20	**1,600**	**77**	<20	<20	<20	<20	<20	**52**
	7/28/2011	<100	<100	**23**	<20	**1,700**	**78**	<20	<20	<20	<20	<20	**65**
	10/6/2011	<100	<100	**24**	<20	**2,100**	**100**	<20	<20	<20	<20	<20	**91**
	1/10/2012	<50	<50	**22**	<10	**1,300**	**81**	<10	<10	<10	<10	<10	**51**
	4/4/2012	<100	<100	<20	<20	**1,600**	**84**	<20	<20	<20	**20**	<20	**170**
	7/11/2012	<100	<100	**23**	<20	**2,500**	**120**	<20	<20	<20	**25**	<20	**210**
	10/8/2012	<100	<100	<20	<20	**1,700**	**93**	<20	<20	<20	<20	<20	**100**
	6/3/2013	<100	<100	**24**	<20	**2,000**	**120**	<20	<20	<20	<20	<20	**220**
	11/11/2013	<100	<100	**35**	<20	**2,500**	**150**	<20	<20	<20	<20	<20	**350**
	5/19/2014	<100	<100	<20	<20	**1,500**	**99**	<20	<20	<20	<20	<20	**150**
	11/26/2014	<100	<100	**21**	<20	**1,900**	**130**	<20	<20	<20	<20	<20	**210**
	5/21/2015	<50	<50	**20**	<10	**1,800**	**130**	<10	<10	<10	<10	<10	**450**
	12/3/2015	<100	<100	<20	<20	**1,700**	**120**	<20	<20	<20	<20	<20	**200**
DUP-01 (MW-03s)	12/8/2009	<120	<120	**42**	<25	**2,000**	**73**	<25	<25	<25	<25	<25	**120**
MW-04s (15-20') Depth to Groundwater Approx. 15 - 17'	3/13/2009	<120	<120	<25	<25	**2,100**	**70**	<25	<25	<25	**5,000**	<25	**460**
	4/20/2009	NA	<500	<100	<100	**1,700**	<100	<100	<100	<100	**4,000**	NA	**520**
	12/9/2009	<250	<250	<50	<50	**2,500**	**90**	<50	<50	<50	**7,100**	<50	**270**
	3/17/2010	<250	<250	<50	<50	**2,900**	**82**	<50	<50	<50	**7,500**	<50	**520**
	5/18/2010	<250	<250	<50	<50	**2,100**	**58**	<50	<50	<50	**4,700**	<50	**280**
	9/17/2010	<250	<250	<50	<50	**2,400**	**70**	<50	<50	<50	**5,200**	<50	**200**
	12/22/2010	<250	<250	<50	<50	**2,700**	**91**	<50	<50	<50	**6,700**	<50	**270**
	2/25/2011	<250	<250	<50	<50	**2,500**	**82**	<50	<50	<50	**5,900**	<50	**280**
	5/11/2011[4]	<250	<250	<50	<50	**1,900**	**58**	<50	<50	<50	**4,600**	<50	**270**
	7/28/2011	<250	<250	<50	<50	**1,700**	**50**	<50	<50	<50	**4,600**	<50	**190**
	10/6/2011	<250	<250	<50	<50	**2,000**	**58**	<50	<50	<50	**4,600**	<50	**190**
	1/10/2012	<250	<250	<50	<50	**1,800**	**72**	<50	<50	<50	**4,800**	<50	**190**
	4/4/2012	<250	<250	<50	<50	**1,600**	**54**	<50	<50	<50	**4,300**	<50	**170**
	7/11/2012	<250	<250	<50	<50	**2,100**	**65**	<50	<50	<50	**5,600**	<50	**200**
	10/8/2012	<250	<250	<50	<50	**2,200**	**66**	<50	<50	<50	**6,700**	<50	**200**
	6/3/2013	<250	<250	<50	<50	**1,900**	**63**	<50	<50	<50	**5,700**	<50	**140**
	11/11/2013	<250	<250	<50	<50	**1,900**	**66**	<50	<50	<50	**6,600**	<50	**140**
	5/19/2014	<250	<250	<50	<50	**1,100**	<50	<50	<50	<50	**3,900**	<50	**56**
	11/26/2014	<250	<250	<50	<50	**1,200**	<50	<50	<50	<50	**5,500**	<50	**80**
	5/21/2015	<250	<250	<50	<50	**1,700**	**64**	<50	<50	<50	**6,200**	<50	**120**
	12/3/2015	<250	<250	<50	<50	**1,300**	**52**	<50	<50	<50	**5,000**	<50	**78**

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-04i (21.5-26.5') Depth to Groundwater Approx. 16-17'	4/3/2013	<250	<250	<50	<50	**3,100**	**100**	<50	<50	<50	**5,000**	<50	**53**
	6/3/2013	<250	<250	<50	<50	**3,400**	**96**	<50	<50	<50	**4,900**	<50	**53**
	8/29/2013	<250	<250	<50	<50	**3,900**	**120**	<50	<50	<50	**5,600**	<50	**68**
	11/11/2013	<250	<250	<50	<50	**4,200**	**120**	<50	<50	<50	**5,400**	<50	**78**
	3/27/2014	<250	<250	<50	<50	**3,000**	**79**	<50	<50	<50	**4,000**	<50	<50
	5/19/2014	<250	<250	<50	<50	**3,300**	**100**	<50	<50	<50	**4,600**	<50	**56**
	7/18/2014	<250	<250	<50	<50	**3,000**	**91**	<50	<50	<50	**4,100**	<50	**54**
	11/26/2014	<250	<250	<50	<50	**3,400**	**110**	<50	<50	<50	**5,200**	<50	**61**
	3/26/2015	<250	<250	<50	<50	**3,500**	**110**	<50	<50	<50	**5,000**	<50	**76**
	5/21/2015	<250	<250	<50	<50	**3,600**	**130**	<50	<50	<50	**6,400**	<50	**80**
	12/4/2015	<250	<250	<50	<50	**3,600**	**130**	<50	<50	<50	**5,800**	<50	**68**
MW-05s (25-30') Depth to Groundwater Approx. 25 - 27'	3/13/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**3.5**	<1.0	<1.0	**120**	<1.0	<1.0
	4/20/2009	NA	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**140**	NA	<5.0
	12/10/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**5.3**	<1.0	<1.0	**190**	<1.0	<1.0
	3/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**6.3**	<1.0	<1.0	**160**	<1.0	<1.0
	5/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**4.6**	<1.0	<1.0	**160**	<1.0	<1.0
	9/9/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**4.6**	<1.0	<1.0	**140**	<1.0	<1.0
	12/21/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**4.9**	<1.0	<1.0	**160**	<1.0	<1.0
	2/24/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**4.4**	<1.0	<1.0	**130**	<1.0	<1.0
	5/13/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**4.9**	<1.0	<1.0	**160**	<1.0	<1.0
	7/27/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**4.8**	<1.0	<1.0	**150**	<1.0	<1.0
	10/10/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**5.1**	<1.0	<1.0	**150**	<1.0	<1.0
	1/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**5.8**	<1.0	<1.0	**150**	<1.0	<1.0
	4/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**5.7**	<1.0	<1.0	**160**	<1.0	<1.0
	7/10/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**5.8**	<1.0	<1.0	**160**	<1.0	<1.0
	10/25/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**3.8**	<1.0	<1.0	**130**	<1.0	<1.0
	11/8/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**3.4**	<1.0	<1.0	**100**	<1.0	<1.0
	11/25/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**3.5**	<1.0	<1.0	**110**	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-06s (24-29') Depth to Groundwater Approx. 23 - 26'	3/16/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**21**	<1.0	<1.0
	4/20/2009	NA	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**23**	NA	<1.0
	12/9/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**37**	<1.0	<1.0
	3/18/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**31**	<1.0	<1.0
	5/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**33**	<1.0	<1.0
	9/10/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**29**	<1.0	<1.0
	12/21/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**34**	<1.0	<1.0
	2/18/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**35**	<1.0	<1.0
	5/10/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**27**	<1.0	<1.0
	7/27/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**27**	<1.0	<1.0
	10/5/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**30**	<1.0	<1.0
	1/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**31**	<1.0	<1.0
	4/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**32**	<1.0	<1.0
	7/10/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**32**	<1.0	<1.0
	10/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**28**	<1.0	<1.0
	11/7/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**27**	<1.0	<1.0
	11/24/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**24**	<1.0	<1.0
MW-07s (23.5-28.5') Depth to Groundwater Approx. 24 - 26'	3/16/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.1**	<1.0	**10**	<1.0	<1.0
	4/20/2009	NA	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	**11**	NA	<1.0
	12/10/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.8**	<1.0	**14**	<1.0	<1.0
	3/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.9**	<1.0	**13**	<1.0	<1.0
	5/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.9**	<1.0	**13**	<1.0	<1.0
	9/10/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	**12**	<1.0	<1.0
	12/21/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.1**	<1.0	**16**	<1.0	<1.0
	2/24/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	**12**	<1.0	<1.0
	5/13/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.5**	<1.0	**12**	<1.0	<1.0
	7/27/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	**11**	<1.0	<1.0
	10/10/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	**13**	<1.0	<1.0
	1/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	**14**	<1.0	<1.0
	4/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	<1.0	**12**	<1.0	<1.0
	7/10/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	**14**	<1.0	<1.0
	10/19/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.5**	<1.0	**14**	<1.0	<1.0
	11/8/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	**13**	<1.0	<1.0
	11/25/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	**15**	<1.0	<1.0
MW-08s (23.5-28.5') Depth to Groundwater 23 - 26'	3/16/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**	<1.0	<1.0
	4/20/2009	NA	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**10**	NA	<1.0
	12/10/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**	<1.0	<1.0
DUP-01 (MW-08s)	4/20/2009	NA	NA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**10**	NA	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-08d (40-45') Depth to Groundwater Approx. 26 - 27'	4/2/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	6/11/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	8/28/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/13/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/21/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/16/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/13/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/24/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/26/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DUP-01 (MW-08d)	4/2/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-09s (7-12') Depth to Groundwater* Approx. 5 - 8'	3/16/2009	<100	<100	<20	<20	<20	<20	<20	**160**	<20	**1,700**	<20	<20
	4/20/2009	NA	<500	<100	<100	<100	<100	<100	**220**	<100	**2,100**	NA	<100
	12/9/2009	<100	<100	<20	<20	<20	<20	<20	**150**	<20	**2,400**	<20	<20
	3/18/2010	<100	<100	<20	<20	<20	<20	<20	**120**	<20	**1,500**	<20	<20
	5/18/2010	<100	<100	<20	<20	<20	<20	<20	**120**	<20	**1,700**	<20	<20
	9/17/2010	<100	<100	<20	<20	<20	<20	<20	**120**	<20	**1,700**	<20	<20
	2/25/2011	<50	<50	<10	<10	<10	<10	<10	**84**	<10	**1,100**	<10	<10
	5/11/2011[4]	<50	<50	<10	<10	<10	<10	<10	**83**	<10	**1,200**	<10	<10
MW-10s (8-13') Depth to Groundwater Approx. 7 - 9'	5/15/2009	NA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/9/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/16/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/3/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/16/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/15/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/9/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/20/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/2/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	6/12/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/14/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/21/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/28/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DUP-02 (MW-10s)	5/15/2009	NA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:
Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.
ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed
Bold font denotes concentrations detected above laboratory reporting limits
Denotes concentrations above one or more criterion
* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.
1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-10d (14-19') Depth to Groundwater Approx. 9 -10'	12/9/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/2/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-11s (29-34') Depth to Groundwater Approx. 29 - 32'	5/14/2009	NA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/13/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/15/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/3/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/17/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/22/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/7/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/6/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/12/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/4/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/24/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DUP-02 (MW-11s)	5/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DUP-01 (MW-11s)	9/3/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-12s (12-17') Depth to Groundwater Approx. 13 - 15'	5/15/2009	NA	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<1.0	<1.0	<1.0
	12/30/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<1.0	<1.0	<1.0
	3/15/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.0**	<1.0	<1.0	<1.0	<1.0	<1.0
	9/3/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	<1.0	<1.0	<1.0	<1.0
	12/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/14/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	<1.0	<1.0	<1.0	<1.0
	7/20/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<1.0	<1.0	<1.0
	10/7/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.9**	<1.0	<1.0	<1.0	<1.0	<1.0
	1/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**2.2**	<1.0	<1.0	<1.0	<1.0	<1.0
	4/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0
	7/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0
	10/12/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/30/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/7/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.7**	<1.0	<1.0	<1.0	<1.0	<1.0
	11/19/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/28/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/2/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.3**	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-12d (33-38') Depth to Groundwater Approx. 13 - 15'	3/18/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/3/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/14/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/20/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/7/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/12/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/31/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/7/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/15/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/19/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/28/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/2/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-13s (13-18') Depth to Groundwater Approx. 15 - 17'	5/15/2009	NA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/10/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/15/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/3/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/14/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/20/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/10/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/10/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/12/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/31/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/7/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/15/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/25/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/28/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-14s (4-9') Depth to Perched Groundwater Approx. 3 - 7'	5/14/2009	NA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/8/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/15/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/3/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/20/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/16/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/11/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/21/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/7/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-14d (37.5-42.5') Depth to Groundwater Approx. 30 - 31'	3/23/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/3/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/16/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/16/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/9/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/21/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/5/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/2/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	6/12/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/14/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/16/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/20/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/23/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/28/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/2/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DUP-01 (MW-14d)	2/16/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/9/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/21/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/5/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/2/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
DUP-02 (MW-14d)	6/12/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/20/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/23/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-15s (30-35') Depth to Groundwater Approx. 30 - 32'	5/15/2009	NA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/30/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/15/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/8/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/17/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/25/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/7/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/2/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/5/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/25/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-17s (3-8') Depth to Groundwater Approx. 6'	7/23/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/7/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/18/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/8/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/16/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/15/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/11/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/21/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/2/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/28/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/11/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/19/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/4/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5

Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-18s (26-31') Depth to Groundwater Approx. 25 - 27'	12/8/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/16/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/8/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/20/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/17/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/9/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/22/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/5/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/6/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/4/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/21/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-19s (25-30') Depth to Groundwater Approx. 24 - 26'	12/8/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.8**	<1.0	**31**	<1.0	<1.0
	1/13/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.2**	**2.3**	<1.0	**36**	<1.0	<1.0
	3/16/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.1**	**1.7**	<1.0	**36**	<1.0	<1.0
	5/18/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	**32**	<1.0	<1.0
	9/10/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.2**	**1.8**	<1.0	**33**	<1.0	<1.0
	12/20/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.8**	<1.0	**37**	<1.0	<1.0
	2/18/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.1**	**1.8**	<1.0	**41**	<1.0	<1.0
	5/10/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.5**	<1.0	**28**	<1.0	<1.0
	7/25/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.0**	**1.4**	<1.0	**27**	<1.0	<1.0
	10/5/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.1**	**1.7**	<1.0	**28**	<1.0	<1.0
	1/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.2**	**1.9**	<1.0	**34**	<1.0	<1.0
	4/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.1**	**1.5**	<1.0	**32**	<1.0	<1.0
	7/10/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.6**	**2.3**	<1.0	**32**	<1.0	<1.0
	10/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	**31**	<1.0	<1.0
	11/7/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	**25**	<1.0	<1.0
	11/24/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.2**	**1.6**	<1.0	**30**	<1.0	<1.0
DUP-03 (MW-19s)	9/10/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.0**	**1.7**	<1.0	**32**	<1.0	<1.0
	11/24/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.3**	**1.6**	<1.0	**31**	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.

4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.

5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.

6) Headspace present in the sample, results are approximate.

Table D5

Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
DUP-02 (MW-19s)	2/18/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.1**	**1.8**	<1.0	**39**	<1.0	<1.0
	5/10/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	**29**	<1.0	<1.0
	7/25/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.1**	**1.4**	<1.0	**27**	<1.0	<1.0
	10/5/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.1**	**1.6**	<1.0	**28**	<1.0	<1.0
	1/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.2**	**1.8**	<1.0	**34**	<1.0	<1.0
	4/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.1**	**1.6**	<1.0	**32**	<1.0	<1.0
	7/10/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.6**	**2.3**	<1.0	**32**	<1.0	<1.0
	10/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	<1.0	**27**	<1.0	<1.0
	11/7/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	**26**	<1.0	<1.0
MW-19d (40-45') Depth to Groundwater Approx. 24 - 26'	12/8/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/16/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/8/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/20/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/18/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/10/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/25/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/5/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/10/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/7/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/25/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DUP-01 (MW-19d)	5/12/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.

4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.

5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.

6) Headspace present in the sample, results are approximate.

Table D5

Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-20s (8-13') Depth to Groundwater* Approx. 4 - 6'	12/30/2009	<5.0	<5.0	**48**	**4.0**	**9.6**	<1.0	<1.0	**150**	<1.0	**71**	**2.9**	<1.0
	1/13/2010	<5.0	<5.0	**50**	**3.5**	**9.0**	<1.0	<1.0	**170**	<1.0	**70**	**2.8**	<1.0
	3/17/2010	<5.0	<5.0	**51**	**3.8**	**9.4**	<1.0	<1.0	**160**	<1.0	**64**	**3.2**	<1.0
	5/18/2010	<10	<10	**58**	**5.1**	**12**	<2.0	<2.0	**210**	<2.0	**94**	**3.4**	<2.0
	9/10/2010	<10	<10	**34**	**4.2**	**9.7**	<2.0	<2.0	**230**	<2.0	**110**	**3.8**	<2.0
	12/21/2010	<10	<10	**24**	**3.6**	**6.1**	<2.0	<2.0	**200**	<2.0	**89**	**3.6**	<2.0
	2/18/2011	<10	<10	**19**	**3.3**	**5.5**	<2.0	<2.0	**190**	<2.0	**93**	**3.5**	<2.0
	5/13/2011	<10	<10	**14**	**2.8**	**4.1**	<2.0	<2.0	**190**	<2.0	**91**	**2.9**	<2.0
	7/25/2011	<10	<10	**6.5**	<2.0	**2.4**	<2.0	<2.0	**190**	<2.0	**100**	**2.3**	<2.0
	10/10/2011	<10	<10	**5.8**	<2.0	<2.0	<2.0	<2.0	**190**	<2.0	**110**	**3.1**	<2.0
	1/9/2012	<5.0	<5.0	**6.0**	**1.4**	**1.9**	<1.0	<1.0	**190**	<1.0	**100**	**3.2**	<1.0
	4/9/2012	<5.0	<5.0	**11**	**1.1**	**2.0**	<1.0	<1.0	**180**	<1.0	**100**	**2.6**	<1.0
	7/10/2012	<10	<10	**17**	<2.0	**2.5**	<2.0	<2.0	**190**	<2.0	**100**	**2.3**	<2.0
	10/19/2012	<10	<10	**24**	<2.0	**3.8**	<2.0	<2.0	**190**	<2.0	**98**	**2.0**	<2.0
	5/31/2013	<10	<10	**18**	**2.6**	**6.7**	<2.0	<2.0	**240**	<2.0	**120**	<2.0	<2.0
	11/8/2013	<10	<10	**6.1**	<2.0	<2.0	<2.0	<2.0	**250**	<2.0	**140**	<2.0	<2.0
	5/15/2014	<10	<10	**4.0**	<2.0	<2.0	<2.0	<2.0	**150**	<2.0	**110**	<2.0	<2.0
	7/16/2014	<5.0	<5.0	**3.9**	<1.0	<1.0	<1.0	<1.0	**140**	<1.0	**130**	<1.0	<1.0
	11/26/2014	<5.0	<5.0	**7.7**	<1.0	**1.2**	<1.0	<1.0	**120**	<1.0	**120**	<1.0	<1.0
	3/25/2015	<5.0	<5.0	**6.6**	<1.0	**1.1**	<1.0	<1.0	**82**	<1.0	**83**	<1.0	<1.0
	5/20/2015	<5.0	<5.0	**7.8**	<1.0	**1.5**	<1.0	<1.0	**96**	<1.0	**110**	<1.0	<1.0
	12/3/2015	<5.0	<5.0	**11**	<1.0	**1.5**	<1.0	<1.0	**89**	<1.0	**86**	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-20d (38.5-43.5') Depth to Groundwater Approx. 12 - 16'	12/30/2009	<5.0	<5.0	**1.2**	<1.0	**86**	<1.0	<1.0	**1.9**	<1.0	<1.0	<1.0	**3.5**
	1/13/2010	<5.0	<5.0	<1.0	<1.0	**94**	**2.0**	<1.0	<1.0	<1.0	<1.0	<1.0	**3.7**
	3/17/2010	<5.0	<5.0	<1.0	<1.0	**85**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.4**
	5/18/2010	<5.0	<5.0	<1.0	<1.0	**120**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.7**
	9/10/2010	<5.0	<5.0	<1.0	<1.0	**95**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/21/2010	<5.0	<5.0	<1.0	<1.0	**200**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.5**
	2/18/2011	<10	<10	<2.0	<2.0	**190**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**3.2**
	5/13/2011	<10	<10	<2.0	<2.0	**170**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**2.6**
	7/25/2011	<5.0	<5.0	<1.0	<1.0	**170**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.6**
	10/10/2011	<10	<10	<2.0	<2.0	**200**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**2.5**
	1/9/2012	<5.0	<5.0	<1.0	<1.0	**140**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.0**
	4/9/2012	<5.0	<5.0	<1.0	<1.0	**190**	<1.0	<1.0	<1.0	<1.0	**1.0**	<1.0	**10**
	7/10/2012	<10	<10	<2.0	<2.0	**230**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**14**
	10/19/2012	<10	<10	<2.0	<2.0	**180**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**43**
	6/3/2013	<10	<10	<2.0	<2.0	**250**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**67**
	11/8/2013	<10	<10	<2.0	<2.0	**310**	<2.0	<2.0	<2.0	<2.0	**5.5**	<2.0	**110**
	5/15/2014	<10	<10	<2.0	<2.0	**380**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**110**
	7/16/2014	<10	<10	<2.0	<2.0	**330**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**100**
	11/26/2014	<10	<10	<2.0	<2.0	**310**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**73**
	3/25/2015	**18**	<10	<2.0	<2.0	**310**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**77**
	5/20/2015	<10	<10	<2.0	<2.0	**360**	**2.1**	<2.0	<2.0	<2.0	**3.5**	<2.0	**65**
	12/3/2015	<25	<25	<5.0	<5.0	**610**	<5.0	<5.0	<5.0	<5.0	**5.9**	<5.0	**34**
DUP-03 (MW-20d)	5/18/2010	<5.0	<5.0	<1.0	<1.0	**120**	**1.0**	<1.0	<1.0	<1.0	<1.0	<1.0	**3.7**

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-21 (28.5-33.5') Depth to Groundwater Approx. 29 - 30'	12/8/2009	<50	<50	**31**	<10	**59**	<10	<10	**54**	<10	**840**	<10	<10
	1/13/2010	<50	<50	**28**	<10	**62**	<10	<10	**56**	<10	**730**	<10	<10
	3/23/2010	<5.0	<5.0	**33**	**2.2**	**81**	**7.5**	<1.0	**62**	<1.0	**850**	<1.0	<1.0
	5/18/2010	<50	<50	**35**	<10	**89**	<10	<10	**63**	<10	**830**	<10	<10
	10/15/2010	<50	<50	**26**	<10	**80**	<10	<10	**59**	<10	**810**	<10	<10
	12/22/2010	<50	<50	**25**	<10	**69**	<10	<10	**55**	<10	**730**	<10	<10
	2/24/2011	<50	<50	**25**	<10	**66**	<10	<10	**52**	<10	**730**	<10	<10
	5/11/2011[4]	<50	<50	**24**	<10	**65**	<10	<10	**49**	<10	**740**	<10	<10
	7/28/2011	<50	<50	**22**	<10	**77**	<10	<10	**54**	<10	**1,000**	<10	<10
	10/6/2011	<50	<50	**22**	<10	**74**	<10	<10	**55**	<10	**960**	<10	<10
	1/10/2012	<50	<50	**27**	<10	**79**	<10	<10	**64**	<10	**990**	<10	<10
	4/4/2012	<50	<50	**25**	<10	**81**	<10	<10	**55**	<10	**980**	<10	<10
	7/11/2012	**58**	<50	**25**	<10	**85**	<10	<10	**63**	<10	**1,000**	<10	<10
	10/8/2012	<50	<50	**22**	<10	**65**	<10	<10	**47**	<10	**850**	<10	<10
	3/6/2013	<50	<50	**26**	<10	**90**	<10	<10	**50**	<10	**760**	<10	<10
	6/11/2013	<50	<50	**26**	<10	**100**	<10	<10	**60**	<10	**1,100**	<10	<10
	8/29/2013	<50	<50	**28**	<10	**130**	<10	<10	**68**	<10	**1,500**	<10	<10
	11/12/2013	<50	<50	**31**	<10	**130**	<10	<10	**76**	<10	**1,300**	<10	<10
	3/27/2014	<50	<50	**25**	<10	**150**	<10	<10	**64**	<10	**1,000**	<10	<10
	5/19/2014	<50	<50	**20**	<10	**170**	<10	<10	**62**	<10	**1,100**	<10	<10
	7/18/2014	<50	<50	**17**	<10	**170**	<10	<10	**63**	<10	**1,300**	<10	<10
	11/26/2014	<50	<50	**16**	<10	**180**	<10	<10	**71**	<10	**1,600**	<10	<10
	3/25/2015	<50	<50	**14**	<10	**170**	<10	<10	**55**	<10	**1,100**	<10	<10
	5/21/2015	<50	<50	**15**	<10	**180**	<10	<10	**53**	<10	**1,200**	<10	<10
	12/4/2015	<50	<50	**11**	<10	**160**	<10	<10	**48**	<10	**1,100**	<10	<10
DUP-01 (MW-21)	8/29/2013	<50	<50	**28**	<10	**130**	<10	<10	**67**	<10	**1,500**	<10	<10
	3/27/2014	<50	<50	**26**	<10	**150**	<10	<10	**68**	<10	**1,100**	<10	<10
	7/18/2014	<50	<50	**15**	<10	**150**	<10	<10	**54**	<10	**1,100**	<10	<10
DUP-02 (MW-21)	3/23/2010	<5.0	<5.0	**33**	**2.2**	**79**	**7.8**	<1.0	**61**	<1.0	**810**	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
DUP-03 (MW-21)	2/24/2011	<50	<50	**24**	<10	**66**	<10	<10	**50**	<10	**740**	<10	<10
	5/11/2011[4]	<50	<50	**24**	<10	**66**	<10	<10	**49**	<10	**750**	<10	<10
	7/28/2011	<50	<50	**23**	<10	**78**	<10	<10	**57**	<10	**1,000**	<10	<10
	10/6/2011	<50	<50	**21**	<10	**73**	<10	<10	**52**	<10	**910**	<10	<10
	1/10/2012	<50	<50	**27**	<10	**85**	<10	<10	**66**	<10	**1,000**	<10	<10
	4/4/2012	<50	<50	**24**	<10	**81**	<10	<10	**61**	<10	**970**	<10	<10
	7/11/2012	<50	<50	**25**	<10	**80**	<10	<10	**59**	<10	**1,000**	<10	<10
	6/11/2013	<50	<50	**26**	<10	**110**	<10	<10	**76**	<10	**1,100**	<10	<10
	11/12/2013	<50	<50	**32**	<10	**120**	<10	<10	**75**	<10	**1,300**	<10	<10
	5/19/2014	<50	<50	**19**	<10	**170**	<10	<10	**64**	<10	**1,100**	<10	<10
DUP-04 (MW-21)	11/26/2014	<50	<50	**17**	<10	**170**	<10	<10	**70**	<10	**1,400**	<10	<10
MW-22 (25-30') Depth to Groundwater Approx. 25 - 26'	12/7/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**10**
	3/18/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**8.5**
	5/18/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.0**
	9/10/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.3**
	12/22/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.0**
	2/24/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.3**
	5/11/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**
	7/21/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.8**
	10/4/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.2**
	1/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**8.4**
	4/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**12**
	7/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**13**
	10/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**18**
	5/29/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**21**
	3/28/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**29**
	5/22/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**23**
	7/17/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**20**
	11/11/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**24**
	3/23/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**25**
	5/19/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**23**

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-23 (17-22') Depth to Groundwater* Approx. 8 - 10'	12/8/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.2**
	1/13/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**7.6**
	3/16/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.0**
	5/18/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.1**
	9/10/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**9.0**
	12/21/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**17**
	2/18/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**18**
	5/10/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**25**
	7/25/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**23**
	10/5/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**56**
	11/4/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**
	1/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**48**
	4/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**85**
	7/10/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**63**
	10/8/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**47**
	5/31/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**88**
	11/8/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**120**
	5/15/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**90**
	7/17/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**90**
	11/25/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**100**
	3/25/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**110**
	5/20/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**130**
	12/3/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**120**
MW-24s (18.5'-23.5') Depth to Groundwater Approx. 19 - 21'	12/8/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/15/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/8/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/14/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/9/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/19/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/2/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/29/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/4/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/17/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/27/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/2/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5

Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-24d (39-44') Depth to Groundwater Approx. 19 - 21'	12/8/2009	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/15/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/8/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/14/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/9/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/19/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/2/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/30/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/4/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/17/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/27/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/2/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-25s (20-25') Depth to Groundwater Approx. 18 - 20'	12/10/2009	<5.0	<5.0	**1.7**	<1.0	**8.8**	<1.0	<1.0	**4.8**	<1.0	<1.0	<1.0	<1.0
	3/16/2010	<5.0	<5.0	**1.2**	<1.0	<1.0	<1.0	<1.0	**17**	<1.0	**1.1**	<1.0	<1.0
	5/14/2010	<5.0	<5.0	**1.2**	<1.0	<1.0	<1.0	<1.0	**18**	<1.0	**1.0**	<1.0	<1.0
	9/8/2010	<5.0	<5.0	**1.0**	<1.0	<1.0	<1.0	<1.0	**19**	<1.0	**1.4**	<1.0	<1.0
	12/22/2010	<5.0	<5.0	**1.2**	<1.0	<1.0	<1.0	<1.0	**26**	<1.0	**2.4**	<1.0	<1.0
	2/24/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**19**	<1.0	**2.2**	<1.0	<1.0
	5/13/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**21**	<1.0	**2.2**	<1.0	<1.0
	7/28/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**19**	<1.0	**2.5**	<1.0	<1.0
	10/10/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**20**	<1.0	**2.8**	<1.0	<1.0
	1/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**20**	<1.0	**3.0**	<1.0	<1.0
	4/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**20**	<1.0	**3.6**	<1.0	<1.0
	7/11/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**21**	<1.0	**4.2**	<1.0	<1.0
	10/25/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**19**	<1.0	**4.6**	<1.0	<1.0
	6/3/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**19**	<1.0	**6.1**	<1.0	<1.0
	11/8/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**22**	<1.0	**7.0**	<1.0	<1.0
	5/16/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**20**	<1.0	**7.6**	<1.0	<1.0
	7/16/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**15**	<1.0	**7.1**	<1.0	<1.0
	11/25/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**17**	<1.0	**8.9**	<1.0	<1.0
	3/24/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**17**	<1.0	**8.6**	<1.0	<1.0
	5/28/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	**15**	<1.0	**8.9**	<1.0	<1.0
DUP-01 (MW-25s)	3/16/2010	<5.0	<5.0	**1.3**	<1.0	<1.0	<1.0	<1.0	**18**	<1.0	**1.0**	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.

4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.

5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.

6) Headspace present in the sample, results are approximate.

Table D5

Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-26s (28-33') Depth to Groundwater Approx. 26 - 28'	4/6/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/8/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/17/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/25/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/7/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/2/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/5/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/25/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-27s (7-12') Depth to Groundwater* Approx. 3 - 4'	3/23/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.0**	<1.0	<1.0
	9/9/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/20/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/16/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0
	5/9/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0
	7/21/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/5/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/6/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	6/12/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/14/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.5**	<1.0	<1.0
	5/22/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	<1.0
	11/17/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**[5]	<1.0	<1.0
	5/27/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/1/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.9**	<1.0	<1.0
DUP-02 (MW-27s)	9/9/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.

4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.

5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.

6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-27d (37.5-42.5') Depth to Groundwater Approx. 24 - 25'	3/23/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/9/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/20/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/16/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/9/2011[4]	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/22/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/5/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/6/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/3/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/4/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	6/12/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/14/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/17/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/27/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/1/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-28s (25-30') Depth to Groundwater Approx. 25 - 27'	3/23/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/9/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/16/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/22/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/7/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/6/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0
	4/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/6/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/12/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/4/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/19/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-28d (49-54') Depth to Groundwater Approx. 25 - 27'	3/23/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/9/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/16/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/22/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/7/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/6/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/6/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/19/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/4/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/19/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DUP-03 (MW-28d)	10/19/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-29s (13-18') Depth to Groundwater Approx. 15 - 16'	3/18/2010	<5.0	<5.0	<1.0	<1.0	**1.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/17/2010	<5.0	<5.0	<1.0	<1.0	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/9/2010	<5.0	<5.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/15/2010	<5.0	<5.0	<1.0	<1.0	**1.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/15/2011	<5.0	<5.0	<1.0	<1.0	**1.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/20/2011	<5.0	<5.0	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/10/2011	<5.0	<5.0	<1.0	<1.0	**1.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/6/2012	<5.0	<5.0	<1.0	<1.0	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/5/2012	<5.0	<5.0	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/9/2012	<5.0	<5.0	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/12/2012	<5.0	<5.0	<1.0	<1.0	**1.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/30/2013	<5.0	<5.0	<1.0	<1.0	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/6/2013	<5.0	<5.0	<1.0	<1.0	**1.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/15/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/20/2014	<5.0	<5.0	<1.0	<1.0	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/27/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/2/2015	<5.0	<5.0	<1.0	<1.0	**1.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:
Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.
ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed
Bold font denotes concentrations detected above laboratory reporting limits
Denotes concentrations above one or more criterion
* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.
1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5

Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-29d (58.5-63.5') Depth to Groundwater* Approx. 18 - 19'	3/18/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/9/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/15/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/15/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/20/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/10/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/6/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/5/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/19/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/30/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/7/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/15/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/20/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/27/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-30s (11-16') Depth to Groundwater* Approx. 9 - 11'	3/23/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/9/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/16/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/15/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/13/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/20/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/10/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/6/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/19/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/30/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/5/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/19/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/27/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/2/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.

4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.

5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.

6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-30d (25.5-30.5') Depth to Groundwater* Approx. 9 - 11'	3/23/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/17/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/9/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/16/2010	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	2/15/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/13/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/20/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/10/2011	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	1/6/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	4/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/9/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	10/19/2012	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/30/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/5/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/19/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/27/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/2/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-31 (33.3-38.3') Depth to Groundwater Approx. 32 - 33'	6/18/2010	<5.0	<5.0	**14**	<1.0	**19**	**2.2**	<1.0	**20**	<1.0	**180**	<1.0	<1.0
	9/17/2010	<10	<10	<2.0	<2.0	**15**	<2.0	<2.0	**48**	<2.0	**220**	<2.0	**2.5**
	12/22/2010[5]	<10	<10	**16**	<2.0	**29**	**2.9**	<2.0	**27**	<2.0	**260**	<2.0	<2.0
	2/24/2011	<10	<10	**16**	<2.0	**31**	**3.1**	<2.0	**26**	<2.0	**300**	<2.0	<2.0
	5/11/2011[4]	<10	<10	**15**	<2.0	**24**	**3.0**	<2.0	**22**	<2.0	**250**	<2.0	<2.0
	7/21/2011	<5.0	<5.0	**7.4**	<1.0	**14**	**1.2**	<1.0	**11**	<1.0	**130**	<1.0	<1.0
	10/4/2011	<5.0	<5.0	**18**	<1.0	**40**	**3.4**	<1.0	**28**	<1.0	**340**	<1.0	<1.0
	1/10/2012	<10	<10	**17**	<2.0	**35**	**3.1**	<2.0	**24**	<2.0	**290**	<2.0	<2.0
	4/5/2012	<10	<10	**16**	<2.0	**36**	**3.1**	<2.0	**24**	<2.0	**290**	<2.0	<2.0
	7/17/2012	<20	<20	**16**	<4.0	**34**	<4.0	<4.0	**23**	<4.0	**310**	<4.0	<4.0
	10/3/2012	**16**	<12	**15**	<2.5	**40**	**3.4**	<2.5	**26**	<2.5	**340**	<2.5	<2.5
	3/6/2013	<12	<12	**13**	<2.5	**32**	**2.9**	<2.5	**23**	<2.5	**270**	<2.5	<2.5
	5/29/2013	<12	<12	**15**	<2.5	**39**	**2.9**	<2.5	**23**	<2.5	**300**	<2.5	<2.5
	8/29/2013	<12	<12	**16**	<2.5	**47**	**2.6**	<2.5	**24**	<2.5	**320**	<2.5	<2.5
	3/28/2014	<12	<12	**16**	<2.5	**34**	<2.5	<2.5	**27**	<2.5	**300**	<2.5	<2.5
	5/22/2014	<12	<12	**16**	<2.5	**34**	<2.5	<2.5	**24**	<2.5	**280**	<2.5	<2.5
	7/17/2014	<12	<12	**13**	<2.5	**33**	<2.5	<2.5	**20**	<2.5	**260**	<2.5	<2.5
	11/11/2014	<12	<12	**14**	<2.5	**40**	<2.5	<2.5	**22**	<2.5	**310**	<2.5	<2.5
	3/23/2015	**13**	<12	**16**	<2.5	**46**	<2.5	<2.5	**25**	<2.5	**340**	<2.5	<2.5
	5/19/2015	<12	<12	**15**	<2.5	**41**	<2.5	<2.5	**22**	<2.5	**320**	<2.5	<2.5
DUP-01 (MW-31)	6/18/2010	<5.0	<5.0	**12**	<1.0	**19**	**2.3**	<1.0	**21**	<1.0	**170**	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-32s (23-28') Depth to Groundwater Approx. 23 - 25'	9/17/2010	<100	<100	**150**	<20	**270**	**26**	<20	**220**	<20	**2,400**	<20	<20
	11/18/2010	<100	<100	<20	<20	**190**	<20	<20	**560**	<20	**2,800**	<20	<20
	12/28/2010	<100	<100	<20	<20	**200**	<20	<20	**510**	<20	**2,300**	<20	<20
	2/25/2011	<100	<100	<20	<20	**190**	<20	<20	**420**	<20	**2,300**	<20	<20
	5/10/2011[4]	<100	<100	<20	<20	**170**	<20	<20	**380**	<20	**2,300**	<20	**31**
	7/28/2011	<100	<100	<20	<20	**140**	<20	<20	**380**	<20	**2,400**	<20	<20
	10/6/2011	<100	<100	<20	<20	**160**	<20	<20	**350**	<20	**2,200**	<20	<20
	1/10/2012	<100	<100	<20	<20	**170**	<20	<20	**400**	<20	**2,300**	<20	<20
	4/4/2012	<100	<100	<20	<20	**130**	<20	<20	**340**	<20	**2,200**	<20	<20
	7/11/2012	<100	<100	<20	<20	**85**	<20	<20	**370**	<20	**2,200**	<20	<20
	10/10/2012	<100	<100	<20	<20	**89**	<20	<20	**280**	<20	**1,600**	<20	<20
	5/20/2013	<100	<100	<20	<20	**89**	<20	<20	**220**	<20	**1,400**	<20	<20
	11/5/2013	<50	<50	<10	<10	**71**	<10	<10	**190**	<10	**1,200**	<10	<10
	7/15/2014	<50	<50	<10	<10	**48**	<10	<10	**160**	<10	**1,200**	<10	<10
	11/12/2014	<50	<50	<10	<10	**54**	<10	<10	**190**	<10	**1,500**	<10	<10
	5/19/2015	<50	<50	<10	<10	**55**	<10	<10	**150**	<10	**1,200**	<10	<10
	12/3/2015	<50	<50	<10	<10	**65**	<10	<10	**130**	<10	**1200**	<10	<10
DUP-01 (MW-32s)	5/19/2015	<50	<50	<10	<10	**55**	<10	<10	**150**	<10	**1,300**	<10	<10
	12/3/2015	<50	<50	<10	<10	**60**	<10	<10	**120**	<10	**1,100**	<10	<10
MW-32d (35-40') Depth to Groundwater Approx. 23 - 24'	5/20/2013	<5.0	<5.0	<1.0	<1.0	**2.0**	**3.2**	<1.0	<1.0	<1.0	**53**	<1.0	<1.0
	8/28/2013	<5.0	<5.0	<1.0	<1.0	**2.4**	**3.3**	<1.0	<1.0	<1.0	**53**	<1.0	<1.0
	11/5/2013	<5.0	<5.0	<1.0	<1.0	**1.9**	**3.2**	<1.0	<1.0	<1.0	**51**	<1.0	<1.0
	3/27/2014	<5.0	<5.0	<1.0	<1.0	**2.0**	**3.0**	<1.0	<1.0	<1.0	**56**	<1.0	<1.0
	5/19/2014	<5.0	<5.0	<1.0	<1.0	**1.8**	**3.0**	<1.0	<1.0	<1.0	**49**	<1.0	<1.0
	7/15/2014	<5.0	<5.0	<1.0	<1.0	**2.3**	**2.4**	<1.0	<1.0	<1.0	**51**	<1.0	<1.0
	11/11/2014	<5.0	<5.0	<1.0	<1.0	**2.1**	**3.2**	<1.0	<1.0	<1.0	**60**	<1.0	<1.0
	2/25/2015	<5.0	<5.0	<1.0	<1.0	**2.1**	**3.4**	<1.0	<1.0	<1.0	**48**	<1.0	<1.0
	5/19/2015	<5.0	<5.0	<1.0	<1.0	**2.0**	**3.0**	<1.0	<1.0	<1.0	**55**	<1.0	<1.0
	12/3/2015	<5.0	<5.0	<1.0	<1.0	**2.7**	**3.0**	<1.0	<1.0	<1.0	**48**	<1.0	<1.0
DUP-01 (MW-32d)	11/5/2013	<5.0	<5.0	<1.0	<1.0	**1.7**	**3.1**	<1.0	<1.0	<1.0	**51**	<1.0	<1.0
	5/19/2014	<5.0	<5.0	<1.0	<1.0	**2.1**	**3.0**	<1.0	<1.0	<1.0	**51**	<1.0	<1.0
	11/11/2014	<5.0	<5.0	<1.0	<1.0	**2.3**	**3.4**	<1.0	<1.0	<1.0	**59**	<1.0	<1.0
	2/25/2015	<5.0	<5.0	<1.0	<1.0	**2.2**	**3.5**	<1.0	<1.0	<1.0	**49**	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-33s (21-26') Depth to Groundwater Approx. 20 - 22'	9/17/2010	<5.0	<5.0	**12**	<1.0	**13**	<1.0	<1.0	<1.0	<1.0	**76**	<1.0	**64**
	11/18/2010	<5.0	<5.0	**14**	<1.0	**22**	<1.0	<1.0	**1.1**	<1.0	**150**	<1.0	**56**
	12/22/2010	<5.0	<5.0	**14**	<1.0	**22**	**1.2**	<1.0	**1.0**	<1.0	**130**	<1.0	**57**
	2/24/2011	<5.0	<5.0	**12**	<1.0	**20**	**1.0**	<1.0	<1.0	<1.0	**110**	<1.0	**60**
	5/10/2011[4]	<10	<10	**11**	<2.0	**21**	<2.0	<2.0	<2.0	<2.0	**220**	<2.0	**55**
	7/28/2011	<10	<10	**8.9**	<2.0	**18**	<2.0	<2.0	<2.0	<2.0	**260**	<2.0	**22**
	10/6/2011	<10	<10	**11**	<2.0	**19**	<2.0	<2.0	<2.0	<2.0	**220**	<2.0	**48**
	1/9/2012[6]	<5.0	**8.9**	**15**	<1.0	**20**	**1.0**	<1.0	**1.3**	<1.0	**170**	<1.0	**51**
	4/4/2012	<5.0	**5.6**	**17**	<1.0	**21**	<1.0	<1.0	**1.2**	<1.0	**170**	<1.0	**48**
	7/11/2012	<5.0	**13**	**25**	<1.0	**32**	**1.3**	<1.0	<1.0	<1.0	**130**	<1.0	**52**
	10/10/2012	<5.0	**12**	**23**	<1.0	**31**	**1.2**	<1.0	<1.0	<1.0	**120**	<1.0	**57**
	5/20/2013	<5.0	**9.4**	**16**	<1.0	**23**	<1.0	<1.0	<1.0	<1.0	**98**	<1.0	**100**
	11/5/2013	<5.0	**7.7**	**16**	<1.0	**28**	<1.0	<1.0	<1.0	<1.0	**77**	<1.0	**58**
	5/19/2014	<5.0	**7.4**	**12**	<1.0	**21**	<1.0	<1.0	<1.0	<1.0	**70**	<1.0	**63**
	11/12/2014	<5.0	**9.2**	**12**	<1.0	**19**	<1.0	<1.0	<1.0	<1.0	**91**	<1.0	**58**
	5/19/2015	<5.0	<5.0	**11**	<1.0	**17**	<1.0	<1.0	<1.0	<1.0	**69**	<1.0	**44**
DUP-01 (MW-33s)	11/18/2010	<5.0	<5.0	**14**	<1.0	**23**	<1.0	<1.0	**1.2**	<1.0	**150**	<1.0	**55**
MW-34s (23-28') Depth to Groundwater Approx. 23 - 25'	9/17/2010	<100	<100	<20	<20	<20	<20	<20	**1,600**	<20	**1,100**	<20	<20
	11/18/2010	<100	<100	<20	<20	<20	<20	<20	**1,600**	<20	**1,200**	<20	<20
	12/28/2010	<50	<50	<10	**13**	<10	<10	<10	**1,400**	<10	**1,000**	<10	<10
	2/25/2011	<50	<50	<10	<10	<10	<10	<10	**1,100**	<10	**900**	<10	<10
	5/10/2011[4]	<50	<50	<10	<10	<10	<10	<10	**1,200**	<10	**970**	<10	<10
	7/28/2011	<50	<50	<10	<10	<10	<10	<10	**1,300**	<10	**1,100**	<10	<10
	10/6/2011	<50	<50	<10	<10	<10	<10	<10	**1,200**	<10	**1,000**	<10	<10
	1/10/2012	<50	<50	<10	**14**	<10	<10	<10	**1,500**	<10	**1,100**	<10	<10
	4/4/2012	<50	<50	<10	<10	<10	<10	<10	**1,400**	<10	**1,200**	<10	<10
	7/11/2012	<50	<50	<10	<10	<10	<10	<10	**1,400**	<10	**1,100**	<10	<10
	10/10/2012	<50	<50	<10	<10	<10	<10	<10	**1,400**	<10	**1,100**	<10	<10
	5/20/2013	<50	<50	<10	<10	<10	<10	<10	**720**	<10	**730**	<10	<10
	11/12/2013	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**490**	<5.0	**450**	<5.0	<5.0
	5/19/2014	<25	<25	<5.0	**5.6**	<5.0	<5.0	<5.0	**690**	<5.0	**730**	<5.0	<5.0
	11/26/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**690**	<5.0	**730**	<5.0	<5.0
	5/21/2015	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**560**	<5.0	**530**	<5.0	<5.0
	12/3/2015	<25	<25	<5.0	**6.6**	<5.0	<5.0	<5.0	**750**	<5.0	**750**	<5.0	<5.0
DUP-01 (MW-34s)	5/20/2013	<50	<50	<10	<10	<10	<10	<10	**730**	<10	**730**	<10	<10

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-34d (45-50') Depth to Groundwater Approx. 23 - 24'	5/20/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	8/28/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0
	11/12/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/21/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0
	7/16/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	<1.0
	11/13/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/24/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/30/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-35i (20.5-22.5') Depth to Groundwater Approx. 16 - 17'	10/29/2012	<250	<250	<50	**94**	<50	<50	<50	**4,500**	<50	**3,000**	<50	<50
	3/27/2013	<250	<250	<50	**110**	<50	<50	<50	**4,500**	<50	**2,700**	<50	<50
	6/5/2013	<250	<250	<50	**160**	<50	<50	<50	**6,400**	<50	**4,300**	<50	<50
	8/29/2013	<250	<250	<50	**160**	<50	<50	<50	**6,600**	<50	**4,900**	<50	<50
	11/12/2013	<250	<250	<50	**190**	<50	<50	<50	**7,400**	<50	**5,100**	<50	<50
	3/28/2014	<250	<250	<50	**170**	<50	<50	<50	**6,300**	<50	**4,600**	<50	<50
	5/21/2014	<250	<250	<50	**140**	**50**	<50	<50	**5,300**	<50	**4,400**	<50	<50
	7/18/2014	<250	<250	<50	**130**	<50	<50	<50	**5,300**	<50	**4,600**	<50	<50
	11/20/2014	<250	<250	<50	**100**	<50	<50	<50	**5,200**	<50	**4,700**	<50	<50
	3/24/2015	<120	<120	<25	**43**	<25	<25	<25	**3,200**	<25	**2,600**	<25	<25
	5/22/2015	<250	<250	<50	**78**	<50	<50	<50	**4,100**	<50	**3,800**	<50	<50
	12/4/2015	<250	<250	<50	**120**	<50	<50	<50	**4,900**	<50	**3,600**	<50	<50
MW-35d (42.5-44.5') Depth to Groundwater Approx. 15 - 16'	7/24/2012	<5.0	<5.0	<1.0	<1.0	**180**	**53**	<1.0	**1.5**	<1.0	**20**	<1.0	**22**
	10/25/2012	<5.0	<5.0	<1.0	<1.0	**3.8**	**1.2**	<1.0	<1.0	<1.0	**2.2**	<1.0	**19**
	3/6/2013	<5.0	<5.0	<1.0	<1.0	**1.6**	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	**24**
	6/11/2013	<5.0	<5.0	<1.0	<1.0	**2.3**	<1.0	<1.0	<1.0	<1.0	**1.7**	<1.0	**23**
	8/28/2013	<5.0	<5.0	<1.0	<1.0	**5.5**	<1.0	<1.0	<1.0	<1.0	**1.5**	<1.0	**26**
	11/12/2013	<5.0	<5.0	<1.0	<1.0	**9.1**	**1.1**	<1.0	<1.0	<1.0	<1.0	<1.0	**33**
	3/26/2014	<5.0	<5.0	<1.0	<1.0	**24**	**3.2**	<1.0	<1.0	<1.0	**1.1**	<1.0	**33**
	5/20/2014	<5.0	<5.0	<1.0	<1.0	**22**	**3.0**	<1.0	<1.0	<1.0	**1.3**	<1.0	**30**
	7/16/2014	<5.0	<5.0	<1.0	<1.0	**12**	**1.4**	<1.0	<1.0	<1.0	**1.2**	<1.0	**31**
	11/13/2014	<5.0	<5.0	<1.0	<1.0	**17**	**2.1**	<1.0	<1.0	<1.0	**1.1**	<1.0	**40**
	3/24/2015	<5.0	<5.0	<1.0	<1.0	**44**	**8.0**	<1.0	<1.0	<1.0	<1.0	<1.0	**42**
	5/22/2015	<5.0	<5.0	<1.0	<1.0	**9.3**	**1.4**	<1.0	<1.0	<1.0	**1.7**	<1.0	**34**
	11/30/2015	<5.0	<5.0	<1.0	<1.0	**6.5**	**1.0**	<1.0	<1.0	<1.0	**2.8**	<1.0	**27**

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-36s (16.5-21.5') Depth to Groundwater Approx. 16 - 17'	5/31/2013	<12	**20**	**14**	**2.6**	**150**	**18**	<2.5	**29**	<2.5	**280**	<2.5	**11**
	8/29/2013	<12	**15**	**16**	**2.9**	**160**	**20**	<2.5	**30**	<2.5	**370**	<2.5	**11**
	11/8/2013	<12	**21**	**20**	**3.0**	**200**	**22**	<2.5	**32**	<2.5	**440**	<2.5	**20**
	3/27/2014	<25	<25	**15**	<5.0	**130**	**15**	<5.0	**21**	<5.0	**430**	<5.0	**15**
	5/15/2014	<25	<25	**15**	<5.0	**120**	**16**	<5.0	**22**	<5.0	**370**	<5.0	**16**
	7/18/2014	<25	<25	**14**	<5.0	**120**	**15**	<5.0	**18**	<5.0	**410**	<5.0	**16**
	11/25/2014	<25	**28**	**18**	<5.0	**150**	**19**	<5.0	**20**	<5.0	**540**	<5.0	**25**
	3/25/2015	<25	**30**	**17**	<5.0	**130**	**16**	<5.0	**21**	<5.0	**550**	<5.0	**30**
	5/20/2015	<25	<25	**17**	<5.0	**130**	**16**	<5.0	**19**	<5.0	**570**	<5.0	**28**
	12/2/2015	<12	**14**	**28**	<2.5	**270**	**37**	<2.5	**7.0**	<2.5	**190**	<2.5	**33**
DUP-02 (MW-36s)	5/20/2015	<25	<25	**17**	<5.0	**130**	**16**	<5.0	**20**	<5.0	**600**	<5.0	**29**
	12/2/2015	<12	**14**	**30**	<2.5	**290**	**39**	<2.5	**6.0**	<2.5	**160**	<2.5	**34**
MW-36d (31-36') Depth to Groundwater Approx. 16 - 17'	4/2/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	6/11/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	8/28/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/12/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/21/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/15/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/13/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/24/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/30/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-37s (25.5-30.5') Depth to Groundwater Approx. 25 - 26'	4/3/2013	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**570**	<5.0	<5.0
	6/3/2013	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**580**	<5.0	<5.0
	8/29/2013	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**580**	<5.0	<5.0
	11/11/2013	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**5.6**	<5.0	**640**	<5.0	<5.0
	3/27/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**550**	<5.0	<5.0
	5/16/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**5.6**	<5.0	**610**	<5.0	<5.0
	7/18/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**610**	<5.0	<5.0
	11/26/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**5.4**	<5.0	**740**	<5.0	<5.0
	3/26/2015	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**580**	<5.0	<5.0
	5/21/2015	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**630**	<5.0	<5.0
	12/3/2015	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**6.8**	<5.0	**630**	<5.0	<5.0
DUP-03 (MW-37s)	5/21/2015	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**640**	<5.0	<5.0
	12/2/2015	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**630**	<5.0	<5.0
MW-38s (9-14') Depth to Groundwater Approx. 9 - 10'	4/3/2013	<10	<10	**13**	<2.0	**22**	**2.7**	<2.0	**18**	<2.0	**210**	<2.0	**16**
	6/3/2013	<10	<10	**15**	<2.0	**30**	**2.6**	<2.0	**18**	<2.0	**230**	<2.0	**16**
	8/29/2013	<12	<12	**20**	<2.5	**42**	**3.4**	<2.5	**22**	<2.5	**280**	<2.5	**17**
	11/11/2013	<10	<10	**21**	<2.0	**35**	**3.0**	<2.0	**28**	<2.0	**290**	<2.0	**19**
	7/17/2014	<10	<10	**13**	<2.0	**26**	**2.5**	<2.0	**21**	<2.0	**240**	<2.0	**11**
	11/26/2014	<10	<10	**9.4**	<2.0	**21**	**2.4**	<2.0	**24**	<2.0	**310**	<2.0	**9.3**
	3/25/2015	**10**	<10	**7.6**	<2.0	**19**	**2.0**	<2.0	**15**	<2.0	**210**	<2.0	**9.7**
	5/21/2015	<10	<10	**8.1**	<2.0	**23**	**2.4**	<2.0	**15**	<2.0	**250**	<2.0	**10**
	12/3/2015	<10	<10	**6.2**	<2.0	**20**	**2.2**	<2.0	**14**	<2.0	**250**	<2.0	**6.3**
MW-38d (29-34') Depth to Groundwater Approx. 30 - 32'	4/3/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**	<1.0	<1.0
	6/12/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.8**	<1.0	<1.0
	8/29/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	<1.0
	11/14/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/27/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/17/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/21/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/25/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/28/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/2/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-39s (15.5-20.5') Depth to Groundwater Approx. 15 - 16'	4/3/2013	<50	<50	**86**	**17**	**56**	<10	<10	**86**	<10	**810**	<10	<10
	6/3/2013	<50	<50	**90**	**18**	**71**	<10	<10	**84**	<10	**870**	<10	<10
	8/29/2013	<25	<25	**42**	**9.5**	**36**	<5.0	<5.0	**39**	<5.0	**460**	<5.0	<5.0
	11/11/2013	<50	<50	**97**	**24**	**67**	<10	<10	**99**	<10	**840**	<10	<10
	3/28/2014	<25	<25	**79**	**18**	**64**	**7.2**	<5.0	**96**	<5.0	**790**	<5.0	<5.0
	5/16/2014	<25	<25	**79**	**21**	**50**	**5.6**	<5.0	**120**	<5.0	**960**	<5.0	<5.0
	7/18/2014	<25	<25	**68**	**17**	**64**	**7.0**	<5.0	**90**	<5.0	**840**	<5.0	<5.0
	11/26/2014	<25	<25	**87**	**21**	**66**	**8.2**	<5.0	**110**	<5.0	**940**	<5.0	<5.0
	3/26/2015	<25	<25	**89**	**20**	**56**	**6.6**	<5.0	**100**	<5.0	**790**	<5.0	<5.0
	5/21/2015	<50	<50	**99**	**22**	**62**	<10	<10	**110**	<10	**870**	<10	<10
	12/3/2015	<50	<50	**110**	**24**	**59**	<10	<10	**130**	<10	**860**	<10	<10
MW-39d (34-39') Depth to Groundwater Approx. 15 - 16'	4/2/2013	<5.0	<5.0	<1.0	<1.0	**2.6**	**2.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	6/11/2013	<5.0	<5.0	<1.0	<1.0	**3.2**	**2.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	8/28/2013	<5.0	<5.0	<1.0	<1.0	**3.4**	**2.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/12/2013	<5.0	<5.0	<1.0	<1.0	**2.9**	**2.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<5.0	<5.0	<1.0	<1.0	**3.3**	**2.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/21/2014	<5.0	<5.0	<1.0	<1.0	**3.3**	**2.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/15/2014	<5.0	<5.0	<1.0	<1.0	**3.0**	**2.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/13/2014	<5.0	<5.0	<1.0	<1.0	**3.4**	**2.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/24/2015	<5.0	<5.0	<1.0	<1.0	**3.4**	**2.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/26/2015	<5.0	<5.0	<1.0	<1.0	**3.2**	**2.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/30/2015	<5.0	<5.0	<1.0	<1.0	**3.6**	**2.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-40s (20-25') Depth to Groundwater Approx. 22 - 23'	4/3/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	6/12/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	8/28/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/13/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/21/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/16/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/17/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/23/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/26/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-40d (37.5-42.5') Depth to Groundwater Approx. 21 - 22'	4/3/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	6/12/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	8/28/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/13/2013	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/22/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/16/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/17/2014	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/23/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/26/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-41 (3.3-6.3') Former B-111 Depth to Groundwater Approx. 0 - 1'	9/1/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/4/2015	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-42D (5.6-8.6') Former B-108D Depth to Groundwater Approx. 0'	9/1/2015	<50	<50	**15**	<10	**1100**	**11**	<10	**25**	<10	**1200**	<10	**23**
	12/1/2015	<50	<50	**16**	<10	**1500**	**14**	<10	**22**	<10	**1100**	<10	**23**
NS-18s (20-25') Depth to Groundwater Approx. 20 - 22'	7/25/2012	<50	<50	**19**	<10	**58**	<10	<10	**11**	<10	**900**	<10	<10
	5/20/2014	<50	<50	**20**	<10	**120**	**11**	<10	**17**	<10	**790**	<10	<10
	7/14/2014	<50	<50	**18**	<10	**100**	<10	<10	**11**	<10	**760**	<10	<10
	11/12/2014	<50	<50	**19**	<10	**120**	**11**	<10	**14**	<10	**1,100**	<10	<10
	2/24/2015	<50	<50	**27**	<10	**130**	**13**	<10	**18**	<10	**1,100**	<10	**25**
	5/20/2015	<50	<50	**24**	<10	**130**	**12**	<10	**15**	<10	**1,100**	<10	**42**
NS-18i (30-35') Depth to Groundwater Approx. 20 - 22'	7/25/2012	<120	<120	<25	<25	**600**	**140**	<25	<25	<25	**2,600**	<25	**26**
	3/27/2014	<120	<120	<25	<25	**630**	**140**	<25	<25	<25	**2,000**	<25	**44**
	5/19/2014	<100	<100	<20	<20	**560**	**110**	<20	<20	<20	**1,700**	<20	**37**
	7/14/2014	<100	<100	<20	<20	**580**	**120**	<20	<20	<20	**1,900**	<20	**37**
	11/12/2014	<100	<100	<20	<20	**650**	**140**	<20	<20	<20	**2,200**	<20	**25**
	2/24/2015	<100	<100	<20	<20	**660**	**150**	<20	<20	<20	**2,100**	<20	**24**
	5/20/2015	<100	<100	<20	<20	**610**	**140**	<20	<20	<20	**2,000**	<20	<20
NS-18d (39.1-44.1') Depth to Groundwater Approx. 20 - 22'	7/25/2012	<10	<10	<2.0	<2.0	**200**	**30**	<2.0	<2.0	<2.0	**33**	<2.0	<2.0
	5/20/2014	<10	<10	<2.0	<2.0	**180**	**30**	<2.0	<2.0	<2.0	**20**	<2.0	**4.1**
	7/14/2014	<10	<10	<2.0	<2.0	**220**	**38**	<2.0	<2.0	<2.0	**17**	<2.0	**5.7**
	11/12/2014	<10	<10	<2.0	<2.0	**190**	**31**	<2.0	<2.0	<2.0	**19**	<2.0	**9.1**
	2/24/2015	<10	<10	<2.0	<2.0	**170**	**28**	<2.0	<2.0	<2.0	**19**	<2.0	**9.1**
	5/19/2015	<10	<10	<2.0	<2.0	**180**	**31**	<2.0	<2.0	<2.0	**20**	<2.0	**3.8**

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5
Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
NS-19s (24-29') Depth to Groundwater Approx. 23 - 25'	7/27/2012	<50	<50	<10	<10	**69**	<10	<10	**30**	<10	**900**	<10	**53**
	5/20/2014	<10	<10	**7.9**	**4.6**	**160**	**2.8**	<2.0	**4.9**	<2.0	**150**	<2.0	**140**
	7/14/2014	<10	<10	**7.2**	**4.4**	**150**	**2.4**	<2.0	**6.3**	<2.0	**190**	<2.0	**120**
	11/13/2014	<50	<50	**45**	**31**	**970**	**14**	<10	**46**	<10	**1,400**	<10	**660**
	2/25/2015	<10	<10	**11**	**7.6**	**260**	**4.1**	<2.0	**7.0**	<2.0	**260**	<2.0	**150**
	5/20/2015	<10	<10	**11**	**4.8**	**200**	**2.6**	<2.0	**7.1**	<2.0	**290**	<2.0	**140**
NS-19i (34-39') Depth to Groundwater Approx. 23 - 25'	7/27/2012	<25	<25	<5.0	<5.0	**91**	**26**	<5.0	<5.0	<5.0	**630**	<5.0	<5.0
	5/20/2014	<25	<25	<5.0	<5.0	**80**	**22**	<5.0	<5.0	<5.0	**490**	<5.0	<5.0
	7/14/2014	<25	<25	<5.0	<5.0	**76**	**19**	<5.0	<5.0	<5.0	**430**	<5.0	<5.0
	11/13/2014	<25	<25	<5.0	<5.0	**75**	**20**	<5.0	<5.0	<5.0	**510**	<5.0	<5.0
	2/25/2015	<25	<25	<5.0	<5.0	**71**	**22**	<5.0	<5.0	<5.0	**520**	<5.0	<5.0
	5/20/2015	<25	<25	<5.0	<5.0	**70**	**20**	<5.0	<5.0	<5.0	**550**	<5.0	<5.0
NS-19d (43.5-48.5') Depth to Groundwater Approx. 23 - 25'	7/27/2012	<5.0	<5.0	<1.0	<1.0	<1.0	**2.1**	<1.0	<1.0	<1.0	**27**	<1.0	<1.0
	5/20/2014	<5.0	<5.0	<1.0	<1.0	**1.3**	**2.4**	<1.0	<1.0	<1.0	**23**	<1.0	<1.0
	7/14/2014	<5.0	<5.0	<1.0	<1.0	<1.0	**1.9**	<1.0	<1.0	<1.0	**21**	<1.0	<1.0
	11/11/2014	<5.0	<5.0	<1.0	<1.0	<1.0	**2.0**	<1.0	<1.0	<1.0	**24**	<1.0	<1.0
	2/25/2015	<5.0	<5.0	<1.0	<1.0	**1.2**	**2.3**	<1.0	<1.0	<1.0	**24**	<1.0	<1.0
	5/19/2015	<5.0	<5.0	<1.0	<1.0	<1.0	**1.6**	<1.0	<1.0	<1.0	**22**	<1.0	<1.0
NS-20s (23-28') Depth to Groundwater Approx. 23 - 25'	7/31/2012	<120	<120	<25	<25	**120**	<25	<25	**830**	<25	**2,600**	<25	<25
	5/20/2014	<100	<100	<20	<20	**160**	<20	<20	**500**	<20	**1,900**	<20	**36**
	7/15/2014	<100	<100	<20	<20	**190**	<20	<20	**490**	<20	**1,800**	<20	**38**
	11/12/2014	<100	<100	<20	<20	**300**	<20	<20	**480**	<20	**2,000**	<20	**62**
	2/25/2015	<50	<50	**24**	<10	**780**	<10	<10	**380**	<10	**1,300**	<10	**160**
	5/20/2015	<50	<50	**16**	<10	**610**	<10	<10	**340**	<10	**1,200**	<10	**120**
NS-20i (29-34') Depth to Groundwater Approx. 23 - 25'	7/31/2012	<5.0	<5.0	**22**	**2.3**	**17**	**1.5**	<1.0	<1.0	<1.0	**18**	<1.0	**130**
	5/20/2014	<5.0	<5.0	**12**	**1.6**	**12**	**1.3**	<1.0	<1.0	<1.0	**10**	<1.0	**42**
	7/15/2014	<5.0	<5.0	**11**	**1.5**	**12**	**1.4**	<1.0	<1.0	<1.0	**14**	<1.0	**55**
	11/12/2014	<5.0	<5.0	**11**	**1.5**	**12**	**1.6**	<1.0	<1.0	<1.0	**18**	<1.0	**52**
	2/25/2015	<5.0	<5.0	**11**	**1.5**	**10**	**1.4**	<1.0	<1.0	<1.0	**14**	<1.0	**34**
	5/20/2015	<5.0	<5.0	**11**	**1.1**	**8.8**	<1.0	<1.0	<1.0	<1.0	**11**	<1.0	**20**

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.
4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.
5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.
6) Headspace present in the sample, results are approximate.

Table D5

Summary of Detected Volatile Organic Compounds at Compliance Monitoring Well Locations

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		2-Butanone[2]	Chloroethane	1,1-Dichloroethane	1,1-Dichloroethene[2]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Trichloro-fluoromethane	Vinyl Chloride
Residential DW Criteria		13,000	430	880	7.0	70	100	5.0	200	5.0	5.0	2,600	2.0
Non-Residential DW Criteria		38,000	1,700	2,500	7.0	70	100	5.0	200	5.0	5.0	7,300	2.0
GSI Criteria		2,200	1,100[1]	740	130	620	1,500[1]	60[1]	89	330[1]	200[1]	NC	13[1]
Residential GWSLs for Vapor Intrusion		4.3E+06	44,000	4,300	370	83	360	94	17,000	96	10	28,000	2.8
Non-Residential GWSLs for Vapor Intrusion		1.8E+07	1.8E+05	18,000	1,600	350	1,500	460	71,000	480	41	1.2E+05	52
Groundwater Contact Criteria		2.4E+08	4.4E+05	2.4E+06	11,000	2.0E+05	2.2E+05	12,000	1.3E+06	21,000	13,000[3]	1.1E+06	1,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
SS-09s (23-28') Depth to Groundwater Approx. 23 - 25'	8/2/2012	<50	<50	<10	<10	<10	<10	**11**	**790**	<10	**560**	<10	<10
	5/20/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	**13**	**370**	<5.0	**330**	<5.0	<5.0
	7/17/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	**13**	**600**	<5.0	**470**	<5.0	<5.0
	11/21/2014	<25	<25	<5.0	**6.8**	<5.0	<5.0	**21**	**820**	<5.0	**560**	<5.0	<5.0
	3/26/2015	<25	<25	<5.0	**6.4**	<5.0	<5.0	**21**	**830**	<5.0	**520**	<5.0	<5.0
	5/22/2015	<50	<50	<10	<10	<10	<10	**27**	**1,200**	<10	**730**	<10	<10
DUP-04 (SS-09s)	5/20/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	**13**	**380**	<5.0	**330**	<5.0	<5.0
DUP-02 (SS-09s)	7/17/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	**13**	**550**	<5.0	**430**	<5.0	<5.0
SS-09i (34-39') Depth to Groundwater Approx. 23 - 25'	8/2/2012	<50	<5.0	**8.0**	<1.0	**37**	**5.4**	<1.0	**2.6**	<1.0	<1.0	<1.0	<1.0
	5/20/2014	<5.0	<5.0	**7.1**	<1.0	**32**	**5.3**	<1.0	**2.2**	<1.0	<1.0	<1.0	<1.0
	7/17/2014	<5.0	<5.0	**6.6**	<1.0	**30**	**4.6**	<1.0	**3.8**	<1.0	**2.5**	<1.0	<1.0
	11/21/2014	<5.0	<5.0	**6.9**	<1.0	**29**	**4.9**	<1.0	**5.2**	<1.0	**3.9**	<1.0	<1.0
	3/26/2015	<5.0	<5.0	**7.3**	<1.0	**30**	**5.0**	<1.0	**5.7**	<1.0	**4.1**	<1.0	<1.0
	5/22/2015	<5.0	<5.0	**7.2**	<1.0	**31**	**5.0**	<1.0	**4.3**	<1.0	**3.7**	<1.0	<1.0
SS-10s (22.5-27.5') Depth to Groundwater Approx. '	8/2/2012	<50	<50	<10	<10	<10	<10	<10	**160**	<10	**770**	<10	<10
	5/21/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**80**	<5.0	**570**	<5.0	<5.0
	7/17/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**83**	<5.0	**640**	<5.0	<5.0
	12/1/2014	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**110**	<5.0	**780**	<5.0	<5.0
	3/26/2015	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**82**	<5.0	**610**	<5.0	<5.0
	5/22/2015	<25	<25	<5.0	<5.0	<5.0	<5.0	<5.0	**56**	<5.0	**600**	<5.0	<5.0
SS-10i (33-38') Depth to Groundwater Approx. 23 - 25'	8/2/2012	<5.0	<5.0	**8.2**	<1.0	**24**	**1.7**	<1.0	<1.0	<1.0	**78**	<1.0	<1.0
	5/21/2014	<5.0	<5.0	**7.2**	<1.0	**25**	**1.9**	<1.0	<1.0	<1.0	**54**	<1.0	<1.0
	7/17/2014	<5.0	<5.0	**7.0**	<1.0	**24**	**1.7**	<1.0	<1.0	<1.0	**52**	<1.0	<1.0
	12/1/2014	<5.0	<5.0	**6.6**	<1.0	**24**	**1.9**	<1.0	<1.0	<1.0	**57**	<1.0	<1.0
	3/26/2015	<5.0	<5.0	**7.1**	<1.0	**23**	**1.9**	<1.0	<1.0	<1.0	**48**	<1.0	<1.0
	5/22/2015	<5.0	<5.0	**7.4**	<1.0	**26**	**1.9**	<1.0	<1.0	<1.0	**59**	<1.0	<1.0
SS-10d (50-55') Depth to Groundwater Approx. 23 - 25'	8/3/2012	<5.0	<5.0	<1.0	<1.0	**15**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/21/2014	<5.0	<5.0	<1.0	<1.0	**17**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	7/17/2014	<5.0	<5.0	<1.0	<1.0	**16**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/13/2014	<5.0	<5.0	<1.0	<1.0	**18**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/24/2015	<5.0	<5.0	<1.0	<1.0	**16**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/21/2015	<5.0	<5.0	<1.0	<1.0	**16**	<1.0	<1.0	<1.0	<1.0	**1.0**	<1.0	<1.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter; NC = No criteria; NA = Not analyzed

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criterion

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlaying clay unit. The depth to the bottom of the upper clay unit is approximately 7.0 feet below ground surface (ft bgs) at MW-09s, 8.0 ft bgs at MW-20s (based on boring log for nearby soil boring B-29), 15.0 ft bgs at MW-23, 9.0 ft bgs at MW-27s, 20.5 ft bgs at MW-29d, and 14.0 ft bgs at MW-30s and MW-30d.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which was published by USEPA on September 28, 2011.

4) The average temperature in this sample shipment exceeded the recommended temperature range. Sample results are approximate.

5) Quality control results for trichloroethene are outside the established control limits, the result is approximate.

6) Headspace present in the sample, results are approximate.

Table D6
Summary of Detected Volatile Organic Compounds in Groundwater at PRB Monitoring Wells
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Acetone(2)	2-Butanone	Benzene(2)	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene(2)	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	Ethyl-benzene(2)	Isopropyl-benzene	n-Propyl Benzene(2)	Tetrachloro-ethene	Toluene(2)	1,1,1-Tri-chloroethane	1,1,2-Tri-chloroethane	Trichloro-ethene	1,2,4-Tri-methyl-benzene	Vinyl Chloride	Total Xylenes(2)
Residential Health-Based DW Criteria		730	13,000	5.0	430	80	880	5.0	7.0	70	100	700	800	80	5.0	1,000	200	5.0	5.0	1,000	2.0	10,000
Non-Residential Health-Based DW Criteria		2,100	38,000	5.0	1,700	80	2,500	5.0	7.0	70	100	700	2,300	230	5.0	1,000	200	5.0	5.0	2,900	2.0	10,000
GSI Criteria		1,700	2,200	200(1)	1,100(1)	350	740	360(1)	130	620	1,500(1)	18	28	NC	60(1)	270	89	330(1)	200(1)	17	13(1)	41
Residential GWSLs for Vapor Intrusion		8.2E+06	4.3E+06	27	44,000	140	4,300	41	370	83	360	700	10	92	94	36,000	17,000	96	10	1,700	2.8	10,000
Non-Residential GWSLs for Vapor Intrusion		3.4E+07	1.8E+07	140	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	53	390	460	1.5E+05	71,000	480	41	7,300	52	10,000
Groundwater Contact Criteria		3.1E+07	2.4E+08	11,000	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	56,000	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000(3)	56,000	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
PRB-01s (6-11') Depth to Groundwater* Approx. 5.5 - 6.5'	8/10/2011	<1,000	<250	<50	<250	<50	<50	<50	**170**	<50	<50	<50	<50	<50	<50	<50	**3,700**	<50	**3,900**	<50	<50	<150
	10/7/2011	<500	<120	<25	<120	<25	<25	<25	**42**	<25	<25	<25	<25	<25	<25	<25	**2,900**	<25	**3,300**	<25	<25	<75
	1/11/2012	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**960**	<10	**2,000**	<10	<10	<30
	4/10/2012	<400	<100	<20	<100	<20	**50**	<20	**31**	**230**	<20	<20	<20	<20	<20	<20	**670**	<20	**1,800**	<20	**22**	<30
	7/16/2012	<200	<50	<10	<50	**10**	**41**	<10	**120**	**750**	<10	<10	<10	<10	<10	<10	**600**	<10	**1,600**	<10	**20**	<30
	10/10/2012	<200	<50	<10	<50	<10	**29**	<10	**23**	**350**	<10	<10	<10	<10	<10	<10	**570**	<10	**1,400**	<10	<10	<30
	3/4/2013	<200	**130**	<10	<50	<10	**90**	<10	**27**	**88**	<10	<10	<10	<10	<10	<10	**730**	<10	**1,100**	<10	**140**	<30
	6/7/2013	<200	<50	<10	<50	<10	**380**	<10	**24**	**620**	<10	<10	<10	<10	<10	<10	**970**	<10	**960**	<10	**48**	<30
	8/26/2013	<200	<50	<10	<50	<10	**81**	<10	**37**	**200**	<10	<10	<10	<10	<10	<10	**1,500**	<10	**1,200**	<10	<10	<30
	11/15/2013	<200	<50	<10	<50	<10	**43**	<10	**20**	**43**	<10	<10	<10	<10	<10	<10	**1,200**	<10	**1,100**	<10	<10	<30
	5/30/2014	<200	<50	<10	<50	<10	**330**	<10	**45**	**550**	<10	<10	<10	<10	<10	<10	**1,500**	<10	**1,700**	<10	**64**	<30
	11/24/2014	<200	<50	<10	<50	<10	**16**	<10	**51**	**18**	<10	<10	<10	<10	<10	<10	**1,200**	<10	**2,000**	<10	<10	<30
	4/21/2015	<200	<50	<10	<50	<10	**17**	<10	**29**	**16**	<10	<10	<10	<10	<10	<10	**940**	<10	**1,600**	<10	<10	<30
	12/7/2015	<200	<50	<10	<50	<10	**12**	<10	**28**	**66**	<10	<10	<10	<10	<10	<10	**760**	<10	**1300**	<10	<10	<30
PRB-02s (6-11') Depth to Groundwater* Approx. 5.5 - 6.5'	8/10/2011	<500	<120	<25	<120	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	**110**	<25	**3,100**	<25	<25	<75
	10/7/2011	<500	<120	<25	<120	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	**80**	<25	**2,300**	<25	<25	<75
	1/11/2012	<400	<100	<20	<100	<20	<20	<20	<20	**1,200**	<20	<20	<20	<20	<20	<20	**64**	<20	**1,900**	<20	<20	<60
	4/10/2012	<400	<100	<20	<100	<20	<20	<20	<20	**1,800**	**23**	<20	<20	<20	<20	<20	**36**	<20	**1,300**	<20	<20	<60
	7/13/2012	<200	<50	<10	<50	<10	<10	<10	<10	**1,000**	**19**	<10	<10	<10	<10	<10	**29**	<10	**1,200**	<10	<10	<30
	10/10/2012	<200	<50	<10	<50	<10	<10	<10	<10	**410**	<10	<10	<10	<10	<10	<10	**24**	<10	**1,100**	<10	**33**	<30
	3/5/2013	<50	<12	<2.5	<12	<2.5	**4.4**	<2.5	<2.5	**250**	**6.4**	<2.5	<2.5	<2.5	<2.5	<2.5	**4.8**	<2.5	**310**	<2.5	**43**	<7.5
	6/7/2013	<50	<12	<2.5	<12	<2.5	**9.0**	<2.5	<2.5	**140**	**4.8**	<2.5	<2.5	<2.5	<2.5	<2.5	**4.8**	<2.5	**280**	<2.5	**26**	<7.5
	8/26/2013	<50	<12	<2.5	<12	<2.5	**12**	<2.5	<2.5	**150**	**4.4**	<2.5	<2.5	<2.5	<2.5	<2.5	**4.8**	<2.5	**260**	<2.5	**25**	<7.5
	11/15/2013	<50	<12	<2.5	<12	<2.5	**5.1**	<2.5	<2.5	**200**	**4.3**	<2.5	<2.5	<2.5	<2.5	<2.5	**3.8**	<2.5	**190**	<2.5	**24**	<7.5
	6/5/2014	<50	<12	<2.5	<12	<2.5	**2.8**	<2.5	<2.5	**350**	**3.0**	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**230**	<2.5	**29**	<7.5
	11/24/2014	<50	<12	<2.5	<12	<2.5	<2.5	<2.5	<2.5	**190**	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**440**	<2.5	**9.6**	<7.5
	4/21/2015	<40	<10	<2.0	<10	<2.0	<2.0	<2.0	<2.0	**73**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**250**	<2.0	**4.9**	<6.0
	12/7/2015	<40	<10	<2.0	<10	<2.0	<2.0	<2.0	<2.0	**100**	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**180**	<2.0	**13**	<6.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlying clay unit. The depth to the bottom of the upper clay unit is approximately 3.5 feet below ground surface (ft bgs) at PRB-09s; 4.0 ft bgs at PRB-06s; 5.0 ft bgs at PRB-08s, PRB-08d, and PRB-10s; 6.5 ft bgs at PRB-01s, PRB-02s, PRB-04s, and PRB-04d; 7.0 ft bgs at PRB-05s and PRB-07s; and 8.0 ft bgs at PRB-03s.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D6
Summary of Detected Volatile Organic Compounds in Groundwater at PRB Monitoring Wells
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Acetone(2)	2-Butanone	Benzene(2)	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene(2)	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	Ethyl-benzene(2)	Isopropyl-benzene	n-Propyl Benzene(2)	Tetrachloro-ethene	Toluene(2)	1,1,1-Tri-chloroethane	1,1,2-Tri-chloroethane	Trichloro-ethene	1,2,4-Tri-methyl-benzene	Vinyl Chloride	Total Xylenes(2)
Residential Health-Based DW Criteria		730	13,000	5.0	430	80	880	5.0	7.0	70	100	700	800	80	5.0	1,000	200	5.0	5.0	1,000	2.0	10,000
Non-Residential Health-Based DW Criteria		2,100	38,000	5.0	1,700	80	2,500	5.0	7.0	70	100	700	2,300	230	5.0	1,000	200	5.0	5.0	2,900	2.0	10,000
GSI Criteria		1,700	2,200	200(1)	1,100(1)	350	740	360(1)	130	620	1,500(1)	18	28	NC	60(1)	270	89	330(1)	200(1)	17	13(1)	41
Residential GWSLs for Vapor Intrusion		8.2E+06	4.3E+06	27	44,000	140	4,300	41	370	83	360	700	10	92	94	36,000	17,000	96	10	1,700	2.8	10,000
Non-Residential GWSLs for Vapor Intrusion		3.4E+07	1.8E+07	140	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	53	390	460	1.5E+05	71,000	480	41	7,300	52	10,000
Groundwater Contact Criteria		3.1E+07	2.4E+08	11,000	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	56,000	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000(3)	56,000	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
PRB-03s (6-11') Depth to Groundwater* Approx. 5.5 - 6.5'	8/10/2011	<200	<50	<10	<50	<10	**19**	<10	<10	<10	<10	**560**	<10	<10	<10	<10	<10	<10	**14**	<10	<10	**3,400**
	10/6/2011	<200	<50	<10	<50	<10	**17**	<10	<10	<10	<10	**510**	<10	<10	<10	<10	<10	<10	**10**	<10	<10	**2,990**
	1/11/2012	<100	<25	<5.0	<25	<5.0	**13**	<5.0	<5.0	<5.0	<5.0	**320**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**24**	<5.0	<5.0	**1,920**
	4/10/2012	<40	<10	<2.0	<10	<2.0	**11**	<2.0	<2.0	<2.0	<2.0	**170**	**2.3**	**2.2**	<2.0	<2.0	**3.6**	<2.0	**25**	<2.0	<2.0	**890**
	7/16/2012	<100	<25	<5.0	**34**	<5.0	**26**	<5.0	<5.0	<5.0	<5.0	**410**	**17**	<5.0	<5.0	<5.0	<5.0	<5.0	**11**	**14**	<5.0	**2,090**
	10/9/2012	<100	<25	<5.0	<25	<5.0	**29**	<5.0	<5.0	<5.0	<5.0	**370**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**21**	**5.0**	**10**	**2,100**
	3/4/2013	<100	<25	<5.0	<25	<5.0	**56**	<5.0	<5.0	<5.0	<5.0	**260**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**20**	<5.0	**7.8**	**1,410**
	6/6/2013	<50	<12	<2.5	<12	<2.5	**62**	<2.5	<2.5	**7.4**	<2.5	**220**	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**14**	**2.8**	**7.2**	**1,010**
	8/26/2013	<100	<25	<5.0	<25	<5.0	**54**	<5.0	<5.0	<5.0	<5.0	**260**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**32**	<5.0	<5.0	**1,090**
	11/15/2013	<50	<12	<2.5	**52**	<2.5	**36**	<2.5	<2.5	<2.5	<2.5	**170**	<2.5	<2.5	<2.5	<2.5	**4.0**	<2.5	**71**	<2.5	<2.5	**640**
	5/28/2014	<40	<10	<2.0	**120**	<2.0	**41**	<2.0	<2.0	<2.0	<2.0	**110**	<2.0	<2.0	<2.0	<2.0	**3.8**	<2.0	**18**	<2.0	<2.0	**360**
	11/25/2014	<40	<10	<2.0	**110**	<2.0	**43**	<2.0	<2.0	<2.0	<2.0	**140**	<2.0	<2.0	<2.0	<2.0	**3.6**	<2.0	**21**	<2.0	<2.0	**320**
	4/22/2015	<20	<5.0	<1.0	**140**	<1.0	**22**	<1.0	<1.0	**1.3**	<1.0	**96**	<1.0	<1.0	<1.0	<1.0	**2.8**	<1.0	**16**	**1.3**	**1.5**	**260**
PRB-04s (6-11') Depth to Groundwater* Approx. 6.0 - 7.0'	8/10/2011	<200	**110**	<10	<50	<10	<10	<10	<10	**590**	<10	<10	<10	<10	<10	<10	**100**	<10	**1,100**	<10	<10	<30
	10/7/2011	<500	**900**	<25	<120	<25	<25	<25	<25	**3,400**	<25	<25	<25	<25	<25	<25	**62**	<25	<25	<25	<25	<75
	1/11/2012	<500	**440**	<25	<120	<25	**110**	<25	<25	**3,600**	**36**	<25	<25	<25	<25	<25	**34**	<25	<25	<25	**67**	<75
	4/10/2012	<500	**360**	<25	**130**	<25	**200**	<25	<25	**2,400**	**37**	<25	<25	<25	<25	<25	<25	<25	**26**	<25	**190**	<75
	7/16/2012	<500	**660**	<25	**120**	<25	**490**	**29**	<25	**2,500**	**67**	<25	<25	<25	<25	<25	<25	<25	<25	<25	**610**	**108**
	10/4/2012	<200	<50	<10	**74**	<10	**180**	<10	<10	**1,400**	**36**	<10	<10	<10	<10	<10	<10	<10	<10	<10	**430**	<30
	3/4/2013	<100	<25	<5.0	**46**	<5.0	**42**	<5.0	<5.0	**560**	**7.0**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**190**	<15
	6/6/2013	**28**	**36**	<1.0	**58**	<1.0	**50**	<1.0	**1.0**	**200**	**2.2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**73**	<3.0
	8/26/2013	<20	**7.0**	<1.0	**60**	<1.0	**33**	<1.0	<1.0	**33**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.5**	<1.0	**18**	<3.0
	11/15/2013	<20	<5.0	<1.0	**22**	<1.0	**22**	<1.0	<1.0	**29**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	**3.6**	<1.0	**15**	<3.0
	5/28/2014	<20	<5.0	<1.0	**15**	<1.0	**21**	<1.0	<1.0	**28**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.3**	<1.0	**1.5**	<3.0
	11/24/2014	<20	<5.0	<1.0	<5.0	<1.0	**36**	<1.0	<1.0	**7.2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.2**	<1.0	**8.1**	<3.0
	4/22/2015	<20	<5.0	<1.0	<5.0	<1.0	**41**	<1.0	<1.0	**9.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.9**	<1.0	**84**	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlying clay unit. The depth to the bottom of the upper clay unit is approximately 3.5 feet below ground surface (ft bgs) at PRB-09s; 4.0 ft bgs at PRB-06s; 5.0 ft bgs at PRB-08s, PRB-08d, and PRB-10s; 6.5 ft bgs at PRB-01s, PRB-02s, PRB-04s, and PRB-04d; 7.0 ft bgs at PRB-05s and PRB-07s; and 8.0 ft bgs at PRB-03s.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D6
Summary of Detected Volatile Organic Compounds in Groundwater at PRB Monitoring Wells
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Acetone(2)	2-Butanone	Benzene(2)	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene(2)	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	Ethyl-benzene(2)	Isopropyl-benzene	n-Propyl Benzene(2)	Tetrachloro-ethene	Toluene(2)	1,1,1-Tri-chloroethane	1,1,2-Tri-chloroethane	Trichloro-ethene	1,2,4-Tri-methyl-benzene	Vinyl Chloride	Total Xylenes(2)
Residential Health-Based DW Criteria		730	13,000	5.0	430	80	880	5.0	7.0	70	100	700	800	80	5.0	1,000	200	5.0	5.0	1,000	2.0	10,000
Non-Residential Health-Based DW Criteria		2,100	38,000	5.0	1,700	80	2,500	5.0	7.0	70	100	700	2,300	230	5.0	1,000	200	5.0	5.0	2,900	2.0	10,000
GSI Criteria		1,700	2,200	200(1)	1,100(1)	350	740	360(1)	130	620	1,500(1)	18	28	NC	60(1)	270	89	330(1)	200(1)	17	13(1)	41
Residential GWSLs for Vapor Intrusion		8.2E+06	4.3E+06	27	44,000	140	4,300	41	370	83	360	700	10	92	94	36,000	17,000	96	10	1,700	2.8	10,000
Non-Residential GWSLs for Vapor Intrusion		3.4E+07	1.8E+07	140	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	53	390	460	1.5E+05	71,000	480	41	7,300	52	10,000
Groundwater Contact Criteria		3.1E+07	2.4E+08	11,000	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	56,000	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000(3)	56,000	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
PRB-04d (25-30') Depth to Groundwater* Approx. 6.0 - 7.0'	8/10/2011	<20	**10**	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**9.8**	<1.0	**12**	<3.0
	10/7/2011	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.4**	<1.0	**11**	<3.0
	1/11/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**2.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.2**	<1.0	**9.4**	<3.0
	4/10/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.1**	<1.0	**9.4**	<3.0
	7/16/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**9.2**	<3.0
	10/4/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**13**	<3.0
	3/4/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**17**	<3.0
	6/6/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**14**	<3.0
	8/26/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**13**	<3.0
	11/15/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**	<3.0
	5/28/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**9.8**	<3.0
	11/25/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**7.7**	<3.0
	4/22/2015	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.4**	<3.0
PRB-05s (6-11') Depth to Groundwater* Approx. 6.0 - 7.0'	8/11/2011	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**270**	<10	**57**	<10	**990**	<10	<10	<30
	10/6/2011	<200	<50	<10	<50	<10	<10	<10	<10	**21**	<10	<10	<10	<10	**270**	<10	**53**	<10	**1,000**	<10	<10	<30
	1/12/2012	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**230**	<10	**35**	<10	**780**	<10	<10	<30
	4/9/2012	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**200**	<5.0	**28**	<5.0	**630**	<5.0	<5.0	<15
	7/12/2012	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**280**	<5.0	**36**	<5.0	**810**	<5.0	<5.0	<15
	10/9/2012	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**290**	<5.0	**37**	<5.0	**760**	<5.0	<5.0	<15
	3/5/2013	<100	**27**	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**310**	<5.0	**35**	<5.0	**720**	<5.0	<5.0	<15
	6/7/2013	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**260**	<5.0	**31**	<5.0	**620**	<5.0	<5.0	<15
	8/27/2013	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**300**	<5.0	**43**	<5.0	**760**	<5.0	<5.0	<15
	11/14/2013	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**320**	<5.0	**52**	<5.0	**720**	<5.0	<5.0	<15
	5/29/2014	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**320**	<5.0	**50**	<5.0	**760**	<5.0	<5.0	<15
	11/25/2014	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**330**	<5.0	**52**	<5.0	**930**	<5.0	<5.0	<15
	4/20/2015	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**350**	<5.0	**47**	<5.0	**810**	<5.0	<5.0	<15

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlying clay unit. The depth to the bottom of the upper clay unit is approximately 3.5 feet below ground surface (ft bgs) at PRB-09s; 4.0 ft bgs at PRB-06s; 5.0 ft bgs at PRB-08s, PRB-08d, and PRB-10s; 6.5 ft bgs at PRB-01s, PRB-02s, PRB-04s, and PRB-04d; 7.0 ft bgs at PRB-05s and PRB-07s; and 8.0 ft bgs at PRB-03s.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D6
Summary of Detected Volatile Organic Compounds in Groundwater at PRB Monitoring Wells
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Acetone(2)	2-Butanone	Benzene(2)	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene(2)	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	Ethyl-benzene(2)	Isopropyl-benzene	n-Propyl Benzene(2)	Tetrachloro-ethene	Toluene(2)	1,1,1-Tri-chloroethane	1,1,2-Tri-chloroethane	Trichloro-ethene	1,2,4-Tri-methyl-benzene	Vinyl Chloride	Total Xylenes(2)
Residential Health-Based DW Criteria		730	13,000	5.0	430	80	880	5.0	7.0	70	100	700	800	80	5.0	1,000	200	5.0	5.0	1,000	2.0	10,000
Non-Residential Health-Based DW Criteria		2,100	38,000	5.0	1,700	80	2,500	5.0	7.0	70	100	700	2,300	230	5.0	1,000	200	5.0	5.0	2,900	2.0	10,000
GSI Criteria		1,700	2,200	200(1)	1,100(1)	350	740	360(1)	130	620	1,500(1)	18	28	NC	60(1)	270	89	330(1)	200(1)	17	13(1)	41
Residential GWSLs for Vapor Intrusion		8.2E+06	4.3E+06	27	44,000	140	4,300	41	370	83	360	700	10	92	94	36,000	17,000	96	10	1,700	2.8	10,000
Non-Residential GWSLs for Vapor Intrusion		3.4E+07	1.8E+07	140	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	53	390	460	1.5E+05	71,000	480	41	7,300	52	10,000
Groundwater Contact Criteria		3.1E+07	2.4E+08	11,000	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	56,000	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000(3)	56,000	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
PRB-06s (6-11') Depth to Groundwater* Approx. 6.0 - 6.5'	8/11/2011	<1,000	**3,600**	<50	<250	<50	**360**	<50	<50	**4,200**	<50	<50	<50	<50	<50	<50	<50	<50	**310**	<50	<50	<150
	10/6/2011	<1,000	**5,800**	<50	<250	<50	**260**	<50	<50	**6,000**	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**71**	<150
	1/12/2012	<200	**940**	<10	**81**	<10	<10	<10	<10	**300**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**35**	<30
	4/10/2012	**24**	**130**	**1.0**	**71**	<1.0	<1.0	<1.0	<1.0	**35**	**2.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.7**	<1.0	**18**	<3.0
	7/12/2012	<100	**480**	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<15
	10/9/2012	<100	**170**	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**450**	<5.0	<5.0	<5.0	<5.0	<5.0	<15
	3/5/2013	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**340**	<5.0	<5.0	<5.0	<5.0	<5.0	<15
	6/7/2013	<100	**38**	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**6.4**	<5.0	<5.0	<5.0	**440**	<5.0	<5.0	<5.0	<5.0	<5.0	<15
	8/27/2013	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**8.0**	<5.0	<5.0	<5.0	**450**	<5.0	<5.0	<5.0	<5.0	<5.0	<15
	11/14/2013	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**370**	<5.0	<5.0	**7.4**	<5.0	<5.0	<15
	5/29/2014	<50	**42**	<2.5	<12	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**3.7**	<2.5	<2.5	<2.5	**310**	<2.5	<2.5	**3.5**	<2.5	<2.5	<7.5
	11/25/2014	<50	**71**	<2.5	<12	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**3.7**	<2.5	<2.5	<2.5	**250**	<2.5	<2.5	<2.5	<2.5	<2.5	<7.5
	4/21/2015	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.4**	<1.0	<1.0	<1.0	**130**	<1.0	<1.0	**1.1**	<1.0	<1.0	<3.0
PRB-07s (7-12') Depth to Groundwater* Approx. 5.5 - 6.5'	8/10/2011	<200	**120**	<10	<50	<10	<10	<10	<10	**880**	<10	<10	<10	<10	<10	<10	**100**	<10	**1,200**	<10	<10	<30
	10/7/2011	<200	<50	<10	<50	<10	**16**	<10	**10**	**790**	**18**	<10	<10	<10	<10	<10	**130**	<10	**1,400**	<10	<10	<30
	1/11/2012	<200	<50	<10	<50	<10	<10	<10	<10	**510**	<10	<10	<10	<10	<10	<10	**92**	<10	**1,300**	<10	<10	<30
	4/10/2012	<200	<50	<10	<50	<10	<10	<10	<10	**260**	**28**	<10	<10	<10	<10	<10	**56**	<10	**1,100**	<10	<10	<30
	7/16/2012	<200	<50	<10	<50	<10	<10	<10	<10	**200**	**50**	<10	<10	<10	<10	<10	**45**	<10	**1,300**	<10	<10	<30
	10/4/2012	<200	<50	<10	<50	<10	<10	<10	<10	**150**	**41**	<10	<10	<10	<10	<10	**17**	<10	**750**	<10	<10	<30
	3/4/2013	<100	<25	<5.0	<25	<5.0	**7.9**	<5.0	<5.0	**100**	**11**	<5.0	<5.0	<5.0	<5.0	<5.0	**7.6**	<5.0	**480**	<5.0	<5.0	<15
	6/6/2013	<100	**50**	<5.0	<25	<5.0	**5.6**	<5.0	<5.0	**570**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**16**	<5.0	**370**	<5.0	**38**	<15
	8/26/2013	<100	<25	<5.0	<25	<5.0	**7.0**	<5.0	<5.0	**240**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**16**	<5.0	**450**	<5.0	**17**	<15
	11/15/2013	<100	<25	<5.0	<25	<5.0	**6.6**	<5.0	<5.0	**74**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**37**	<5.0	**550**	<5.0	**8.4**	<15
	5/28/2014	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	**45**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**38**	<5.0	**730**	<5.0	**6.4**	<15
	11/25/2014	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	**79**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**21**	<5.0	**610**	<5.0	**14**	<15
	4/22/2015	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	**59**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**29**	<5.0	**630**	<5.0	**14**	<15

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlying clay unit. The depth to the bottom of the upper clay unit is approximately 3.5 feet below ground surface (ft bgs) at PRB-09s; 4.0 ft bgs at PRB-06s; 5.0 ft bgs at PRB-08s, PRB-08d, and PRB-10s; 6.5 ft bgs at PRB-01s, PRB-02s, PRB-04s, and PRB-04d; 7.0 ft bgs at PRB-05s and PRB-07s; and 8.0 ft bgs at PRB-03s.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D6
Summary of Detected Volatile Organic Compounds in Groundwater at PRB Monitoring Wells
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Acetone(2)	2-Butanone	Benzene(2)	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene(2)	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	Ethyl-benzene(2)	Isopropyl-benzene	n-Propyl Benzene(2)	Tetrachloro-ethene	Toluene(2)	1,1,1-Tri-chloroethane	1,1,2-Tri-chloroethane	Trichloro-ethene	1,2,4-Tri-methyl-benzene	Vinyl Chloride	Total Xylenes(2)
Residential Health-Based DW Criteria		730	13,000	5.0	430	80	880	5.0	7.0	70	100	700	800	80	5.0	1,000	200	5.0	5.0	1,000	2.0	10,000
Non-Residential Health-Based DW Criteria		2,100	38,000	5.0	1,700	80	2,500	5.0	7.0	70	100	700	2,300	230	5.0	1,000	200	5.0	5.0	2,900	2.0	10,000
GSI Criteria		1,700	2,200	200(1)	1,100(1)	350	740	360(1)	130	620	1,500(1)	18	28	NC	60(1)	270	89	330(1)	200(1)	17	13(1)	41
Residential GWSLs for Vapor Intrusion		8.2E+06	4.3E+06	27	44,000	140	4,300	41	370	83	360	700	10	92	94	36,000	17,000	96	10	1,700	2.8	10,000
Non-Residential GWSLs for Vapor Intrusion		3.4E+07	1.8E+07	140	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	53	390	460	1.5E+05	71,000	480	41	7,300	52	10,000
Groundwater Contact Criteria		3.1E+07	2.4E+08	11,000	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	56,000	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000(3)	56,000	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
PRB-08s (6-11') Depth to Groundwater* Approx. 6.0 - 7.0'	8/10/2011	**83**	**39**	<1.0	<5.0	<1.0	**11**	<1.0	**1.0**	**84**	**9.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.3**	<1.0	**31**	<3.0
	10/7/2011	**240**	**300**	<2.5	<12	<2.5	**7.3**	<2.5	<2.5	**77**	**9.2**	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**24**	<7.5
	1/11/2012	<20	<5.0	<1.0	<5.0	<1.0	**2.0**	<1.0	<1.0	**35**	**4.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**10**	<3.0
	4/10/2012	<20	<5.0	<1.0	<5.0	<1.0	**1.3**	<1.0	<1.0	**18**	**2.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.5**	<3.0
	7/13/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**11**	**1.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.8**	<3.0
	10/4/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**11**	**1.6**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.2**	<3.0
	3/5/2013	<20	<5.0	<1.0	<5.0	<1.0	**3.6**	<1.0	<1.0	**27**	**3.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.9**	<3.0
	6/6/2013	<20	<5.0	<1.0	<5.0	<1.0	**6.9**	<1.0	<1.0	**50**	**6.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.0**	<3.0
	8/26/2013	<20	<5.0	<1.0	<5.0	<1.0	**6.9**	<1.0	<1.0	**65**	**7.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.5**	<3.0
	11/15/2013	<20	<5.0	<1.0	<5.0	<1.0	**5.3**	<1.0	<1.0	**62**	**7.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	<3.0
	5/28/2014	<20	<5.0	<1.0	<5.0	<1.0	**4.0**	<1.0	<1.0	**13**	**1.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	<3.0
	11/25/2014	<20	<5.0	<1.0	<5.0	<1.0	**5.3**	<1.0	<1.0	**14**	**1.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.2**	<3.0
	4/22/2015	<20	<5.0	<1.0	<5.0	<1.0	**4.4**	**1.0**	<1.0	**12**	**1.6**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<3.0
	12/7/2015	<20	<5.0	<1.0	<5.0	<1.0	**3.5**	**1.4**	<1.0	**4.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<3.0
PRB-08d (18.5-23.5') Depth to Groundwater* Approx. 6.0 - 7.0'	8/10/2011	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**14**	<3.0
	10/7/2011	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.6**	<3.0
	1/11/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.2**	<3.0
	4/10/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.1**	<3.0
	7/13/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**11**	<3.0
	10/4/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**23**	<3.0
	3/5/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**37**	<3.0
	6/6/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**37**	<3.0
	8/26/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**46**	<3.0
	11/15/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**44**	<3.0
	5/28/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**49**	<3.0
	11/25/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**36**	<3.0
	4/22/2015	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**28**	<3.0
	12/7/2015	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**39**	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlying clay unit. The depth to the bottom of the upper clay unit is approximately 3.5 feet below ground surface (ft bgs) at PRB-09s; 4.0 ft bgs at PRB-06s; 5.0 ft bgs at PRB-08s, PRB-08d, and PRB-10s; 6.5 ft bgs at PRB-01s, PRB-02s, PRB-04s, and PRB-04d; 7.0 ft bgs at PRB-05s and PRB-07s; and 8.0 ft bgs at PRB-03s.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D6
Summary of Detected Volatile Organic Compounds in Groundwater at PRB Monitoring Wells
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Acetone(2)	2-Butanone	Benzene(2)	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene(2)	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	Ethyl-benzene(2)	Isopropyl-benzene	n-Propyl Benzene(2)	Tetrachloro-ethene	Toluene(2)	1,1,1-Tri-chloroethane	1,1,2-Tri-chloroethane	Trichloro-ethene	1,2,4-Tri-methyl-benzene	Vinyl Chloride	Total Xylenes(2)
Residential Health-Based DW Criteria		730	13,000	5.0	430	80	880	5.0	7.0	70	100	700	800	80	5.0	1,000	200	5.0	5.0	1,000	2.0	10,000
Non-Residential Health-Based DW Criteria		2,100	38,000	5.0	1,700	80	2,500	5.0	7.0	70	100	700	2,300	230	5.0	1,000	200	5.0	5.0	2,900	2.0	10,000
GSI Criteria		1,700	2,200	200(1)	1,100(1)	350	740	360(1)	130	620	1,500(1)	18	28	NC	60(1)	270	89	330(1)	200(1)	17	13(1)	41
Residential GWSLs for Vapor Intrusion		8.2E+06	4.3E+06	27	44,000	140	4,300	41	370	83	360	700	10	92	94	36,000	17,000	96	10	1,700	2.8	10,000
Non-Residential GWSLs for Vapor Intrusion		3.4E+07	1.8E+07	140	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	53	390	460	1.5E+05	71,000	480	41	7,300	52	10,000
Groundwater Contact Criteria		3.1E+07	2.4E+08	11,000	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	56,000	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000(3)	56,000	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
PRB-09s (5-10') Depth to Groundwater* Approx. 6.5 - 7.5'	8/11/2011	**4,200**	**8,200**	<100	<500	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<300
	10/6/2011	**13,000**	**17,000**	<100	<500	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**110**	<100	<100	<100	<100	<100	<300
	1/12/2012	<200	**68**	<10	<50	<10	<10	<10	<10	**14**	<10	<10	<10	<10	<10	**1,400**	<10	<10	<10	<10	<10	<30
	2/9/2012	<200	**200**	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**1,600**	<10	<10	<10	<10	<10	<30
	4/9/2012	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**2,000**	<10	<10	<10	<10	<10	<30
	7/13/2012	<400	<100	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**2,000**	<20	<20	<20	<20	<20	<60
	10/9/2012	<100	<25	<5.0	<25	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**610**	<5.0	<5.0	<5.0	<5.0	<5.0	<15
	3/5/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.9**	<1.0	<1.0	<1.0	**54**	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	6/7/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.2**	<1.0	<1.0	<1.0	**160**	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	8/27/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.2**	<1.0	<1.0	<1.0	**32**	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	11/14/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.4**	<1.0	<1.0	<1.0	**8.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	5/30/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.0**	<1.0	<1.0	<1.0	**18**	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	11/25/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.4**	<1.0	<1.0	<1.0	**3.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	4/20/2015	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.7**	<1.0	<1.0	<1.0	**2.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
PRB-10s (6-11') Depth to Groundwater* Approx. 7.0 - 8.0'	8/11/2011	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**11**	**1.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	10/6/2011	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**16**	**2.6**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	1/12/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**42**	**4.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	4/9/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**26**	**3.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	7/13/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**17**	**2.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	10/9/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**5.9**	**1.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	3/5/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**15**	**2.6**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	6/6/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**31**	**4.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	8/27/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**57**	**7.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	11/14/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**40**	**5.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	5/30/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**31**	**4.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	11/26/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**16**	**2.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	4/20/2015	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**8.0**	**1.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlying clay unit. The depth to the bottom of the upper clay unit is approximately 3.5 feet below ground surface (ft bgs) at PRB-09s; 4.0 ft bgs at PRB-06s; 5.0 ft bgs at PRB-08s, PRB-08d, and PRB-10s; 6.5 ft bgs at PRB-01s, PRB-02s, PRB-04s, and PRB-04d; 7.0 ft bgs at PRB-05s and PRB-07s; and 8.0 ft bgs at PRB-03s.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D6
Summary of Detected Volatile Organic Compounds in Groundwater at PRB Monitoring Wells
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Acetone[2]	2-Butanone	Benzene[2]	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene[2]	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	Ethyl-benzene[2]	Isopropyl-benzene	n-Propyl Benzene[2]	Tetrachloro-ethene	Toluene[2]	1,1,1-Tri-chloroethane	1,1,2-Tri-chloroethane	Trichloro-ethene	1,2,4-Tri-methyl-benzene	Vinyl Chloride	Total Xylenes[2]
Residential Health-Based DW Criteria		730	13,000	5.0	430	80	880	5.0	7.0	70	100	700	800	80	5.0	1,000	200	5.0	5.0	1,000	2.0	10,000
Non-Residential Health-Based DW Criteria		2,100	38,000	5.0	1,700	80	2,500	5.0	7.0	70	100	700	2,300	230	5.0	1,000	200	5.0	5.0	2,900	2.0	10,000
GSI Criteria		1,700	2,200	200[1]	1,100[1]	350	740	360[1]	130	620	1,500[1]	18	28	NC	60[1]	270	89	330[1]	200[1]	17	13[1]	41
Residential GWSLs for Vapor Intrusion		8.2E+06	4.3E+06	27	44,000	140	4,300	41	370	83	360	700	10	92	94	36,000	17,000	96	10	1,700	2.8	10,000
Non-Residential GWSLs for Vapor Intrusion		3.4E+07	1.8E+07	140	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	53	390	460	1.5E+05	71,000	480	41	7,300	52	10,000
Groundwater Contact Criteria		3.1E+07	2.4E+08	11,000	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	56,000	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000[3]	56,000	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
PRB-11s (15-20') Depth to Groundwater Approx. 15.5 - 16.5'	8/10/2011	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.4**	<1.0	<1.0	<3.0
	10/6/2011	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.5**	<1.0	<1.0	<3.0
	1/11/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.7**	<1.0	<1.0	<3.0
	4/9/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<3.0
	7/16/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<3.0
	10/11/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.0
	3/4/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	<1.0	<1.0	<3.0
	6/7/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	<1.0	<1.0	<3.0
	8/26/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.5**	<1.0	<1.0	<3.0
	11/15/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.5**	<1.0	<1.0	<3.0
	5/29/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<3.0
	11/26/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<3.0
	4/22/2015	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<3.0
	12/7/2015	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**	<1.0	<1.0	<3.0
PRB-12s (15-20') Depth to Groundwater Approx. 15.5 - 16.5'	8/11/2011	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**17**	<10	**33**	<10	**1,100**	<10	<10	<30
	10/7/2011	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**17**	<10	**35**	<10	**1,300**	<10	<10	<30
	1/12/2012	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**14**	<10	**26**	<10	**950**	<10	<10	<30
	4/9/2012	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**12**	<10	**25**	<10	**850**	<10	<10	<30
	7/12/2012	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**14**	<10	**27**	**10**	**1,200**	<10	<10	<30
	10/11/2012	<200	**84**	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**16**	<10	**30**	<10	**1,600**	<10	<10	<30
	3/5/2013	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**12**	<10	**21**	<10	**840**	<10	<10	<30
	6/5/2013	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**12**	<10	**19**	<10	**950**	<10	<10	<30
	8/27/2013	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**13**	<10	**24**	<10	**1,200**	<10	<10	<30
	11/13/2013	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**16**	<10	**25**	<10	**1,200**	<10	<10	<30
	5/29/2014	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**11**	<10	**26**	<10	**870**	<10	<10	<30
	11/26/2014	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	**12**	<10	**30**	<10	**1,100**	<10	<10	<30
	4/21/2015	<200	<50	<10	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**32**	<10	**910**	<10	<10	<30

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlying clay unit. The depth to the bottom of the upper clay unit is approximately 3.5 feet below ground surface (ft bgs) at PRB-09s; 4.0 ft bgs at PRB-06s; 5.0 ft bgs at PRB-08s, PRB-08d, and PRB-10s; 6.5 ft bgs at PRB-01s, PRB-02s, PRB-04s, and PRB-04d; 7.0 ft bgs at PRB-05s and PRB-07s; and 8.0 ft bgs at PRB-03s.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D6
Summary of Detected Volatile Organic Compounds in Groundwater at PRB Monitoring Wells
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Acetone(2)	2-Butanone	Benzene(2)	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene(2)	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	Ethyl-benzene(2)	Isopropyl-benzene	n-Propyl Benzene(2)	Tetrachloro-ethene	Toluene(2)	1,1,1-Tri-chloroethane	1,1,2-Tri-chloroethane	Trichloro-ethene	1,2,4-Tri-methyl-benzene	Vinyl Chloride	Total Xylenes(2)
Residential Health-Based DW Criteria		730	13,000	5.0	430	80	880	5.0	7.0	70	100	700	800	80	5.0	1,000	200	5.0	5.0	1,000	2.0	10,000
Non-Residential Health-Based DW Criteria		2,100	38,000	5.0	1,700	80	2,500	5.0	7.0	70	100	700	2,300	230	5.0	1,000	200	5.0	5.0	2,900	2.0	10,000
GSI Criteria		1,700	2,200	200(1)	1,100(1)	350	740	360(1)	130	620	1,500(1)	18	28	NC	60(1)	270	89	330(1)	200(1)	17	13(1)	41
Residential GWSLs for Vapor Intrusion		8.2E+06	4.3E+06	27	44,000	140	4,300	41	370	83	360	700	10	92	94	36,000	17,000	96	10	1,700	2.8	10,000
Non-Residential GWSLs for Vapor Intrusion		3.4E+07	1.8E+07	140	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	53	390	460	1.5E+05	71,000	480	41	7,300	52	10,000
Groundwater Contact Criteria		3.1E+07	2.4E+08	11,000	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	56,000	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000(3)	56,000	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
PRB-13s (19-24') Depth to Groundwater Approx. 18.0 - 19.0'	8/11/2011	<200	<50	<10	<50	<10	<10	<10	<10	**12**	<10	<10	<10	<10	<10	<10	**380**	<10	**550**	<10	**14**	<30
	10/6/2011	<500	<120	<25	<120	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	**1,100**	<25	**2,700**	<25	<25	<75
	1/12/2012	<500	<120	<25	<120	<25	<25	<25	<25	**25**	<25	<25	<25	<25	<25	<25	**1,200**	<25	**2,800**	<25	<25	<75
	4/3/2012	<500	<120	<25	<120	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	**1,100**	<25	**2,500**	<25	<25	<75
	7/12/2012	<400	<100	<20	<100	<20	<20	<20	**23**	<20	<20	<20	<20	<20	<20	<20	**1,200**	<20	**2,900**	<20	**20**	<60
	10/11/2012	<400	**110**	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**1,200**	<20	**3,100**	<20	<20	<60
	3/5/2013	<400	**110**	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**1,300**	<20	**3,200**	<20	<20	<60
	6/5/2013	<400	<100	<20	<100	<20	<20	<20	<20	**20**	<20	<20	<20	<20	<20	<20	**1,200**	<20	**2,700**	<20	<20	<60
	8/27/2013	<400	<100	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**1,100**	<20	**2,800**	<20	<20	<60
	11/13/2013	<400	<100	<20	<100	<20	<20	<20	<20	**20**	<20	<20	<20	<20	<20	<20	**1,200**	<20	**2,500**	<20	<20	<60
	5/29/2014	<400	<100	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**1,200**	<20	**2,400**	<20	<20	<60
	11/26/2014	<400	<100	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**1,000**	<20	**2,700**	<20	**29**	<60
	4/21/2015	<400	<100	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**1,300**	<20	**2,700**	<20	**20**	<60
PRB-14s (19.5-24.5') Depth to Groundwater 17.0 - 18.0'	8/11/2011	<400	<100	<20	<100	<20	<20	<20	<20	**65**	<20	<20	<20	<20	<20	<20	**910**	<20	**3,000**	<20	**62**	<60
	10/6/2011	<400	<100	<20	<100	<20	<20	<20	<20	**48**	<20	<20	<20	<20	<20	<20	**1,100**	<20	**3,300**	<20	**65**	<60
	1/12/2012	<400	<100	<20	<100	<20	<20	<20	<20	**53**	<20	<20	<20	<20	<20	<20	**1,000**	<20	**3,200**	<20	**57**	<60
	4/3/2012	<400	<100	<20	<100	<20	<20	<20	<20	**29**	<20	<20	<20	<20	<20	<20	**990**	<20	**2,700**	<20	**32**	<60
	7/12/2012	<400	<100	<20	<100	<20	<20	<20	<20	**33**	<20	<20	<20	<20	<20	<20	**1,200**	<20	**3,100**	<20	**43**	<60
	10/11/2012	<400	**120**	<20	<100	<20	<20	<20	<20	**35**	<20	<20	<20	<20	<20	<20	**1,300**	<20	**3,500**	<20	**45**	<60
	3/5/2013	<400	**120**	<20	<100	<20	<20	<20	<20	**29**	<20	<20	<20	<20	<20	<20	**1,100**	<20	**3,200**	<20	**41**	<60
	6/5/2013	<400	<100	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**1,200**	<20	**2,700**	<20	<20	<60
	8/27/2013	<400	<100	<20	<100	<20	<20	<20	<20	**29**	<20	<20	<20	<20	<20	<20	**1,100**	<20	**3,100**	<20	**31**	<60
	11/13/2013	<400	<100	<20	<100	<20	<20	<20	<20	**25**	<20	<20	<20	<20	<20	<20	**1,100**	<20	**2,600**	<20	**25**	<60
	5/29/2014	<400	<100	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**1,000**	<20	**2,800**	<20	**42**	<60
	11/26/2014	<400	<100	<20	<100	<20	<20	<20	<20	**43**	<20	<20	<20	<20	<20	<20	**920**	<20	**2,900**	<20	**56**	<60
	4/21/2015	<400	<100	<20	<100	<20	<20	<20	<20	**20**	<20	<20	<20	<20	<20	<20	**1,200**	<20	**2,900**	<20	**40**	<60

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlying clay unit. The depth to the bottom of the upper clay unit is approximately 3.5 feet below ground surface (ft bgs) at PRB-09s; 4.0 ft bgs at PRB-06s; 5.0 ft bgs at PRB-08s, PRB-08d, and PRB-10s; 6.5 ft bgs at PRB-01s, PRB-02s, PRB-04s, and PRB-04d; 7.0 ft bgs at PRB-05s and PRB-07s; and 8.0 ft bgs at PRB-03s.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D6
Summary of Detected Volatile Organic Compounds in Groundwater at PRB Monitoring Wells
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Acetone(2)	2-Butanone	Benzene(2)	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene(2)	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	Ethyl-benzene(2)	Isopropyl-benzene	n-Propyl Benzene(2)	Tetrachloro-ethene	Toluene(2)	1,1,1-Tri-chloroethane	1,1,2-Tri-chloroethane	Trichloro-ethene	1,2,4-Tri-methyl-benzene	Vinyl Chloride	Total Xylenes(2)
Residential Health-Based DW Criteria		730	13,000	5.0	430	80	880	5.0	7.0	70	100	700	800	80	5.0	1,000	200	5.0	5.0	1,000	2.0	10,000
Non-Residential Health-Based DW Criteria		2,100	38,000	5.0	1,700	80	2,500	5.0	7.0	70	100	700	2,300	230	5.0	1,000	200	5.0	5.0	2,900	2.0	10,000
GSI Criteria		1,700	2,200	200(1)	1,100(1)	350	740	360(1)	130	620	1,500(1)	18	28	NC	60(1)	270	89	330(1)	200(1)	17	13(1)	41
Residential GWSLs for Vapor Intrusion		8.2E+06	4.3E+06	27	44,000	140	4,300	41	370	83	360	700	10	92	94	36,000	17,000	96	10	1,700	2.8	10,000
Non-Residential GWSLs for Vapor Intrusion		3.4E+07	1.8E+07	140	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	53	390	460	1.5E+05	71,000	480	41	7,300	52	10,000
Groundwater Contact Criteria		3.1E+07	2.4E+08	11,000	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	56,000	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000(3)	56,000	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
PRB-15s (15-20') Depth to Groundwater 16.0 - 17.0'	8/11/2011	<400	<100	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**1,200**	<20	**2,500**	<20	<20	<60
	10/6/2011	<400	<100	<20	<100	<20	<20	<20	<20	**20**	<20	<20	<20	<20	<20	<20	**1,200**	<20	**2,700**	<20	<20	<60
	1/12/2012	<400	<100	<20	<100	<20	<20	<20	<20	**21**	<20	<20	<20	<20	<20	<20	**850**	<20	**1,900**	<20	<20	<60
	4/9/2012	<400	<100	<20	<100	<20	<20	<20	<20	**1,700**	<20	<20	<20	<20	<20	<20	**730**	<20	**1,800**	<20	<20	<60
	7/12/2012	<400	<100	<20	<100	<20	<20	<20	<20	**460**	<20	<20	<20	<20	<20	<20	**580**	<20	**2,300**	<20	<20	<60
	10/11/2012	<400	**120**	<20	<100	<20	<20	<20	<20	**880**	<20	<20	<20	<20	<20	<20	**750**	<20	**2,700**	<20	<20	<60
	3/5/2013	<400	**110**	<20	<100	<20	<20	<20	<20	**120**	<20	<20	<20	<20	<20	<20	**570**	<20	**1,800**	<20	<20	<60
	6/5/2013	<400	<100	<20	<100	<20	<20	<20	<20	**130**	<20	<20	<20	<20	<20	<20	**260**	<20	**1,600**	<20	<20	<60
	8/27/2013	<400	<100	<20	<100	<20	<20	<20	<20	**100**	<20	<20	<20	<20	<20	<20	**280**	<20	**1,800**	<20	<20	<60
	11/14/2013	<400	<100	<20	<100	<20	<20	<20	<20	**46**	<20	<20	<20	<20	<20	<20	**720**	<20	**1,500**	<20	<20	<60
	5/29/2014	<200	<50	<10	<50	<10	<10	<10	<10	**41**	<10	<10	<10	<10	<10	<10	**350**	<10	**1,500**	<10	<10	<30
	11/26/2014	<200	<50	<10	<50	<10	<10	<10	<10	**28**	<10	<10	<10	<10	<10	<10	**500**	<10	**1,900**	<10	<10	<30
	4/21/2015	<400	<100	<20	<100	<20	<20	<20	<20	**24**	<20	<20	<20	<20	<20	<20	**570**	<20	**2,000**	<20	<20	<60
	12/4/2015	<500	<120	<25	<120	<25	<25	<25	<25	**28**	<25	<25	<25	<25	<25	<25	**420**	<25	**2100**	<25	<25	<75
PRB-15d (29-34') Depth to Groundwater 16.0 - 17.0'	8/11/2011	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.9**	<1.0	<1.0	<3.0
	10/6/2011	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**5.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.3**	<1.0	**13**	<1.0	**1.9**	<3.0
	1/12/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**3.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.4**	<1.0	**28**	<1.0	**1.2**	<3.0
	4/9/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**6.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.0**	<1.0	**24**	<1.0	**2.0**	<3.0
	7/12/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**2.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.7**	<1.0	**19**	<1.0	<1.0	<3.0
	10/11/2012	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**3.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.2**	<1.0	**26**	<1.0	<1.0	<3.0
	3/5/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**3.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.0**	<1.0	**32**	<1.0	<1.0	<3.0
	6/5/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**2.6**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.7**	<1.0	**19**	<1.0	<1.0	<3.0
	8/27/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.0**	<1.0	**21**	<1.0	<1.0	<3.0
	11/14/2013	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	**1.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.6**	<1.0	**26**	<1.0	<1.0	<3.0
	5/29/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.5**	<1.0	<1.0	<3.0
	11/26/2014	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.4**	<1.0	<1.0	<3.0
	4/21/2015	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1**	<3.0
	12/4/2015	<20	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.3**	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlying clay unit. The depth to the bottom of the upper clay unit is approximately 3.5 feet below ground surface (ft bgs) at PRB-09s; 4.0 ft bgs at PRB-06s; 5.0 ft bgs at PRB-08s, PRB-08d, and PRB-10s; 6.5 ft bgs at PRB-01s, PRB-02s, PRB-04s, and PRB-04d; 7.0 ft bgs at PRB-05s and PRB-07s; and 8.0 ft bgs at PRB-03s.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D6
Summary of Detected Volatile Organic Compounds in Groundwater at PRB Monitoring Wells
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		Acetone(2)	2-Butanone	Benzene(2)	Chloroethane	Chloroform	1,1-Dichloro-ethane	1,2-Dichloro-ethane	1,1-Dichloro-ethene(2)	cis-1,2-Dichloro-ethene	trans-1,2-Dichloro-ethene	Ethyl-benzene(2)	Isopropyl-benzene	n-Propyl Benzene(2)	Tetrachloro-ethene	Toluene(2)	1,1,1-Tri-chloroethane	1,1,2-Tri-chloroethane	Trichloro-ethene	1,2,4-Tri-methyl-benzene	Vinyl Chloride	Total Xylenes(2)
Residential Health-Based DW Criteria		730	13,000	5.0	430	80	880	5.0	7.0	70	100	700	800	80	5.0	1,000	200	5.0	5.0	1,000	2.0	10,000
Non-Residential Health-Based DW Criteria		2,100	38,000	5.0	1,700	80	2,500	5.0	7.0	70	100	700	2,300	230	5.0	1,000	200	5.0	5.0	2,900	2.0	10,000
GSI Criteria		1,700	2,200	200(1)	1,100(1)	350	740	360(1)	130	620	1,500(1)	18	28	NC	60(1)	270	89	330(1)	200(1)	17	13(1)	41
Residential GWSLs for Vapor Intrusion		8.2E+06	4.3E+06	27	44,000	140	4,300	41	370	83	360	700	10	92	94	36,000	17,000	96	10	1,700	2.8	10,000
Non-Residential GWSLs for Vapor Intrusion		3.4E+07	1.8E+07	140	1.8E+05	720	18,000	210	1,600	350	1,500	2,600	53	390	460	1.5E+05	71,000	480	41	7,300	52	10,000
Groundwater Contact Criteria		3.1E+07	2.4E+08	11,000	4.4E+05	1.5E+05	2.4E+06	19,000	11,000	2.0E+05	2.2E+05	1.7E+05	56,000	15,000	12,000	5.3E+05	1.3E+06	21,000	13,000(3)	56,000	1,000	1.9E+05
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
PRB-16s (5-10') Depth to Groundwater 6.5 - 7.5'	8/6/2012	<20	<5.0	<1.0	<5.0	<1.0	**5.3**	<1.0	**1.4**	**51**	**4.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.5**	**3.5**	<1.0	<1.0	<3.0
	10/9/2012	<20	<5.0	<1.0	<5.0	<1.0	**3.8**	<1.0	**1.1**	**31**	**2.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.5**	**4.6**	<1.0	<1.0	<3.0
	3/27/2013	<20	<5.0	<1.0	<5.0	<1.0	**3.6**	<1.0	**1.1**	**29**	**3.2**	<1.0	<1.0	<1.0	<1.0	<1.0	**1.0**	**2.8**	**12**	<1.0	<1.0	<3.0
	6/6/2013	<20	<5.0	<1.0	<5.0	<1.0	**4.4**	<1.0	**1.3**	**32**	**2.9**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**3.1**	**11**	<1.0	<1.0	<3.0
	8/27/2013	<20	<5.0	<1.0	<5.0	<1.0	**7.9**	<1.0	**1.9**	**28**	**2.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.2**	**21**	<1.0	<1.0	<3.0
	11/14/2013	<20	<5.0	<1.0	<5.0	<1.0	**12**	<1.0	**2.9**	**28**	**2.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**5.0**	**21**	<1.0	<1.0	<3.0
	5/30/2014	<20	<5.0	<1.0	<5.0	<1.0	**8.2**	<1.0	**3.0**	**19**	**1.6**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**4.5**	**25**	<1.0	<1.0	<3.0
	12/1/2014	<20	<5.0	<1.0	<5.0	<1.0	**9.9**	<1.0	**5.2**	**28**	**2.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**9.1**	**66**	<1.0	<1.0	<3.0
	4/20/2015	<20	<5.0	<1.0	<5.0	<1.0	**9.7**	<1.0	**5.3**	**26**	**2.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**9.6**	**91**	<1.0	<1.0	<3.0

Notes:

Health-Based Residential and Non-Residential Drinking Water (DW) Criteria and Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Groundwater Contact (GC) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, September 28, 2012. Groundwater Screening Levels (GWSLs) for Vapor Intrusion were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ug/L = micrograms per liter

NC = No criteria

Bold font denotes concentrations detected above laboratory reporting limits

Denotes concentrations above one or more criteria

* An asterisk indicates that the depth to groundwater intersects or may periodically intersect an overlying clay unit. The depth to the bottom of the upper clay unit is approximately 3.5 feet below ground surface (ft bgs) at PRB-09s; 4.0 ft bgs at PRB-06s; 5.0 ft bgs at PRB-08s, PRB-08d, and PRB-10s; 6.5 ft bgs at PRB-01s, PRB-02s, PRB-04s, and PRB-04d; 7.0 ft bgs at PRB-05s and PRB-07s; and 8.0 ft bgs at PRB-03s.

1) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.

2) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.

3) At the request of USEPA, a site-specific groundwater contact criteria for trichloroethene (TCE) was recalculated to reflect revised TCE toxicity data which were published by USEPA on September 28, 2011.

Table D7
Summary of Chlorinated Volatile Organic Compounds at Storm Water Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene[1]	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
GSI Criteria		740	360[2]	130	620	1,500[2]	60[2]	89	200[2]	13[2]
Human Non-Cancer Value (Non-Drink)		400,000	420,000	33,000	36,000	19,000	1,800	1,300,000	550	4,400
Human Cancer Value (Non-Drink)		NC	360	NC	NC	NC	60	NC	370	13
Final Chronic Value		740	2,000	130	620	1,500	190	89	200	930
Aquatic Maximum Value		6,600	8,200	1,200	5,500	14,000	1,400	800	1,800	8,400
Final Acute Value		13,000	16,000	2,300	11,000	28,000	2,900	1,600	3,500	17,000
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
STW-1	4/13/2009	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.85**
	12/9/2009	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/16/2010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/2/2010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/10/2010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
STW-2	4/13/2009	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**23**
	12/9/2009	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	3/16/2010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/14/2010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	9/2/2010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/10/2010[3]	--	--	--	--	--	--	--	--	--
STW-3	4/13/2009	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
STW-4	4/13/2009	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
STW-5	4/13/2009	<0.5	<0.5	<0.5	**1.6**	<0.5	<0.5	<0.5	**0.55**	<0.5
STW-6	4/13/2009	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
STW-7	4/13/2009	<0.5	<0.5	<0.5	**0.64**	<0.5	**0.63**	<0.5	**2.7**	<0.5
STW-8	4/13/2009	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Notes:
Groundwater/Surface Water Interface (GSI) Criteria from MDEQ RRD Part 201 Generic Cleanup Criteria/Part 213 Risk Based Cleanup Levels, December 30, 2013. Human Non-Cancer Values (HNV), Human Cancer Values (HCV), Final Chronic Values (FCV), Aquatic Maximum Values (AMV) and Final Acute Values (FAV) from MDEQ Surface Water Assessment Rule 57 Water Quality Values, September 7, 2012.
ug/L = micrograms per liter
NC = No criteria
-- = No data
Bold font denotes concentrations detected above laboratory reporting limits
Denotes concentrations above one or more criteria
1) Compound may exhibit characteristic ignitability as defined in 40 C.F.R. § 261.21.
2) Criterion is not protective for surface water used as a drinking water source as described in footnote {X} of MDEQ Op Memo 1 Part 201, Attachment 1.
3) Insufficient flow to collect sample.

Table D8
Summary of Chlorinated Volatile Organic Compounds at On-Site Sub-Slab Soil Gas Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl chloride	2-Propanol
Non-Residential Sub-Slab SGSLs[1]		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500	NC
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	%
SV-01	10/29/2009	**30.8**	<0.94	<0.94	**450**	**6.4**	**9.1**	**554**	**17,100**	<0.92	**0.010**
SV-01	1/5/2010	**178**	**41.6**	<29.4	**456**	<56.4	**128**	**482**	**13,000**	<28.8	**2.2E-05**
SV-02	10/29/2009	**39.8**	<1.0	<1.0	**137**	**18.3**	**8.4**	**6,180**	**11,800**	<0.98	**0.025**
SV-02	1/5/2010	**39.3**	<17.5	<17.5	**187**	**56.7**	**115**	**1,940**	**3,390**	<17.1	**9.8E-04**
SV-02	3/26/2010	<261	<261	<261	**326**	<502	<261	**5,570**	**16,700**	<256	<2.5E-5
SV-03[2]	10/29/2009	--	--	--	--	--	--	--	--	--	**24**
SV-03	1/5/2010	**87.9**	<17.5	<17.5	**874**	<33.6	**162**	**532**	**9,500**	<17.1	**2.8E-04**
SV-04	10/29/2009	**2.3**	<0.97	<0.97	<0.97	<1.9	**14.9**	**410**	**2,430**	<0.95	**0.004**
SV-04	1/5/2010	<29.4	<29.4	<29.4	<29.4	<56.4	<29.4	**289**	**1,330**	<28.8	**4.2E-06**
SV-05	10/29/2009	**2.6**	<0.87	<0.87	<0.87	<1.7	<0.87	**13.0**	**25.9**	<0.86	**0.055**
SV-05	1/5/2010	<29.4	<29.4	<29.4	<29.4	<56.4	<29.4	<29.4	<29.4	<28.8	**1.6E-03**
SV-06	10/29/2009	**467**	<280	<280	<280	<538	<280	**8,400**	**12,800**	<274	**1.3**
SV-06	1/5/2010	**416**	<17.5	**29.9**	**261**	<33.6	**38.3**	**7,200**	**15,200**	<17.1	**5.4E-05**
SV-06	3/26/2010	**371**	**474**	<290	<290	<557	<290	**5,840**	**6,580**	<284	<2.8E-5
SV-07	10/29/2009	<321	<321	<321	**1,030**	<618	<321	<321	**4,120**	<315	**0.002**
SV-07	1/5/2010	**119**	<17.5	<17.5	**806**	**327**	<17.5	**152**	**1,720**	<17.1	**2.1E-06**
SV-08	10/29/2009	<280	<280	<280	<280	<538	<280	<280	**13,400**	<274	**0.016**
SV-08	1/5/2010	**33.5**	<17.5	<17.5	**225**	**256**	<17.5	**185**	**2,370**	<17.1	**2.0E-06**
SV-09	10/29/2009	<321	<321	<321	<321	<618	<321	<321	**510**	<315	**1.4E-04**
SV-09	1/5/2010	<17.5	**17.8**	<17.5	<17.5	<33.6	<17.5	**59.8**	**453**	<17.1	**8.4E-05**
SV-10	10/29/2009	<290	<290	<290	<290	<557	<290	<290	<290	<284	**0.52**
SV-10	1/5/2010	<29.4	<29.4	<29.4	<29.4	<56.4	<29.4	<29.4	**644**	<28.8	**3.7E-06**
SV-11	10/29/2009	<4,470	<4,470	<4,470	<4,470	<8,600	<4,470	**6,490**	**118,000**	<4,390	**8.1E-04**
SV-11	1/5/2010	**87.5**	**183**	<47.0	**1,010**	<90.3	**53.0**	**2,190**	**20,200**	<46.1	**7.4E-05**
SV-11	3/26/2010	**95.3**	<18.1	<18.1	**743**	<34.8	<18.1	**1,200**	**9,670**	<17.7	**8.60E-06**
SV-12	10/29/2009	<321	<321	<321	<321	<618	<321	**13,200**	**13,300**	<315	**0.002**
SV-12	1/5/2010	**61.1**	<17.5	**88.3**	**30.6**	<33.6	<17.5	**9,270**	**10,500**	<17.1	**3.9E-05**
SV-12	3/26/2010	<579	<579	<579	<579	<1,110	<579	**14,900**	**8,230**	<568	<5.6E-5
SV-13	10/29/2009	<321	<321	**1,160**	<321	<618	<321	**19,200**	**6,660**	<315	**8.4E-05**
SV-13	1/5/2010	**46.1**	**363**	**242**	**71.0**	<33.6	**93.8**	**10,900**	**4,840**	<17.1	**4.4E-06**
SV-13 (DUP-01)	1/5/2010	**62.5**	<17.5	**356**	**92.4**	<33.6	**44.2**	**4,810**	**2,810**	<17.1	**6.3E-04**
SV-14[2]	10/30/2009	--	--	--	--	--	--	--	--	--	**16**
SV-14	1/5/2010	<29.4	<29.4	<29.4	<29.4	<56.4	<29.4	**118**	**219**	<28.8	**3.2E-06**
DUP-01 (SV-14)	10/30/2009	<223	<223	<223	<223	<429	<223	**261**	**555**	<219	**0.39**
SV-15	10/29/2009	<290	<290	**4,360**	<290	<557	<290	**208,000**	**45,400**	<284	**1.5**
SV-15	1/5/2010	**468**	<29.4	**3,850**	**537**	<56.4	**344**	**436,000**	**103,000**	<28.8	**2.3E-05**
SV-15	3/26/2010	<16,700	<16,700	<16,700	<16,700	<32,200	<16,700	**186,000**	**43,600**	<16,400	<1.6E-3
SV-15 (DUP-02)	3/26/2010	<16,700	<16,700	<16,700	<16,700	<32,200	<16,700	**191,000**	**45,700**	<16,400	<1.6E-3
SV-16[2]	10/29/2009	--	--	--	--	--	--	--	--	--	**9.7**
SV-16	1/5/2010	**222**	<17.5	**93.0**	**551**	<33.6	<17.5	**3,930**	**5,670**	<17.1	<1.7E-06
SV-16	3/26/2010	**313**	<280	<280	**707**	<538	<280	**6,200**	**4,650**	<274	<2.7E-5
SV-17	10/29/2009	<321	<321	<321	<321	<618	<321	**9,320**	**14,700**	<315	**7.5E-04**
SV-17	1/5/2010	<29.4	<29.4	**44.9**	**49.3**	<56.4	<29.4	**7,360**	**7,160**	<28.8	**7.1E-05**
SV-18	10/29/2009	**2,910**	<310	<310	**313**	**1,730**	<310	**324**	**11,100**	<304	**1.0**
SV-18	1/5/2010	**762**	<17.5	**36.4**	**138**	**552**	<17.5	**91.3**	**6,820**	<17.1	<1.7E-06

Notes:
1) Non-Residential Sub-Slab Soil Gas Screening Levels (SGSLs) were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013
2) Elevated concentrations of 2-propanol (tracer) detected. Analytical data for other analytes are presumed to be invalid (--).
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above non-residential SGSLs
ppbv = parts per billion by volume
NC = No Criteria

Table D9
Summary of Chlorinated Volatile Organic Compounds at On-Site Indoor Air Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
95th Percentile Background Indoor Air Concentration[1]		<0.06	0.05	0.18	0.30	NA	1.4	5.0	0.63	0.04
Residential Indoor Air Screening Levels[2]		120	0.24	50	1.7	17	5.0	1,100	0.37	0.62
Non-Residential Indoor Air Screening Levels[2]		510	1.2	210	7.3	73	25	4,600	1.5	12
OHSA PELS[3]		100,000	50,000	NC	200,000	200,000	100,000	350,000	100,000	1,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
IA-01 (SV-07)	1/4/2010	<0.70	<0.70	<0.70	<0.70	<1.3	<0.70	<0.70	**16.0**	<0.68
	2/2/2010[4]	<0.70	<0.70	<0.70	<0.70	<1.3	<0.70	<0.70	<0.70	<0.68
IA-02 (SV-08)	1/4/2010	<0.70	<0.70	<0.70	<0.70	<1.3	<0.70	<0.70	**19.8**	<0.68
	2/2/2010[4]	<0.77	<0.77	<0.77	<0.77	<1.5	<0.77	<0.77	**4.3**	<0.75
IA-03 (SV-09)	1/4/2010	<0.74	<0.74	<0.74	<0.74	<1.4	<0.74	<0.74	**15.6**	<0.73
	2/2/2010[4]	<0.80	<0.80	<0.80	<0.80	<1.5	<0.80	<0.80	**2.6**	<0.79
IA-04 (SV-10)	1/4/2010	<0.70	<0.70	<0.70	<0.70	<1.3	<0.70	<0.70	**8.7**	<0.68
	2/2/2010[4]	<0.77	<0.77	<0.77	<0.77	<1.5	<0.77	<0.77	**2.7**	<0.75
IA-05 (SV-18)	1/4/2010	<0.74	<0.74	<0.74	<0.74	<1.4	<0.74	<0.74	**10.8**	<0.73
	2/2/2010[4]	<0.80	<0.80	<0.80	<0.80	<1.5	<0.80	<0.80	**3.0**	<0.79
IA-06	2/2/2010[4]	<0.77	<0.77	<0.77	<0.77	<1.5	<0.77	<0.77	<0.77	<0.75
IA-07	2/2/2010[4]	<0.80	<0.80	<0.80	<0.80	<1.5	<0.80	<0.80	**4.0**	<0.79
IA-08	2/2/2010[4]	<0.96	<0.96	<0.96	<0.96	<1.8	<0.96	<0.96	<0.96	<0.94
IA-09 (SV-06)	3/25/2010	<0.65	<0.65	<0.65	<0.65	<1.2	<0.65	**2.5**	**13.5**	<0.64
IA-10 (SV-03)	3/25/2010	<0.65	<0.65	<0.65	<0.65	<1.2	<0.65	**5.3**	**10.4**	<0.64
IA-11 (SV-11)	3/25/2010	<0.65	<0.65	<0.65	<0.65	<1.2	<0.65	**4.8**	**19.1**	<0.64
IA-12 (SV-12)	3/25/2010	<0.72	<0.72	<0.72	<0.72	<1.4	<0.72	**7.0**	**9.8**	<0.70
IA-13 (SV-13)	3/25/2010	<0.70	**0.83**	<0.70	<0.70	<1.3	<0.70	**10.8**	**8.5**	<0.68
IA-14 (SV-14)	3/25/2010	<0.70	<0.70	<0.70	<0.70	<1.3	<0.70	**6.3**	**8.0**	<0.68
IA-15 (SV-15)	3/25/2010	<0.65	**1.5**	<0.65	<0.65	<1.2	<0.65	**19.2**	**14.4**	<0.64
IA-16 (SV-16)	3/25/2010	<0.70	**0.83**	<0.70	<0.70	<1.3	<0.70	**10.1**	**10.0**	<0.68
IA-17 (SV-17)	3/25/2010	<0.65	**0.65**	<0.65	<0.65	<1.2	<0.65	**8.4**	**17.4**	<0.64
IA-18 (SV-02)	3/25/2010	<0.70	<0.70	<0.70	<0.70	<1.3	<0.70	**3.1**	**17.1**	<0.68
IA-18 (SV-02) DUP-01	3/25/2010	<0.65	<0.65	<0.65	<0.65	<1.2	<0.65	**3.0**	**18.6**	<0.64
IA-19 (SV-01)	3/25/2010	<0.70	<0.70	<0.70	<0.70	<1.3	<0.70	<0.70	**2.2**	<0.68

Notes:
1) Background indoor air concentrations taken from the USEPA Report titled Background Indoor Air Concentrations of Volatile Organic Compounds in North American Residences (1990-2005): A Compilation of Statistics for Assessing Vapor Intrusion, EPA 530-R-10-001, dated June 2011.
2) Residential and Non-Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013
3) United States Department of Labor, Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs) over an 8-hour period (time weighted average).
4) Samples dated February 2, 2010 were collected during a ventilation test. Sample results are not representative of current, stagnant indoor air conditions.

Bold font denotes concentrations detected above laboratory reporting limits.

Denotes concentrations above one or more applicable non-residential indoor air screening level.

ppbv = parts per billion by volume
NC = No Criteria

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-01 (8-8.5')	4/5/2010	**5.7**	<2.3	**4.4**	**17.0**	<4.4	<2.3	**279**	**396**	<2.3
	5/20/2010 (2)	**52.4**	<4.4	**21.6**	**184**	<4.4	**52.1**	**1,690**	**2,800**	<4.4
	10/21/2010	**74.7**	<16.8	<16.8	**272**	**25.8**	**222**	**8,300**	**32,100**	<16.8
	12/9/2010	<709	<709	<709	<709	<709	<709	**6,440**	**17,800**	<709
	4/13/2011	**32.8**	**166**	**21.0**	**110**	**7.8**	**84.6**	**2,630**	**10,500**	<6.7
	6/27/2011	<180	<90	<180	<180	<180	**98.0**	**1,420**	**7,340**	<90
	9/28/2011	<100	<100	<100	**220**	<200	**150**	**4,300**	**19,000**	<100
	11/21/2011 (3)	--	--	--	--	--	--	--	--	--
	1/30/2012	**10**	<4.0	**6.2**	**17**	<8.0	<4.0	**610**	**700**	<4.0
	6/27/2012	**53**	<5.0	**13**	**170**	**19**	**190**	**4,700**	**23,000**	<5.0
	10/1/2012	**56**	<50	<50	**190**	<100	**310**	**5,100**	**16,000**	<50
	11/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**10**	**1.9**	<1.0
	3/14/2013	**4.7**	<1.0	**4.7**	**6.7**	<2.0	<1.0	**300**	**190**	<1.0
	5/30/2013 (4)	<120	<24	<120	<120	<120	**49**	**1,400**	**3,700**	<19
	6/24/2013 (3)	--	--	--	--	--	--	--	--	--
	8/8/2013	**110**	<1.0	**30**	**440**	**45**	**2,200**	**12,000**	**110,000**	<1.0
	11/12/2013	**42**	<1.0	**13**	**160**	**15**	**950**	**6,000**	**51,000**	<1.0
	3/26/2014	<1.0	<1.0	<1.0	**1.2**	<2.0	**11**	**31**	**310**	<1.0
	5/21/2014	**1.0**	**1.6**	<1.0	**3.0**	<2.0	**73**	**180**	**1,500**	<1.0
	7/24/2014	<5.0	<5.0	<5.0	<5.0	<10	**140**	**28**	**890**	<5.0
	11/3/2014	<5.0	<5.0	<5.0	<5.0	<10	**18**	<5.0	**97**	<5.0
	4/1/2015	<1.0	<1.0	<1.0	**1.1**	<2.0	**1.7**	**160**	**150**	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**7.2**	**27**	**89**	<1.0
	9/15/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**11**	**5.7**	**100**	<1.0
	10/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**1.1**	**2.0**	**8.9**	<1.0
SG-01 (DUP-01)	4/5/2010	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2
	5/20/2010 (2)	**63.2**	<4.4	**31.0**	**245**	**22.6**	**256**	**2,120**	**3,770**	<4.4
	9/28/2011	<100	<100	<100	**270**	<200	**200**	**5,800**	**28,000**	<100
	11/21/2011	**22** (6)	<5.0	**9.9**	**48**	<10	**25**	**1,700**	**8,500**	<5.0
	1/30/2012	**15**	<4.0	**9.3**	**26**	<8.0	**4.0**	**920**	**1,000**	<4.0
	10/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**1.0**	**2.1**	**8.1**	<1.0
SG-01 (DUP-02)	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**7.7**	**29**	**95**	<1.0
	9/15/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**9.3**	**5.8**	**100**	<1.0

Notes:

1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.

Bold font denotes concentrations detected above laboratory reporting limits.

Denotes concentrations above one or more soil gas screening level

ppbv - parts per billion by volume

NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-02 (5.5-6')	4/5/2010	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	**19.6**	<4.0	<4.0
	10/21/2010	<12.5	<12.5	<12.5	<12.5	<12.5	**532**	**328**	**1,610**	<12.5
	12/9/2010 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	3/31/2011 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/27/2011	**8.5**	<3.5	<7.0	**28.0**	**8.6**	**1,240**	**943**	**3,970**	<3.5
	9/28/2011	<5.0	<5.0	<5.0	**6.1**	<10	**1,100**	**230**	**550**	<5.0
	11/21/2011	**2.3**	<1.0	<1.0	**2.6**	**2.5**	**400**	**120**	**310**	**1.1**
	1/30/2012	<1.0	<1.0	**2.1**	<1.0	<2.0	<1.0	**8.6**	**2.3**	<1.0
	6/27/2012	**18**	<1.0	**4.2**	**1,300**	**52**	**780**	**430**	**2,200**	**3.3**
	10/2/2012	**11**	<5.0	<5.0	**260**	**33**	**280**	**510**	**1,900**	<5.0
	11/27/2012	**4.6**	<1.0	**2.4**	**44**	**7.3**	**3.4**	**80**	**120**	<1.0
	3/26/2013	<2.0	<2.0	**3.4**	**46**	**4.6**	**10**	**32**	**100**	**2.1**
	5/30/2013 (6)	**7.3**	<2.0	**4.5**	**200**	**22**	**350**	**380**	**1,900**	<2.0
	8/9/2013	**17**	<1.0	**12**	**220**	**46**	**4,800**	**990**	**9,100**	<1.0
	11/13/2013	**7.4**	<1.0	**2.0**	**51**	**10**	**950**	**270**	**1,800**	<1.0
	3/26/2014 (3)	--	--	--	--	--	--	--	--	--
	4/16/2014	<1.0	<1.0	<1.0	**9.9**	**2.5**	**210**	**34**	**300**	<1.0
	5/21/2014	**7.6**	<1.0	**5.1**	**68**	**16**	**2,000**	**410**	**2,600**	<1.0
	7/24/2014	**31**	<10	<10	**120**	**47**	**5,400**	**1,300**	**5,600**	<10
	9/22/2014	**15**	<10	<10	**71**	**38**	**2,500**	**770**	**5,000**	<10
	11/5/2014	<10	<10	<10	**17**	<20	**1,800**	**310**	**2,800**	<10
	4/1/2015 (10)	<1.0	<1.0	**1.5**	**4.5**	**2.9**	**400**	**59**	**460**	<1.0
	6/18/2015	**6.3**	<1.0	**5.2**	**47**	**28**	**1,900**	**650**	**4,000**	<1.0
	9/14/2015	**13**	<1.0	**7.5**	**55**	**23**	**2,700**	**870**	**5,000**	<1.0
	10/30/2015	<5.0	<5.0	<5.0	**27**	<10	**600**	**370**	**1,800**	<5.0

Notes:

1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.

Bold font denotes concentrations detected above laboratory reporting limits.

Denotes concentrations above one or more soil gas screening level

ppbv - parts per billion by volume

NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-03 (5-5.5')	4/5/2010	<2.6	<2.6	<2.6	<2.6	<5.1	<2.6	<2.6	<2.6	<2.6
	10/21/2010	**91.0**	<15.7	<15.7	**193**	**90.3**	<15.7	<15.7	<15.7	<15.7
	12/9/2010	**47.7**	<11.9	<11.9	**98.0**	**48.5**	<11.9	<11.9	<11.9	<11.9
	3/31/2011	<0.56	<0.56	<0.57	<0.57	<0.57	<0.57	<0.56	<0.57	<0.58
	6/27/2011	<0.36	<0.18	<0.37	<0.37	<0.37	**6.8**	**4.8**	**22.3**	<0.18
	9/28/2011	**3.0**	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	11/21/2011	**3.5**	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	**1.8**
	1/30/2012 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/27/2012	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	**12**	<2.0
	10/2/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/26/2013 (3)	--	--	--	--	--	--	--	--	--
	4/15/2013 (3)	--	--	--	--	--	--	--	--	--
SG-03R (5-5.5')	5/30/2013	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	8/9/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/13/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/21/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**1.8**	<1.0	<1.0	<1.0
	9/22/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/5/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	4/1/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**1.7**	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**1.1**	**1.9**	**2.4**	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL [1]		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL [1]		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL [1]		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL [1]		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-04 (5-5.5')	4/5/2010	<2.6	<1.3 [7]	<2.6	<2.6	<4.9	<2.6	<2.6	<2.6	<2.5
	9/23/2010	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
	12/9/2010	<0.78	<0.78	<0.78	<0.78	<0.78	<0.78	<0.78	<0.78	<0.78
	3/31/2011	<1.6	<1.6	<1.6	<1.6	<1.6	**2.0**	<1.6	<1.6	<1.6
	6/7/2011	<1.0	<0.53	<1.1	<1.1	<1.1	<0.52	<1.0	<0.53	<0.54
	9/28/2011	<1.0	<1.0	<1.0	<1.0	<2.0	**1.7**	<1.0	<1.0	<1.0
	11/21/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	**2.4**
	1/30/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**1.0**	<1.0
	10/2/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/24/2013 [4]	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	8/9/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**4.7**	<1.0
	11/13/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/21/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	7/24/2014 [8]	<1.0	<1.0	<1.0	<1.0	<2.0	**5.6**	<1.0	<1.0	<1.0
	11/5/2014	**6.8**	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	4/1/2015 [10]	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**3.0**	<1.0	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-05 (7.5-8')	4/5/2010	<2.6	<2.6	<2.6	<2.6	<4.9	<2.6	**28.7**	**26.6**	<2.5
	10/21/2010	<16.8	<16.8	<16.8	<16.8	<16.8	<16.8	**708**	**1,320**	<16.8
	12/9/2010	<15.7	<15.7	<15.7	<15.7	<15.7	<15.7	**357**	**538**	<15.7
	3/31/2011 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/27/2011	<0.34	<0.17	<0.35	<0.35	<0.35	<0.17	**2.2**	**0.20**	<0.17
	9/28/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**2.1**	**1.1**	<1.0
	11/21/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	1/30/2012 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/26/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.1**	<1.0	<1.0
	10/1/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**220**	**380**	<1.0
	11/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**54**	**22**	<1.0
	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/23/2013 (4)	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**16**	**21**	<1.0
	11/12/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**170**	**260**	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**150**	**250**	<1.0
	5/19/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.2**	**1.7**	<1.0
	7/22/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**1.3**	**5.0**	**14**	<1.0
	11/3/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**34**	**36**	<1.0
	3/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.8**	**2.5**	<1.0
	6/17/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**2.7**	**3.8**	<1.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**18**	**14**	<1.0
	10/30/2015	<1.0	<1.0	<1.0	**1.1**	<2.0	<1.0	**130**	**140**	<1.0
SG-05 (DUP-01)	10/21/2010	<16.8	<16.8	<16.8	<16.8	<16.8	<16.8	**581**	**1,020**	<16.8
	12/9/2010	<211	<211	<211	<211	<211	<211	**772**	**849**	<211
	10/1/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**190**	**370**	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-06 (8-8.5')	4/5/2010	<2.6	<2.6	<2.6	<2.6	<4.9	<2.6	<2.6	**7.2**	<2.5
	5/20/2010	<4.6	<4.6	<4.6	<4.6	<4.6	**9.5**	**6.0**	**104**	<4.6
	9/21/2010	<29.2	<29.2	<29.2	<29.2	<29.2	**62.2**	<29.2	**263**	<29.2
	12/9/2010	<3.9	<3.9	<3.9	**6.1**	<3.9	**4.3**	**7.4**	**64.9**	<3.9
	3/31/2011	**0.73**	<0.17	<0.35	<0.35	**1.3**	<0.17	**1.7**	**14.1**	<0.17
	6/7/2011	**0.88**	<0.18	<0.37	**5.6**	**2.5**	**7.5**	**2.5**	**50.2**	<0.18
	9/28/2011	**3.6**	<2.0	<2.0	**35**	**6.4**	**16**	**7.7**	**150**	<2.0
	11/21/2011	**2.2**	<1.0	<1.0	**9.2**	**2.6**	<1.0	**5.1**	**29**	**1.1**
	1/30/2012	**1.4**	<1.0	<1.0	**5.4**	<2.0	<1.0	**1.3**	**9.7**	<1.0
	6/27/2012	<1.0	<1.0	<1.0	**7.7**	<2.0	**9.1**	**3.4**	**68**	<1.0
	10/1/2012	<1.0	<1.0	<1.0	<1.0	<2.0	**2.3** (6)	<1.0	**12** (6)	<1.0
	11/28/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**2.1**	<1.0
	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/23/2013 (4)	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	**20**	<1.0	**10**	<1.0
	11/12/2013	<1.0	<1.0	<1.0	<1.0	<2.0	**8.9**	<1.0	**6.0**	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**1.7**	<1.0	**1.1**	<1.0
	5/19/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**5.0**	<1.0	**2.1**	<1.0
	7/22/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**59**	**7.9**	**59**	<1.0
	11/3/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**3.7**	<1.0	**1.7**	<1.0
	3/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**1.6**	<1.0	<1.0	<1.0
	6/17/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**2.3**	<1.0	**1.8**	<1.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**2.7**	<1.0	**1.6**	<1.0
	10/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**2.1**	<1.0	**1.7**	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL [1]		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL [1]		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL [1]		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL [1]		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-07 (8-8.5')	4/5/2010	<75.2	<75.2	<75.2	<75.2	<75.2	<75.2	<75.2	<75.2	<75.2
	5/20/2010	<5.0	<5.0	<5.0	<5.0	<5.0	**13.8**	**6.8**	**145**	<5.0
	9/21/2010	<69.6	<69.6	<69.6	<69.6	<69.6	**140**	<69.6	**403**	<69.6
	12/9/2010	<22.2	<22.2	<22.2	<22.2	<22.2	**24.4**	<22.2	**139**	<22.2
	3/31/2011	<0.34	<0.17	<0.35	<0.35	<0.35	**5.9**	**4.3**	**47.2** [6]	<0.17
	6/7/2011	<0.36	<0.18	<0.37	<0.37	<0.37	**23.6**	**4.4** [6]	**171** [6]	<0.18
	9/28/2011	<1.0	<1.0	<1.0	<1.0	<2.0	**76**	**16**	**260**	<1.0
	11/21/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**2.7**	**3.1**	**1.5**
	1/30/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**2.4**	<1.0
	6/26/2012	<1.0	<1.0	<1.0	<1.0	<2.0	**67**	**9.0**	**250**	<1.0
	10/1/2012	<1.0	<1.0	<1.0	<1.0	<2.0	**16**	**8.8**	**130**	<1.0
	11/28/2012	<1.0	<1.0	<1.0	<1.0	<2.0	**1.7**	**3.4**	**34**	<1.0
	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.4**	**13**	<1.0
	5/23/2013	<1.0	<1.0	<1.0	<1.0	<2.0	**27**	**4.0**	**120**	<1.0
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	**260**	**13**	**510**	<1.0
	11/12/2013	<1.0	<1.0	<1.0	<1.0	<2.0	**160**	**7.7**	**340**	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**41**	**2.5**	**79**	<1.0
	5/19/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**110**	**4.1**	**180**	<1.0
	7/23/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**210**	**11** [6]	**320**	<1.0
	11/3/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**180**	**7.0**	**330**	<1.0
	3/30/2015	<1.0	<1.0	<1.0	**1.3**	<2.0	**47**	**2.4**	**110**	<1.0
	6/17/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**140**	**6.1**	**250**	<1.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**130**	**11**	**310**	<1.0
	10/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**63**	**3.6**	**110**	<1.0
SG-07 (DUP-01)	3/31/2011	<0.56	<0.56	<0.57	<0.57	<0.57	**7.9**	**5.0**	**90.6** [6]	<0.58
	6/7/2011	<0.36	<0.18	<0.37	<0.37	<0.37	**28.4** [6]	**9.5** [6]	**97.2** [6]	<0.18
	6/26/2012	<1.0	<1.0	<1.0	<1.0	<2.0	**66**	**9.3**	**250**	<1.0
	11/28/2012	<1.0	<1.0	<1.0	<1.0	<2.0	**1.5**	**3.1**	**33**	<1.0
	5/23/2013 [4]	<4,900	<970	<5,000	<5,000	<5,000	<580	<3,600	<730	<770
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	**220**	**12**	**420**	<1.0
	11/12/2013	<1.0	<1.0	<1.0	<1.0	<2.0	**160**	**7.6**	**350**	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**42**	**2.6**	**82**	<1.0
	5/19/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**110**	**4.3**	**180**	<1.0
	7/23/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**190**	**8.6** [6]	**300**	<1.0
	11/3/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**180**	**6.8**	**320**	<1.0
	6/17/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**130**	**5.8**	**230**	<1.0
	3/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**230**	**12**	**400**	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-07 (DUP-02)	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.4**	**12**	<1.0
SG-08 (6.5-7')	4/5/2010	<2.6	<1.3 (7)	<2.6	<2.6	<5.1	<2.6	<2.6	<2.6	<2.6
	9/23/2010	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**4.5**	**3.5**	<2.0
	12/9/2010 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	3/31/2011	<0.34	<0.17	<0.35	<0.35	<0.35	**0.29**	**3.4**	<0.17	<0.17
	6/27/2011	<0.34	<0.17	<0.35	<0.35	<0.35	<0.17	**0.97**	<0.18	<0.17
	9/28/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.9**	<1.0	<1.0
	11/21/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**6.9**	**1.3**	**1.0**
	1/30/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/29/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.8**	**2.0**	<1.0
	10/2/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.7**	<1.0	<1.0
	11/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/24/2013 (4)	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	8/9/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**5.4**	**8.6**	<1.0
	11/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**2.6**	**3.2**	<1.0
	4/16/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**1.2**	<1.0
	5/20/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.4**	**4.0**	<1.0
	7/24/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**2.2**	**4.0**	**5.2**	<1.0
	11/5/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**4.2**	**2.2** (6)	<1.0
	4/1/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**2.7**	**1.9**	<1.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**6.3**	**4.7**	<1.0
SG-08 (DUP-02)	5/24/2013 (4)	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	8/9/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**4.8**	**7.1**	<1.0
	11/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**2.5**	**3.7**	<1.0
	5/20/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**2.0**	**1.6**	<1.0
	7/24/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**1.8**	**3.9**	**5.2**	<1.0
	11/5/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**4.7**	**8.6** (6)	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-09 (5.5-6')	4/5/2010 (3)	--	--	--	--	--	--	--	--	--
	5/20/2010	**10.6**	<4.4	<4.4	<4.4	<4.4	<4.4	**123**	**176**	<4.4
	9/23/2010	<23.4	<23.4	<23.4	<23.4	<23.4	<23.4	**142**	**436**	<23.4
	12/9/2010	<13.2	<13.2	<13.2	<13.2	<13.2	<13.2	**61.8**	**51.7**	<13.2
	3/31/2011	**4.3**	<0.17	<0.35	**1.3**	<0.35	<0.17	**52.5**	**13.9**	<0.17
	6/27/2011	**5.4**	<0.17	<0.35	**1.4**	<0.35	<0.17	**52.8**	**45.8**	<0.17
	9/28/2011	**1.7**	<1.0	<1.0	<1.0	<2.0	<1.0	**13**	**7.9**	<1.0
	11/21/2011	**3.8**	<1.0	<1.0	<1.0	<2.0	<1.0	**32**	**9.1**	<1.0
	1/30/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**7.2**	**1.3**	<1.0
	6/29/2012	<1.0	<1.0	<1.0	**1.0**	<2.0	<1.0	**89**	**190**	<1.0
	10/2/2012	**1.0**	<1.0	<1.0	<1.0	<2.0	<1.0	**56**	**74**	<1.0
	11/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**4.3**	**1.9**	<1.0
	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**5.4**	**4.0**	<1.0
	5/24/2013 (4)	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	**18**	**27**	<2.0
	8/9/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**67**	**270**	<1.0
	11/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**35**	**170**	<1.0
	4/16/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**6.2**	**36**	<1.0
	5/20/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**15**	**73**	<1.0
	7/24/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**23**	**99**	<1.0
	11/5/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**11**	**67**	<1.0
	4/1/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**4.0**	**21**	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**10**	**69**	<1.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**14**	**88**	<1.0
	10/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**11**	**58**	<1.0
SG-09 (DUP-02)	6/29/2012	<1.0	<1.0	<1.0	**1.2**	<2.0	<1.0	**93**	**200**	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.

Bold font denotes concentrations detected above laboratory reporting limits.

Denotes concentrations above one or more soil gas screening level

ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL [1]		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL [1]		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL [1]		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL [1]		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-10 (5-5.5')	4/5/2010	<40.3 [7]	<40.3 [7]	<80.6	<80.6	<80.6	<40.3 [7]	<80.6	<40.3 [7]	<40.3 [7]
	9/21/2010	<4.4	<2.2 [7]	<4.4	<4.4	<4.4	<4.4	<4.4	**11.5**	<4.4
	12/9/2010	<8.7	<4.4 [7]	<8.7	<8.7	<8.7	<4.4 [7]	<8.7	<8.7	<8.7
	3/31/2011	<0.61	<0.61	<0.62	<0.62	<0.62	<0.61	<0.59	<0.60	<0.62
	6/27/2011 [5]	NS	NS	NS	NS	NS	NS	NS	NS	NS
	9/28/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.4**	**19**	<1.0
	11/21/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**19**	**56**	<1.0
	1/30/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/27/2012	<1.0	<1.0	<1.0	**4.8**	<2.0	**1.9**	**46**	**210**	<1.0
	10/1/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/29/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/23/2013 [3]	--	--	--	--	--	--	--	--	--
	6/24/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	8/8/2013	<1.0	<1.0	<1.0	**1.6**	<2.0	**29**	**6.9**	**53**	<1.0
	11/13/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/20/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	7/23/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/4/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/17/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**3.4**	<1.0
	9/15/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**5.5**	<1.0
	10/30/2015	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	<5.0	<5.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-11 (5.5-6')	4/5/2010	<2.8	<1.4 (7)	<2.8	<2.8	<5.4	<2.8	<2.8	<2.8	<2.8
	9/23/2010	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
	12/9/2010	<0.84	<0.84	<0.84	<0.84	<0.84	<0.84	<0.84	<0.84	<0.84
	3/31/2011	<0.56	<0.56	<0.57	<0.57	<0.57	<0.57	<0.56	<0.57	<0.58
	6/7/2011	<0.39	<0.19	<0.40	<0.40	<0.40	**0.89**	**0.54**	**1.2**	<0.19
	9/28/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/21/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**6.8**	**18**	<1.0
	1/30/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	10/1/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/29/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/23/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	**1.2**	<1.0	**3.0**	<1.0
	11/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**1.3**	<1.0	<1.0	<1.0
	5/20/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	7/23/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/4/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/17/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	9/15/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	10/30/2015	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	<5.0	<5.0
SG-12 (5-5.5')	4/5/2010 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/20/2020 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	9/21/2010 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	12/9/2010	<2.5	<1.3 (7)	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
	3/31/2011 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/27/2011 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	9/28/2011 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	11/21/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	1/30/2012 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	11/28/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/26/2013 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/24/2013 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS
	9/14/2015 (5)	NS	NS	NS	NS	NS	NS	NS	NS	NS

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL [1]		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL [1]		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL [1]		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL [1]		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-12R (7-7.5')	6/26/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	10/3/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/28/2012 [9]	NS	NS	NS	NS	NS	NS	NS	NS	NS
	3/26/2013 [9]	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/24/2013 [9]	NS	NS	NS	NS	NS	NS	NS	NS	NS
	8/9/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/13/2013	<1.0	<1.0	<1.0	**1.9**	<2.0	<1.0	<1.0	**5.6**	<1.0
	3/26/2014 [3]	--	--	--	--	--	--	--	--	--
	4/16/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/19/2014	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	7/22/2014 [3]	--	--	--	--	--	--	--	--	--
	12/5/2014 [10]	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**1.3**	<1.0
	9/15/2015 [5]	NS	NS	NS	NS	NS	NS	NS	NS	NS
SG-13 (5.5-6')	4/5/2010	<2.5	<1.3 [7]	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
	5/20/2010	<4.5	<2.2 [7]	<4.5	<4.5	<4.5	<4.5	<4.5	**6.1**	<4.5
	9/23/2010	<1.5	<1.5	<1.5	**2.5**	**5.6**	<1.5	<1.5	<1.5	<1.5
	12/9/2010	<1.6	<1.6	<1.6	<1.6	**2.9**	<1.6	<1.6	<1.6	<1.6
	3/31/2011	<0.56	<0.56	<0.57	<0.57	<0.57	<0.57	<0.56	<0.57	<0.58
	6/7/2011	**1.5**	<0.19	<0.40	**4.8**	**10.8**	**0.77**	**0.81**	**1.6**	<0.19
	9/28/2011	**1.1**	<1.0	<1.0	**6.2**	**10**	<1.0	<1.0	<1.0	<1.0
	11/21/2011	**1.9**	<1.0	<1.0	**2.0**	**4.0**	<1.0	<1.0	<1.0	<1.0
	1/30/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/26/2012	<1.0	<1.0	<1.0	**4.9**	**7.7**	<1.0	<1.0	<1.0	<1.0
	10/2/2012	<1.0	<1.0	<1.0	**3.4** [6]	**5.9** [6]	<1.0	<1.0	<1.0	<1.0
	11/28/2012	<1.0	<1.0	<1.0	**1.7**	**2.7**	<1.0	<1.0	<1.0	<1.0
	3/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/23/2013	<1.0	<1.0	<1.0	<1.0	**3.4**	<1.0	<1.0	<1.0	<1.0
	8/8/2013	<1.0	<1.0	<1.0	**1.3**	**8.8**	<1.0	<1.0	<1.0	<1.0
	11/14/2013	<1.0	<1.0	<1.0	<1.0	**4.5**	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/20/2014	<1.0	<1.0	<1.0	**1.3**	**4.0**	<1.0	<1.0	<1.0	<1.0
	7/23/2014	<1.0	<1.0	<1.0	**1.4**	**6.6**	<1.0	<1.0	<1.0	<1.0
	11/4/2014	<1.0	<1.0	<1.0	<1.0	**4.5** [6]	<1.0	<1.0	<1.0	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	**2.5**	<1.0	<1.0	<1.0	<1.0
	6/17/2015	<1.0	<1.0	<1.0	**2.2**	**9.4**	<1.0	<1.0	<1.0	<1.0
	9/15/2015	<1.0	<1.0	<1.0	<1.0	**2.8**	<1.0	<1.0	<1.0	<1.0

Notes:

1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.

Bold font denotes concentrations detected above laboratory reporting limits.

Denotes concentrations above one or more soil gas screening level

ppbv - parts per billion by volume

NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL [1]		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL [1]		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL [1]		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL [1]		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-14 (6.5-7') [5]	4/5/2010	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/20/2010	NS	NS	NS	NS	NS	NS	NS	NS	NS
	9/21/2010	NS	NS	NS	NS	NS	NS	NS	NS	NS
	12/9/2010	NS	NS	NS	NS	NS	NS	NS	NS	NS
	3/31/2011	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/27/2011	NS	NS	NS	NS	NS	NS	NS	NS	NS
	9/28/2011	NS	NS	NS	NS	NS	NS	NS	NS	NS
	11/21/2011	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1/30/2012	NS	NS	NS	NS	NS	NS	NS	NS	NS
SG-14R (6.5-7')	6/26/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**1.3**	<1.0
	10/3/2012 [9]	NS	NS	NS	NS	NS	NS	NS	NS	NS
	11/28/2012 [9]	NS	NS	NS	NS	NS	NS	NS	NS	NS
	3/14/2013	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/24/2013 [3]	--	--	--	--	--	--	--	--	--
	8/9/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**1.6**	<1.0
	11/13/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	4/16/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/19/2014	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	7/22/2014 [3]	--	--	--	--	--	--	--	--	--
	11/4/2014	<100	<100	<100	<100	<200	<100	<100	<100	<100
	4/1/2015 [10]	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0	<5.0	<5.0
SG-15 (11-11.5')	9/23/2010 [5]	NS	NS	NS	NS	NS	NS	NS	NS	NS
	12/15/2010 [5]	NS	NS	NS	NS	NS	NS	NS	NS	NS
	3/31/2011 [5]	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6/27/2011 [5]	NS	NS	NS	NS	NS	NS	NS	NS	NS
	9/28/2011 [5]	NS	NS	NS	NS	NS	NS	NS	NS	NS
	11/21/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**10**	**30**	<1.0
	1/30/2012 [5]	NS	NS	NS	NS	NS	NS	NS	NS	NS

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL [1]		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL [1]		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL [1]		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL [1]		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-15R (8.75-9.25')	6/26/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	10/3/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/28/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/24/2013 [4,7]	<1.6	<1.6	<1.9	<1.6	<1.2	<1.0	<1.0	<1.2	<1.8
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/13/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/20/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	7/23/2014 [8]	<1.0	<1.0	<1.0	<1.0	<2.0	**1.4**	<1.0	**8.5**	<1.0
	11/4/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/17/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	9/15/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
SG-16 (7.5-8')	9/23/2010	<2.5	<2.5	<2.5	<2.5	<2.5	**2.6**	<2.5	<2.5	<2.5
	12/9/2010	<15.7	<7.8 [7]	<15.7	<15.7	<15.7	<7.8 [7]	<15.7	<15.7	<7.8 [7]
	3/31/2011	<0.61	<0.61	<0.60	<0.60	<0.60	<0.61	<0.59	<0.60	<0.62
	6/7/2011	<1.1	<0.53	<1.1	<1.1	<1.1	<0.54	<1.1	**0.62**	<0.54
	9/28/2011	<1.0	<1.0	<1.0	**3.3**	<2.0	**7.4**	<1.0	**28**	<1.0
	11/21/2011	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	**1.1**
	1/30/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	10/2/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/28/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/23/2013 [4]	<4,900	<970	<5,000	<5,000	<5,000	<580	<3,600	<730	<770
	6/24/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**13**	<1.0
	11/13/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/19/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	7/23/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**1.3**	<1.0	**1.1**	<1.0
	11/4/2014	<1.0	<1.0	<1.0	**5.2**	**3.1** [6]	**11**	<1.0	**4.4**	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**1.2**	<1.0	<1.0	<1.0
	6/17/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	10/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-16 (DUP-02)	10/2/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/24/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
SG-17 (8-8.5')	6/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	**1.8**	**330**	**5.7**	<1.0
	10/1/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**250**	<1.0	<1.0
	11/28/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**42**	<1.0	<1.0
	3/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**42**	<1.0	<1.0
	5/23/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**83**	<1.0	<1.0
	8/8/2013	<2.0	<2.0	<2.0	<2.0	<4.0	**6.0**	**550**	<2.0	<2.0
	11/12/2013	<1.0	<1.0	<1.0	<1.0	<2.0	**5.1**	**300**	**6.2**	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**81**	<1.0	<1.0
	5/19/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**1.8**	**120**	<1.0	<1.0
	7/23/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**4.6**	**330**	<1.0	<1.0
	11/4/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**2.4**	**370**	<1.0	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**71**	<1.0	<1.0
	6/17/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**3.5**	**300**	<1.0	<1.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**4.6**	**470**	<1.0	<1.0
SG-18 (8-8.5')	6/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.1**	**2.3**	<1.0
	10/1/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/29/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/23/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	**2.1**	<1.0	**6.4**	<1.0
	11/13/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/20/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	7/23/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**2.1**	<1.0	**1.9**	<1.0
	11/4/2014	<1.0	<1.0	<1.0	**2.8**	**6.1** (6)	<1.0	<1.0	<1.0	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/17/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	9/15/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-19 (8-8.5')	6/26/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	10/2/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/24/2013 (4)	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/20/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	7/23/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	12/4/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/17/2015	<1.0	<1.0	<1.0	<1.0	**3.0**	<1.0	<1.0	<1.0	<1.0
	9/15/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
SG-20 (8-8.5')	6/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	**5.4**	**1.5**	**17**	<1.0
	10/2/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**1.9**	<1.0
	11/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**1.3**	<1.0
	5/24/2013 (4)	<2.0	<2.0	<2.0	<2.0	<4.0	**3.6**	<2.0	<2.0	<2.0
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**3.1**	**1.0**	<1.0
	11/12/2013	<1.0	<1.0	<1.0	<1.0	<2.0	**13**	**1.4**	**23**	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**2.9**	<1.0	**5.3**	<1.0
	5/20/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**7.8**	<1.0	**12**	<1.0
	7/24/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/5/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**12**	**1.5**	**21**	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**3.4**	<1.0	**7.1**	<1.0
	6/18/2015	<5.0	<5.0	<5.0	<5.0	<10	**15**	<5.0	**25**	<5.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**26**	**2.2**	**36**	<1.0
	10/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**16**	**1.8**	**27**	<1.0
SG-20 (DUP-02)	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**2.7**	<1.0	**5.8**	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**4.1**	<1.0	**7.1**	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-21 (8-8.5')	6/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.1**	**2.3**	<1.0
	3/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/24/2013 (4)	<120	<24	<120	<120	<120	<15	<91	<18	<19
	6/24/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/12/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	4/16/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/20/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	7/24/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/5/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/31/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	9/14/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
SG-21 (DUP-01)	3/14/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
SG-21 (DUP-02)	11/29/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
SG-22 (6-6.5')	10/2/2014	**120**	<20	<20	<20	<40	**230**	**7,000**	**6,200**	<20
	11/3/2014	**81**	<20	<20	<20	<40	**160**	**5,100**	**4,500**	<20
	3/30/2015	**63**	<20	<20	<20	<40	**100**	**2,800**	**2,300**	<20
	6/18/2015	**200**	<10	<10	**36**	<20	**330**	**6,100**	**6,300**	<10
	9/15/2015	**140**	<10	<10	**21**	<20	**470**	**6,900**	**6,900**	<10
	10/30/2015	**110**	<1.0	**2.3**	**16**	<2.0	**250**	**5,400**	**6,500**	<1.0
SG-23 (5-5.5')	10/2/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/3/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**2.3**	<1.0	<1.0	<1.0
	3/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**4.1**	<1.0
	9/15/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
SG-23 (DUP-01)	10/2/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
SG-24 (5-5.5')	10/2/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**3.2**	<1.0	<1.0	<1.0
	11/3/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**3.3**	<1.0
	3/30/2015 (10)	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**2.0**	**2.1**	<1.0
	9/15/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**1.3**	<1.0	<1.0	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D10
Summary of Chlorinated Volatile Organic Compounds at Soil Gas Sample Locations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Residential Sub-Slab SGSL (1)		4,100	8.2	1,700	58	580	170	36,000	12	21
MDEQ Residential Deep SGSL (1)		41,000	82	17,000	580	5,800	1,700	360,000	120	210
MDEQ Non-Residential Sub-Slab SGSL (1)		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL (1)		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-25 (5-5.5')	10/2/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**210**	**58**	<1.0
	11/3/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**140**	**34**	<1.0
	3/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**8.5**	**4.9**	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**84**	**20**	<1.0
	9/15/2015	<1.0	<1.0	<1.0	<1.0	<2.0	**1.9**	**120**	**26**	<1.0
	10/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**120**	**38**	<1.0
MHC-01 (0.5-1.0')	3/30/2015	**2.2**	<1.0	<1.0	<1.0	<2.0	<1.0	**96**	**44**	<1.0
	6/18/2015	**8.7**	<1.0	<1.0	<1.0	<2.0	**8.6**	**450**	**360**	<1.0
	9/15/2015	**3.2**	<1.0	<1.0	<1.0	<2.0	**2.5**	**310**	**190**	<1.0
	10/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**15**	**1.7**	<1.0
TVP-02s (10-10.5')	6/27/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**1.2**	**8.8**	<1.0
	10/1/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**1.2**	<1.0
	11/28/2012	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/18/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/23/2013 (4)	<2.0	<2.0	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<2.0
	8/8/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/12/2013	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/26/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	5/19/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	7/23/2014 (8)	<1.0	<1.0	<1.0	<1.0	<2.0	**18**	**2.9**	**20**	<1.0
	11/3/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	3/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/17/2015	<1.0	<1.0	<1.0	**1.4**	<2.0	<1.0	<1.0	**11**	<1.0

Notes:
1) As recommended by USEPA in an email dated August 1, 2013, soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.
2) Elevated concentrations of 2-propanol (tracer) detected; DUP-01 results from 5/20/10 reflect true soil gas concentrations. Tracer concentration from SG-01 and analytical data from DUP-01 suggests that sample was diluted with approximately 30-percent ambient air.
3) Elevated concentrations of tracer detected. Analytical data for other analytes are presumed to be invalid (--).
4) Elevated detection limit due to siloxane contamination in sample.
5) Water in sample point prevented sample collection.
6) Quality control results are outside the established control limits, the result is approximate.
7) Analyte was evaluated for detection to the method detection limit.
8) Potential data quality issues were identified with tetrachloroethene, 1,1,1-trichloroethane, and tricholorethene concentrations reported in July 2014. Data may be biased high. Data for these compounds, in the absence of additional data confirming these low-level detections, should be considered suspect and should not, in isolation, be used to trigger further action.
9) Sample port is screened in the low permeability zone. Available sample volume insufficient for analysis.
10) Elevated concentrations of tracer detected. Results and detection limits may be biased low.
Bold font denotes concentrations detected above laboratory reporting limits.
Denotes concentrations above one or more soil gas screening level
ppbv - parts per billion by volume
NS - No Sample

Table D11
Summary of Volatile Organic Compounds in Ambient Air
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels (1)	December 3-4, 2012 Ambient Air
Acetone	ppbv	2,500	**1.9**
Benzene	ppbv	0.97	**0.11**
Bromodichloromethane	ppbv	0.21	<0.10
Bromoform	ppbv	2.3	<0.10
Bromomethane	ppbv	1.3	<0.10
2-Butanone (MEK)	ppbv	1,700	<0.20
Carbon disulfide	ppbv	220	<0.10
Carbon tetrachloride	ppbv	0.68	**0.053**
Chlorobenzene	ppbv	15	<0.10
Chloroethane	ppbv	3,800	<0.10
Chloroform	ppbv	2.2	<0.050
Chloromethane	ppbv	20	**0.45**
Dibromochloromethane	ppbv	0.12	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	<0.20
1,1-Dichloroethane	ppbv	120	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	<0.10
1,1-Dichloroethene	ppbv	50	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10
Ethylbenzene	ppbv	19	<0.10
4-Ethyltoluene	ppbv	NC	<0.10
Hexachlorobutadiene	ppbv	0.11	<0.20
2-Hexanone (MBK)	ppbv	7.4	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	<0.10
Styrene	ppbv	11	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.10
Tetrachloroethene	ppbv	5.0	<0.10
Toluene	ppbv	1,300	**0.24**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.10
1,1,1-Trichloroethane	ppbv	1,100	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.10
Trichloroethene	ppbv	0.37	<0.10
Trichlorofluoromethane (F11)	ppbv	9,900	**0.14**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	<0.10
1,2,4-Trimethylbenzene	ppbv	44	<0.10
1,3,5-Trimethylbenzene	ppbv	44	<0.10
Vinyl chloride	ppbv	0.62	<0.050
m,p-Xylene	ppbv	23	**0.15**
o-Xylene	ppbv	23	<0.10

Notes:
1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013
ppbv = parts per billion by volume
NC = No criterion
Bold font denotes concentrations detected above laboratory reporting limits

Appendix E
Potential Source Evaluation and Soil Investigation Workplan

Technical Memorandum

To:	Joseph Kelly, USEPA
From:	Stacy Metz and Graham Crockford, TRC
Subject:	Workplan for Additional On-Site Soil Sampling Former Tecumseh Products Company Site in Tecumseh, Michigan (RCRA-05-2010-0012)
Date:	January 29, 2016
cc:	Jason Smith, Tecumseh Products Company
Project No.:	246667.0002.0000

Background

Tecumseh Products Company (TPC) retained TRC Environmental Corporation (TRC) to investigate soil and groundwater conditions at the former TPC site located in Tecumseh, Michigan. Between 2009 and 2015 site wide investigation activities were completed to characterize the nature and extent of contamination in soil and groundwater. These investigation activities included high resolution site characterization (HRSC) to locate and define potential on-site source areas. HRSC investigation activities included the following:

- **Passive Soil Gas Survey:** Between 2010 and 2014 passive soil gas (PSG) surveys were completed throughout the footprint of the manufacturing area and beyond to several areas which had the potential to be discrete source areas, specifically the former drum storage areas, tank areas, areas adjacent to former railroad spurs where loading/unloading of materials may have occurred, and the area east/southeast of the southern portion of the building where a number of outbuildings and two hazardous waste storage areas were located. The results of the PGS Survey are summarized on Figure 12 in the Corrective Measures Proposal (CMP).
- **Membrane Interface Probe Investigation:** Following completion of PSG survey investigation activities, a membrane interface probe (MIP) investigation was completed to provide high-density vertical distribution data in these source areas/potential source areas. Using PSG survey data, a total of 21 initial MIP investigation locations were selected prior to initiation of MIP investigation activities. MIP investigation techniques allow data to be viewed and reported in real time. TRC staff reviewed these preliminary MIP data as they became available, adjusting the project scope and selecting additional investigation locations based on the findings at previous investigation locations. Ultimately a total of 68 MIP borings were completed. The results of the

MIP investigation are documented in the 2014 *MIP Investigation Report and Workplan for High Resolution Site Characterization*.

- **MIP Confirmation Sampling:** MIP response data are semi-quantitative. MIP confirmation sampling was completed to develop a correlation between MIP response and VOC concentrations. To that end, confirmation sample locations and depth intervals were selected to target a broad range of ECD peak heights. Locations with high ECD response offer the most insight into an improved understanding of potential for the presence of dense non-aqueous phase liquid (DNAPL) residuals. Therefore, the sample selection was biased to include a greater percentage of those peak locations. MIP confirmation sampling was completed at 24 locations to help correlate soil/groundwater concentrations with MIP response. MIP confirmation sample locations were designated with an "SB" followed by the MIP boring number, e.g. SB-MIP-23 to distinguish between the original MIP boring and the confirmation boring. Soil sample data from MIP confirmation sampling and all other soil sampling completed during site investigation activities are summarized in Table D1 of Appendix D in the CMP.
- **PCE Source Investigation:** During the HRSC investigation activities, up to 15,000 micrograms per liter (µg/L) of tetrachloroethene (PCE) was identified in groundwater at boring location B-81 located along Maumee Street near the southeast corner of the site. Subsequent investigation activities identified a likely PCE source area near an interior north-south fence line located immediately west of boring location B-100. Further localized delineation of PCE-affected soil and groundwater in the area of soil boring B-100 was conducted to more precisely define the nature and extent of PCE in this area and to support decision making related to recommended final corrective measures. The findings of these PCE investigation activities are described in the January 28, 2016 Technical Memorandum titled PCE Source Area Investigation.

Based on the HRSC activities described above, a comprehensive evaluation of PSG, MIP and soil data was completed to define the nature and extent of potential source areas, including the following:

- An evaluation of whether elevated PSG response was due to soil and/or groundwater contamination;
- An assessment of the whether observed soil concentrations exceed, or are likely to exceed risk-based screening levels;
- An assessment of the lateral extent of contaminants, including whether additional investigation is merited to more precisely define the lateral extent of contamination above target concentrations (e.g., risk-based screening levels and/or site specific remedial goals);
- An assessment of the vertical distribution of contaminants, including whether additional investigation is merited to more precisely define that distribution; and
- An assessment of the soil type in which contaminants are present.

That assessment is provided in detail in Attachment 1. The findings of this data evaluation were used to prepare this Supplemental Soil Investigation Workplan.

Purpose and Scope

This Supplemental Soil Investigation Workplan describes proposed additional soil sampling activities to support the selection of appropriate corrective measures for soil. Specifically, the proposed work is designed to meet the following objectives:

- To further define the extent of tetrachloroethene (PCE) above soil saturation levels (88 milligrams per kilogram [mg/kg]);
- To further define the extent of trichloroethene (TCE) in permeable soils where soil vapor extraction (SVE) may be appropriate;
- To further define the extent of TCE in low permeability soils above the site-specific risk-based cleanup level (25 mg/kg); and
- To establish baseline non-source area soil concentrations.

Proposed Activities

Align Soil Investigation and Proposed Treatment with Expected Redevelopment

Prior to completion of proposed soil investigation activities, TRC and TPC will meet with the prospective purchaser to align the proposed soil investigation and corrective measures with the site redevelopment plan. This meeting will be used to clarify which areas may be redeveloped, how site grading and soil management will be performed, and verify that the proposed soil sampling strategy is appropriate, based on anticipated redevelopment activities and future use. The investigation scope outlined below may be adjusted based on the outcome of this meeting.

Define the extent of PCE above Soil Saturation Levels

Detected concentrations of PCE exceed soil saturation levels at five boring locations (B-121, B-125, B-127, B-128, and B-131). Soil samples have not been collected south or west of boring location B-131. Three (3) additional soil borings are recommended in this area (as illustrated on Figure 1), to define the lateral extent of soils affected above soil saturation levels to the southwest prior to evaluating options to address the soil source. The proposed borings will be completed as summarized below:

- Soil borings will be advanced to 15 feet below ground surface (ft bgs) by direct-push technology.
- Soil samples will be collected for visual classification to evaluate site geology.
- Soils will be field screened in approximate 1-foot intervals using a photoionization detector (PID) to aid in selecting depth intervals to be sampled for volatile organic compound (VOC) analysis.
- At each location soil samples will be collected for VOC analysis from the two depth intervals with the highest PID readings.

- Samples will be shipped under chain-of-custody documentation to the analytical laboratory (either Environmental Chemistry Consulting Services [ECCS] or TriMatrix Laboratories, depending on project pricing and anticipated turn-around time).

Determine the Extent of TCE in Permeable Soils for Potential SVE Treatment

As described in Attachment 1, the highest concentrations of TCE are typically found in the near surface lower permeability soil. However two areas exhibit TCE concentrations above either the risk-based cleanup level for TCE (SB-MIP-40) and/or concentrations above soil volatilization to indoor air inhalation (SVIAI) criteria throughout the more permeable sandy vadose zone (in the vicinity of the southern source area). Although MIP data are not well correlated to VOC concentration data, relative ECD response can be used to support the vertical delineation of COCs in this zone. Collectively these data were used to select additional investigation locations to support decisions regarding potential SVE system expansion and system design. TCE that is present in the more permeably sandy portion of the vadose zone is more mobile that TCE bound-up in the near surface low permeability material. Six (6) soil borings are proposed as illustrated on Figure 1, and will be completed as summarized below:

- Soil borings will be advanced to the target depth by direct-push technology.
- Soil samples will be collected for visual classification to evaluate site geology. The boring will be terminated at a minimum depth of two feet below the water table.
- Soils will be field screened in approximate 1-foot intervals using a photoionization detector (PID). Note that beneath the building co-deposition of other hydrocarbons which respond more strongly to PID that CVOCs is expected. Therefore strong correlation between CVOC concentration and PID response is not expected.
- At each location a surface soil samples will be collected from the following depth intervals:
    - Immediately below the building slab or from 1 to 2 ft bgs if the sample locations is outside of the building slab; and
    - At approximately 5 foot intervals throughout the sandy portion of the vadose zone, including a sample from the depth interval with the highest PID response. Note the deepest sample will be collected from approximately 2 to 3 feet above the water table (the anticipated maximum effective treatment depth for SVE).
- Samples will be shipped under chain-of-custody documentation to the analytical laboratory (either Environmental Chemistry Consulting Services [ECCS] or TriMatrix Laboratories, depending on project pricing and anticipated turn-around time).

Evaluate Effectiveness of Current SVE Treatment

Soil sample data from the western portion of P-Building collected prior to SVE system installation indicated elevated TCE concentrations in the sandy soil. However, during the more recent MIP investigation (completed after approximately 2 years of SVE system operation), data indicates that soil concentrations in the vadose in this treatment area are at

or near the sensitivity of the ECD. Two (2) soil borings are proposed to evaluate current soil concentrations in this area, and verify whether ongoing operation of the SVE system (for soil treatment) is necessary [1]. Proposed sample locations are illustrated on Figure 1, and will be completed as summarized below:

- Soil borings will be advanced to the target depth by direct-push technology.
- Soil samples will be collected for visual classification to evaluate site geology. The boring will be terminated at a minimum depth of two feet below the water table.
- Soils will be field screened in approximate 1-foot intervals using a photoionization detector (PID). Note that beneath the building co-deposition of other hydrocarbons which respond more strongly to PID that CVOCs is expected. Therefore strong correlation between CVOC concentration and PID response is not expected.
- At each location a surface soil samples will be collected from the following depth intervals:
  - Immediately below the building slab; and
  - At approximately 5 foot intervals throughout the sandy portion of the vadose zone, including a sample from the depth interval with the highest PID response. Note the deepest sample will be collected from approximately 2 to 3 feet above the water table (the anticipated maximum effective treatment depth for SVE).
- Samples will be shipped under chain-of-custody documentation to the analytical laboratory (either Environmental Chemistry Consulting Services [ECCS] or TriMatrix Laboratories, depending on project pricing and anticipated turn-around time).

Establish Baseline Non-Source Area Soil Concentrations

Soil investigation activities have been biased towards defining the nature and extent of potential soil source areas. Consequently the majority of soil samples have been collected near and adjacent to potential soil sources. These sample data can reasonably be considered representative of worst-case site conditions. Based on the limited extent of soils affected above applicable risk-based screening levels in these potential soil source areas, it is unlikely that other on-site soils, beyond the areas of historic solvent use are impacted above risk-based screening levels. However, during a conference call in December 2015 regarding the risk assessment, USEPA Region 5 requested that additional soil sampling be performed to establish baseline surface and sub-surface soil conditions in the area beyond the area of historic solvent use for purposes of risk assessment. A total of nine (9) soil borings near the site perimeter are proposed to meet this objective. Proposed sample locations are illustrated on Figure 1, and will be completed as summarized below:

[1] As described in the Corrective Measures Proposal, the SVE system also serves to limit volatilization to indoor air from affected groundwater. Continued SVE system operation is expected until the building-specific groundwater clean-up levels is achieved beneath P-Building.

- Soil borings will be advanced to 5 feet below ground surface (ft bgs) by direct-push technology.
- Soil samples will be collected for visual classification to evaluate site geology.
- Soils will be field screened in approximate 1-foot intervals using a photoionization detector (PID).
- At each location a surface soil samples will be collected from 1 to 2 ft bgs and a subsurface soil sample will be collected from 4 to 5 ft bgs.
- Samples will be shipped under chain-of-custody documentation to the analytical laboratory (either Environmental Chemistry Consulting Services [ECCS] or TriMatrix Laboratories, depending on project pricing and anticipated turn-around time).

Refine the Extent of TCE in Low Permeability Soils

As described in Attachment 1, the highest concentrations of TCE is in soil are typically found in the near surface lower permeability soil. A total of 8 vadose zone soil samples[2] have TCE concentrations above the site-specific risk-based cleanup level for TCE (25 mg/kg). These sample locations (GP-14, GP-15, NS-15, NS-17, SB-MIP-01, SB-MIP-46, SB-MIP-40, and SB-MIP-44) are illustrated on Figure 1. All of these sample locations are beneath the building slab, and with the exception of SB-MIP-40 all of these samples were collected from the near surface lower permeability soil, making soil treatment impractical. Ten (10) borings in the vicinity of these locations (and locations where a peak in MIP response is indicative of similar concentrations) are proposed as illustrated on Figure 1. These sample locations will be used to refine the area subject to soil corrective measures. This data will be used to better define areas requiring a soil management plan during site redevelopment. Proposed sample collection will be completed as summarized below:

- Soil borings will be advanced to the target depth by direct-push technology.
- Soil samples will be collected for visual classification to evaluate site geology. The boring will be terminated at a minimum depth of two feet below the near surface low permeability material or 15 ft bgs, whichever is deeper.
- Soils will be field screened in approximate 1-foot intervals using a photoionization detector (PID). Note that beneath the building co-deposition of other hydrocarbons which respond more strongly to PID that CVOCs is expected. Therefore strong correlation between CVOC concentration and PID response is not expected.
- At each location a surface soil samples will be collected from the following depth intervals:
    - Immediately below the building slab;

[2] A number of soil samples were collected from at or below the water table for purposes of source delineation. However for purposes of risk assessment samples collected from at or below the water table are considered representative of groundwater condition and are not used to evaluate the nature and extent of COCs in soil.

    - From the topmost foot of the low permeability material;
    - From the topmost foot of the sandy higher permeability material; and
    - From the depth interval with the highest PID response.
  - Samples will be shipped under chain-of-custody documentation to the analytical laboratory (either Environmental Chemistry Consulting Services [ECCS] or TriMatrix Laboratories, depending on project pricing and anticipated turn-around time).

Schedule

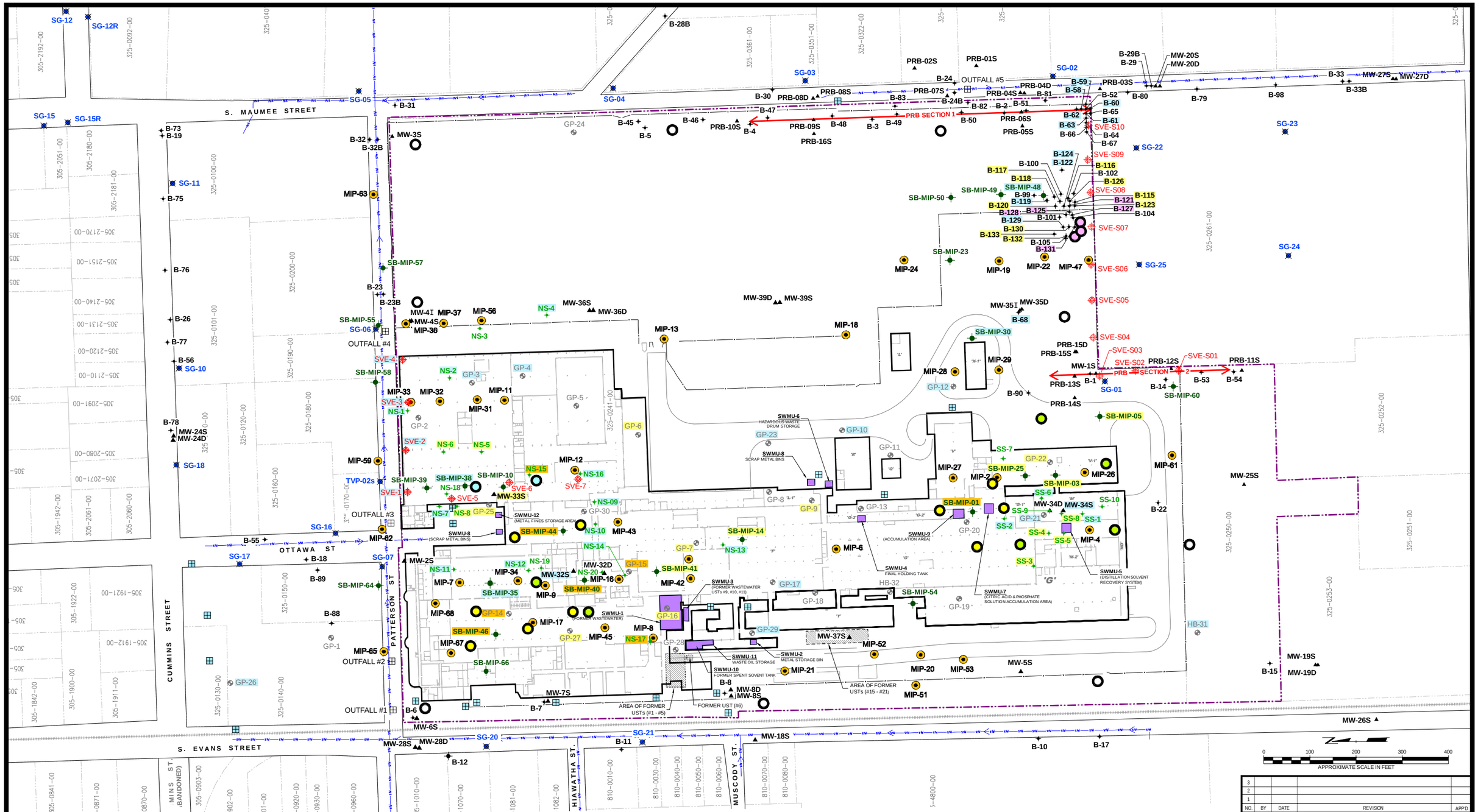
The proposed schedule for this work is outlined in the January 2016 Corrective Measures Proposal. In general, the proposed investigation activities described in this workplan will be completed as soon as feasible, contingent on the following:

- Meet with Prospective Purchaser as soon as possible, and adjust scope if appropriate;
- Substantial agreement from USEPA regarding proposed investigation activities (location and means and methods); and
- Contractor availability.

Attachments

Figures
Attachment 1 – Detailed Soil Evaluation

Figure



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- FENCE LINE
- PARCEL BOUNDARY
- PRB LOCATION
- B-8 PERIMETER/OFF-SITE INVESTIGATION BORING LOCATION AND NUMBER
- MW-8D MONITORING WELL LOCATION AND NUMBER
- SS-10 SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- GP-23 ATC PHASE II ESA BORING LOCATION AND NUMBER
- SVE-7 SOIL VAPOR EXTRACTION WELL LOCATION AND NUMBER
- SG-01 SOIL GAS SAMPLE LOCATION AND NUMBER
- MIP-40 MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- STORM SEWER CATCH BASIN (2006 SITE SURVEY)
- OUTFALL FROM ON-SITE STORM SEWER
- AREA OF FORMER UST
- APPROXIMATE LOCATION OF FORMER SOLID WASTE MANAGEMENT UNITS (SWMUs)
- STORM WATER SEWER
- BLUE HIGHLIGHTING INDICATES SOIL SAMPLE LOCATIONS WHERE CONCENTRATIONS DO NOT EXCEED RISK-BASED SCREENING LEVELS
- YELLOW HIGHLIGHTING INDICATES LOCATIONS WHERE TCE OR PCE CONCENTRATIONS EXCEEDS THE NON-RESIDENTIAL SOIL VOLITILIZATION TO INDOOR AIR INHALATION CRITERIA (1.9 mg/kg for TCE; 21 mg/kg FOR PCE)
- ORANGE HIGHLIGHTING INDICATES LOCATIONS WHERE TCE CONCENTRATIONS EXCEED NON-RESIDENTIAL VOLATILE SOIL INHALATION CRITERIA (14 mg/kg)
- PINK HIGHLIGHTING INDICATES LOCATIONS WHERE PCE CONCENTRATIONS EXCEED SOIL SATURATION SCREENING LEVELS
- PROPOSED PCE SOURCE AREA INVESTIGATION LOCATIONS
- PROPOSED INVESTIGATION LOCATION TO SUPPORT SVE SYSTEM DESIGN
- PROPOSED INVESTIGATION LOCATION TO EVALUATE SVE SYSTEM EFFECTIVENESS
- PROPOSED INVESTIGATION LOCATION TO ESTABLISH BASELINE NEW SOURCE CONDITIONS
- PROPOSED INVESTIGATION LOCATION TO REFINE EXTEND OF TCE IN LOW PERMEABILITY SOILS

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: **FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN**

TITLE: **PROPOSED SOIL INVESTIGATION LOCATIONS**

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0002	
CHECKED BY: SEM		FILE NO. 246667.0002.01.dwg	
APPROVED BY: GC	DATE PRINTED:	**FIGURE 1**	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

Attachment 1
Detailed Soil Evaluation

Background and Purpose

A total of 13 potential on-site soil source areas were identified during HRSC investigation activities. With the exception of the PCE source area and PSG Area 11, these areas are all located below the concrete building slab/impermeable surfaces and therefore will be subject to Institutional Controls as described in the corrective measures proposal.

These potential on-site soil source areas are illustrated and labeled numerically on the attached figures. This section provides a summary of data collected in and around each of those potential source areas. Data used in this evaluation were taken from the following sources:

- TRC Environmental Corporation. 2014. Technical Memorandum: Summary of 2014 Passive Soil Gas Survey Activities: Former Tecumseh Products Company Site in Tecumseh, Michigan. June 18, 2014.
- TRC Environmental Corporation. 2014. MIP Investigation Report and Workplan for High Resolution Site Characterization: RCRA-05-2010-0012, Former Tecumseh Products Company Site, Tecumseh, Michigan. December 2014, Revised March 2015 and April 2015.
- TRC Environmental Corporation. 2015. PCE Source Area Investigation: Former Tecumseh Products Company Site in Tecumseh, Michigan (RCRA-05-2010-0012). January 28, 2016.
- TRC Environmental Corporation. 2016. Corrective Measures Proposal: Former Tecumseh Products Company Site in Tecumseh, Michigan (RCRA-05-2010-0012). January 2016. Table D1.

In some cases, these data are insufficient to fully characterize the nature and extent of COCs in soil, and supplemental soil sampling is proposed to better characterize these potential source areas. This Attachment provides a detailed description of soil sample data from each potential source area. Figures to support this evaluation are attached. These figures illustrate sample locations and screening levels exceedences (Figure E1a), building areas (Figure E1b), passive soil gas (PSG) sample results (Figure E1c), membrane interface probe (MIP) response in the vadose zone (Figure E1d), and PCE concentrations in subsurface soil in the PCE source area (Figure E1e).

PSG Survey Area 1

PSG Survey Area 1 is located through the eastern portion of P-Building. As illustrated on Figure E1c, a total of 14 PSG samples had relatively high PSG concentrations (> 150 microgram [µg]) in this area. This former machining area encompasses the majority of the footprint of P-Building prior to building expansion and renovation in the 1990s. The PSG survey in this area was completed in 2010. The results of the PSG survey are shown on Figure E1a. In 2012, the P-Building soil vapor extraction (SVE) system was installed in this area to mitigate the potential for VOCs from soil and groundwater to migrate into on-site and off-site indoor air. To date, this system has removed approximately 600 kilograms (kg) of TCE from the subsurface in this area. The highest concentrations of TCE in groundwater are detected in this area (SB-MIP-38) and immediately downgradient of this area (SB-MIP-55).

In 2014 three MIP borings (MIP-10, MIP-12 and MIP-38) were completed in this area. The logs for these borings indicate modest electron capture detector (ECD) peaks (up to 3 1 x 10^6 microvolts (uV) in the near surface low permeability material (approximately 1-4 feet), very low ECD response in the upper sand unit with response increasing slightly with depth through the vadose zone. ECD response is much higher in the saturated zone, particularly at SB-MIP-38.

Based on MIP response data, the highest COC concentrations are present for approximately 1 to 4 feet below ground surface (ft bgs) in this area.[3] Soil samples have been collected from five locations (GP-25, MW-33s, NS-15, NS-16 and SB-MIP-38) in PSG Survey Area 1 over this depth interval. Because these samples were collected over the most affected depth interval, they are reasonably expected to represent worst-case soil concentrations in this area. Seven additional soil samples were collected at deeper locations within PSG Survey Area 1. With one exception, NS-08 (15-16′), these samples were collected from at or below the water table (>18 ft), as such these saturated soil samples are representative of groundwater condition and are not used to evaluate the nature and extent of COCs in soil.

Notably, SB-MIP-38 (1.5-3.5′) is the only sample from PSG Area 1 collected after installation of the SVE system. It is also has a measured TCE concentration more than 10 times lower than the other sample locations. At GP-25, MW-33s, and NS-15 the measured TCE concentration exceeds one or more of the applicable risk-based screening level. No other COCs exceed applicable risk-based screening levels for exposure to soil. The TCE concentrations in this area range from 0.12 milligrams per kilogram (mg/kg) at SB-MIP-38 (1.5-3.5′) to 72 mg/kg at NS-15 (2-4′).

- TCE concentrations exceed SVIAI criteria at GP-25, MW-33s, NS-08, and NS-15 in this area.
  - North of this area, along the northern perimeter of the site soil concentrations are at or below the non-residential SVIAI criterion for TCE at all soil sample locations (two depth intervals at each of NS-01, SVE-01, SVE-02, SVE-03, SVE-04). These data are corroborated with ECD response data from MIP borings completed in the Patterson Street ROW. No ECD peaks were observed in the vadose zone at these locations (MIP-58, MIP-59 and MIP-62).
  - Immediately east of this area, at boring locations GP-06, NS-05, and NS-06, concentrations above SVIAI criteria TCE persist. However further east, TCE concentrations in soil are below SVIAI criteria (one depth interval at each of GP-03, GP-04, NS-02, and NS-04). These data are corroborated with ECD response data from MIP borings completed in the eastern portion of P-Building (MIP-11, MIP-31, MIP-32, and MIP-33) and beyond (MIP-36, MIP-37, MIP-55 and MIP-57). With the exception of MIP-11, no ECD peaks were observed in the vadose zone at these locations. Although present, the peak in ECD response (1x10^6 V) at MIP-11 is lower than those observed in PSG Survey Area 1.

[3] Although MIP data are not well correlated to VOC concentration data. Relative ECD response can be used to support the vertical delineation of COCs.

  - South of this area concentrations at PSG points are much lower (<50 mg). However no soil samples have been collected in the near vicinity of PSG Survey Area 1 to the south.
  - At the nearest soil sample locations to the west, concentrations are at or below the non-residential SVIAI criterion for TCE at NS-07 (10-11′), NS-09 (2-3′), NS-10 (8-9′), NS-10 (9-10′) and NS-11 (0-4′). However, the TCE concentration in soil sample SB-MIP-44 (4.5-5.5′) exceeds SVIAI criteria for TCE, as do soil concentrations in PSG Area 3.

- TCE concentrations exceed VSI criteria at one location, NS-15 (2-4′), in this area. This exceedence is bounded to the north by MW-33s and NS-05, in the east by NS-05 and GP-06, and in the south by NS-16 and NS-09. The observed TCE concentration in soil sample SB-MIP-44 (4.5-5.5′), 80 mg/kg also exceeds VSI criteria. Elevated PSG response was not observed in the vicinity of SB-MIP-44. However, in reviewing the soil boring log for SB-MIP-44, brick fragments were noted at approximately 2 ft bgs. This brick may be evidence of a historic area of brick paving between P-Building and Building Area B. Building Areas B-2 and D-2 were constructed in 1967 to connect the previously existing P-Building (1948) and Building Area B (1908). If present, historic brick paving may have impeded soil gas flow vertically, causing PSG data to be biased low in this area. Two (2) additional soil samples are recommended in the vicinity of SB-MIP-44.
- TCE concentrations do NOT exceed DC criteria in this area, or in any of the samples collected adjacent to this area.
- TCE concentrations do NOT exceed PSI criteria in this area, or in any of the samples collected adjacent to this area.
- TCE concentrations do NOT exceed soil saturation levels in this area, or in any of the samples collected adjacent to this area.
- As noted above, PSG Area1 has undergone soil treatment via SVE since 2012. Limited soil sampling is recommended to assess current soil concentrations, and verify that the SVE system is no longer needed to treat soil in this area. Two (2) proposed sample locations are illustrated on Figure 1.

PSG Survey Area 2

PSG Survey Area 2 is located near the northern perimeter of the site in Building Area B. As illustrated on Figure E1c, a single PSG sample had relatively high PSG concentrations (> 150 µg) in this area. In 2014 MIP boring MIP-07 was completed in this area. The log for this boring illustrates low ECD response (<5.0 x 10^5) throughout the vadose zone, including the near surface low permeability soils. ECD response is much higher in the saturated zone.

Soil samples were collected near the surface and near the water table at soil boring NS-11. The sample collected at the water table is representative of groundwater conditions and, as such was not used to evaluate the nature and extent of COCs in soil.

The COC concentrations in the near surface soil sample at NS-11 are below all applicable risk based criteria and soil saturation levels. The lateral extent of PSG data (one sample point) was very limited, and MIP response data are not indicative of a soil source in this area. PSG Survey Area 2 is not a soil source area, nor are risk based criteria exceeded in this area. No further evaluation of PSG Survey Area 2 is necessary.

PSG Survey Area 3

PSG Survey Area 3 extends from the southern portion of Building Area B south through Building Area D.[4] This is the location of a former chemical stockroom and the adjacent corridors. As illustrated on Figure E1c, a total of 11 PSG samples had relatively high PSG concentrations (> 150 μg) in this area, with the highest concentrations observed immediately adjacent to the former chemical stockroom in Building Area D.

In 2014 four MIP borings (MIP-09, MIP-16, MIP-34 and MIP-40) were completed in PSG Survey Area 3. The log for boring MIP-40, located centrally within this area indicates a modest ECD peak (2.1×10^6 uV) in the near surface low permeability material (approximately 2 feet), relatively low ECD response in the sand unit from 2.5 to 8 ft bgs then a significant increase in response from 8 to 20 ft bgs (from 5.0×10^5 uV to 5.6×10^6 uV). ECD response at boring MIP-16 is similar, though the peak in the near surface low permeability zone is approximately two times higher and the peak response in the deep vadose zone is about half of that observed at boring MIP-40. By contrast, ECD response in borings MIP-09 and MIP-34 is relatively low. No ECD peak is observed in the near surface low permeability material at either location, and though ECD response does increase gradually with depth, the maximum response in the vadose zone is relatively low (approximately 1.0×10^6 uV).

Based on MIP response data, the highest COC concentrations are expected to be present in the near surface low permeability material (Building Area D only) and in the sand from approximately 12 to 20 ft bgs. Soil samples have been collected from the near surface sandy fill material at two locations in this area (NS-12 and NS-14). Soil samples have also been collected from the near surface low permeability material at three locations in this area (GP-15, MW-32s, and SB-MIP-40). Soil samples were collected through the entire vadose zone at soil boring SB-MIP-40 (8 total). No other samples were collected from the deep vadose in this PSG Area 3. Ten additional soil samples were collected from at or below the water table (>20 ft) within PSG Survey Area 3. These saturated soil samples are representative of groundwater condition and are not used to evaluate the nature and extent of COCs in soil.

---

[4] A former chemical stockroom was located in Building Area D. Communications with former on-site TPC staff indicate that plant workers may have transported small quantities of degreasing solvents from the stockroom to their work stations to clean machining equipment. Historically, small amounts of these solvents may have spilled as they were transported by hand from the stockroom. PSG survey results, which indicate the presence of elevated concentrations of TCE throughout the corridor north and south of the stockroom, support this explanation.

Neither of the sandy surface fill samples (NS-12 and NS-14) exceed applicable risk-based screening levels for any COCs. As supported by both MIP response data and soil sample data, near surface fill material in this area is not impacted above risk-based screening levels or soil saturation levels in this area.

The TCE concentration at GP-15 (38 mg/kg) in the low permeability near-surface soils exceeds both SVIAI and VSI criteria for TCE. The extent of these exceedences is laterally limited. To the north, TCE concentrations at both MW-32s and SB-MIP-40 are below non-residential risk-based screening levels through this low permeability zone. To the south, at boring SB-MIP-41 shallow COC concentrations are below all risk-based screening levels. To the east and west soil sample data is not available; however both PSG data and ECD response data (MIP-43 and MIP-45) indicate that TCE concentrations east and west of GP-15 are much lower.

TCE concentrations at SB-MIP-40 are below non-residential risk-based screening levels in samples collected from 1-2 ft bgs, 2-3 ft bgs, and 6-7 ft bgs. The non-residential SVIAI criterion for TCE is exceeded in each of the five samples collected from 9 to 19 ft bgs at SB-MIP-40, and VSI criteria for TCE area exceeded in three of the four samples collected from 12 to 19 ft bgs at SB-MIP-40. ECD response data from boring MIP-16 indicate that these exceedences likely extend to the south through Building Area D. The lateral extent of exceedences of VSI criteria is limited by ECD response data from MIP borings around this area (MIP-09, MIP-34, MIP-41, MIP-43, MIP-44, and MIP-45). This assessment is validated by confirmation soil sample data collected at SB-MIP-41 and SB-MIP-44. Notably, although VSI criteria are exceeded in the vicinity of SB-MIP-40 and MIP-16, these exceedences are deeper (> 8 feet) than typical excavation depths. The area in the vicinity of SB-MIP-40 and MIP-16 will likely be targeted for SVE. Two (2) additional soil sample locations are proposed to confirm MIP data to north and west and support SVE system design.

COC concentrations do NOT exceed DC criteria, PSI criteria, or soil saturation levels in PSG Area 3, or in any of the samples collected adjacent to this area. Previous investigation activities have defined the lateral extent of VSI criteria exceedences in this area.

PSG Survey Area 4

PSG Survey Area 4 is located through in the central portion of Building Area K in the northwest portion of the site. As illustrated on Figure E1c, a single PSG sample had relatively high PSG concentrations (> 150 μg) in this area. In 2014, MIP boring MIP-17 was completed in this area. The log for this boring illustrates a sharp peak in ECD response (4.7×10^6 uV) in the near surface low permeability material (approximately 3 ft bgs). ECD response was low through the remainder of the vadose zone. A comparable peak in ECD response is also observed near the top of the saturated zone. North of this location, ECD response data, at MIP-46, closely mirror those of MIP-17 through the vadose, though the peak in ECD response is lower (3.7×10^6 uV).

No soil samples have been collected from this area. However soil samples were collected from two borings in the near vicinity of PSG Area 4: GP-14 and SB-MIP-46. TCE concentrations in the near

surface low permeability material at both of the locations exceed SVIAI criteria and VSI criteria. TCE concentrations do not exceed DC or PSI criteria in this area. No other COCs exceeded risk-based screening levels at these locations, nor are concentrations above soil saturation levels.

Soil samples were collected at four depths from SB-MIP-46, these data indicate that the vertical distribution of elevated TCE concentration is very limited in this area, with TCE concentrations decreasing with depth: 58 mg/kg (0.5-1.5′), 7.0 mg/kg (1.5-2.5′), 0.12 mg/kg (2.5-3.5′), and 0.052 mg/kg (7-8′). Based on ECD response data, this area is laterally limited to the east by MIP-09, MIP-34 and MIP-35; to the north by MIP 67 and MIP 68; to the west by MIP-66; and to the south by MIP-45. However, soil sample data in the vicinity of PSG Area 4 do indicate that soil concentrations above risk-based screening levels extend laterally beyond the area of relatively high PSG response. These PSG data likely indicate that the mobility of TCE in this low permeability material is significantly restricted. Nevertheless, additional near surface soil sampling is recommended in Building Area K, as illustrated on Figure 1, to more precisely define the lateral extent of these exceedences.

PSG Survey Area 5

PSG Survey Area 5 is located in the southwest corner of Building Area K.[5] As illustrated on Figure E1c, a single PSG sample had relatively high PSG concentrations (> 150 μg) in this area. In 2014 MIP boring MIP-08 was completed in this area. The log for this boring illustrates a sharp peak ECD response at approximately 2 ft bgs. ECD response through the remainder of the vadose zone is low, and although an ECD peak is observed in the saturated zone, that peak is lower than is typical for the site. Moreover the magnitude of the peak in the vadose zone is greater than the peak in the saturated zone.

A single soil sample was collected from soil boring NS-17 in PGS Area 5. With the exception of TCE, COC concentrations in the surface soil sample at NS-17 are below all applicable risk based criteria and soil saturation levels. The TCE concentration (100 mg/kg) exceeds applicable SVIAI and VSI criteria at this location. TCE concentrations do not exceed DC or PSI criteria in this area, nor is the concentration above soil saturation levels.

ECD response data indicate that the vertical extent of these exceedences is very limited. Additionally, based on PSG data (one sample point), the lateral extent of these exceedences is very limited. PSG Survey Area 5 is a localized soil source area that is likely the result of poor housekeeping practices during overhead conveyance piping modifications. TCE concentrations in the saturated zone are low in comparison to the majority of the site, indicating that the TCE is this area has been immobilized in

[5] Above ground chemical piping to and from the stockroom in Building Area D was traced to the point of termination. Piping extended to the north into Building Area B. Two chemical lines extended to the south to the approximate location of sub-slab sample point SV-06. From there, the piping turned to the west and followed the corridor into Building Area K. One of the pipes terminated near sample location 144; the end was cut but not capped. The other pipe turned to the south and entered Building Area TD where several above ground chemical storage tanks were located.

the near surface low permeability soils. No further investigation of PSG Survey Area 5 is recommended. This area will be managed through the ICs and ECs.

PSG Survey Area 6

PSG Survey Area 6 extends from the southern portion of Building Area E south through the northern half of Building Area F. As illustrated on Figure E1c, a total of 12 PSG samples had relatively high PSG concentrations (> 150 μg) in this area. In 2014 three MIP borings (MIP-14, MIP-15, and MIP-42) were completed in this area. The logs for these borings indicate ECD peaks (up to 1.2×10^7 uV) in the near surface low permeability material (approximately 3-6 feet), relatively low ECD response in the sand unit with response increasing modestly with depth through the vadose zone.

Based on MIP response data, the highest COC concentrations are expected to be present in the near surface low permeability material. Soil samples have been collected from four locations (GP-07, GP-17, NS-13, and SB-MIP-14 [2 samples]) in PSG Survey Area 6 over this depth interval. Because these samples were collected over the most affected depth interval, they are reasonably expected to represent worst-case soil concentrations in this area.

With the exception of NS-13, TCE concentrations at each of these locations exceed SVIAI criteria. TCE concentrations do not exceed VSI, DC or PSI criteria in this area, nor are concentrations above soil saturation levels. No other COCs exceed applicable screening criteria in PSG Area 6. Although soil concentrations exceed SVIAI criteria, TCE is expected to be relatively immobile in the near surface low permeability material, and as such has limited potential for lateral soil gas migration. The risk associated with exceedences of SVIAI criteria is expected to be addressed through a site wide IC protective of the vapor intrusion pathway. Therefore no further evaluation of PSG Area 6 is recommended.

PSG Survey Area 7

PSG Survey Area 7 is located in the central portion of the building between Building Areas F and G. As illustrated on Figure E1c, 3 PSG samples had relatively high PSG concentrations (> 150 μg) in this area. In 2014 MIP boring MIP-06 was completed in this area. The log for this boring illustrates low ECD response ($<1.0 \times 10^6$) throughout the vadose zone, including the near surface low permeability soils. A modest peak in ECD response was observed in the saturated zone. No soil samples were collected from this area. However given the low MIP response observed through the vadose zone in this area, PSG Survey Area 7 is not considered a soil source area. Therefore no further evaluation of PSG Area 7 is recommended.

PSG Survey Area 8

PSG Survey Area 8 is located in the central portion of the Building Area G. As illustrated on Figure E1c, a 2 PSG samples had relatively high PSG concentrations (> 150 μg) in this area. Although concentrations were above 150 μg, concentrations were relatively low in comparison to other areas of elevated PSG response in the near vicinity, further investigation of this area was not completed. Based on soil

concentrations in other potential source areas, soil concentrations in this area may exceed SVIAI criteria, but are not expected to exceed any other risk-based screening levels. As described above, risk associated with widespread exceedences of SVIAI criteria is expected to be addressed through a site-wide IC protective of the vapor intrusion pathway. Therefore no further evaluation of PSG Area 8 is recommended.

PSG Survey Area 9

PSG Survey Area 9 extends from the southern extent of Building Area G-2 through Building Area V-2. As illustrated on Figure E1c, a total of 7 PSG samples had relatively high PSG concentrations (>150 μg) in this area. In 2014 two MIP borings (MIP-01 and MIP-02) were completed in this area. The logs for these borings indicate a peak in ECD response (up to 1.4×10^7 uV) in the near surface low permeability material (approximately 2-5 ft bgs), and low ECD response in the sand unit through the remainder of the vadose zone.

Based on MIP response data, the highest COC concentrations are expected to be present in the near surface low permeability material. A soil sample was collected at one location (SB-MIP-01) in PSG Survey Area 9 over this depth interval. The TCE concentration in this sample (92 mg/kg) exceeds both SVIAI and VSI criteria. Ten additional samples were collected from the sandy vadose zone below the near surface low permeability material at SB-MIP-01. Concentrations in these samples were much lower ranging from 0.63 to 2.8 mg/kg. TCE concentrations do not exceed DC or PSI criteria in this area, nor is the concentration above soil saturation levels. No other COCs exceed applicable screening criteria in PSG Area 9.

Based on both MIP and soil sample data, the vertical extent of VSI criteria exceedences is limited. However, no other soil samples have been collected in the near vicinity of SB-MIP-01 to define the lateral extent of TCE above VSI criteria. The mobility of TCE in this low permeability zone is likely significantly restricted. Nevertheless, additional near surface soil sampling is recommended in the vicinity of PSG Area 9 (four [4] locations), as illustrated on Figure 1, to further define the lateral extent of these exceedences.

PSG Survey Area 10

PSG Survey Area 10 is located in the southeast corner of the building in the vicinity of the former distillation solvent recovery system. As illustrated on Figure E1c, a total of 12 PSG samples had relatively high PSG concentrations (>150 μg) in this area. In 2014 three MIP borings (MIP-03, MIP-04 and MIP-26) were completed in this area. The logs for these borings indicate a peak in ECD response (up to 1.6×10^7 uV) in the near surface low permeability material (approximately 2-5 ft bgs), and low to moderate response through the remainder of the vadose zone.

Based on MIP response data, the highest COC concentrations are expected to be present in the near surface low permeability material (3-6 ft bgs). Soil samples have been collected from this depth interval at four locations (GP-21, SS-05, SS-06, SB-MIP-03 [two depths]) in PSG Area 10. The highest

concentration observed as 11 mg/kg at SS-05 (3-4'). In addition samples were collected from the near surface sandy fill material at three locations (MW-34S, SS-01, and SB-MIP-03 [2 depths]). Additional samples were also collected from the sandy vadose zone below the near surface low permeability material at a number of locations throughout this area: GP-22, SS-03 (two depths), SS-04 (two depths), SS-05, SS-08, SB-MIP-03 (6 depths). Thirteen samples were collected from at or below the water table (>20 ft), as such these saturated soil samples are representative of groundwater condition and are not used to evaluate the nature and extent of COCs in soil. Soil concentrations in the more permeable vadose zone materials exhibited TCE concentrations up to 9.4 mg/kg. These exceedences of the SVIAI criterion for TCE throughout the permeable portion of the vadose zone may represent of source for lateral soil gas migration. Therefore area in the vicinity of SS-05 and SB-MIP-03 will likely be targeted for SVE. Three (3) additional soil sample locations are proposed to support SVE system design.

TCE concentrations throughout this area exceed SVIAI criteria. TCE concentrations do not exceed VSI, DC or PSI criteria in this area, nor are concentrations above soil saturation levels. No other COCs exceed applicable screening criteria in PSG Area 10.

PSG Survey Area 11

PSG Survey Area 11 is located immediately east of the southeast corner of the building. As illustrated on Figure E1c, a total of 3 PSG samples had relatively high PSG concentrations (> 150 μg) in this area. In 2014 one MIP borings (MIP-05) were completed in this area. No peak in ECD response is observed at those location; however low to moderate level ECD response is observed to the entire vadose zone. MIP confirmation sampling was completed at this location in 2015. Soil samples were collected from three depth intervals at SB-MIP-05. Concentrations of TCE, which ranged from 2.4 to 4.9 mg/kg, exceed SVIAI criteria. However, TCE concentrations do not exceed VSI, DC or PSI criteria in this area, nor is the concentration above soil saturation levels. No other COCs exceed applicable screening criteria in PSG Area 11. Given the proximity of this potential source area to the property line, an historic soil gas concentrations at SG-01, this area will likely be targeted for SVE. One (1) additional soil sample locations are proposed to support SVE system design.

MIP-20

A modest peak in ECD response was observed in the near surface lower permeability soils at MIP boring MIP-20 (Figure E1d). The lateral extent of TCE in this area is bounded by additional MIP borings completed in the vicinity MIP-51, MIP-52, MIP-53 and MIP-54 which show this potential source area is laterally limited. SVIAI criteria are likely exceeded in the near surface low permeability soil at this location. However, this modest peak in ECD is unlikely to indicate an exceedence of VSI criteria. TCE in this area is expected to be relatively immobilized in the near surface low permeability materials. The risk associated with exceedences of SVIAI criteria is expected to be addressed through a site-wide institutional control protective of the vapor intrusion pathway. Therefore no further evaluation is recommended.

PCE Source Area

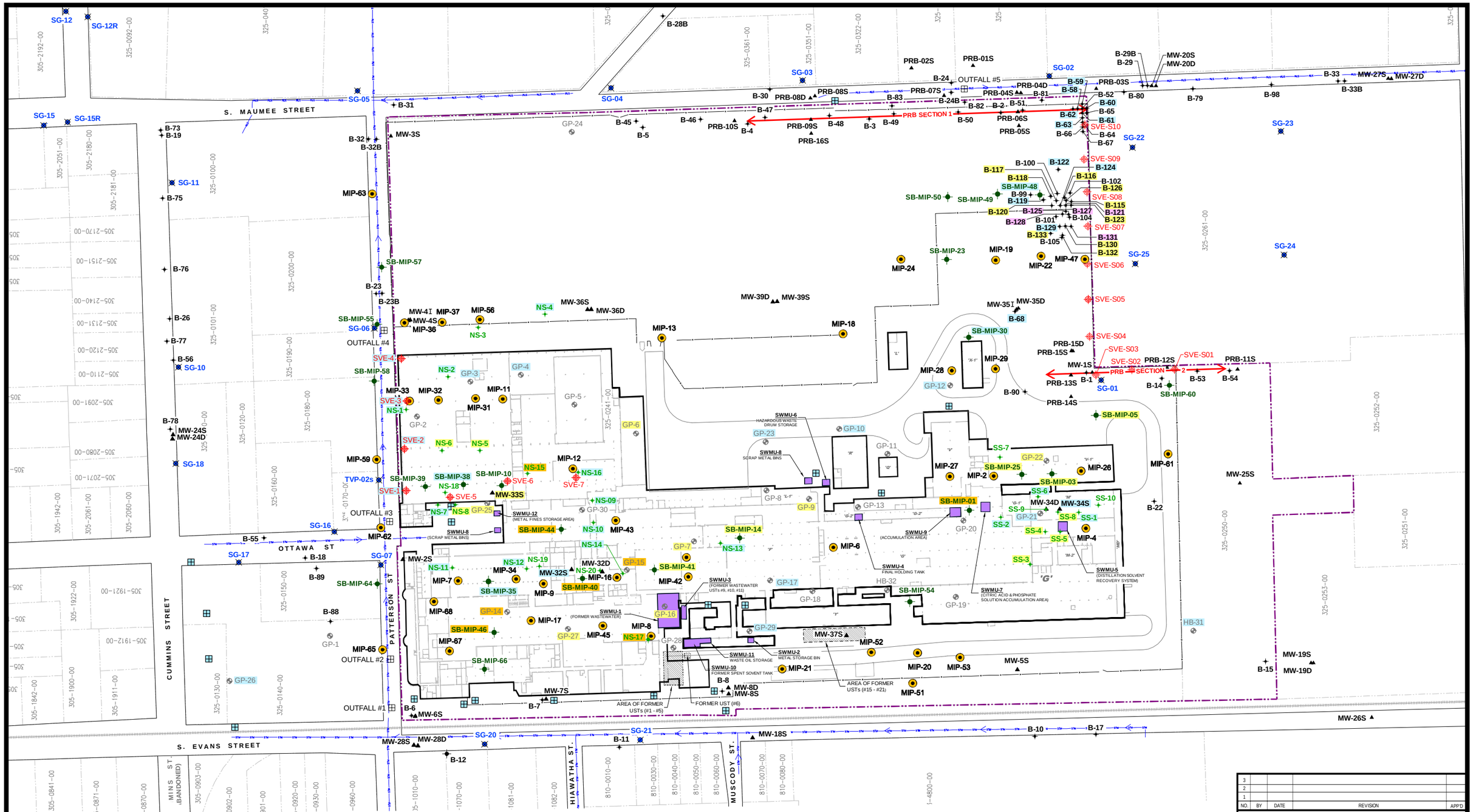
As described previously, a previously unidentified PCE source area was identified in the vicinity of soil boring B-100 during HRSC investigation activities. A targeted soil and groundwater investigation was completed in the December 2015 to better define the nature and extent of PCE contamination in this area. The findings of that investigation are described in detail in Appendix C of the Corrective Measures Proposal and illustrated on Figure E1e.

Surface soil samples were collected from 1 to 2 ft bgs at 14 of the PCE source area borings and at soil boring B-122 located downgradient (east) of the PCE source area. The highest PCE concentration observed in surface soil was 6.9 mg/kg. No risk-based screening levels for non-residential exposure to soil are exceeded in surface soils, nor are soil saturation levels exceeded. As expected, due to the volatile nature of the COCs, high concentrations of PCE and TCE are not persistent in near surface soils. Soil treatment or other corrective measures are not required for surface soils in the PCE source area. Moreover these data indicate that there is no potential for off-site soils at adjacent properties to be affected above risk-based screening levels due to the erosion of contaminated surface soil unto off-site properties.

Sub-surface soil samples were collected from each of the PCE source area borings (26 total samples from 18 boring locations) completed in December 2015, from soil boring MIP-SB-48 (4 samples), and at soil boring B-122 (one sample). TCE concentrations exceeded the non-residential soil volatilization to indoor air inhalation criterion at four locations (B-118 [9-10′], B-131 [10-11′], B-132 [10-11′], and B-133 [10-11′]). No other risk-based screening levels for TCE were exceeded, nor were soil saturation levels exceeded. The risk associated with exceedences of SVIAI criteria is expected to be addressed through a site-wide institutional control protective of the vapor intrusion pathway. Therefore no further evaluation of these exceedences is recommended.

Detected concentrations of PCE exceed soil saturation levels at five boring locations (B-121, B-125, B-127, B-128, and B-131). The highest sub-surface soil concentration was measured at soil boring B-127 from 10 to 11 ft bgs (520 mg/kg). Surface soils in this area are relatively un-impacted, and the depth to groundwater is shallow consequently the soil source thickness is not reasonably expected to exceed 2 meters, as such the non-residential finite volatile soil inhalation (VSI) criteria for a 2 meter source are the applicable VSI criteria for this area (1,100 mg/kg for PCE). The detected PCE concentrations do not exceed any applicable VSI, direct contact or particulate soil inhalation risk-based screening levels in this area. However, PCE concentrations do exceed soil saturation level in this area, and have resulted in leaching to groundwater. Consequently soils exceeding soil saturation levels and a “buffer zone” will be targeted for soil treatment. Note that soil samples have not been collected south or west of soil boring B-131. Three (3) additional soil borings are recommended in this area as illustrated on Figure 1 to define the lateral extent of soils affected above soil saturation levels to the southwest.

Figures



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- FENCE LINE
- PARCEL BOUNDARY
- PRB LOCATION
- B-8 PERIMETER/OFF-SITE INVESTIGATION BORING LOCATION AND NUMBER
- MW-8D MONITORING WELL LOCATION AND NUMBER
- SS-10 SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- GP-23 ATC PHASE II ESA BORING LOCATION AND NUMBER
- SVE-7 SOIL VAPOR EXTRACTION WELL LOCATION AND NUMBER
- SG-01 SOIL GAS SAMPLE LOCATION AND NUMBER
- MIP-40 MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- STORM SEWER CATCH BASIN (2006 SITE SURVEY)
- OUTFALL FROM ON-SITE STORM SEWER
- AREA OF FORMER UST
- APPROXIMATE LOCATION OF FORMER SOLID WASTE MANAGEMENT UNITS (SWMUs)
- STORM WATER SEWER
- BLUE HIGHLIGHTING INDICATES SOIL SAMPLE LOCATIONS WHERE CONCENTRATIONS DO NOT EXCEED RISK-BASED SCREENING LEVELS
- YELLOW HIGHLIGHTING INDICATES LOCATIONS WHERE TCE OR PCE CONCENTRATIONS EXCEEDS THE NON-RESIDENTIAL SOIL VOLITILIZATION TO INDOOR AIR INHALATION CRITERIA (1.9 mg/kg for TCE; 21 mg/kg FOR PCE)
- ORANGE HIGHLIGHTING INDICATES LOCATIONS WHERE TCE CONCENTRATIONS EXCEED NON-RESIDENTIAL VOLATILE SOIL INHALATION CRITERIA (14 mg/kg)
- PINK HIGHLIGHTING INDICATES LOCATIONS WHERE PCE CONCENTRATIONS EXCEED SOIL SATURATION SCREENING LEVELS

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

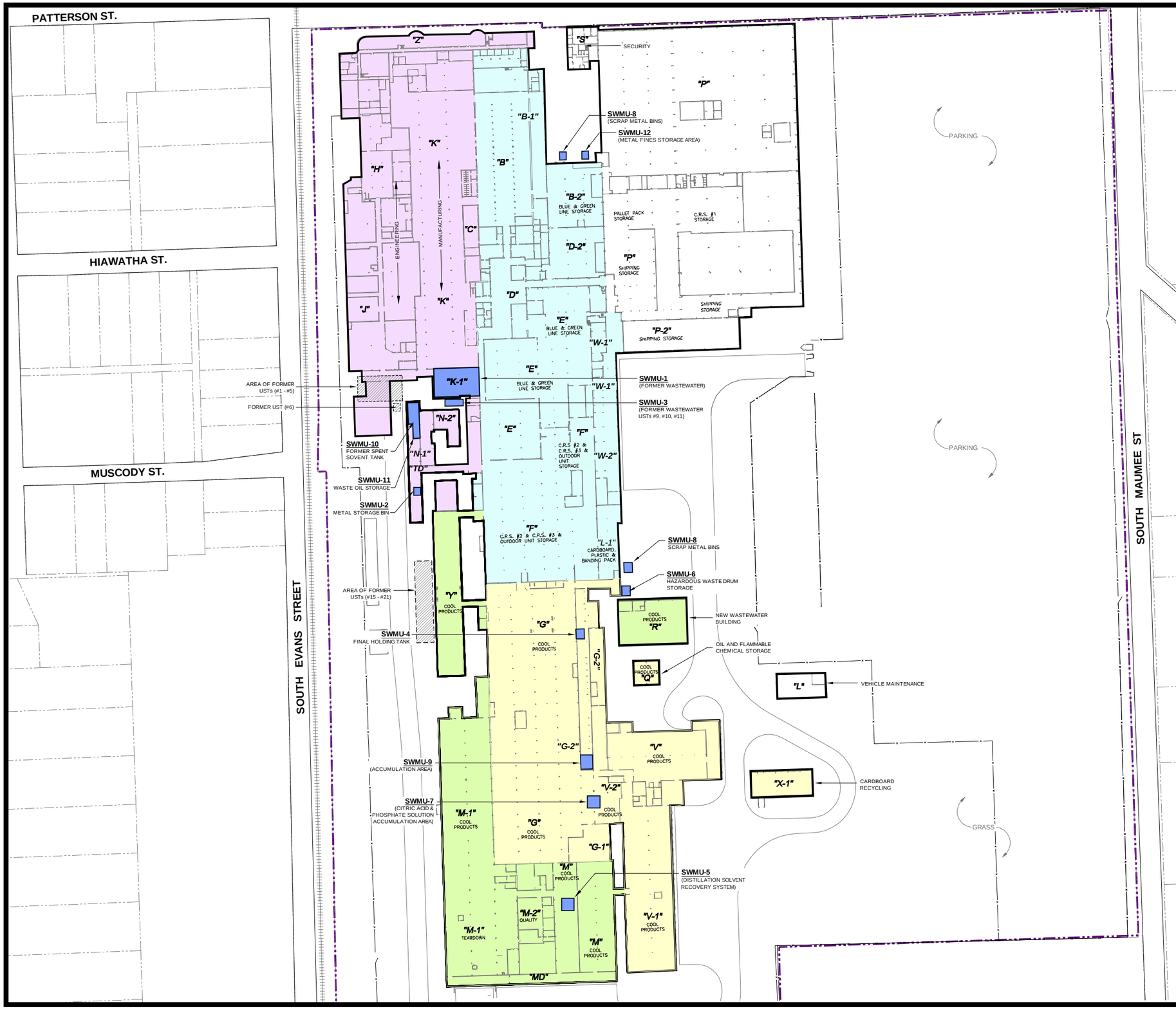
PROJ.: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: SOIL AREAS ABOVE RISK-BASED SCREENING LEVELS

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.15.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE E1a	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: A:\TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Rp2\246667.0003.15.dwg
Operator Name: STEHLE, EMANUEL
Drawing File Name: 0.dwg



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- TECUMSEH PRODUCTS BUILDING OUTLINE
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- APPROXIMATE LOCATION OF FORMER SOLID WASTE MANAGEMENT UNITS (SWMUs)
- FENCE LINE

Demolition Key

- PHASE I DEMOLITION AREA (DEMOLITION COMPLETE - 2013)
- PHASE II DEMOLITION AREA (DEMOLITION COMPLETE - 2013)
- PHASE III DEMOLITION AREA (PROPOSED)
- PHASE IV DEMOLITION AREA (PROPOSED)

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. SEE SECTION 2 OF THE SEPTEMBER 2012 REMEDIAL INVESTIGATION AND GROUNDWATER ENVIRONMENTAL INDICATOR REPORT FOR A DESCRIPTION OF SWMUs, UNDERGROUND STORAGE TANKS AND OTHER RELEVANT DATA.

N

0 80' 160' 240' 320'
APPROXIMATE SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: SITE FEATURES AND DEMOLITION AREAS

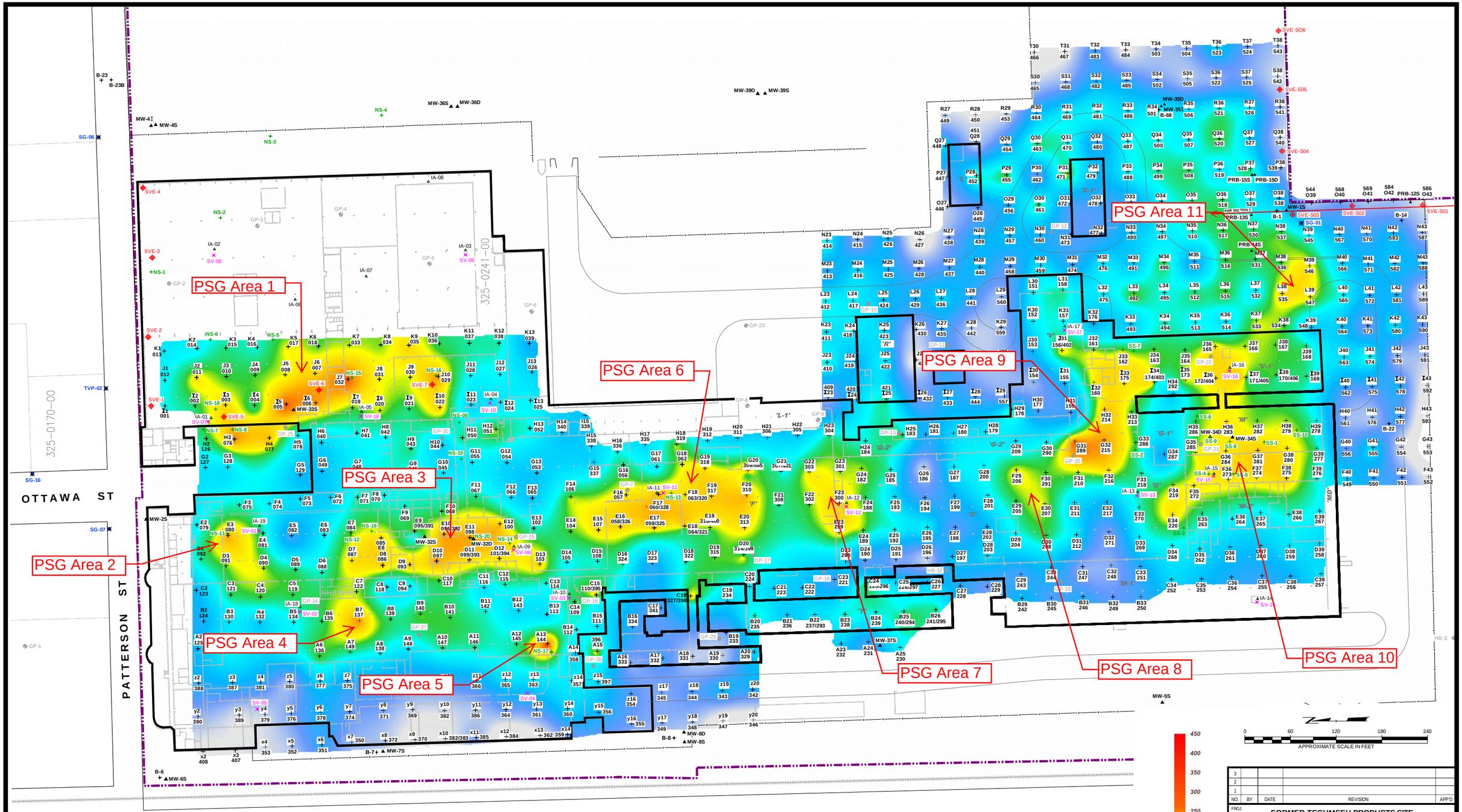
DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.02.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE E1b	
DATE: JANUARY 2015			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CAP Rpt\246667.0003.02.dwg
Operator Name: STEWALE, DAWAH
Drawing Pat Name: C3D8M3

Dwg Size: 2.69 Mb
Plot Date: January 05, 2015
Plot Time: 3:17 PM

Attached Xref's: tec0301r10
Attached Images: 10026 Site Features & Demo Areas
Layout: E1b



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- FENCE LINE
- PARCEL BOUNDARY
- PRB LOCATION
- B-8 — PERIMETER/OFF-SITE INVESTIGATION BORING LOCATION AND NUMBER
- MW-8D — MONITORING WELL LOCATION AND NUMBER
- NS/SS-10 — SOURCE AREA INVESTICATION BORING LOCATION AND NUMBER
- GP-23 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- SVE-7 — SOIL VAPOR EXTRACTION WELL LOCATION AND NUMBER
- SG-01 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SV-08 — SUB-SLAB SOIL GAS SAMPLE LOCATION AND NUMBER
- IA-03 — INDOOR AIR SAMPLE LOCATION AND NUMBER
- J13 026 — PASSIVE SOIL GAS SURVEY SAMPLE LOCATION AND NUMBER
- G20 309/535 — DUPLICATE SAMPLE LOCATION TO ASSESS TEMPORAL VARIABILITY

NOTES

1. PASSIVE SOIL GAS SURVEY COMPLETED IN PHASES;

   - SAMPLE LOCATIONS 001 THROUGH 150 COMPLETED JUNE-JULY 2010.
   - SAMPLE LOCATIONS 151 THROUGH 292 COMPLETED JULY 2013.
   - SAMPLE LOCATIONS 293 THROUGH 341 COMPLETED SEPTEMBER 2013.
   - SAMPLE LOCATIONS 342 THROUGH 593 COMPLETED APRIL 2014.

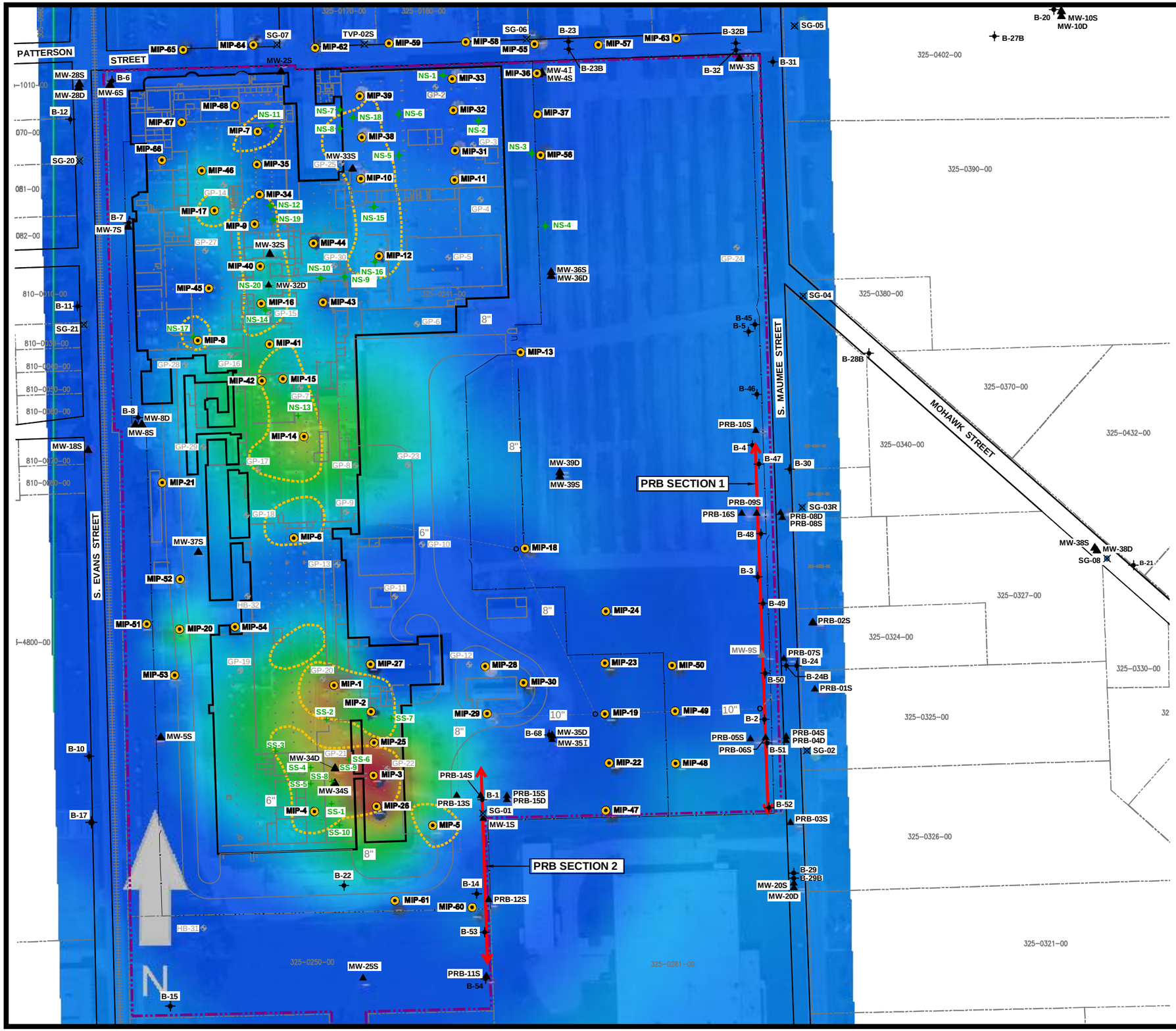
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN

TITLE: PASSIVE SOIL GAS SURVEY LOCATIONS TCE AND BREAKDOWN DISTRIBUTION MAP

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 203342.0001.04	
CHECKED BY: SEM		FILE NO. 203342.0001.04.TCE+BD.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE E1c	
DATE: JUNE 2014			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- 8" — PIPE DIAMETER AND APPROXIMATE LOCATION OF ON-SITE SANITARY SEWER
- PRB LOCATION
- FENCE LINE
- MIP-57 — MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- OUTLINE OF PASSIVE SOIL GAS SURVEY AREAS WITH TCE AND BREAKDOWN ELEVATED RESPONSE FOR PRODUCTS

MAXIMUM ECD RESPONSE

- 15,898,923 uV
- 13,911,558 uV
- 11,924,192 uV
- 9,936,827 uV
- 7,949,462 uV
- 5,962,096 uV
- 3,974,931 uV
- 1,987,365 uV
- 0 uV

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. TCE BREAKDOWN PRODUCTS INCLUDE cis-1,2-DICHLOROETHENE; trans-1,2-DICHLOROETHENE; 1,1-DICHLOROETHENE; AND VINYL CHLORIDE.
4. LATERAL DISTRIBUTION OF ECD RESPONSE MAPPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE TO KRIG MIP DATA.
5. VADOSE ZONE INCLUDES ALL DEPTHS FROM THE GROUND SURFACE TO THE MAXIMUM OBSERVED WATER TABLE (APPROXIMATELY 2 FEET ABOVE THE WATER TABLE AT THE TIME OF THE INVESTIGATION).

0 100' 200' 300' 400'
APPROXIMATE SCALE IN FEET

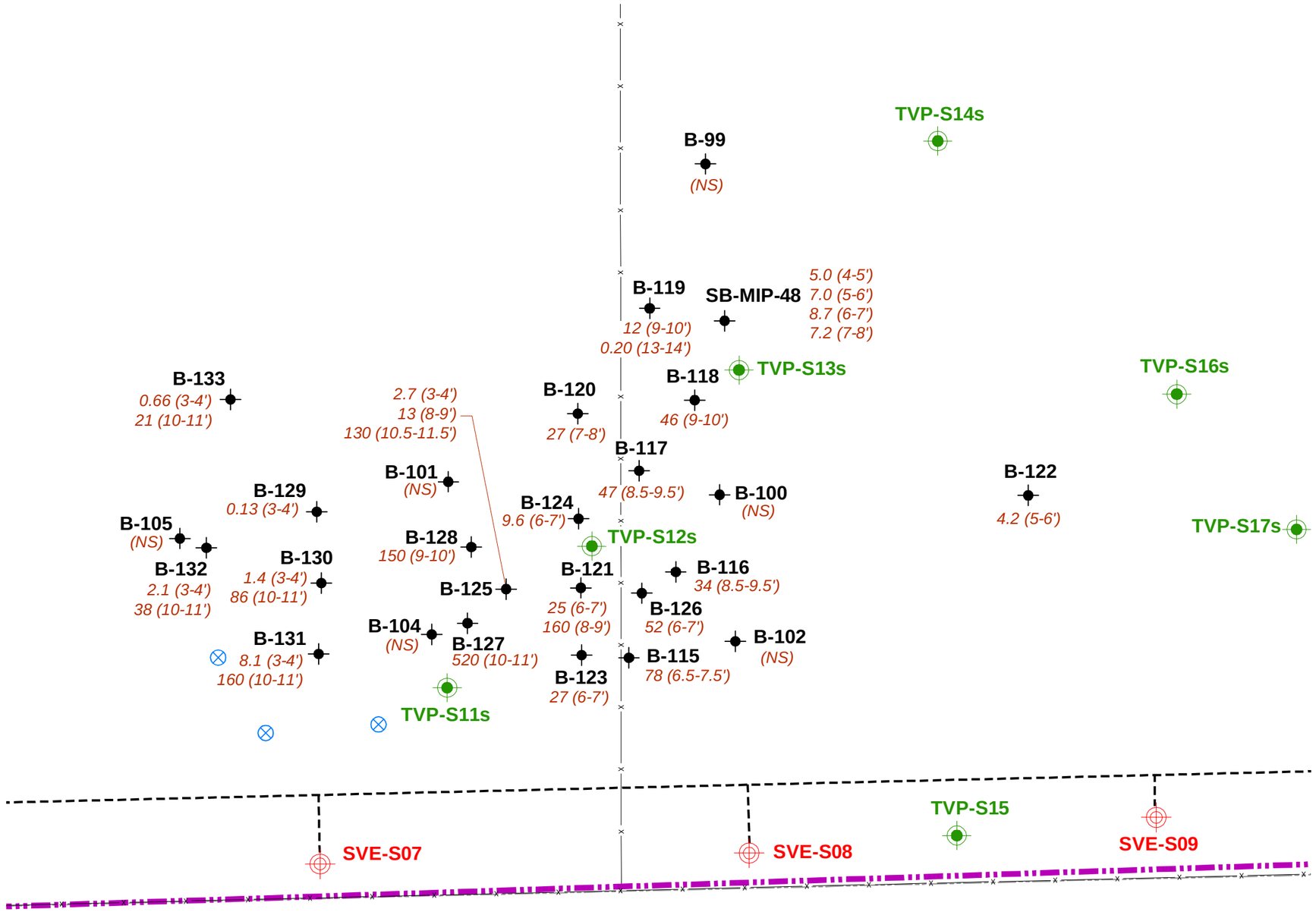
NO.	BY	DATE	REVISION	APP'D
3				
2				
1	DGS	02/17/15	UPDATE EVS MODEL OUTPUT	SEM

PROJ: FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN

TITLE: MIP INVESTIGATION RESULTS DISTRIBUTION OF MAXIMUM ECD RESPONSE IN VADOSE ZONE

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 220003.0000	
CHECKED BY: SEM		FILE NO. 220003.0000.00.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE E1d	
DATE: FEBRUARY 2015			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

	FORMER TECUMSEH PRODUCTS SITE BOUNDARY
	FENCE LINE
	SVE CONVEYANCE PIPING (4-INCH)
B-2	BORING LOCATION AND NUMBER
SVE-S08	SVE EXTRACTION WELL LOCATION
TVP-S09	SVE VACUUM MONITORING POINT LOCATION
	PROPOSED BORING LOCATION
78 (6.5-7.5')	PCE CONCENTRATION IN mg/kg AND SAMPLE DEPTH INTERVAL
(NS)	NO SUBSURFACE SOIL SAMPLE COLLECTED

NOTES

1. BORING LOCATIONS B-115 THROUGH B-133 WERE FIELD LOCATED RELATIVE TO VACUUM MONITORING POINTS FOR SOIL VAPOR EXTRACTION (SVE) SYSTEM.
2. THE DEPTH INTERVALS FOR SUBSURFACE SOIL SAMPLES WERE SELECTED BASED ON FIELD SCREENING WITH A PHOTOIONIZATION DETECTOR.

N

0 20' 40'

APPROXIMATE SCALE IN FEET

PROJECT:
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:
PCE CONCENTRATIONS IN SUBSURFACE SOILS

DRAWN BY: DGS	SCALE:	PROJ. NO.	220003.0000
CHECKED BY: MP	AS INDICATED	FILE NO.	220003.0000.03.dwg
APPROVED BY: SEM	DATE PRINTED:	FIGURE E1e	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\220003\0000_PCE Investigation\220003.0000.03.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.386863
Dwg Size: 1.87 Mb
Plot Date: January 27, 2016
Plot Time: 9:19 AM
Attached Xref's:
Attached Images:
Layout: FIG03 PCE SS Soils

Appendix F
Supplemental Groundwater Profile Sampling Workplan

Technical Memorandum

To:	Joseph Kelly, USEPA
From:	Stacy Metz and Graham Crockford, TRC
Subject:	Workplan for Additional High Resolution Site Characterization: Supplemental Groundwater Profile Sampling at Downgradient Properties Former Tecumseh Products Company Site in Tecumseh, Michigan (RCRA-05-2010-0012)
Date:	January 18, 2016
cc:	Jason Smith, Tecumseh Products Company
Project No.:	246667.0002.0000

Background

Tecumseh Products Company (TPC) retained TRC Environmental Corporation (TRC) to investigate soil and groundwater conditions at the former TPC site located in Tecumseh, Michigan. Between April and June 2015 a High Resolution Site Characterization (HRSC) Investigation was completed to supplement existing data and support the development of the final corrective measures proposal. On July 31, 2015 final data were provided to USEPA including a figure showing investigation locations, tabulated soil and groundwater data, laboratory analytical reports, and soil boring logs. Subsequently, a comprehensive evaluation of HRSC data collected during the April through June 2015 investigation activities was completed by TRC. The *2015 High Resolution Site Characterization Report and Updated Conceptual Site Model* (CSM Report) was prepared to document the findings of that data evaluation. The CSM Report, which was submitted in October 2015, included an updated site description including site geology and hydrogeology, an evaluation of membrane interface probe (MIP) confirmation sample data, and an evaluation of groundwater chemistry data.

As described in the CSM Report, groundwater concentrations exceeding 1-percent of solubility were observed at two locations along the site perimeter.

- Downgradient of the northern source area, up to 12,000 micrograms per liter [µg/L] of trichloroethene (TCE) was identified in groundwater at boring location SB-MIP-57 (Figure 1). The lateral extent of TCE in this area is bounded to the west by MIP confirmation boring SB-MIP-55 and to the east by MIP boring MIP-63. Additionally, similar TCE concentrations in this area are observed up gradient (west-southwest) to soil boring SB-MIP-38. However,

downgradient delineation was limited by off site property access. Consequently the nearest downgradient groundwater profile sample locations are along Cummins Street (soil borings B-75 and B-76).

- Downgradient of the southern source area, up to 15,000 µg/L of tetrachloroethene (PCE) was identified in groundwater at boring location B-81 (Figure 1). The lateral extent of PCE in this area is bounded to the north by groundwater profile sample location B-82 and to the south by groundwater profile sample location B-80. Additionally, the PCE in this area was subsequently tracked up gradient (west) to a source area near soil boring B-100. However, delineation downgradient of soil boring B-81 was limited by off site property access. Consequently, the nearest downgradient groundwater profile sample location is soil boring B-86.

Purpose and Scope

The findings of the CSM Report were discussed with USEPA during the December 8, 2015 Project Meeting. Based on that discussion, TPC agreed, contingent on site assess, to complete groundwater profile sampling at additional boring locations, downgradient of the areas along the site perimeter where the highest volatile organic compound (VOC) concentrations are observed in groundwater. Data from the proposed supplemental groundwater profile sampling will be used as follows:

- To refine the limit of constituents of concern (COCs) with concentrations exceeding 1-percent of solubility downgradient of the site;
- To collect additional groundwater data off site to determine if off-site groundwater treatment may be appropriate;
- To verify that gravity flow of parent products along the clay surface downgradient of B-81 has not diverted contaminants to the southeast;
- To refine the description of site geology/hydrogeology between South Maumee Street and Mohawk Street, in order to more accurately calculate horizontal gradient and groundwater flow velocity through this area; and
- To optimize the vertical and horizontal placement of downgradient monitoring wells to monitor the effectiveness of planned groundwater remediation.

Proposed Investigation Activities

The approximate locations of proposed additional vertical profile sample locations are illustrated on Figure 1. The proposed boring locations are placed along the flow path of highest molar mass based on the recent HRSC data. Completion of the proposed borings is contingent on site access and owner agreement. TPC expects that an access agreement can be obtained within a reasonable timeframe.[1]

---

[1] As discussed with USEPA previously, the owner of Parcel Number 325-0200-00 has been aggressive and uncooperative with TRC staff, contractors, and utility locate personnel during previous investigation activities in the right-of-way near his property. TPC cannot reasonably gain access to that property for additional investigation activities.

TPC has obtained access agreements for the two properties downgradient of the southern plume area (Parcel Numbers 325-0321-00 and 325-0326-00). TPC has also initiated communications with the owners of properties downgradient of the northern portion of the site (Parcel Numbers 325-0100-00 and 325-0101-00) to obtain site access for the proposed work. The owner of Parcel Number 325-0101-00 has denied access. The proposed HRSC borings are located on Parcel Number 325-0100-00.

The methodology for the installation of soil borings and groundwater sampling will be generally consistent with previous HRSC investigation activities. Specifically:

- Soil borings will be advanced to the top of the clay confining unit by direct-push technology. To ensure that the true basal clay, rather than an intermediate clay has been reached a ground survey will be completed prior to boring completion. A target elevation of 750 ft MSL has been selected to ensure that borings are not terminated in this intermediate clay layer.
- Soil samples will be collected for visual classification to evaluate site geology, depth to groundwater, and depth to the clay confining unit. The boring will be terminated at the depth which corresponds to the target elevation of 750 ft MSL as described above or a minimum clay thickness of two feet, whichever is deeper.
- Groundwater samples will be collected for VOC analysis throughout the water column as described below:
  - At each location a temporary 1-inch PVC well with a 3-foot screened interval will be installed at the top of the clay confining unit.
  - At an off-site location (within 5 feet of the original location), a second 1-inch temporary well with a 3-foot screened interval will be installed to a target depth in the intermediate aquifer.
  - Each temporary well will be purged and stabilized for turbidity using low-flow sampling techniques prior to collection of a groundwater sample for VOC analysis.
  - Following sample collection, the temporary well will be pulled up approximately 3 feet to the next depth interval.[2] Well stabilization and sampling will be repeated until a sample has been collected from each depth interval throughout the aquifer.
  - After the completion of groundwater sampling, the temporary wells will be removed and the holes will be plugged with bentonite.
  - Samples will be shipped under chain-of-custody documentation to the analytical laboratory (either Environmental Chemistry Consulting Services [ECCS] or TriMatrix Laboratories, depending on project pricing and anticipated turn-around time).

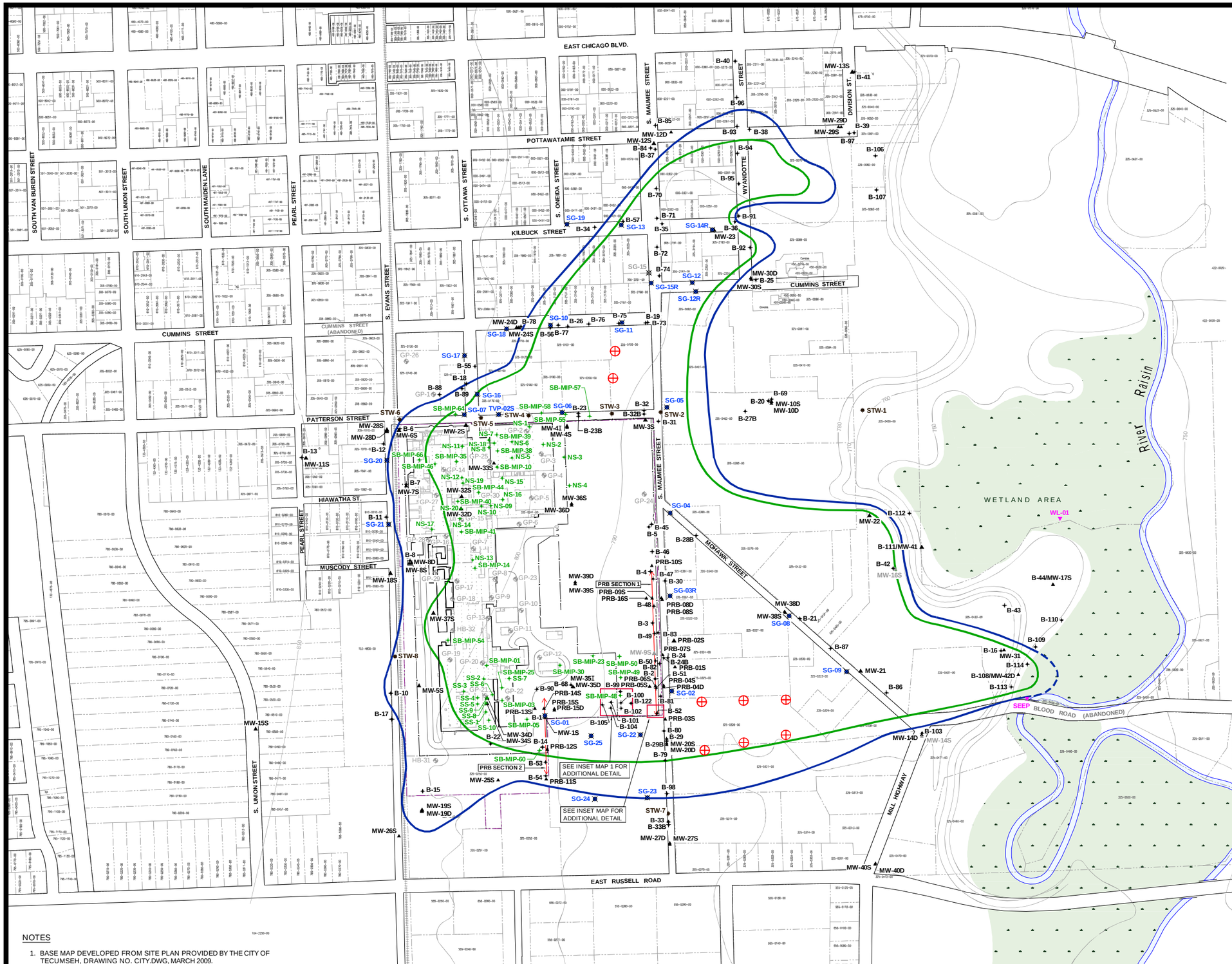
[2] The aquifer is composed of loose flowable sands. As wells are pulled from one depth interval to the next, native material will collapse into the borehole, mitigating the potential for preferential vertical flow within the borehole.

Schedule

The proposed schedule for this work is outlined in the January 2016 Corrective Measures Proposal. In general, the proposed investigation activities described in this workplan will be completed as soon as feasible, contingent on the following:

- Site access;
- Substantial agreement from USEPA regarding proposed investigation activities (location and means and methods); and
- Contractor availability.

Figure

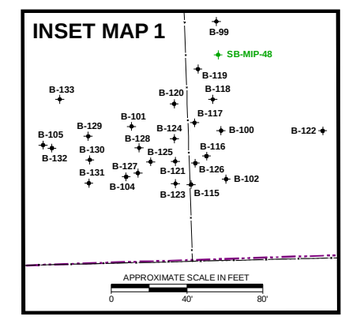


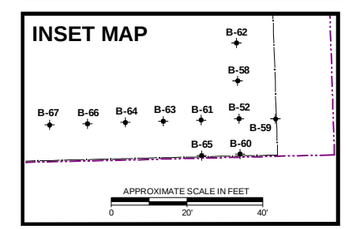
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- PROPOSED VERTICAL GROUNDWATER PROFILE SAMPLE LOCATIONS

KEY

- EXTENT OF VOCs ABOVE MICHIGAN PART 201 DRINKING WATER CRITERIA
- EXTENT OF VOCs ABOVE MICHIGAN PART 201 GROUNDWATER SURFACE WATER INTERFACE CRITERIA





0 250' 500' 750' 1000'
APPROXIMATE SCALE IN FEET

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: PROPOSED LOCATIONS FOR GROUNDWATER PROFILE SAMPLING

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0002	
CHECKED BY: SEM		FILE NO. 246667.0002.01.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE 1	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0002_2016 HRSC Workplan\246667.0002.01.dwg
Dataset Name: STRIKE, DWAHT
Drawing Type Model: Elevation
Deg Size: 1.61 Mb
Plot Date: January 28, 2016
Plot Time: 1:54 AM
Attached Xref's: tecf100110 (Filed)
Attached Images:
Layout: FIGURE Prep (BW Profile Samples

Appendix G
Residential Vapor Intrusion Evaluation Data Tables

Table G1

Summary of Volatile Organic Compounds in Soil Gas at 704 Mohawk Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential SGSLs [1]	Sub-Slab Depressurization/Ventilation System Exhaust Sample			
			Oct 12, 2011	Nov 14, 2011	May 10, 2012	Nov. 8, 2012
Acetone	ppbv	82,000	**8.7**	<10	**25**	<10
Benzene	ppbv	32	**0.07**	<1.0	**2.0**	<1.0
Bromodichloromethane	ppbv	7.1	<0.10	<2.0	**4.4**	<2.0
Bromoform	ppbv	76	<0.10	<2.0	<0.50	<2.0
Bromomethane	ppbv	43	<0.10	<2.0	<0.50	<2.0
2-Butanone (MEK)	ppbv	56,000	**0.83**	<4.0	**2.4**	<4.0
Carbon disulfide	ppbv	7,400	<0.10	<2.0	**0.80**	<2.0
Carbon tetrachloride	ppbv	23	<0.05	<1.0	<0.50	<1.0
Chlorobenzene	ppbv	500	<0.10	<2.0	<0.25	<2.0
Chloroethane	ppbv	130,000	<0.10	<2.0	<0.50	<2.0
Chloroform	ppbv	73	**0.23**	<1.0	<0.25	<1.0
Chloromethane	ppbv	650	<0.10	<2.0	<0.50	<2.0
Dibromochloromethane	ppbv	4.1	<0.10	<2.0	<0.50	<2.0
1,2-Dibromoethane (EDB)	ppbv	0.19	<0.10	<2.0	<0.50	<2.0
1,2-Dichlorobenzene	ppbv	1,600	<0.10	<2.0	<0.50	<2.0
1,3-Dichlorobenzene	ppbv	16	<0.10	<2.0	<0.50	<2.0
1,4-Dichlorobenzene	ppbv	21	<0.10	<2.0	<0.50	<2.0
Dichlorodifluoromethane (F12)	ppbv	330,000	<0.20	<4.0	<1.0	<4.0
1,1-Dichloroethane	ppbv	4,100	**8.0**	**11**	**8.1**	**15**
1,2-Dichloroethane (EDC)	ppbv	8.2	<0.10	<2.0	<0.50	<2.0
1,1-Dichloroethene	ppbv	1,700	<0.10	<2.0	**0.55**	<2.0
cis-1,2-Dichloroethene	ppbv	58	**8.1** [2]	**14**	**17**	**44**
trans-1,2-Dichloroethene	ppbv	580	**2.8**	**4.2**	**3.5**	**7.1**
1,2-Dichloropropane	ppbv	29	<0.10	<2.0	<0.50	<2.0
cis-1,3-Dichloropropene	ppbv	47	<0.10	<2.0	<0.50	<2.0
trans-1,3-Dichloropropene	ppbv	47	<0.10	<2.0	<0.50	<2.0
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10	<2.0	<0.50	<2.0
Ethylbenzene	ppbv	640	**0.78**	<2.0	**6.9**	<2.0
4-Ethyltoluene	ppbv	NC	<0.10	<2.0	<0.50	<2.0
Hexachlorobutadiene	ppbv	3.7	<0.20	<4.0	<1.0	<4.0
2-Hexanone (MBK)	ppbv	250	<0.20	<4.0	<1.0	<4.0
4-Methyl-2-pentanone (MIBK)	ppbv	24,000	<0.20	<4.0	<1.0	<4.0
Methylene chloride (Dichloromethane)	ppbv	880	<0.10	<2.0	**1.0**	<2.0
Styrene	ppbv	350	<0.10	<2.0	<0.50	<2.0
1,1,1,2-Tetrachloroethane	ppbv	17	<0.10	<2.0	<0.50	<2.0
1,1,2,2-Tetrachloroethane	ppbv	2.2	<0.10	<2.0	<0.50	<2.0
Tetrachloroethene	ppbv	170	<0.10	<2.0	<0.50	<2.0
Toluene	ppbv	44,000	<0.50	<10	**15**	<4.0
1,2,4-Trichlorobenzene	ppbv	18	<0.10	<2.0	<0.50	<2.0
1,1,1-Trichloroethane	ppbv	36,000	**140**	**140**	**69**	**110**
1,1,2-Trichloroethane	ppbv	9.8	<0.10	<2.0	<0.50	<2.0
Trichloroethene	ppbv	12	**480**	**620**	**450**	**1,100**
Trichlorofluoromethane (F11)	ppbv	330,000	**1.9**	<2.0	**1.1**	<2.0
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	84,000	<0.50	<10	<1.0	<2.0
1,2,4-Trimethylbenzene	ppbv	1,500	**0.11**	<2.0	**0.75**	<2.0
1,3,5-Trimethylbenzene	ppbv	1,500	<0.10	<2.0	<0.50	<2.0
Vinyl chloride	ppbv	21	<0.05	<1.0 [2]	<0.25	<1.0
m,p-Xylene	ppbv	760	**0.81**	<2.0	**3.3**	<2.0
o-Xylene	ppbv	760	**0.34**	<2.0	**1.0**	<2.0
1,1-Difluoroethane - TRACER	percent	1.0	$<3.6 \times 10^{-4}$	$<3.6 \times 10^{-4}$	$<3.6 \times 10^{-4}$	**5.0×10^{-4}**

Notes:

1) Residential sub-slab soil gas screening levels (SGSLs) were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013

2) Quality control results for this datum are outside the established control limits. The result is approximate.

Bold font denotes concentrations detected above laboratory reporting limits.

Denotes concentrations above the residential soil gas screening level.

ppbv = parts per billion by volume

NC = No Criterion

Table G2

Summary of Volatile Organic Compounds in Indoor Air at 704 Mohawk Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels [1]	Nov 14-15, 2011	May 10-11, 2012		Nov 8-9, 2012
			704 Mohawk Basement Sample	704 Mohawk Basement Sample	Duplicate - 704 Mohawk	704 Mohawk Basement Sample
Acetone	ppbv	2,500	**9.3**	**4.0** [2]	**1.8** [2]	**3.4**
Benzene	ppbv	0.97	**0.19**	**0.13**	**0.13**	**0.42**
Bromodichloromethane	ppbv	0.21	<0.20	<0.10	<0.10	<0.10
Bromoform	ppbv	2.3	<0.20	<0.10	<0.10	<0.10
Bromomethane	ppbv	1.3	<0.20	<0.10	<0.10	<0.10
2-Butanone (MEK)	ppbv	1,700	<0.40	**0.29**	**0.20**	**0.31**
Carbon disulfide	ppbv	220	<0.20	<0.10	<0.10	<0.10
Carbon tetrachloride	ppbv	0.68	<0.10	**0.077**	**0.075**	**0.081**
Chlorobenzene	ppbv	15	<0.20	<0.050	<0.050	<0.10
Chloroethane	ppbv	3,800	<0.20	<0.10	<0.10	<0.10
Chloroform	ppbv	2.2	<0.10	<0.050	<0.050	<0.050
Chloromethane	ppbv	20	<0.20	**0.42**	**0.40**	**0.67**
Dibromochloromethane	ppbv	0.12	<0.20	<0.10	<0.10	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.20	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.20	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.20	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.20	<0.10	<0.10	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	<0.40	<0.20	<0.20	**0.29** [3]
1,1-Dichloroethane	ppbv	120	<0.20	<0.10	<0.10	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	<0.20	<0.10	<0.10	<0.10
1,1-Dichloroethene	ppbv	50	<0.20	<0.10	<0.10	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.20	<0.10	<0.10	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.20	<0.10	<0.10	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.20	<0.10	<0.10	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.20	<0.10	<0.10	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.20	<0.10	<0.10	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.20	<0.10	<0.10	<0.10
Ethylbenzene	ppbv	19	<0.20	<0.10	<0.10	<0.10
4-Ethyltoluene	ppbv	NC	<0.20	<0.10	<0.10	<0.10
Hexachlorobutadiene	ppbv	0.11	<0.40	<0.20	<0.20	<0.20
2-Hexanone (MBK)	ppbv	7.4	<0.40	<0.20	<0.20	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.40	<0.20	<0.20	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	<0.20	<0.10	<0.10	**0.23**
Styrene	ppbv	11	<0.20	<0.10	<0.10	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.20	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.20	<0.10	<0.10	<0.10
Tetrachloroethene	ppbv	5.0	<0.20	<0.10	<0.10	<0.10
Toluene	ppbv	1,300	**1.9**	**0.55**	**0.47**	**0.86**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.20	<0.10	<0.10	<0.10
1,1,1-Trichloroethane	ppbv	1,100	<0.20	<0.10	<0.10	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.20	<0.10	<0.10	<0.10
Trichloroethene	ppbv	0.37	<0.20	**0.15**	**0.16**	**0.19**
Trichlorofluoromethane (F11)	ppbv	9,900	**0.21**	**0.26**	**0.25**	**0.26**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	<1.0	<0.20	<0.20	<0.10
1,2,4-Trimethylbenzene	ppbv	44	<0.20	**0.10**	<0.10	<0.10
1,3,5-Trimethylbenzene	ppbv	44	<0.20	<0.10	<0.10	<0.10
Vinyl chloride	ppbv	0.62	<0.10 [2]	<0.050	<0.050	<0.050
m,p-Xylene	ppbv	23	<0.20	**0.20**	**0.15**	**0.24**
o-Xylene	ppbv	23	<0.20	<0.10	<0.10	<0.10

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013

2) Quality control results for this datum are outside the established control limits. The result is approximate.

3) Quality control results exceed quality control limits. Results are estimated and biased high.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Table G3

Summary of Volatile Organic Compounds in Crawl Space Samples at 610 Mohawk Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels [1]	October 11-12, 2011		May 10-11, 2012	November 8-9, 2012	
			610 Mohawk Crawlspace	Duplicate - 610 Mohawk	610 Mohawk Crawlspace	610 Mohawk Crawlspace	Duplicate - 610 Mohawk
Acetone	ppbv	2,500	**1.9**	**2.2**	**2.7**	**5.7** [2]	**9.2** [2]
Benzene	ppbv	0.97	**0.20**	**0.21**	**0.23**	**1.4**	**1.4**
Bromodichloromethane	ppbv	0.21	<0.10	<0.10	<0.10	<0.10	<0.10
Bromoform	ppbv	2.3	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	ppbv	1.3	<0.10	<0.10	<0.10	<0.10	<0.10
2-Butanone (MEK)	ppbv	1,700	<0.20	**0.28**	**0.23**	**0.58**	**0.42**
Carbon disulfide	ppbv	220	<0.10	<0.10	<0.10	<0.10	<0.10
Carbon tetrachloride	ppbv	0.68	**0.080**	**0.070**	**0.077**	**0.079**	**0.077**
Chlorobenzene	ppbv	15	<0.10	<0.10	<0.050	<0.10	<0.10
Chloroethane	ppbv	3,800	<0.10	<0.10	<0.10	<0.10	<0.10
Chloroform	ppbv	2.2	<0.050	<0.050	<0.050	<0.050	<0.050
Chloromethane	ppbv	20	<0.10	<0.10	**0.21**	**0.59**	**0.60**
Dibromochloromethane	ppbv	0.12	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.10	<0.10	<0.10	<0.10	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	<0.20	<0.20	<0.20	**0.20** [3]	**0.21** [3]
1,1-Dichloroethane	ppbv	120	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	<0.10	<0.10	<0.10	<0.10	<0.10
1,1-Dichloroethene	ppbv	50	<0.10	<0.10	<0.10	<0.10	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.10	<0.10	<0.10	<0.10	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.10	<0.10	<0.10	<0.10	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10	<0.10	<0.10	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10	<0.10	<0.10	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	ppbv	19	<0.10	<0.10	<0.10	**0.54**	**0.58**
4-Ethyltoluene	ppbv	NC	<0.10	<0.10	<0.10	**0.15**	**0.17**
Hexachlorobutadiene	ppbv	0.11	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone (MBK)	ppbv	7.4	<0.20	<0.20	<0.20	<0.20	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.20	<0.20	<0.20	<0.20	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	<0.10	<0.10	<0.10	**0.19**	**0.18**
Styrene	ppbv	11	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.10	<0.10	<0.10	<0.10	<0.10
Tetrachloroethene	ppbv	5.0	**0.11**	<0.10	<0.10	**0.10**	**0.10**
Toluene	ppbv	1,300	**0.74**	**0.65**	**0.63**	**3.6**	**3.7**
1,2,4-Trichlorobenzene	ppbv	0.53	**0.16**	<0.10	<0.10	<0.10	<0.10
1,1,1-Trichloroethane	ppbv	1,100	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.10	<0.10	<0.10	<0.10	<0.10
Trichloroethene	ppbv	0.37	<0.10	<0.10	<0.10	**0.12**	**0.11**
Trichlorofluoromethane (F11)	ppbv	9,900	**0.24**	**0.22**	**0.23**	**0.29**	**0.29**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	<0.50	<0.50	<0.20	**0.10**	**0.15**
1,2,4-Trimethylbenzene	ppbv	44	**0.15**	**0.13**	**0.12**	**0.65**	**0.71**
1,3,5-Trimethylbenzene	ppbv	44	<0.10	<0.10	<0.10	**0.18**	**0.19**
Vinyl chloride	ppbv	0.62	<0.050	<0.050	<0.050	<0.050	<0.050
m,p-Xylene	ppbv	23	**0.35**	**0.34**	**0.24**	**1.9**	**2.0**
o-Xylene	ppbv	23	**0.14**	**0.13**	<0.10	**0.65**	**0.69**

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013

2) Duplicate result is outside quality control limits. Result is estimated.

3) Quality control results exceed quality control limits. Results are estimated and biased high.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Table G4

Summary of Volatile Organic Compounds in Crawl Space Samples

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels [1]	502 Mohawk Deep Crawlspace			502 Mohawk Bedroom Crawlspace			505 Maumee Crawlspace			507 Maumee Crawlspace		
			Oct. 11-12, 2011	May 10-11, 2012	Nov. 8-9, 2012	Oct. 11-12, 2011	May 10-11, 2012	Nov. 8-9, 2012	Oct. 11-12, 2011	May 10-11, 2012	Nov. 8-9, 2012	Oct. 11-12, 2011	May 10-11, 2012	Nov. 8-9, 2012
Acetone	ppbv	2,500	**4.5**	**5.3**	**7.2**	**6.6**	**14**	**12**	**4.2**	**1.8**	**3.1**	<0.50	**4.2**	**1.6**
Benzene	ppbv	0.97	**0.97**	**0.40**	**0.73**	**0.68**	**0.40**	**0.64**	<0.10	**0.082**	**0.31**	**0.060**	<0.050	**0.13**
Bromodichloromethane	ppbv	0.21	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Bromoform	ppbv	2.3	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	ppbv	1.3	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
2-Butanone (MEK)	ppbv	1,700	**0.55**	**0.43**	**0.45**	**0.74**	**1.2**	**1.0**	<0.40	<0.20	<0.20	<0.20	**0.51**	<0.20
Carbon disulfide	ppbv	220	<0.20	<0.10	<0.10	<0.20	**6.2**	**3.6**	<0.20	<0.10	<0.10	**0.17**	<0.10	<0.10
Carbon tetrachloride	ppbv	0.68	<0.10	**0.080**	**0.083**	<0.10	**0.078**	**0.083**	<0.10	**0.074**	**0.088**	**0.050**	**0.075**	**0.081**
Chlorobenzene	ppbv	15	<0.20	<0.050	<0.10	<0.20	<0.050	<0.10	<0.20	<0.050	<0.10	<0.10	<0.050	<0.10
Chloroethane	ppbv	3,800	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Chloroform	ppbv	2.2	<0.10	<0.050	<0.050	<0.10	<0.050	<0.050	<0.10	<0.050	<0.050	<0.050	<0.050	<0.050
Chloromethane	ppbv	20	<0.20	**0.67**	<0.10	<0.20	**0.79**	**0.54**	<0.20	**0.19**	**0.34**	**0.10**	**0.11**	**0.13**
Dibromochloromethane	ppbv	0.12	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	<0.40	<0.20	**0.30** [2]	<0.40	<0.20	**0.27** [2]	<0.40	<0.20	**0.38** [2]	<0.20	**0.25**	**0.31** [2]
1,1-Dichloroethane	ppbv	120	<0.20	<0.10	<0.10	**0.25**	<0.10	**0.12**	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	**0.23**	**0.12**	**0.11**	<0.20	**0.13**	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
1,1-Dichloroethene	ppbv	50	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	ppbv	19	<0.20	<0.10	**0.13**	**1.1**	**0.15**	**0.19**	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
4-Ethyltoluene	ppbv	NC	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Hexachlorobutadiene	ppbv	0.11	<0.40	<0.20	<0.20	<0.40	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone (MBK)	ppbv	7.4	<0.40	<0.20	<0.20	<0.40	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.40	<0.20	<0.20	<0.40	<0.20	**0.23**	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	<0.20	**0.15**	**3.3**	<0.20	**0.32**	**7.2**	<0.20	<0.10	**0.27**	<0.10	<0.10	**0.18**
Styrene	ppbv	11	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Tetrachloroethene	ppbv	5.0	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	ppbv	1,300	**2.2**	**0.68**	**1.6**	**1.7**	**1.2**	**2.1**	<1.0	**0.26**	**0.90**	<0.50	**0.26**	**0.35**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.20	<0.10	<0.10	<0.20	<1.0	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,1-Trichloroethane	ppbv	1,100	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	**0.28**	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Trichloroethene	ppbv	0.37	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Trichlorofluoromethane (F11)	ppbv	9,900	**0.23**	**0.23**	**0.29**	**0.24**	**0.36**	**0.33**	**0.23**	**0.24**	**0.34**	<0.10	**0.25**	**0.29**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	<1.0	<0.20	<0.10	<1.0	<0.20	<0.10	<1.0	<0.20	**0.12**	<0.50	<0.20	<0.10
1,2,4-Trimethylbenzene	ppbv	44	<0.20	**0.12**	**0.23**	<0.20	**0.12**	**0.20**	<0.20	<0.10	**0.15**	<0.10	<0.10	<0.10
1,3,5-Trimethylbenzene	ppbv	44	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Vinyl chloride	ppbv	0.62	<0.10	<0.050	**0.10**	<0.10	<0.050	**0.053**	<0.10	<0.050	<0.050	<0.050	<0.050	<0.050
m,p-Xylene	ppbv	23	**0.50**	**0.25**	**0.49**	**0.78**	**0.43**	**0.61**	<0.20	**0.11**	**0.32**	<0.10	**0.11**	**0.12**
o-Xylene	ppbv	23	<0.20	<0.10	**0.16**	**0.33**	**0.13**	**0.23**	<0.20	<0.10	**0.12**	<0.10	<0.10	<0.10

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013

2) Quality control results exceed quality control limits. Results are estimated and biased high.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Table G5

Summary of Volatile Organic Compounds in Indoor Air at 217 East Cummins Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels [1]	July 28-29, 2014
			217 E Cummins Basement
Acetone	ppbv	2,500	**11**
Benzene	ppbv	0.97	**0.19**
Bromodichloromethane	ppbv	0.21	<0.10
Bromoform	ppbv	2.3	<0.10
Bromomethane	ppbv	1.3	<0.10
2-Butanone (MEK)	ppbv	1,700	**0.46**
Carbon disulfide	ppbv	220	<0.10
Carbon tetrachloride	ppbv	0.68	**0.11**
Chlorobenzene	ppbv	15	<0.10
Chloroethane	ppbv	3,800	<0.10
Chloroform	ppbv	2.2	**0.080**
Chloromethane	ppbv	20	**0.96**
Dibromochloromethane	ppbv	0.12	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	**0.71**
1,1-Dichloroethane	ppbv	120	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	<0.10
1,1-Dichloroethene	ppbv	50	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10
Ethylbenzene	ppbv	19	**0.11**
4-Ethyltoluene	ppbv	NC	<0.10
Hexachlorobutadiene	ppbv	0.11	<0.25
2-Hexanone (MBK)	ppbv	7.4	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	**0.13**
Styrene	ppbv	11	**0.10**
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.10
Tetrachloroethene	ppbv	5.0	<0.10
Toluene	ppbv	1,300	**0.58**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.25
1,1,1-Trichloroethane	ppbv	1,100	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.10
Trichloroethene	ppbv	0.37	<0.10
Trichlorofluoromethane (F11)	ppbv	9,900	**0.33**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	**0.11**
1,2,4-Trimethylbenzene	ppbv	44	**0.15**
1,3,5-Trimethylbenzene	ppbv	44	<0.10
Vinyl chloride	ppbv	0.62	<0.050
m,p-Xylene	ppbv	23	**0.35**
o-Xylene	ppbv	23	**0.14**

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Table G6

Summary of Volatile Organic Compounds in Indoor Air at 219 East Cummins Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels [1]	July 28-29, 2014 219 E Cummins Basement
Acetone	ppbv	2,500	**13**
Benzene	ppbv	0.97	**0.13**
Bromodichloromethane	ppbv	0.21	<0.10
Bromoform	ppbv	2.3	<0.10
Bromomethane	ppbv	1.3	<0.10
2-Butanone (MEK)	ppbv	1,700	**1.2**
Carbon disulfide	ppbv	220	**0.15**
Carbon tetrachloride	ppbv	0.68	**0.10**
Chlorobenzene	ppbv	15	<0.10
Chloroethane	ppbv	3,800	<0.10
Chloroform	ppbv	2.2	**0.050**
Chloromethane	ppbv	20	**0.77**
Dibromochloromethane	ppbv	0.12	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	**0.67**
1,1-Dichloroethane	ppbv	120	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	<0.10
1,1-Dichloroethene	ppbv	50	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10
Ethylbenzene	ppbv	19	<0.10
4-Ethyltoluene	ppbv	NC	<0.10
Hexachlorobutadiene	ppbv	0.11	<0.25
2-Hexanone (MBK)	ppbv	7.4	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	**0.12**
Styrene	ppbv	11	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.10
Tetrachloroethene	ppbv	5.0	<0.10
Toluene	ppbv	1,300	**0.32**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.25
1,1,1-Trichloroethane	ppbv	1,100	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.10
Trichloroethene	ppbv	0.37	<0.10
Trichlorofluoromethane (F11)	ppbv	9,900	**0.30**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	**0.11**
1,2,4-Trimethylbenzene	ppbv	44	<0.10
1,3,5-Trimethylbenzene	ppbv	44	<0.10
Vinyl chloride	ppbv	0.62	<0.050
m,p-Xylene	ppbv	23	**0.19**
o-Xylene	ppbv	23	<0.10

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Table G7

Summary of Volatile Organic Compounds in Indoor Air at 223 East Cummins Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels [1]	July 28-29, 2014 223 E Cummins Crawl Space
Acetone	ppbv	2,500	**9.8**
Benzene	ppbv	0.97	**0.14**
Bromodichloromethane	ppbv	0.21	<0.10
Bromoform	ppbv	2.3	<0.10
Bromomethane	ppbv	1.3	<0.10
2-Butanone (MEK)	ppbv	1,700	**0.39**
Carbon disulfide	ppbv	220	**0.14**
Carbon tetrachloride	ppbv	0.68	**0.090**
Chlorobenzene	ppbv	15	<0.10
Chloroethane	ppbv	3,800	<0.10
Chloroform	ppbv	2.2	<0.050
Chloromethane	ppbv	20	**0.53**
Dibromochloromethane	ppbv	0.12	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	**0.59**
1,1-Dichloroethane	ppbv	120	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	<0.10
1,1-Dichloroethene	ppbv	50	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10
Ethylbenzene	ppbv	19	**0.10**
4-Ethyltoluene	ppbv	NC	<0.10
Hexachlorobutadiene	ppbv	0.11	<0.25
2-Hexanone (MBK)	ppbv	7.4	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	**0.10**
Styrene	ppbv	11	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.10
Tetrachloroethene	ppbv	5.0	<0.10
Toluene	ppbv	1,300	**1.2**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.25
1,1,1-Trichloroethane	ppbv	1,100	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.10
Trichloroethene	ppbv	0.37	<0.10
Trichlorofluoromethane (F11)	ppbv	9,900	**0.25**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	<0.10
1,2,4-Trimethylbenzene	ppbv	44	<0.10
1,3,5-Trimethylbenzene	ppbv	44	<0.10
Vinyl chloride	ppbv	0.62	<0.050
m,p-Xylene	ppbv	23	**0.28**
o-Xylene	ppbv	23	**0.11**

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Table G8

Summary of Volatile Organic Compounds in Indoor Air at 227 East Cummins Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels (1)	July 28-29, 2014	January 12, 2016
			227 E Cummins Basement	227 E Cummins Basement
Acetone	ppbv	2,500	**44**	**22**
Benzene	ppbv	0.97	**0.25**	**0.24**
Bromodichloromethane	ppbv	0.21	<0.10	<0.10
Bromoform	ppbv	2.3	<0.10	<0.10
Bromomethane	ppbv	1.3	<0.10	<0.10
2-Butanone (MEK)	ppbv	1,700	**1.8**	**0.55**
Carbon disulfide	ppbv	220	**0.27**	<0.10
Carbon tetrachloride	ppbv	0.68	**0.12**	**0.063**
Chlorobenzene	ppbv	15	<0.10	<0.10
Chloroethane	ppbv	3,800	<0.10	<0.10
Chloroform	ppbv	2.2	**0.10**	**0.096**
Chloromethane	ppbv	20	**0.68**	**0.61**
Dibromochloromethane	ppbv	0.12	<0.10	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.10	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.10	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.10	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.10	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	**0.35**	**0.32**
1,1-Dichloroethane	ppbv	120	<0.10	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	**0.21**	<0.10
1,1-Dichloroethene	ppbv	50	<0.10	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	**0.62**	**0.31**
trans-1,2-Dichloroethene	ppbv	17	**0.19**	**0.20**
1,2-Dichloropropane	ppbv	0.86	<0.10	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10	<0.10
Ethylbenzene	ppbv	19	**0.75**	**0.15**
4-Ethyltoluene	ppbv	NC	**1.4**	**0.34**
Hexachlorobutadiene	ppbv	0.11	<0.25	<0.25
2-Hexanone (MBK)	ppbv	7.4	<0.20	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.20	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	**0.10**	<0.10
Styrene	ppbv	11	**0.54**	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.10	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.10	<0.10
Tetrachloroethene	ppbv	5.0	<0.10	**0.18**
Toluene	ppbv	1,300	**3.5**	**1.2**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.25	<0.25
1,1,1-Trichloroethane	ppbv	1,100	<0.10	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.10	<0.10
Trichloroethene	ppbv	0.37	**0.35**	<0.10
Trichlorofluoromethane (F11)	ppbv	9,900	**0.22**	**0.25**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	<0.10	<0.10
1,2,4-Trimethylbenzene	ppbv	44	**5.0**	**1.2**
1,3,5-Trimethylbenzene	ppbv	44	**1.4**	**0.25**
Vinyl chloride	ppbv	0.62	<0.050	<0.050
m,p-Xylene	ppbv	23	**3.4**	**0.70**
o-Xylene	ppbv	23	**2.5**	**0.45**

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Table G9

Summary of Volatile Organic Compounds in Indoor Air at 410 Ottawa Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels [1]	July 16-17, 2014	January 12, 2016
			410 Ottawa Basement	410 Ottawa Basement
Acetone	ppbv	2,500	**4.7**	**4.7**
Benzene	ppbv	0.97	**0.15**	**0.13**
Bromodichloromethane	ppbv	0.21	<0.10	<0.10
Bromoform	ppbv	2.3	<0.10	<0.10
Bromomethane	ppbv	1.3	<0.10	<0.10
2-Butanone (MEK)	ppbv	1,700	**0.56**	**0.55**
Carbon disulfide	ppbv	220	<0.10	<0.10
Carbon tetrachloride	ppbv	0.68	**0.084**	<0.050
Chlorobenzene	ppbv	15	<0.10	<0.10
Chloroethane	ppbv	3,800	<0.10	<0.10
Chloroform	ppbv	2.2	<0.050	<0.050
Chloromethane	ppbv	20	**0.43**	**0.80**
Dibromochloromethane	ppbv	0.12	<0.10	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.10	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.10	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.10	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.10	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	**0.49**	**0.46**
1,1-Dichloroethane	ppbv	120	<0.10	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	<0.10	<0.10
1,1-Dichloroethene	ppbv	50	<0.10	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.10	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.10	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.10	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10	<0.10
Ethylbenzene	ppbv	19	<0.10	<0.10
4-Ethyltoluene	ppbv	NC	<0.10	<0.10
Hexachlorobutadiene	ppbv	0.11	<0.25	<0.25
2-Hexanone (MBK)	ppbv	7.4	<0.20	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.20	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	<0.10	<0.10
Styrene	ppbv	11	<0.10	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.10	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.10	<0.10
Tetrachloroethene	ppbv	5.0	<0.10	<0.10
Toluene	ppbv	1,300	**0.66**	**0.30**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.25	<0.25
1,1,1-Trichloroethane	ppbv	1,100	<0.10	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.10	<0.10
Trichloroethene	ppbv	0.37	<0.10	<0.10
Trichlorofluoromethane (F11)	ppbv	9,900	**0.33**	**0.26**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	<0.10	<0.10
1,2,4-Trimethylbenzene	ppbv	44	<0.10	<0.10
1,3,5-Trimethylbenzene	ppbv	44	<0.10	<0.10
Vinyl chloride	ppbv	0.62	<0.050	<0.050
m,p-Xylene	ppbv	23	**0.31**	**0.15**
o-Xylene	ppbv	23	**0.11**	<0.10

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Table G10

Summary of Volatile Organic Compounds in Indoor Air at 501 South Evans Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels (1)	May 18, 2015	January 12, 2016
			501 S Evans Basement	501 S Evans Basement
Acetone	ppbv	2,500	**5.8**	**1.6**
Benzene	ppbv	0.97	**0.24**	**0.14**
Bromodichloromethane	ppbv	0.21	<0.10	<0.10
Bromoform	ppbv	2.3	<0.10	<0.10
Bromomethane	ppbv	1.3	<0.10	<0.10
2-Butanone (MEK)	ppbv	1,700	**0.20**	<0.20
Carbon disulfide	ppbv	220	<0.10	<0.10
Carbon tetrachloride	ppbv	0.68	**0.089**	**0.055**
Chlorobenzene	ppbv	15	<0.10	<0.10
Chloroethane	ppbv	3,800	<0.10	<0.10
Chloroform	ppbv	2.2	<0.050	<0.050
Chloromethane	ppbv	20	**0.38**	**0.52**
Dibromochloromethane	ppbv	0.12	<0.10	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.10	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.10	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.10	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.10	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	**0.46**	**0.36**
1,1-Dichloroethane	ppbv	120	<0.10	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	<0.10	<0.10
1,1-Dichloroethene	ppbv	50	<0.10	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.10	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.10	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.10	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10	<0.10
Ethylbenzene	ppbv	19	**0.11**	<0.10
4-Ethyltoluene	ppbv	NC	<0.10	<0.10
Hexachlorobutadiene	ppbv	0.11	<0.25	<0.25
2-Hexanone (MBK)	ppbv	7.4	<0.20	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.20	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	<0.10	<0.10
Styrene	ppbv	11	<0.10	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.10	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.10	<0.10
Tetrachloroethene	ppbv	5.0	<0.10	<0.10
Toluene	ppbv	1,300	**1.5**	**0.26**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.25	<0.25
1,1,1-Trichloroethane	ppbv	1,100	<0.10	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.10	<0.10
Trichloroethene	ppbv	0.37	<0.10	<0.10
Trichlorofluoromethane (F11)	ppbv	9,900	**0.22**	**0.22**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	<0.10	<0.10
1,2,4-Trimethylbenzene	ppbv	44	**0.19**	<0.10
1,3,5-Trimethylbenzene	ppbv	44	<0.10	<0.10
Vinyl chloride	ppbv	0.62	<0.050	<0.050
m,p-Xylene	ppbv	23	**0.58**	**0.11**
o-Xylene	ppbv	23	**0.18**	<0.10

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Table G11

Summary of Volatile Organic Compounds in Indoor Air at 505 South Evans Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels (1)	May 18, 2015 505 S Evans Crawl Space	May 18, 2015 505 S Evans Basement
Acetone	ppbv	2,500	**5.1**	**10**
Benzene	ppbv	0.97	**0.093**	**0.12**
Bromodichloromethane	ppbv	0.21	<0.10	<0.10
Bromoform	ppbv	2.3	<0.10	<0.10
Bromomethane	ppbv	1.3	<0.10	<0.10
2-Butanone (MEK)	ppbv	1,700	**0.48**	**0.76**
Carbon disulfide	ppbv	220	<0.10	<0.10
Carbon tetrachloride	ppbv	0.68	**0.089**	**0.095**
Chlorobenzene	ppbv	15	<0.10	<0.10
Chloroethane	ppbv	3,800	<0.10	<0.10
Chloroform	ppbv	2.2	<0.050	<0.050
Chloromethane	ppbv	20	**0.58**	**0.63**
Dibromochloromethane	ppbv	0.12	<0.10	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.10	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.10	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.10	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.10	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	**0.25**	**0.68**
1,1-Dichloroethane	ppbv	120	<0.10	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	<0.10	**0.12**
1,1-Dichloroethene	ppbv	50	<0.10	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.10	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.10	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.10	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10	<0.10
Ethylbenzene	ppbv	19	<0.10	**0.18**
4-Ethyltoluene	ppbv	NC	<0.10	<0.10
Hexachlorobutadiene	ppbv	0.11	<0.25	<0.25
2-Hexanone (MBK)	ppbv	7.4	<0.20	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.20	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	<0.10	<0.10
Styrene	ppbv	11	<0.10	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.10	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.10	<0.10
Tetrachloroethene	ppbv	5.0	<0.10	<0.10
Toluene	ppbv	1,300	**0.95**	**0.97**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.25	<0.25
1,1,1-Trichloroethane	ppbv	1,100	<0.10	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.10	<0.10
Trichloroethene	ppbv	0.37	<0.10	<0.10
Trichlorofluoromethane (F11)	ppbv	9,900	**0.21**	**0.21**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	**0.12**	**0.20**
1,2,4-Trimethylbenzene	ppbv	44	<0.10	<0.10
1,3,5-Trimethylbenzene	ppbv	44	<0.10	<0.10
Vinyl chloride	ppbv	0.62	<0.050	<0.050
m,p-Xylene	ppbv	23	**0.13**	**0.24**
o-Xylene	ppbv	23	<0.10	<0.10

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Table G12

Summary of Volatile Organic Compounds in Indoor Air at 509 South Evans Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels (1)	May 18-19, 2015	January 12, 2016
			509 S. Evans Basement	509 S. Evans Basement
Acetone	ppbv	2,500	**9.6**	**8.6**
Benzene	ppbv	0.97	**13**	**1.7**
Bromodichloromethane	ppbv	0.21	<0.10	<0.10
Bromoform	ppbv	2.3	<0.10	<0.10
Bromomethane	ppbv	1.3	<0.10	<0.10
2-Butanone (MEK)	ppbv	1,700	**0.82**	**0.29**
Carbon disulfide	ppbv	220	<0.10	<0.10
Carbon tetrachloride	ppbv	0.68	**0.080**	<0.050
Chlorobenzene	ppbv	15	<0.10	<0.10
Chloroethane	ppbv	3,800	<0.10	<0.10
Chloroform	ppbv	2.2	<0.050	<0.050
Chloromethane	ppbv	20	**0.42**	**0.55**
Dibromochloromethane	ppbv	0.12	<0.10	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.10	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.10	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.10	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.10	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	**0.35**	**0.39**
1,1-Dichloroethane	ppbv	120	<0.10	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	<0.10	<0.10
1,1-Dichloroethene	ppbv	50	<0.10	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.10	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.10	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.10	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10	<0.10
Ethylbenzene	ppbv	19	<0.10	<0.10
4-Ethyltoluene	ppbv	NC	<0.10	<0.10
Hexachlorobutadiene	ppbv	0.11	<0.25	<0.25
2-Hexanone (MBK)	ppbv	7.4	<0.20	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.20	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	**99**	**9.6**
Styrene	ppbv	11	<0.10	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.10	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.10	<0.10
Tetrachloroethene	ppbv	5.0	<0.10	<0.10
Toluene	ppbv	1,300	**1.5**	**0.30**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.25	<0.25
1,1,1-Trichloroethane	ppbv	1,100	**0.12**	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.10	<0.10
Trichloroethene	ppbv	0.37	<0.10	<0.10
Trichlorofluoromethane (F11)	ppbv	9,900	**1.2**	**0.23**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	<0.10	<0.10
1,2,4-Trimethylbenzene	ppbv	44	<0.10	<0.10
1,3,5-Trimethylbenzene	ppbv	44	<0.10	<0.10
Vinyl chloride	ppbv	0.62	<0.050	<0.050
m,p-Xylene	ppbv	23	**0.20**	<0.10
o-Xylene	ppbv	23	<0.10	<0.10

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Table G13

Summary of Volatile Organic Compounds in Indoor Air at 511 South Evans Street
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	Units	Residential Indoor Air Screening Levels [1]	May 18, 2015	January 12, 2016	January 12, 2016
			511 S Evans Basement	511 S Evans Basement	Duplicate - 511 S Evans
Acetone	ppbv	2,500	**5.2**	**6.5**	**6.3**
Benzene	ppbv	0.97	**0.17**	**0.30**	**0.30**
Bromodichloromethane	ppbv	0.21	<0.10	<0.10	<0.10
Bromoform	ppbv	2.3	<0.10	<0.10	<0.10
Bromomethane	ppbv	1.3	<0.10	<0.10	<0.10
2-Butanone (MEK)	ppbv	1,700	**0.50**	**0.23**	**0.21**
Carbon disulfide	ppbv	220	<0.10	<0.10	<0.10
Carbon tetrachloride	ppbv	0.68	**0.067**	**0.058**	**0.053**
Chlorobenzene	ppbv	15	<0.10	<0.10	<0.10
Chloroethane	ppbv	3,800	<0.10	<0.10	<0.10
Chloroform	ppbv	2.2	<0.050	<0.050	<0.05
Chloromethane	ppbv	20	**0.44**	**0.49**	**0.55**
Dibromochloromethane	ppbv	0.12	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	ppbv	49	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	ppbv	0.49	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	ppbv	0.62	<0.10	<0.10	<0.10
1,2-Dibromoethane (EDB)	ppbv	0.0056	<0.10	<0.10	<0.10
Dichlorodifluoromethane (F12)	ppbv	9,900	<0.20	**0.29**	**0.34**
1,1-Dichloroethane	ppbv	120	<0.10	<0.10	<0.10
1,2-Dichloroethane (EDC)	ppbv	0.24	**0.13**	<0.10	<0.10
1,1-Dichloroethene	ppbv	50	<0.10	<0.10	<0.10
cis-1,2-Dichloroethene	ppbv	1.7	<0.10	<0.10	<0.10
trans-1,2-Dichloroethene	ppbv	17	<0.10	<0.10	<0.10
1,2-Dichloropropane	ppbv	0.86	<0.10	<0.10	<0.10
cis-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10	<0.10
trans-1,3-Dichloropropene	ppbv	1.4	<0.10	<0.10	<0.10
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.10	<0.10	<0.10
Ethylbenzene	ppbv	19	**0.14**	<0.10	<0.10
4-Ethyltoluene	ppbv	NC	**0.33**	<0.10	<0.10
Hexachlorobutadiene	ppbv	0.11	<0.25	<0.25	<0.25
2-Hexanone (MBK)	ppbv	7.4	<0.20	<0.20	<0.20
4-Methyl-2-pentanone (MIBK)	ppbv	730	<0.20	<0.20	<0.20
Methylene chloride (Dichloromethane)	ppbv	27	**0.15**	**0.10**	**0.11**
Styrene	ppbv	11	<0.10	<0.10	<0.10
1,1,1,2-Tetrachloroethane	ppbv	0.51	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	ppbv	0.065	<0.10	<0.10	<0.10
Tetrachloroethene	ppbv	5.0	<0.10	<0.10	<0.10
Toluene	ppbv	1,300	**0.92**	**0.54**	**0.48**
1,2,4-Trichlorobenzene	ppbv	0.53	<0.25	<0.25	<0.25
1,1,1-Trichloroethane	ppbv	1,100	<0.10	<0.10	<0.10
1,1,2-Trichloroethane	ppbv	0.30	<0.10	<0.10	<0.10
Trichloroethene	ppbv	0.37	<0.10	<0.10	<0.10
Trichlorofluoromethane (F11)	ppbv	9,900	**0.18**	**0.22**	**0.22**
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	2,500	<0.10	<0.10	<0.10
1,2,4-Trimethylbenzene	ppbv	44	**0.41**	**0.18**	**0.18**
1,3,5-Trimethylbenzene	ppbv	44	**0.12**	<0.10	<0.10
Vinyl chloride	ppbv	0.62	<0.050	<0.050	<0.050
m,p-Xylene	ppbv	23	**0.65**	**0.20**	**0.18**
o-Xylene	ppbv	23	**0.30**	<0.10	<0.10

Notes:

1) Residential Indoor Air Screening Levels were taken from the MDEQ Guidance Document for the Vapor Intrusion Pathway, May 2013.

ppbv = parts per billion by volume

NC = No criterion

Bold font denotes concentrations detected above laboratory reporting limits

Appendix H
RBCA Modeling Summary

Technical Memorandum

To:	Jason Smith, Tecumseh Products Company
From:	Emily Wright and Stacy Metz, TRC
Subject:	Evaluation of Current Exposure at Off-Site Non-Residential Properties and Determination of Groundwater Clean-Up Objectives for Vapor Intrusion under Reasonably Anticipated Current and Future Land Use Scenarios
Date:	January 29, 2016
cc:	Graham Crockford, TRC
Project No.:	226667.0000.0000

Objective

In October 2015, groundwater data collected through that time were used to prepare figures illustrating the lateral extent of constituents of concern (COCs) in shallow groundwater above Michigan Department of Environmental Quality (MDEQ) groundwater screening levels (GWSLs) for vapor intrusion (Figure 1). These figures were used to determine the area over which site specific evaluation of the volatilization to indoor air migration pathway was merited. The purpose of the site specific evaluation was (1) to determine whether existing non-residential buildings were reasonably expected to have indoor air concentrations above generic non-residential MDEQ indoor air screening levels and (2) to calculate groundwater clean-up levels protective of the off-site residential and non-residential vapor intrusion pathway. This technical memorandum provides detailed documentation of the site specific evaluation of the volatilization to indoor air migration pathway.

Methods

The Risk-Based Corrective Action Tool Kit Version 2.6 (RBCA) was used to complete fate and transport modeling of the vapor intrusion pathway. The RBCA Tool Kit is a modeling software package designed in for use within Microsoft Excel to determine risks associated with COCs. The software is capable of using site specific input parameters to determine cleanup levels for soil and groundwater for a number of potential exposure pathways, including vapor intrusion. The software can also be used to predict indoor air concentrations along the contaminant plume (GSI Environmental, 2011). All calculations within and the full capabilities of this modeling software can be found in the guidance manual (GSI Environmental, 2007). The RBCA Tool Kit is capable of calculating both baseline risks (e.g. predict indoor air concentrations of COCs) and cleanup levels. The Volatilization to Indoor Air Inhalation exposure scenario within the RBCA Tool Kit was used to meet both of these

objectives. The Johnson & Ettinger model for soil and groundwater volatilization was selected to predict the indoor air concentrations and clean-up levels (see the user manual for more details [GSI Environmental, 2007]).

In order to meet the project objectives, 3 types of modeling scenarios were developed to encompass the potential hazards to both current and future developments within the current plume area: (1) existing non-residential buildings, (2) potential future non-residential buildings, and (3) future residential buildings.[1]

Figure 1 illustrates the approximate horizontal extent of COCs in shallow groundwater above GWSLs. Aerial imagery and site/building information from publically available sources were used to determine the location of non-residential buildings within the area over which non-residential GWSLs are exceeded in shallow groundwater. Figure 1 also illustrates the approximately building footprint of non-residential structures within or near that area. Results from soil gas sample points are also summarized. Each non-residential property is assigned a map number for reference purposes. A brief description of each property, including current land use is provided in Table 1. A total of 12 occupied (or potentially occupied) non-residential buildings are located within the area of concern. Model settings were developed for each of these existing, occupied buildings in order to predict current indoor air concentrations and clean-up objectives for groundwater at the off-site property protective of the vapor intrusion pathway. As described below, cleanup levels and predicted indoor air concentrations are dependent on site geology and building specific parameters. The affected area was subdivided into ten geographic areas based on land use, soil type in the vadose zone, hydraulic gradient, depth to groundwater and saturated thickness. For each of the nine geographic areas where future non-residential development is reasonable, cleanup levels for groundwater were calculated using building parameters consistent with a typical office building, and for each of the four geographic areas where residential land use is reasonable, cleanup levels for groundwater were calculated using building parameters consistent with a typical house.

Site-specific risk at each existing structure was assessed using RBCA software. Model input parameter are summarized in Table 2. Site-specific input parameters include building specific parameters, local geology and hydrogeology, and local groundwater chemistry data. The basis for these site-specific parameters for each property is briefly described below.

Model Inputs: Chemical Properties

Tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-DCE), vinyl chloride have been detected in groundwater at off-site sample locations above GWSLs. Therefore cleanup levels and indoor air concentration were calculated for each of these parameters. The chemical parameter inputs (e.g. physical, chemical and toxicological properties) into the model for each of these compounds were taken from the USEPA Risk-Based Screening Tables (USEPA, 2015). For cis-DCE, the USEPA Risk-Based

[1] Current exposures at existing residential structures was previously addressed through indoor air sampling and/or presumptive installation of sub-slab depressurization/ventilation system.

Screening Tables do not include a chronic inhalation reference concentration (RfC_i). Therefore, the RfC_i for cis-DCE was taken from Chemical Data included in the MDEQ Part 201 Cleanup Criteria (MDEQ, 2013a). These chemical input parameters are provided in Attachment 1 for each of the 5 COCs.

Model Inputs: Exposure Assumptions

Exposure assumptions for each potential receptor are summarized in Tables N7, N11 and N12 of Appendix N in the Corrective Measures Proposal.

Model Inputs: Soil and Groundwater Parameters

In order to facilitate modeling and risk assessment, the area over which GWSLs are exceeded was subdivided into the 10 geographic areas. Site specific soil and groundwater parameters were selected for each of those areas based on the local geology. Those values were subsequently used in the RBCA Model to estimate indoor air concentrations at current non-residential structures and to determine target groundwater concentrations protective of human exposures under reasonable future land use scenarios. These geographic areas are illustrated on Figure 1 and described in detail in Attachment 2. Note that for a number of values (e.g., capillary zone thickness, volumetric water content, volumetric air content, etc.) default values in the RBCA Model Tool Kit were used based on the **site-specific** soil type. For certain input soil and groundwater properties a site-wide value was used regardless of geologic area. These values include: fraction organic carbon, soil/groundwater pH, saturated hydraulic conductivity, and sand as the dominant soil type in the water bearing unit. The RBCA Tool Kit input parameter summary sheets for each of the current model scenarios are included in Attachment 3, the RBCA Tool Kit input parameter summary sheets for each of the future non-residential model scenarios are included in Attachment 4, and RBCA Tool Kit input parameter summary sheets for each of the future residential model scenarios are included in Attachment 5. Attachment 3 also includes input parameters for the one existing on-site structure (P-building) that has the potential to be occupied in the future.

Model Inputs: Building Parameters

Existing Buildings

For each of the 12 occupied (or potentially occupied) off-site non-residential buildings and P-building (on-site), building specific input parameters were used to model current risk.[2] As outlined in Table 2, building specific values were used for the large majority the building input parameters, e.g. foundation area, perimeter, ceiling height, foundation thickness, etc. These values were determined using publicly available construction

[2] Note that modeling was not performed for the building located on Property 6 because a building specific evaluation, including indoor air sampling was previously completed for Property 6. This evaluation is documented in Appendix I of the Corrective Measures Proposal.

blueprints provided by the City of Tecumseh, publically available property information available on the City of Tecumseh's Tax and Assessing Software Database, and Google Earth™ imagery for all offsite properties (City of Tecumseh, 2015a; City of Tecumseh, 2015b; Google Earth, 2015); on-site boring logs and maps were used for P-building characteristics. For some parameters, literature values were used in the absence of available building specific data, e.g. building air exchange rate and the indoor-outdoor differential pressure (Table 2). For these values, property specific values are summarized on the RBCA Tool Kit input parameter summary sheets provided in Attachment 3. Attachment 6 provides supporting documentation for the determination of these values, e.g. copies of relevant blueprints, Google Earth™ images, tax assessment information pages, boring logs and maps.

Future Non-Residential Buildings

Cleanup levels were calculated for conservative reasonable "worst-case"[3] new commercial structures. The non-residential model input parameters used represent a typical office building or similar. Office buildings when compared to other new-construction commercial buildings, typically have smaller a smaller building footprint, lower ceilings and lower air exchange rates than most other commercial settings. These features result in higher predicted indoor air concentrations, or conversely, lower cleanup levels for groundwater under future land use scenarios. Building-specific input parameters used when calculating cleanup levels for future non-residential buildings, and references for the determination of those values are provided in Table 2. Additionally, these values are included in the RBCA Model input parameter summary sheets provided in Attachment 4.

Future Residential Buildings

Residential cleanup levels were calculated for each geographic area with existing or reasonably anticipated future residential use. Typical values for residential buildings were taken from the 2004 EPA User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. Given current building standards, these parameters are considered reasonable, conservative values for new residential construction. The basement scenario was modeled as the worst case condition except where shallow groundwater precludes basement construction. Building specific input parameters used when calculating cleanup levels for future non-residential buildings, and references for the determination of those values are provided in Table 2. Additionally, these values are included in the RBCA Model input parameter summary sheets provided in Attachment 5.

[3] "Worst-case" future commercial and residential buildings parameters were selected from standards set in the USEPA 2004 User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings (USEPA, 2004).

Model Inputs: Groundwater Concentration Data

In order to predict indoor air COC concentrations in existing buildings, measured groundwater concentrations were input into the model. For each building, current groundwater COC concentrations were determined using groundwater sampling data from grab groundwater sample locations and monitoring wells[4] located within roughly 100 feet of the existing building. For each parameter the maximum shallow groundwater concentration within the area was used. These input concentrations and the location where those concentrations were measured are included in Attachment 3. The distance from the sampling location to the building was estimated using Figure 1.

Results

RBCA Model outputs are included in Attachment 3 (current non-residential), Attachment 4 (future non-residential), and Attachment 5 (future residential). Calculated indoor air concentrations at each of the existing buildings are summarized in Table 3. None of the calculated indoor air concentrations exceed MDEQ non-residential indoor air criteria. Groundwater concentrations, protective of potential future vapor intrusion at these properties are provided in Table 4.

Risk-based cleanup levels, protective of potential future exposures for each geographic area are summarized in Table 5. As described in the Corrective Measures Proposal these values were compared to existing groundwater chemistry data in order to determine target groundwater treatment areas, select groundwater corrective measures and develop an appropriate monitoring program for the achievement of cleanup levels.

References

City of Tecumseh (2015a). City of Tecumseh Tax and Assessing Software Database. City Assessor Amanda Lacelle. Accessed December 2015. Available at: http://www.mytecumseh.org/government/city-assessor/city-assessor.htm

City of Tecumseh (2015b). Building Plans. Supplied by the City Building Inspector.

Google Earth (2015). *City of Tecumseh, Michigan Area*. Google, Inc. Viewed December 2015.

GSI Environmental, Inc. (2007). *RBCA Tool Kit for Chemical Releases Software Guidance Manual*. Groundwater Services, Inc. Houston, Texas. Available at: http://www.gsi-net.com/en/software/rbca-software-tool-kit-for-chemical-releases-version-2-6.html

[4] For monitoring well locations, groundwater chemistry data from the most recent sampling event as of December 2015 was used.

GSI Environmental, Inc. (2011). RBCA Tool Kit for Chemical Releases, Version 2.6. Groundwater Services, Inc. Houston, Texas. Available at: http://www.gsi-net.com/en/software/rbca-software-tool-kit-for-chemical-releases-version-2-6.html

MDEQ (2013a). *Cleanup Criteria Requirements for Response Activity (Formerly the Part 201 Generic Cleanup Criteria and Screening Levels) - Table 4. Toxicological and Chemical-Physical Data*. Michigan Department of Environmental Quality. State of Michigan. Available at: http://www.michigan.gov/deq/0,4561,7-135-3311_4109-251790--,00.html

MDEQ (2013b). *Guidance Document For the Vapor Intrusion Pathway.* Michigan Department of Environmental Quality Remediation and Redevelopment Division. State of Michigan. Available at: https://www.michigan.gov/documents/deq/deq-rrd-VIGuidanceDoc-May2013_422550_7.pdf

USEPA (2004). *User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings.* U.S. Environmental Protection Agency, Washington, D.C. Available at: https://www.dtsc.ca.gov/AssessingRisk/upload/VI_USEPA_Users-guide.pdf

USEPA (2011). *Exposure Factors Handbook 2011 Edition (Final)*. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-09/052F, 2011.

USEPA (2015). *Risk-Based Screening Table (November 2015) - Chemical Specific Parameters*. U.S. Environmental Protection Agency. December 21, 2015. http://www.epa.gov/risk/risk-based-screening-table-generic-tables

Tables

Table H1
Non-Residential Vapor Intrusion Property Summary
Former Tecumseh Products Company Site
Tecumseh, MI

Map Number[1]	Property Class[2]	Occupancy Status[3]	Property Use	Summary of Potential Pathway	Risk Assessment Status
1	Commercial	Occupied	Warehouse for furniture/hardware store with north portion leased for light manufacturing, office space in southeast corner	Located along the side gradient perimeter of the plume. ~1/3 of building over area of shallow groundwater affected above non-residential GWSLs, ~1/3 of building within 100 feet of that area, and ~1/3 of building (including office area) more than 100 feet from shallow groundwater above GWSLs.	**Current:** Site specific attenuation factor for SGSLs calculated. Soil gas concentrations below site specific SGSL. Indoor air sample collected to verify site-specific calculations. Indoor air concentrations below non-residential indoor air criteria. **Future:** RBCA Tool Kit used to model potential future exposures. Area targeted for groundwater treatment.
2	Industrial	Occupied	Light manufacturing / machine shop	Property is located along the side gradient perimeter of affected groundwater. The entire building footprint is more than 100 feet from shallow groundwater affected above non-residential GWSLs.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.
3	Commercial	Occupied	Website and Marketing Services Office	Located along the side gradient perimeter of the plume. On-site building is >500 feet from shallow groundwater affected above non-residential GWSLs.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.
4	Commercial	Unoccupied / In Use	Warehouse and garage for carpet company; No water supply at property	On-site building is located above shallow groundwater affected above GWSLs. Building is used as a carpet warehouse and does not have a water supply indicating that although the building is in use it is not occupied. No receptors. Pathway is not complete.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.
5	Commercial	Unoccupied / In Use	Three mini storage units for Tecumseh Self Storage	On-site structures are three unoccupied mini storage units. No receptors. Pathway is not complete.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is potentially significant. Property is downgradient of target treatment area.
6	Commercial	Occupied	Warehouse and office for Tecumseh Self Storage	Building is a warehouse with an office area for the adjacent mini storage facility (Map Number 5). Building located within the area of shallow groundwater above GWSLs.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is potentially significant. Property is downgradient of target treatment area.
7	Exempt	Occupied	School bus garage, parking and service	Building serves as service building for school buses. Building located within the area of shallow groundwater above GWSLs.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant. Property is downgradient of target treatment area.
8	Industrial	Occupied	Ididit Company - Hot rod car restoration, repair, parts, sales and showroom	Building includes office area, showroom, workshop and warehouse for hot rod restoration business. Building located within the area of shallow groundwater above GWSLs.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant. Property is downgradient of target treatment area.
9	Exempt	Unknown	Garage, parking and vehicle service for phone company	Building serves as service building for phone company. Building located within the area of shallow groundwater above GWSLs.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.
10	Exempt	No Building	Parking lot and stockyard for phone company	No building on-site. Pathway is not complete.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.
11	DEV	No Building	Portion of Tecumseh Tire Exchange (Map Number 12) extends onto property, remaining property undeveloped.	No building on-site except where a portion of the building from Map Number 12 extends onto west corner of this parcel. See Map Number 12 below for an evaluation of that building. No other buildings on-site. No receptors. Pathway is not complete.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is potentially significant. Property is downgradient of target treatment area.
12	Commercial	Occupied	Tecumseh Tire Exchange - garage and service center on property	Building serves as commercial tire shop and vehicle service center. Building is located within the area of shallow groundwater above GWSLs.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is potentially significant. Property is downgradient of target treatment area.
13	Commercial	Unknown	Outbuilding for Tecumseh Tire Exchange	Building owned by commercial tire shop and vehicle service center, use and occupancy of that building is unknown. Building is located within the area of shallow groundwater above GWSLs.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is potentially significant. Property is downgradient of target treatment area.
14	Commercial	Unknown	Warehouse / storage	Use and occupancy of on-site storage building is unknown. Building is located within the area of shallow groundwater above GWSLs.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.

Notes:

SGSL = Soil Gas Screening Level set by the Michigan DEQ

GWSL = Groundwater Screening Level set by the Michigan DEQ

RBCA = Risk-Based Corrective Action Tool Kit Version 2.6

1. Map Numbers for each non-residential property within the area where shallow groundwater exceeds non-residential groundwater screening levels for vapor intrusion (GWSLs) are illustrated on associated Figure 1.
2. Property class determined from publically available City of Tecumseh property assessment records, database accessed at http://www.mytecumseh.org/government/city-assessor/city-assessor.htm
3. Occupancy Status: *Occupied* = Indicates that indoor workers typically spend the majority of their work day in the building; generic non-residential exposure assumptions apply. *Unoccupied/In Use* = Indicates that the building is in use, typically for storage or as a garage, but does not have the amenities (such as water) required for occupancy by indoor workers; workers may intermittently enter the building for short periods; generic non-residential exposure assumptions do not apply. *Unoccupied/Vacant* = Indicates that the building is vacant, indoor workers do not enter the building.

Table H1
Non-Residential Vapor Intrusion Property Summary
Former Tecumseh Products Company Site
Tecumseh, MI

Map Number[1]	Property Class[2]	Occupancy Status[3]	Property Use	Summary of Potential Pathway	Risk Assessment Status
15	Commercial	Unknown	Warehouse/storage	Located along the side gradient perimeter of affected groundwater. ~5% of building within 100 feet of shallow groundwater affected above non-residential GWSLs.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.
16	Industrial	Unoccupied / In Use	Storage - Records for Tecumseh Products Company	Building is located more than 100 feet from area of shallow groundwater affected above GWSLs. Building is unoccupied. Pathway is not complete.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.
17	Industrial	Occupied	Light manufacturing	Buildings are located more than 100 feet from area of shallow groundwater affected above GWSLs. Pathway is not relevant.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.
18	Commercial	Occupied	Office, storage and stockyard for cable, voice and internet company	Building is in use by cable company. Building is located within area of shallow groundwater above GWSLs.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant. Property is downgradient of target treatment area.
19	Commercial	Occupied	Limousine company - office and garage	Building is in use by a limousine company. Building is located within area of shallow groundwater above GWSLs.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is potentially significant. Property is downgradient of target treatment area.
20	Commercial	Unoccupied / In Use	Two mini storage units	On-site structures are two mini storage units. No receptors. Pathway is not complete.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is potentially significant. Property is downgradient of target treatment area.
21	Industrial	No Building	Electric substation	No building on-site. Pathway is not complete.	**Current:** Pathway is not complete. **Future:** Pathway is not complete.
22	Commercial	Unknown	City records indicate warehouse/storage, former tool and die company.	Building is located more than 100 feet from area of shallow groundwater affected above GWSLs. Pathway is not relevant.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.
23	Commercial	Occupied	Baron's Towing and Service/Repair Garage	Buildings in use by towing company and service center. Buildings are located with the area of affected groundwater.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is potentially significant. Property is downgradient of target treatment area.
24	Industrial	No Building	Electric substation	No building on-site. Pathway is not complete.	**Current:** Pathway is not complete. **Future:** Pathway is not complete.
25	Industrial	Unoccupied / Vacant	Former TPC International Building. Sale pending.	Building is currently unoccupied. Restrictive covenant for former TPC site requires that the potential for vapor mitigation on existing and new structures be controlled by the site owner prior to building occupancy.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.
26	Industrial	No Building	Former parking area (including open car port) for TPC International Building located on Map Number 25.	Property is a parking lot. No occupants. Restrictive covenant for former TPC site requires that the potential for vapor mitigation on new structures. If any, be controlled by the site owner prior to building occupancy.	**Current:** Pathway is not complete. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.
27	Industrial	Occupied	Manufacturer of Corrugated Boxes	Located along the up gradient perimeter of affected groundwater. Approximately 2/3 of the main warehouse/storage area within 100 feet of shallow groundwater affected above non-residential GWSLs.	**Current:** RBCA Tool Kit used to model potential current exposures. Modeled indoor air concentrations are acceptable. **Future:** RBCA Tool Kit used to model potential future exposures. Pathway is insignificant.

Notes:

SGSL = Soil Gas Screening Level set by the Michigan DEQ

GWSL = Groundwater Screening Level set by the Michigan DEQ

RBCA = Risk-Based Corrective Action Tool Kit Version 2.6

1. Map Numbers for each non-residential property within the area where shallow groundwater exceeds non-residential groundwater screening levels for vapor intrusion (GWSLs) are illustrated on associated Figure 1.
2. Property class determined from publically available City of Tecumseh property assessment records, database accessed at http://www.mytecumseh.org/government/city-assessor/city-assessor.htm
3. Occupancy Status: *Occupied* = Indicates that indoor workers typically spend the majority of their work day in the building; generic non-residential exposure assumptions apply. *Unoccupied/In Use* = Indicates that the building is in use, typically for storage or as a garage, but does not have the amenities (such as water) required for occupancy by indoor workers; workers may intermittently enter the building for short periods; generic non-residential exposure assumptions do not apply. *Unoccupied/Vacant* = Indicates that the building is vacant, indoor workers do not enter the building.

Table H2
RBCA Tool Kit Site Specific Parameter Summary
Former Tecumseh Products Company Site
Tecumseh, Michigan

Soil Parameters						
Parameter	**Symbol**	**Property Category**	**Value**	**Units**	**Reference(1)**	**Summary**
Dominant Vadose Zone Soil Type	--	All Properties	varies	(-)	TRC 2012; TRC 2015b	Based on nearby monitoring well or soil boring data
Capillary Zone Thickness	h_{cap}	All Properties	varies	m	RBCA	RBCA default value based on soil type
Vadose Zone Thickness	h_v	All Properties	varies	m	RBCA	RBCA default value based on soil type
Fraction of Organic Carbon	f_{oc}	All Properties	0.0037	(-)	TriMatrix Laboratories 2009 Sample Data (RMT, 2010)	Average of 4 samples taken at monitoring wells and soil borings in November and December of 2009
Volumetric Water Content	Θ_w	All Properties	varies	(-)	RBCA Version 2	RBCA default value based on soil type
Volumetric Air Content	Θa	All Properties	varies	(-)	RBCA Version 2	RBCA default value based on soil type
Vertical Hydraulic Conductivity	K_{vs}	All Properties	varies	cm/d	RBCA Version 2	RBCA default value based on soil type
Vapor Permeability	k_v	All Properties	varies	m^2	RBCA Version 2	RBCA default value based on soil type
Depth to Groundwater	L_{gw}	All Properties	varies	m	TRC 2012; TRC 2015b	Based on nearby monitoring well or soil boring data
Soil/Groundwater pH	pH	All Properties	7.13	(-)	TRC 2015a (Table 4)	Site wide average from existing monitoring wells
Groundwater Parameters						
Parameter	**Symbol**	**Property Category**	**Value**	**Units**	**Reference(1)**	**Summary**
Saturated Hydraulic Conductivity	K_s	All Properties	821	cm/d	TRC 2015b	Site wide average
Groundwater Gradient	i	All Properties	varies	(-)	TRC, 2015a (Figure 2)	varies based on location
Width of Groundwater Source Zone	S_w	North of Site	189	m	Figure 1 (Attached)	measured from width of source perpendicular to flow for each compass direction where the plume has left the site
		West of Site	460			
		East of Site	195			
Depth of Groundwater Source Zone	S_d	All Properties	varies	m	TRC, 2012; TRC, 2015a	Measured for property area or geological area
Effective Porosity in water-bearing unit	Θ_{eff}	All Properties	0.321	(-)	RBCA Version 2	Sand is dominant soil type
Fraction of organic carbon in water-bearing unit	$f_{oc\text{-}sat}$	All Properties	0.0037	(-)	TriMatrix Laboratories 2009 Sample Data (RMT, 2010)	Average of 4 samples taken at monitoring wells and soil borings in November and December of 2009
Groundwater pH	pH_{sat}	All Properties	7.13	(-)	TRC, 2015a (Table 4)	Site wide average from existing monitoring wells

Notes:

(1) Reference Details:

RBCA Version 2= Connor, J., Bowers, R., McHugh, T., Spexet, A., 2007. Risk-Based Corrective Action Version 2 Software and Guidance Manual. GSI Environmental Inc., Houston, Texas. www.gsi-net.com purchased December 2015.

RMT, Inc. 2010. Technical Memorandum: Status Update – Characterization of Volatile Organic Compounds in Groundwater; Former Tecumseh Products Company Site, Tecumseh, Michigan. February 12, 2010.

TRC Environmental Corporation. 2012. Remedial Investigation and Groundwater Environmental Indicator Report: RCRA-05-2010-0012 – Former Tecumseh Products Company Site, Tecumseh, Michigan. September 2012.

TRC Environmental Corporation. 2015a. Summary of the First and Second Quarter 2015 Groundwater Monitoring Events: Former Tecumseh Products Company Site, Tecumseh, Michigan; RCRA-05-2010-0012. July 2015.

TRC Environmental Corporation. 2015b. 2015 High Resolution Site Characterization Report and Updated Conceptual Site Model: Former Tecumseh Products Company Site, Tecumseh, Michigan; RCRA-05-2010-0012. October 2015.

US EPA (2004). User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. US Environmental Protection Agency, Washington, D.C. Available at: https://www.dtsc.ca.gov/AssessingRisk/upload/VI_USEPA_Users-guide.pdf

US EPA (2011). Exposure Factors Handbook 2011 Edition (Final). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-09/052F, 2011.

(2) Existing property characteristics came from the following sources and are included in Attachment 6

City of Tecumseh Tax and Assessing Software Database. City Assessor Amanda Lacelle. Accessed December 2015. http://www.mytecumseh.org/government/city-assessor/city-assessor.htm

Construction blueprints publicly accessible from the City of Tecumseh

Google Earth 2015. City of Tecumseh, Michigan Area. [Viewed December 2015]

NA=Not Applicable
m=meter
m^2 =square meters
cm/d =centimeters per day
$g/cm/s^2$= grams per centimeter per square second
1/s= inverse seconds

Table H2
RBCA Tool Kit Site Specific Parameter Summary
Former Tecumseh Products Company Site
Tecumseh, Michigan

Building Parameters						
Parameter	**Symbol**	**Property Category**	**Value**	**Units**	**Reference(1)**	**Summary**
Building Volume/area ratio	L_b	Future Residential Property - slab-on-grade	2.44	m	2004 EPA User's Guide for Evaluating Subsurface Vapor Intrusion	Recommended Default Value
		Future Residential Property - basement	3.66			
		Future Commercial Property - slab-on-grade	2.44			Typical ceiling height for office area
		Existing Properties	Varies		See Footnote 2	Equivalent to average ceiling height
Foundation Area	A_b	Future Residential Property - slab-on-grade	120	m^2	2004 EPA User's Guide for Evaluating Subsurface Vapor Intrusion	Recommended Default Value
		Future Residential Property - basement	120			
		Future Commercial Property - slab-on-grade	464.5		USEPA Exposure Factors Handbook	Mean for all commercial buildings (Table 9)
		Existing Properties	varies		See Footnote 2	
Foundation Perimeter	X_{crk}	Future Residential Property - slab-on-grade	44	m	2004 EPA User's Guide for Evaluating Subsurface Vapor Intrusion	Recommended Default Value
		Future Residential Property - basement	44			
		Future Commercial Property - slab-on-grade	91.4		USEPA Exposure Factors Handbook	Mean for all commercial buildings (Table 9)
		Existing Properties	varies		See Footnote 2	
Building Air Exchange Rate	ER	Commercial	4.17E-04	1/s	USEPA Exposure Factors Handbook	Mean for all commercial buildings (Table 19-27)
		Residential	1.25E-04			Value for residential buildings (Table 19-1)
Foundation Thickness	L_{crk}	Future Property- Commercial	0.15	m	2004 EPA User's Guide for Evaluating Subsurface Vapor Intrusion	
		Future Property- Residential	0.10			
		Existing Properties	varies		See Footnote 2	
Depth to Bottom of Foundation Slab	Z_{crk}	Future Residential Property - slab-on-grade	0.10	m	2004 EPA User's Guide for Evaluating Subsurface Vapor Intrusion	
		Future Residential Property - basement	2.0			
		Future Commercial Property - slab-on-grade	0.15			
		Existing Properties	varies		See Footnote 2	
Foundation Crack Fraction	η	Future Residential Property - slab-on-grade	0.00038	(-)	2004 EPA User's Guide for Evaluating Subsurface Vapor Intrusion	
		Future Residential Property - basement	0.00020			
		Future Commercial Property - slab-on-grade	0.000196771		Calculated	For commercial structures estimated as typical crack width (0.001 m [2004 EPA User's Guide for Evaluating Subsurface Vapor Intrusion]) times the foundation perimeter, divided by the foundation area
		Existing Properties	varies			
Indoor/Outdoor Differential Pressure	dP	All Properties	40	$g/cm/s^2$	2004 EPA User's Guide for Evaluating Subsurface Vapor Intrusion	Mean value for all structures
Volumetric Water Content of Cracks	θ_{wcrack}	All Properties	0.080	(-)	RBCA Version 2 default value for sand	Conservatively assumed sand was laid below all foundation slabs - cracks would have similar water content
Volumetric Air Content of Cracks	θ_{acrack}	All Properties	0.33	(-)	RBCA Version 2 default value for sand	Conservatively assumed sand was laid below all foundation slab- cracks would have similar air content

Notes:

(1) Reference Details:

RBCA Version 2= Connor, J., Bowers, R., McHugh, T., Spexet, A., 2007. Risk-Based Corrective Action Version 2 Software and Guidance Manual. GSI Environmental Inc., Houston, Texas. www.gsi-net.com purchased December 2015.

RMT, Inc. 2010. Technical Memorandum: Status Update – Characterization of Volatile Organic Compounds in Groundwater; Former Tecumseh Products Company Site, Tecumseh, Michigan. February 12, 2010.

TRC Environmental Corporation. 2012. Remedial Investigation and Groundwater Environmental Indicator Report: RCRA-05-2010-0012 – Former Tecumseh Products Company Site, Tecumseh, Michigan. September 2012.

TRC Environmental Corporation. 2015a. Summary of the First and Second Quarter 2015 Groundwater Monitoring Events: Former Tecumseh Products Company Site, Tecumseh, Michigan; RCRA-05-2010-0012. July 2015.

TRC Environmental Corporation. 2015b. 2015 High Resolution Site Characterization Report and Updated Conceptual Site Model: Former Tecumseh Products Company Site, Tecumseh, Michigan; RCRA-05-2010-0012. October 2015.

US EPA (2004). User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. US Environmental Protection Agency, Washington, D.C. Available at: https://www.dtsc.ca.gov/AssessingRisk/upload/VI_USEPA_Users-guide.pdf

US EPA (2011). Exposure Factors Handbook 2011 Edition (Final). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-09/052F, 2011.

(2) Existing property characteristics came from the following sources and are included in Attachment 6

City of Tecumseh Tax and Assessing Software Database. City Assessor Amanda Lacelle. Accessed December 2015. http://www.mytecumseh.org/government/city-assessor/city-assessor.htm

Construction blueprints publicly accessible from the City of Tecumseh

Google Earth 2015. City of Tecumseh, Michigan Area. [Viewed December 2015]

NA=Not Applicable

m=meter

m^2 =square meters

cm/d =centimeters per day

$g/cm/s^2$= grams per centimeter per square second

1/s= inverse seconds

Table H3

Summary of RBCA Toolkit Modeled Existing Non-Residential Indoor Air Concentrations
Former Tecumseh Products Company Site
Tecumseh, Michigan

Analyte	1,1-Dichloroethene	cis-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene	Vinyl chloride
Non- Residential Indoor Air Criteria(1)	880	31	180	8.8	31
Units	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3
Property 6	0.10	0.53	0.051	4.2	0.12
Property 7	0.030	0.18	0.012	0.016	0.91
Property 8	0.094	0.61	0.038	0.77	2.9
Property 9	0.042	0.026	0.0012	0.61	0.027
Property 12	0.013	0.017	0.0051	0.099	0.019
Property 13	0.021	0.029	0.0086	0.17	0.031
Property 14	0.0013	0.0046	0.00051	0.10	0.010
Property 15	0.0015	0.013	0.00059	0.057	0.012
Property 18	0.020	0.29	0.0078	0.0061	0.25
Property 19	0.034	0.15	0.014	1.0	0.068
Property 23	0.20	0.55	0.10	3.1	0.23
Property 27	0.0050	0.00093	0.0027	0.10	0.0055

Notes:

ug/m^3 = micrograms per cubic meter

Denotes concentrations above one or more criteria

(1) Non-Residential Indoor Air Criteria = Indoor Air Criteria for Vapor Intrusion were take from the MDEQ Guidance Document for Vapor Intrusion Pathway, May 2013.

Table H4

Summary of RBCA Toolkit Modeled Existing Property Clean-Up Levels

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		1,1-Dichloroethene	cis-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene	Vinyl chloride
Units		ug/L	ug/L	ug/L	ug/L	ug/L
On-Site P-building		94,000	93,000	32,000	2,600	2,800
Geographic Area 1	Property 23	88,000	71,000	35,000	2,400	2,400
	Property 27	170,000	160,000	65,000	4,800	5,100
Geographic Area 2	--	NA	NA	NA	NA	NA
Geographic Area 3	--	NA	NA	NA	NA	NA
Geographic Area 4	--	NA	NA	NA	NA	NA
Geographic Area 5	Property 18	890,000	870,000	>210,000	29,000	22,000
	Property 19	1,300,000	1,300,000	>210,000	42,000	32,000
Geographic Area 6	Property 1 (1)	NA	NA	NA	NA	NA
Geographic Area 7	Property 7	1,500,000	1,500,000	>210,000	47,000	37,000
	Property 8	470,000	440,000	>210,000	15,000	12,000
	Property 9	580,000	560,000	>210,000	19,000	15,000
	Property 14	690,000	650,000	>210,000	22,000	17,000
	Property 15	1,200,000	1,200,000	>210,000	39,000	30,000
Geographic Area 8	Property 6	84,000	68,000	35,000	2,300	2,300
	Property 12	1,400,000	1,300,000	>210,000	44,000	34,000
	Property 13	820,000	780,000	>210,000	26,000	21,000
Geographic Area 9	--	NA	NA	NA	NA	NA
Geographic Area 10	--	NA	NA	NA	NA	NA

Notes:

-- = no buildings exist within the respective geological area and the extent of the groundwater plume

NA = not applicable

ug/L = micrograms per liter

(1) Property 1, Martin's Home Center, was analyzed using the US EPA's JEM model. See Appendix I for details.

Table H5

Summary of RBCA Toolkit Modeled Future Building Clean-Up Levels

Former Tecumseh Products Company Site

Tecumseh, Michigan

Analyte		1,1-Dichloroethene	cis-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene	Vinyl chloride
Units		ug/L	ug/L	ug/L	ug/L	ug/L
Geographic Area 1	Residential	4,900	3,900	2,000	130	110
	Non-residential	49,000	40,000	20,000	1,300	1,400
Geographic Area 2	Residential	4,800	3,800	2,000	130	110
	Non-residential	NA	NA	NA	NA	NA
Geographic Area 3	Residential	51,000	48,000	26,000	1,600	1,100
	Non-residential	NA	NA	NA	NA	NA
Geographic Area 4	Residential(1)	NA	NA	NA	NA	NA
	Non-residential	220,000	210,000	76,000	6,000	6,200
Geographic Area 5	Residential(1)	NA	NA	NA	NA	NA
	Non-residential	630,000	610,000	>210,000	20,000	16,000
Geographic Area 6	Residential(1)	NA	NA	NA	NA	NA
	Non-residential	47,000	37,000	19,000	1,300	1,300
Geographic Area 7	Residential	33,000	29,000	16,000	1,000	700
	Non-residential	620,000	610,000	>210,000	20,000	16,000
Geographic Area 8	Residential	5,100	4,100	2,100	140	120
	Non-residential	51,000	42,000	21,000	1,400	1,400
Geographic Area 9	Residential(1)	NA	NA	NA	NA	NA
	Non-residential	680,000	670,000	>210,000	22,000	17,000
Geographic Area 10(2)	Residential	NA	NA	NA	NA	NA
	Non-residential	NA	NA	NA	NA	NA

Notes:

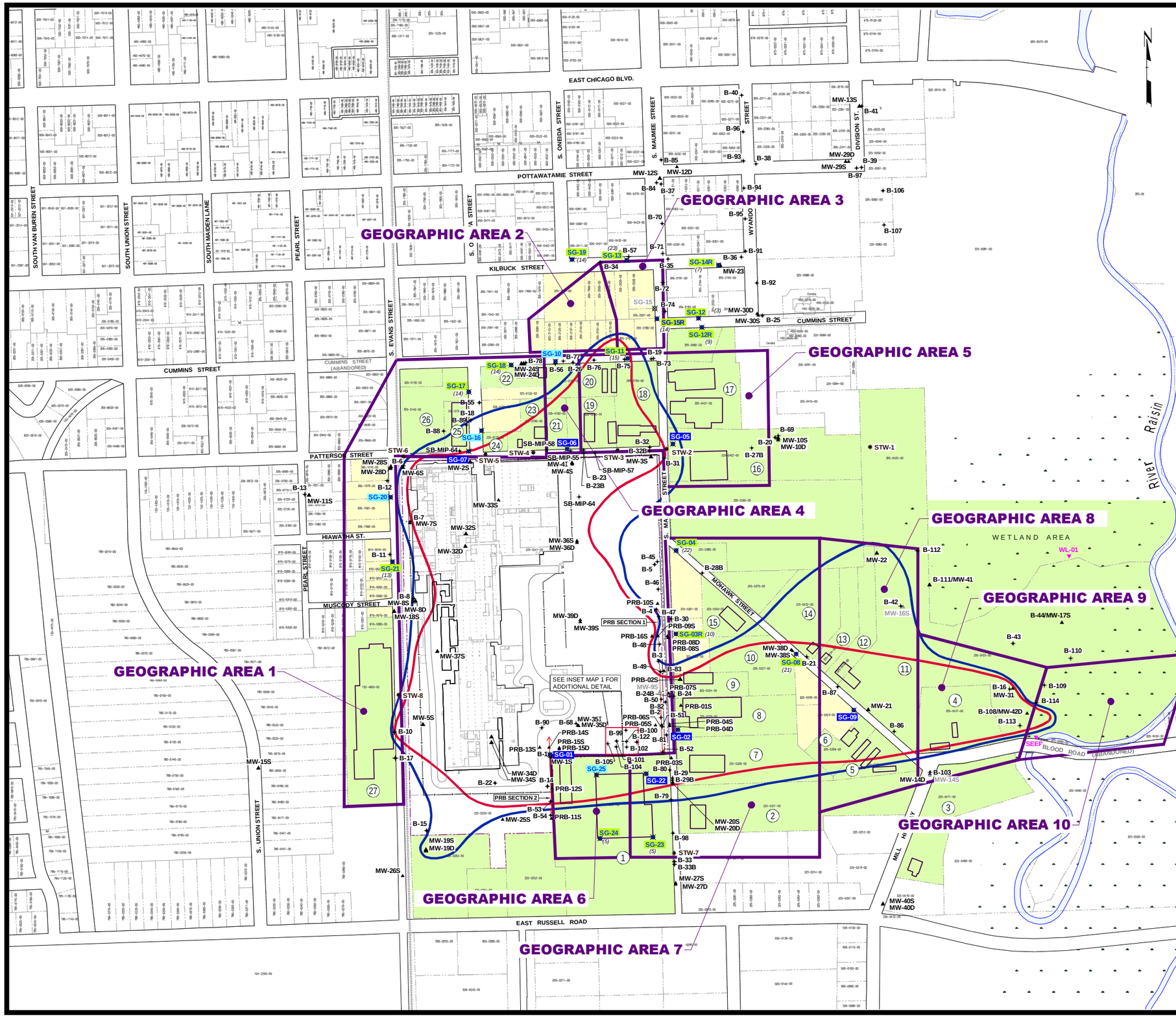
NA = not applicable

ug/L = micrograms per liter

(1) Residential Clean-Up Levels were not calculated for geographic areas where current or future land use does not include reasonably anticipated residential use.

(2) Geological Area 10 is a regulated wetland area. Reasonable future use does not include building construction and occupancy.

Figure 1



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE

KEY

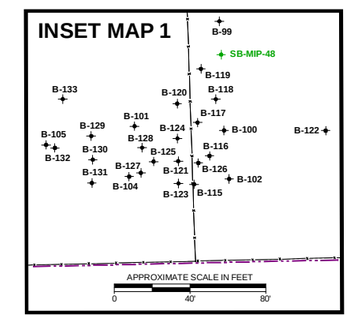
- EXTENT OF VOCs ABOVE THE GENERIC NON-RESIDENTIAL MDEQ GWSLs
- EXTENT OF VOCs ABOVE THE GENERIC RESIDENTIAL MDEQ GWSLs
- SG-06 — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ABOVE NON-RESIDENTIAL SGSLs HAVE BEEN OBSERVED DURING AT LEAST 2 SAMPLING EVENTS.
- SG-10 — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ABOVE RESIDENTIAL SGSLs HAVE BEEN OBSERVED DURING AT LEAST 2 SAMPLING EVENTS.
- SG-15R (14) — SOIL GAS SAMPLE LOCATION WHERE CONCENTRATIONS ARE CONSISTENTLY BELOW RESIDENTIAL SGSLs. THE NUMBER OF CONSECUTIVE SAMPLING EVENTS WITH CONCENTRATIONS BELOW RESIDENTIAL SGSLs, AS OF SEPTEMBERE 2015, IS LISTED IN PARENTHESIS.

PROPERTY KEY

- RESIDENTIAL PROPERTY
- NON-RESIDENTIAL PROPERTY
- APPROXIMATE NON-RESIDENTIAL BUILDING FOOTPRINT
- (16) MAP NUMBER

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE OUTPUTS AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.
5. SAMPLE POINT SG-25 WAS INSTALLED AFTER THE INSTALLATION AND START-UP OF THE PERIMETER SOIL VAPOR EXTRACTION SYSTEM. ONGOING OPERATION OF THIS SYSTEM HAS LIKELY REDUCED THE OBSERVED CONCENTRATIONS AT THIS LOCATION.
6. UNSHADED PROPERTIES ARE MORE THAT 100 FEET FROM THE AREA OF SHALLOW GROUNDWATER AFFECTED ABOVE MDEQ GROUNDWATER SCREENING LEVELS FOR VAPOR INTRUSION.



0 250' 500' 750' 1000'
APPROXIMATE SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: GEOGRAPHIC AREAS FOR VAPOR INTRUSION RISK ASSESSMENT

DRAWN BY:	DGS	SCALE:	PROJ. NO. 246667.0003
CHECKED BY:	ES	AS INDICATED	FILE NO. 246667.0000.01.dwg
APPROVED BY:	GC	DATE PRINTED:	FIGURE 1
DATE:	JANUARY 2016		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA:
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh\246667\0003_EPA Letter\246667.0000.01.dwg
Character Name: STEWALE, DANIAH
Drawing Per Date: 6/28/2016

Attached Xrefs: bnd0710 (Filed); TCS - Page 1; Tecumseh B2; Tecumseh C2; Tecumseh D2; Tecumseh H2; Tecumseh B2;
Attached Images: 7.5X7 Geo Areas Hyper Blue
Dwg Size: 1.88 Mb
Plot Date: January 28, 2016
Plot Time: 12:01 PM

Attachment 1
Summary of Chemical Properties

Highlighted Parameters were changed to match US EPA Risk-based Screening Tables (US EPA, 2015)

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Former Tecumseh Products Company Site | Completed By: Emily Sokol | Job ID: Property 27 Current Building

Site Location: Property 27 | Date Completed: 11-Jan-16

Constituent: Dichloroethylene, 1,1- * **CAS No.: 75-35-4**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (m)		None	None	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (m)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (m)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1E+0	NA		
	TR = 1E-5	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$RBEL_{air}$ (µg/m^3)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Soil Volatilization/Particulates to Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$RBEL_{air}$ (µg/m^3)	THQ = 1E+0	NA	2.9E+2	NA
	TR = 1E-5	NA	NC	NA
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA		
	TR = 1E-5	NA		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	5.8E+1	NA
	TR = 1E-5	NA	NC	NA
Soil Leaching to Groundwater to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	5.8E+1	NA
	TR = 1E-5	NA	NC	NA

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/m3-air)	NA	NA	NA
VF_{samb}	(kg-soil/m3-air)	NA	NA	NA
VF_{wamb}	(m3-wat/m3-air)	NA	NA	NA
VF_{sesp}	(kg-soil/m3-air)	NA	NA	NA
VF_{wesp}	(m3-wat/m3-air)	NA	NA	NA
LF	(kg-soil/L-wat)	NA		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	NA	NA	NA
DAFs/gw	(-)	NA	NA	NA

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	9.7E+1	TX11
Sol	(mg/L)	2.4E+3	TX11
P_{vap}	(mmHg)	6.0E+2	TX11
H	(L-wat/L-air)	1.1E+0	TX11
$\log(K_{oc})$	(log[L/kg])	1.5E+0	TX11
$\log(K_{ow})$	(log[L/kg])	2.1E+0	TX11
D_{air}	(cm^2/sec)	8.6E-2	TX11
D_{wat}	(cm^2/sec)	1.1E-5	TX11
Toxicity Data			
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[µg/m^3])	-	-
RfD_o	(mg/kg/day)	5.0E-2	EPA-I
RfD_d	(mg/kg/day)	5.0E-2	D2
RfC_i	(mg/m^3)	2.0E-1	TX11
BCF	(-)	2.4E+1	LY
RBAF	(-)	1.0E+0	TX11
Dermal Exposure Parameters			
RAFd	(-)	0.0E+0	TX11
abs.d	(-)	0.0E+0	TX11
abs.gi	(-)	1.0E+0	TX11
K_p	(cm/hr)	-	-
tau_d	(hr/event)	-	-
t_{crit}	(hr)	-	-
B	(-)	-	-
Regulatory Standards			
MCL	(mg/L)	7.0E-3	*
TWA	(mg/m3)	-	-
SWQC	(mg/L)		-
Br.Abg	(-)	-	-
Br.bg	(-)	-	
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	-	-
ADL_s	(mg/kg)	-	-
$t_{1/2,sat}$	(d)	1.3E+2	H
$t_{1/2,unsat}$	(d)	1.3E+2	H

	Units	Value
Derived Parameters		
K_{sw}	(L-wat/kg-soil)	2.6E+0
C_{sat}	(mg/kg-soil)	9.1E+2
$C_{sat,vap}$	(µg/m^3-air)	3.2E+9
$D_{eff,s}$	(cm^2/sec)	1.3E-2
$D_{eff,crk}$	(cm^2/sec)	1.3E-2
$D_{eff,cap}$	(cm^2/sec)	1.4E-5
$D_{eff,ws}$	(cm^2/sec)	1.9E-3
R_{sat}	(-)	-
R_{unsat}	(-)	-
Z	(cm/event)	-

Notes: 1) NA = Not applicable; NC = Not calculated.
2) Definitions and references presented on page 6 of 6.

Highlighted Parameters were changed to match US EPA Risk-based Screening Tables (US EPA, 2015)

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Former Tecumseh Products Company Site | Completed By: Emily Sokol | Job ID: Property 27 Current Building

Site Location: Property 27 | Date Completed: 11-Jan-16 |

Constituent: Dichloroethylene, cis-1,2- * CAS No.: 156-59-2

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (m)		None	None	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (m)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (m)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1E+0	NA		
	TR = 1E-5	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$RBEL_{air}$ (µg/m^3)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Soil Volatilization/Particulates to Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$RBEL_{air}$ (µg/m^3)	THQ = 1E+0	NA	5.0E+1	NA
	TR = 1E-5	NA	NC	NA
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA		
	TR = 1E-5	NA		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	5.3E+1	NA
	TR = 1E-5	NA	NC	NA
Soil Leaching to Groundwater to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	3.2E+1	NA
	TR = 1E-5	NA	NC	NA

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	9.7E+1	TX11
Sol	(mg/L)	6.4E+3	TX11
P_{vap}	(mmHg)	2.0E+2	TX11
H	(L-wat/L-air)	1.7E-1	TX11
$\log(K_{oc})$	(log[L/kg])	1.6E+0	TX11
$\log(K_{ow})$	(log[L/kg])	1.9E+0	TX11
D_{air}	(cm^2/sec)	8.8E-2	TX11
D_{wat}	(cm^2/sec)	1.1E-5	TX11
Toxicity Data			
SF_o	(1/[mg/kg/day])	-	-
SF_d	(1/[mg/kg/day])	-	-
URF_i	(1/[µg/m^3])	-	-
RfD_o	(mg/kg/day)	2.0E-3	EPA-I
RfD_d	(mg/kg/day)	2.0E-3	D2
RfC_i	(mg/m^3)	3.4E-2	TX11
BCF	(-)	1.5E+1	LY
RBAF	(-)	1.0E+0	TX11
Dermal Exposure Parameters			
RAFd	(-)	0.0E+0	TX11
abs.d	(-)	0.0E+0	TX11
abs.gi	(-)	1.0E+0	TX11
K_p	(cm/hr)	-	-
tau_d	(hr/event)	-	-
t_{crit}	(hr)	-	-
B	(-)	-	-
Regulatory Standards			
MCL	(mg/L)	7.0E-2	*
TWA	(mg/m3)	7.9E+2	OS
SWQC	(mg/L)		-
Br.Abg	(-)	-	-
Br.bg	(-)	-	
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	1.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)	2.9E+3	H
$t_{1/2,unsat}$	(d)	2.9E+3	H

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/m3-air)	NA	NA	NA
VF_{samb}	(kg-soil/m3-air)	NA	NA	NA
VF_{wamb}	(m3-wat/m3-air)	NA	NA	NA
VF_{sesp}	(kg-soil/m3-air)	NA	NA	NA
VF_{wesp}	(m3-wat/m3-air)	NA	NA	NA
LF	(kg-soil/L-wat)	NA		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	NA	NA	NA
DAFs/gw	(-)	NA	NA	NA

	Units	Value
Derived Parameters		
K_{sw}	(L-wat/kg-soil)	4.4E+0
C_{sat}	(mg/kg-soil)	1.5E+3
$C_{sat,vap}$	(µg/m^3-air)	1.1E+9
$D_{eff,s}$	(cm^2/sec)	1.3E-2
$D_{eff,crk}$	(cm^2/sec)	1.3E-2
$D_{eff,cap}$	(cm^2/sec)	2.6E-5
$D_{eff,ws}$	(cm^2/sec)	3.2E-3
R_{sat}	(-)	-
R_{unsat}	(-)	-
Z	(cm/event)	-

Green highlighted parameter was changed to match MDEQ formerly Part 201 Table 4 Toxicology and Chemical-Physical Data (MDEQ, 2013a).

Notes: 1) NA = Not applicable; NC = Not calculated.
2) Definitions and references presented on page 6 of 6.

Highlighted Parameters were changed to match US EPA Risk-based Screening Tables (US EPA, 2015)

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Former Tecumseh Products Company Site | Completed By: Emily Sokol | Job ID: Property 27 Current Building

Site Location: Property 27 | Date Completed: 11-Jan-16 |

Constituent: Tetrachloroethylene * **CAS No.: 127-18-4**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (m)		None	None	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (m)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (m)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1E+0	NA		
	TR = 1E-5	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$RBEL_{air}$ (µg/m^3)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Soil Volatilization/Particulates to Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$RBEL_{air}$ (µg/m^3)	THQ = 1E+0	NA	5.8E+1	NA
	TR = 1E-5	NA	1.6E+2	NA
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA		
	TR = 1E-5	NA		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	2.1E+1	NA
	TR = 1E-5	NA	5.8E+1	NA
Soil Leaching to Groundwater to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	3.0E+1	NA
	TR = 1E-5	NA	8.2E+1	NA

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/m3-air)	NA	NA	NA
VF_{samb}	(kg-soil/m3-air)	NA	NA	NA
VF_{wamb}	(m3-wat/m3-air)	NA	NA	NA
VF_{sesp}	(kg-soil/m3-air)	NA	NA	NA
VF_{wesp}	(m3-wat/m3-air)	NA	NA	NA
LF	(kg-soil/L-wat)	NA		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	NA	NA	NA
DAFs/gw	(-)	NA	NA	NA

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	1.7E+2	TX11
Sol	(mg/L)	2.1E+2	TX11
P_{vap}	(mmHg)	1.9E+1	TX11
H	(L-wat/L-air)	7.2E-1	TX11
$\log(K_{oc})$	(log[L/kg])	2.0E+0	TX11
$\log(K_{ow})$	(log[L/kg])	3.4E+0	TX11
D_{air}	(cm^2/sec)	5.0E-2	TX11
D_{wat}	(cm^2/sec)	9.5E-6	TX11
Toxicity Data			
SF_o	(1/[mg/kg/day])	2.1E-3	TX11
SF_d	(1/[mg/kg/day])	5.2E-2	D2
URF_i	(1/[µg/m^3])	2.6E-7	TX11
RfD_o	(mg/kg/day)	6.0E-3	EPA-I
RfD_d	(mg/kg/day)	1.0E-2	D2
RfC_i	(mg/m^3)	4.0E-2	TX11
BCF	(-)	4.9E+1	LY
RBAF	(-)	1.0E+0	TX11
Dermal Exposure Parameters			
RAFd	(-)	0.0E+0	TX11
abs.d	(-)	0.0E+0	TX11
abs.gi	(-)	1.0E+0	TX11
K_p	(cm/hr)	4.8E-2	D
tau_d	(hr/event)	9.0E-1	D
t_{crit}	(hr)	4.3E+0	D
B	(-)	2.5E-1	D
Regulatory Standards			
MCL	(mg/L)	5.0E-3	*
TWA	(mg/m3)	6.9E+2	OS
SWQC	(mg/L)		-
Br.Abg	(-)	-	-
Br.bg	(-)	-	
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	5.0E-4	S
ADL_s	(mg/kg)	-	-
$t_{1/2,sat}$	(d)	7.2E+2	H
$t_{1/2,unsat}$	(d)	7.2E+2	H

	Units	Value
Derived Parameters		
K_{sw}	(L-wat/kg-soil)	1.9E+0
C_{sat}	(mg/kg-soil)	1.1E+2
$C_{sat,vap}$	(µg/m^3-air)	1.7E+8
$D_{eff,s}$	(cm^2/sec)	7.4E-3
$D_{eff,crk}$	(cm^2/sec)	7.4E-3
$D_{eff,cap}$	(cm^2/sec)	1.0E-5
$D_{eff,ws}$	(cm^2/sec)	1.3E-3
R_{sat}	(-)	-
R_{unsat}	(-)	-
Z	(cm/event)	2.2E-1

Notes: 1) NA = Not applicable; NC = Not calculated.
2) Definitions and references presented on page 6 of 6.

Highlighted Parameters were changed to match US EPA Risk-based Screening Tables (US EPA, 2015)

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Former Tecumseh Products Company Site | Completed By: Emily Sokol | Job ID: Property 27 Current Building

Site Location: Property 27 | Date Completed: 11-Jan-16

Constituent: Trichloroethylene * **CAS No.: 79-01-6**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (m)		None	None	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (m)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (m)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1E+0	NA		
	TR = 1E-5	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$RBEL_{air}$ (µg/m^3)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Soil Volatilization/Particulates to Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$RBEL_{air}$ (µg/m^3)	THQ = 1E+0	NA	2.9E+0	NA
	TR = 1E-5	NA	1.0E+1	NA
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA		
	TR = 1E-5	NA		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	1.6E+0	NA
	TR = 1E-5	NA	5.4E+0	NA
Soil Leaching to Groundwater to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	1.5E+0	NA
	TR = 1E-5	NA	5.0E+0	NA

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	1.3E+2	TX11
Sol	(mg/L)	1.3E+3	TX11
P_{vap}	(mmHg)	6.9E+1	TX11
H	(L-wat/L-air)	4.0E-1	TX11
$log(K_{oc})$	(log[L/kg])	1.8E+0	TX11
$log(K_{ow})$	(log[L/kg])	2.4E+0	TX11
D_{air}	(cm^2/sec)	6.9E-2	TX11
D_{wat}	(cm^2/sec)	1.0E-5	TX11
Toxicity Data			
SF_o	(1/[mg/kg/day])	4.6E-2	TX11
SF_d	(1/[mg/kg/day])	1.3E-2	D2
URF_i	(1/[µg/m^3])	4.1E-6	TX11
RfD_o	(mg/kg/day)	5.0E-4	TX11
RfD_d	(mg/kg/day)	6.0E-3	D2
RfC_i	(mg/m^3)	2.0E-3	TX11
BCF	(-)	3.9E+1	LY
RBAF	(-)	1.0E+0	TX11
Dermal Exposure Parameters			
RAFd	(-)	0.0E+0	TX11
abs.d	(-)	0.0E+0	TX11
abs.gi	(-)	1.0E+0	TX11
K_p	(cm/hr)	1.6E-2	D
tau_d	(hr/event)	5.5E-1	D
t_{crit}	(hr)	1.3E+0	D
B	(-)	2.6E-2	D
Regulatory Standards			
MCL	(mg/L)	5.0E-3	*
TWA	(mg/m3)	5.4E+2	OS
SWQC	(mg/L)		-
Br.Abg	(-)	-	-
Br.bg	(-)	-	
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	1.0E-3	S
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)	1.7E+3	H
$t_{1/2,unsat}$	(d)	1.7E+3	H

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/m3-air)	NA	NA	NA
VF_{samb}	(kg-soil/m3-air)	NA	NA	NA
VF_{wamb}	(m3-wat/m3-air)	NA	NA	NA
VF_{sesp}	(kg-soil/m3-air)	NA	NA	NA
VF_{wesp}	(m3-wat/m3-air)	NA	NA	NA
LF	(kg-soil/L-wat)	NA		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	NA	NA	NA
DAFs/gw	(-)	NA	NA	NA

	Units	Value
Derived Parameters		
K_{sw}	(L-wat/kg-soil)	2.8E+0
C_{sat}	(mg/kg-soil)	4.6E+2
$C_{sat,vap}$	(µg/m^3-air)	4.9E+8
$D_{eff,s}$	(cm^2/sec)	1.0E-2
$D_{eff,crk}$	(cm^2/sec)	1.0E-2
$D_{eff,cap}$	(cm^2/sec)	1.5E-5
$D_{eff,ws}$	(cm^2/sec)	2.0E-3
R_{sat}	(-)	-
R_{unsat}	(-)	-
Z	(cm/event)	6.5E-2

Notes: 1) NA = Not applicable; NC = Not calculated.
2) Definitions and references presented on page 6 of 6.

Highlighted Parameters were changed to match US EPA Risk-based Screening Tables (US EPA, 2015)

RBCA SITE ASSESSMENT | **Chemical-Specific Tier 2 Cleanup Summary**

Site Name: Former Tecumseh Products Company Site | Completed By: Emily Sokol | Job ID: Property 27 Current Building

Site Location: Property 27 | Date Completed: 11-Jan-16

Constituent: Vinyl chloride * **CAS No.: 75-01-4**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (m)		None	None	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (m)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (m)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1E+0	NA		
	TR = 1E-5	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$RBEL_{air}$ (µg/m^3)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Soil Volatilization/Particulates to Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (m)		None	None	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	NA	NA
	TR = 1E-5	NA	NA	NA
Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$RBEL_{air}$ (µg/m^3)	THQ = 1E+0	NA	1.5E+2	NA
	TR = 1E-5	NA	9.3E+0	NA
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1E+0	NA		
	TR = 1E-5	NA		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	2.6E+1	NA
	TR = 1E-5	NA	1.7E+0	NA
Soil Leaching to Groundwater to Indoor Air Inhalation				
Receptor Type / Distance (m)		None	Commercial / 1	None
$SSTL_{gw}$ (mg/L)	THQ = 1E+0	NA	2.4E+1	NA
	TR = 1E-5	NA	1.5E+0	NA

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/m3-air)	NA	NA	NA
VF_{samb}	(kg-soil/m3-air)	NA	NA	NA
VF_{wamb}	(m3-wat/m3-air)	NA	NA	NA
VF_{sesp}	(kg-soil/m3-air)	NA	NA	NA
VF_{wesp}	(m3-wat/m3-air)	NA	NA	NA
LF	(kg-soil/L-wat)	NA		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	NA	NA	NA
DAFs/gw	(-)	NA	NA	NA

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	6.2E+1	TX11
Sol	(mg/L)	8.8E+3	TX11
P_{vap}	(mmHg)	3.0E+3	TX11
H	(L-wat/L-air)	1.1E+0	TX11
$\log(K_{oc})$	(log[L/kg])	1.3E+0	TX11
$\log(K_{ow})$	(log[L/kg])	1.6E+0	TX11
D_{air}	(cm^2/sec)	1.1E-1	TX11
D_{wat}	(cm^2/sec)	1.2E-5	TX11
Toxicity Data			
SF_o	(1/[mg/kg/day])	7.2E-1	EPA-I
SF_d	(1/[mg/kg/day])	1.5E+0	D2
URF_i	(1/[µg/m^3])	4.4E-6	TX11
RfD_o	(mg/kg/day)	3.0E-3	EPA-I
RfD_d	(mg/kg/day)	3.0E-3	D2
RfC_i	(mg/m^3)	1.0E-1	TX11
BCF	(-)	1.0E+1	LY
RBAF	(-)	1.0E+0	TX11
Dermal Exposure Parameters			
RAFd	(-)	0.0E+0	TX11
abs.d	(-)	0.0E+0	TX11
abs.gi	(-)	1.0E+0	TX11
K_p	(cm/hr)	7.3E-3	D
tau_d	(hr/event)	2.1E-1	D
t_{crit}	(hr)	5.1E-1	D
B	(-)	2.3E-3	D
Regulatory Standards			
MCL	(mg/L)	2.0E-3	*
TWA	(mg/m3)	2.6E+0	OS
SWQC	(mg/L)		-
Br.Abg	(-)	-	-
Br.bg	(-)	-	
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	S
ADL_s	(mg/kg)	1.0E-2	S
$t_{1/2,sat}$	(d)	2.9E+3	H
$t_{1/2,unsat}$	(d)	2.9E+3	H

	Units	Value
Derived Parameters		
K_{sw}	(L-wat/kg-soil)	2.9E+0
C_{sat}	(mg/kg-soil)	3.0E+3
$C_{sat,vap}$	(µg/m^3-air)	1.0E+10
$D_{eff,s}$	(cm^2/sec)	1.6E-2
$D_{eff,crk}$	(cm^2/sec)	1.6E-2
$D_{eff,cap}$	(cm^2/sec)	1.8E-5
$D_{eff,ws}$	(cm^2/sec)	2.4E-3
R_{sat}	(-)	-
R_{unsat}	(-)	-
Z	(cm/event)	2.5E-2

Notes: 1) NA = Not applicable; NC = Not calculated.
2) Definitions and references presented on page 6 of 6.

Attachment 2
Description of Geographic Areas

In order to facilitate modeling and risk assessment the area over which GWSLs are exceeded was subdivided into 10 geologic areas. Site specific soil and groundwater parameters were selected for each of those areas based on the local geology. Those values were subsequently used in the RBCA Model to estimate indoor air concentrations at current non-residential structures and to determine target groundwater concentrations protective of human exposures under reasonable future land use scenarios. Each selected model parameter is summarized in the table below, followed by a detailed description of each geographic area.

Geographic Areas Parameters Table
Summary of RBCA Inputs Used for Each Geographic Area
Former Tecumseh Products Company Site
Tecumseh, Michigan

Geographic Area(1)	Dominant Soil Type(2)		Depth to Groundwater(2)		Aquifer Thickness(2)		Plume Width(1)		Average Hydraulic Gradient(3)
	Vadose Zone	Aquifer	ft	m	ft	m	ft	m	
1	Sand	Sand	20	6.1	25	7.6	1700	518	0.0010
2	Sand	Sand	15	4.6	30	9.1	600	183	0.0010
3	Clayey Sand	Sand	15	4.6	20	6.1	600	183	0.0010
4	Silty Sand	Sand	15	4.6	25	7.6	600	183	0.0010
5	Clayey Sand	Sand	8.0	2.4	18	5.5	600	183	0.0010
6	Sand	Sand	9.0	2.7	29	8.8	620	189	0.0010
7	Clayey Sand	Sand	7.0	2.1	30	9.1	620	189	0.035
8	Sand	Sand	29	8.8	8	2.4	620	189	0.0025
9	Clayey Sand	Sand	30	9.1	10	3.0	620	189	0.0025
10(4)	Organic Silt/Sand		0.0	0.0	8.0	2.4	620	189	0.0025

Notes:

ft = feet

m = meters

(1) See Figure 1

(2) Determined from soil borings described in Attachment 2

(3) May 2015 groundwater contour map (Figure 7 of the Corrective Measures Proposal)

(4) Geographic Area 10 was not modeled in RBCA; see description in Attachment 2

Geographic Area 1

This area is located along the up gradient perimeter of the site. The geology in this area, particularly dominant soil type, depth to groundwater and aquifer thickness, was determined through a review of Cross-Sections A-A' and C-C' (October 2015) and nearby soil boring logs (MW-02S, MW-04S/I, MW-06s, MW-08D, MW-19D, MW-24D, MW-28D, B-78, B-77, B-88, B-89, NS-01, and SB-MIP-55). This area is characterized by a discontinuously low permeability surficial silty/sandy clay having a thickness of 0 to 6 feet underlain by sand. Therefore vadose zone soils are conservatively modeled as sand. Depth to groundwater in this area ranges from 18 to 28 feet. A typical aquifer thickness of 25 feet was used for modeling purposes. The plume width for the up gradient area was measured using Figure 1 which illustrates the lateral extent of shallow groundwater affected above non-residential screening levels for vapor intrusion. The hydraulic gradient was estimated using the May 2015 Groundwater Contour Map.

Geographic Area 2

This residential area is located along the downgradient extent of the northern source area plume. The geology in this area, particularly dominant soil type, depth to groundwater and aquifer thickness, was determined through a review of Cross-Section A-A' (October 2015) and nearby soil boring logs (MW-24D, B-34, B-71, B-72, B-73, B-74, B-75, B-76, B-77, and B-78). This area is characterized by a low permeability surficial silty/sandy clay having a thickness of 4 to 8 feet underlain by sand. Because typical basement depth may extend below this surficial unit, vadose zone soils are conservatively modeled as sand. Depth to groundwater in this area ranges from 18 to 28 feet. A typical aquifer thickness of 25 feet was used for modeling purposes. The plume width for the up gradient area was measured using the figure titled "Summary of Non-Residential Vapor Intrusion Pathway" which illustrates the lateral extent of shallow groundwater affected above non-residential screening levels for vapor intrusion. The hydraulic gradient was estimated using the May 2015 Groundwater Contour Map.

Geographic Area 3

This residential area is located along the downgradient extent of the northern source area plume. The geology in this area, particularly dominant soil type, depth to groundwater and aquifer thickness, was determined through a review of Cross-Section A-A' (October 2015) and nearby soil boring logs (B-34, B-71, B-72, B-73, B-74, B-75, and B-76). This area is characterized by a low permeability surficial silty/sandy clay which is present to a minimum depth 8 feet. This unit is contiguous as evidenced by the presence of perched groundwater throughout this area. Vadose zone soils are conservatively modeled as clayey sand. The plume width for the up gradient area was measured using the figure titled "Summary of Non-Residential Vapor Intrusion Pathway" which illustrates the lateral extent of shallow groundwater affected above non-residential screening levels for vapor intrusion. The hydraulic gradient was estimated using the May 2015 Groundwater Contour Map.

Geographic Area 4

This area is located adjacent to the site downgradient of the northern source area. The geology in this area, particularly dominant soil type, depth to groundwater and aquifer thickness, was determined

through a review of Cross-Sections A-A′ and B-B′ (October 2015) and nearby soil boring logs (MW-4S/I, B-23, B-76, B-77, B-78, NS-01, and SB-MIP-55). This area is characterized by a low permeability surficial silty/sandy clay which has a thickness of 4 to 6 feet. Vadose zone soils are conservatively modeled as silty sand. The plume width for the up gradient area was measured using the figure titled "Summary of Non-Residential Vapor Intrusion Pathway" which illustrates the lateral extent of shallow groundwater affected above non-residential screening levels for vapor intrusion. The hydraulic gradient was estimated using the May 2015 Groundwater Contour Map.

Geographic Area 5

This area is located adjacent to the site downgradient of the northern source area. The geology in this area, particularly dominant soil type, depth to groundwater and aquifer thickness, was determined through a review of Cross-Sections A-A′ and B-B′ (October 2015) and nearby soil boring logs (MW-3S, MW-4S/I, MW-10S, B-23, B-69, B-73, B-75, B-76, B-77, B-78, and SB-MIP-55). This area is characterized by a low permeability silty/sandy clay which is present to a minimum depth 6 feet. Vadose zone soils for this non-residential area are conservatively modeled as clayey sand. The plume width for the northern source area was measured using the figure titled "Summary of Non-Residential Vapor Intrusion Pathway" which illustrates the lateral extent of shallow groundwater affected above non-residential screening levels for vapor intrusion. The hydraulic gradient was estimated using the May 2015 Groundwater Contour Map.

Geographic Area 6

This area is located immediately east and south of the site downgradient of the southern source area. The geology in this area, particularly dominant soil type, depth to groundwater and aquifer thickness, was determined through a review of Cross-Section C-C′ (October 2015) and nearby soil boring logs (SG-22, SG-23, SG-24 and SG-25). This area is characterized by shallow groundwater. The depth to the affected aquifer throughout this area is 9 to 10 feet. Significant excavation along the western portion of the Property 1 to level the building area likely removed a large portion of the low permeability surficial clayey sand. Therefore vadose zone soils are conservatively modeled as sand. The plume width for the southern source area was measured using the figure titled "Summary of Non-Residential Vapor Intrusion Pathway" which illustrates the lateral extent of shallow groundwater affected above non-residential screening levels for vapor intrusion. The hydraulic gradient was estimated using the May 2015 Groundwater Contour Map.

Geographic Area 7

This area is located immediately east of the site downgradient of the southern source area. The geology in this area, particularly dominant soil type, depth to groundwater and aquifer thickness, was determined through a review of Cross-Section D-D′ (October 2015) and nearby soil boring logs (MW-38d, B-21 and B-87). This area is characterized by shallow groundwater. The depth to the affected aquifer throughout this area is no more than 10 feet. Vadose zone soils are primarily low permeability silty/sandy clay. The thickness of this low permeability silty/sandy clay ranges from 5 to 8 feet. This clay may be interbedded with sand or silty sand. Vadose zone soils are conservatively modeled as clayey sand. The plume width for the southern source area was measured using the

figure titled "Summary of Non-Residential Vapor Intrusion Pathway" which illustrates the lateral extent of shallow groundwater affected above non-residential screening levels for vapor intrusion. The hydraulic gradient was estimated using the May 2015 Groundwater Contour Map.

Geographic Area 8

This area is located downgradient (east) of Geologic Area 2. The geology in this area, particularly dominant soil type, depth to groundwater and aquifer thickness, was determined through a review of Cross-Section C-C' (October 2015) and nearby soil boring logs (MW-14s/d, MW-21, MW-22, MW-38d, B-21, B-86 and B-87). In this area, the depth to the affected aquifer increases, and there is a corresponding decrease in the aquifer thickness and horizontal gradient with that change. Additionally the near surface low permeability silty/sandy clay is discontinuous, e.g., present is some but not all of the soil borings completed through this area. Vadose zone soils are conservatively modeled as sand. The plume width for the southern source area was measured using the figure titled "Summary of Non-Residential Vapor Intrusion Pathway" which illustrates the lateral extent of shallow groundwater affected above non-residential screening levels for vapor intrusion. The hydraulic gradient was estimated using the May 2015 Groundwater Contour Map.

Geographic Area 9

This area is located downgradient (east) of Geologic Area 3. The geology in this area, particularly dominant soil type, depth to groundwater and aquifer thickness, was determined through a review of Cross-Section C-C' (October 2015) and nearby soil boring logs (MW-14s/d, MW-22, MW-31, B-21, B-42, B-43 and B-87). In this area, vadose zone soils include an intermediate clay unit having a thickness of approximately 10 feet. Vadose zone soils are conservatively modeled as clayey sand. The plume width for the southern source area was measured using the figure titled "Summary of Non-Residential Vapor Intrusion Pathway" which illustrates the lateral extent of shallow groundwater affected above non-residential screening levels for vapor intrusion. The hydraulic gradient was estimated using the May 2015 Groundwater Contour Map.

Geographic Area 10

This area is located downgradient (east) of Geologic Area 4. This area is a wetland that is separated from geologic area 4 by a sharp drop in surface topography. There are no buildings in this area. Future development is not expected due to both physical features (access over steep topography, flooding, etc.) and institutional controls (restrictions on development in regulated wetlands). The geology in this area, particularly dominant soil type, depth to groundwater and aquifer thickness, was determined through a review of nearby soil boring logs (B-108, B-109, B-113 and B-114). In this area, groundwater is at or near ground surface. The plume width for the southern source area was measured using the figure titled "Summary of Non-Residential Vapor Intrusion Pathway" which illustrates the lateral extent of shallow groundwater affected above non-residential screening levels for vapor intrusion. The hydraulic gradient was estimated using the May 2015 Groundwater Contour Map.

Attachment 3
Model Summary Sheets – Existing Buildings

Property 6

Indoor Air Concentrations

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None
Trichloroethylene *	1.1E+0		2.6E+2			4.2E-3	
Dichloroethylene, cis-1,2- *	2.4E-1		4.5E+2			5.3E-4	
Tetrachloroethylene *	1.0E-2		2.0E+2			5.1E-5	
Vinyl chloride *	1.0E-2		8.2E+1			1.2E-4	
Dichloroethylene, 1,1- *	1.0E-2		9.6E+1			1.0E-4	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Property 6

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 6-entire building

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Current Building Scenario- Property 6 entire building

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	1.1E+0					2.3E+0					2.3E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	2.4E-1					6.8E+1					6.8E+1	☐	<1
127-18-4	Tetrachloroethylene *	1.0E-2					3.5E+1					3.5E+1	☐	<1
75-01-4	Vinyl chloride *	1.0E-2					2.3E+0					2.3E+0	☐	<1
75-35-4	Dichloroethylene, 1,1- *	1.0E-2					8.4E+1					8.4E+1	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

Property 6

Input Concentrations of COCs

RBCA Tool Kit for Chemical Releases, Version 2.6

Site Name: Former Tecumseh Products Company Site Job Name: Current Building Scenario- Property 6 entire building

Location: Property 6-entire building Date: 11-Jan-16

Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete

Sort List: Top, Bottom, MoveUp, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	1.1E+0	MW-21			
Dichloroethylene, cis-1,2-	2.4E-1	Highest of B-86 or MW-21			
Tetrachloroethylene	1.0E-2	MW-21 detection limit			
Vinyl chloride	1.0E-2	MW-21 detection limit			
Dichloroethylene, 1,1-	1.0E-2	MW-21 detection limit			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 6-entire building

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 6-entire building

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	***8.75***			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	***0.0037***			(-)
θ_T	Soil total porosity	***0.41***			(-)
		capillary	**vadose**	**foundation**	
θ_w	Volumetric water content	***0.369***	***0.08***	***0.08***	(-)
θ_a	Volumetric air content	***0.041***	***0.33***	***0.33***	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	***8.8***			(m)
pH	Soil/groundwater pH	***7.13***			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	***4.3***	(m)
A_b	Foundation area	NA	***341***	(m^2)
X_{crk}	Foundation perimeter	NA	***80.5***	(m)
ER	Building air exchange rate	NA	***0.000417***	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	***0.152***	(m)
η	Foundation crack fraction	NA	***0.0002361***	(-)
dP	Indoor/outdoor differential pressure	NA	***40***	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	***1.95522E-05***	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	***0.08***	(-)
θ_{acrack}	Volumetric air content of cracks	NA	***0.33***	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	***2.1***	(m)
I_f	Net groundwater infiltration rate	***30***	(cm/yr)
U_{gw}	Groundwater Darcy velocity	***2.463***	(cm/d)
V_{gw}	Groundwater seepage velocity	***7.672897196***	(cm/d)
K_s	Saturated hydraulic conductivity	***821***	(cm/d)
i	Groundwater gradient	***0.003***	(-)
S_w	Width of groundwater source zone	***195***	(m)
S_d	Depth of groundwater source zone	***2.1***	(m)
θ_{eff}	Effective porosity in water-bearing unit	***0.321***	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	***0.0037***	(-)
pH_{sat}	Groundwater pH	***7.13***	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		**Groundwater Ingestion**		**Groundwater to Indoor Air**		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		**Soil to Outdoor Air Inhal.**		**GW to Outdoor Air Inhal.**		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Property 7

Indoor Air Concentrations

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
		On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)
Constituents of Concern	Groundwater Conc. (mg/L)	None	Commercial	None	None	Commercial	None
Trichloroethylene *	8.6E-2		5.4E+3			1.6E-5	
Dichloroethylene, cis-1,2- *	1.8E+0		9.9E+3			1.8E-4	
Tetrachloroethylene *	5.0E-2		4.0E+3			1.2E-5	
Vinyl chloride *	1.2E+0		1.3E+3			9.1E-4	
Dichloroethylene, 1,1- *	5.0E-2		1.7E+3			3.0E-5	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Property 7
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 7

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Current Building Scenario- Property 7

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	8.6E-2					4.7E+1					4.7E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	1.8E+0					1.5E+3					1.5E+3	☐	<1
127-18-4	Tetrachloroethylene *	5.0E-2					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	1.2E+0					3.7E+1					3.7E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	5.0E-2					1.5E+3					1.5E+3	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

Property 7

Input Concentrations of COCs

RBCA Tool Kit for Chemical Releases, Version 2.6

Site Name: Former Tecumseh Products Company Site Job ID: Current Building Scenario- Property 7
Location: Property 7 Date: 11-Jan-16
Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

☐ Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete
Sort List: Top, Bottom, MoveUp, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	8.6E-2	MW-20s			
Dichloroethylene, cis-1,2-	1.8E+0	highest B-81 or MW-20s			
Tetrachloroethylene	5.0E-2	highest B-81 or MW-20s			
Vinyl chloride	1.2E+0	highest B-81 or MW-20s			
Dichloroethylene, 1,1-	5.0E-2	highest B-81 or MW-20s			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 7

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA Tool Kit for Chemical Releases, Version 2.6

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 7

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	1.89			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	2.1			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	3.7	(m)
A_b	Foundation area	NA	14.9	(m^2)
X_{crk}	Foundation perimeter	NA	15.8	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.000106	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.74007E-09	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	4.911294541	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	24.63	(cm/d)
V_{gw}	Groundwater seepage velocity	76.72897196	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.03	(-)
S_w	Width of groundwater source zone	195	(m)
S_d	Depth of groundwater source zone	4.911294541	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

Property 8
Indoor Air Concentrations

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None
Trichloroethylene *	1.3E+0		1.7E+3			7.7E-4	
Dichloroethylene, cis-1,2- *	1.8E+0		2.9E+3			6.1E-4	
Tetrachloroethylene *	5.0E-2		1.3E+3			3.8E-5	
Vinyl chloride *	1.2E+0		4.2E+2			2.9E-3	
Dichloroethylene, 1,1- *	5.0E-2		5.3E+2			9.4E-5	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Property 8

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 8

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Current Building Scenario- Property 8

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	1.3E+0					1.5E+1					1.5E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	1.8E+0					4.4E+2					4.4E+2	☐	<1
127-18-4	Tetrachloroethylene *	5.0E-2					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	1.2E+0					1.2E+1					1.2E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	5.0E-2					4.7E+2					4.7E+2	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

Property 8

Input Concentrations of COCs

RBCA Tool Kit for Chemical Releases, Version 2.6

Site Name: Former Tecumseh Products Company Site Job ID: Current Building Scenario- Property 8
Location: Property 8 Date: 11-Jan-16
Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

☐ Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete

Sort List: Top, MoveUp, Bottom, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	1.3E+0	PRB-01s			
Dichloroethylene, cis-1,2-	1.8E+0	highest of B-81 or PRB-01s			
Tetrachloroethylene	5.0E-2	highest of B-81 or PRB-01s			
Vinyl chloride	1.2E+0	highest of B-81 or PRB-01s			
Dichloroethylene, 1,1-	5.0E-2	highest of B-81 or PRB-01s			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 8

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 8

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	1.89			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	2.1			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	2.44	(m)
A_b	Foundation area	NA	269.4	(m^2)
X_{crk}	Foundation perimeter	NA	79	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.000293	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	1.92292E-08	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	4.89000872	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	28.735	(cm/d)
V_{gw}	Groundwater seepage velocity	89.51713396	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.035	(-)
S_w	Width of groundwater source zone	195	(m)
S_d	Depth of groundwater source zone	4.89000872	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None
Trichloroethylene *	1.3E+0		2.1E+3			6.1E-4	
Dichloroethylene, cis-1,2- *	1.0E-1		3.8E+3			2.6E-5	
Tetrachloroethylene *	2.0E-3		1.7E+3			1.2E-6	
Vinyl chloride *	1.4E-2		5.2E+2			2.7E-5	
Dichloroethylene, 1,1- *	2.8E-2		6.6E+2			4.2E-5	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Property 9

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 9

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Current Building Scenario- Property 9

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	1.3E+0					1.9E+1					1.9E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	1.0E-1					5.6E+2					5.6E+2	☐	<1
127-18-4	Tetrachloroethylene *	2.0E-3					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	1.4E-2					1.5E+1					1.5E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	2.8E-2					5.8E+2					5.8E+2	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

Property 9

Input Concentrations of COCs

RBCA Tool Kit for Chemical Releases, Version 2.6

Site Name: Former Tecumseh Products Company Site Job ID: Current Building Scenario- Property 9
Location: Property 9 Date: 11-Jan-16
Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete
Sort List: Top, Bottom, MoveUp, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	1.3E+0	PRB-01s			
Dichloroethylene, cis-1,2-	1.0E-1	PRB-02s			
Tetrachloroethylene	2.0E-3	PRB-02s detection limit			
Vinyl chloride	1.4E-2	PRB-07s			
Dichloroethylene, 1,1-	2.8E-2	PRB-01s			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 9

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 9

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	1.89			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	2.1			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	2.44	(m)
A_b	Foundation area	NA	206	(m^2)
X_{crk}	Foundation perimeter	NA	59	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.2	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.2	(m)
η	Foundation crack fraction	NA	0.000286	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	1.36703E-08	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	4.889973477	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	28.735	(cm/d)
V_{gw}	Groundwater seepage velocity	89.51713396	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.035	(-)
S_w	Width of groundwater source zone	195	(m)
S_d	Depth of groundwater source zone	4.889973477	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Property 12

Indoor Air Concentrations

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None
Trichloroethylene *	5.0E-1		5.0E+3			9.9E-5	
Dichloroethylene, cis-1,2- *	1.5E-1		9.0E+3			1.7E-5	
Tetrachloroethylene *	2.0E-2		3.9E+3			5.1E-6	
Vinyl chloride *	2.3E-2		1.2E+3			1.9E-5	
Dichloroethylene, 1,1- *	2.0E-2		1.5E+3			1.3E-5	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Tecumseh Products Company Site
Site Location: Property 12
Completed By: Emily Sokol

Date Completed: 11-Jan-16
Job ID: Property 12 Current Buildi

Property 12

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 12

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Property 12 Current Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	5.0E-1					4.4E+1					4.4E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	1.5E-1					1.3E+3					1.3E+3	☐	<1
127-18-4	Tetrachloroethylene *	2.0E-2					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	2.3E-2					3.4E+1					3.4E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	2.0E-2					1.4E+3					1.4E+3	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

Property 12
Input Concentrations of COCs

Site Name: Former Tecumseh Products Company Site Job ID: Property 12 Current Building Scenario
Location: Tecumseh, Michigan Date: 28-Dec-15
Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete
Sort List: Top, Bottom, MoveUp, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	5.0E-1	B-87	9.43E+143		
Dichloroethylene, cis-1,2-	1.5E-1	B-87			
Tetrachloroethylene	2.0E-2	B-87			
Vinyl chloride	2.3E-2	MW-22			
Dichloroethylene, 1,1-	2.0E-2	B-87			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 12

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 12

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	7.99			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	8.2			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	4.3	(m)
A_b	Foundation area	NA	706	(m^2)
X_{crk}	Foundation perimeter	NA	116	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.000164	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.82302E-08	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	1.8	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	2.0525	(cm/d)
V_{gw}	Groundwater seepage velocity	6.394080997	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.0025	(-)
S_w	Width of groundwater source zone	195	(m)
S_d	Depth of groundwater source zone	1.8	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
Constituents of Concern	Groundwater Conc. (mg/L)	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None
Trichloroethylene *	5.0E-1		3.0E+3			1.7E-4	
Dichloroethylene, cis-1,2- *	1.5E-1		5.2E+3			2.9E-5	
Tetrachloroethylene *	2.0E-2		2.3E+3			8.6E-6	
Vinyl chloride *	2.3E-2		7.4E+2			3.1E-5	
Dichloroethylene, 1,1- *	2.0E-2		9.4E+2			2.1E-5	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Tecumseh Products Company Site
Site Location: Property 13
Completed By: Emily Sokol

Date Completed: 11-Jan-16
Job ID: Property 13 Current Buildi

Property 13
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 13

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Property 13 Current Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	5.0E-1					2.6E+1					2.6E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	1.5E-1					7.8E+2					7.8E+2	☐	<1
127-18-4	Tetrachloroethylene *	2.0E-2					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	2.3E-2					2.1E+1					2.1E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	2.0E-2					8.2E+2					8.2E+2	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

Property 13

Input Concentrations of COCs

RBCA Tool Kit for Chemical Releases, Version 2.6

Site Name: Former Tecumseh Products Company Site Job ID: Property 13 Current Building Scenario

Location: Property 13 Date: 11-Jan-16

Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete

Sort List: Top, MoveUp, Bottom, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	5.0E-1	B-87	9.4E+143		
Dichloroethylene, cis-1,2-	1.5E-1	B-87			
Tetrachloroethylene	2.0E-2	B-87			
Vinyl chloride	2.3E-2	MW-22			
Dichloroethylene, 1,1-	2.0E-2	B-87			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 13

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 13

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	***0.21***			(m)
h_v	Vadose zone thickness	***2.84***			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	***0.0037***			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	**vadose**	**foundation**	
θ_w	Volumetric water content	0.342	***0.23***	***0.08***	(-)
θ_a	Volumetric air content	0.038	***0.15***	***0.33***	(-)
K_{vs}	Vertical hydraulic conductivity	***0.864***			(cm/d)
k_v	Vapor permeability	***1E-15***			(m^2)
L_{gw}	Depth to groundwater	***3.05***			(m)
pH	Soil/groundwater pH	***7.13***			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	***4***	(m)
A_b	Foundation area	NA	***234***	(m^2)
X_{crk}	Foundation perimeter	NA	***63***	(m)
ER	Building air exchange rate	NA	***0.000417***	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	***0.00027***	(-)
dP	Indoor/outdoor differential pressure	NA	***40***	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	***1.53446E-08***	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	***0.08***	(-)
θ_{acrack}	Volumetric air content of cracks	NA	***0.33***	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	***2.1***	(m)
I_f	Net groundwater infiltration rate	***30***	(cm/yr)
U_{gw}	Groundwater Darcy velocity	***2.0525***	(cm/d)
V_{gw}	Groundwater seepage velocity	***6.394080997***	(cm/d)
K_s	Saturated hydraulic conductivity	***821***	(cm/d)
i	Groundwater gradient	***0.0025***	(-)
S_w	Width of groundwater source zone	***195***	(m)
S_d	Depth of groundwater source zone	***2.1***	(m)
θ_{eff}	Effective porosity in water-bearing unit	***0.321***	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	***0.0037***	(-)
pH_{sat}	Groundwater pH	***7.13***	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		**Groundwater Ingestion**		**Groundwater to Indoor Air**		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		**Soil to Outdoor Air Inhal.**		**GW to Outdoor Air Inhal.**		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Property 14

Indoor Air Concentrations

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None
Trichloroethylene *	2.5E-1		2.5E+3			1.0E-4	
Dichloroethylene, cis-1,2- *	2.0E-2		4.3E+3			4.6E-6	
Tetrachloroethylene *	1.0E-3		2.0E+3			5.1E-7	
Vinyl chloride *	6.3E-3		6.2E+2			1.0E-5	
Dichloroethylene, 1,1- *	1.0E-3		7.9E+2			1.3E-6	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Property 14
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 14

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: current Building Scenario 14

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	2.5E-1					2.2E+1					2.2E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	2.0E-2					6.5E+2					6.5E+2	☐	<1
127-18-4	Tetrachloroethylene *	1.0E-3					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	6.3E-3					1.7E+1					1.7E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	1.0E-3					6.9E+2					6.9E+2	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

Property 14

Input Concentrations of COCs

RBCA Tool Kit for Chemical Releases, Version 2.6

Site Name: Former Tecumseh Products Company Site | Job ID: current Building Scenario 14

Location: Property 14 | Date: 11-Jan-16

Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete

Sort List: Top, MoveUp, Bottom, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	2.5E-1	MW-38s			
Dichloroethylene, cis-1,2-	2.0E-2	MW-38s			
Tetrachloroethylene	1.0E-3	B-21			
Vinyl chloride	6.3E-3	MW-38s			
Dichloroethylene, 1,1-	1.0E-3	B-21			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 14

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 14

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	2.49			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	2.7			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	3.7	(m)
A_b	Foundation area	NA	169	(m^2)
X_{crk}	Foundation perimeter	NA	52	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.000308	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	1.26613E-08	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	2.1	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	24.63	(cm/d)
V_{gw}	Groundwater seepage velocity	76.72897196	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.03	(-)
S_w	Width of groundwater source zone	195	(m)
S_d	Depth of groundwater source zone	2.1	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Property 15

Indoor Air Concentrations

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
		On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)
Constituents of Concern	Groundwater Conc. (mg/L)	None	Commercial	None	None	Commercial	None
Trichloroethylene *	2.5E-1		4.4E+3			5.7E-5	
Dichloroethylene, cis-1,2- *	1.0E-1		7.8E+3			1.3E-5	
Tetrachloroethylene *	2.0E-3		3.4E+3			5.9E-7	
Vinyl chloride *	1.3E-2		1.1E+3			1.2E-5	
Dichloroethylene, 1,1- *	2.0E-3		1.3E+3			1.5E-6	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Tecumseh Products Company Site
Site Location: Property 15
Completed By: Emily Sokol

Date Completed: 11-Jan-16
Job ID: Property 15 Current Buildi

Property 15

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 15

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Property 15 Current Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	2.5E-1					3.9E+1					3.9E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	1.0E-1					1.2E+3					1.2E+3	☐	<1
127-18-4	Tetrachloroethylene *	2.0E-3					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	1.3E-2					3.0E+1					3.0E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	2.0E-3					1.2E+3					1.2E+3	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

Property 15

RBCA Tool Kit for Chemical Releases, Version 2.6

Input Concentrations of COCs

Site Name: Former Tecumseh Products Company Site Job ID: Property 15 Current Building Scenario
Location: Property 15 Date: 11-Jan-16
Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete
Sort List: Top, MoveUp, Bottom, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	2.5E-1	MW-38s			
Dichloroethylene, cis-1,2-	1.0E-1	PRB-02s			
Tetrachloroethylene	2.0E-3	PRB-02s			
Vinyl chloride	1.3E-2	PRB-02s			
Dichloroethylene, 1,1-	2.0E-3	PRB-02s			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA Tool Kit for Chemical Releases, Version 2.6

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 15

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 15

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	2.19			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	2.4			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	4	(m)
A_b	Foundation area	NA	669	(m^2)
X_{crk}	Foundation perimeter	NA	110	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.000164	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.67667E-08	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	4.874069407	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	32.84	(cm/d)
V_{gw}	Groundwater seepage velocity	102.305296	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.04	(-)
S_w	Width of groundwater source zone	195	(m)
S_d	Depth of groundwater source zone	4.874069407	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Property 18

Indoor Air Concentrations

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
Constituents of Concern	Groundwater Conc. (mg/L)	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None	On-site (0 m) None	Off-site 1 (1 m) Commercial	Off-site 2 (1 m) None
Trichloroethylene *	2.0E-2		3.3E+3			6.1E-6	
Dichloroethylene, cis-1,2- *	1.7E+0		5.8E+3			2.9E-4	
Tetrachloroethylene *	2.0E-2		2.6E+3			7.8E-6	
Vinyl chloride *	2.0E-1		8.0E+2			2.5E-4	
Dichloroethylene, 1,1- *	2.0E-2		1.0E+3			2.0E-5	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Tecumseh Products Company Site
Site Location: Property 18
Completed By: Emily Sokol

Date Completed: 11-Jan-16
Job ID: Property 18 Current Buildi

Property 18
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 18

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Property 18 Current Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	2.0E-2					2.9E+1					2.9E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	1.7E+0					8.7E+2					8.7E+2	☐	<1
127-18-4	Tetrachloroethylene *	2.0E-2					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	2.0E-1					2.2E+1					2.2E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	2.0E-2					8.9E+2					8.9E+2	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA Tool Kit for Chemical Releases, Version 2.6

Site Name: Former Tecumseh Products Company Site Job ID: Property 18 Current Building Scenario
Location: Property 18 Date: 11-Jan-16
Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete
Sort List: Top, Bottom, MoveUp, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	2.0E-2	MW-03s			
Dichloroethylene, cis-1,2-	1.7E+0	MW-03s			
Tetrachloroethylene	2.0E-2	MW-03s			
Vinyl chloride	2.0E-1	MW-03s			
Dichloroethylene, 1,1-	2.0E-2	MW-03s			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 18

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 18

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	1.89			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	2.1			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	3.7	(m)
A_b	Foundation area	NA	594	(m^2)
X_{crk}	Foundation perimeter	NA	126	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.000212	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	3.06708E-08	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	5.8	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	189	(m)
S_d	Depth of groundwater source zone	5.8	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

Property 19

Indoor Air Concentrations

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
		On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)
Constituents of Concern	Groundwater Conc. (mg/L)	None	Commercial	None	None	Commercial	None
Trichloroethylene *	5.0E+0		4.8E+3			1.0E-3	
Dichloroethylene, cis-1,2- *	1.3E+0		8.5E+3			1.5E-4	
Tetrachloroethylene *	5.0E-2		3.7E+3			1.4E-5	
Vinyl chloride *	7.8E-2		1.1E+3			6.8E-5	
Dichloroethylene, 1,1- *	5.0E-2		1.5E+3			3.4E-5	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Tecumseh Products Company Site
Site Location: Property 19- current building
Completed By: Emily Sokol

Date Completed: 11-Jan-16
Job ID: Property 19 Current Buildi

Property 19
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 19- current building

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Property 19 Current Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	5.0E+0					4.2E+1					4.2E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	1.3E+0					1.3E+3					1.3E+3	☐	<1
127-18-4	Tetrachloroethylene *	5.0E-2					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	7.8E-2					3.2E+1					3.2E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	5.0E-2					1.3E+3					1.3E+3	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

Property 19
Input Concentrations of COCs

RBCA Tool Kit for Chemical Releases, Version 2.6

Site Name: Former Tecumseh Products Company Site Job ID: Property 19 Current Building Scenario
Location: Property 19- current building Date: 11-Jan-16
Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

☐ Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete
Sort List: Top, MoveUp, Bottom, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	5.0E+0	MW-04s			
Dichloroethylene, cis-1,2-	1.3E+0	MW-04s			
Tetrachloroethylene	5.0E-2	MW-04s			
Vinyl chloride	7.8E-2	MW-04s			
Dichloroethylene, 1,1-	5.0E-2	MW-04s			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 19- current building

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 19- current building

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	4.39			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	4.6			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	4.3	(m)
A_b	Foundation area	NA	773	(m^2)
X_{crk}	Foundation perimeter	NA	129	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.000167	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	3.14081E-08	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	5.2	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	189	(m)
S_d	Depth of groundwater source zone	5.2	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

Property 23
Indoor Air Concentrations

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
		On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (38.1 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (38.1 m)
Constituents of Concern	Groundwater Conc. (mg/L)	None	Commercial	None	None	Commercial	None
Trichloroethylene *	8.3E-1		2.7E+2			3.1E-3	
Dichloroethylene, cis-1,2- *	2.6E-1		4.8E+2			5.5E-4	
Tetrachloroethylene *	2.0E-2		2.0E+2			1.0E-4	
Vinyl chloride *	2.0E-2		8.6E+1			2.3E-4	
Dichloroethylene, 1,1- *	2.0E-2		1.0E+2			2.0E-4	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Tecumseh Products Company Site
Site Location: Property 23-garage
Completed By: Emily Sokol

Date Completed: 11-Jan-16
Job ID: Property 23 Current Buildi

Property 23
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 23-garage

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Property 23 Current Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (38.1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	8.3E-1					2.4E+0					2.4E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	2.6E-1					7.1E+1					7.1E+1	☐	<1
127-18-4	Tetrachloroethylene *	2.0E-2					3.5E+1					3.5E+1	☐	<1
75-01-4	Vinyl chloride *	2.0E-2					2.4E+0					2.4E+0	☐	<1
75-35-4	Dichloroethylene, 1,1- *	2.0E-2					8.8E+1					8.8E+1	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

Property 23

Input Concentrations of COCs

RBCA Tool Kit for Chemical Releases, Version 2.6

Site Name: Former Tecumseh Products Company Site Job ID: Property 23 Current Building Scenario

Location: Property 23-garage Date: 11-Jan-16

Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete

Sort List: Top, Bottom, MoveUp, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	8.3E-1	NS-01			
Dichloroethylene, cis-1,2-	2.6E-1	NS-01			
Tetrachloroethylene	2.0E-2	NS-01			
Vinyl chloride	2.0E-2	NS-01			
Dichloroethylene, 1,1-	2.0E-2	NS-01			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA Tool Kit for Chemical Releases, Version 2.6

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 23-garage

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 23-garage

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	***6.65***			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	***0.0037***			(-)
θ_T	Soil total porosity	***0.41***			(-)
		capillary	**vadose**	**foundation**	
θ_w	Volumetric water content	***0.369***	***0.08***	***0.08***	(-)
θ_a	Volumetric air content	***0.041***	***0.33***	***0.33***	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	***6.7***			(m)
pH	Soil/groundwater pH	***7.13***			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	***4.3***	(m)
A_b	Foundation area	NA	***323***	(m^2)
X_{crk}	Foundation perimeter	NA	***62.5***	(m)
ER	Building air exchange rate	NA	***0.000417***	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	***0.000193***	(-)
dP	Indoor/outdoor differential pressure	NA	***40***	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	***1.52083E-05***	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	***0.08***	(-)
θ_{acrack}	Volumetric air content of cracks	NA	***0.33***	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	***5.5***	(m)
I_f	Net groundwater infiltration rate	***30***	(cm/yr)
U_{gw}	Groundwater Darcy velocity	***0.821***	(cm/d)
V_{gw}	Groundwater seepage velocity	***2.557632399***	(cm/d)
K_s	Saturated hydraulic conductivity	***821***	(cm/d)
i	Groundwater gradient	***0.001***	(-)
S_w	Width of groundwater source zone	***189***	(m)
S_d	Depth of groundwater source zone	***5.5***	(m)
θ_{eff}	Effective porosity in water-bearing unit	***0.321***	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	***0.0037***	(-)
pH_{sat}	Groundwater pH	***7.13***	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		**Groundwater Ingestion**		**Groundwater to Indoor Air**		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		**Soil to Outdoor Air Inhal.**		**GW to Outdoor Air Inhal.**		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

Property 27
Indoor Air Concentrations

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(Checked if Pathway is Complete)**

GROUNDWATER: VAPOR INTRUSION INTO BUILDINGS

Exposure Concentration

	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2)		
		On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)
Constituents of Concern	Groundwater Conc. (mg/L)	None	Commercial	None	None	Commercial	None
Trichloroethylene *	5.7E-2		5.4E+2			1.0E-4	
Dichloroethylene, cis-1,2- *	1.0E-3		1.1E+3			9.3E-7	
Tetrachloroethylene *	1.0E-3		3.7E+2			2.7E-6	
Vinyl chloride *	1.0E-3		1.8E+2			5.5E-6	
Dichloroethylene, 1,1- *	1.0E-3		2.0E+2			5.0E-6	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Tecumseh Products Company Site
Site Location: Property 27
Completed By: Emily Sokol

Date Completed: 11-Jan-16
Job ID: Property 27 Current Buildi

Property 27
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Property 27

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Property 27 Current Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	5.7E-2					4.8E+0					4.8E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	1.0E-3					1.6E+2					1.6E+2	☐	<1
127-18-4	Tetrachloroethylene *	1.0E-3					6.5E+1					6.5E+1	☐	<1
75-01-4	Vinyl chloride *	1.0E-3					5.1E+0					5.1E+0	☐	<1
75-35-4	Dichloroethylene, 1,1- *	1.0E-3					1.7E+2					1.7E+2	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA Tool Kit for Chemical Releases, Version 2.6

Site Name: Former Tecumseh Products Company Site Job ID: Property 27 Current Building Scenario
Location: Property 27 Date: 11-Jan-16
Compl. By: Emily Sokol

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs ?

COC Select: Add/Insert, Delete
Sort List: Top, Bottom, MoveUp, MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone (Enter Directly / Enter Site Data) (mg/L)	note	Soil Source Zone (Enter Directly / Enter Site Data) (mg/kg)	note	Mole Fraction in Source Material (-)
Trichloroethylene	5.7E-2	B-10			
Dichloroethylene, cis-1,2-	1.0E-3	B-10			
Tetrachloroethylene	1.0E-3	B-10			
Vinyl chloride	1.0E-3	B-10			
Dichloroethylene, 1,1-	1.0E-3	B-10			

View Chemical Parameters

Chemicals in orange have parameters that differ from the current User Chemcial Database.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 27

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Property 27

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	7.85			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.41			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.08	0.08	(-)
θ_a	Volumetric air content	0.041	0.33	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	7.9			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	5.5	(m)
A_b	Foundation area	NA	4366	(m^2)
X_{crk}	Foundation perimeter	NA	329	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.0000754	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	8.01013E-05	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	7.3	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	460	(m)
S_d	Depth of groundwater source zone	7.3	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

On-site P-building

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Completed By: Emily Sokol
Job ID: P-building exisiting scenario
Site Location: P-building
Date Completed: 12-Jan-16

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (12 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	Commercial	None	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0				2.6E+0						2.6E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0				9.3E+1						9.3E+1	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0				3.2E+1						3.2E+1	☐	<1
75-01-4	Vinyl chloride *	0.0E+0				2.8E+0						2.8E+0	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0				9.4E+1						9.4E+1	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA Tool Kit for Chemical Releases, Version 2.6

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: P-building

Completed By: Emily Sokol
Date Completed: 12-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	250	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	Commercial	None	None
Soil Leaching to Groundwater Volatilization	Commercial	None	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	0	NA	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: P-building

Completed By: Emily Sokol
Date Completed: 12-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	6.05			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.41			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.08	0.08	(-)
θ_a	Volumetric air content	0.041	0.33	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	6.1			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	5.5	(m)
A_b	Foundation area	NA	15017.8	(m^2)
X_{crk}	Foundation perimeter	NA	562.4	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.2	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.2	(m)
η	Foundation crack fraction	NA	0.0000374	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	0.00013031	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	7.6	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	NA	(m)
S_d	Depth of groundwater source zone	NA	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	NA	(-)
pH_{sat}	Groundwater pH	NA	(-)
	Biodegradation considered?	NA	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	NA	NA	(m)
α_y	Transverse dispersivity	NA	NA	NA	NA	(m)
α_z	Vertical dispersivity	NA	NA	NA	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Attachment 4
Model Summary Sheets – Future Non-Residential Buildings

Geographic Area 1

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 1

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					1.3E+0					1.3E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					4.0E+1					4.0E+1	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					2.0E+1					2.0E+1	☐	<1
75-01-4	Vinyl chloride *	0.0E+0					1.4E+0					1.4E+0	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					4.9E+1					4.9E+1	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 1

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 1

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	6.05			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.41			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.08	0.08	(-)
θ_a	Volumetric air content	0.041	0.33	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	6.1			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	2.44	(m)
A_b	Foundation area	NA	464.5	(m^2)
X_{crk}	Foundation perimeter	NA	91.44	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.000197	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.22633E-05	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	7.6	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	518	(m)
S_d	Depth of groundwater source zone	7.6	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Geographic Area 2

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 2

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					1.3E+0					1.3E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					3.9E+1					3.9E+1	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					1.9E+1					1.9E+1	☐	<1
75-01-4	Vinyl chloride *	0.0E+0					1.3E+0					1.3E+0	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					4.8E+1					4.8E+1	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 2

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 2

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	4.55			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.41			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.08	0.08	(-)
θ_a	Volumetric air content	0.041	0.33	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	4.6			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	2.44	(m)
A_b	Foundation area	NA	464.5	(m^2)
X_{crk}	Foundation perimeter	NA	91.44	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.000197	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.22633E-05	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	8.313698347	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	183	(m)
S_d	Depth of groundwater source zone	8.313698347	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Geographic Area 3
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 3

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					1.3E+0					1.3E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					3.9E+1					3.9E+1	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					1.9E+1					1.9E+1	☐	<1
75-01-4	Vinyl chloride *	0.0E+0					1.3E+0					1.3E+0	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					4.8E+1					4.8E+1	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 3

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 3

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	4.55			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.41			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.08	0.08	(-)
θ_a	Volumetric air content	0.041	0.33	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	4.6			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	2.44	(m)
A_b	Foundation area	NA	464.5	(m^2)
X_{crk}	Foundation perimeter	NA	91.44	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.000197	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.22633E-05	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	6.1	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	183	(m)
S_d	Depth of groundwater source zone	6.1	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Geographic Area 4

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 4

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					6.0E+0					6.0E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					2.1E+2					2.1E+2	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					7.6E+1					7.6E+1	☐	<1
75-01-4	Vinyl chloride *	0.0E+0					6.2E+0					6.2E+0	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					2.2E+2					2.2E+2	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 4

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 4

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.09			(m)
h_v	Vadose zone thickness	4.51			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.41			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.12	0.08	(-)
θ_a	Volumetric air content	0.041	0.29	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	86.4			(cm/d)
k_v	Vapor permeability	1E-13			(m^2)
L_{gw}	Depth to groundwater	4.6			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	2.44	(m)
A_b	Foundation area	NA	464.5	(m^2)
X_{crk}	Foundation perimeter	NA	91.44	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.15	(m)
η	Foundation crack fraction	NA	0.000197	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.22633E-06	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	7.6	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	183	(m)
S_d	Depth of groundwater source zone	7.6	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Geographic Area 5
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 5

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					2.0E+1					2.0E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					6.1E+2					6.1E+2	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	0.0E+0					1.6E+1					1.6E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					6.3E+2					6.3E+2	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 5

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 5

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	2.19			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	2.4			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	2.44	(m)
A_b	Foundation area	NA	464.5	(m^2)
X_{crk}	Foundation perimeter	NA	91.44	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.152	(m)
η	Foundation crack fraction	NA	0.000197	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.22117E-08	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	5.5	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	183	(m)
S_d	Depth of groundwater source zone	5.5	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Geographic Area 6

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 6

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					1.3E+0					1.3E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					3.7E+1					3.7E+1	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					1.9E+1					1.9E+1	☐	<1
75-01-4	Vinyl chloride *	0.0E+0					1.3E+0					1.3E+0	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					4.7E+1					4.7E+1	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA Tool Kit for Chemical Releases, Version 2.6

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 6

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 6

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	2.65			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.41			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.08	0.08	(-)
θ_a	Volumetric air content	0.041	0.33	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	2.7			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	2.44	(m)
A_b	Foundation area	NA	464.5	(m^2)
X_{crk}	Foundation perimeter	NA	91.44	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.152	(m)
η	Foundation crack fraction	NA	0.000197	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.22117E-05	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	8.28635744	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	189	(m)
S_d	Depth of groundwater source zone	8.28635744	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.3	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

Geographic Area 7
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 7

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					2.0E+1					2.0E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					6.1E+2					6.1E+2	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	0.0E+0					1.6E+1					1.6E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					6.2E+2					6.2E+2	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 7

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 7

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	1.89			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	2.1			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	2.44	(m)
A_b	Foundation area	NA	464.5	(m^2)
X_{crk}	Foundation perimeter	NA	91.44	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.152	(m)
η	Foundation crack fraction	NA	0.000197	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.22117E-08	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	4.890072266	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	28.735	(cm/d)
V_{gw}	Groundwater seepage velocity	89.51713396	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.035	(-)
S_w	Width of groundwater source zone	189	(m)
S_d	Depth of groundwater source zone	4.890072266	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Geographic Area 8
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 8

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					1.4E+0					1.4E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					4.2E+1					4.2E+1	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					2.1E+1					2.1E+1	☐	<1
75-01-4	Vinyl chloride *	0.0E+0					1.4E+0					1.4E+0	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					5.1E+1					5.1E+1	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 8

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 8

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	8.75			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.41			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.08	0.08	(-)
θ_a	Volumetric air content	0.041	0.33	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	8.8			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	2.44	(m)
A_b	Foundation area	NA	464.5	(m^2)
X_{crk}	Foundation perimeter	NA	91.44	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.152	(m)
η	Foundation crack fraction	NA	0.000197	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.22117E-05	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	2.4	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	2.0525	(cm/d)
V_{gw}	Groundwater seepage velocity	6.394080997	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.0025	(-)
S_w	Width of groundwater source zone	189	(m)
S_d	Depth of groundwater source zone	2.4	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

Geographic Area 9
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 9

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Commercial	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					2.2E+1					2.2E+1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					6.7E+2					6.7E+2	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					>2.1E+2					>2.1E+2	☐	NA
75-01-4	Vinyl chloride *	0.0E+0					1.7E+1					1.7E+1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					6.8E+2					6.8E+2	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 9

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Commercial	None
Soil Leaching to Groundwater Volatilization	None	Commercial	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: Geological Area 9

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	8.89			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	9.1			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	2.44	(m)
A_b	Foundation area	NA	464.5	(m^2)
X_{crk}	Foundation perimeter	NA	91.44	(m)
ER	Building air exchange rate	NA	0.000417	(1/s)
L_{crk}	Foundation thickness	NA	0.15	(m)
Z_{crk}	Depth to bottom of foundation slab	NA	0.152	(m)
η	Foundation crack fraction	NA	0.000197	(-)
dP	Indoor/outdoor differential pressure	NA	40	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	2.22117E-08	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	NA	0.08	(-)
θ_{acrack}	Volumetric air content of cracks	NA	0.33	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	3	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	2.0525	(cm/d)
V_{gw}	Groundwater seepage velocity	6.394080997	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.0025	(-)
S_w	Width of groundwater source zone	189	(m)
S_d	Depth of groundwater source zone	3	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	0.0E+0	NA	(m)
α_y	Transverse dispersivity	NA	NA	0.0E+0	NA	(m)
α_z	Vertical dispersivity	NA	NA	0.0E+0	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

Attachment 5
Model Summary Sheets – Future Residential Buildings

Geographic Area 1 residential

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: GEO1b residential (north 1)

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario-Property GEO 1 residential

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Residential	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					1.3E-1					1.3E-1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					3.9E+0					3.9E+0	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					2.0E+0					2.0E+0	☐	<1
75-01-4	Vinyl chloride *	0.0E+0					1.1E-1					1.1E-1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					4.9E+0					4.9E+0	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: GEO1b residential (north 1)

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Residential	None
Soil Leaching to Groundwater Volatilization	None	Residential	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA Tool Kit for Chemical Releases, Version 2.6

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: GEO1b residential (north 1)

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	***6.05***			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	***0.0037***			(-)
θ_T	Soil total porosity	***0.41***			(-)
		capillary	**vadose**	**foundation**	
θ_w	Volumetric water content	***0.369***	***0.08***	***0.08***	(-)
θ_a	Volumetric air content	***0.041***	***0.33***	***0.33***	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	***6.1***			(m)
pH	Soil/groundwater pH	***7.13***			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	***3.66***	NA	(m)
A_b	Foundation area	***120***	NA	(m^2)
X_{crk}	Foundation perimeter	***44***	NA	(m)
ER	Building air exchange rate	***0.000125***	NA	(1/s)
L_{crk}	Foundation thickness	***0.1***	NA	(m)
Z_{crk}	Depth to bottom of foundation slab	***2***	NA	(m)
η	Foundation crack fraction	***0.0002***	NA	(-)
dP	Indoor/outdoor differential pressure	***40***	NA	(g/cm/s^2)
Q_s	Convective air flow through slab	***6.86459E-06***	NA	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	***0.08***	NA	(-)
θ_{acrack}	Volumetric air content of cracks	***0.33***	NA	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	***7.6***	(m)
I_f	Net groundwater infiltration rate	***30***	(cm/yr)
U_{gw}	Groundwater Darcy velocity	***0.821***	(cm/d)
V_{gw}	Groundwater seepage velocity	***2.557632399***	(cm/d)
K_s	Saturated hydraulic conductivity	***821***	(cm/d)
i	Groundwater gradient	***0.001***	(-)
S_w	Width of groundwater source zone	***183***	(m)
S_d	Depth of groundwater source zone	***7.6***	(m)
θ_{eff}	Effective porosity in water-bearing unit	***0.321***	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	***0.0037***	(-)
pH_{sat}	Groundwater pH	***7.13***	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		**Groundwater Ingestion**		**Groundwater to Indoor Air**		
α_x	Longitudinal dispersivity	NA	NA	1.0E-1	NA	(m)
α_y	Transverse dispersivity	NA	NA	3.3E-2	NA	(m)
α_z	Vertical dispersivity	NA	NA	5.0E-3	NA	(m)
Lateral Outdoor Air Transport		**Soil to Outdoor Air Inhal.**		**GW to Outdoor Air Inhal.**		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Geographic Area 2 residential

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: GEO 2 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario-Property GEO 2 residential

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Residential	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					1.3E-1					1.3E-1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					3.8E+0					3.8E+0	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					2.0E+0					2.0E+0	☐	<1
75-01-4	Vinyl chloride *	0.0E+0					1.1E-1					1.1E-1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					4.8E+0					4.8E+0	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: GEO 2 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Residential	None
Soil Leaching to Groundwater Volatilization	None	Residential	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: GEO 2 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	4.55			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.41			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.08	0.08	(-)
θ_a	Volumetric air content	0.041	0.33	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	4.6			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	3.66	NA	(m)
A_b	Foundation area	120	NA	(m^2)
X_{crk}	Foundation perimeter	44	NA	(m)
ER	Building air exchange rate	0.000125	NA	(1/s)
L_{crk}	Foundation thickness	0.1	NA	(m)
Z_{crk}	Depth to bottom of foundation slab	2	NA	(m)
η	Foundation crack fraction	0.0002	NA	(-)
dP	Indoor/outdoor differential pressure	40	NA	(g/cm/s^2)
Q_s	Convective air flow through slab	6.86459E-06	NA	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	0.08	NA	(-)
θ_{acrack}	Volumetric air content of cracks	0.33	NA	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	8.313698347	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	183	(m)
S_d	Depth of groundwater source zone	8.313698347	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	1.0E-1	NA	(m)
α_y	Transverse dispersivity	NA	NA	3.3E-2	NA	(m)
α_z	Vertical dispersivity	NA	NA	5.0E-3	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Geographic Area 3 residential
Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: GEO 3 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario-Property GEO 3 residential

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Residential	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					1.6E+0					1.6E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					4.8E+1					4.8E+1	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					2.6E+1					2.6E+1	☐	<1
75-01-4	Vinyl chloride *	0.0E+0					1.1E+0					1.1E+0	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					5.1E+1					5.1E+1	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: GEO 3 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Residential	None
Soil Leaching to Groundwater Volatilization	None	Residential	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: GEO 3 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	4.39			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	4.6			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	3.66	NA	(m)
A_b	Foundation area	120	NA	(m^2)
X_{crk}	Foundation perimeter	44	NA	(m)
ER	Building air exchange rate	0.000125	NA	(1/s)
L_{crk}	Foundation thickness	0.1	NA	(m)
Z_{crk}	Depth to bottom of foundation slab	2	NA	(m)
η	Foundation crack fraction	0.0002	NA	(-)
dP	Indoor/outdoor differential pressure	40	NA	(g/cm/s^2)
Q_s	Convective air flow through slab	6.86459E-09	NA	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	0.08	NA	(-)
θ_{acrack}	Volumetric air content of cracks	0.33	NA	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	6.1	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	0.821	(cm/d)
V_{gw}	Groundwater seepage velocity	2.557632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.001	(-)
S_w	Width of groundwater source zone	183	(m)
S_d	Depth of groundwater source zone	6.1	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	1.0E-1	NA	(m)
α_y	Transverse dispersivity	NA	NA	3.3E-2	NA	(m)
α_z	Vertical dispersivity	NA	NA	5.0E-3	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

Geographic Area 7 residential

Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: East 1 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario-Property east 1

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (1 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Residential	None	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					1.0E+0					1.0E+0	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					2.9E+1					2.9E+1	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					1.6E+1					1.6E+1	☐	<1
75-01-4	Vinyl chloride *	0.0E+0					7.0E-1					7.0E-1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					3.3E+1					3.3E+1	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: East 1 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	***83***	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Residential	None
Soil Leaching to Groundwater Volatilization	None	Residential	None

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	1	NA	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable
Orange = Site-specific value (different from current default value)

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: East 1 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.21			(m)
h_v	Vadose zone thickness	1.89			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.38			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.23	0.08	(-)
θ_a	Volumetric air content	0.038	0.15	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	0.864			(cm/d)
k_v	Vapor permeability	1E-15			(m^2)
L_{gw}	Depth to groundwater	2.1			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	3.66	NA	(m)
A_b	Foundation area	120	NA	(m^2)
X_{crk}	Foundation perimeter	44	NA	(m)
ER	Building air exchange rate	0.000125	NA	(1/s)
L_{crk}	Foundation thickness	0.1	NA	(m)
Z_{crk}	Depth to bottom of foundation slab	0.1	NA	(m)
η	Foundation crack fraction	0.00038	NA	(-)
dP	Indoor/outdoor differential pressure	40	NA	(g/cm/s^2)
Q_s	Convective air flow through slab	1.16095E-08	NA	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	0.08	NA	(-)
θ_{acrack}	Volumetric air content of cracks	0.33	NA	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	5.200409554	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	8.21	(cm/d)
V_{gw}	Groundwater seepage velocity	25.57632399	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.01	(-)
S_w	Width of groundwater source zone	195	(m)
S_d	Depth of groundwater source zone	5.200409554	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	1.0E-1	NA	(m)
α_y	Transverse dispersivity	NA	NA	3.3E-2	NA	(m)
α_z	Vertical dispersivity	NA	NA	5.0E-3	NA	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Geographic Area 8 residential Groundwater Clean-Up Levels

RBCA SITE ASSESSMENT

Site Name: Former Tecumseh Products Company Site
Site Location: East 2 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Job ID: Future Building Scenario-Property east 2

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option: Domenico - No Decay
(One-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways (Checked if Pathway is Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	☐ Groundwater Ingestion / Discharge to Surface Water			■ Groundwater Volatilization to Indoor Air			☐ Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)	On-site (0 m)	Off-site 1 (200 m)	Off-site 2 (1 m)	On-site (0 m)	Off-site 1 (0 m)	Off-site 2 (0 m)			Only if "yes" left
CAS No.	**Name**	(mg/L)	None	None	None	None	Residential	Residential	None	None	None	(mg/L)	"■" if yes	
79-01-6	Trichloroethylene *	0.0E+0					1.8E+0	1.4E-1				1.4E-1	☐	<1
156-59-2	Dichloroethylene, cis-1,2- *	0.0E+0					5.2E+1	4.1E+0				4.1E+0	☐	<1
127-18-4	Tetrachloroethylene *	0.0E+0					2.7E+1	2.1E+0				2.1E+0	☐	<1
75-01-4	Vinyl chloride *	0.0E+0					1.5E+0	1.2E-1				1.2E-1	☐	<1
75-35-4	Dichloroethylene, 1,1- *	0.0E+0					6.5E+1	5.1E+0				5.1E+0	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: East 2 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Exposure Parameters		Residential				Commercial/Industrial		User Defined
		Child*	Adolescent	Adult	Age Adjusted**	Adult	Construct.	
ATc	Averaging time for carcinogens (yr)	70	70	70	NA	70	70	-
ATn	Averaging time for non-carcinogens (yr)	6	12	30	NA	25	1	-
BW	Body weight (kg)	15	35	70	NA	70	70	-
ED	Exposure duration (yr)	6	12	30	NA	25	1	-
τ	Averaging time for vapor flux (yr)	30	30	30	NA	30	30	-
EF	Exposure frequency (days/yr)	350	350	350	NA	250	180	-
EFD	Exposure frequency for dermal exposure	350	350	350	NA	250	180	-
IRw	Ingestion rate of water (L/day)	1	1	2	2.5	1	NA	-
IRs	Ingestion rate of soil (mg/day)	200	200	100	387	50	100	-
SA	Skin surface area (dermal) (cm^2)	2023	2023	3160	4771	3160	3160	-
M	Soil to skin adherence factor	0.5	0.5	0.5	NA	0.5	0.5	-
ETswim	Swimming exposure time (hr/event)	1	3	3	NA	NA	NA	NA
EVswim	Swimming event frequency (events/yr)	12	12	12	NA	NA	NA	NA
IRswim	Water ingestion while swimming (L/hr)	0.5	0.5	0.05	0.3	NA	NA	NA
SAswim	Skin surface area for swimming (cm^2)	3500	8100	23000	15680	NA	NA	NA
IRfish	Ingestion rate of fish (kg/yr)	0.025	0.025	0.025	0.053	NA	NA	NA
FIfish	Contaminated fish fraction (unitless)	1	1	1	NA	NA	NA	NA
IRbg	Below-ground vegetable ingestion	0.002	0.002	0.006	2.053	NA	NA	NA
IRabg	Above-ground vegetable ingestion	0.001	0.001	0.002	0.887	NA	NA	NA
VGbg	Above-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA
VGabg	Below-ground Veg. Ingest. Correction Factor	0.01	0.01	0.01	NA	NA	NA	NA

* = Child Receptor used for Non-Carcinogens
** = Age-adjusted rate is effective value corresponding to adult exposure factors.

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Apply MCL Values	No	No	No
Applicable Surface Water Exposure Routes:			
Swimming	NA	NA	None
Fish Consumption	NA	NA	None
Aquatic Life Protection	NA	NA	None
Soil:			
Direct Contact: direct combined pathways	None	NA	NA
Apply CLEA- UK SGV levels		No	
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Soils	None	NA	NA
Volatilization from Groundwater	None	Residential	Residential
Soil Leaching to Groundwater Volatilization	None	Residential	Residential

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(m)
Outdoor air inhalation receptor	NA	NA	NA	(m)
Indoor air inhalation receptor	NA	200	1	(m)

Target Health Risk Values		Individual	Cumulative
TR	Target Risk (carcinogens)	1.0E-5	1.0E-5
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	NA
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	ASTM leaching model
Use soil attenuation model (SAM) for leachate?	No
Use dual equilibrium desorption model?	No
Apply Mass Balance Limit for Soil Volatilization?	No
Apply UK (CLEA) SGV as soil concentration limit	No
Vegetable calculation options	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Tecumseh Products Company Site
Site Location: East 2 residential

Completed By: Emily Sokol
Date Completed: 11-Jan-16

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	0.05			(m)
h_v	Vadose zone thickness	8.75			(m)
ρ_s	Soil bulk density	1.7			(g/cm^3)
f_{oc}	Fraction organic carbon	0.0037			(-)
θ_T	Soil total porosity	0.41			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.369	0.08	0.08	(-)
θ_a	Volumetric air content	0.041	0.33	0.33	(-)
K_{vs}	Vertical hydraulic conductivity	864			(cm/d)
k_v	Vapor permeability	1E-12			(m^2)
L_{gw}	Depth to groundwater	8.8			(m)
pH	Soil/groundwater pH	7.13			(-)
W	Length of source-zone area parallel to wind	NA			(m)
W_{gw}	Length of source-zone area parallel to GW flow	45			(m)
L_{ss}	Thickness of affected surface soils	NA			(m)
A	Source zone area	NA			(m^2)
L_s	Depth to top of affected soils	NA			(m)
L_{base}	Depth to base of affected soils	NA			(m)
L_{subs}	Thickness of affected soils	NA			(m)

Outdoor Air Parameters		Value	(Units)
U_{air}	Ambient air velocity in mixing zone	NA	(m/s)
δ_{air}	Air mixing zone height	NA	(m)
Q/C	Inverse mean concentration at the center of source	NA	
P_a	Areal particulate emission rate	NA	(g/cm^2/s)
V	Fraction of vegetative cover	NA	
U_m	Mean annual airvelocity at 7m	NA	
U_t	Equivalent 7m air velocity threshold value	NA	
F(x)	Windspeed function dependant on Um/Ut	NA	
PEF	Partculate Emission Factor	NA	

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	3.66	NA	(m)
A_b	Foundation area	120	NA	(m^2)
X_{crk}	Foundation perimeter	44	NA	(m)
ER	Building air exchange rate	0.000125	NA	(1/s)
L_{crk}	Foundation thickness	0.1	NA	(m)
Z_{crk}	Depth to bottom of foundation slab	2	NA	(m)
η	Foundation crack fraction	0.0002	NA	(-)
dP	Indoor/outdoor differential pressure	40	NA	(g/cm/s^2)
Q_s	Convective air flow through slab	6.86459E-06	NA	(m^3/s)
θ_{wcrack}	Volumetric water content of cracks	0.08	NA	(-)
θ_{acrack}	Volumetric air content of cracks	0.33	NA	(-)
BV	Building Volume	NA	NA	(m^3)
w	Building Width Perpendicular to GW flow	NA	NA	(m)
L	Building Length Parallel to GW flow	NA	NA	(m)
ν	Saturated Soil Zone Porosity	NA	NA	(-)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	2.1	(m)
I_f	Net groundwater infiltration rate	30	(cm/yr)
U_{gw}	Groundwater Darcy velocity	2.0525	(cm/d)
V_{gw}	Groundwater seepage velocity	6.394080997	(cm/d)
K_s	Saturated hydraulic conductivity	821	(cm/d)
i	Groundwater gradient	0.0025	(-)
S_w	Width of groundwater source zone	195	(m)
S_d	Depth of groundwater source zone	2.1	(m)
θ_{eff}	Effective porosity in water-bearing unit	0.321	(-)
$f_{oc\text{-}sat}$	Fraction organic carbon in water-bearing unit	0.0037	(-)
pH_{sat}	Groundwater pH	7.13	(-)
	Biodegradation considered?	No	

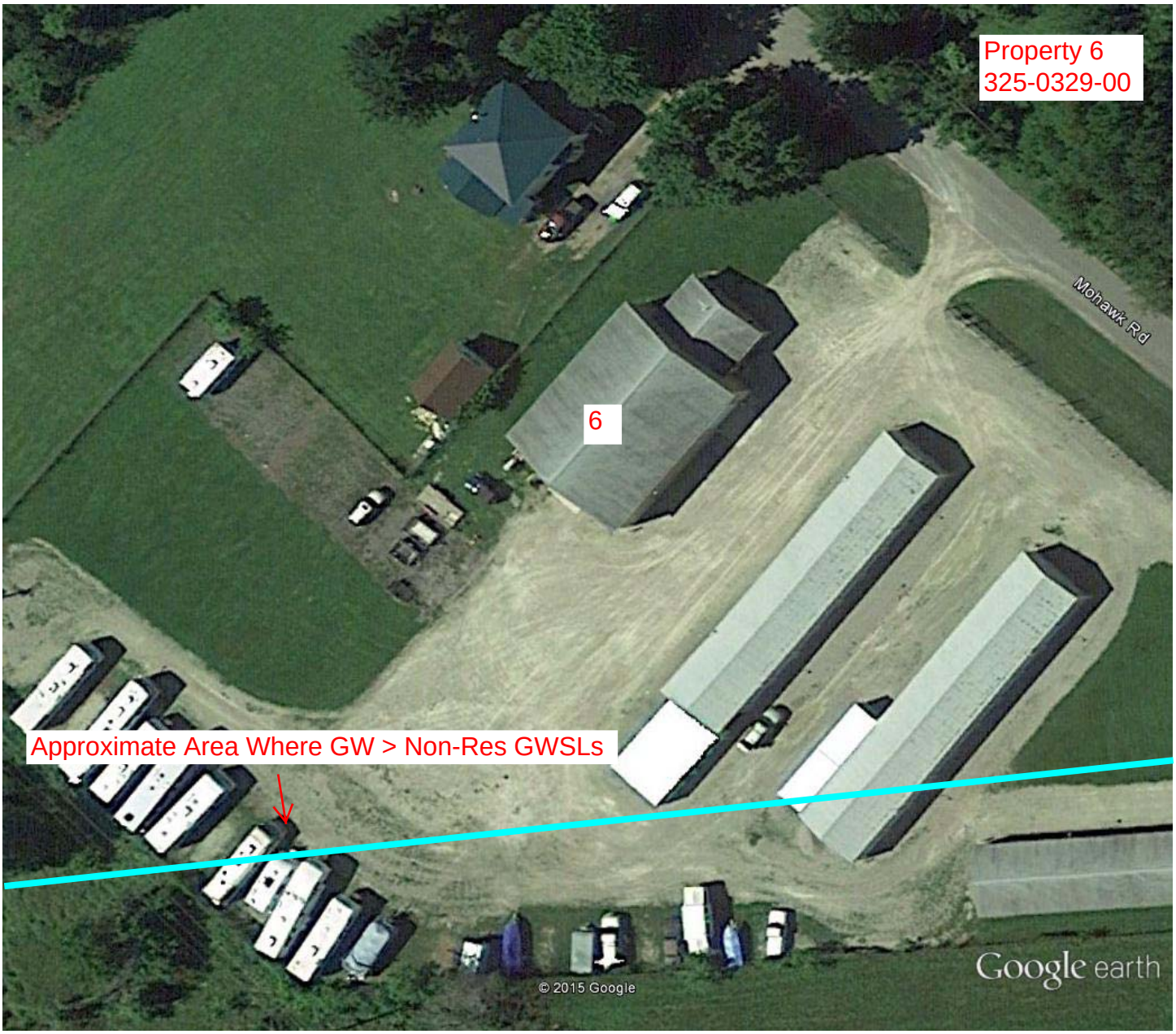
Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Groundwater to Indoor Air		
α_x	Longitudinal dispersivity	NA	NA	2.0E+1	1.0E-1	(m)
α_y	Transverse dispersivity	NA	NA	6.6E+0	3.3E-2	(m)
α_z	Vertical dispersivity	NA	NA	1.0E+0	5.0E-3	(m)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(m)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(m)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(m^3/s)
W_{pi}	Width of GW plume at SW discharge	NA	(m)
δ_{pi}	Thickness of GW plume at SW discharge	NA	(m)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

Orange = Site-specific value (different from current default value)

Attachment 6
Supporting Documentation for Existing Building Input Parameters



Google earth

feet 200
meters 60

Property 6

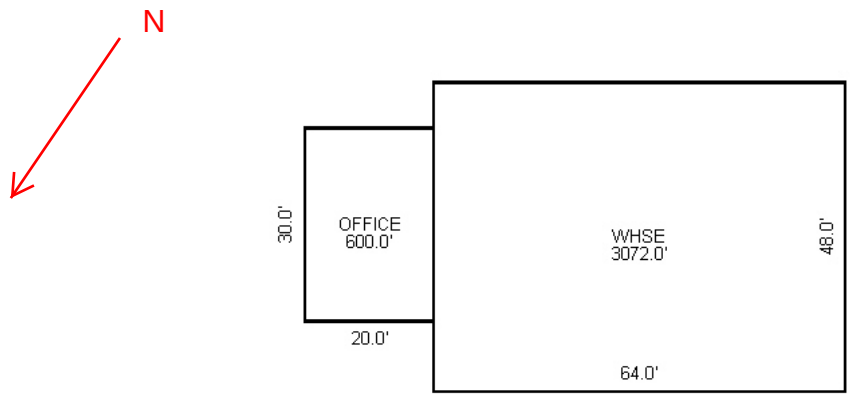
Image/Sketch for Parcel: XT0-325-0329-00

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 6

Image/Sketch for Parcel: XT0-325-0328-00



Sketch by Apex IV™

**Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 6

800 MOHAWK ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-325-0329-00

Item **1** of **2** 1 Image / 1 Sketch

Property Owner: TECUMSEH SELF STORAGE LLC

Summary Information

> Commercial/Industrial Building Summary
- Yr Built: 1999
- # of Buildings: 2
- Total Sq.Ft.: 3,672

> Property Tax Information found

> Assessed Value: $80,500 | Taxable Value: $79,959

> 2 Building Department records found across 1 property

Owner and Taxpayer Information

Owner	TECUMSEH SELF STORAGE LLC 500 W KILBUCK ST TECUMSEH, MI 49286	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	COMMERCIAL	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$80,500
MAP #	*Not Available*	**Taxable Value**	$79,959
ACTS/CHGS	0	**State Equalized Value**	$80,500
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	09/07/2006
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date *Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$78,700	$78,700	$78,700
2013	$79,000	$79,000	$79,000
2012	$80,400	$80,400	$80,400

Land Information

Zoning Code	I-C	**Total Acres**	1.090
Land Value	$29,200	**Land Improvements**	$6,897
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	COMM OTHER NEW	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	*Not Available*	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

PART LOT 32 DESC AS COMM 277.58 FT SE OF NE COR SD LOT TH S 46D 23M E 100 FT TH S 43D 37M W 327 FT TH N 46D 23M W 196 FT TH N 43D 37M E 156 FT TH S 46D 23M E 96 FT TH N 43D 37M E 171 FT TO POB ASSRS PLAT #6 CITY OF TECUMSEH

Land Division Act Information

Date of Last Split/Combine	*Not Available*	**Number of Splits Left**	0
Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0
Date Created	*Not Available*	**Unallocated Div.s Transferred**	0

Property 6

Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*
Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	*Not Available*		

Sale History

Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
08/19/2006	$1.00	QC	MALLORY, DONALD D & LAURA J	TECUMSEH SELF STORAGE LLC	Quit Claim	2329/512	
04/30/1999	$135,000.00	WD	BROWN TRUST, WILLIAM D	MALLORY, DONALD D & LAURA J	Buyer on Roll/Old Sa	1638/183	
06/03/1996	$0.00	LC	BROWN, WILLIAM D	MALLORY, DONALD D & LAURA J	Affidavit/Memo LC	1416/907	
12/24/1993	$22,000.00	WD	BELAND, TERRANCE B & JEANNE M	BROWN, WILLIAM D	Buyer on Roll/Old Sa	1292/699	

Building Information - 3072.00 sq ft Warehouse, Storage (Commercial)

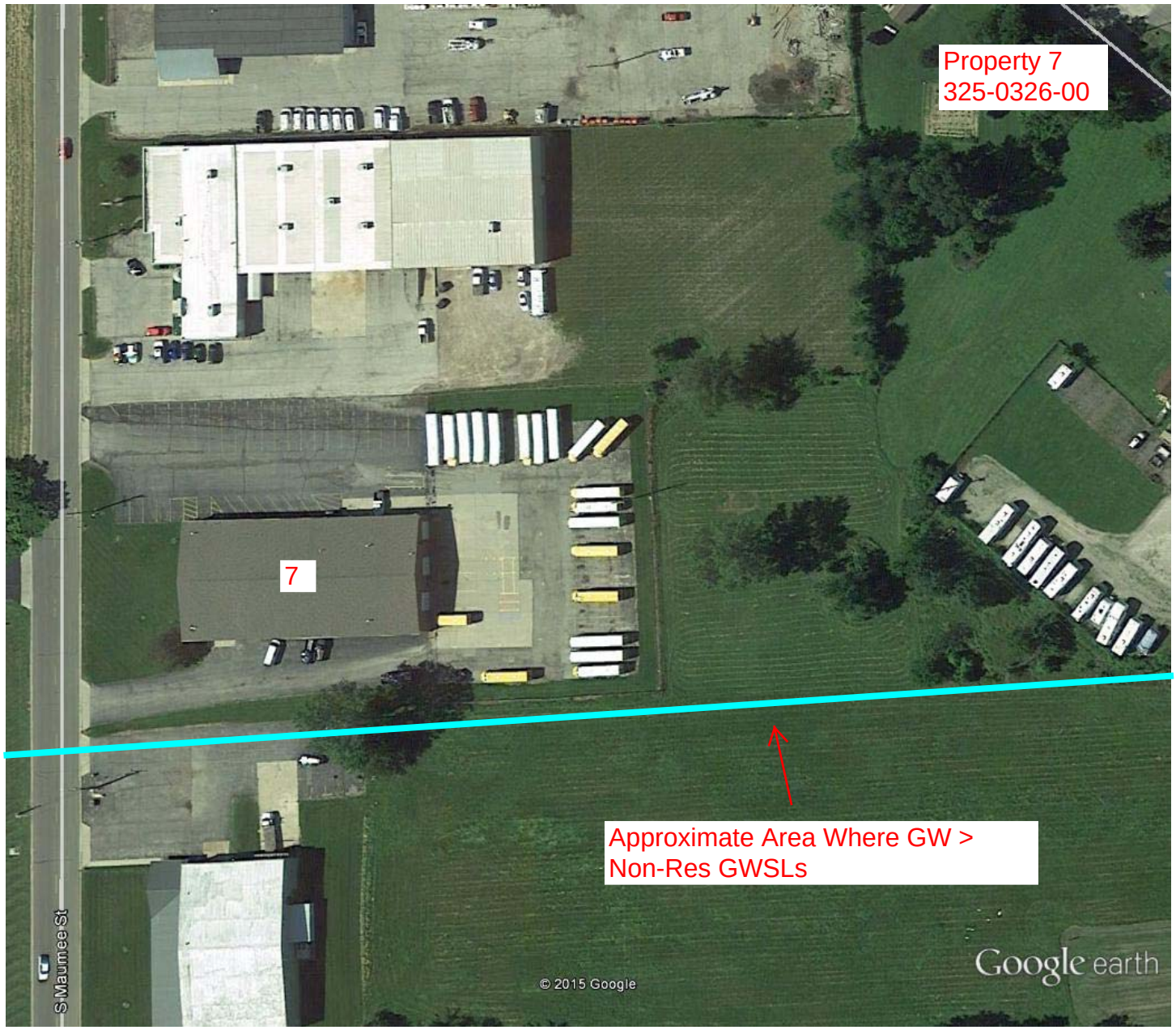
Floor Area	3,072 sq ft	**Estimated TCV**	$76,341
Occupancy	Warehouse, Storage	**Class**	D,Pole
Stories Above Ground	1	**Average Story Height**	16 ft
Basement Wall Height	*Not Available*		
Year Built	1999	**Year Remodeled**	*Not Available*
Percent Complete	0%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	65%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	17 yrs

Building Information - 600.00 sq ft Office Building (Commercial)

Floor Area	600 sq ft	**Estimated TCV**	$45,364
Occupancy	Office Building	**Class**	D,Pole
Stories Above Ground	1	**Average Story Height**	10 ft
Basement Wall Height	*Not Available*		
Year Built	1999	**Year Remodeled**	*Not Available*
Percent Complete	0%	**Heat**	Package Heating & Cooling
Physical Percent Good	65%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	17 yrs

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.



Google earth

feet 400

meters 100

Property 7

Image/Sketch for Parcel: XT0-325-0326-00

West Side of Building, along S. Maumee Street

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 7

700 S MAUMEE ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-325-0326-00

Item **1** of **2** 1 Image / 1 Sketch

Property Owner: TECUMSEH PUBLIC SCHOOLS

Summary Information

> Commercial/Industrial Building Summary
- Yr Built: 1970
- # of Buildings: 2
- Total Sq.Ft.: 15,172

> Property Tax Information found

> 1 Utility Billing Account found

> Assessed Value: $0 | Taxable Value: $0

> 3 Building Department records found across 1 property

Owner and Taxpayer Information

Owner	TECUMSEH PUBLIC SCHOOLS 212 N OTTAWA ST TECUMSEH, MI 49286	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	EXEMPT	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$0
MAP #	*Not Available*	**Taxable Value**	$0
ACTS/CHGS	0	**State Equalized Value**	$0
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	11/17/2003
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date *Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$0	$0	$0
2013	$0	$0	$0
2012	$0	$0	$0

Land Information

Zoning Code	I-1	**Total Acres**	0.000
Land Value	$0	**Land Improvements**	$1,131
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	100 EXEMPT ALL	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	*Not Available*	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

PART OF LOT 32 BEG 30 FT E AND 504 FT S OF NW COR OF LOT 32 TH E 592 FT TH S 39 FT TH SE'LY 231 FT TH S 20 FT TH W 768 FT TH N 244 FT TO POB ASSESS PLAT NO 6 CITY OF TECUMSEH

Land Division Act Information

Date of Last Split/Combine	*Not Available*	**Number of Splits Left**	0
Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0
Date Created	*Not Available*	**Unallocated Div.s Transferred**	0

Property 7

Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*
Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	*Not Available*		

Sale History

Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
05/23/1986	$110,000.00	WD	SISSON, GWENDOLYN R	TECUMSEH PUBLIC SCHOOLS	Arms-Length	1014/969	

Building Information - 8266.00 sq ft Garage, Service/Repair Shed (Commercial)

Floor Area	8,266 sq ft	**Estimated TCV**	$77,252
Occupancy	Garage, Service/Repair Shed	**Class**	D,Pole
Stories Above Ground	1	**Average Story Height**	18 ft
Basement Wall Height	*Not Available*		
Year Built	1970	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Heaters, Vented
Physical Percent Good	35%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	34 yrs

Building Information - 6906.00 sq ft Garage, Service/Repair Shed (Commercial)

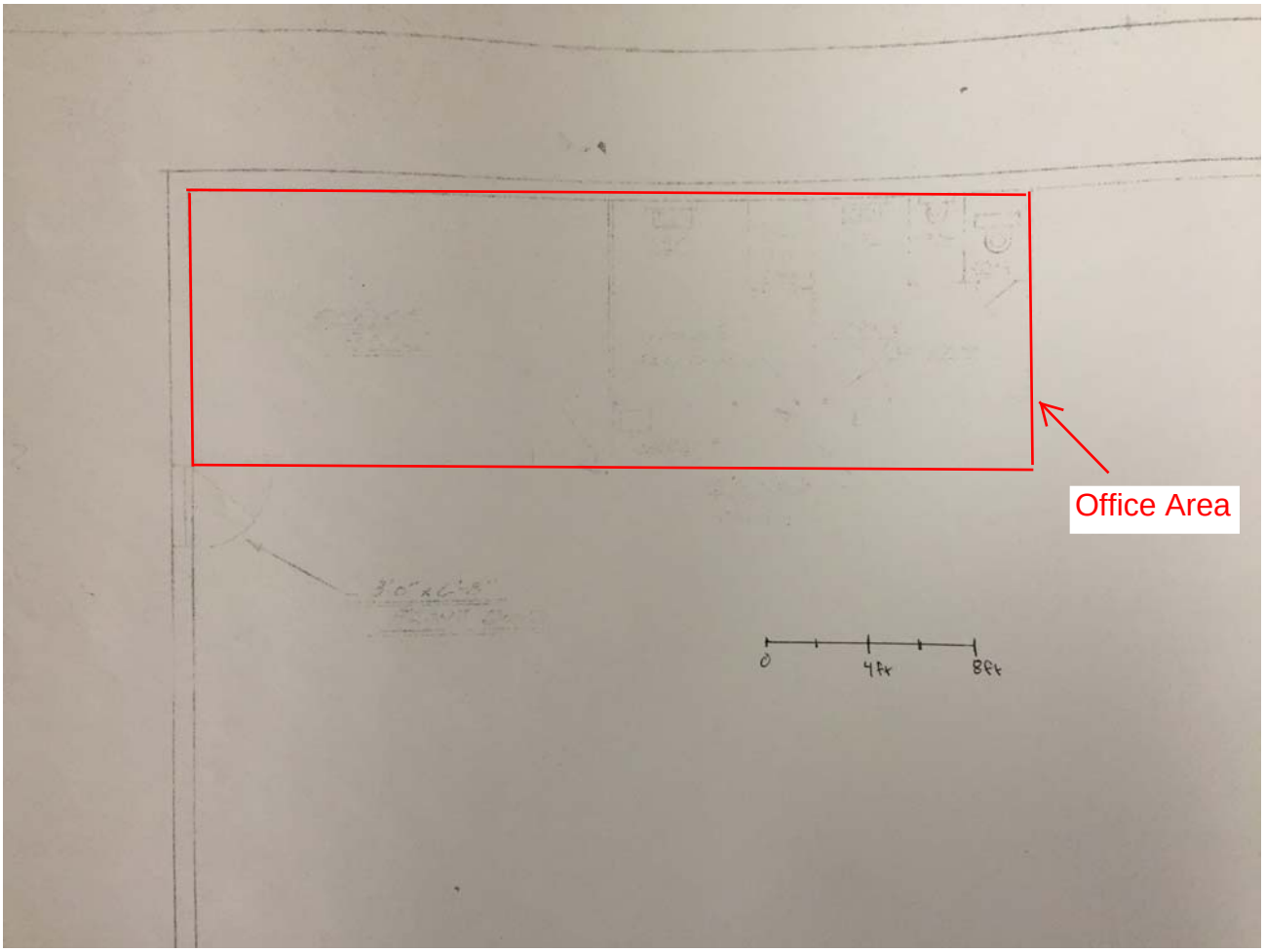
Floor Area	6,906 sq ft	**Estimated TCV**	$54,251
Occupancy	Garage, Service/Repair Shed	**Class**	D,Pole
Stories Above Ground	1	**Average Story Height**	18 ft
Basement Wall Height	*Not Available*		
Year Built	1977	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	No Heating or Cooling
Physical Percent Good	35%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	34 yrs

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

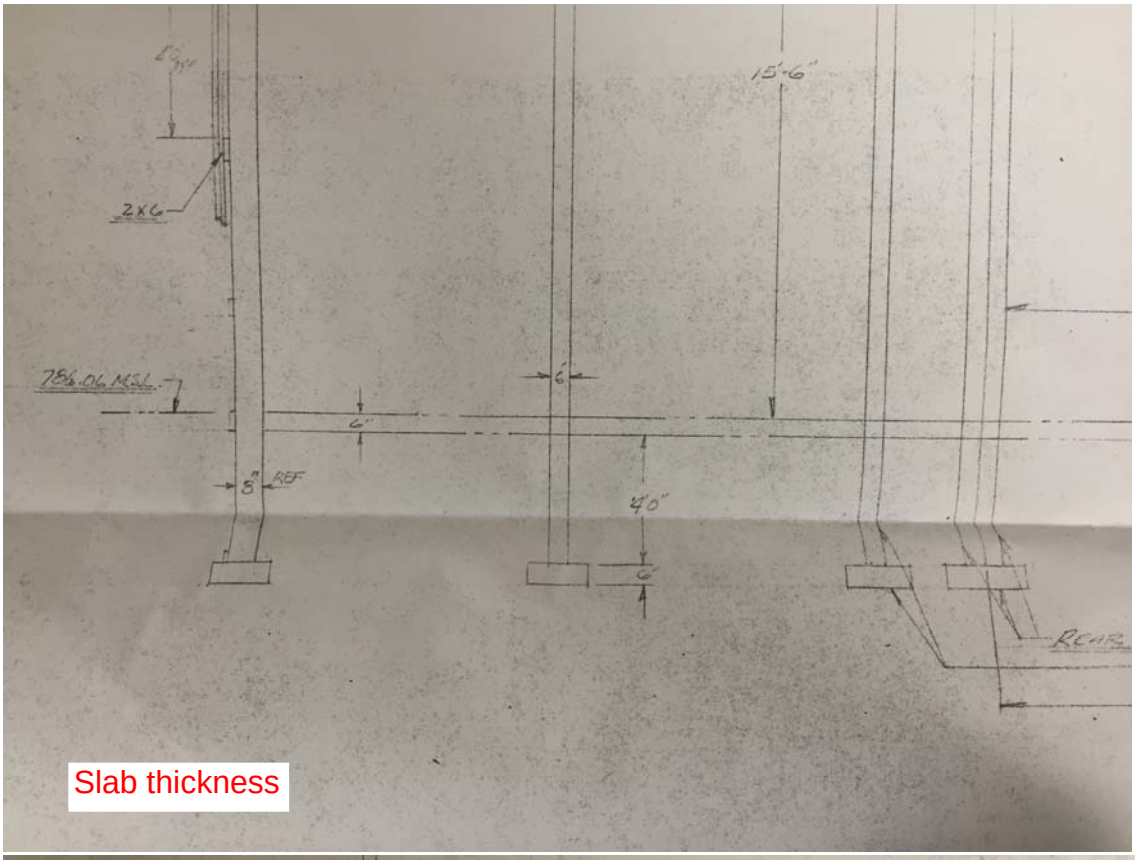
Property 7

Floor plan Blueprints

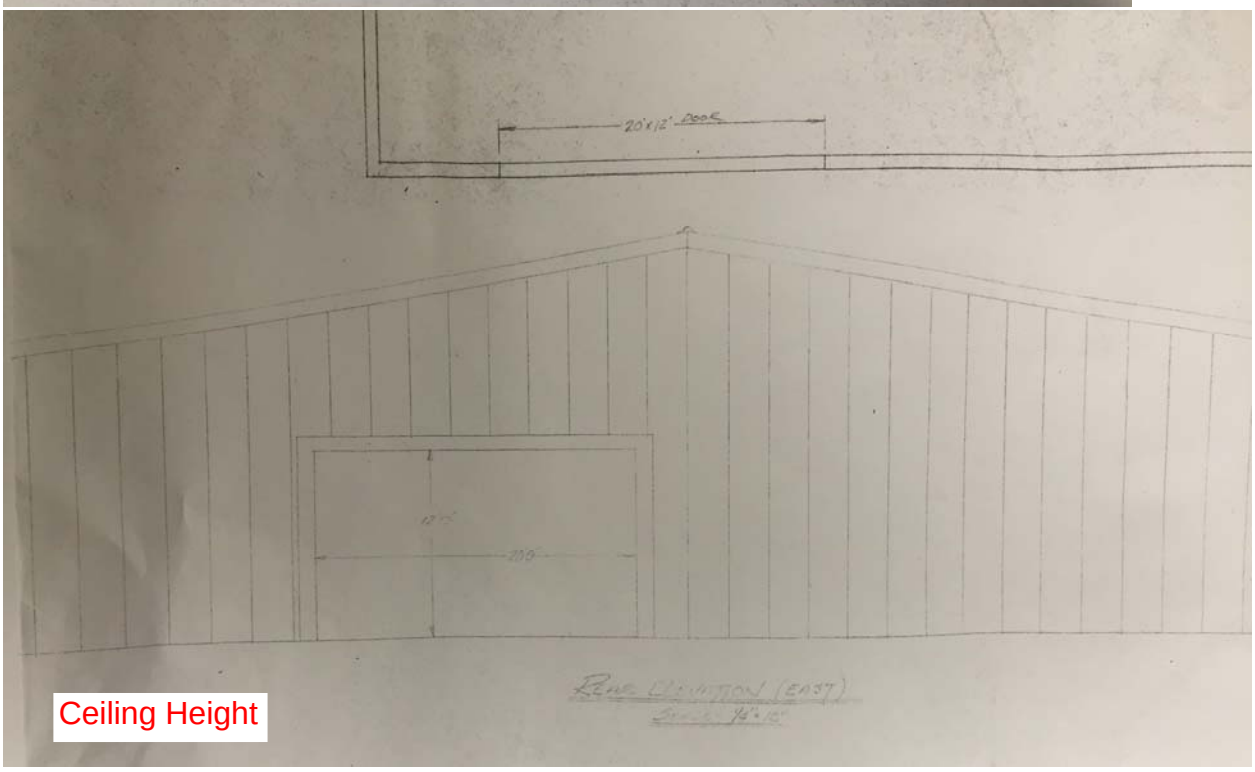


All blueprint were provided by the City of Tecumseh

Property 7
Blueprints

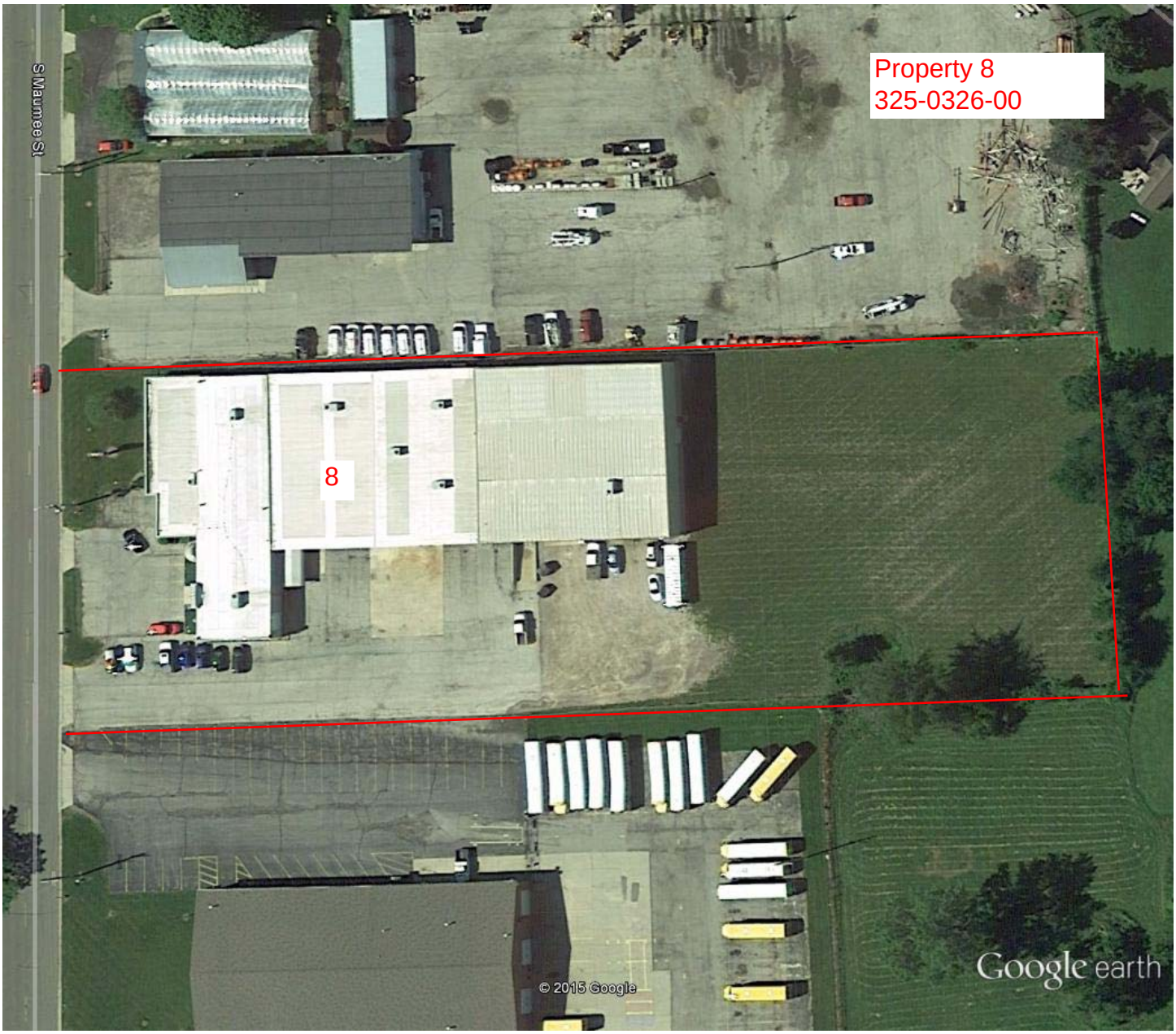


Slab thickness



Ceiling Height

All blueprint were provided by the City of Tecumseh



Google earth

feet 300
meters 100

Property 8

Image/Sketch for Parcel: XT0-325-0325-00

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 8

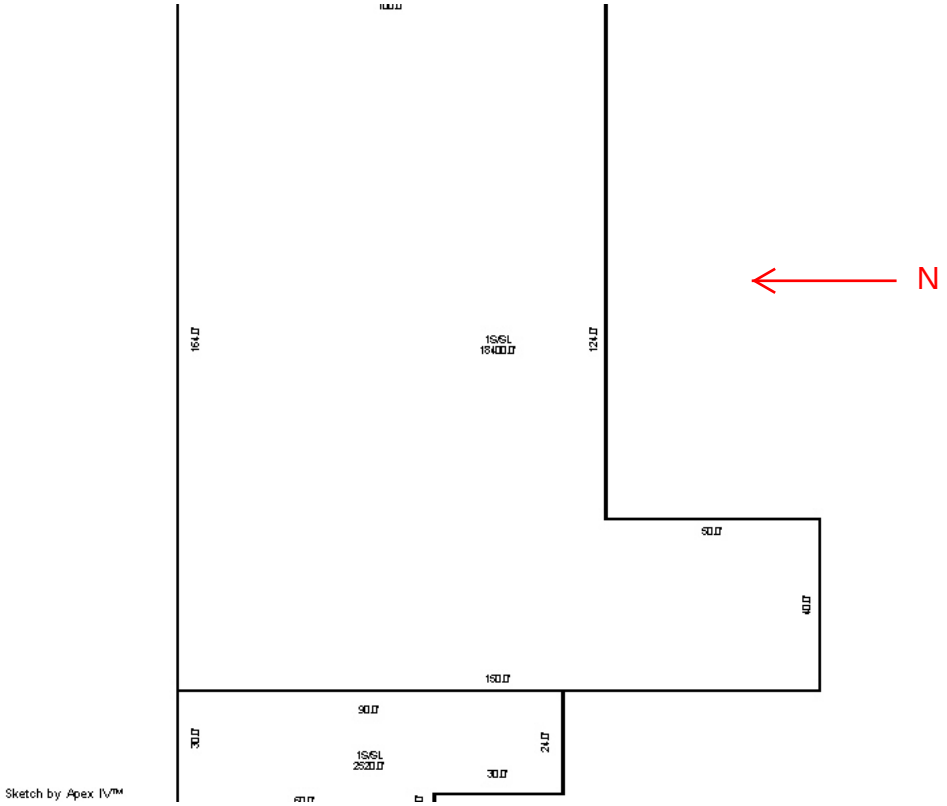
Image/Sketch for Parcel: XT0-325-0325-00

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 8

Image/Sketch for Parcel: XT0-325-0325-00



Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 8

610 S MAUMEE ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-325-0325-00

Item **1** of **4** 2 Images / 2 Sketches

Property Owner: DCD IDID REALTY, LLC

Summary Information

> Commercial/Industrial Building Summary
- Yr Built: 1960
- # of Buildings: 3
- Total Sq.Ft.: 33,190

> Property Tax Information found

> 1 Utility Billing Account found

> Assessed Value: $355,200 | Taxable Value: $355,200

> 32 Building Department records found across 1 property

Owner and Taxpayer Information

Owner	DCD IDID REALTY, LLC 117 W FERRY ST BERRIEN SPRINGS, MI 49103	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	INDUSTRIAL	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$355,200
MAP #	*Not Available*	**Taxable Value**	$355,200
ACTS/CHGS	0	**State Equalized Value**	$355,200
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	08/19/2015
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date *Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$357,600	$357,600	$357,600
2013	$194,000	$194,000	$194,000
2012	$212,000	$212,000	$212,000

Land Information

Zoning Code	I-1	**Total Acres**	2.700
Land Value	$39,600	**Land Improvements**	$22,776
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	IND OLDER	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	*Not Available*	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

COMM 30 FT S 89° 36' E & 304 FT S 0° 15' W OF NW COR LOT 32 TH S 89° 36' E 352 FT TH S 0° 15' W 200 FT TH N 89° 36' W 352 FT TH N 0° 15' E 200 TO POB ALSO THAT PART OF LOT 32 DESC AS BEG AT S 1/4 COR SEC 34 TH N 89D 5M 44S W 333.67 FT ALG S LI SD SEC 34 TO N 1/4 COR SEC 3 TH N 23D 3M 21S E 802.57 FT ALG CTR MILL HWY TH N 46D 23M W 925.75 FT ALG CTR LI MOHAWK ST TH S 0D 5M 42S E 235.52 FT TO FURTH POB TH S 0D 5M 42S E 203.39 FT TH N 89D 34M 52S W 239.97 FT TH N 0D 17M 51S E 200.0 FT TH N 89D 37M 16S E 238.59 FT TO POB 1.11 ACRES ASSESS PLAT #6 CITY OF TECUMSEH

Land Division Act Information

Date of Last Split/Combine	*Not Available*	**Number of Splits Left**	0

Property 8

Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0
Date Created	*Not Available*	**Unallocated Div.s Transferred**	0
Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*
Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	*Not Available*		

Sale History

Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
07/23/2015	$650,000.00	WD	CALLISON LEASING CORPORATION	DCD IDID REALTY, LLC	Arms-Length	2511/0413	
07/19/2000	$550,000.00	WD	NOBLE LAND HOLDINGS INC	CALLISON LEASING CORPORATION	Arms-Length	1726/698	
04/19/1996	$11,500.00	WD	GTE NORTH INC	JEBCO MFG INC	Split	1422/182	

Building Information - 9190.00 sq ft Industrial, Light Manufacturing (Commercial)

Floor Area	9,190 sq ft	**Estimated TCV**	$430,762
Occupancy	Industrial, Light Manufacturing	**Class**	S
Stories Above Ground	1	**Average Story Height**	10 ft
Basement Wall Height	*Not Available*		
Year Built	1960	**Year Remodeled**	1978
Percent Complete	0%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	40%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	40 yrs

Building Information - 12000.00 sq ft Industrial, Light Manufacturing (Commercial)

Floor Area	12,000 sq ft	**Estimated TCV**	$105,540
Occupancy	Industrial, Light Manufacturing	**Class**	S
Stories Above Ground	1	**Average Story Height**	14 ft
Basement Wall Height	*Not Available*		
Year Built	1960	**Year Remodeled**	1978
Percent Complete	0%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	42%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	34 yrs

Building Information - 12000.00 sq ft Warehouse, Storage (Commercial)

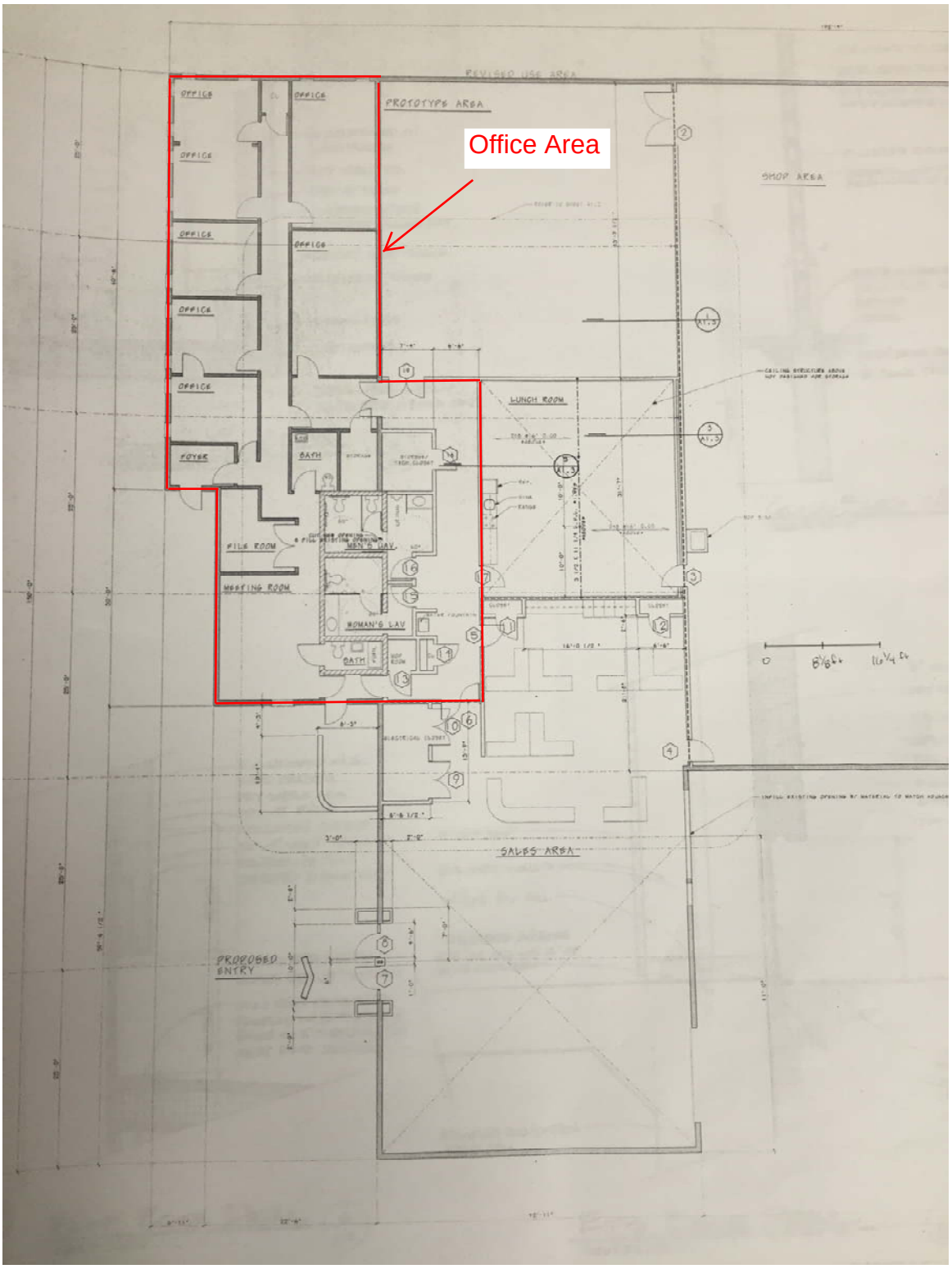
Floor Area	12,000 sq ft	**Estimated TCV**	$101,517
Occupancy	Warehouse, Storage	**Class**	C
Stories Above Ground	0	**Average Story Height**	0 ft
Basement Wall Height	*Not Available*		
Year Built	*Not Available*	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	45%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	26 yrs

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

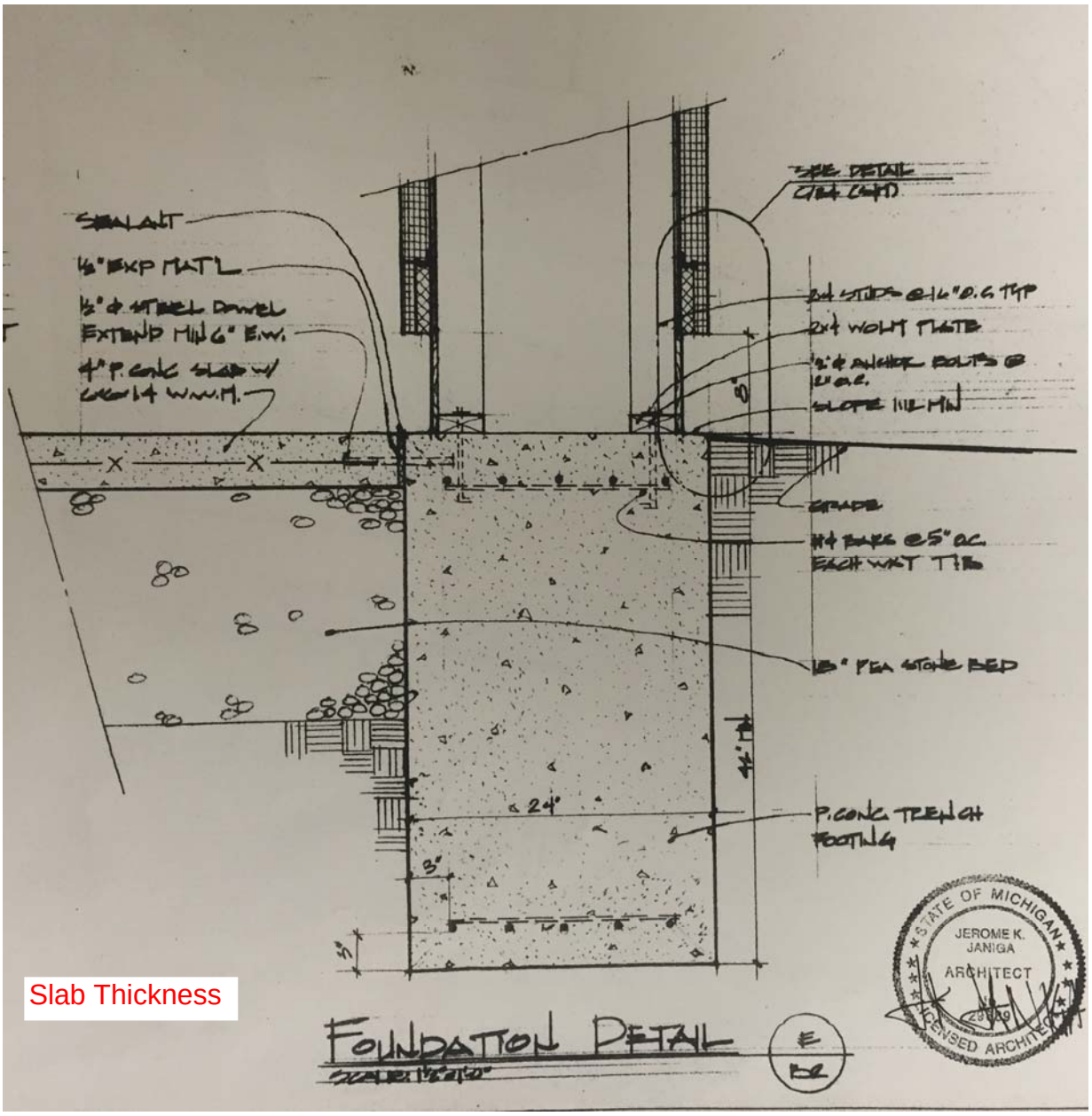
Property 8

Floor plan Blueprints



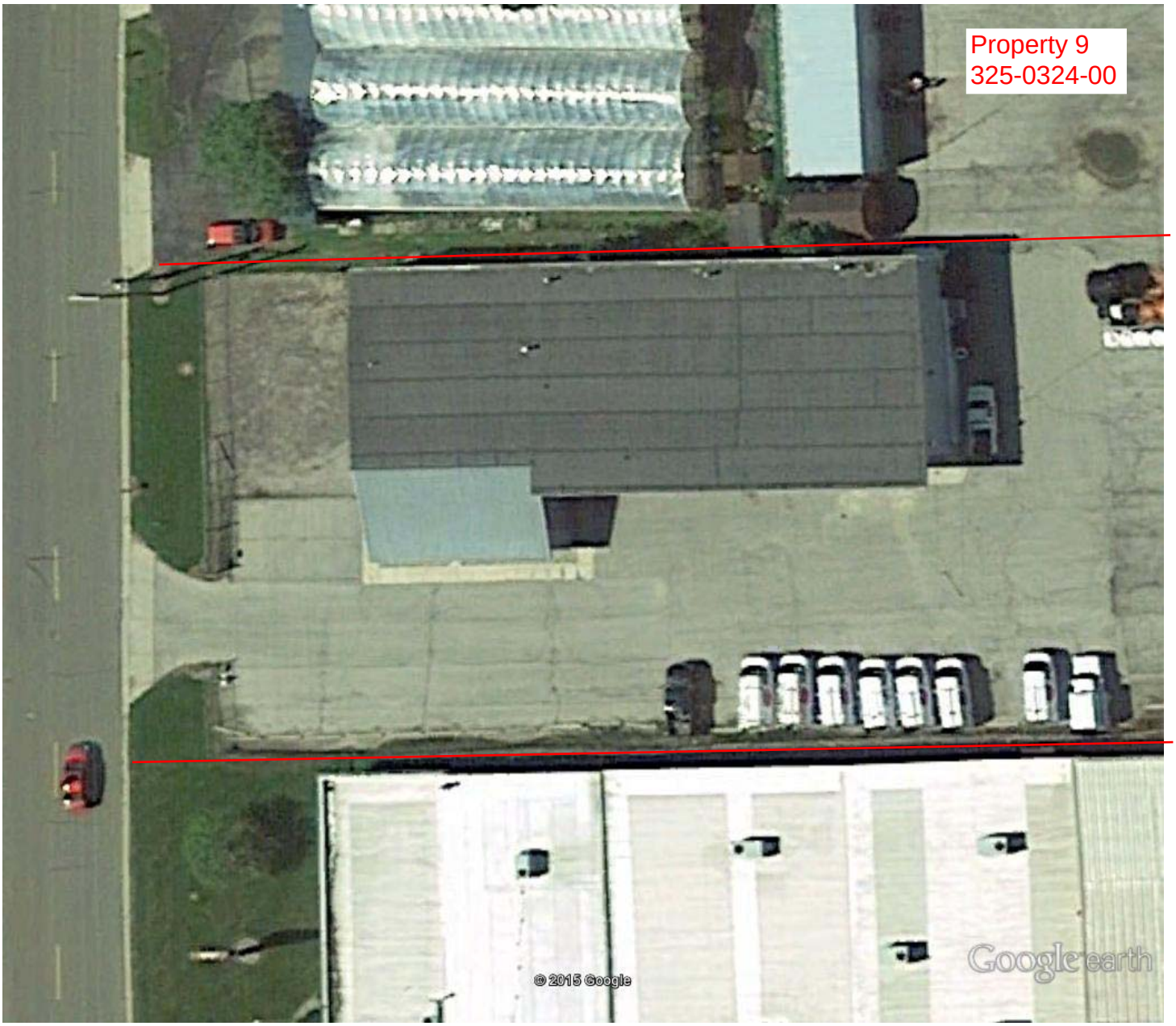
All blueprints were provided by the City of Tecumseh

Property 8



Slab Thickness

All blueprint were provided by the City of Tecumseh



Google earth

feet 100

meters 40

Property 9

Image/Sketch for Parcel: XT0-325-0324-00

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 9

Image/Sketch for Parcel: XT0-325-0324-00

**Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 9

Image/Sketch for Parcel: XT0-325-0324-00

**Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 9

606 S MAUMEE ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-325-0324-00

Item **1** of **4** 3 Images / 1 Sketch

Property Owner: G T E TELEPHONE OPER

Summary Information

> Assessed Value: $0 | Taxable Value: $0
> 6 Building Department records found across 1 property
> Property Tax Information found
> 1 Utility Billing Account found

Parcel is Vacant

Owner and Taxpayer Information

Owner	G T E TELEPHONE OPER BRENT BADEN 115 NORTH LYNN ST BRYAN, OH 43506	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	EXEMPT	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$0
MAP #	*Not Available*	**Taxable Value**	$0
ACTS/CHGS	0	**State Equalized Value**	$0
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	07/26/2011
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date *Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$0	$0	$0
2013	$0	$0	$0
2012	$0	$0	$0

Land Information

Zoning Code	I-1	**Total Acres**	0.000
Land Value	$0	**Land Improvements**	$0
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	100 EXEMPT ALL	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	*Not Available*	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

THAT PART OF LOT 32 DESC AS BEG AT A POINT LOC 30 FT S 89D 36M E AND 180 FT S 0D 15M W FROM NW COR SD LOT 32 TH RUNN S 89D 36M E 352 FT TH S 0D 15M W 124 FT TH N 89D 36M W 352 FT TO E LI MAUMEE ST TH N 0D 15M E 124 FT TO POB ASSESS PLAT #6 CITY OF TECUMSEH

Land Division Act Information

Property 9

Date of Last Split/Combine	*Not Available*	**Number of Splits Left**	0
Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0
Date Created	*Not Available*	**Unallocated Div.s Transferred**	0
Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*
Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	*Not Available*		

Sale History

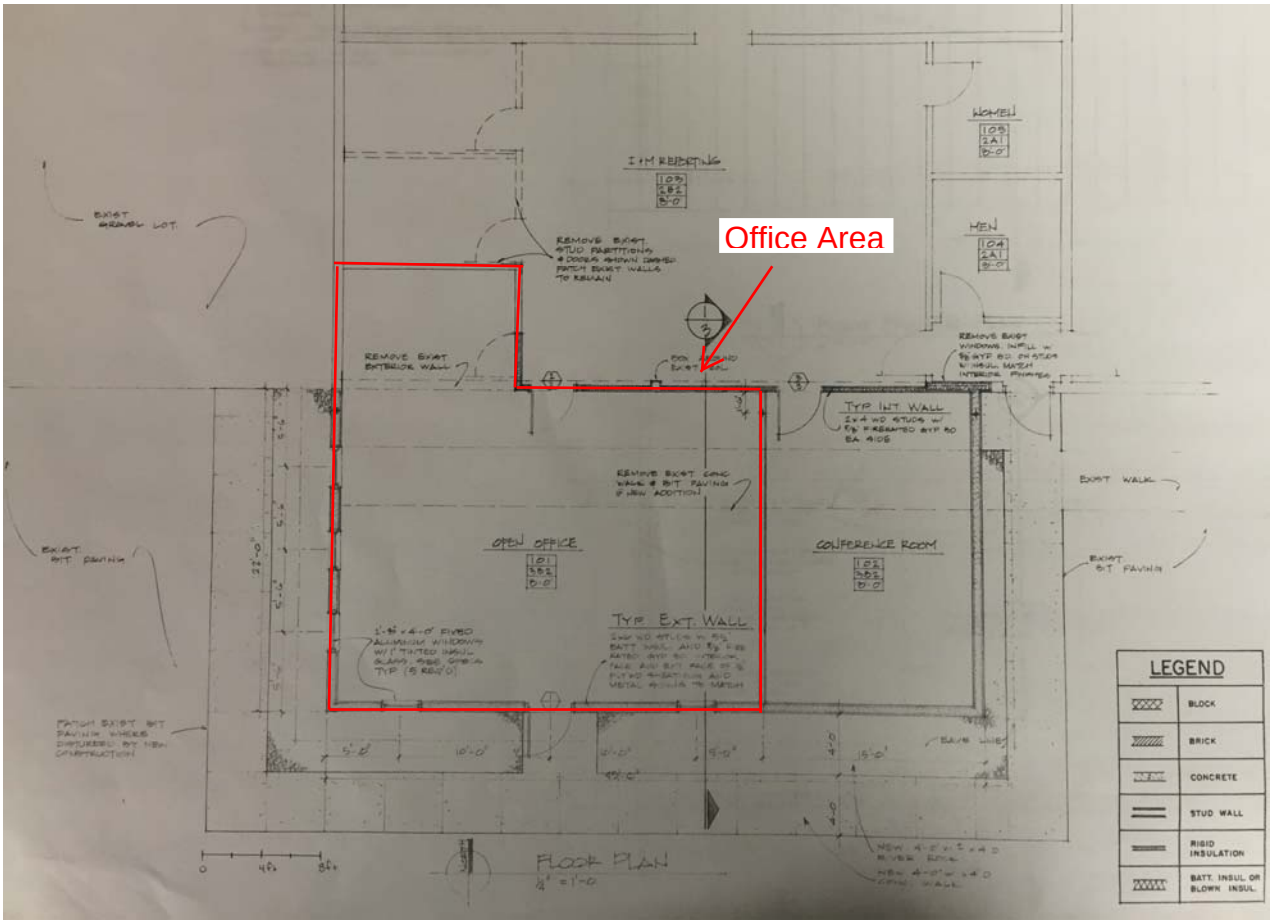
Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
No sales history found.							

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

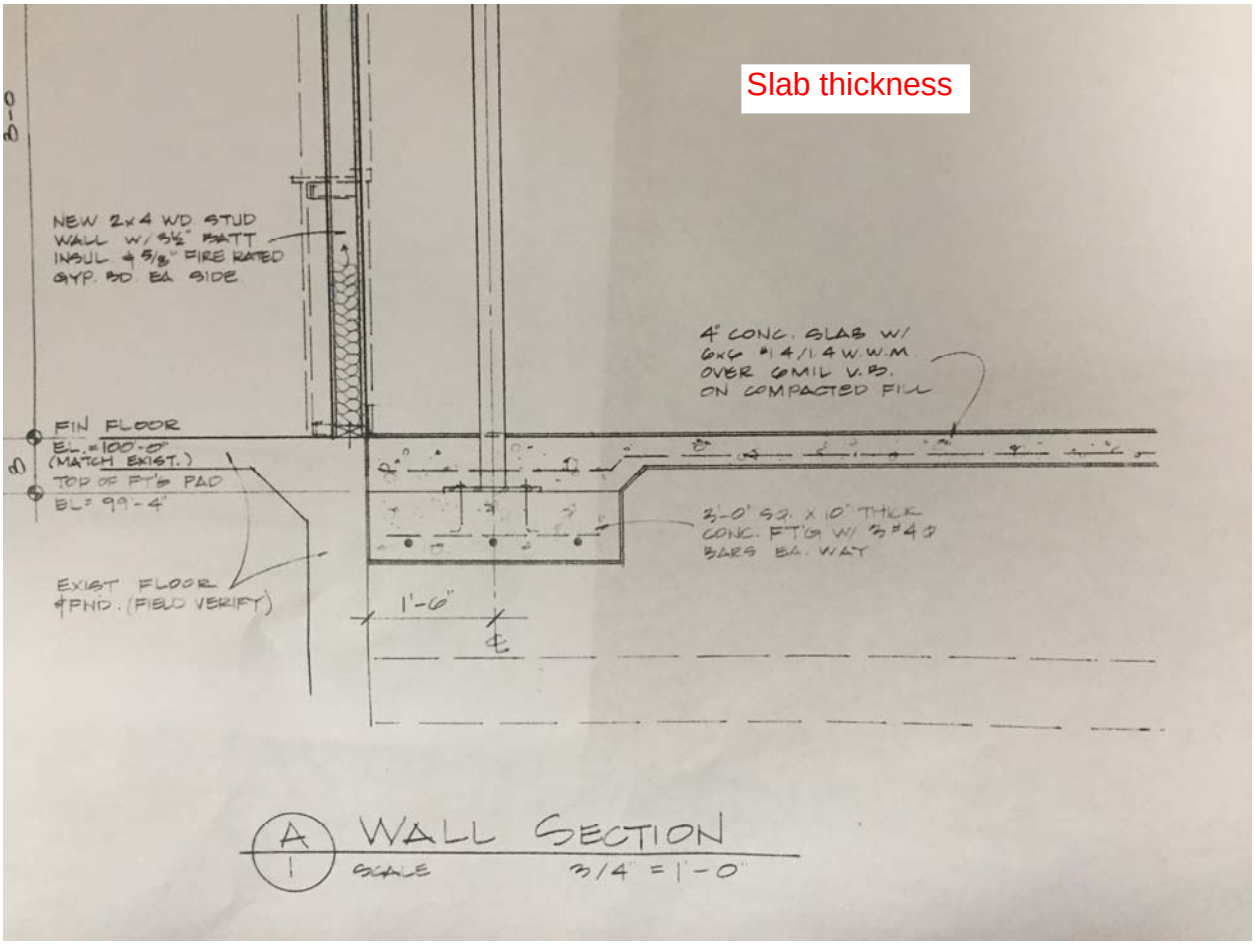
Property 9

Floor plan Blueprints

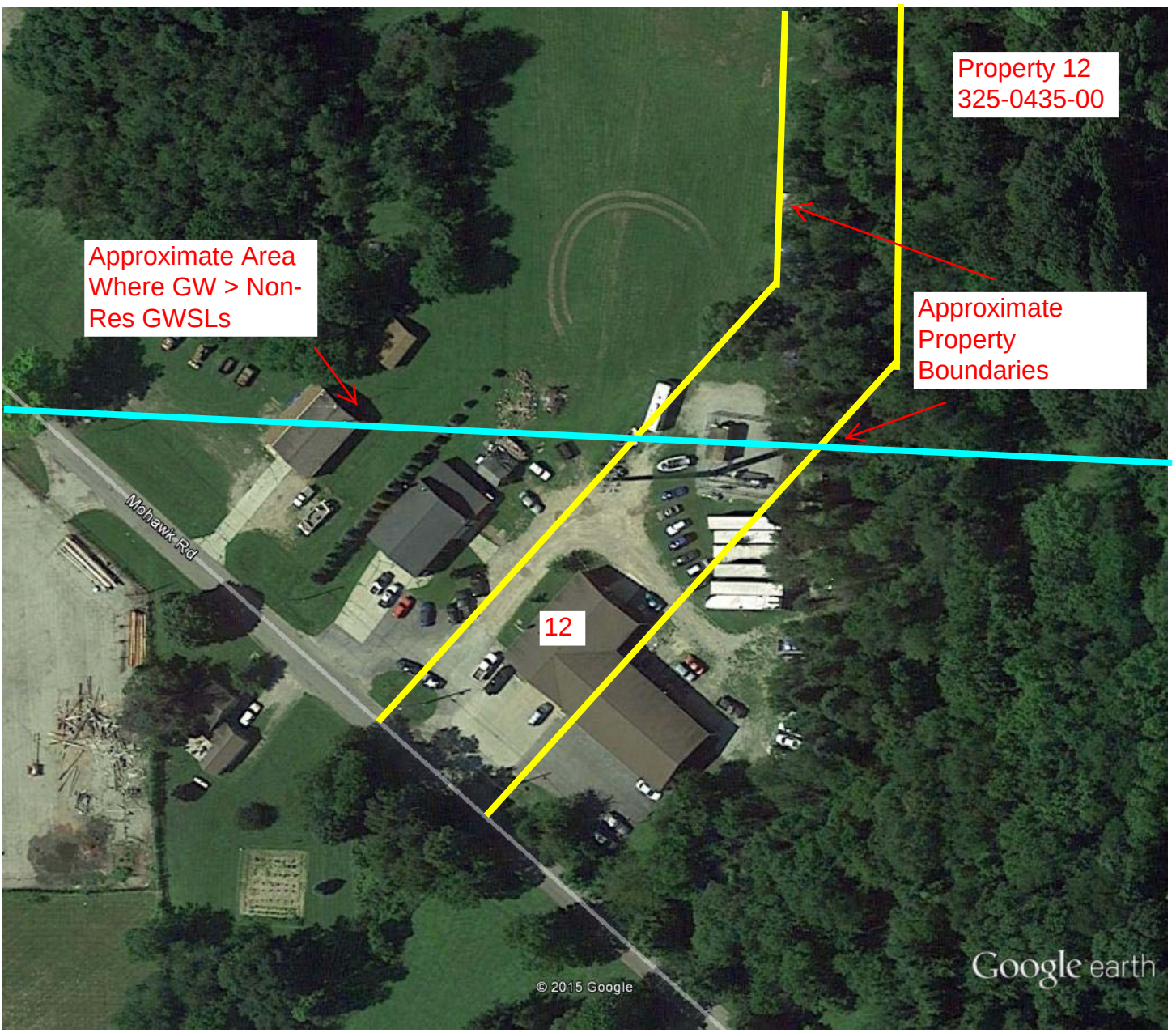


All blueprints were provided by the City of Tecumseh

Property 9



All blueprint were provided by the City of Tecumseh



Google earth

feet 300
meters 100

Property 12

Image/Sketch for Parcel: XT0-325-0435-00

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 12

Image/Sketch for Parcel: XT0-325-0435-00

**Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 12

Image/Sketch for Parcel: XT0-325-0435-00

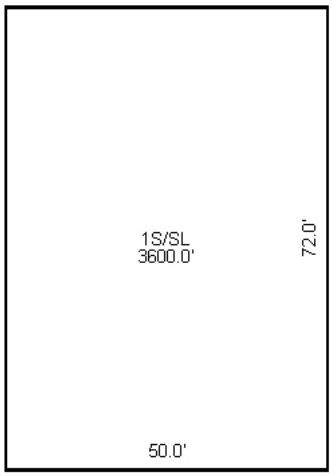
Southwest Side of Building, along Mohawk Street

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 12

Image/Sketch for Parcel: XT0-325-0435-00



Sketch by Apex IV™

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 12

615 MOHAWK ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-325-0435-00

Item **1** of **7** 5 Images / 2 Sketches

Property Owner: TECUMSEH ROAD SERVICE, LLC

Summary Information

> Commercial/Industrial Building Summary
- Yr Built: 1974
- # of Buildings: 2
- Total Sq.Ft.: 7,440

> Property Tax Information found

> 1 Utility Billing Account found

> Assessed Value: $90,600 | Taxable Value: $90,600

> 10 Building Department records found across 2 properties

Owner and Taxpayer Information

Owner	TECUMSEH ROAD SERVICE, LLC 615 MOHAWK ST TECUMSEH, MI 49286	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	COMMERCIAL	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$90,600
MAP #	*Not Available*	**Taxable Value**	$90,600
ACTS/CHGS	0	**State Equalized Value**	$90,600
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	06/08/2015
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date *Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$89,500	$89,500	$89,306
2013	$87,900	$87,900	$87,900
2012	$91,200	$91,200	$91,200

Land Information

Zoning Code	I-C	**Total Acres**	1.460
Land Value	$38,200	**Land Improvements**	$3,084
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	COMM OTHER OLDER	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	*Not Available*	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

THAT PART LOT 43 DESC AS BEG AT S 1/4 COR SEC 34 TH N 89D 04M 22S W 333.367 FT TO N 1/4 COR SEC 3 T6S R4E TH N 23D 04M 43S E 837.59 FT TH N 46D 23M W 627.19 FT ALG N'LY LI MOHAWK ST FOR FURTH POB TH N 46D 23M W 90 FT TH N 43D 37M E 263.23 FT TH N 0D 30M E 338.44 FT TH N 89D 01M 01S E 22.27 FT TH N 0D 18M E 86 FT TH S 85D 12M E 68.23 FT TH S 0D 30M W 455.46 FT TH S 43D 37M W 298.79 FT TO FURTH POB 1.448 ACRES ASSESSORS PLAT NO 6 CITY OF TECUMSEH

Land Division Act Information

Date of Last Split/Combine	*Not Available*	**Number of Splits Left**	0

Property 12

Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0
Date Created	*Not Available*	**Unallocated Div.s Transferred**	0
Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*
Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	*Not Available*		

Sale History

Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
05/29/2015	$0.00	AFF	TECUMSEH ROAD SERVICE, LLC &	TECUMSEH ROAD SERVICE, LLC	CONSTRUCTION AFTER	2508/0447	
12/12/2014	$1.00	QC	BIRCHFIELD, RONALD A & SHERRIE L	TECUMSEH ROAD SERVICE, LLC	QUIT CLAIM	2499/0282	
01/28/2014	$0.00	AFF	TECUMSEH ROAD SERVICE, LLC	TECUMSEH ROAD SERVICE, LLC &	Invalid Sale	2501/0869	
03/24/2011	$0.00	LC	TCO ASSETS LAND LLC	TOWERCO ASSETS LLC	Affidavit/Memo LC	2421/0254	
12/22/2010	$123,000.00	EAS	BIRCHFIELD, RONALD A & SHERRIE L	TCO ASSETS LAND LLC	Invalid Sale		TRANSFER AFFIDAVIT FOR EASEMEN
10/06/1999	$50,000.00	WD	BIRCHFIELD, SONDRA	BIRCHFIELD, RONALD A & SHERRIE L	Buyer on Roll/Old Sa	1672/26	1986 LC

Building Information - 3600.00 sq ft Warehouse, Storage (Commercial)

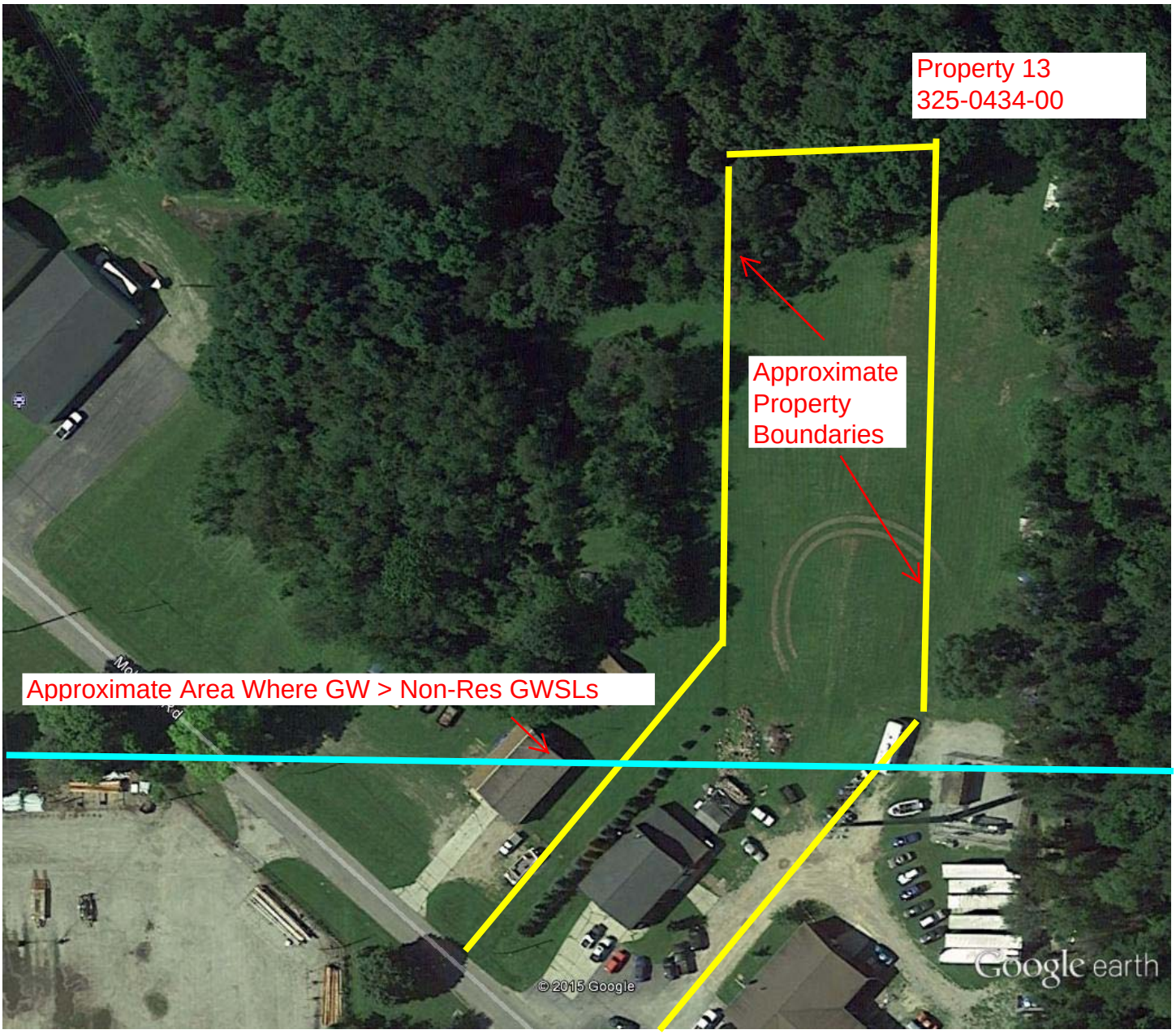
Floor Area	3,600 sq ft	**Estimated TCV**	$66,923
Occupancy	Warehouse, Storage	**Class**	D
Stories Above Ground	1	**Average Story Height**	14 ft
Basement Wall Height	*Not Available*		
Year Built	1974	**Year Remodeled**	*Not Available*
Percent Complete	0%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	40%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	40 yrs

Building Information - 3840.00 sq ft Warehouse, Storage (Commercial)

Floor Area	3,840 sq ft	**Estimated TCV**	$70,318
Occupancy	Warehouse, Storage	**Class**	D,Pole
Stories Above Ground	1	**Average Story Height**	12 ft
Basement Wall Height	*Not Available*		
Year Built	*Not Available*	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	75%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	14 yrs

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.



Google earth

feet 300
meters 100

Property 13

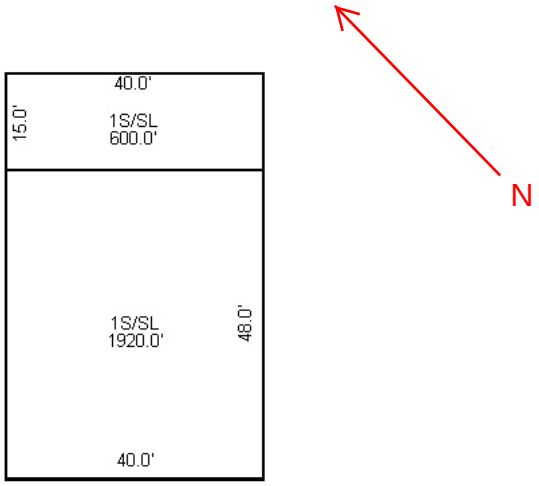
Image/Sketch for Parcel: XT0-325-0434-00

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 13

Image/Sketch for Parcel: XT0-325-0434-00



Sketch by Apex IV™

**Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 13

611 MOHAWK ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-325-0434-00

Item **1** of **3** 1 Image / 2 Sketches

Property Owner: TECUMSEH ROAD SERVICE, LLC

Summary Information

> Commercial/Industrial Building Summary
- Yr Built: 1974
- # of Buildings: 1
- Total Sq.Ft.: 2,560

> Property Tax Information found

> 1 Utility Billing Account found

> Assessed Value: $36,900 | Taxable Value: $36,900

> 3 Building Department records found across 1 property

Owner and Taxpayer Information

Owner	TECUMSEH ROAD SERVICE, LLC 615 MOHAWK ST TECUMSEH, MI 49286	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	COMMERCIAL	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$36,900
MAP #	*Not Available*	**Taxable Value**	$36,900
ACTS/CHGS	0	**State Equalized Value**	$36,900
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	01/07/2015
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date *Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$26,700	$26,700	$26,700
2013	$26,400	$26,400	$26,400
2012	$27,000	$27,000	$27,000

Land Information

Zoning Code	I-C	**Total Acres**	1.190
Land Value	$45,000	**Land Improvements**	$1,025
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	COMM OTHER OLDER	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	*Not Available*	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

THAT PART OF LOT 43 DESC AS BEG AT S 1/4 COR SSEC 34 TH N 89D 04M 22S W 333.67 FT TO N 1/4 COR SEC 3 T6S R4E TH N 23D 04M 43S E 837.59 FT TH N 46D 23M W 717.19 FT TO FURTH POB TH N 46D 23M W 90 FT TH N 43D 37M E 227.67 FT TH N 0D 30M E 300.55 FT TH N 89D 01M E 90.03 FT TH S 0D 30M W 338.44 FT TH S 43D 37M W 263.23 FT TO FURTH POB ASSESSORS PLAT NO 6 CITY OF TECUMSEH

Land Division Act Information

Date of Last Split/Combine	*Not Available*	**Number of Splits Left**	0
Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0

Property 13

Date Created	*Not Available*	**Unallocated Div.s Transferred**	0
Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*
Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	*Not Available*		

Sale History

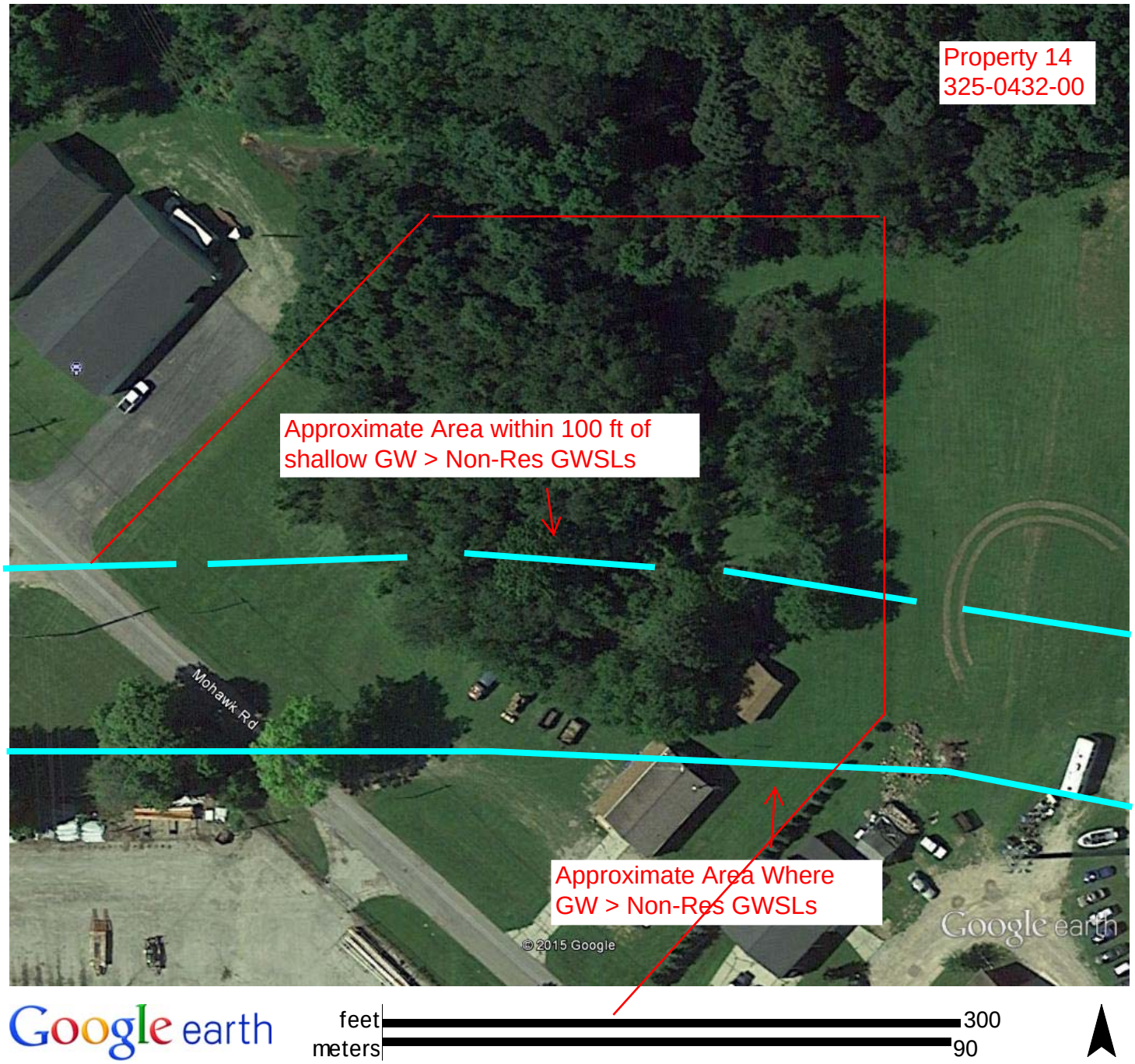
Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
12/12/2014	$1.00	WD	BIRCHFIELD, RONALD A & SHARRIE L	TECUMSEH ROAD SERVICE, LLC	Arms-Length	2499/0874	
12/08/2014	$94,000.00	WD	WOTRING, JOHN & BARBARA	BIRCHFIELD, RONALD A & SHARRIE L	BUYER ON ROLL/LC	2499/0328	
12/08/2014	$94,000.00	WD	WOTRING, JOHN & BARBARA	BIRCHFIELD, RONALD A & SHARRIE L	BUYER ON ROLL/LC	2499/0328	
07/11/2002	$94,000.00	LC	WOTRING, JOHN & BARBARA	BIRCHFIELD, RONALD A & SHERRIE L	Affidavit/Memo LC	1979/496	

Building Information - 2560.00 sq ft Garage, Service/Repair Shed (Commercial)

Floor Area	2,560 sq ft	**Estimated TCV**	$27,445
Occupancy	Garage, Service/Repair Shed	**Class**	D,Pole
Stories Above Ground	1	**Average Story Height**	13 ft
Basement Wall Height	*Not Available*		
Year Built	1974	**Year Remodeled**	*Not Available*
Percent Complete	0%	**Heat**	No Heating or Cooling
Physical Percent Good	59%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	26 yrs

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.


Property 14
325-0432-00
Approximate Area within 100 ft of shallow GW > Non-Res GWSLs
Mohawk Rd
Approximate Area Where GW > Non-Res GWSLs
© 2015 Google
Google earth
Google earth
feet
meters
300
90

Image/Sketch for Parcel: XT0-325-0432-00

Property 14

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 14

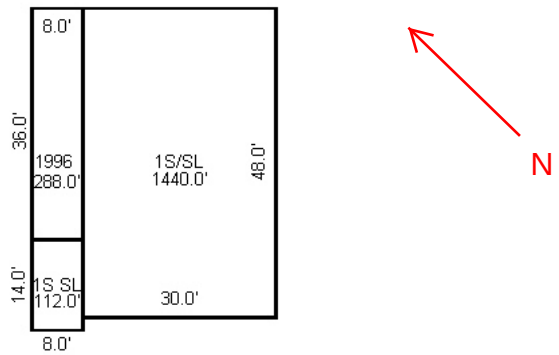
Image/Sketch for Parcel: XT0-325-0432-00

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 14

Image/Sketch for Parcel: XT0-325-0432-00



Sketch by Apex IV™

**Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 14

607 MOHAWK ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-325-0432-00

Item **1** of **5** 3 Images / 2 Sketches

Property Owner: LOGAN, ROBERT W

Summary Information

> Commercial/Industrial Building Summary
- Yr Built: 1968 - # of Buildings: 1
- Total Sq.Ft.: 1,840

> Property Tax Information found
> 1 Utility Billing Account found

> Assessed Value: $43,900 | Taxable Value: $42,672
> 4 Building Department records found across 1 property

Owner and Taxpayer Information

Owner	LOGAN, ROBERT W 1207 MURRAY DR TECUMSEH, MI 49286	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	COMMERCIAL	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$43,900
MAP #	*Not Available*	**Taxable Value**	$42,672
ACTS/CHGS	0	**State Equalized Value**	$43,900
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	07/06/2005
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date *Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$42,000	$42,000	$42,000
2013	$41,600	$41,600	$41,600
2012	$42,400	$42,400	$42,400

Land Information

Zoning Code	I-C	**Total Acres**	2.870
Land Value	$50,600	**Land Improvements**	$433
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	COMM OTHER OLDER	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	*Not Available*	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

THAT PART OF LOT 43 DESC AS COMM AT SW'LY COR LOT 43 TH RUNN N 43D 37M E 193.7 FT TH N 0D 30M E 263.29 FT TH N 89D 01M E 88.6 FT TH S 0D 30M W 300.55 FT TH S 43D 37M W 227.67 FT TH N 46D 23M 2 88.52 TO POB ALSO THAT PART OF LOT 37 DESC AS COMM 325 FT FROM THE MOST W'LY POINT OF LOT 37 TH N 43D 37M E 304.41 FT TH S 89D 30M E 117.77 FT TH S 0D 30M W 263.29 FT TH S 43D 37M W 197.70 FT TH N 46D 23M W 265.94 FT TO POB ASSESS PLAT NO 6 CITY OF TECUMSEH

Land Division Act Information

Date of Last Split/Combine	*Not Available*	**Number of Splits Left**	0

Property 14

Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0
Date Created	*Not Available*	**Unallocated Div.s Transferred**	0
Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*
Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	*Not Available*		

Sale History

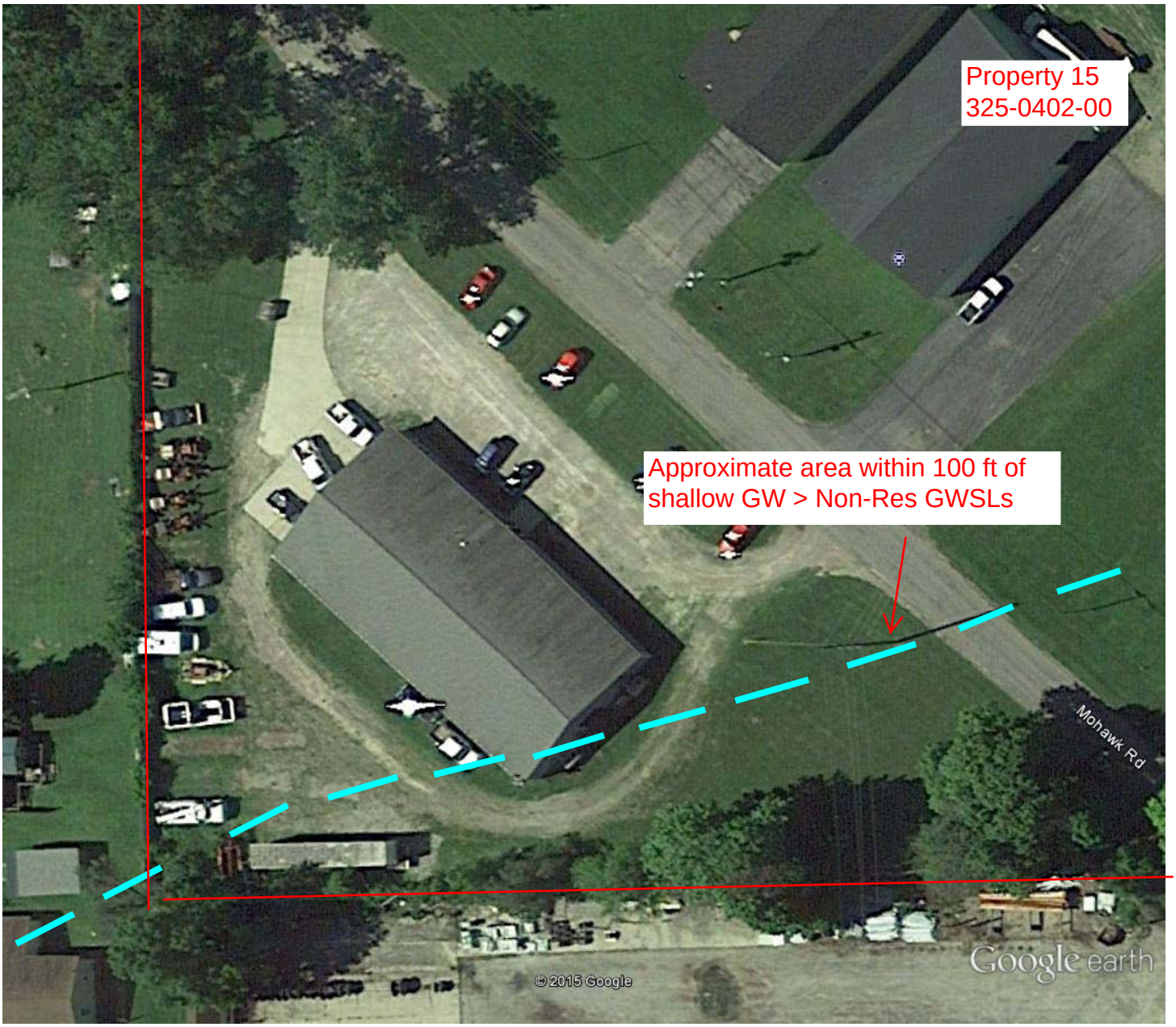
Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
05/21/1999	$1.00	QC	STRAND, HENRY & MARGARET	LOGAN, ROBERT W	Quit Claim	1641/244	
05/20/1999	$56,000.00	WD	SCHNEIDER REV L/TRST, ROSEMARY	LOGAN, ROBERT W	High Ratio	1641/246	

Building Information - 1840.00 sq ft Warehouse, Storage (Commercial)

Floor Area	1,840 sq ft	**Estimated TCV**	$36,053
Occupancy	Warehouse, Storage	**Class**	D
Stories Above Ground	1	**Average Story Height**	12 ft
Basement Wall Height	*Not Available*		
Year Built	1968	**Year Remodeled**	*Not Available*
Percent Complete	0%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	40%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	40 yrs

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.



Google earth

feet 200
meters 60

Property 15

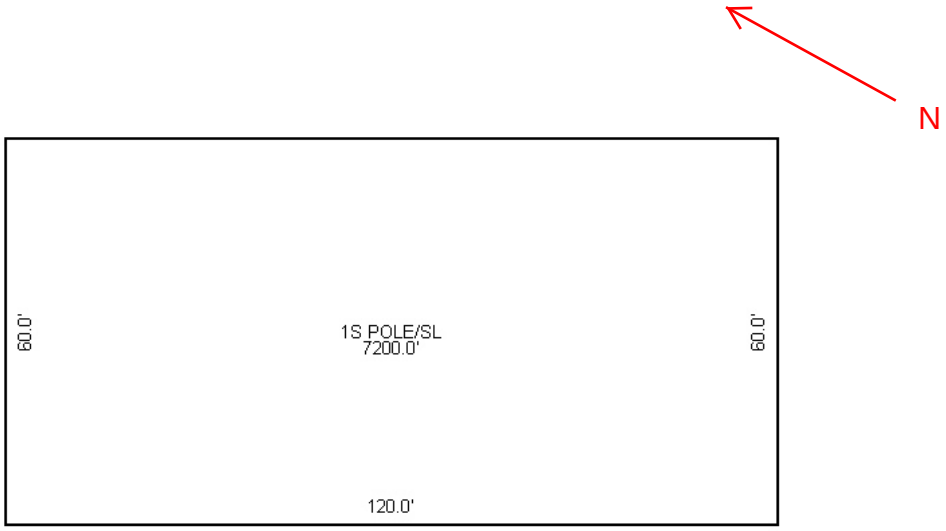
Image/Sketch for Parcel: XT0-325-0340-00

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 15

Image/Sketch for Parcel: XT0-325-0340-00



Sketch by Apex IV™

**Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 15

508 MOHAWK ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-325-0340-00

Item **1** of **3** 1 Image / 2 Sketches

Property Owner: DERBY, KEVIN G & JASON E

Summary Information

> Commercial/Industrial Building Summary
- Yr Built: 1989
- # of Buildings: 1
- Total Sq.Ft.: 7,200

> Property Tax Information found

> 1 Utility Billing Account found

> Assessed Value: $112,000 | Taxable Value: $112,000

> 6 Building Department records found across 1 property

Owner and Taxpayer Information

Owner	DERBY, KEVIN G & JASON E 508 MOHAWK ST TECUMSEH, MI 49286	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	COMMERCIAL	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$112,000
MAP #	*Not Available*	**Taxable Value**	$112,000
ACTS/CHGS	0	**State Equalized Value**	$112,000
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	08/26/2002
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date *Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$110,800	$110,800	$110,800
2013	$111,100	$111,100	$111,100
2012	$109,900	$109,900	$109,900

Land Information

Zoning Code	I-C	**Total Acres**	1.267
Land Value	$45,000	**Land Improvements**	$544
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	COMM OTHER NEW	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	250*250	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

LOT 34 ASSESS PLAT NO 6 CITY OF TECUMSEH

Land Division Act Information

Date of Last Split/Combine	*Not Available*	**Number of Splits Left**	0
Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0
Date Created	*Not Available*	**Unallocated Div.s Transferred**	0
Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*

Property 15

Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	*Not Available*		

Sale History

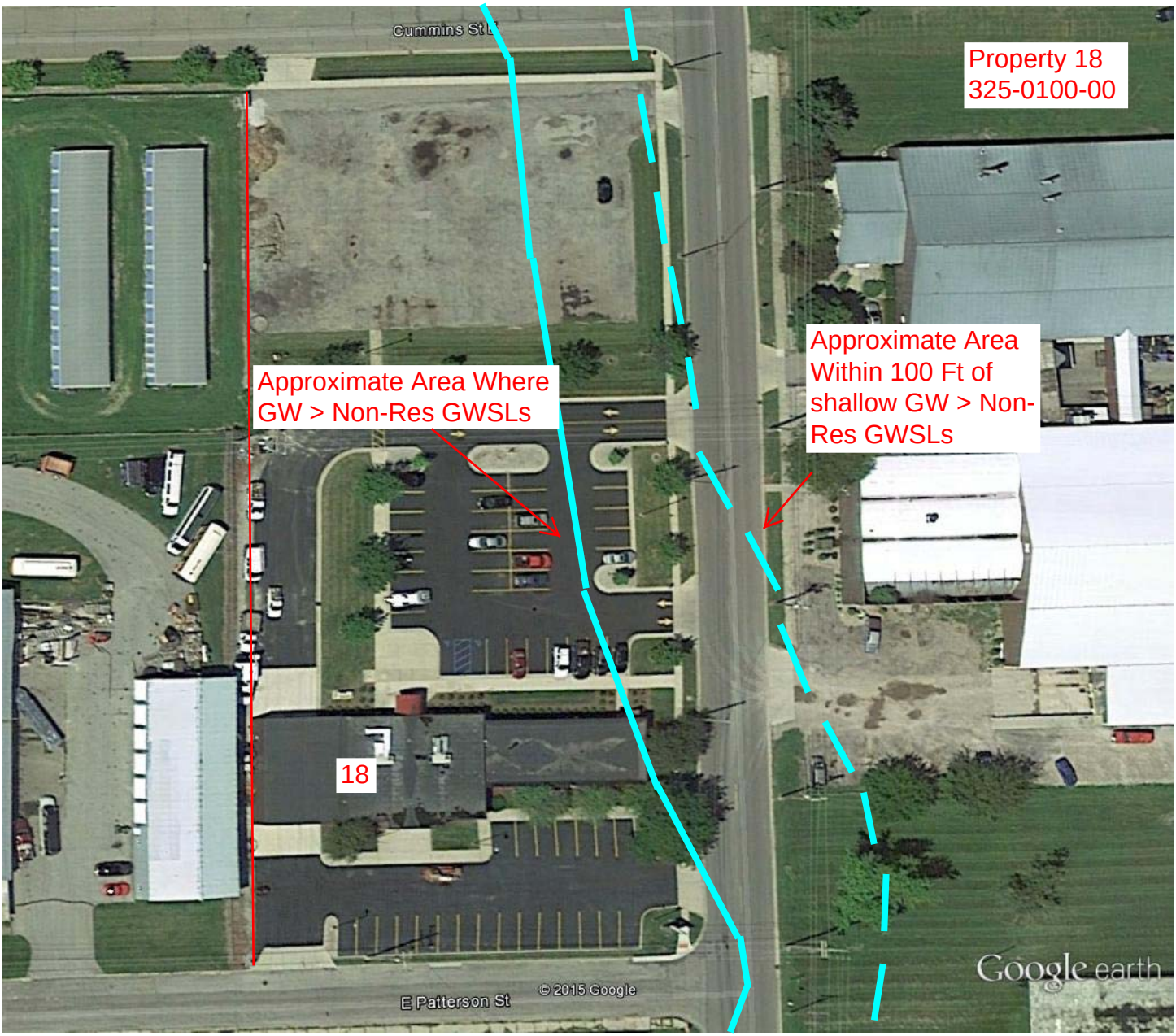
Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
08/27/2003	$199,500.00	WD	JUBENVILLE TRUST, LEO G & JOYCE T	DERBY, KEVIN G & JASON E	Buyer on Roll/Old Sa	2244/798	
07/28/2000	$0.00	LC	JUBENVILLE, LEO G & JOYCE T	DERBY, KEVIN G & JASON E	Affidavit/Memo LC	1731/580	
07/28/2000	$199,500.00	LC	JUBENVILLE TRST, LEO & JOYCE	DERBY, KEVIN G & JASON E	Private Sale	UNREC LC	
07/13/2000	$1.00	QC	JUBENVILLE, LEO & JOYCE	JUBENVILLE TRST, LEO & JOYCE	Owner to Trust	1726/040	
09/07/1996	$1.00	QC	JUBENVILLE, LEO G	JUBENVILLE TRST, LEO & JOYCE	Owner to Trust	1433/764	
09/03/1993	$110,000.00	WD	DUSTIN JOHN	JUBENVILLE	Arms-Length	1273/637	

Building Information - 7200.00 sq ft Warehouse, Storage (Commercial)

Floor Area	7,200 sq ft	**Estimated TCV**	$176,604
Occupancy	Warehouse, Storage	**Class**	D,Pole
Stories Above Ground	1	**Average Story Height**	13 ft
Basement Wall Height	*Not Available*		
Year Built	1989	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Package Heating & Cooling
Physical Percent Good	58%	**Functional Percent Good**	105%
Economic Percent Good	100%	**Effective Age**	27 yrs

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.



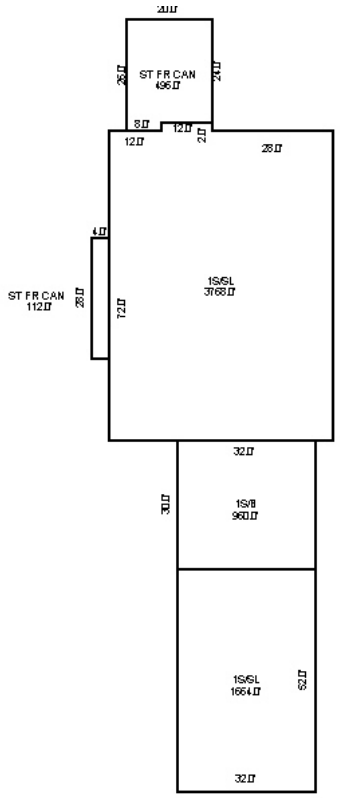
Google earth

feet 200

meters 90

Property 18

Image/Sketch for Parcel: XT0-325-0100-00



N

Sketch by Apex IV™

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 18

415 S MAUMEE ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-325-0100-00

Item **4** of **6** 4 Images / 2 Sketches

Property Owner: D & P COMMUNICATIONS, INC

Summary Information

> Commercial/Industrial Building Summary
- Yr Built: 1960
- # of Buildings: 2
- Total Sq.Ft.: 8,390

> Property Tax Information found

> 2 Utility Billing Accounts found

> Assessed Value: $386,000 | Taxable Value: $379,984

> 38 Building Department records found across 17 properties

Owner and Taxpayer Information

Owner	D & P COMMUNICATIONS, INC 4200 TEAL RD PETERSBURG, MI 49270	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	COMMERCIAL	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$386,000
MAP #	*Not Available*	**Taxable Value**	$379,984
ACTS/CHGS	0	**State Equalized Value**	$386,000
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	07/30/2008
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date *Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$374,000	$374,000	$374,000
2013	$370,700	$370,700	$370,700
2012	$368,600	$368,600	$368,600

Land Information

Zoning Code	I-C	**Total Acres**	1.410
Land Value	$45,000	**Land Improvements**	$66,959
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	COMM OTHER NEW	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	210*475	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

LOTS 21, 22, 23, THE EAST 12 FT OF LOT 20 AND ALL THAT PART OF LOT 10 BEG 159.27 FT S FROM NE COR LOT 10 TH S 00°15'39" W 275.86 FT TH N 89°45'55" W 222.26 FT TH N 00°18'00" E 262.04 FT TH S 89°35'13" E 12 FT TH N 00°22'30" W 14.74 FT TH S 89°31'26" E 210.24 FT TO POB CONT. 1.41 AC , ASSESSOR'S PLAT NO. 6 CITY OF TECUMSEH

Land Division Act Information

Date of Last Split/Combine	12/31/2000	**Number of Splits Left**	0
Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0

Property 18

Date Created	12/31/2000	**Unallocated Div.s Transferred**	0
Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*
Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	*Not Available*		

Sale History

Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
07/25/2008	$235,000.00	WD	TLC COMMUNITY CREDIT UNION	D & P COMMUNICATIONS, INC	Private Sale	2369/281	
11/30/1999	$41,120.00	WD	TECUMSEH PRODUCTS COMPANY	TLC COMMUNITY CREDIT UNION	Private Sale	1684/543	BLDG RAZED AFTER SALE
12/01/1998	$40,005.00	WD	UNITED PROD WORKERS	TECUMSEH PRODUCTS COMPANY	Private Sale	1600/103	

Building Information - 6392.00 sq ft Office Building (Commercial)

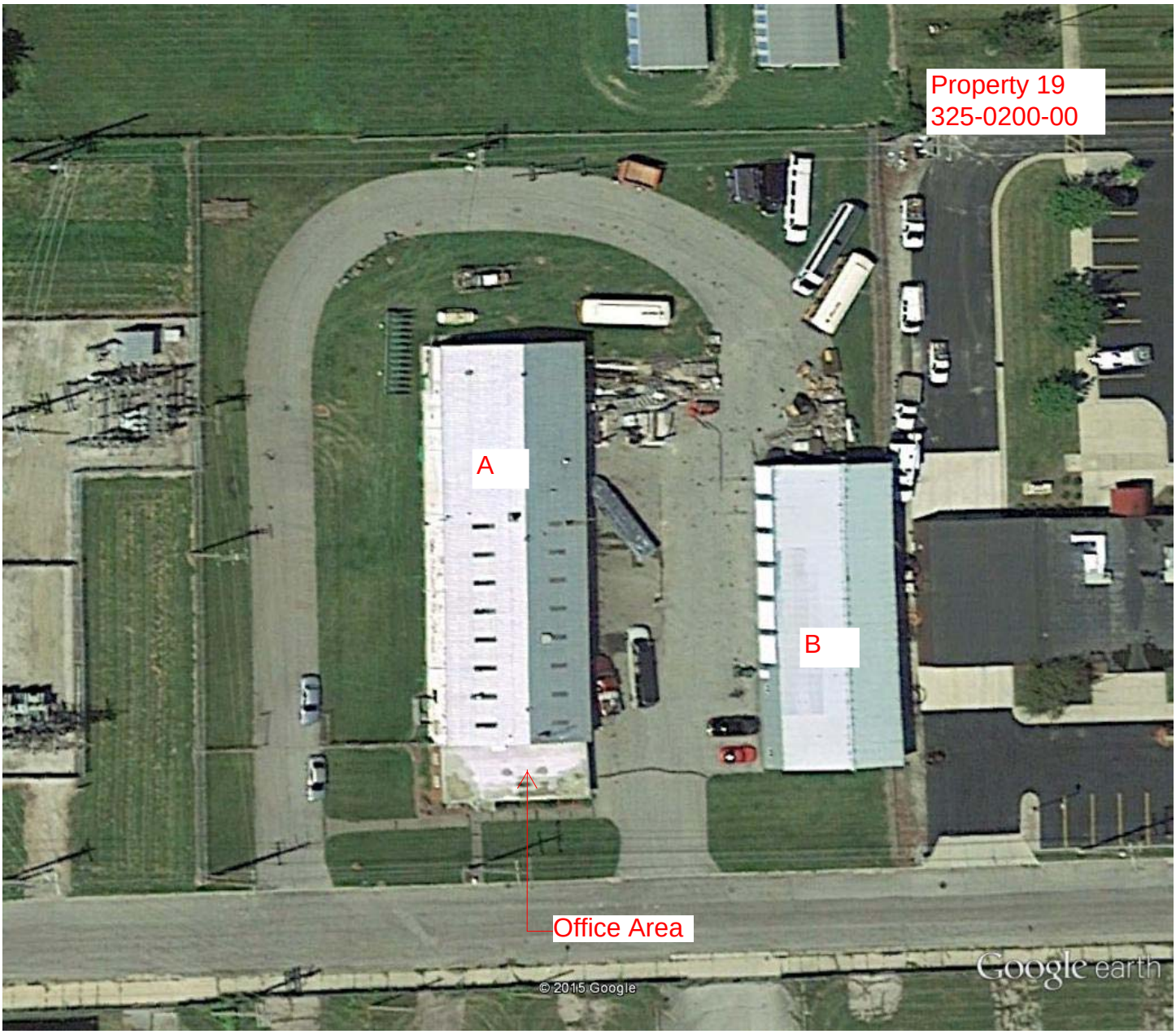
Floor Area	6,392 sq ft	**Estimated TCV**	$572,073
Occupancy	Office Building	**Class**	C
Stories Above Ground	1	**Average Story Height**	12 ft
Basement Wall Height	*Not Available*		
Year Built	1960	**Year Remodeled**	1980
Percent Complete	0%	**Heat**	Package Heating & Cooling
Physical Percent Good	53%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	28 yrs

Building Information - 1998.00 sq ft Garage, Service/Repair (Commercial)

Floor Area	1,998 sq ft	**Estimated TCV**	$82,152
Occupancy	Garage, Service/Repair	**Class**	D,Pole
Stories Above Ground	1	**Average Story Height**	15 ft
Basement Wall Height	*Not Available*		
Year Built	2012	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	No Heating or Cooling
Physical Percent Good	82%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	8 yrs

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.



Google earth

feet 200
meters 60

Image/Sketch for Parcel: XT0-325-0200-00

Property 19

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 19

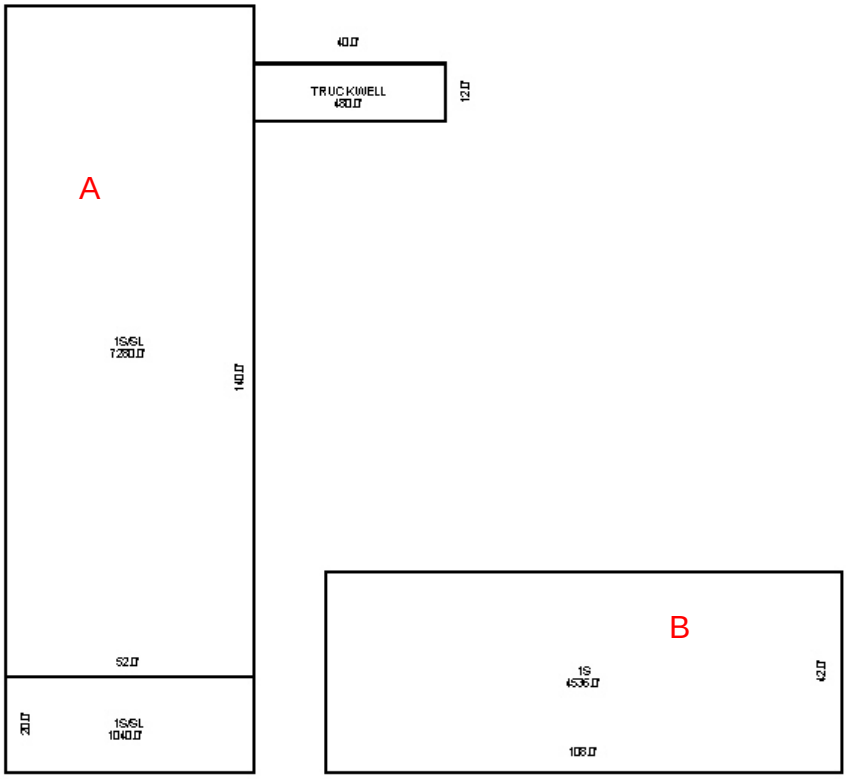
Image/Sketch for Parcel: XT0-325-0200-00

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Image/Sketch for Parcel: XT0-325-0200-00

Property 19



Sketch by Apex IV™

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 19

223 E PATTERSON ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-325-0200-00

Item **1** of **5** 3 Images / 2 Sketches

Property Owner: M & S LAND HOLDINGS, LLC

Summary Information

> Commercial/Industrial Building Summary
- Yr Built: 1940
- # of Buildings: 1
- Total Sq.Ft.: 8,320

> Property Tax Information found

> 1 Utility Billing Account found

> Assessed Value: $147,500 | Taxable Value: $147,500

> 3 Building Department records found across 1 property

Owner and Taxpayer Information

Owner	M & S LAND HOLDINGS, LLC 8514 PENNINGTON RD TECUMSEH, MI 49286	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	COMMERCIAL	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$147,500
MAP #	*Not Available*	**Taxable Value**	$147,500
ACTS/CHGS	0	**State Equalized Value**	$147,500
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	06/22/2009
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date	*Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$145,400	$145,400	$145,400
2013	$144,900	$144,900	$144,900
2012	$149,500	$149,500	$149,500

Land Information

Zoning Code	I-1	**Total Acres**	1.470
Land Value	$33,800	**Land Improvements**	$5
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	COMM OTHER OLDER	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	*Not Available*	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

LOT 2O EXC E 12 FT ASSESSOR'S PLAT NO 6 CITY OF TECUMSEH

Land Division Act Information

Property 19

Date of Last Split/Combine	01/05/2003	**Number of Splits Left**	0
Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0
Date Created	01/05/2003	**Unallocated Div.s Transferred**	0
Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*
Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	XT0-325-0200-00		

Sale History

Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
09/22/2015	$13,104.00	RC	M & S LAND HOLDINGS, LLC	COUNTY TREASURER REDEMPTION CERT	FORECLOSURE	2514/0267	2009 TAXES
03/01/2011	$11,947.00	CRT	M & S LAND HOLDINGS, LLC	LENAWEE COUNTY TREASURER	Foreclosure	2423/0192	CERT OF FORFEITURE 2009 TAXES
12/20/2010	$9,770.00	CRT	LENAWEE COUNTY TREASURER	M & S LAND HOLDINGS, LLC	Foreclosure	2417/0166	REDEMPTION CERT 2008 TAXES
03/01/2010	$9,100.00	TAX	M & S LAND HOLDINGS, LLC	LENAWEE COUNTY TREASURER	LIEN	2402/874	2008 TAX LIEN
05/22/2009	$12,441.00	CRT	LENAWEE COUNTY TREASURER	M & S LAND HOLDINGS, LLC	Redemption Cert	2386/254	REDEMPTION CERTIFICATE
03/01/2009	$12,111.00	CRT	M & S LAND HOLDINGS, LLC	LENAWEE COUNTY TREASURER	LIEN	2381/838	TAX LIEN
11/14/2002	$170,000.00	WD	ROTEC, INC	M & S LAND HOLDINGS, LLC	Private Sale	2045/945	
09/25/1997	$175,000.00	WD	STANDARD ELECTRIC TIME CORP	ROTEC, INC	Arms-Length	1498/273	

Building Information - 8320.00 sq ft Warehouse, Storage (Commercial)

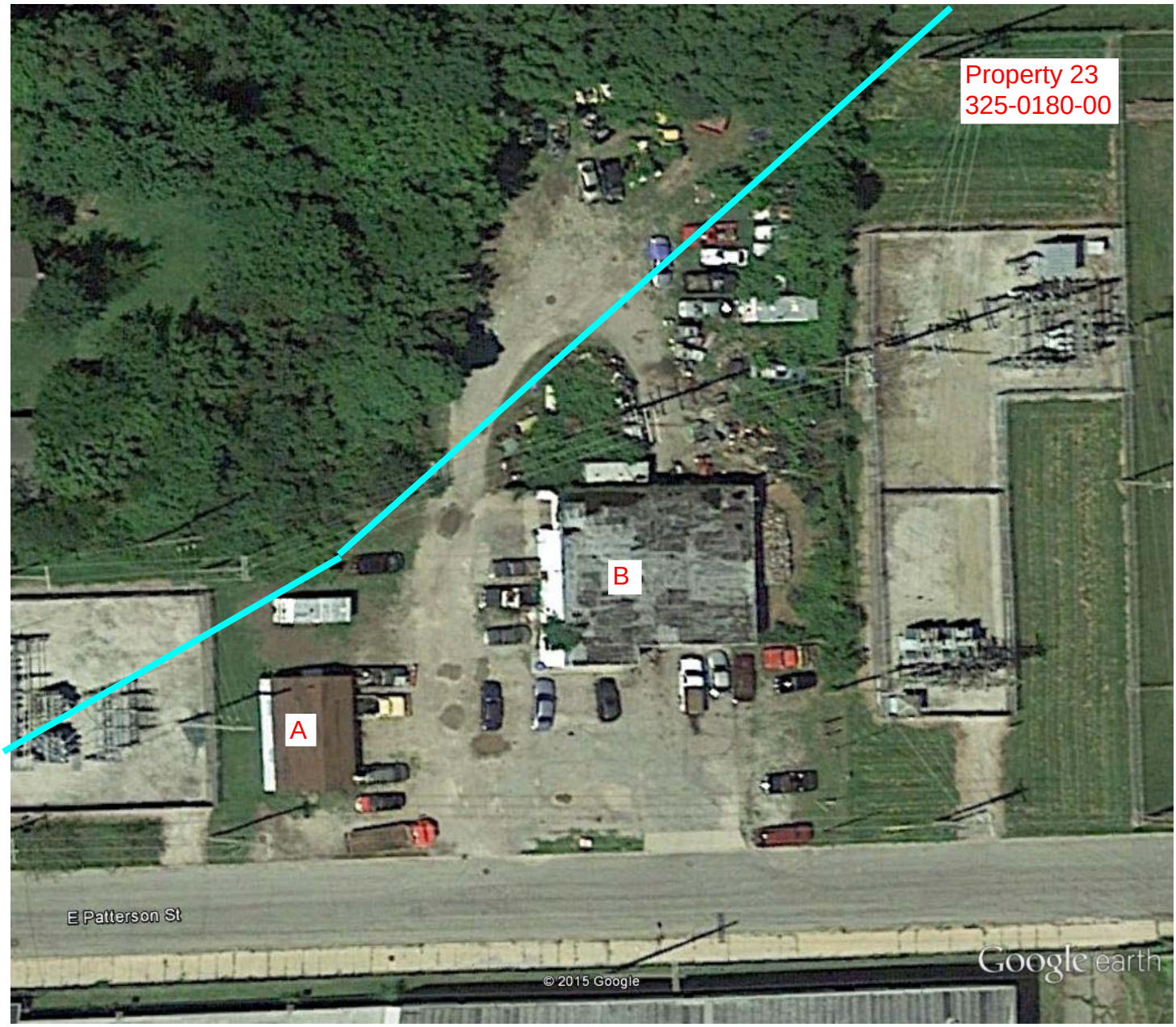
Floor Area	8,320 sq ft	**Estimated TCV**	$166,696
Occupancy	Warehouse, Storage	**Class**	D
Stories Above Ground	1	**Average Story Height**	14 ft
Basement Wall Height	*Not Available*		
Year Built	1940	**Year Remodeled**	*Not Available*
Percent Complete	0%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	47%	**Functional Percent Good**	117%
Economic Percent Good	100%	**Effective Age**	33 yrs

Building Information - 4536 sq ft Equipment Shelter (Agricultural)

Type	Equipment Shelter	**Class**	D,Frame
Floor Area	4,536 sq ft	**Estimated TCV**	$91,107
Perimeter	300 ft	**Height**	14 ft
Year Built	2004	**Quality**	Good
Percent Complete	100%	**Heat**	Pkg A.C., Heat/Cool
Physical Percent Good	78%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	11 yrs

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.



Google earth

feet 100

meters 60

Image/Sketch for Parcel: XT0-325-0180-00

Property 23

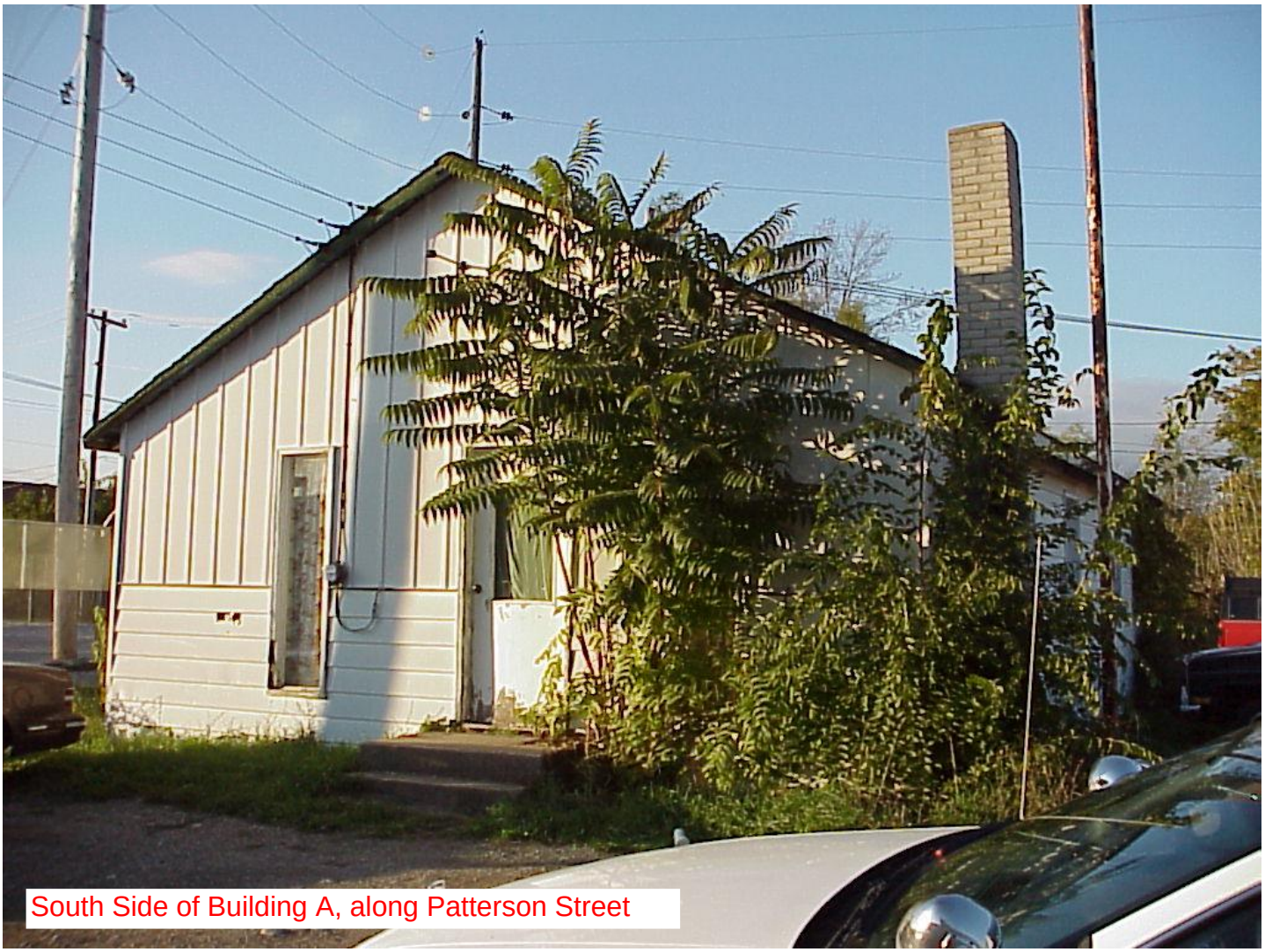
South side of Building B, along Patterson Street

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Image/Sketch for Parcel: XT0-325-0180-00

Property 23

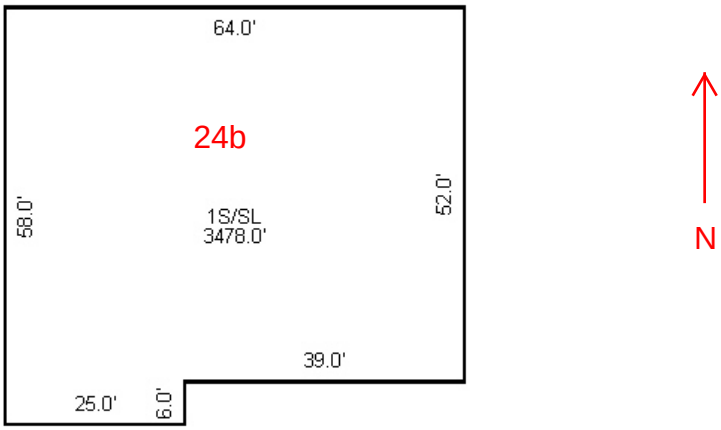


Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Image/Sketch for Parcel: XT0-325-0180-00

Property 23



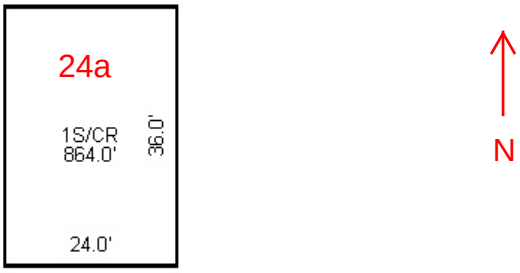
Sketch by Apex IV™

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Image/Sketch for Parcel: XT0-325-0180-00

Property 23



Sketch by Apex IV™

Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 23

209 E PATTERSON ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-325-0180-00

Item **1** of **5** 2 Images / 3 Sketches

Property Owner: IRELAN, DENNIS C & KAREN

Summary Information

> Commercial/Industrial Building Summary
- Yr Built: 1950
- # of Buildings: 2
- Total Sq.Ft.: 4,342

> Property Tax Information found

> 2 Utility Billing Accounts found

> Assessed Value: $37,400 | Taxable Value: $36,953

> 2 Building Department records found across 1 property

Owner and Taxpayer Information

Owner	IRELAN, DENNIS C & KAREN BOX 66 TECUMSEH, MI 49286	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	COMMERCIAL	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$37,400
MAP #	*Not Available*	**Taxable Value**	$36,953
ACTS/CHGS	0	**State Equalized Value**	$37,400
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	09/20/1999
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date *Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$36,700	$36,700	$36,372
2013	$35,800	$35,800	$35,800
2012	$37,000	$37,000	$37,000

Land Information

Zoning Code	I-1	**Total Acres**	0.980
Land Value	$22,600	**Land Improvements**	$0
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	COMM OTHER OLDER	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	*Not Available*	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

LOT 18 ASSESS PLAT N0 6 CITY OF TECUMSEH

Land Division Act Information

Property 23

Date of Last Split/Combine	*Not Available*	**Number of Splits Left**	0
Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0
Date Created	*Not Available*	**Unallocated Div.s Transferred**	0
Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*
Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	*Not Available*		

Sale History

Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
No sales history found.							

Building Information - 3478.00 sq ft Garage, Service/Repair Shed (Commercial)

Floor Area	3,478 sq ft	**Estimated TCV**	$27,658
Occupancy	Garage, Service/Repair Shed	**Class**	C
Stories Above Ground	1	**Average Story Height**	14 ft
Basement Wall Height	*Not Available*		
Year Built	1950	**Year Remodeled**	*Not Available*
Percent Complete	0%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	35%	**Functional Percent Good**	100%
Economic Percent Good	85%	**Effective Age**	34 yrs

Building Information - 864.00 sq ft Office Building (Commercial)

Floor Area	864 sq ft	**Estimated TCV**	$23,525
Occupancy	Office Building	**Class**	D
Stories Above Ground	1	**Average Story Height**	8 ft
Basement Wall Height	*Not Available*		
Year Built	1950	**Year Remodeled**	*Not Available*
Percent Complete	0%	**Heat**	Forced Air Furnace
Physical Percent Good	38%	**Functional Percent Good**	100%
Economic Percent Good	80%	**Effective Age**	44 yrs

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Google earth

feet 800

meters 200

Property 27

Image/Sketch for Parcel: XT0-133-4800-00

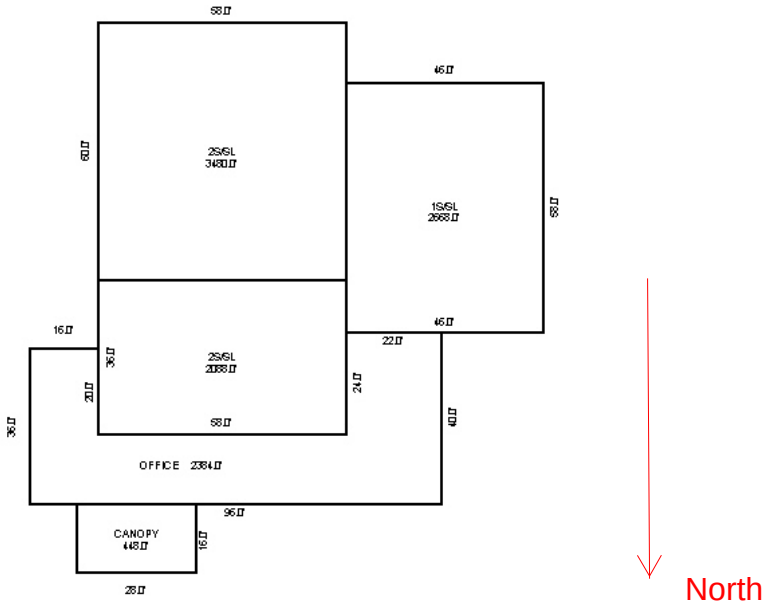
Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 27

Image/Sketch for Parcel: XT0-133-4800-00

Northernmost
Portion of Building



Sketch by Apex IV™

**Disclaimer: BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.

Property 27

705 S EVANS ST TECUMSEH, MI 49286 (Property Address)

Parcel Number: XT0-133-4800-00

Item **1** of **5** 3 Images / 2 Sketches

Property Owner: JBM TECUMSEH MFG RE, LLC

Summary Information

> Commercial/Industrial Building Summary
- Yr Built: 1976
- # of Buildings: 10
- Total Sq.Ft.: 112,382

> Property Tax Information found

> Assessed Value: $558,000 | Taxable Value: $464,515

> 6 Building Department records found across 1 property

Based on Aerial Imagery, Buildings are all connected

Owner and Taxpayer Information

Owner	JBM TECUMSEH MFG RE, LLC 707 S EVANS ST TECUMSEH, MI 49286	**Taxpayer**	SEE OWNER INFORMATION

General Information for Tax Year 2015

Property Class	INDUSTRIAL	**Unit**	XT0 CITY OF TECUMSEH
School District	TECUMSEH	**Assessed Value**	$558,000
MAP #	*Not Available*	**Taxable Value**	$464,515
ACTS/CHGS	0	**State Equalized Value**	$558,000
DESIGNATIONS	*Not Available*	**Date of Last Name Change**	02/02/2007
USER ALPHA 3	*Not Available*	**Notes**	*Not Available*
Historical District	No	**Census Block Group**	*Not Available*
ACTS/CHGS	*Not Available*		

Principal Residence Exemption Information

Homestead Date *Not Available*

Principal Residence Exemption	June 1st	Final
2016	0.0000 %	-
2015	0.0000 %	0.0000 %

Previous Year Information

Year	MBOR Assessed	Final SEV	Final Taxable
2014	$562,500	$562,500	$457,200
2013	$590,000	$590,000	$450,000
2012	$593,900	$593,900	$393,500

Land Information

Zoning Code	I-1	**Total Acres**	5.150
Land Value	$58,600	**Land Improvements**	$67,326
Renaissance Zone	No	**Renaissance Zone Expiration Date**	*Not Available*
ECF Neighborhood	IND OLDER	**Mortgage Code**	*Not Available*
Lot Dimensions/Comments	*Not Available*	**Neighborhood Enterprise Zone**	No

Lot(s)	Frontage	Depth
No lots found.		
	Total Frontage: 0.00 ft	**Average Depth: 0.00 ft**

Legal Description

LD BEG AT A PT LOC 81.17 FT W & 603 FT N OF SE COR SEC 33 TH W 258 FT TH N 855 FT TH E 258 FT TH S 855 FT TO POB ALSO LOT 9 EX THE N 12 FT & THE S 24 FT OF LOT 20 & VACATED ALLEYS WENONAH PARK SEC 33 T5S R4E CITY OF TECUMSEH

Land Division Act Information

Date of Last Split/Combine	*Not Available*	**Number of Splits Left**	0
Date Form Filed	*Not Available*	**Unallocated Div.s of Parent**	0
Date Created	*Not Available*	**Unallocated Div.s Transferred**	0

Property 27

Acreage of Parent	0.00	**Rights Were Transferred**	*Not Available*
Split Number	0	**Courtesy Split**	*Not Available*
Parent Parcel	*Not Available*		

Sale History

Sale Date	Sale Price	Instrument	Grantor	Grantee	Terms of Sale	Liber/Page	Comments
06/12/2006	$1,061,000.00	WD	TECUMSEH CORRUGATED BOX	JBM TECUMSEH MFG RE, LLC	High Ratio	2325/448	

Building Information - 4768.00 sq ft Office Building (Commercial)

Floor Area	4,768 sq ft	**Estimated TCV**	$129,214
Occupancy	Office Building	**Class**	C
Stories Above Ground	2	**Average Story Height**	12 ft
Basement Wall Height	*Not Available*		
Year Built	1976	**Year Remodeled**	1989
Percent Complete	100%	**Heat**	Forced Air Furnace
Physical Percent Good	35%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	47 yrs

Building Information - 4756.00 sq ft Office Building (Commercial)

Floor Area	4,756 sq ft	**Estimated TCV**	$126,109
Occupancy	Office Building	**Class**	C
Stories Above Ground	1	**Average Story Height**	12 ft
Basement Wall Height	*Not Available*		
Year Built	1989	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Forced Air Furnace
Physical Percent Good	35%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	47 yrs

Building Information - 5568.00 sq ft Store, Warehouse Discount (Commercial)

Floor Area	5,568 sq ft	**Estimated TCV**	$54,882
Occupancy	Store, Warehouse Discount	**Class**	S
Stories Above Ground	1	**Average Story Height**	12 ft
Basement Wall Height	*Not Available*		
Year Built	1976	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Forced Air Furnace
Physical Percent Good	35%	**Functional Percent Good**	100%
Economic Percent Good	100%	**Effective Age**	47 yrs

Building Information - 7540.00 sq ft Industrial, Light Manufacturing (Commercial)

Floor Area	7,540 sq ft	**Estimated TCV**	$63,590
Occupancy	Industrial, Light Manufacturing	**Class**	S
Stories Above Ground	1	**Average Story Height**	16 ft
Basement Wall Height	*Not Available*		
Year Built	1976	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	35%	**Functional Percent Good**	75%
Economic Percent Good	100%	**Effective Age**	44 yrs

Building Information - 19140.00 sq ft Industrial, Light Manufacturing (Commercial)

Floor Area	19,140 sq ft	**Estimated TCV**	$142,617
Occupancy	Industrial, Light Manufacturing	**Class**	S
Stories Above Ground	1	**Average Story Height**	16 ft
Basement Wall Height	*Not Available*		
Year Built	1913	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	35%	**Functional Percent Good**	70%
Economic Percent Good	100%	**Effective Age**	49 yrs

Building Information - 9690.00 sq ft Warehouse, Storage (Commercial)

Floor Area	9,690 sq ft	**Estimated TCV**	$65,398
Occupancy	Warehouse, Storage	**Class**	S
Stories Above Ground	1	**Average Story Height**	16 ft

Property 27

Basement Wall Height	*Not Available*		
Year Built	1913	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	35%	**Functional Percent Good**	70%
Economic Percent Good	100%	**Effective Age**	52 yrs

Building Information - 19580.00 sq ft Warehouse, Storage (Commercial)

Floor Area	19,580 sq ft	**Estimated TCV**	$127,923
Occupancy	Warehouse, Storage	**Class**	S
Stories Above Ground	1	**Average Story Height**	18 ft
Basement Wall Height	*Not Available*		
Year Built	1973	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	35%	**Functional Percent Good**	70%
Economic Percent Good	100%	**Effective Age**	52 yrs

Building Information - 11340.00 sq ft Warehouse, Storage (Commercial)

Floor Area	11,340 sq ft	**Estimated TCV**	$91,058
Occupancy	Warehouse, Storage	**Class**	S
Stories Above Ground	1	**Average Story Height**	16 ft
Basement Wall Height	*Not Available*		
Year Built	1983	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	43%	**Functional Percent Good**	70%
Economic Percent Good	100%	**Effective Age**	33 yrs

Building Information - 15000.00 sq ft Warehouse, Storage (Commercial)

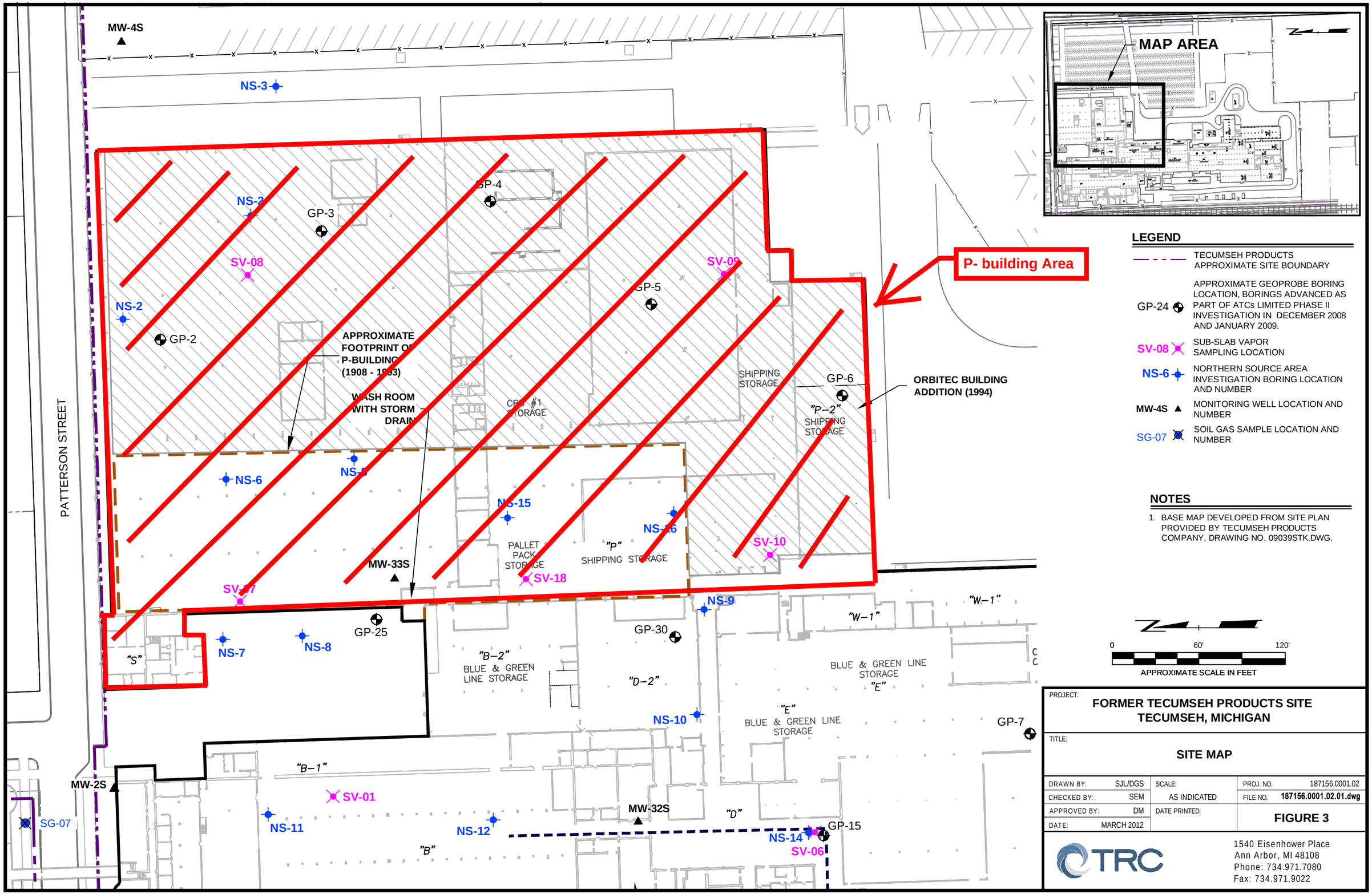
Floor Area	15,000 sq ft	**Estimated TCV**	$96,248
Occupancy	Warehouse, Storage	**Class**	S
Stories Above Ground	1	**Average Story Height**	18 ft
Basement Wall Height	*Not Available*		
Year Built	1977	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	35%	**Functional Percent Good**	70%
Economic Percent Good	100%	**Effective Age**	52 yrs

Building Information - 15000.00 sq ft Warehouse, Storage (Commercial)

Floor Area	15,000 sq ft	**Estimated TCV**	$96,248
Occupancy	Warehouse, Storage	**Class**	S
Stories Above Ground	1	**Average Story Height**	18 ft
Basement Wall Height	*Not Available*		
Year Built	1989	**Year Remodeled**	*Not Available*
Percent Complete	100%	**Heat**	Space Heaters, Gas with Fan
Physical Percent Good	35%	**Functional Percent Good**	70%
Economic Percent Good	100%	**Effective Age**	37 yrs

****Disclaimer:** BS&A Software provides AccessMyGov.com as a way for municipalities to display information online and is not responsible for the content or accuracy of the data herein. This data is provided for reference only and WITHOUT WARRANTY of any kind, expressed or inferred. Please contact your local municipality if you believe there are errors in the data.

Copyright © 2015 BS&A Software, Inc.



PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\187156\0001\02\187156.0001.02.01.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.386863
Dwg Size: 8.47 Mb
Plot Date: March 21, 2012
Plot Time: 11:47 AM
Attached Xref's: Bldg Columns; TPC Plant Area
Attached Images: Beacon TCE Color Scale; Beacon TCE Contour Image; Beacon TCE+Birkdn Color Scale; Beacon TCE+Birkdn Contour Image;
Layout: FIG03 Site Map

On-Site P-building: Boring Log Slab-thickness

WELL CONSTRUCTION LOG

TRC

WELL NO. SVE-01

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
Tecumseh Products Company - SVE System	3/30/12	4/4/12	187156.0001.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe/Stearns Drilling	Direct Push/HSA	---	---	20.0	18.25

Boring Location: 28 feet east and 7 feet south of the northwest corner of P-Building

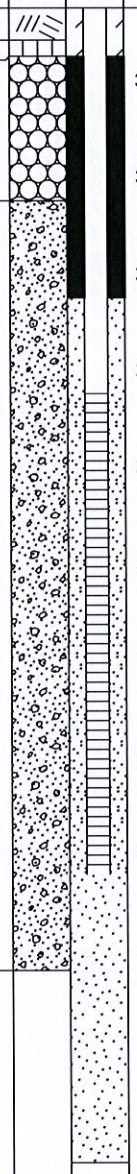
Personnel
Logged By - J.A. Bacon
Driller - Fojtik/Heffernan

Drilling Equipment: Geoprobe 6620DT/CME LC60

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	Michigan

Water Level Observations:
While Drilling: Date/Time
After Drilling: Date/Time
Depth (ft bgs) 20
Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	PID (PPM)	COMMENTS
				CONCRETE			Soil logged to a depth of 20 ft bgs with using Geoprobe direct push methods. Extraction well installed to a depth of 18 ft bgs using 18-inch hollow-stem augers.
				SILT	ML		
1 GP	25			**FILL** mostly fine to medium sand, slight organic odor.		34.0	
						33.8	
2 GP	50		5	**WELL-GRADED SAND WITH GRAVEL** Mostly fine to coarse sand, some gravel, trace silt, dark brown (10YR 3/3) to very dark grayish brown (10YR 3/2), slight organic odor, damp, loose.		25.8	Soil sample collected from 3 to 5 ft bgs.
						29.0	
3 GP	75		10	Same as above.		25.2	
						26.3	
4 GP	75		15	Same as above.	SW	25.3	
						26.1	
5 GP	90			Same as above.		20.9	Soil sample collected from 16 to 18 ft bgs.
			20	Change to moist. Change to no odor, saturated.		21.6	
				End of boring at 20.0 feet below ground surface.			



Signature:

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, MI 48108
(734) 971-7080
Fax (734) 971-9022

On-Site P-building: Boring Log Slab-thickness

WELL CONSTRUCTION LOG

TRC

WELL NO. SVE-03

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
Tecumseh Products Company - SVE System	3/30/12	4/4/12	187156.0001.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe/Stearns Drilling	Direct Push/HSA	---	---	24.0	18.25

Boring Location: 99 feet west and 14 feet south of the northeast corner of P-Building

Personnel
Logged By - J.A. Bacon
Driller - Fojtik/Heffernan

Drilling Equipment: Geoprobe 6620DT/CME LC60

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	Michigan

Water Level Observations:
While Drilling: Date/Time
After Drilling: Date/Time
∇ Depth (ft bgs) 20.2
Depth (ft bgs)

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	PID (PPM)	COMMENTS
				CONCRETE		4.3	Soil logged to a depth of 24 ft bgs with using Geoprobe direct push methods. Extraction well installed to a depth of 18 ft bgs using 18-inch hollow-stem augers.
1 GP	50			**FILL** mostly fine to medium sand, trace silt, trace clay, brown (10YR 5/3), slight organic odor, dry to damp, loose.		9.7 17.6	
				ASPHALT or asphalt-like material.	ML	18.7	
				SANDY SILT mostly silt, little sand, little clay, cohesive, low plasticity, dark brown (7.5YR 3/4), damp.		20.3	
2 GP	25		5	**WELL-GRADED SAND WITH GRAVEL** Mostly fine to coarse sand, some gravel, trace silt, dark brown (10YR 3/3) to very dark grayish brown (10YR 3/2), slight organic odor, damp, loose.		19.8 19.5 20.9	Soil sample collected from 4 to 6 ft bgs.
3 GP	60		10	Same as above.		20.3 21.7 32.2 35.1	
4 GP	75		15	Same as above.	SW	38.7 27.2 23.4 23.1	
5 GP	75			Same as above.		19.5 22.3 23.3 21.6	Soil sample collected from 16 to 18 ft bgs.
6 GP	90		20	∇ Change to no odor, saturated at 20.2 feet.			
				End of boring at 24.0 feet below ground surface.			

Signature:

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, MI 48108
(734) 971-7080
Fax (734) 971-9022

Attachment 7
Reference Sheets

Reference: US EPA (2004). Building Parameters for Parameter Summary Table

TABLE 9. BUILDING-RELATED PARAMETERS FOR THE VAPOR INTRUSION MODEL

Input Parameter	Units	Fixed or Variable	Typical or Mean Value	Range	Conservative Value	Default Value
Total Porosity	cm^3/cm^3	Fixed	Specific to soil texture, see Table 10			
Unsaturated Zone Water-filled Porosity	cm^3/cm^3	Variable	Specific to soil texture, see Table 10			
Capillary Transition zone Water-filled Porosity	cm^3/cm^3	Fixed	Specific to soil texture, see Table 10			
Capillary Transition Zone height	cm^3/cm^3	Fixed	Specific to soil texture, see Table 10			
Q_{soil}	L/min	Variable	Specific to soil texture, see Table 10			
Soil air permeability	m^2	Variable	Specific to soil texture, see Table 10			
Building Depressurization	Pa	Variable	4	0-15	15	N/A
Henry's law constant (for single chemical)	-	Fixed	Specific to chemical, see Appendix B			
Free-Air Diffusion Coefficient (single chemical)	-	Fixed	Specific to chemical, see Appendix B			
Building Air exchange Rate	hr^{-1}	Variable	0.5	0.1-1.5	0.1	0.25
Building Mixing height – Basement scenario	m	Variable	3.66	2.44-4.88	2.44	3.66
Building Mixing height – Slab-on-grade scenario	m	Variable	2.44	2.13-3.05	2.13	2.44
Building Footprint Area – Basement Scenario	m^2	Variable	120	80-200+	80	100
Building Footprint Area – Slab-on-Grade Scenario	m^2	Variable	120	80-200+	80	100
Subsurface Foundation area – Basement Scenario	m^2	Variable	208	152-313+	152	180
Subsurface Foundation area – Slab-on-Grade Scenario	m^2	Fixed	127	85-208+	85	106
Depth to Base of Foundation – Basement Scenario	m	Fixed	2	N/A	N/A	2
Depth to Base of Foundation – Slab-on-Grade Scenario	m	Fixed	0.15	N/A	N/A	0.15
Perimeter Crack Width	mm	Variable	1	0.5-5	5	1
Building Crack ratio – Slab-on-Grade Scenario	dimensionless	Variable	0.00038	0.00019-0.0019	0.0019	3.77×10^{-4}
Building Crack ratio – Basement Scenario	dimensionless	Variable	0.0002	0.0001-0.001	0.001	2.2×10^{-4}
Crack Dust Water-Filled Porosity	cm^3/cm^3	Fixed	Dry	N/A	N/A	Dry
Building Foundation Slab Thickness	m	Fixed	0.1	N/A	N/A	0.1

Reference: US EPA (2004)
crack width and differential pressure
for Parameter Summary Table

TABLE 7. RANGE OF VALUES FOR SELECTED INPUT PARAMETERS

Input parameter	Practical range of values	Default value
Soil water-filled porosity (θ_w)	0.04 – 0.33 cm^3/cm^3[a]	Soil dependent see Table 10
Soil vapor permeability (k_v)	10^{-6} – 10^{-12} cm^2[b,c]	10^{-8} cm^2[d]
Soil-building pressure differential (ΔP)	0 – 20 Pa[3]	4 Pa[f]
Media initial concentration (C_R, C_w)	User-defined	NA
Depth to bottom of soil contamination (L_b)	User-defined	NA
Depth to top of concentration (L_T)	User-defined	NA
Floor-wall seam gap (w)	0.05 – 1.0 cm[e]	0.1 cm[e]
Soil organic carbon fraction (f_{oc})	0.001 – 0.006[a]	0.002[a]
Indoor air exchange rate (ER)	0.18 – 1.26 (H^{-1})[g]	0.25 (h^{-1})[g,h]
Soil total porosity (n)	0.34 – 0.53 cm^3/cm^3[a]	0.43 cm^3/cm^3[a]
Soil dry bulk density (ρ_b)	1.25 – 1.75 g/cm^3[a]	1.5 g/cm^3[a]

[a]U.S. EPA (1996a and b).
[b]Johnson and Ettinger (1991).
[c]Nazaroff (1988).
[d]Based on transition point between diffusion and convection dominated transport from Johnson and Ettinger (1991).
[e]Eaton and Scott (1984); Loureiro et al. (1990).
[f]Loureiro et al. (1990); Grimsrud et al. (1983).
[g]Koontz and Rector (1995).
[h]Parker et al. (1990).
[i]U.S. DOE (1995).

Reference: US EPA (2011) residential building air exchange rate for building parameter summary table

indoor sinks), lower values for either the indoor volume or the air exchange rate will result in higher indoor-air concentrations. Thus, values near the lower end of the distribution (e.g., 10th percentile) for either parameter are appropriate in developing conservative estimates of exposure.

There are some uncertainties in, or limitations on, the distribution for volumes and air exchange rates that are presented in this chapter. For example, the RECS contains information on floor area rather than total volume. The PFT database did not base its measurements on a sample that was statistically representative of the national housing stock. PFT has been found to underpredict seasonal average air exchange by 20 to 30% Sherman (1989). Using PFT to determine air exchange can produce significant errors when conditions during the measurements greatly deviate from idealizations calling for constant, well-mixed conditions. Principal concerns focus on the effects of naturally varying air exchange and the effects of temperature in the permeation source. Some researchers have found that failing to use a time-weighted average temperature can greatly affect air exchange rate estimates (Leaderer et al., 1985). A final difficulty in estimating air exchange rates for any particular zone results from interconnectedness of multi-zone models and the effect of neighboring zones as demonstrated by Sinden (1978) and Sandberg (1984).

Table 19-1. Summary of Recommended Values for Residential Building Parameters

	Mean	10th Percentile	Source
Volume of Residence[a]	492 m^3 (central estimate)[b]	154 m^3 (lower percentile)[c]	U.S. EPA 2010 analysis of U.S. DOE (2008a)
Air Exchange Rate	0.45 ACH (central estimate)[d]	0.18 ACH (lower percentile)[e]	Koontz and Rector (1995)

[a] Volumes vary with type of housing. For specific housing type volumes, see Table 19-6.
[b] Mean value presented in Table 19-6 recommended for use as a central estimate for all single family homes, including mobile homes and multifamily units.
[c] 10th percentile value from Table 19-8 recommended to be used as a lower percentile estimate.
[d] Median value recommended to be used as a central estimate based across all U.S. census regions (see Table 19-24).
[e] 10th percentile value across all U.S. census regions recommended to be used as a lower percentile value (see Table 19-24).
ACH = Air changes per hour.

Reference: US EPA (2011) commercial building air exchange rate for building parameter summary table

Table 19-26. Distributions of Residential Air Exchange Rates (in ACH)[a] by Climate Region and Season

Climate Region[b]	Season	Sample Size	Arithmetic Mean	Standard Deviation	Percentiles				
					10th	25th	50th	75th	90th
Coldest	Winter	161	0.36	0.28	0.11	0.18	0.27	0.48	0.71
	Spring	254	0.44	0.31	0.18	0.24	0.36	0.53	0.80
	Summer	5	0.82	0.69	0.27	0.41	0.57	1.08	2.01
	Fall	47	0.25	0.12	0.10	0.15	0.22	0.34	0.42
Colder	Winter	428	0.57	0.43	0.21	0.30	0.42	0.69	1.18
	Spring	43	0.52	0.91	0.13	0.21	0.24	0.39	0.83
	Summer	2	1.31	-	-	-	-	-	-
	Fall	23	0.35	0.18	0.15	0.22	0.33	0.41	0.59
Warmer	Winter	96	0.47	0.40	0.19	0.26	0.39	0.58	0.78
	Spring	165	0.59	0.43	0.18	0.28	0.48	0.82	1.11
	Summer	34	0.68	0.50	0.27	0.36	0.51	0.83	1.30
	Fall	37	0.51	0.25	0.30	0.30	0.44	0.60	0.82
Warmest	Winter	454	0.63	0.52	0.24	0.34	0.48	0.78	1.13
	Spring	589	0.77	0.62	0.28	0.42	0.63	0.92	1.42
	Summer	488	1.57	1.56	0.33	0.58	1.10	1.98	3.28
	Fall	18	0.72	1.43	0.22	0.25	0.42	0.46	0.74

[a] ACH = air changes per hour.

[b] The coldest region was defined as having 7,000 or more heating degree days, the colder region as 5,500–6,999 degree days, the warmer region as 2,500–5,499 degree days, and the warmest region as fewer than 2,500 degree days.

\- Few observations for summer results in colder regions. Data not available.

Source: Murray and Burmaster (1995).

Table 19-27. Air Exchange Rates in Commercial Buildings by Building Type

Building Type	*N*	Mean (ACH[a])	SD	10th Percentile	Range (ACH)
Educational	7	1.9			0.8 to 3.0
Office (<100,000 ft^2)	8	1.5			0.3 to 4.1
Office (>100,000 ft^2)	14	1.8			0.7 to 3.6
Libraries	3	0.6			0.3 to 1.0
Multi-use	5	1.4			0.6 to 1.9
Naturally ventilated	3	0.8			0.6 to 0.9
Total (all commercial)	40	1.5	0.87	0.60[b]	0.3 to 4.1

[a] ACH = air changes per hour.

[b] Calculated from data presented in Turk et al. (1987), Table IV.C.1.

N = Number of observations.

SD = Standard deviation.

Source: Turk et al. (1987).

Hydraulic Conductivity for parameter summary table

Groundwater elevation data are collected semi-annually. A groundwater contour map, developed using elevation data from the most recent sampling event, May 2015, is included as Figure 3. The depth to groundwater and the direction of groundwater flow has been generally consistent. Groundwater flow at the TPC site is generally east toward the River Raisin, the nearest body of water located 1,500 to 2,500 feet east of the site. The River Raisin is the regional discharge feature for groundwater beneath the TPC site. A mean horizontal hydraulic gradient of 0.001 was measured across the former TPC site using the June 2015 groundwater elevation data. Data from *in situ* hydraulic conductivity tests performed on monitoring wells screened in the unconfined sand and gravel aquifer were used to calculate a geometric mean hydraulic conductivity. The geometric mean hydraulic conductivity is 9.5×10^{-3} cm/s with an upper 95-percent confidence limit of 2.2×10^{-1} cm/s and a lower 95-percent confidence limit of 4.2×10^{-4} cm/s. Assuming an effective porosity of 0.3, the resultant estimated groundwater flow velocity is 3.2×10^{-5} cm/s (33 feet per year). The surface topography drops steeply downgradient of the site from an approximate elevation of 780 feet mean sea level (ft MSL) to an approximate elevation of 750 ft MSL in the wetland area adjacent to the River Raisin. East of the site, in proximity to the change in surface elevation, the horizontal hydraulic gradient increases; with this increase the groundwater flow velocity also increases east of the site.

The vertical hydraulic gradient in the upper sand/gravel aquifer is evaluated semi-annually at seventeen nested well pairs. Along the western (up gradient) portion of the site, the measured vertical hydraulic gradient is essentially neutral. Similarly, on-site nested well pairs also exhibit near neutral vertical gradients. Northeast of the site the hydraulic gradient varies from downward at well pairs MW-29s/d and MW-12s/d to near neutral at well pair MW-30s/d. East of the site a downward hydraulic gradient is observed, with the downward hydraulic gradient increasing to the south. This significant vertical downward gradient in the upper sand/gravel aquifer east/southeast of the site is the result of the presence of a higher hydraulic conductivity sand and gravel deposit that underlies the sand deposit, and a significant change in surface topography. At well pair MW-40s/d, near the river, the vertical gradient returns to near neutral. Throughout the duration of the project, these vertical gradients between well pairs has been consistent and stable.

2.3.2 Summary of Geologic Data Collected in 2015

Between April 27, 2015 and June 9, 2015, TRC completed a high resolution site characterization (HRSC) investigation as described in the April 2015 revision of the *MIP Investigation Report and Workplan for High Resolution Site Characterization* (HRSC Workplan).

Appendix I
MHC Calculations and Indoor Air Sample Data

Table I1

Summary of Chlorinated Volatile Organic Compounds in Indoor Air at MHC
Tecumseh Products Company
Tecumseh, Michigan

Analyte	Units	MDEQ Non-Residential Vapor Intrusion Indoor Air Screening Levels[1]	IA-MHC-01	IA-MHC-02
			10/30/2015	10/30/2015
1,1-Dichloroethane	ppbv	510	<0.10	<0.10
1,2-Dichloroethane	ppbv	1.2	<0.10	<0.10
1,1-Dichloroethene	ppbv	210	<0.10	<0.10
cis-1,2-Dichloroethene	ppbv	7.3	<0.10	<0.10
trans-1,2-Dichloroethene	ppbv	73	<0.10	<0.10
Tetrachloroethene	ppbv	25	**0.14**	<0.10
1,1,1-Trichloroethane	ppbv	4,600	**1.1**	**0.14**
Trichloroethene	ppbv	1.5	**0.63**	**0.19**
Vinyl Chloride	ppbv	12	<0.050	<0.050

Notes:

1) Vapor Intrusion Indoor Air Screening Levels are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.

ppbv - parts per billion by volume

Bold font denotes concentrations detected above laboratory reporting limits.

Denotes concentrations above indoor air screening level

Technical Memorandum

To:	Jason Smith, Tecumseh Products Company
From:	Stacy Metz and Laura Trozzolo, TRC
Subject:	Development of a Site Specific Attenuation Factor for the Off-Site Non-Residential Property Located at 805 S. Maumee Street in Tecumseh, Michigan
Date:	September 10, 2015
cc:	Graham Crockford, TRC Chris DeWetter, Tecumseh Products Company Douglas McClure, Conlin, McKenney & Philbrick, PC
Project No.:	225314.0000.0000

Objective

To calculate a site-specific sub-slab soil gas attenuation factor for the commercial building located southeast of the former Tecumseh Products Company (TPC) site, at 805 S. Maumee Street. This building is a large commercial structure used primarily as a warehouse for a furniture and hardware store. A portion of the building is leased to a tooling company.

Background

Volatile organic compounds (VOCs), including trichloroethylene (TCE), found in soil and groundwater in the vicinity of the former TPC site have the potential to move into soil gas. Under certain conditions, affected soil gas can migrate into nearby buildings. In order to further investigate this potential, TRC installed four soil gas monitoring points around the perimeter of the main building located at 805 South Maumee Street in September 2014[1]. Sample locations are illustrated on Figure 1. An initial soil gas sample event was completed in early October 2014 and a second event was completed in November 2014.

During the November 2014 soil gas sample event, soil gas concentrations were similar to the previous sample event, and all but one of the detected soil gas concentrations were below the generic non-residential soil gas screening levels set forth in the Guidance Document For The Vapor Intrusion Pathway (May 2013) created by the Michigan Department of Environmental Quality (MDEQ), as a

[1] There is a second pole-barn structure on-site. That structure is not routinely occupied by on-site staff.

technical reference that may be informative when conducting work at sites where vapor intrusion issues are a potential concern.[2]

During the fourth quarter 2014, the concentration of TCE at soil gas sample point, SG-22, ranged from 4,500 to 6,200 parts per billion by volume (ppbv), which exceeds the generic non-residential deep MDEQ soil gas screening level (SGSL) of 2,100 ppbv. Consequently, TRC, on behalf of TPC, requested permission to install a sub-slab soil gas monitoring point in the northeast corner of the main building located at 805 South Maumee Street. That sub-slab soil gas monitoring point, MHC-01, was installed on February 25, 2015, and a soil gas sample event was completed at both the newly installed sub-slab soil gas monitoring point and each of the four exterior soil gas monitoring locations on March 30, 2015. During that sampling event, the concentration of TCE at MHC-01 was 44 ppbv compared to the generic MDEQ non-residential sub-slab SGSL of 210 ppbv; the concentration of TCE at SG-22 (2,300 ppbv) remained above the generic non-residential deep MDEQ soil gas screening level.

Due to the expected temporal variability in soil gas concentrations, soil gas concentrations are monitored quarterly for a limited time to collect sufficient data to assess risk. The second quarter 2015 sampling event was completed on June 18, 2015. During this sampling event, the concentrations of TCE at both soil gas sample point SG-22 (6,300 ppbv) and sub-slab soil gas sample point MHC-01 (360 ppbv) increased when compared to the previous sampling event. The concentration of TCE at soil gas sample point MHC-01 exceeded the generic MDEQ non-residential sub-slab SGSL of 210 ppbv. Soil gas sample data are summarized in Table 1.

This exceedance of the generic MDEQ non-residential sub-slab SGSL does NOT automatically indicate unacceptable risk of indoor air exposure. Rather, it is an indication that further evaluation is merited. Many factors affect how much, if any, soil gas can migrate into indoor air, and because the potential for soil gas migration into indoor air is variable, generic soil gas screening levels are designed to be conservative and protective under reasonable worst-case conditions. For non-residential settings, the generic sub-slab soil gas attenuation factor was derived empirically from residential soil gas and indoor air data. The justification for this conservative assumption is that many commercial buildings (e.g., law offices, doctor offices, restaurants, daycare centers, etc.) are, in fact, converted residential buildings (USEPA 2015). For large non-residential structures, such as the main building located at 805 South Maumee Street, use of this empirical correlation may be excessively conservative due to the following:

- A higher air exchange rate is required and expected;
- A thicker building slab, with less cracks extending the full thickness of the slab is expected;
- Ceiling height is much greater; and
- Building area is much greater.

---

[2] The MDEQ Guidance Document for the Vapor Intrusion Pathway provides the following disclaimer: "A policy guidance document cannot establish regulatory requirements for parties outside of the MDEQ. It is explanatory and provides direction to staff, guidance to the regulated community, and consistency in enforcing the NREPA, but does not have the force and effect of law and is not legally binding on the public or the regulated community."

Typically, USEPA recommends indoor air sampling concurrent with sub-slab soil gas sampling to calculate a building-specific attenuation factor. However, potential background indoor air sources make that approach unreliable.

The majority of the building is used as a warehouse for a hardware and furniture store. The new furniture and carpets stored in the warehouse are a potential source of both TCE and 1,1,1-trichloroethane (1,1,1-TCA) to indoor air. Because the potential indoor sources of TCE and 1,1,1-TCA cannot feasibility be eliminated and concentrations emanating from the indoor sources would be difficult to quantify, collection of indoor air for purposes of calculating a soil gas attenuation factor into indoor air is impractical.

USEPA (2015) guidance suggests that background sources may be determined through a comparison of the relative concentrations of multiple compounds present in both soil gas and indoor air. This approach works best if multiple compounds are detected in both soil gas and indoor air. 1,1,1-TCA is the only other compound detected in soil gas at a detected concentration comparable to TCE. Because there are potential indoor air sources for both of these compounds, indoor air sampling would work only if neither TCE nor 1,1,1-TCA are detected in indoor air. If either or both compounds are detected, the source of the detection is unknown and the indoor air sampling results provide null data, neither demonstrating that vapor intrusion poses an unacceptable risk nor demonstrating that TCE (or 1,1,1-TCA) is present due only to a background source (even a "high" concentration of TCE in indoor air without a corresponding 1,1,1-TCA detection does not conclusively show TCE in indoor air is due to vapor intrusion). USEPA (2015) guidance falls short in this area of uncertainty. The guidance recommends additional and ongoing data collection, but provides no recommendations for how to end the process other than presumptive mitigation.

Given the uncertainty of indoor air sampling, the cost of presumptive mitigation for such a large structure, and the conservative nature of the generic non-residential soil gas attenuation factor when applied to large commercial buildings, TRC recommends calculating a building-specific attenuation factor of soil gas to indoor air to determine whether detected sub-slab soil gas concentrations merit further investigation and/or mitigation.

Methods

Consistent with industry standard practices the steady-source, building specific attenuation factor (α) was calculated using the 1991 Johnson and Ettinger Model. Use of this Model is an accepted means of estimating attenuation for site-specific conditions. In fact, USEPA (2015) vapor intrusion guidance uses this model (and input values consistent with residential structures) to verify and defend the reasonableness of its empirically derived recommended soil attenuation factor.

$$\alpha = \frac{C_{indoor}}{C_{source}} = \frac{\frac{D_T^{eff} A_B}{Q_B L_T} exp\left(\frac{Q_{soil} L_{crack}}{D_{crack}^{eff} \eta A_B}\right)}{exp\left(\frac{Q_{soil} L_{crack}}{D_{crack}^{eff} \eta A_B}\right) + \frac{D_T^{eff} A_B}{Q_B L_T} + \frac{D_T^{eff} A_B}{Q_{soil} L_T}\left(exp\left(\frac{Q_{soil} L_{crack}}{D_{crack}^{eff} \eta A_B}\right) - 1\right)}$$

where:

- C_{indoor} = Concentration of the constituent of concern in indoor air
- C_{source} = Concentration of the constituent of concern at some depth (L_T) below the foundation
- A_B = the surface area of the enclosed space in contact with soil [cm^2]
- D^{eff}_{crack} = the effective overall vapor-phase diffusion coefficient through the walls and foundation cracks [cm^2/d]
- D^{eff}_T = the effective overall vapor-phase diffusion coefficient in soil between the foundation and the depth L_T [cm^2/s]
- L_{crack} = the enclosed space foundation thickness [cm]
- L_T = the distance (depth) to the vapor source or other point of interest below foundation [cm], e.g., the depth of the sub-slab soil gas screened interval, measured from the foundation to the vapor source or other point of interest
- Q_B = the enclosed space volumetric air flow rate [cm^3/s] of fresh air; usually estimated to be the product of the enclosed-space volume (V_B [cm^3]) and the indoor air exchange rate with outdoor air (E_B [1/s])
- Q_{soil} = the pressure-driven soil gas flow rate from the subsurface into the enclosed space [cm^3/s]
- η = the fraction of enclosed space surface area open for vapor intrusion [cm^2/cm^2]; this is sometimes referred to as the "crack factor" and is estimated to be the total area of cracks, seams, and any perforations of surfaces in contact with soil divided by the total area in contact with soil.

Calculations are described in detail in Attachment 1.

Summary and Conclusion

Based on empirical data from residential structures, the Michigan Department of Environmental Quality (MDEQ) and USEPA recommend the use of a generic sub-slab soil gas attenuation factor of 0.03. As documented in Appendix A of the 2015 USEPA Vapor Intrusion Guidance, these empirically-derived values are consistent with modeled values for residential structures. Specifically, if 10th percentile building volumes and air exchange rates for residential structures are used as input values in the Johnson and Ettinger Model, the predicted soil gas attenuation factor is 0.02.

As documented in Attachment 1, input parameters for the Johnson and Ettinger Model were adjusted based on building-specific conditions at 805 S. Maumee Street. These calculations clearly show that the empirically-derived residential values grossly underestimate a reasonable conservative soil gas attenuation factor for large commercial structures, such as the property located at 805 South Maumee Street. **Based on this building-specific evaluation, the recommended soil gas attenuation factor is 0.0002, which is 150 times lower than the USEPA generic sub-slab soil gas attenuation factor.** Using the site-specific attenuation factor, the building specific soil gas screening level of the TCE is 7,500 ppbv. Both the measured sub-slab soil gas concentrations, and the deep soil gas concentrations around the building perimeter are below the building-specific screening level.

References

Environmental Quality Management, Inc. February 22, 2004. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. Prepared for USEPA under Contract Number 68-W-02-33.

Johnson, P.C. May 2002. Identification of Critical Parameters for the Johnson and Ettinger (1991) Vapor Intrusion Model. American Petroleum Institute. No. 17.

Johnson, P.C. and Ettinger, R.A. 1991. Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Buildings. Environmental Science and Technology, 25(8): 1445-1452.

Michigan Department of Environmental Quality – Remediation and Redevelopment Division. May 2013. Guidance Document for the Vapor Intrusion Pathway.

USEPA – OSWER. June 2015. OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air. OSWER Publication 9200.2-154.

Table

Table 1
Summary of Chlorinated Volatile Organic Compounds at MHC Soil Gas Sample Locations
Tecumseh Products Company
Tecumseh, Michigan

Analyte		1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Vinyl Chloride
MDEQ Non-Residential Sub-Slab SGSL [1]		69,000	160	28,000	980	9,800	3,300	610,000	210	1,500
MDEQ Non-Residential Deep SGSL [1]		690,000	1,600	280,000	9,800	98,000	33,000	6,100,000	2,100	15,000
Building Specific SGSL [2]		2,500,000	6,000	1,000,000	36,000	360,000	120,000	23,000,000	7,500	60,000
Units		ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv	ppbv
SG-22 (6-6.5')	10/2/2014	**120**	<20	<20	<20	<40	**230**	**7,000**	**6,200**	<20
	11/3/2014	**81**	<20	<20	<20	<40	**160**	**5,100**	**4,500**	<20
	3/30/2015	**63**	<20	<20	<20	<40	**100**	**2,800**	**2,300**	<20
	6/18/2015	**200**	<10	<10	**36**	<20	**330**	**6,100**	**6,300**	<10
SG-23 (5-5.5')	10/2/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	11/3/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**2.3**	<1.0	<1.0	<1.0
	3/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**4.1**	<1.0
SG-23 (DUP-01)	10/2/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
SG-24 (5-5.5')	10/2/2014	<1.0	<1.0	<1.0	<1.0	<2.0	**3.2**	<1.0	<1.0	<1.0
	11/3/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**3.3**	<1.0
	3/30/2015 [3]	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**2.0**	**2.1**	<1.0
SG-25 (5-5.5')	10/2/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**210**	**58**	<1.0
	11/3/2014	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**140**	**34**	<1.0
	3/30/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**8.5**	**4.9**	<1.0
	6/18/2015	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	**84**	**20**	<1.0
MHC-01 (0.5-1.0')	3/30/2015	**2.2**	<1.0	<1.0	<1.0	<2.0	<1.0	**96**	**44**	<1.0
	6/18/2015	**8.7**	<1.0	<1.0	<1.0	<2.0	**8.6**	**450**	**360**	<1.0

Notes:

1) As recommended by USEPA in an email dated August 1, 2013, generic soil gas screening levels (SGSLs) are taken from the May 2013 Michigan Department of Environmental Quality (MDEQ) Final Guidance Document for the Vapor Intrusion Pathway.

2) The building-specific SGSL was calculated used the building-specific attenuation factor (0.0002), calculated as documented in the TRC Technical Memorandum dated September 10, 2015.

3) Elevated concentrations of tracer detected. Results and detection limits may be biased low.

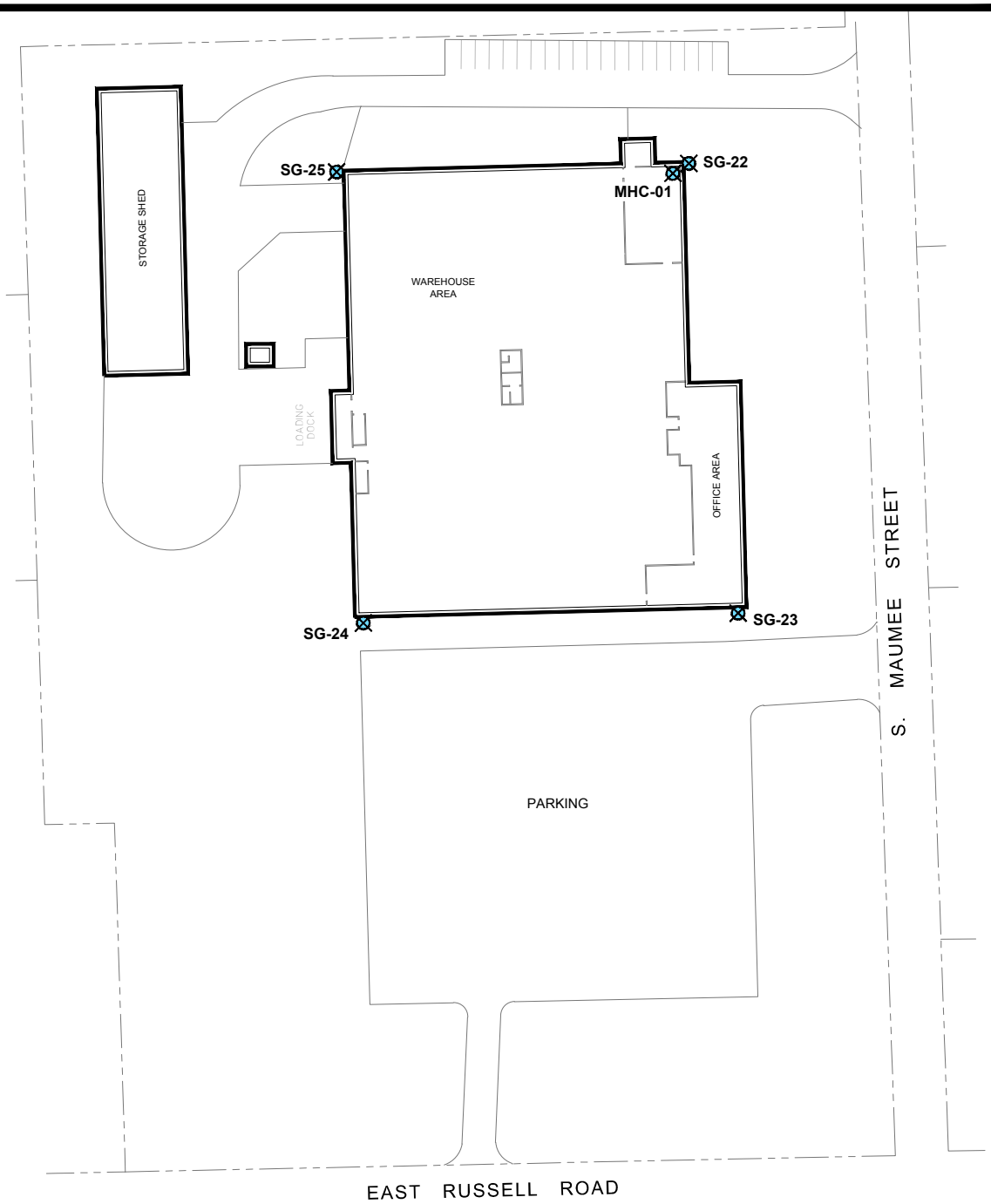
Bold font denotes concentrations detected above laboratory reporting limits.

Denotes concentrations above one or more soil gas screening level

ppbv - parts per billion by volume

NS - No Sample

Figure



LEGEND

PARCEL BOUNDARY

SG-22 SOIL GAS SAMPLE LOCATION AND NUMBER

NOTES:

1. BASE MAP DEVELOPED FROM SITE PLANS PROVIDED BY THE CITY OF TECUMSEH, PROPOSED BUILDING FOR TECUMSEH INDUSTRIAL GROUP, JOB NO. 1327, OCTOBER 1961 AND MANUFACTURING PLANT: TECUMSEH AREA INDUSTRIAL DEVELOPMENT ASSOC., EDWARD J. MOSSING, JOB NO. 6205, JUNE 1969.

N

0 120' 240'

APPROXIMATE SCALE IN FEET

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PROJECT:

FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:

SOIL GAS MONITORING LOCATIONS AT
805 SOUTH MAUMEE STREET

DRAWN BY:	DGS
APPROVED BY:	GC
PROJ. NO.	225314
FILE NO.	225314.0000.01.dwg
DATE:	SEPTEMBER 2015

FIGURE 1

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\225314\0000_2015 2Q Rpt\225314.0000.01.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.386863
Dwg Size: 8.66 Mb
Plot Date: September 2, 2015
Plot Time: 1:58 PM
Attached Xrefs:
Attached Images:
Layout: FIG01 SG Monitoring Locs

Attachment 1
Attenuation Factor Calculation

Calculation of a Building Specific Attenuation Factor for 805 S. Maumee Street

Consistent with industry standard practices the steady-source, building specific attenuation factor (α) was calculated using the Johnson and Ettinger Model:

$$\alpha = \frac{C_{indoor}}{C_{source}} = \frac{\frac{D_T^{eff} A_B}{Q_B L_T} exp\left(\frac{Q_{soil} L_{crack}}{D_{crack}^{eff} \eta A_B}\right)}{exp\left(\frac{Q_{soil} L_{crack}}{D_{crack}^{eff} \eta A_B}\right) + \frac{D_T^{eff} A_B}{Q_B L_T} + \frac{D_T^{eff} A_B}{Q_{soil} L_T}\left(exp\left(\frac{Q_{soil} L_{crack}}{D_{crack}^{eff} \eta A_B}\right) - 1\right)}$$

where:

- C_{indoor} = Concentration of the constituent of concern in indoor air
- C_{source} = Concentration of the constituent of concern at some depth (L_T) below the foundation
- A_B = the surface area of the enclosed space in contact with soil [cm^2]
- D^{eff}_{crack} = the effective overall vapor-phase diffusion coefficient through the walls and foundation cracks [cm^2/d]
- D^{eff}_T = the effective overall vapor-phase diffusion coefficient in soil between the foundation and the depth L_T [cm^2/s]
- L_{crack} = the enclosed space foundation thickness [cm]
- L_T = the distance (depth) to the vapor source or other point of interest below foundation [cm], e.g., the depth of the sub-slab soil gas screened interval, measured from the foundation to the vapor source or other point of interest
- Q_B = the enclosed space volumetric air flow rate [cm^3/s] of fresh air; usually estimated to be the product of the enclosed-space volume (V_B [cm^3]) and the indoor air exchange rate with outdoor air (E_B [1/s])
- Q_{soil} = the pressure-driven soil gas flow rate from the subsurface into the enclosed space [cm^3/s]
- η = the fraction of enclosed space surface area open for vapor intrusion [cm^2/cm^2]; this is sometimes referred to as the "crack factor" and is estimated to be the total area of cracks, seams, and any perforations of surfaces in contact with soil divided by the total area in contact with soil.

Model input parameters were determined as described below and summarized in the attached table.

Primary Model Input: Depth of C_{source}

The objective of this calculation is to determine the attenuation factor between indoor air and a <u>sub-slab</u> soil gas. The sample point construction form for sample point MHC-01 was used to determine the distance (depth) to the vapor source or other point of interest (e.g., the screened interval below the slab). Therefore:

$$L_T = depth\ to\ center\ of\ screened\ interval = 10\ inches$$

$$\boldsymbol{L_T = 25.4\ cm}$$

Primary Model Input: Building Area

Building area was determined directly from the building floor plan (dated June 19, 1969) provided by the City of Tecumseh. Google Earth™ was used to verify these measurements and confirm that no changes to building footprint were made since construction. For determination of the total building area, the building footprint was sub-divided into three rectangular sub-sections:

$$A_B = (L_1 \times W_1) + (L_2 \times W_2) + (L_3 \times W_3)$$

$$A_B = (240ft \times 320ft) + (23ft \times 14ft) + (40ft \times 160ft)$$

$$A_B = 76{,}800ft^2 + 322ft^2 + 6{,}400ft^2 = 83{,}522ft^2$$

$$\boldsymbol{A_B = 7.759\ x\ 10^7\ cm^2}$$

Primary Model Input: Foundation Thickness

The foundation thickness was determined from the engineering drawings provided by the City of Tecumseh which report the concrete thickness of 5 inches. This thickness was verified through direct measurement. Field notes from the installation of sample point MHC-01 report a measured concrete thickness of 5.5 inches. To be conservative, the lower value was used:

$$L_{crack} = 5\ inches$$

$$\boldsymbol{L_{crack} = 12.7\ cm}$$

Primary Model Input: Vapor Phase Diffusion Coefficients

The effective overall vapor-phase diffusion coefficient in soil between the foundation and the depth L_T, may allow for layers of materials having different total porosity. However, given the limited distance to the depth L_T and the building age (i.e., an engineered sub-base), the soil is assumed to be homogeneous. Given a homogeneous material the vapor-phase diffusion coefficient is calculated from a combination of partitioning expressions[3].

$$D^{eff} = D^{air}\frac{\theta_V^{3.33}}{\theta_T^2} + \left(\frac{D^{H20}}{H_i}\right)\frac{\theta_m^{3.33}}{\theta_T^2}$$

where:

- D^{eff} = vapor phase diffusion coefficient
- H_i = the chemical-specific Henry's Law constant [(ug/m^3-vapor)/(ug/ m^3-H_2O)]
- θ_m = the volumetric moisture content [m^3-H_2O/ m^3-soil]
- θ_T = the total porosity [m^3-voids/ m^3-soil]

[3] This Millington-Quirk effective diffusion coefficient formulation is referenced in the 1991 Johnson and Ettinger Model publication and used in subsequent spreadsheets prepared by USEPA.

— θ_V = the volumetric vapor content (=$\theta_T - \theta_m$) [m^3-vapor/ m^3-soil]

— D^{air} = the chemical-specific molecular diffusion coefficient in air [m^2/d]

— D^{H2O} = the chemical-specific molecular diffusion coefficient in water [m^2/d]

Moreover the soil filling the cracks is assumed to be the same homogeneous material as the material directly beneath the slab. Therefore:

$$D^{eff} = D_T^{eff} = D_{crack}^{eff}$$

Microsoft Excel™ spreadsheets prepared by USEPA provide chemical specific parameters and reasonable estimates of soil properties that can reasonably be input into this equation to calculate vapor phase diffusion coefficients.

— Published values for Henry's Law Constants are adjusted to be consistent with the average soil temperature. For Tecumseh the average soil and groundwater temperature was taken from a map of average groundwater temperature accessed via the EPA On-line Tools for Site Assessment Calculation (http://www.epa.gov/athens/learn2model/part-two/onsite/tempmap.html, accessed on August 24, 2015). The average groundwater temperature in Tecumseh, Michigan is 10ºC. Temperature specific Henry's Law Constant were calculated using the Microsoft Excel™ spreadsheets prepared by USEPA.

  - H_{TCE} = 0.197
  - H_{TCA} = 0.366

— Diffusivity in air varies by chemical

  - $D^{air}_{TCE} = 6.87 \times 10^{-2}$ cm^2/s
  - $D^{air}_{TCA} = 6.48 \times 10^{-2}$ cm^2/s

— Diffusivity in water varies by chemical

  - $D^{H2O}_{TCE} = 1.02 \times 10^{-5}$ cm^2/s
  - $D^{H2O}_{TCA} = 9.60 \times 10^{-6}$ cm^2/s

— Based on local geology and typical building practices, the sub-slab soil is assumed to be sandy. From the USEPA Soil Properties Lookup Table:

  - $\theta_T = 0.375$
  - $\theta_m = 0.054$
  - $\theta_V = \theta_T - \theta_m = 0.321$

Therefore,

$$D_{TCE}^{eff} = 6.87 \text{ x } 10^{-2} cm^2/s \left(\frac{0.321^{3.33}}{0.375^2}\right) + \left(\frac{1.02 \text{ x } 10^{-5} cm^2/s}{0.366}\right)\left(\frac{0.054^{3.33}}{0.375^2}\right)$$

$$D_{TCE}^{eff} = 1.11 \text{ x } 10^{-2} cm^2/s$$

$$D_{TCA}^{eff} = 6.48 \text{ x } 10^{-2} cm^2/s \left(\frac{0.321^{3.33}}{0.375^2}\right) + \left(\frac{9.60 \text{ x } 10^{-6} cm^2/s}{0.197}\right)\left(\frac{0.054^{3.33}}{0.375^2}\right)$$

$$D_{TCE}^{eff} = 1.05 \text{ x } 10^{-2} cm^2/s$$

Based on this evaluation, the chemical properties of TCE and 1,1,1-TCA are similar and their vapor phase diffusion coefficients are approximately the same. For purposes of the attenuation factor calculation, the same vapor phase diffusion coefficient will be used for both chemicals.

$$\boldsymbol{D_T^{eff} = D_{crack}^{eff} = 1.1 \text{ x } 10^{-2} cm^2/s}$$

Primary Model Input: Enclosed Space Volumetric Air Flow Rate

The enclosed space volumetric air flow rate is estimated to be the product of the enclosed-space volume (V_B) and the indoor air exchange rate (E_B).

- The total area, $A_B = 7.759 \text{ x } 10^7\ cm^2$ $(calculated\ above)$
- Area is subdivided into a "manufacturing" area and an "office" area.
  - The office area has an area (A_{office}) of 5,600 ft^2 (5.203 x 10^6 cm^2), from floor plan dated 10/30/1961
  - The manufacturing area has an area (A_{mftg}) of 7.239 x 10^7 cm^2, calculated A_B - A_{office}
- The office area has a ceiling height (H_{office}) of 10 feet (305 cm), from floor plan dated 10/30/1961
- The manufacturing area has a ceiling height (H_{mftg}) of 14 feet (427 cm), from floor plan dated 10/30/1961

Therefore the enclosed-space volume is calculated as shown below:

$$V_B = \left(A_{office} \times H_{office}\right) + \left(A_{mftg} \times H_{mftg}\right)$$

$$V_B = (5.203\ x\ 10^6\ cm^2 \times 305\ cm) + (7.239\ x\ 10^7\ cm^2 \times 427\ cm)$$

$$V_B = 3.25\ x\ 10^{10}\ cm^3$$

The indoor air exchange rate is approximated using published values. The 2011 USEPA Exposure Factors Handbook provides a literature review and summary of recommended values in Chapter 19. For non-residential buildings, the mean air exchange rate is 1.5 changes

per hour and the 10th percentile value is 0.60 changes per hour. The 10th percentile value is used as a conservative low end estimate of the air exchange rate.

$$E_B = 0.60\ hr^{-1} = 1.67\ x\ 10^{-4}\ s^{-1}$$

Therefore the enclosed space volumetric air flow rate is calculated as

$$Q_B = V_B \times E_B$$

$$Q_B = 3.25\ x\ 10^{10}\ cm^3 \times 1.67\ x\ 10^{-4}\ s^{-1}$$

$$Q_B = 5.42\ x\ 10^6\ \frac{cm^3}{s}$$

Primary Model Input: Enclosed Space Volumetric Air Flow Rate

The pressure-driven soil gas flow rate from the subsurface into the enclosed space is approximated by USEPA using the following theoretical expression:

$$Q_{soil} = \frac{2\pi k \Delta P X_{crack}}{\mu \ln\left({2Z_{crack}}/{R_{crack}}\right)}$$

where:

- k = the soil permeability (near foundation) to air flow [cm^2]
- ΔP = the indoor-outdoor pressure difference [$g/cm\text{-}s^2$]
- X_{crack} = the total length of cracks through which soil gas vapors are flowing [cm]
- μ = the viscosity of air [g/cm-s]
- Z_{crack} = the crack opening depth below grade [cm]
- R_{crack} = the effective crack radius or width [cm]

The effective soil permeability and vapor viscosity as a function of soil temperature are calculated using the Microsoft Excel™ spreadsheets prepared by USEPA. For sandy soil:

$$k = 9.91\ x\ 10^{-8} cm^2$$

$$\mu = 1.75\ x10^{-4}\ {g}/{cm - s}$$

Using the default assumptions included in the Microsoft Excel™ spreadsheets prepared by USEPA, the crack opening depth is equivalent to the foundation thickness. Therefore:

$$Z_{crack} = 12.7cm$$

Using the default assumed pressure change in the Microsoft Excel™ spreadsheets prepared by USEPA:

$$\Delta P = 4Pa = 40\frac{g}{cm - s^2}$$

Similarly, using the default assumptions included in the Microsoft Excel™ spreadsheets prepared by USEPA, the crack width is assumed to be 0.1 cm for slab-on-grade structures. Therefore:

$$R_{crack} = 0.1cm$$

Based visual inspection, the concrete floor is well maintained. Therefore the total length of the cracks through which soil gas vapors are flowing is equal to the building perimeter. Based on visual inspection of the engineering drawings, the total crack length is estimated as follows:

$$X_{crack} = 2L_1 + 2W_1 + 2W_2 \ + 2L_3 \ (2L_1 \times W_1) + (L_2 \times W_2) + (L_3 \times W_3)$$

$$X_{crack} = (2 \ \times 240ft) + (2 \times 320ft) + (2 \times 14ft) + (2 \times 40ft)$$

$$X_{crack} = 480ft + 640ft + 28ft + 80ft = 1228ft$$

$$X_{crack} = \mathbf{37,430\ cm}$$

From above

$$Q_{soil} = \frac{2\pi(9.91\ x\ 10^{-8}cm^2) \times 40\frac{g}{cm - s^2} \times 37{,}430cm}{\left(1.75\ x10^{-4}\ {}^{cm}/_{g-s}\right)\ \ln\left({}^{2(12.7cm)}/_{0.1cm}\right)}$$

$$\boldsymbol{Q_{soil} = 962\ \frac{cm^3}{s} = 9.62\ x10^{-4}\ {}^{m^3}/_{s} = 57.7\ {}^{L}/_{min}}$$

The published typical range for Q_{soil} is between 1 L/min and 10 L/min, however Q_{soil} increases with building size. This value is above the typical range due to a larger industrial building size.

Primary Model Input: Crack Factor

The fraction of enclosed space surface area open for vapor intrusion is estimated as the ratio of the total cracks, seam and perforation to the total foundation area in contact with the soil. Therefore:

$$\eta = \frac{X_{crack} \times R_{crack}}{A_B}$$

$$\eta = \frac{37{,}430\ cm \times 0.1\ cm}{7.759\ x\ 10^7\ cm^2}$$

$$\boldsymbol{\eta = 4.82\ \mathrm{x}\ 10^{-6}}$$

Model input parameters were determined as described above. In summary:

- $A_B = 7.759 \times 10^7$ cm^2
- $D^{eff}_{crack} = 1.1 \times 10^{-2}$ cm^2/s
- $D^{eff}_T = 1.1 \times 10^{-2}$ cm^2/s
- $L_{crack} = 12.7$ cm
- $L_T = 25.4$ cm
- $Q_B = 5.42 \times 10^6$ cm^3/s
- $Q_{soil} = 9.62 \times 10^2$ cm^3/s
- $\eta = 4.82 \times 10^{-6}$

Recall from above that the attenuation factor is calculated using the following equation:

$$\alpha = \frac{\frac{D_T^{eff} A_B}{Q_B L_T} exp\left(\frac{Q_{soil} L_{crack}}{D_{crack}^{eff} \eta A_B}\right)}{exp\left(\frac{Q_{soil} L_{crack}}{D_{crack}^{eff} \eta A_B}\right) + \frac{D_T^{eff} A_B}{Q_B L_T} + \frac{D_T^{eff} A_B}{Q_{soil} L_T}\left(exp\left(\frac{Q_{soil} L_{crack}}{D_{crack}^{eff} \eta A_B}\right) - 1\right)}$$

To simplify calculation, repeated terms are refined below:

$$X = \frac{D_T^{eff} A_B}{Q_B L_T} = \frac{1.1 \text{ x } 10^{-2}\ cm^2/s \times 7.759\text{x } 10^7\ cm^2}{5.42\ x\ 10^6\ {}^{cm^3}/_s \times 25.4\ cm} = 6.20\ x\ 10^{-3}$$

$$Y = \frac{Q_{soil} L_{crack}}{D_{crack}^{eff} \eta A_B} = \frac{9.62\ x10^2\ {}^{cm^3}/_s \times 12.7\ cm}{1.1 \text{ x } 10^{-2} cm^2/s \times 4.82 \text{ x } 10^{-6} \times 7.759\text{x } 10^7\ cm^2} = 2{,}970$$

$$Z = \frac{D_T^{eff} A_B}{Q_{soil} L_T} = \frac{1.1 \text{ x } 10^{-2}\ cm^2/s \times 7.759\text{x } 10^7\ cm^2}{9.62 \text{ x } 10^2 cm^3/s \times 25.4\ cm} = 34.9$$

Such that

$$\alpha = \frac{Xexp(\mathrm{Y})}{exp(\mathrm{Y}) + \mathrm{X} + Z(exp(\mathrm{Y}) - 1)}$$

The term Y defined above represents the equivalent Peclet number for transport through the building foundation. As the value of this group approaches infinity, i.e., the exponent becomes too great to be calculated (as is the case above), and the attenuation factor approaches:

$$\alpha = \frac{X}{Z + 1}$$

Inputting values from above:

$$\alpha = \frac{6.20\ x\ 10^{-3}}{34.9 + 1} = 1.73\ x\ 10^{-4}$$

Therefore,

$$\alpha \approx 0.0002$$

Based on empirical data from residential structures, the MDEQ and USEPA recommend the use of a generic sub-slab soil gas attenuation factor of 0.03. As documented in Appendix A of the 2015 USEPA Vapor Intrusion Guidance, these empirically derived values are consistent with modeled values for residential structures. Specifically, if 10th percentile building volumes and air exchange rates for residential structures are used as input values in the Johnson Ettinger Model, the predicted soil gas attenuation factor is 0.02.

As documented in Attachment A, input parameters for California's Department of Toxic Substances Control (DTSC) version of the Johnson and Ettinger Model were adjusted based on building-specific conditions at 805 S. Maumee Street, when available. If a measured value was not available, default literature values based on an industrial building scenario were assumed. These calculations clearly show that default residential attenuation factors grossly overestimated the vapor intrusion of soil gas into the 805 S. Maumee Street building. **Based on this building specific evaluation, the recommended soil gas attenuation factor is 0.0002.** Using the site-specific attenuation factor, the building specific soil gas screening level of the TCE is 7,500 ppbv. Both the measured sub-slab soil gas concentrations, and the deep soil gas concentrations around the building perimeter are below the building-specific screening level.

Table A1
Summary of Input Parameters for Building Specific Attenuation Factor Calculation
Tecumseh Products Company
Tecumseh, Michigan

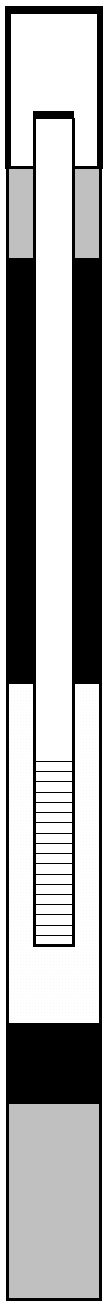
Input Parameter	Value Used	Units	Reference Number and Description	Notes
L_T, depth below grade to point of interest	25.4	cm	1. Construction form for MHC-01	Use depth to the middle of the well screen at the sub-slab sample point of interest
A_B, building area	7.759×10^7	cm^2	2. Building floor plan	Dated 1969, Google Earth™ used to verify no changes to building footprint since construction
L_{crack}, foundation thickness	12.7	cm	3. Engineering Drawing 4. Field notes from MHC-01 installation	To be conservative, lower of the two values used
Average soil/groundwater temperature	10	ºC	5. EPA groundwater temperature map (Figure 8)	Tecumseh is in southeast Michigan Used to determine temperature for adjusted Henry's Law constant
H_{TCE}, Henry's Law constant for TCE	0.197	--	6. EPA Intercalc spreadsheet for JEM	Intermediate calculation completed as described in supporting documentation
H_{TCA}, Henry's Law constant for TCA	0.366	--	6. EPA Intercalc spreadsheet for JEM	Intermediate calculation completed as described in supporting documentation
D^{air}_{TCE}, diffusivity of TCE in air	6.87×10^{-2}	cm^2/s	7. EPA ChemProps spreadsheet for JEM	Default chemical parameter
D^{air}_{TCA}, diffusivity of TCA in air	6.48×10^{-2}	cm^2/s	7. EPA ChemProps spreadsheet for JEM	Default chemical parameter
D^{H2O}_{TCE}, diffusivity of TCE in water	1.02×10^{-5}	cm^2/s	7. EPA ChemProps spreadsheet for JEM	Default chemical parameter
D^{H2O}_{TCA}, diffusivity of TCA in water	9.60×10^{-6}	cm^2/s	7. EPA ChemProps spreadsheet for JEM	Default chemical parameter
Soil type	Sand	--	8. Soil boring logs from on-site soil gas sample points	Shallow local geology a mix of clay, silt & sand Engineered sub-base observed during MHC-01 install. Sand selected to be conservative
θ_T or n, total porosity	0.375	--	9. EPA soil properties look-up table	Default parameter for sand
θ_m or θ_w, water-filled porosity	0.054	--	9. EPA soil properties look-up table	Default parameter for sand
V_B, building volume	3.25×10^{10}	cm^3	2. Building floor plan 3. Engineering Drawing	Calculated as the sum of the volume of each building section Volume of each section calculated as the product of ceiling height and area
E_B, indoor air exchange rate	1.67×10^{-4}	s^{-1}	10. 2011 EPA Exposure Factors Handbook	10th percentile value for commercial structures used as a conservative estimate
k, effective soil permeability	9.92×10^{-8}	cm^2	11. EPA Intercalc spreadsheet for JEM	Intermediate calculation completed as described in supporting documentation
μ, vapor viscosity	1.75×10^{-4}	g/cm-s	11. EPA Intercalc spreadsheet for JEM	
ΔP, interior to exterior pressure differential	40	$g/cm\text{-}s^2$	12. EPA recommended default for JEM	
R_{crack}, crack width	0.1	cm	12. EPA recommended default for JEM	
X_{crack}, crack length	37,430	cm	2. Building floor plan	Building perimeter, well maintained concrete slab

Reference 1

WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	Former Tecumseh Products Company: Off-Site Soil Gas	WELL ID:	**MHC-01**
PROJ. NO: 225314.0000	DATE INSTALLED: 2/25/2015 INSTALLED BY: S. Metz	CHECKED BY: CRG	

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (INCHES)
NM	0.0 GROUND SURFACE
	1.0 TOP OF CASING
	3.0 CEMENT SURFACE PLUG
	SEAL MATERIAL
	HYDRAULIC CEMENT
	GROUT/BACKFILL METHOD
6.0	FILL FROM ABOVE
	6.0 BOTTOM OF SEAL
	7.0 TOP OF SCREEN
	FILTER PACK MATERIAL
6.0	GLASS BEADS
	13.0 BOTTOM OF SCREEN
	17.5 BOTTOM OF FILTER PACK
	NA BENTONITE PLUG
	BACKFILL MATERIAL
	NA
	17.5 HOLE BOTTOM



NOTES:
Installed 5 feet west and 5 feet south of northeastern corner of Martin's Home Center building.
Tubing equipped with a stop cock to close sample point when not in use. Manhole is openned with a 1/4-inch hex wrench.

CASING AND SCREEN DETAILS

TYPE OF RISER: 1/4" Teflon Tubing

PIPE SCHEDULE: NA

PIPE JOINTS: NA

SOLVENT USED? NO

SCREEN TYPE: 6" Geoprobe Vapor Implant (304 SS)

SCR. SLOT SIZE: Wire Mesh

BOREHOLE DIAMETER:	6	IN. FROM	0	TO	5.5	IN.
	1	IN. FROM	5.5	TO	17.5	IN.
SURF. CASING DIAMETER:	4	IN. FROM	0	TO	3	IN.
		IN. FROM		TO		IN.

WELL DEVELOPMENT

DEVELOPMENT METHOD: NA

TIME DEVELOPING: -- HOURS

WATER REMOVED: -- GALLONS

WATER ADDED: -- GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: NA

COLOR BEFORE: NA

CLARITY AFTER: NA

COLOR AFTER: NA

ODOR (IF PRESENT): NA

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	--	T/PVC	--	--
DTB AFTER DEVELOPING:	--	T/PVC	--	--
SWE BEFORE DEVELOPING:	--	T/PVC	--	--
SWE AFTER DEVELOPING:	--	T/PVC	--	--
OTHER SWE:	--	T/PVC	--	--
OTHER SWE:	--	T/PVC	--	--

PROTECTIVE CASING DETAILS

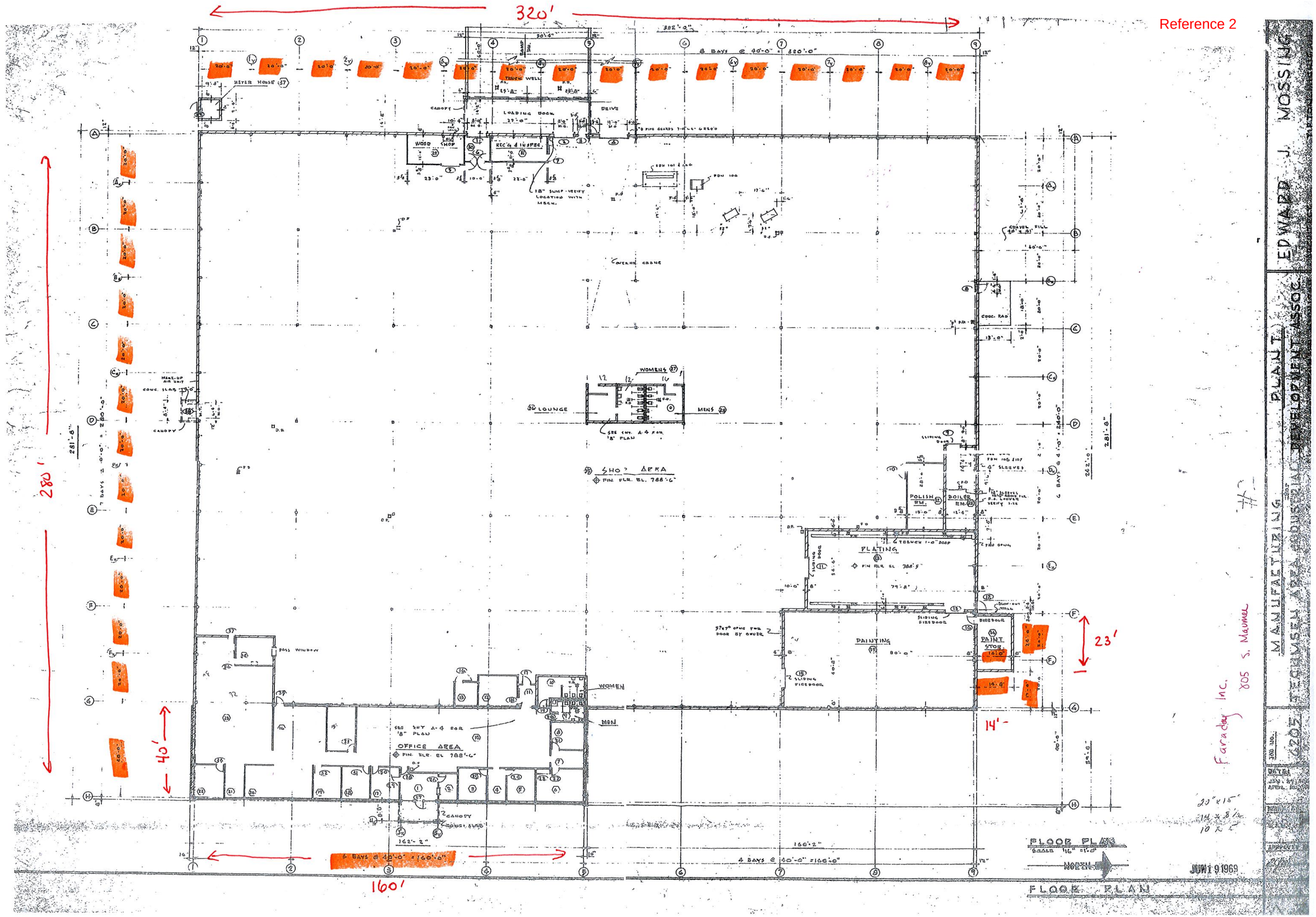
PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER INSTALLED? ☑ YES ☐ NO

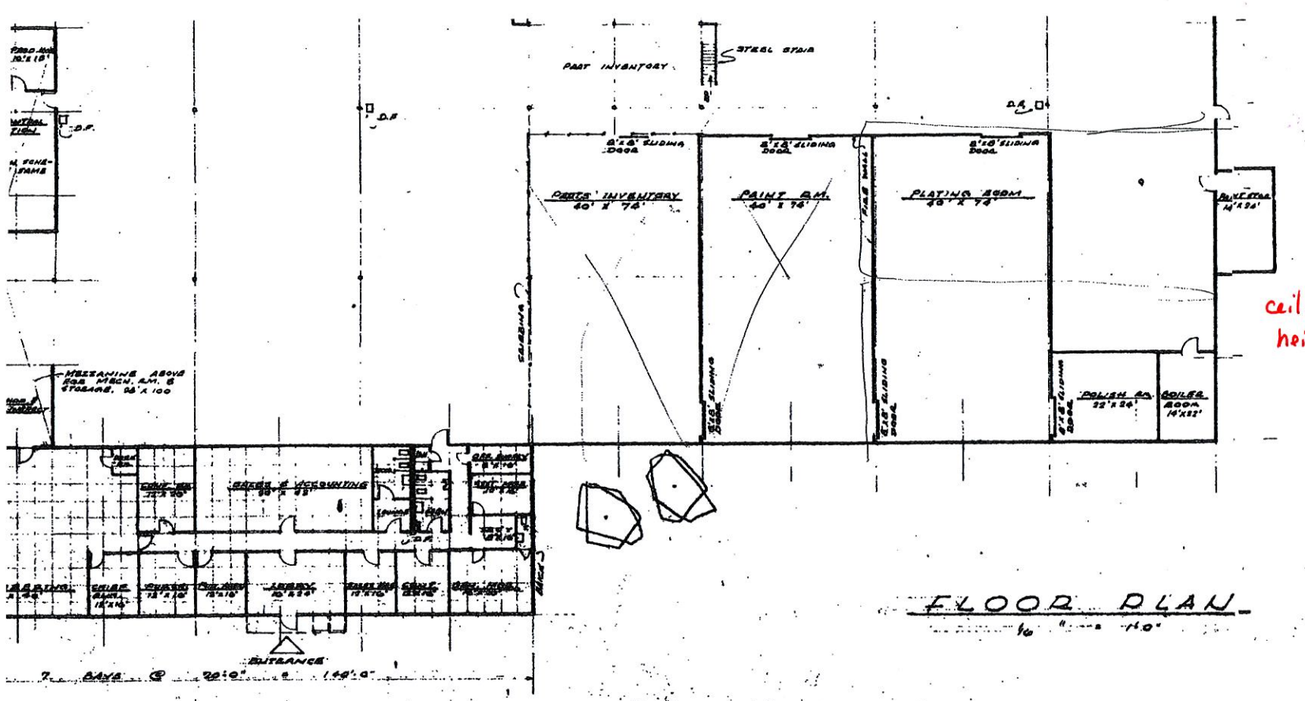
LOCK KEY NUMBER: NA

REVISED 06/2011

Reference 2

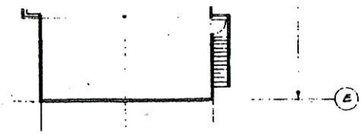

320'
280'
160'
40'
23'
14'
METER HOUSE
TRUCK WELL
LOADING DOCK
WOOD SHOP
REC'G & INSPEC.
OVERHD CRANE
WOMENS
LOUNGE
MENS
SHOP AREA
FIN. FLR. EL. 788'-6"
POLISH RM.
BOILER RM.
PLATING
PAINTING
PAINT STOR.
SLIDING FIREDOOR
PASS WINDOW
WOMEN
MEN
OFFICE AREA
FIN. FLR. EL. 788'-6"
CANOPY
FLOOR PLAN
NORTH
JUN 19 1969
MANUFACTURING
PLANT
DEVELOPMENT ASSOC
EDWARD J. MOSSING
Faraday Inc.
805 S. Maumee

Reference 3



FLOOR PLAN

1/16" = 1'-0"



MEZZANINE

1/16" = 1'-0"

MANUFACTURING AREA

14'-0" CLEAR CEILING HT.
5" CONC. FLOOR (REINF.)

OFFICE AREA = 5,600 ±

10'-0" CLEAR CEILING HT.
5" CONC. FLOOR (REINF.)

ceiling height

Concrete thickness

ceiling height

Concrete thickness

PROPOSED BUILDING FOR
TECUMSEH INDUSTRIAL DEVELOPMENT GROUP
TECUMSEH, MICHIGAN

REVISIONS		
DRAWN	APPROVED	JOB NO. 1327
CHECKED	DATE 10-30-61	SHEET NO. 2 of 4

61 B 255

Reference 4

SHEET NO. 3 OF 4
PROJECT NO. 225314
DATE 2/25/15
BY S. Motz
CHK'D C. Gregg

TRC Results you can rely on

SUBJECT TPC - MHC Sub-Slab Point Installation

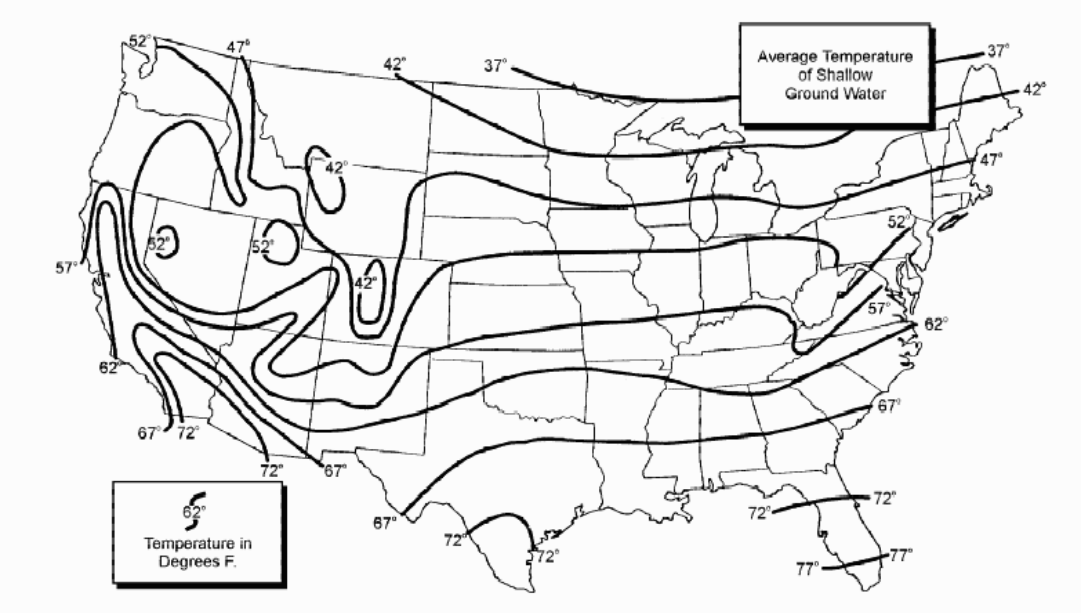
855 Arrive on-site - TPC
Leave GEM 2000 & Velosicale w/ C. Gregg
900 Arrive at 505 Maumee
Call Al. Roberts re site entry
Jim Roberts comes over from additional site across street
905 Meet J. Roberts → look at possible location
for NE corner is actually part of MHC warehouse (~40 ft from East wall)
Jim calls MHC Manager (Pat) for keys - door unlocked
915 Roger Christensen arrives on-site
get extension cord so generator does not need to be used
P. Roberts offers hand cart to facilitate equipment transport thru man doors
Prep for day & HAS Briefing
Verify utility locations - water & sewer will be deeper than proposed drilling; gas ~~up above grade~~ electric overhead
Select sample point location 5' west & 5' south of NE corner of building - See Photos
1008 Begin coring (wet core no dust generated) - DI water used
1019 Finished coring; Clean-up
Concrete 5.5 inches thick
Assemble sample point - total length is 10"
3" point; 6" screen & 1" bulb at top
Drill bit ~ 2" too short use pipe & hammer to extend depth
1050 Insert vapor point & backfill w/ glass beads
Cut manhole to fit
1105 Begin installing hydraulic cement to seal & fill
1125 Manhole in w/ hydraulic cement in anulas
allow to set & make minor adjustments to location/leveling as it sets
Install stop-cock assembly
1135 Begin clean-up while setting continues
1220 Finished clean-up & took photos; J. Roberts says we'll never even know its there.
Roger Christensen loads all equipment back up
1250 ~~The~~ Stearns & TPC depart MHC property; Break for lunch
1325 Back on-site; Fire watch for GW Sampling & P-Building SVE inspection
1723 P-Building inspection Complete ~~/ Off-Site~~
1730 Gate Locked & Off-Site

A

Reference 5

EPA United States Environmental Protection Agency

http://www.epa.gov/athens/learn2model/part-two/onsite/ex/jne_henrys_map.html



WCMS
Last updated on Thursday, January 10, 2013

INTERMEDIATE CALCULATIONS SHEET

Average Soil Tempurature (°C) = 10

Scenario: **Commercial**

Chemical: **Trichloroethylene**

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
25.4	0.321	0.003	9.92E-08	0.998	9.91E-08	37,430	3.32E+04	5.42E+06

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
7.76E+07	4.82E-06	12.7	8,557	4.58E-03	**1.97E-01**	1.75E-04	1.11E-02	145

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
12.7	3.32E+04	0.10	9.6E+02	1.11E-02	3.74E+02	#NUM!	**1.7E-04**	5.71E+00

Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
4.1E-06	2.0E-03

END

INTERMEDIATE CALCULATIONS SHEET

Average Soil Tempurature (C) = 10

Scenario: **Commercial**

Chemical: **1,1,1-Trichloroethane**

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
25.4	0.321	0.003	9.92E-08	0.998	9.91E-08	37,430	3.32E+04	5.42E+06

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
7.76E+07	4.82E-06	12.7	7,885	8.50E-03	**3.66E-01**	1.75E-04	1.05E-02	145

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
12.7	3.32E+04	0.10	9.6E+02	1.05E-02	3.74E+02	#NUM!	**1.7E-04**	5.70E+00

Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	1.0E+00

END

C_R = Initial soil concentration, g/g

ρ_b = Soil dry bulk density, g/cm^3

θ_w = Soil water-filled porosity, cm^3/cm^3

K_d = Soil-water partition coefficient, cm^3/g (= K_{oc} x f_{oc})

θ_a = Soil air-filled porosity, cm^3/cm^3

K_{oc} = Soil organic carbon partition coefficient, cm^3/g

f_{oc} = Soil organic carbon weight fraction.

If the initial soil concentration includes a residual phase, the user is referred to the NAPL-SCREEN or NAPL-ADV models as discussed in Appendix A. These models estimate indoor air concentrations and associated risks for up to 10 user-defined contaminants that comprise a residual phase mixture in soils.

C_{source} for groundwater contamination is estimated assuming that the vapor and aqueous-phases are in local equilibrium according to Henry's law such that:

$$C_{source} = H'_{TS} C_w \qquad (2)$$

where C_{source} = Vapor concentration at the source of contamination, g/cm^3-v

H'_{TS} = Henry's law constant at the system (groundwater) temperature, dimensionless

C_w = Groundwater concentration, g/cm^3-w.

The dimensionless form of the Henry's law constant at the system temperature (i.e., at the average soil/groundwater temperature) may be estimated using the Clapeyron equation by:

$$H'_{TS} = \frac{\exp\left[-\frac{\Delta H_{v,TS}}{R_c}\left(\frac{1}{T_S} - \frac{1}{T_R}\right)\right] H_R}{RT_S} \qquad (3)$$

where H'_{TS} = Henry's law constant at the system temperature, dimensionless

$\Delta H_{v,TS}$ = Enthalpy of vaporization at the system temperature, cal/mol

T_S = System temperature, °K

T_R = Henry's law constant reference temperature, °K

H_R = Henry's law constant at the reference temperature, atm-m^3/mol

R_C = Gas constant (= 1.9872 cal/mol - °K)

R = Gas constant (= 8.205 E-05 atm-m^3/mol-°K).

The enthalpy of vaporization at the system temperature can be calculated from Lyman et al. (1990) as:

$$\Delta H_{v,TS} = \Delta H_{v,b}\left[\frac{(1-T_S/T_C)}{(1-T_B/T_C)}\right]^n \qquad (4)$$

where $\Delta H_{v,TS}$ = Enthalpy of vaporization at the system temperature, cal/mol

$\Delta H_{v,b}$ = Enthalpy of vaporization at the normal boiling point, cal/mol

T_S = System temperature, °K

T_C = Critical temperature, °K

T_B = Normal boiling point, °K

n = Constant, unitless.

Table 2 gives the value of n as a function of the ratio T_B/T_C.

TABLE 2. VALUES OF EXPONENT n AS A FUNCTION OF T_B/T_C

T_B/T_C	N
< 0.57	0.30
0.57 - 0.71	0.74 (T_B/T_C) - 0.116
> 0.71	0.41

CHEMICAL PROPERTIES SHEET

Trichloroethylene

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
6.87E-02	1.02E-05	9.85E-03	25	7,505	360.36	544.20	4.1E-06	2.0E-03	131.39

END

Reference 7
p. 1 of 2

CHEMICAL PROPERTIES SHEET

1,1,1-Trichloroethane

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
6.48E-02	9.60E-06	1.72E-02	25	7,136	347.24	545.00	0.0E+00	1.0E+00	133.40

END

WELL CONSTRUCTION LOG

TRC

WELL NO. SG-22

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
Former Tecumseh Products Company Site: Off-Site Soil Gas	9/29/14	9/29/14	225314.0000.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Direct Push	---	---	12.0	2.0-3.0

Boring Location: 3 feet south and 2 feet east of northeast corner of Martin's Home Center building.

Personnel
Logged By - Rachel Sortor
Driller - Joe Fojtik

Drilling Equipment: Geoprobe 6610DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	Michigan

Water Level Observations:
While Drilling: Date/Time 9/29/14 00:00 ▽ Depth (ft bgs) 10.0
After Drilling: Date/Time Depth (ft bgs) NM

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
				TOPSOIL roots present.				
				CLAYEY SAND mostly fine sand, some clay, very dark grayish brown (10YR 3/2), no odor, moist, dense.	SC			Stepped out 1.0 foot south of boring to install soil vapor point.
1 GP	60		2	**SILTY CLAY** mostly clay, some silt, trace to few fine sand, dark grayish brown (10YR 4/2), no odor, moist, soft to stiff.	CL-ML			
			4	**SILTY CLAY WITH SAND** mostly clay, some silt, little fine sand, dark grayish brown (10YR 4/2), no odor, moist, soft to stiff.	CL-ML			
2 GP	55		6	**POORLY GRADED SAND WITH SILT** mostly fine sand, little silt, brown (10YR 4/3), moist, no odor, loose. Change to little medium sand at 7.0 feet.	SP-SM			
			8	**WELL GRADED SAND** mostly medium sand, some fine sand, dark yellowish brown (10YR 4/4), moist, no odor, loose.				
3 GP	85		10	▽ Change to saturated at 10.0 feet.	SW			
			12	End of boring at 12.0 feet below ground surface.				

SOIL_BORING WELL CONSTRUCTION LOG 004308.0001.0000 2012.GPJ RMT_CORP.GDT 225314.0000.0000 10/29/14

Signature: Rachel M. Sortor

Firm: TRC Environmental Corp.
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

TRC

WELL NO. SG-23

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
Former Tecumseh Products Company Site: Off-Site Soil Gas	9/29/14	9/29/14	225314.0000.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Direct Push	---	---	12.0	2.0-3.0

Boring Location: 6.5 feet west and 4 feet south of southeast corner of Martin's Home Center building.

Personnel
Logged By - Rachel Sortor
Driller - Joe Fojtik

Drilling Equipment: Geoprobe 6610DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	Michigan

Water Level Observations:
While Drilling: Date/Time 9/29/14 00:00 ▽ Depth (ft bgs) 9.0
After Drilling: Date/Time Depth (ft bgs) NM

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 GP	50		2	**CLAYEY SAND WITH SILT** mostly fine sand, some clay, little silt, very dark grayish brown (10YR 3/2), no odor, moist, dense.	SC-SM			Stepped out 1.0 feet west of boring to install soil vapor point.
			4	**SILTY CLAY WITH SAND** mostly clay, some silt, little fine sand, black (10YR 2/1), no odor, dry, very stiff.	CL-ML			Poor recovery in initial boring from 0.0 to 8.0 feet due to rock in shoe; Stepped over 2.0 feet south for an additional boring to improve recovery.
2 GP	70		6	**POORLY GRADED SAND** mostly fine sand, grayish brown (10YR 5/2), no odor, moist, loose.	SP			
				SILTY CLAY mostly clay, some silt, grayish brown (10YR 5/2), no odor, moist to dry, soft to very stiff.	CL-ML			
			8	**SILTY CLAY WITH SAND** mostly clay, some silt, little fine sand, few fine gravel, yellow (10YR 7/6), no odor, dry, very stiff.	CL-ML			
3 GP	60		10	▽ **WELL GRADED SAND** mostly medium sand, some coarse sand, dark yellowish brown (10YR 4/4), no odor, saturated, loose.	SW			
			12	End of boring at 12.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 004308.0001.0000_2012.GPJ RMT_CORP.GDT 225314.0000.0000 10/29/14

Signature: Rachel M. Sortor

Firm: TRC Environmental Corp.
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

TRC

WELL NO. SG-24

Page 1 of 1

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
Former Tecumseh Products Company Site: Off-Site Soil Gas	9/29/14	9/29/14	225314.0000.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Direct Push	---	---	12.0	2.0-3.0

Boring Location: 6 feet east and 4 feet south of southwest corner of Martin's Home Center building.

Personnel
Logged By - Rachel Sortor
Driller - Joe Fojtik

Drilling Equipment: Geoprobe 6610DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	Michigan

Water Level Observations:
While Drilling: Date/Time 9/29/14 00:00 ∇ Depth (ft bgs) 10.0
After Drilling: Date/Time Depth (ft bgs) NM

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
				CLAYEY SAND WITH SILT mostly fine sand, some clay, little silt, very dark grayish brown (10YR 3/2), no odor, dry, very dense.	SC-SM			
1 GP	50		2	**SILTY CLAY WITH SAND** mostly clay, some silt, little fine sand, dark yellowish brown (10YR 4/4), no odor, dry, very stiff.	CL-ML			Offset 1.0 foot east of boring to install soil vapor point.
			4	**WELL GRADED SAND** mostly medium sand, some fine sand, dark yellowish brown (10YR 4/4), no odor, moist, loose.				
2 GP	70		6					
			8		SW			
3 GP	70		10	∇ Change to saturated at 10.0 feet.				
			12	End of boring at 12.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 004308.0001.0000_2012.GPJ RMT_CORP.GDT 225314.0000.0000 10/29/14

Signature: Rachel M. Sortor

Firm: TRC Environmental Corp.
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

TRC

WELL NO. SG-25

Page 1 of 1

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
Former Tecumseh Products Company Site: Off-Site Soil Gas	9/29/14	9/29/14	225314.0000.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Terra Probe, Inc.	Direct Push	---	---	12.0	2.0-3.0

Boring Location: 5 feet west and 1 foot south of northwest corner of Martin's Home Center building.

Personnel
Logged By - Rachel Sortor
Driller - Joe Fojtik

Drilling Equipment: Geoprobe 6610DT

Civil Town/City/or Village:	County:	State:
Tecumseh	Lenawee	Michigan

Water Level Observations:
While Drilling: Date/Time 9/29/14 00:00 ▽ Depth (ft bgs) 9.0
After Drilling: Date/Time Depth (ft bgs) NM

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 GP	60		2	**CLAYEY SAND WITH SILT** mostly fine sand, some clay, little silt, very dark grayish brown (10YR 3/2), no odor, dry, dense.	SC-SM			Offset 1.0 foot east of boring to install soil vapor point.
				SILTY CLAY WITH SAND mostly clay, some silt, little medium sand, dark grayish brown (10YR 4/2), no odor, moist, very stiff.	CL-ML			
			4	**WELL GRADED SAND** mostly medium sand, some fine sand, dark yellowish brown (10YR 4/4), moist, no odor, loose.				
2 GP	50		6					
					SW			
			8	▽ Change to saturated at 9.0 feet.				
3 GP	60		10					
			12	End of boring at 12.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 004308.0001.0000 2012.GPJ RMT_CORP.GDT 225314.0000.0000 10/29/14

Signature: Rachel M. Sortor

Firm: TRC Environmental Corp.
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

Reference 9

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α_1 (1/cm)	N (unitless)	M (unitless)	n (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)	Bulk Density (g/cm^3)	θ_w (cm^3/cm^3)	SCS Soil Name
C	0.61	0.01496	1.253	0.2019	0.459	0.098	0.0092	1.43	0.215	Clay
CL	0.34	0.01581	1.416	0.2938	0.442	0.079	0.016	1.48	0.168	Clay Loam
L	0.50	0.01112	1.472	0.3207	0.399	0.061	0.020	1.59	0.148	Loam
LS	4.38	0.03475	1.746	0.4273	0.390	0.049	0.040	1.62	0.076	Loamy Sand
S	26.78	0.03524	3.177	0.6852	0.375	0.053	0.044	1.66	0.054	Sand
SC	0.47	0.03342	1.208	0.1722	0.385	0.117	0.025	1.63	0.197	Sandy Clay
SCL	0.55	0.02109	1.330	0.2481	0.384	0.063	0.029	1.63	0.146	Sandy Clay Loam
SI	1.82	0.00658	1.679	0.4044	0.489	0.050	0.0046	1.35	0.167	Silt
SIC	0.40	0.01622	1.321	0.2430	0.481	0.111	0.0039	1.38	0.216	Silty Clay
SICL	0.46	0.00839	1.521	0.3425	0.482	0.090	0.0056	1.37	0.198	Silty Clay Loam
SIL	0.76	0.00506	1.663	0.3987	0.439	0.065	0.011	1.49	0.180	Silt Loam
SL	1.60	0.02667	1.449	0.3099	0.387	0.039	0.030	1.62	0.103	Sandy Loam

(hour^{-1}). It is defined as the ratio of the airflow (m^3 hour^{-1}) to the volume (m^3). The distribution of airflows across the building envelope that contributes to air exchange and the interzonal airflows along interior flowpaths is determined by the interior pressure distribution. The forces causing the airflows are temperature differences, the actions of wind, and mechanical ventilation systems. Basic concepts on distributions and airflows have been reviewed by the American Society of Heating Refrigerating & Air Conditioning Engineers (ASHRAE, 2009). Indoor-outdoor and room-to-room temperature differences create density differences that help determine basic patterns of air motion. During the heating season, warmer indoor air tends to rise to exit the building at upper levels by stack action. Exiting air is replaced at lower levels by an influx of colder outdoor air. During the cooling season, this pattern is reversed: stack forces during the cooling season are generally not as strong as in the heating season because the indoor-outdoor temperature differences are not as pronounced.

The position of the neutral pressure level (i.e., the point where indoor-outdoor pressures are equal) depends on the leakage configuration of the building envelope. The stack effect arising from indoor-outdoor temperature differences is also influenced by the partitioning of the building interior. When there is free communication between floors or stories, the building behaves as a single volume affected by a generally rising current during the heating season and a generally falling current during the cooling season. When vertical communication is restricted, each level essentially becomes an independent zone. As the wind flows past a building, regions of positive and negative pressure (relative to indoors) are created within the building; positive pressures induce an influx of air, whereas negative pressures induce an outflow. Wind effects and stack effects combine to determine a net inflow or outflow.

The final element of indoor transport involves the actions of mechanical ventilation systems that circulate indoor air through the use of fans. Mechanical ventilation systems may be connected to heating/cooling systems that, depending on the type of building, recirculate thermally treated indoor air or a mixture of fresh air and recirculated air. Mechanical systems also may be solely dedicated to exhausting air from a designated area, as with some kitchen range hoods and bath exhausts, or to recirculating air in designated areas as with a room fan. Local air circulation also is influenced by the movement of people and the operation of local heat sources.

19.2. RECOMMENDATIONS

Table 19-1 presents the recommendations for residential building volumes and air exchange rates. Table 19-2 presents the confidence ratings for the recommended residential building volumes. The U.S. EPA 2010 analysis of the 2005 Residential Energy Consumption Survey (RECS) data indicates a 492 m^3 average living space (DOE, 2008a). However, these values vary depending on the type of housing (see Section 19.3.1.1). The recommended lower end of housing volume is 154 m^3. Other percentiles are available in Section 19.3.1.1. Residential air exchange rates vary by region of the country. The recommended median air exchange rate for all regions combined is 0.45 ACH. The arithmetic mean is not preferred because it is influenced fairly heavily by extreme values at the upper tail of the distribution. This value was derived by Koontz and Rector (1995) using the perflourocarbon tracer (PFT) database. Section 19.5.1.1.1 presents distributions for the various regions of the country. For a conservative value, the 10th percentile for the PFT database (0.18 ACH) is recommended (see Section 19.5.1.1.1).

Table 19-3 presents the recommended values for non-residential building volumes and air exchange rates. Volumes of non-residential buildings vary with type of building (e.g., office space, malls). They range from 1,889 m^3 for food services to 287,978 m^3 for enclosed malls. The mean for all buildings combined is 5,575 m^3. These data come from the Commercial Buildings Energy Consumption Survey (CBECS) (DOE, 2008b). The last CBECS for which data are publicly available was conducted in 2003. Table 19-4 presents the confidence ratings for the non-residential building volume recommendations. The mean air exchange rate for all non-residential buildings combined is 1.5 ACH. The 10th percentile air exchange rate for all buildings combined is 0.60 ACH. These data come from Turk et al. (1987).

Table 19-5 presents the confidence ratings for the air exchange rate recommendations for both residential and non-residential buildings. Air exchange rate data presented in the studies are extremely limited. Therefore, the recommended values have been assigned a "low" overall confidence rating, and these values should be used with caution.

Volume and air exchange rates can be used by exposure assessors in modeling indoor-air concentrations as one of the inputs to exposure estimation. Other inputs to the modeling effort include rates of indoor pollutant generation and losses to (and, in some cases, re-emissions from) indoor sinks. Other things being equal (i.e., holding constant the pollutant generation rate and effect of

INTERMEDIATE CALCULATIONS SHEET

Average Soil Tempurature (°C) = 10

Scenario: **Commercial**

Chemical: **Trichloroethylene**

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
25.4	0.321	0.003	**9.92E-08**	0.998	9.91E-08	37,430	3.32E+04	5.42E+06

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
7.76E+07	4.82E-06	12.7	8,557	4.58E-03	1.97E-01	**1.75E-04**	1.11E-02	145

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
12.7	3.32E+04	0.10	9.6E+02	1.11E-02	3.74E+02	#NUM!	**1.7E-04**	5.71E+00

Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
4.1E-06	2.0E-03

END

2.7 THE SOIL GAS MODELS

Use of the J&E Model has typically relied on a theoretical partitioning of the total volume soil concentration into the sorbed, aqueous, and vapor phases. The model has also relied on a theoretical approximation of vapor transport by diffusion and convection from the source of emissions to the building floor in contact with the soil. Use of measured soil gas concentrations directly beneath the building floor instead of theoretical vapor concentrations and vapor transport has obvious advantages that would help to reduce the uncertainty in the indoor air concentration estimates made by the model.

The soil gas models (SG-SCREEN and SG-ADV) are designed to allow the user to input measured soil gas concentration and sampling depth information directly into the spreadsheets. In the new models, the value of the user-defined soil gas concentration is assigned as the value of C_{source} in Equation 19. The steady-state (infinite source) attenuation coefficient (α) in Equation 19 is calculated using Equation 13. The steady-state solution for the attenuation coefficient is used because no evaluation has been made regarding the size and total mass of the source of emissions. The source of emissions, therefore, cannot be depleted over time. The soil gas models estimate the steady-state indoor air concentration over the exposure duration. For a detailed discussion of using the soil gas models as well as soil gas sampling, see Section 4 of this document.

2.8 SOIL VAPOR PERMEABILITY

Soil vapor permeability (k_v) is one of the most sensitive model parameters associated with convective transport of vapors within the zone of influence of the building. Soil vapor permeability is typically measured from field pneumatic tests. If field data are lacking, however, an estimate of the value of k_v can be made with limited data.

Soil intrinsic permeability is a property of the medium alone that varies with the size and shape of connected soil pore openings. Intrinsic permeability (k_i) can be estimated from the soil saturated hydraulic conductivity:

$$k_i = \frac{K_s \mu_w}{\rho_w \, g} \qquad (26)$$

where k_i = Soil intrinsic permeability, cm^2

K_s = Soil saturated hydraulic conductivity, cm/s

μ_w = Dynamic viscosity of water, g/cm-s (= 0.01307 at 10^oC)

ρ_w = Density of water, g/cm^3 (= 0.999)

g = Acceleration due to gravity, cm/s^2 (= 980.665).

Schaap and Leij (1998) computed the SCS class average values of the saturated hydraulic conductivity (K_s) for each of the 12 SCS soil textural classifications (Table 5). With these values, a general estimate of the value of k_i can be made by soil type. As an alternative, in situ measurements of the site-specific saturated hydraulic conductivity can be made and the results input into Equation 26 to compute the value of the soil intrinsic permeability.

Effective permeability is the permeability of the porous medium to a fluid when more than one fluid is present; it is a function of the degree of saturation. The relative air permeability of soil (k_{rg}) is the effective air permeability divided by the intrinsic permeability and therefore takes into account the effects of the degree of water saturation on air permeability.

TABLE 5. CLASS AVERAGE VALUES OF SATURATED HYDRAULIC CONDUCTIVITY FOR THE 12 SCS SOIL TEXTURAL CLASSIFICATIONS

Soil texture , USDA	Class average saturated hydraulic conductivity, cm/h
Sand	26.78
Loamy sand	4.38
Sandy loam	1.60
Sandy clay loam	0.55
Sandy clay	0.47
Loam	0.50
Clay loam	0.34
Silt loam	0.76
Clay	0.61
Silty clay loam	0.46
Silt	1.82
Silty clay	0.40

Parker et al. (1987) extended the relative air permeability model of van Genuchten (1980) to allow estimation of the relative permeabilities of air and water in a two- or three-phase system:

$$k_{rg} = (1 - S_{te})^{1/2} \left(1 - S_{te}^{1/M}\right)^{2M} \qquad (27)$$

where k_{rg} = Relative air permeability, unitless ($0 \le k_{rg} \le 1$)

S_{te} = Effective total fluid saturation, unitless

M = van Genuchten shape parameter, unitless.

Given a two-phase system (i.e., air and water), the effective total fluid saturation (S_{te}) is calculated as:

$$S_{te} = \frac{(\theta_w - \theta_r)}{(n - \theta_r)} \qquad (28)$$

where S_{te} = Effective total fluid saturation, unitless

θ_w = Soil water-filled porosity, cm^3/cm^3

θ_r = Residual soil water content, cm^3/cm^3

n = Soil total porosity, cm^3/cm^3.

Class average values for the parameters θ_r and M by SCS soil type may be obtained from Table 3.

The effective air permeability (k_v) is then the product of the intrinsic permeability (k_i) and the relative air permeability (k_{rg}) at the soil water-filled porosity θ_w.

2.9 CALCULATION OF A RISK-BASED SOIL OR GROUNDWATER CONCENTRATION

Both the infinite source model estimate of the steady-state building concentration and the finite source model estimate of the time-averaged building concentration represent the exposure point concentration used to assess potential risks. Calculation of a risk-based media concentration for a carcinogenic contaminant takes the form:

$$C_C = \frac{TR \, x \, AT_C \, x \, 365 \, days/yr}{URF \, x \, EF \, x \, ED \, x \, C_{building}} \qquad (29)$$

where C_C = Risk-based media concentration for carcinogens, µg/kg-soil, or µg/L-water

TR = Target risk level, unitless

AT_C = Averaging time for carcinogens, yr

URF = Unit risk factor, $\mu g/m^3)^{-1}$

EF = Exposure frequency, days/yr

ED = Exposure duration, yr

TABLE 7. RANGE OF VALUES FOR SELECTED INPUT PARAMETERS

Input parameter	Practical range of values	Default value
Soil water-filled porosity (θ_w)	0.04 – 0.33 cm^3/cm^3[a]	Soil dependent see Table 10
Soil vapor permeability (k_v)	10^{-6} – 10^{-12} cm^2[b,c]	10^{-8} cm^2[d]
Soil-building pressure differential (ΔP)	0 – 20 Pa[3]	4 Pa[f]
Media initial concentration (C_R, C_w)	User-defined	NA
Depth to bottom of soil contamination (L_b)	User-defined	NA
Depth to top of concentration (L_T)	User-defined	NA
Floor-wall seam gap (w)	0.05 – 1.0 cm[e]	0.1 cm[e]
Soil organic carbon fraction (f_{oc})	0.001 – 0.006[a]	0.002[a]
Indoor air exchange rate (ER)	0.18 – 1.26 (H^{-1})[g]	0.25 (h^{-1})[g,h]
Soil total porosity (n)	0.34 – 0.53 cm^3/cm^3[a]	0.43 cm^3/cm^3[a]
Soil dry bulk density (ρ_b)	1.25 – 1.75 g/cm^3[a]	1.5 g/cm^3[a]

[a]U.S. EPA (1996a and b).
[b]Johnson and Ettinger (1991).
[c]Nazaroff (1988).
[d]Based on transition point between diffusion and convection dominated transport from Johnson and Ettinger (1991).
[e]Eaton and Scott (1984); Loureiro et al. (1990).
[f]Loureiro et al. (1990); Grimsrud et al. (1983).
[g]Koontz and Rector (1995).
[h]Parker et al. (1990).
[i]U.S. DOE (1995).

Appendix J
Ambient Air Calculations

Technical Memorandum

To:	Jason Smith, Tecumseh Products Company
From:	Emily Sokol and Stacy Metz, TRC
Subject:	Determination of Ambient Air Concentrations Downwind of Residential SSDV Systems
Date:	November 23, 2015
cc:	Graham Crockford, TRC
Project No.:	226667.0000.0000

Objective

To calculate ambient air concentrations of trichloroethene (TCE) adjacent to sub-slab depressurization/ventilation (SSDV) systems installed at 6 residential properties near the former Tecumseh Products Company (TPC) site, resulting from stack emissions from those SSDV systems. The evaluated systems are located at 231 E. Cummins Street, 219 E. Cummins Street, 221 E. Cummins Street, 229 E. Cummins Street, 704 S. Maumee Street, and 408 S. Ottawa Street. The calculated ambient air concentrations were compared to the Michigan Department of Environmental Quality (MDEQ) residential indoor air criterion of 1.3 μg/m^3.

Methods

The concentration of TCE downwind of the source and the distance at which the highest concentration occurred were determined using a diffusion model of Gaussian plume distribution. The concentration, C, at a distance x downwind of the source was determined using the basic Gaussian plume equation (de Nevers 2000).

$$C\left(\frac{\mu g}{m^3}\right) = \frac{Q}{2\pi u \sigma_y \sigma_z} e^{-\left(\frac{y^2}{2\sigma_y^2} + \frac{(z-H)^2}{2\sigma_z^2}\right)}$$

where:

- C = Concentration of TCE (μg/m^3) at a distance x downwind from the source
- Q = flow rate of pollutant from stack source (μg/s)
- u = effective wind speed (m/s) at the height of the stack

- σ_x, σ_y = dispersion coefficients (m) in the x and y direction, respectively
- x = horizontal distance (km) downwind from the source
- y = horizontal distance (m) the plume moved along the y axis (distance away from the center line), assumed to be 0 to account for the highest possible concentration
- z = vertical distance (m) from the ground at which the concentration of interest would exist
- H = effective stack height (m), estimated from building construction (10 feet for each building level, ground floor approximately 0-2 feet above ground surface and stack 2 feet above roofline). It was assumed that plume rise was negligible

In order to determine the appropriate conditions for when exposure is most likely to occur and for how long, the following assumptions were made:

- Worst-case receptor: a child who spends the majority of his/her summer playing outside at home.
- TCE is the constituent of concern (COCs) which prompted SSDV system installation. Other COCs may be present in the subsurface. However risk is controlled by TCE which has both comparably high concentrations and comparably high toxicity.
- Exposure to the maximum concentration of TCE occurs outside, during daylight hours, up to 8 hours over a 24 hour period.

Atmospheric conditions vary temporally. A Microsoft Excel™ spreadsheet was designed to calculate ambient air concentrations under a range of typical atmospheric conditions. A summary of outputs for each property is included as Attachment 1. Input parameters were determined as described below. Reference documents used to support those calculations are provided as Attachment 2.

Using outputs for each typical atmospheric condition, the concentration of TCE in ambient air was calculated as a weighted average based on the frequency of those atmospheric conditions during Michigan summers over an 8-hour exposure period each day.

$$Final\ TCE\ Concentration = \frac{\sum_{i=1}^{n} w_i C_i}{\sum w_i} \times \frac{8\ hours}{24\ hours}$$

where

- w_i = the frequency (in percent) of the atmospheric conditions associated with concentration C_i
- C_i = Maximum concentration of TCE (μg/m^3) in ambient air for the modeled atmospheric conditions

Primary Model Input: Solar Insulation

To determine the typical daytime solar insolation category, average cloud cover data collected at the Lenawee County Airport since 2003 (WeatherSpark 2015) was used. Based on these

data, average daily cloud cover ranges from 7 to 19 percent. Using Table 7.7 from de Nevers (2000), the atmospheric stability class was determined to be **moderate**.

Primary Model Input: Flow Rate Q

The objective of this calculation is to determine the flow of TCE from each stack in units of μg/s. The system flow rate was designated as the maximum flow rate possible for the SSDV system of interest, provided in cubic feet per minute. This value was determined using the differential pressure measured at the U-tube manometer and blower curve for the system fan. The selected measured exhaust concentration was the average concentration (ppbv) measured at the nearest soil gas point over the past 3 years.

$$Q\ (\mu g/m^3) = \frac{Exhaust\ concentration\ (ppbv)}{0.19\ \frac{ppbv}{\mu g/m^3}} \times \left(system\ flow\ rate\ \left(\frac{ft^3}{min}\right) \times \frac{0.0283 m^3}{ft^3} \times \frac{1\ min}{60\ sec}\right)$$

where

- $0.19\ \frac{ppbv}{\mu g/m^3}$ is the compound specific (TCE) conversion factor (at standard temperature and pressure) to adjust parts per billion by volume (ppbv), a volume-based concentration unit, to micrograms per meter cubed (μg/m^3) a mass based concentration unit.
- Exhaust concentration (ppbv) is the average soil gas concentration over the past three years (12 sampling events, November 2012 – September 2015) from the soil gas sample point which triggered SSDV system installation at the subject property: SG-10 for all properties on E. Cummins Street, SG-09 for 704 Mohawk Street and SG-16 for 408 S. Ottawa.

Primary Model Input: Effective Wind Speed

Effective wind speed (u) was determined by using wind rose data collected at the nearby Jackson County Reynolds Field Airport. The average wind speed from the 3 most common wind speed categories for the summer months were used in the model for separate iterations to determine the highest possible TCE concentration. It was assumed that the wind was measured at a height of 10 meters from ground surface.

$$u = u_m \left(\frac{H}{z_a}\right)^p$$

where

- u_m = measured wind speed (m/s)
- z_a = height at which u_m was measured (m)
- p= wind profile exponent, determined using Table 7.6 from de Nevers (2000)

Primary Model Input: Dispersion Coefficient σ_y and σ_z

The dispersion coefficients can be estimated using the following equations, which were derived from Figure 7.50 of de Nevers (2000) to correlate the distance, x, with the dispersion coefficient based on the stability class.

$$\sigma_y = ax^{0.894}$$

$$\sigma_z = cx^d + f$$

where

— a, c, d, and f are coefficients or exponents determined from Table 7.8 of de Nevers (2000) using the applicable stability class.

Summary and Conclusion

Ambient air concentrations of TCE adjacent to SSDV systems installed at 6 residential properties near the former TPC site, were calculated to evaluate the potential inhalation of affected ambient air migration pathway at off-site properties. Calculated downwind ambient air concentrations ranged from 0.0037 μg/m^3 to 0.11 μg/m^3. Ambient air concentrations are well below the residential indoor air criterion of 1.3 μg/m^3. Therefore, this potential migration pathway is not relevant.

References

De Nevers, Noel. *Air pollution control engineering*. Waveland Press, 2010.

WeatherSpark. *Summary of Cloud Cover Data for Adrian, MI, USA.* Data published by the National Oceanic and Atmospheric Organization. Cedar Lake Ventures, Inc. https://weatherspark.com/#!dashboard;q=Adrian%2C%20MI%2C%20USA

Attachment 1
Calculation Output Sheets

Summary of Ambient Air Concentration Calculations Downwind of 219 Cummins SSDV System

Former Tecumseh Products Company Site

Tecumseh, Michigan

Input Variables	Value
System Flow Rate (CFM) [1]	42
Exhaust Concentration of TCE (ppbv) [2]	5.9
Stack Height (feet) [3]	25
Q, Flow Rate of pollutant from stack (ug/s)	0.62
z, Distance from ground (meters) [4]	0.91
H, effective stack height (meters) [5]	7.6

Average Wind Speed [6]	wind speed category	Percent of time winds occur during summer months [6]	Calculated Maximum TCE Concentration	Distance x from stack where max concentration occurs	Day Solar Insolation Category [7]	Stability Class [8]	**Weighted average concentration based on wind speed percentages over an 8 hour period**
m/s	m/s		ug/m^3	meters			µg/m^3
1.3	<2	32.9	0.034	0.50	moderate	A-B	**0.0037**
4.4	3 to 5	60.6	0.00024	35.5	moderate	B-C	
8.2	>6	6.4	0.00011	106.5	moderate	D	

Notes:

[1] Determined using the differential pressure measured at the U-tube manometer during system start-up and the blower curve for the system fan (AMG Prowler).

[2] Average concentration measured at the nearest soil gas point (SG-10) over the past three years (12 sampling events, November 2012 - September 2015) .

[3] Estimated height based on building construction (10 feet for each building level (2), ground floor approximately 2 feet above ground surface and stack 2-feet above roofline).

[4] Exposure conservatively calculated for a child having a height of 3 feet (0.91 meters).

[5] Plume rise assumed to be zero, therefore effective stack height is equal to physical stack height.

[6] From wind rose diagram from Jackson County, Michigan Reynolds Field Airport - KJXN (www.crh.noaa.gov/grr.aviation/jxnl)), 1973-2007.

[7] Determined using cloud cover data from Lenawee County Airport

[8] Determined using Table 7.7 from de Nevers (2000)

CFM = cubic feet per minute

ppbv = parts per billion by volume

ug/s = microgram per second

m/s = meters per second

ug/m^3 = micrograms per meter cubed

Summary of Ambient Air Concentration Calculations Downwind of 221 Cummins SSDV System

Former Tecumseh Products Company Site

Tecumseh, Michigan

Input Variables	Value
System Flow Rate (CFM) [1]	82
Exhaust Concentration of TCE (ppbv) [2]	5.9
Stack Height (feet) [3]	12
Q, Flow Rate of pollutant from stack (ug/s)	1.2
z, Distance from ground (meters) [4]	0.91
H, effective stack height (meters) [5]	3.7

Average Wind Speed [6]	wind speed category	Percent of time winds occur during summer months [6]	Calculated Maximum TCE Concentration	Distance x from stack where max concentration occurs	Day Solar Insolation Category [7]	Stability Class [8]	**Weighted average concentration based on wind speed percentages over an 8 hour period**
m/s	m/s		ug/m^3	meters			µg/m^3
1.3	<2	32.9	0.11	0.50	moderate	A-B	**0.023**
4.4	3 to 5	60.6	0.052	0.50	moderate	B-C	
8.2	>6	6.4	0.0012	50.5	moderate	D	

Notes:

[1] Determined assuming a moderate differential pressure of 1-inch water column and the blower curve for the system fan (Radonaway RP145).

[2] Average concentration measured at the nearest soil gas point (SG-10) over the past three years (12 sampling events, November 2012 - September 2015) .

[3] Estimated height based on building construction (10 feet for each building level (2), ground floor at ground surface and stack 2-feet above roofline).

[4] Exposure conservatively calculated for a child having a height of 3 feet (0.91 meters).

[5] Plume rise assumed to be zero, therefore effective stack height is equal to physical stack height.

[6] From wind rose diagram from Jackson County, Michigan Reynolds Field Airport - KJXN (www.crh.noaa.gov/grr.aviation/jxnl)), 1973-2007.

[7] Determined using cloud cover data from Lenawee County Airport

[8] Determined using Table 7.7 from de Nevers (2000)

CFM = cubic feet per minute

ppbv = parts per billion by volume

ug/s = microgram per second

m/s = meters per second

ug/m^3 = micrograms per meter cubed

Summary of Ambient Air Concentration Calculations Downwind of 229 Cummins SSDV System

Former Tecumseh Products Company Site

Tecumseh, Michigan

Input Variables	Value
System Flow Rate (CFM) [1]	42
Exhaust Concentration of TCE (ppbv) [2]	5.9
Stack Height (feet) [3]	18
Q, Flow Rate of pollutant from stack (ug/s)	0.62
z, Distance from ground (meters) [4]	0.91
H, effective stack height (meters) [5]	5.5

Average Wind Speed [6]	wind speed category	Percent of time winds occur during summer months [6]	Calculated Maximum TCE Concentration	Distance x from stack where max concentration occurs	Day Solar Insolation Category [7]	Stability Class [8]	**Weighted average concentration based on wind speed percentages over an 8 hour period**
m/s	m/s		ug/m^3	meters			µg/m^3
1.3	<2	32.9	0.047	0.50	moderate	A-B	**0.0057**
4.4	3 to 5	60.6	0.0024	0.50	moderate	B-C	
8.2	>6	6.4	0.00023	75.0	moderate	D	

Notes:

[1] Determined using the differential pressure measured at the U-tube manometer during system start-up and the blower curve for the system fan (AMG Prowler).

[2] Average concentration measured at the nearest soil gas point (SG-10) over the past three years (12 sampling events, November 2012 - September 2015) .

[3] Estimated height based on building construction (10 feet for each building level (1.5), ground floor approximately 1 feet above ground surface and stack 2-feet above roofline).

[4] Exposure conservatively calculated for a child having a height of 3 feet (0.91 meters).

[5] Plume rise assumed to be zero, therefore effective stack height is equal to physical stack height.

[6] From wind rose diagram from Jackson County, Michigan Reynolds Field Airport - KJXN (www.crh.noaa.gov/grr.aviation/jxnl)), 1973-2007.

[7] Determined using cloud cover data from Lenawee County Airport

[8] Determined using Table 7.7 from de Nevers (2000)

CFM = cubic feet per minute

ppbv = parts per billion by volume

ug/s = microgram per second

m/s = meters per second

ug/m^3 = micrograms per meter cubed

Summary of Ambient Air Concentration Calculations Downwind of 231 Cummins SSDV System

Former Tecumseh Products Company Site

Tecumseh, Michigan

Input Variables	Value
System Flow Rate (CFM) [1]	42
Exhaust Concentration of TCE (ppbv) [2]	5.9
Stack Height (feet) [3]	14
Q, Flow Rate of pollutant from stack (ug/s)	0.62
z, Distance from ground (meters) [4]	0.91
H, effective stack height (meters) [5]	4.3

Average Wind Speed [6]	wind speed category	Percent of time winds occur during summer months [6]	Calculated Maximum TCE Concentration	Distance x from stack where max concentration occurs	Day Solar Insolation Category [7]	Stability Class [8]	**Weighted average concentration based on wind speed percentages over an 8 hour period**
m/s	m/s		ug/m^3	meters			µg/m^3
1.3	<2	32.9	0.054	0.50	moderate	A-B	**0.0087**
4.4	3 to 5	60.6	0.014	0.50	moderate	B-C	
8.2	>6	6.4	0.00042	58.5	moderate	D	

Notes:

[1] Determined using the differential pressure measured at the U-tube manometer during system start-up and the blower curve for the system fan (AMG Prowler).

[2] Average concentration measured at the nearest soil gas point (SG-10) over the past three years (12 sampling events, November 2012 - September 2015) .

[3] Estimated height based on building construction (10 feet for each building level (1), ground floor approximately 2 feet above ground surface and stack 2-feet above roofline).

[4] Exposure conservatively calculated for a child having a height of 3 feet (0.91 meters).

[5] Plume rise assumed to be zero, therefore effective stack height is equal to physical stack height.

[6] From wind rose diagram from Jackson County, Michigan Reynolds Field Airport - KJXN (www.crh.noaa.gov/grr.aviation/jxnl)), 1973-2007.

[7] Determined using cloud cover data from Lenawee County Airport

[8] Determined using Table 7.7 from de Nevers (2000)

CFM = cubic feet per minute

ppbv = parts per billion by volume

ug/s = microgram per second

m/s = meters per second

ug/m^3 = micrograms per meter cubed

Summary of Ambient Air Concentration Calculations Downwind of 408 Ottawa SSDV System

Former Tecumseh Products Company Site

Tecumseh, Michigan

Input Variables	Value
System Flow Rate (CFM) [1]	82
Exhaust Concentration of TCE (ppbv) [2]	2.3
Stack Height (feet) [3]	19
Q, Flow Rate of pollutant from stack (ug/s)	0.47
z, Distance from ground (meters) [4]	0.91
H, effective stack height (meters) [5]	5.8

Average Wind Speed [6]	wind speed category	Percent of time winds occur during summer months [6]	Calculated Maximum TCE Concentration	Distance x from stack where max concentration occurs	Day Solar Insolation Category [7]	Stability Class [8]	**Weighted average concentration based on wind speed percentages over an 8 hour period**
m/s	m/s		ug/m^3	meters			µg/m^3
1.3	<2	32.9	0.034	0.50	moderate	A-B	**0.0040**
4.4	3 to 5	60.6	0.0011	0.50	moderate	B-C	
8.2	>6	6.4	0.00015	79.5	moderate	D	

Notes:

[1] Determined assuming a moderate differential pressure and the blower curve for the system fan (Radonaway RP145).

[2] Average concentration measured at the nearest soil gas point (SG-16) over the past three years (12 sampling events, November 2012 - September 2015) .

[3] Estimated height based on building construction (10 feet for each building level (1.5), ground floor approximately 2 feet above ground surface and stack 2-feet above roofline).

[4] Exposure conservatively calculated for a child having a height of 3 feet (0.91 meters).

[5] Plume rise assumed to be zero, therefore effective stack height is equal to physical stack height.

[6] From wind rose diagram from Jackson County, Michigan Reynolds Field Airport - KJXN (www.crh.noaa.gov/grr.aviation/jxnl)), 1973-2007.

[7] Determined using cloud cover data from Lenawee County Airport

[8] Determined using Table 7.7 from de Nevers (2000)

CFM = cubic feet per minute

ppbv = parts per billion by volume

ug/s = microgram per second

m/s = meters per second

ug/m^3 = micrograms per meter cubed

Summary of Ambient Air Concentration Calculations Downwind of 704 Mohawk SSDV System

Former Tecumseh Products Company Site

Tecumseh, Michigan

Input Variables	Value
System Flow Rate (CFM) [1]	95
Exhaust Concentration of TCE (ppbv) [2]	77
Stack Height (feet) [3]	25
Q, Flow Rate of pollutant from stack (ug/s)	18
z, Distance from ground (meters) [4]	0.91
H, effective stack height (meters) [5]	7.6

Average Wind Speed [6]	wind speed category	Percent of time winds occur during summer months [6]	Calculated Maximum TCE Concentration	Distance x from stack where max concentration occurs	Day Solar Insolation Category [7]	Stability Class [8]	**Weighted average concentration based on wind speed percentages over an 8 hour period**
m/s	m/s		ug/m^3	meters			µg/m^3
1.3	<2	32.9	0.99	0.50	moderate	A-B	**0.11**
4.4	3 to 5	60.6	0.0072	35.5	moderate	B-C	
8.2	>6	6.4	0.0032	106.5	moderate	D	

Notes:

[1] Determined using the differential pressure measured at the U-tube manometer in January 2014 and the blower curve for the system fan (Radonaway GP501).

[2] Average concentration measured at the nearest soil gas point (SG-09) over the past three years (12 sampling events, November 2012 - September 2015) .

[3] Estimated height based on building construction (10 feet for each building level (2), ground floor approximately 2 feet above ground surface and stack 2-feet above roofline).

[4] Exposure conservatively calculated for a child having a height of 3 feet (0.91 meters).

[5] Plume rise assumed to be zero, therefore effective stack height is equal to physical stack height.

[6] From wind rose diagram from Jackson County, Michigan Reynolds Field Airport - KJXN (www.crh.noaa.gov/grr.aviation/jxnl)), 1973-2007.

[7] Determined using cloud cover data from Lenawee County Airport

[8] Determined using Table 7.7 from de Nevers (2000)

CFM = cubic feet per minute

ppbv = parts per billion by volume

ug/s = microgram per second

m/s = meters per second

ug/m^3 = micrograms per meter cubed

Attachment 2
Reference Sheets

TABLE 7.6

Wind Profile Exponent p, for Rough Terrain[a]

Stability Class	Description	Exponent p
A	Very unstable	0.15
B	Moderately unstable	0.15
C	Slightly unstable	0.20
D	Neutral	0.25
E	Slightly stable	0.40
F	Stable	0.60

[a]For smooth terrain, multiply p by 0.6; see Table 7.7 for further descriptions of the stability classifications used here.
Source: Peterson, 1978.

TABLE 7.7

Atmospheric Stability Classifications

Surface Windspeed[a] (m/s)	Day Solar Insolation			Night Cloudiness[e]	
	Strong[b]	Moderate[c]	Slight[d]	Cloudy (≥4/8)	Clear (≤3/8)
<2	A	A–B[f]	B	E	F
2–3	A–B	B	C	E	F
3–5	B	B–C	C	D	E
5–6	C	C–D	D	D	D
>6	C	D	D	D	D

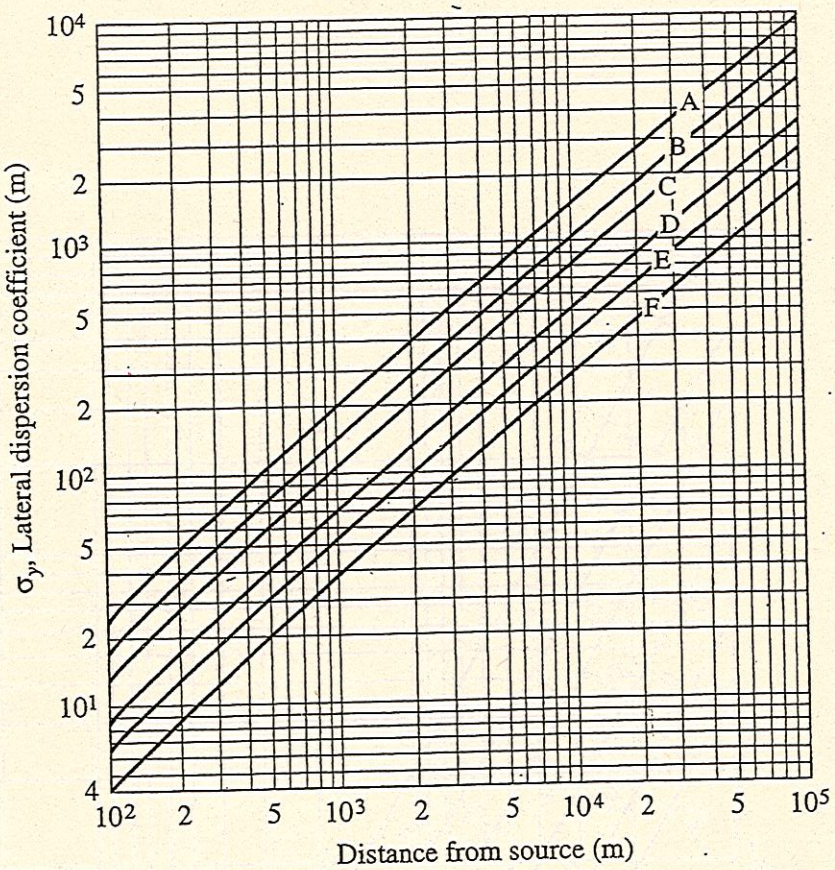
[a]Surface windspeed is measured at 10 m above the ground.
[b]Corresponds to clear summer day with sun higher than 60° above the horizon.
[c]Corresponds to a summer day with a few broken clouds, or a clear day with sun 35–60° above the horizon.
[d]Corresponds to a fall afternoon, or a cloudy summer day, or clear summer day with the sun 15–35° above the horizon.
[e]Cloudiness is defined as the fraction of sky covered by clouds.
[f]For A–B, B–C, or C–D conditions, average the values obtained for each.
Note: A, Very unstable; B, moderately unstable; C, slightly unstable; D, neutral; E, slightly stable; F, stable. Regardless of windspeed, class D should be assumed for overcast conditions, day or night.
Source: Turner, 1970.

TABLE 7.8

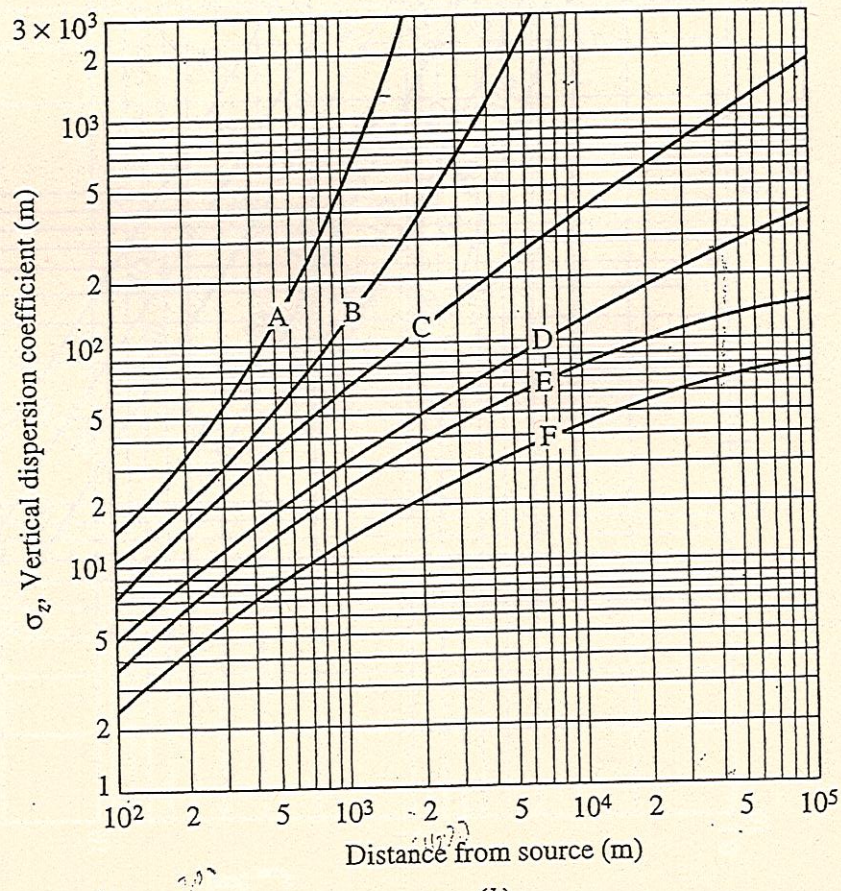
Values of the Constants a, c, d, and f for Use in (7.47) and (7.48)

		$x \leq 1$ km			$x \geq 1$ km		
Stability	a	c	d	f	c	d	f
A	213	440.8	1.941	9.27	459.7	2.094	−9.6
B	156	106.6	1.149	3.3	108.2	1.098	2.0
C	104	61.0	0.911	0	61.0	0.911	0
D	68	33.2	0.725	−1.7	44.5	0.516	−13.0
E	50.5	22.8	0.678	−1.3	55.4	0.305	−34.0
F	34	14.35	0.740	−0.35	62.6	0.180	−48.6

Note: The computed values of σ will be in meters when x is given in kilometers.
Source: Martin, 1976.



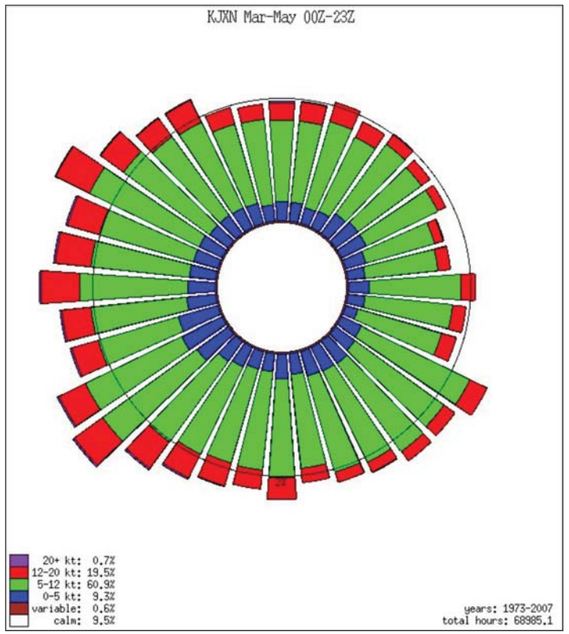
(*a*)



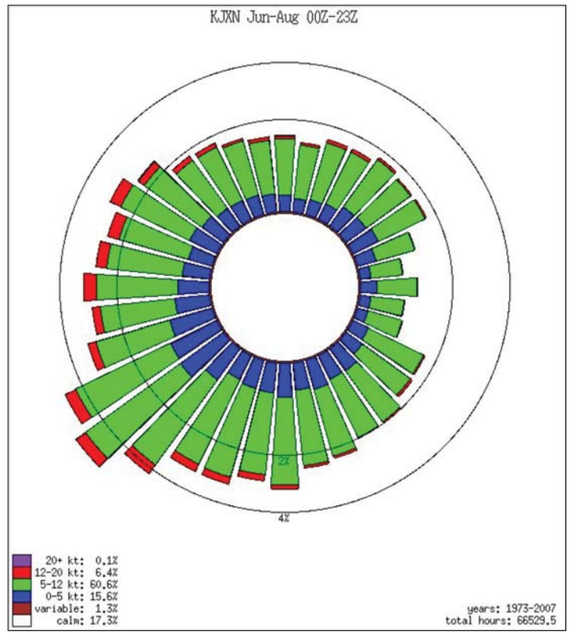
(*b*)

FIGURE 7.50 Gaussian dispersion coefficients as a function of distance downwind (*a*) horizontal coefficient, σ_y, (*b*) vertical coefficient, σ_z.
(Source: Turner, 1970.)

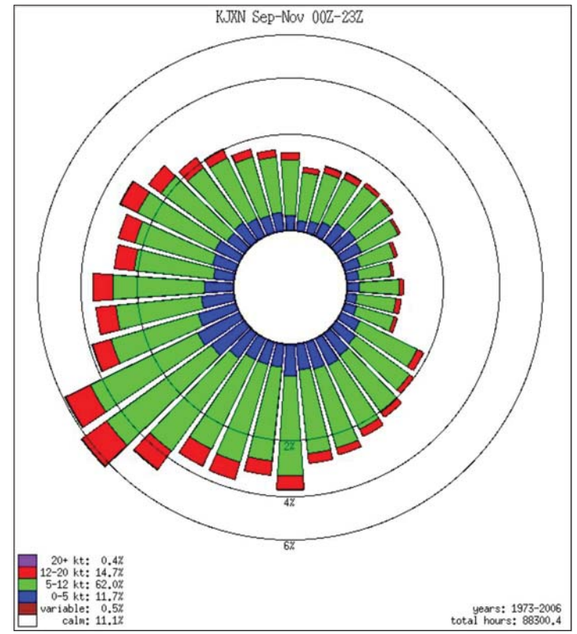
SPRING



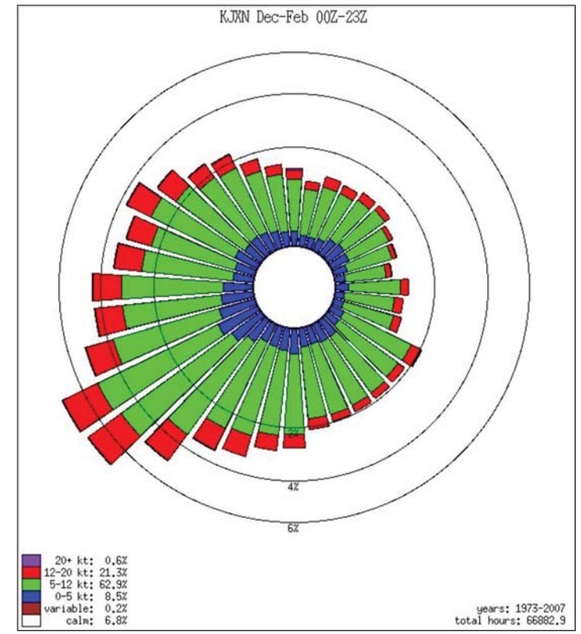
SUMMER



FALL



WINTER



N

NOTES:
1. WIND ROSE DIAGRAMS FROM JACKSON COUNTY REYNOLDS FIELD AIRPORT - KJXN (www.crh.noaa.gov/grr.aviation/jxnl).

PROJECT:

JACKSON COUNTY, MICHIGAN

TITLE:

WIND ROSE DIAGRAMS (1993-2007)

DRAWN BY: DGS	SCALE:	PROJ. NO.	187883.0000
CHECKED BY: DV	NONE	FILE NO.	187883.0000.01.04.dwg
APPROVED BY: APPR	DATE PRINTED:		**FIGURE 4**
DATE: MARCH 2013			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Liberty LF\187883\0000\011\EA Rpt\187883.0000.01.04.dwg
Operator Name: STEHLE, DIANAH
Drawing Plot Scale: 0.386863
Dwg Size: 0.15 Mb
Plot Date: March 12, 2013
Plot Time: 1:17 PM
Attached Xrefs:
Attached Images: JXNFallRose; JXNSpringRose; JXNSummerRose; JXNWinterRose;
Layout FIG04 Wind Roses

Appendix K
Declarations of Restrictive Covenants and License Agreement

RCVD PM12:16 JAN 4 '10 LENAWEE

RCVD AM11:58 JAN14 '10 LENAWEE

LIBER 2396 PAGE 0535 1 of 9

STATE OF MICHIGAN - LENAWEE COUNTY
RECORDED 01/14/2010 12:21:25 PM RESTR.C
Victoria J. Daniels , REGISTER OF DEEDS $38.00

DECLARATION OF ENVIRONMENTAL RESTRICTIVE COVENANTS

This Declaration of Environmental Restrictive Covenants ("Restrictive Covenant") has been executed and recorded with the Lenawee County Register of Deeds for the purpose of protecting public health, safety, and welfare, and the environment by prohibiting or restricting certain activities herinafter described at the property known as 100 East Patterson Street, Tecumseh, Michigan and legally described in Exhibit 1 attached hereto, and is generally depicted on the Site Layout attached as Exhibit 2 (the "Property").

WHEREAS, the Property is the subject of investigation and corrective measures being undertaken by the prior owner, Tecumseh Products Company, Inc., (the "Prior Owner") in cooperation with the Michigan Department of Environmental Quality (MDEQ) and the U.S. Environmental Protection Agency (EPA) as identified in the Notice Regarding Statutory Obligation filed for record on February 19, 2002 at Lenawee County Registrar of Deeds Libor 1920, page 996; and

WHEREAS, Tecumseh Bakery, LLC, an Ohio limited liability company ("Declarant"), is the current owner of the Property; and

WHEREAS, the purpose of this Restrictive Covenant is to prohibit or restrict certain identified land uses and activities that could result in unacceptable exposures to hazardous substances located on the Property if not so prohibited or restricted.

NOW, THEREFORE, Declarant imposes the following restrictions on the Property:

1. Summary of Conditions

(a) Due to activities of the Prior Owner before Declarant acquired the Property, volatile organic compounds (VOCs) are present in soil and groundwater at the Property. VOCs above current generic industrial cleanup criteria of the MDEQ generally include BTEX compounds (benzene, toluene, ethylbenzene, and xylenes), trimethylbenzenes (TMBs), and chlorinated VOCs (CVOCs). In particular, CVOCs, which were historically used by the Prior Owner at the Property for degreasing purposes, including trichloroethene (TCE), tetrachloroethene (PCE) and 1,1,1-TCA, and associated byproducts of their decomposition such as cis-1,2-dichloroethene (cis 1,2-DCE), trans-1,2-dichloroethene (trans 1,2-DCE), 1,1-dichloroethene (1,1,-DCE), and vinyl chloride, are present at elevated concentrations on or about the Property.

(b) Corrective measures and land use restrictions are and will in the future be utilized to address each relevant exposure pathway relating to the above-described presence of hazardous substances on and about the Property. Such land use restrictions include any Residential or Commercial I land uses, as such use categories are defined in the MDEQ Remediation and Redevelopment Division Operational Memorandum No. 1, dated Dember 10, 2004 ("MDEQ Memorandum No. 1"), and the installation and use of any on-site groundwater supply wells other than for investigative or remedial purposes.

3355306

3800 Eno. Kasparnet Inc

2. Definitions

(a) "MDEQ" means the Michigan Department of Environmental Quality, its successor entities, and those persons or entities acting on its behalf.

(b) "Owner" means at any given time the then current title holder of the Property or any portion thereof.

I All other capitalized terms used in this document not otherwise defined herein shall have the meaning ascribed thereto in Part 3, Definitions, of the Michigan Natural Resources and Environmental Protection Act of 1994 ("NREPA"); Part 201 of the NREPA; or the Part 201 Administrative Rules ("Part 201 Rules"), 1990 AACS R 299.5101 et seq., as of the date of filing of this Restrictive Covenant.

3. Land Use or Resource Use Restrictions: The Owner hereby prohibits and restricts against all future uses of and activities on the Property as follows:

(a) The Property may not be used for Residential and Commercial I purposes, as those terms are defined in Part 201 of the NREPA, the Part 201 Rules, and the MDEQ Memorandum No. 1, including, without limitation, prohibiting the use of the Property for single family dwellings, residential condominiums, apartment buildings, child day care centers, educational facilities, hospitals, elder care facilities, nursing homes, and any other land use which is intended to house, educate, or provide care for children, the elderly, the infirm, or other sensitive subpopulations.

(b) The Property may not be used to construct or use any underground water wells or other devices to extract groundwater on or under the Property for consumption, irrigation, or any other use, except for wells and devices that are part of any investigation, corrective measures or response activities which are undertaken now or in the future to address the presence of hazardous substances on or about the Property. Short-term dewatering for construction purposes is permitted provided the dewatering, including management and disposal of the groundwater, is conducted in accordance with all applicable local, state, and federal laws and regulations and does not cause or result in a new release of hazardous substances, exacerbation of existing contamination, or any other violation of local, state, and federal environmental laws and regulations including, but not limited to, Part 201 of the NREPA.

4. Access. The Owner grants to the MDEQ and EPA, and their designated representatives the right to enter the Property at reasonable times for the purpose of determining and monitoring compliance with this Restrictive Covenant.

5. Notice. The Owner shall provide notice to the MDEQ and EPA of the Owner's intent to transfer any interest in the Property at least fourteen (14) business days prior to consummating the conveyance. Any conveyance of title, easement, or other interest in the Property shall be subject to the terms and conditions of this Restrictive Covenant. A copy of this Restrictive Covenant shall be provided to all future owners, heirs, successors, lessees, easement holders, assigns, and transferees by the person transferring the interest.

6. Term and Enforcement of Restrictive Covenant. This Restrictive Covenant shall run with the land referred to herein as the Property and shall be binding on the Owner, future owners, and all current and future successors, lessees, easement holders, their assigns, and their authorized agents, employees, or persons acting under their direction and control. This Restrictive Covenant may only be modified or rescinded with the written approval of the EPA or MDEQ. The EPA, and the State of Michigan through the MDEQ, and Tecumseh Products Company, Inc., may enforce the restrictions set forth in this Restrictive Covenant by legal action in a court of competent jurisdiction.

7. Severability. If any provision of this Restrictive Covenant is held to be invalid by any court of competent jurisdiction, the invalidity of such provision shall not affect the validity of any other provisions hereof, and all such other provisions shall continue unimpaired and in full force and effect.

805 Authority to Execute Restrictive Covenant. The undersigned person executing this Restrictive Covenant is the Owner and represents and certifies that he or she is duly authorized and has been empowered to execute and deliver this Restrictive Covenants.

IN WITNESS WHEREOF, Tecumseh Bakery, LLC, an Ohio limited liability company, as Owner, has caused this Restrictive Covenant, to be executed as of the 18th day of December, 2009.

Tecumseh Bakery, LLC

By: William H Varney
Signature

Name: William H Varney

Its: Vice President

STATE OF OHIO
COUNTY OF HANCOCK

The foregoing instrument was acknowledged before me this 18 day of December, 2009 by WILLIAM H. VARNEY a/the VICE PRESIDENT of Tecumseh Bakery, LLC, an Ohio limited liability company, on behalf of the company.

Diane L. Courtright
Notary Public

Commissioned in _____ County, _____

My Commission Expires: _____

Diane L. Courtright
Notary Public
Hancock County State of Ohio
Comm. Expires Feb 4, 2014

EXHIBIT 1

LEGAL DESCRIPTION OF PROPERTY

Real property situated in the City of Tecumseh, County of Lenawee, Michigan, described as follows:

Parcel 1

A parcel of land located in the Southwest ¼ of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan and being a part of Lot 24 of "Assessor's Plat No. 6" City of Tecumseh as recorded in Liber 14, pages 15 through 17 in the Office of the Register of Deeds for Lenawee County, Michigan and being further described as: Beginning at the Southwest Corner of said Lot 24; thence North 00 degrees 21 minutes 54 seconds East, 959.73 feet (recorded as North 00 degrees 17 minutes East) along the West line of said Lot 24; thence North 89 degrees 21 minutes 43 seconds West, 25.00 feet; thence North 00 degrees 21 minutes 17 seconds East, 745.43 feet (recorded as North 00 degrees 17 minutcs East) along the West line of said Lot 24 and its extension Southerly, to the Northwest Corner of said Lot 24; thence South 89 degrees 33 minutes 12 seconds East, 385.12 feet (recorded as South 89 degrees 37 minutes East, 384.8 feet) along the South line of Patterson Street; thence South 00 degrees 01 minutes 27 seconds East, 8.40 feet (recorded as South 00 degrees 02 minutes West, 8.4 feet) along said South line; thence North 89 degrees 40 minutes 52 seconds East, 896.23 feet (recorded as South 89 degrees 46 minutes East, 897.18 feet) along said South line to the Northeast Corner of said Lot 24; thence South 00 degrees 19 minutes 41 seconds West, 1526.83 feet (recorded as South 00 degrees 18 minutes West) along the West line of Maumee Street to the South line of said Lot 24; thence North 89 degrees 28 minutes 33 seconds West, 598.80 feet (recorded as North 89 degrees 34 minutes West) along said South line to the Northwest Corner of Lot 26 of said "Assessor's Plat No. 6" City of Tecumseh; thence South 00 degrees 42 minutes 29 seconds West, 178.06 (recorded as South 00 degrees 21 minutes West) along the West line of said Lot 24 to the Northeast Corner of Lot 25 of said "Assessor's Plat No. 6" City of Tecumseh; thence North 89 degrees 05 minutes 50 seconds West, 657.42 feet (recorded as North 89 degrees 05 minutes West, 657.3 feet) along the South line of said Lot 24 to the point of beginning.

All bearings are derived from the bearing of the South line of Lot 24 of "Assessors Plat No. 6" City of Tecumseh as bearing North 89 degrees 04 minutes 00 seconds West as shown on the recorded plat, and KEBS, Inc. drawing of Job No. 05-B-76298.

All of the above described land also being described as follows:

Parcel "A"
Part of Lot 24 of Assessor's Plat No. 6 City of Tecumseh being part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan described as beginning at the Southwest corner of Lot 24 of "Assessor's Plat No. 6"; thence N 00 deg. 17' 00" E along the West line of said Lot 24 a distance of 959.53 feet (recorded as N 00 deg. 17' E 959.73 feet); thence N 89 deg. 03' 58" W a distance of 24.84 feet (recorded as N 89 deg. 21' 43" W 25 feet); thence N 00 deg. 15' 47" E a distance of 744.78 feet (recorded as N 00 deg. 17' E 745.43 feet) to a chiseled "X" at the South Right of Way line of Patterson Street; thence S 89 deg. 45' 16" E along the

South Right of Way line of Patterson Street a distance of 385.13 feet (recorded as S 89 deg. 37' E 384.8 feet) to a found nail; thence S 00 deg. 10' 05" E a distance of 8.38 feet (recorded as S 00 deg. 01' 27" E 8.4 feet) to a chiseled "X"; thence S 89 deg. 34' 16" E along the South Right of Way line of Patterson Street a distance of 896.18 feet (recorded as S 89 deg. 46' E 897.18 feet); thence S 00 deg. 14' 44" W a distance of 1,524.10 feet (recorded as S 00 deg. 18' W 1526.83 feet); thence N 89 deg. 33' 09" W a distance of 598.85 feet (recorded as N 89 deg. 34' W 598.80 feet); thence S 00 deg. 36' 36" W a distance of 178.08 feet (recorded as S 00 deg. 21' W 177.7 feet); thence N 89 deg. 10' 17" W a distance of 657.45 feet (recorded N 89 deg. 05' W 657.3 feet) to the Point of Beginning.

Contains 2,052,326 square feet or 47.114 acres. Subject to any easements, restrictions, and Rights of Way of record if any.

100 E. Patterson St., Tecumseh, MI 49286
Tax I.D. No.: 325-0241 -00 (as to Parcels I & 2)

Parcel 2

Situated in the City (formerly Township) of Tecumseh, County of Lenawee, Michigan, to wit:

All that part of the Southwest Quarter (1/4) of Section Thirty-four (34) in Town Five (5) South, Range Four (4) East, described as commencing in the center of highway at a point located Fifty-seven and five tenths (57.5) feet South Eighty-eight (88) degrees Forty-five (45) minutes East from the Southwest corner of said Section Thirty-four (34) and running thence North No (0) degrees Forty-one (41) minutes East and along the East line of land now, or formerly, owned by the New York Central Railroad Company Eight hundred forty and six tenths (840.6) feet, thence South Eighty-eight (88) degrees Forty-five (45) minutes East Six hundred fifty-seven and four tenths (657.4) feet, thence South No (0) degrees Forty-five (45) minutes West Eight hundred forty and six tenths (840.6) feet to the center of highway, thence North Eighty-eight (88) degrees Forty-five (45) minutes West Six hundred fifty-six and eight tenths (656.8) feet to the place of beginning, except the northerly One hundred seventy-seven and seven tenths (177.7) feet thereof as described in Liber 398 at Folio 146, containing Ten (10) acres of land more or less.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan:

All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Page 15, 16 and 17, Lenawee County Records) described as beginning 464.03 feet S 89 deg. 04' 00" E (along the south line of said Section 34) and 283.00 feet N 00 deg. 21' 00" E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21' 00" E 176.00 feet; thence S 89 deg. 04' 00" E 250.00 feet; thence S 00 deg. 21' 00" W 176.00 feet along the east line of said Lot 25; thence N 89 deg. 04' 00" W 250.00 feet to the place of beginning. Containing 1.01 acres.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan:

All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records), described as beginning at the Southwest corner of Lot 25, aforesaid, 57.36 feet (recorded as 57.3 feet) South 89 deg. 04' 00" East (along the South line of said Section 34) and 33.00 feet North 00 deg. 17' 00" East from the Southwest corner of said Section 34; thence North 00 deg. 17' 00" East 426.00 feet along the West line of said Lot 25; thence South 89 deg. 04' 00" East 326.97 feet; thence South 00 deg. 17' 00" West 176.00 feet; thence North 89 deg. 04' 00" West 120.00 feet; thence South 00 deg. 21' 00" West 250.00 feet to the South line of said Lot 25; thence North 89 deg. 04' 00" West 206.68 feet to the point of beginning.

SAVE AND EXCEPT:

Situated in the City of Tecumseh County of Lenawee, Michigan, to-wit:

All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (Also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Pages 15, 16 and 17, Lenawee County Records), described as beginning on the south line of Lot 25 aforesaid 464.03 feet S 89 deg. 04' 00" E (along the south line of said Section 34) and 33.00 feet N 00 deg. 21' 00" E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21' 00" E 250.00 feet; thence S 89 deg. 04' 00" 250.00 feet to the east line of said Lot 25; thence S 00 deg. 21' 00" W 250.00 feet to the southeast corner of said Lot 25; thence N 89 deg. 04' 00" W 250.00 feet to the place of beginning containing 1.435 acres.

Subject to easements and restrictions of record.

The bearings are referenced to the Assessor's Plat No. 6, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan, to-wit:

All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (Also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Pages 15, 16 and 17, Lenawee County Records), described as beginning on the south line of Lot 25 aforesaid 264.03 feet S 89 deg. 04' 00" E (along the south line of said Section 34) and 33.00 feet N 00 deg. E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21' 00" E 250.00 feet; thence S 89 deg. 04' 00" 200.00 feet; thence S 00 deg. 21' 00" W 250.00 feet to the south line of said Lot 25; thence N 89 deg. 04' 00" W 200.00 feet to the place of beginning containing 1.148 acres.

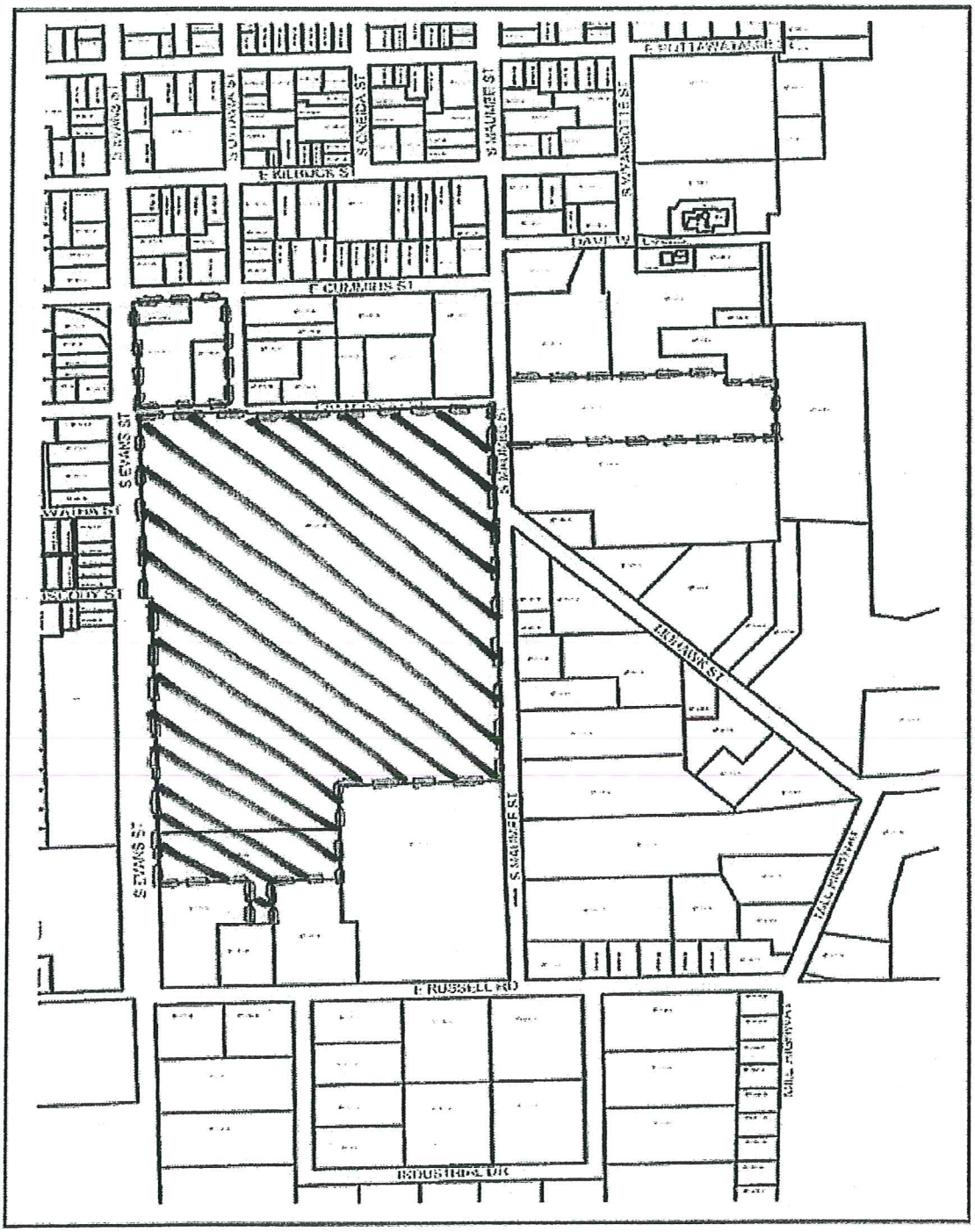
The bearings are referenced to the Assessor's Plat No. 6, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records,

805 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0250-00 (as to Parcel 3) Vacant Land

EXHIBIT 2

SITE LAYOUT OF THE PROPERTY

SITE MAP


E KILBOURN ST
E CUMMINS ST
S EVANS ST
S MAUMEE ST
E RUSSELL RD
INDUSTRIAL DR

ASSIGNMENT AND ASSUMPTION OF LEASE AND LICENSE

THIS ASSIGNMENT AND ASSUMPTION OF LEASE AND LICENSE (the "Assignment") is entered into on the 3rd day of February, 2012 between **TECUMSEH BAKERY, LLC**, an Ohio limited liability company ("Assignor") and **TECUMSEH FOOD, MACHINERY & EQUIPMENT, LLC**, a Michigan limited liability company ("Assignee"), but effective as of the latest date set forth below (the "Effective Date").

RECITALS; WHEREAS:

A. Assignor leased to Patjim Holdings Company, Ohio corporation (formerly Consolidated Biscuit Co.) ("PJH") all of Assignor's real property located at 100 and 101 E. Patterson Street, Tecumseh, Michigan, legally described on Exhibit A attached hereto and made a part hereof (the "Property") according to the Master Lease dated December 12, 2009 (the "Master Lease");

B. PJH subleased to Tecumseh Products Company, a Michigan corporation ("TPC") part of the Property described as the Leased Premises according to the Sublease Agreement dated December 18, 2009 (the "Sublease");

C. Assignor and PJH terminated the Master Lease and as a result the Sublease, according to its terms, is now a lease between Assignor and TPC according to the terms and conditions of the Sublease (the "Lease");

D. Assignor is the licensor under the License Agreement Regarding Environmental Work dated December 18, 2009 between Licensor and TPC, a true and correct copy which is attached hereto as Exhibit B (the "License"); and

E. Assignor will convey, or has conveyed, the Property to Assignee and desires to assign and transfer the Lease and License to Assignee.

NOW, THEREFORE, for valuable consideration, the receipt and sufficiency is hereby acknowledged, the parties, intending to be legally bound, incorporate the above recitals by reference and agree as follows:

1. **Assignment**. Assignor assigns, conveys and transfers to Assignee, its successors and assigns, all of Assignor's right, title and interest in and to the Lease and the License. Assignor will defend, indemnify and hold Assignee harmless from and against any and all liabilities, damages, costs, losses and expenses arising from any default by Assignor under the Lease or the License, any act or omission by Assignor related to the Lease or the License, prior to and as of the Effective Date.

2. **Assumption**. Assignee accepts this assignment of the Lease and the License, and Assignee agrees to perform all of the conditions, covenants, and provisions of the Lease and the License to be kept and performed by Assignor from and after the Effective Date. Assignee agrees this Assignment, and Assignee's obligation under this Assignment, are in addition to Assignee's obligations under the Acknowledge and Acceptance of the Terms of the License Agreement Regarding Environmental Work Among Consolidated Biscuit Co. (n/k/a/ Patjim Holdings Company) ("Patjim"), Tecumseh Bakery, LLC and Tecumseh Products Company dated December 18, 2009. Assignee agrees to defend, indemnify and hold Assignor harmless from and against any and all

liabilities, damages, costs, losses and expenses arising from any default by Assignee under the Lease, any act or omission by Assignee related to the Lease subsequent to the Effective Date.

3. **Miscellaneous**. This Assignment shall be effective and the assignment and assumption of the Lease and the License complete as of the Effective Date. This Assignment is binding on and inures to the benefit of the parties hereto and their successors and assigns. The terms and conditions of this Assignment shall be governed by Michigan law.

ASSIGNOR:

TECUMSEH BAKERY, LLC,
an Ohio limited liability company

By: Jim M. Cippolla

Title: President

Date: 2-3-2012

ASSIGNEE:

TECUMSEH FOOD, MACHINERY & EQUIPMENT, LLC,
a Michigan limited liability company

By: Dave Rabbitt

Title: Owner

Date: 2-2-2012

EXHIBIT A

Real property situated in the City of Tecumseh, County of Lenawee, Michigan, described as follows:

Parcel 1
A parcel of land located in the West 1/2 of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan and being Lots 13, 14 and 15 of "Assessors Plat No. 6" City of Tecumseh as recorded in Liber 14, pages 15 through 17 in the Office of the Register of Deeds for Lenawee County.

402 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0130-00 (as to Parcels 1 & 2)

404 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0140-00 (as to Parcels 1 & 2)

600 S. Ottawa St., Tecumseh, MI 49286
Tax I.D. No.: 325-0150-00 (as to Parcels 1 & 2)

Parcel 2
A parcel of land located in the Southwest 1/4 of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan and being a part of Lot 24 of "Assessor's Plat No. 6" City of Tecumseh as recorded in Liber 14, pages 15 through 17 in the Office of the Register of Deeds for Lenawee County, Michigan and being further described as: Beginning at the Southwest Corner of said Lot 24; thence North 00 degrees 21 minutes 54 seconds East, 959.73 feet (recorded as North 00 degrees 17 minutes East) along the West line of said Lot 24; thence North 89 degrees 21 minutes 43 seconds West, 25.00 feet; thence North 00 degrees 21 minutes 17 seconds East, 745.43 feet (recorded as North 00 degrees 17 minutes East) along the West line of said Lot 24 and its extension Southerly, to the Northwest Corner of said Lot 24; thence South 89 degrees 33 minutes 12 seconds East, 385.12 feet (recorded as South 89 degrees 37 minutes East, 384.8 feet) along the South line of Patterson Street; thence South 00 degrees 01 minutes 27 seconds East, 8.40 feet (recorded as South 00 degrees 02 minutes West, 8.4 feet) along said South line; thence North 89 degrees 40 minutes 52 seconds East, 896.23 feet (recorded as South 89 degrees 46 minutes East, 897.18 feet) along said South line to the Northeast Corner of said Lot 24; thence South 00 degrees 19 minutes 41 seconds West, 1526.83 feet (recorded as South 00 degrees 18 minutes West) along the West line of Maumee Street to the South line of said Lot 24; thence North 89 degrees 28 minutes 33 seconds West, 598.80 feet (recorded as North 89 degrees 34 minutes West) along said South line to the Northwest Corner of Lot 26 of said "Assessor's Plat No. 6" City of Tecumseh; thence South 00 degrees 42 minutes 29 seconds West, 178.06 (recorded as South 00 degrees 21 minutes West) along the West line of said Lot 24 to the Northeast Corner of Lot 25 of said "Assessor's Plat No. 6" City of Tecumseh; thence North 89 degrees 05 minutes 50 seconds West, 657.42 feet (recorded as North 89 degrees 05 minutes West, 657.3 feet) along the South line of said Lot 24 to the point of beginning.

All bearings are derived from the bearing of the South line of Lot 24 of "Assessors Plat No. 6" City of Tecumseh as bearing North 89 degrees 04 minutes 00 seconds West as shown on the recorded plat, and KEBS, Inc. drawing of Job No. 05-B-76298.

All of the above described land also being described as follows:

Parcel "A"

Part of Lot 24 of Assessor's Plat No. 6 City of Tecumseh being part of the Southwest 1/4 of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan described as beginning at the Southwest corner of Lot 24 of "Assessor's Plat No. 6"; thence N 00 deg. 17' 00" E along the West line of said Lot 24 a distance of 959.53 feet (recorded as N 00 deg. 17' E 959.73 feet); thence N 89 deg. 03' 58" W a distance of 24.84 feet (recorded as N 89 deg. 21' 43" W 25 feet); thence N 00 deg. 15' 47" E a distance of 744.78 feet (recorded as N 00 deg. 17' E 745.43 feet) to a chiseled "X" at the South Right of Way line of Patterson Street; thence S 89 deg. 45' 16" E along the South Right of Way line of Patterson Street a distance of 385.13 feet (recorded as S 89 deg. 37' E 384.8 feet) to a found nail; thence S 00 deg. 10' 05" E a distance of 8.38 feet (recorded as S 00 deg. 01' 27" E 8.4 feet) to a chiseled "X"; thence S 89 deg. 34' 16" E along the South Right of Way line of Patterson Street a distance of 896.18 feet (recorded as S 89 deg. 46' E 897.18 feet); thence S 00 deg. 14' 44" W a distance of 1,524.10 feet (recorded as S 00 deg. 18' W 1526.83 feet); thence N 89 deg. 33' 09" W a distance of 598.85 feet (recorded as N 89 deg. 34' W 598.80 feet); thence S 00 deg. 36' 36" W a distance of 178.08 feet (recorded as S 00 deg. 21' W 177.7 feet); thence N 89 deg. 10' 17" W a distance of 657.45 feet (recorded N 89 deg. 05' W 657.3 feet) to the Point of Beginning.

Contains 2,052,326 square feet or 47.114 acres. Subject to any easements, restrictions, and Rights of Way of record if any.

100 E. Patterson St., Tecumseh, Ml 49286
Tax l.D. No.: 325-0241 -00 (as to Parcels I & 2)

Parcel "B"

Part of Lots 13, 14, and 15 of Assessor's Plat No. 6 City of Tecumseh being part of the Southwest 1/4 of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan described as commencing at the Southwest corner of Lot 24 of "Assessor's Plat No. 6"; thence N 00 deg. 17' 00" E along the West line of said Lot 24 a distance of 959.53 feet; thence N 89 deg. 03' 58" W a distance of 24.84 feet; thence N 00 deg. 15' 47" E a distance of 744.78 feet to a chiseled "X" at the South Right of Way line of Patterson Street; thence N 00 deg. 15' 23" E a distance of 33.60 feet to the Northeast Right of Way intersection of Patterson Street and Evans Street and the Point of Beginning; thence N 00 deg. 14' 10" E along the East Right of Way line of Evans Street a distance of 259.97 feet (recorded as N 00 deg. 17' E 260 feet); thence N 89 deg. 04' 50" W a distance of 8.84 feet (recorded as N 89 deg. 37' W 8.55 feet); thence N 00 deg. 09' 40" W along the East Right of Way of Evans Street a distance of 169.35 feet (recorded as N 00 deg. 26' W 169.55 feet) to a point on the South Right of Way line of Cummins Street; thence S 89 deg. 49' 11" E, along the South Right of Way line of Cummins Street a distance of 326.61 feet (recorded as S 89 deg. 46' E 327.25 feet); thence S 00 deg. 06' 38" E along the West Right of Way line of Ottawa Street a distance of 430.45 feet (recorded as S 00 deg. 02' W 430.7 feet); thence N 89 deg. 38' 19" W along the North Right of Way line of Patterson Street a distance of 319.20 feet (recorded as N 89 deg. 37' W 318.8 feet) to the Point of Beginning.

Contains 138,273 square feet or 3.174 acres. Subject to any easements, restrictions, and Rights of Way of record if any.

402 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0130-00 (as to Parcels 1 & 2)

404 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0140-00 (as to Parcels 1 & 2)

600 S. Ottawa St., Tecumseh, MI 49286
Tax I.D. No.: 325-0150-00 (as to Parcels 1 & 2)

Parcel 3
Situated in the City (formerly Township) of Tecumseh, County of Lenawee, Michigan, to wit:

All that part of the Southwest Quarter (1/4) of Section Thirty-four (34) in Town Five (5) South, Range Four (4) East, described as commencing in the center of highway at a point located Fifty-seven and five tenths (57.5) feet South Eighty-eight (88) degrees Forty-five (45) minutes East from the Southwest corner of said Section Thirty-four (34) and running thence North No (0) degrees Forty-one (41) minutes East and along the East line of land now, or formerly, owned by the New York Central Railroad Company Eight hundred forty and six tenths (840.6) feet, thence South Eighty-eight (88) degrees Forty-five (45) minutes East Six hundred fifty-seven and four tenths (657.4) feet, thence South No (0) degrees Forty-five (45) minutes West Eight hundred forty and six tenths (840.6) feet to the center of highway, thence North Eighty-eight (88) degrees Forty-five (45) minutes West Six hundred fifty-six and eight tenths (656.8) feet to the place of beginning, except the northerly One hundred seventy-seven and seven tenths (177.7) feet thereof as described in Liber 398 at Folio 146, containing Ten (10) acres of land more or less.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan:

All that part of the Southwest 1/4 of Section 34, Town 5 South, Range 4 East, (also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Page 15, 16 and 17, Lenawee County Records) described as beginning 464.03 feet S 89 deg. 04' 00" E (along the south line of said Section 34) and 283.00 feet N 00 deg. 21' 00" E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21' 00" E 176.00 feet; thence S 89 deg. 04' 00" E 250.00 feet; thence S 00 deg. 21' 00" W 176.00 feet along the east line of said Lot 25; thence N 89 deg. 04' 00" W 250.00 feet to the place of beginning. Containing 1.01 acres.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan:

All that part of the Southwest 1/4 of Section 34, Town 5 South, Range 4 East, (also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records), described as beginning at the Southwest corner of Lot 25, aforesaid, 57.36 feet (recorded as 57.3 feet) South 89 deg. 04' 00" East (along the South line of said Section 34) and 33.00 feet North 00 deg. 17' 00" East from the Southwest corner of said Section 34; thence North 00 deg. 17' 00" East 426.00 feet along the West line of said Lot 25; thence South 89 deg. 04'

00" East 326.97 feet; thence South 00 deg. 17' 00" West 176.00 feet; thence North 89 deg. 04' 00" West 120.00 feet; thence South 00 deg. 21' 00" West 250.00 feet to the South line of said Lot 25; thence North 89 deg. 04' 00" West 206.68 feet to the point of beginning.

SAVE AND EXCEPT:

Situated in the City of Tecumseh County of Lenawee, Michigan, to-wit:

All that part of the Southwest 1/4 of Section 34, Town 5 South, Range 4 East, (Also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Pages 15, 16 and 17, Lenawee County Records), described as beginning on the south line of Lot 25 aforesaid 464.03 feet S 89 deg. 04' 00" E (along the south line of said Section 34) and 33.00 feet N 00 deg. 21' 00" E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21' 00" E 250.00 feet; thence S 89 deg. 04' 00" 250.00 feet to the east line of said Lot 25; thence S 00 deg. 21' 00" W 250.00 feet to the southeast corner of said Lot 25; thence N 89 deg. 04' 00" W 250.00 feet to the place of beginning containing 1.435 acres.

Subject to easements and restrictions of record.

The bearings are referenced to the Assessor's Plat No. 6, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan, to-wit:

All that part of the Southwest 1/4 of Section 34, Town 5 South, Range 4 East, (Also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Pages 15, 16 and 17, Lenawee County Records), described as beginning on the south line of Lot 25 aforesaid 264.03 feet S 89 deg. 04' 00" E (along the south line of said Section 34) and 33.00 feet N 00 deg. E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21' 00" E 250.00 feet; thence S 89 deg. 04' 00" 200.00 feet; thence S 00 deg. 21' 00" W 250.00 feet to the south line of said Lot 25; thence N 89 deg. 04' 00" W 200.00 feet to the place of beginning containing 1.148 acres.

The bearings are referenced to the Assessor's Plat No. 6, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records,

805 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0250-00 (as to Parcel 3) Vacant Land

EXHIBIT B

LICENSE AGREEMENT REGARDING ENVIRONMENTAL WORK

This License Agreement Regarding Environmental Work ("License Agreement") is made as of this 18th day of December, 2009 ("Effective Date") by and between Consolidated Biscuit Co., an Ohio corporation and Tecumseh Bakery, LLC, an Ohio limited liability company (collectively "Grantor"), and Tecumseh Products Company, Inc., a Michigan corporation ("Grantee").

Whereas, Grantor and Grantee entered into a Real Estate Purchase Agreement dated October__, 2009 ("Purchase Agreement") setting forth the terms and conditions by which Grantor purchased from Grantee the property and improvements known as 100 and 101 East Patterson Street, Tecumseh, MI, and more specifically described by the legal description attached hereto as Exhibit A ("Property"); and

Whereas, Grantor is as of the Effective Date of this License Agreement the owner of the Property, and intends to redevelop it for commercial and industrial purposes; and

Whereas, Grantee is in the process of investigating, monitoring, remediating, cleaning up and/or responding to certain releases of "Hazardous Materials", as that term is defined in the Purchase Agreement, at the Property (collectively the "Environmental Work"), and intends to continue in the future undertaking and completing the Environmental Work on, under or about the Property in accordance with the terms of the Purchase Agreement and applicable laws, regulations, and future orders; and

Whereas, a portion of the Property is subject to the Declaration of Restrictive Covenants recorded at Lenawee County Register of Deeds Liber ___, page ___ ("Declaration") which prohibits uses of groundwater on the Property and limits the uses of the Property to industrial and certain commercial uses;

Now, therefore, the parties agree as follows:

1. Grantor grants to Grantee and its representatives, agents, employees, contractors, and consultants a non-exclusive revocable license to enter the Property at reasonable times upon at least 24 hours notice to Grantor for the purposes of undertaking, monitoring, and/or overseeing any Environmental Work (using persons and equipment of its choosing) which in Grantee's reasonable opinion is necessary to comply with Grantee's obligations under applicable laws, regulations, future orders, and the Purchase Agreement; provided, however, that i) Grantee shall fully comply with all terms of this License Agreement when exercising its rights hereunder; ii) Grantee shall not undertake any activities that materially disrupt or impede Grantor's active manufacturing or related operations without Grantor's advanced consent, which consent shall not be unreasonably withheld; and iii) Grantee shall not undertake any activities that violate any laws, rules, or regulations applicable to Grantor's business and operations on the Property, provided that Grantor shall advise Grantee of any such laws, rules or regulations applicable to Grantor's business and operations and will reasonably cooperate with Grantee in accommodating the needs of Grantee to perform the Environmental Work in a safe and legal manner. Grantor further grants to the Michigan Department of Environmental Quality ("MDEQ"), the United States Environmental Protection Agency ("U.S. EPA"), and their

respective representatives, agents, employees, contractors, and consultants a revocable non-exclusive license to enter the Property at reasonable times and in accordance with the terms of this License Agreement for the purposes of monitoring and/or overseeing the Environmental Work, or determining compliance with any applicable laws, regulations, and/or future orders related to the Environmental Work.

2. In exercising the rights granted under this License Agreement, Grantee and its contractors, subcontractors, agents, consultants, designees, and representatives (collectively the "Licensees") shall at all times conduct their activities on the Property in such a way as to not unreasonably or materially interfere with the activities, operations, and business of Grantor or any other authorized occupants of the Property. Notwithstanding the foregoing, the parties acknowledge that essential Environmental Work may at times require that Grantor's operations be interrupted in order to accommodate the essential Environmental Work on a temporary basis. Grantee will use best efforts to avoid any such interruptions, and shall provide prior written notice describing any anticipated interruption so that the parties may work together in good faith to avoid or minimize any such interruption so as not to unreasonably or materially interfere with the activities, operations, and business of Grantor or any other authorized occupants of the Property.

3. In exercising the rights granted under this License Agreement, Grantee shall be solely responsible for the implementation of any Environmental Work it chooses to undertake, including, without limitation, complying with applicable laws, regulations, and/or future orders, and Grantor shall not be deemed to have accepted any responsibilities relating to the Environmental Work undertaken by Grantee by entering into or cooperating under this License Agreement. Grantee assumes all risks related to the exercise of the Licensees' rights under this License Agreement, whether foreseeable or unforeseeable, and hereby waives, to the extent permitted by law, all claims against Grantor for damage or injury to persons, property, or business sustained by any Licensee, however caused.

4. Licensees shall be responsible for providing or causing to be provided workers' compensation insurance for all of their respective employees and the employees of their respective contractors, subcontractors, agents, consultants, designees, and representatives while on the Property, in accordance with the statutory requirements of the State of Michigan. During the term of this License Agreement, Grantee shall also provide or cause to be provided general commercial liability, employers' liability, property and automobile insurance covering all activities of the Licensees and their respective employees, contractors, subcontractors, agents, consultants, designees, and representatives while on the Property or related in any way to the performance of any Environmental Work. The insurance policies for such insurance shall each have coverage limits of at least $3,000,000 per occurrence with an annual aggregate of $6,000,000. All such insurance policies shall be primary and Grantor shall be named as an additional insured on all such insurance policies.

5. In exercising the rights granted under this License Agreement, the Licensees shall adhere to, and not interfere with, any existing security or safety requirements of Grantor. Notwithstanding the foregoing, all Licensees shall be solely responsible for the safety and protection of their respective property, employees, contractors, subcontractors, agents, consultants, designees, and representatives while on the Property.

6. Grantee shall be responsible, at its sole cost, for timely and fully restoring to Grantor's reasonable satisfaction any damages to the Property caused by any Licensees at any time during the term of this License Agreement (including, without limitation, damages to buildings, improvements, appurtenances, and personal property) to substantially the same condition that existed prior to such damage.

7. Grantee shall use reasonable care in its performance of the Environmental Work and exercising its rights and obligations under this License Agreement, and shall defend, indemnify and hold harmless Grantor, its agents, employees, officers, directors, affiliates and agents (collectively, the "Grantor Indemnified Parties"), from and against any and all claims, actions, damages, losses, costs, liabilities or expenses (including reasonable attorney fees), arising from or caused by any Licensee's entry upon or occupancy of the Property, or the performance of the Environmental Work, except to the extent that such claims arise solely as a result of the gross negligence or intentional actions of the Grantor Indemnified Parties. In the event claims should arise from or are caused by the joint negligence and/or intentional actions of the Grantor Indemnified Parties and one or more Licensee, then Grantee's duty of indemnification under this paragraph 7 shall be in proportion to the allocable share of the Licensees' joint negligence and/or intentional actions.

8. During the term of this License Agreement, Grantee shall not permit any construction, mechanic's or materialman's lien to be filed against the Property as the result of any work, labor, service or materials performed or furnished by, for or to any Licensee, their representatives, designees, employees, agents or contractors and shall take immediate action to remove any such lien from the Property. Grantee shall defend, indemnify, and hold Grantor harmless from all such liens or claims of lien arising out of, or claimed by reason of, such activities. If Grantee fails to discharge or bond any lien or claim of lien for which it is responsible hereunder within 30 days following notice from Grantor, then Grantor may, but shall not be obligated to, at its option, pay the same or any part thereof, and the amount of such payment shall be due and owing from Grantee as of the date of such payment with interest thereon at the rate of 18% per annum until paid in full.

9. Grantor shall use reasonable care not to damage or interfere with any existing or future monitoring wells/points or related apparatus or equipment installed on the Property by Grantee as part of the Environmental Work and in accordance with the terms of this License Agreement.

10. Grantor shall comply with any obligations imposed on Grantor as owner of Property under the Declaration and any additional reasonable remedy-related restrictions (including restrictions necessary for remedy implementation), due care plans or risk mitigation plans prepared by and/or implemented by Grantee as part of the Environmental Work; provided, however, that such remedy-related restrictions, due care plans or risk mitigation plans 1) comport with applicable laws, regulations, future orders, the terms of the Purchase Agreement, and the terms of this License Agreement, including, without limitation, Paragraphs 1 and 2 herein and 2) do not require Grantor to incur any material out-of-pocket costs or expenses. Notwithstanding the foregoing sentence, in the event Grantee designs, installs, and operates for one year a vapor mitigation system or makes HVAC modifications in existing buildings on the Property (and monitors such modifications for one year) for purposes of preventing or mitigating vapor intrusion into on-site buildings, Grantor agrees to take over responsibility from Grantee for operating such vapor mitigation systems or HVAC

modifications provide there is no material out-of-pocket costs to Grantor in doing so aside from employee-related costs. Grantor shall provide Grantee with adequate utility access to run any such remedy-related equipment, such as blowers and HVAC systems, with the costs of such utilities to be borne by Grantee, unless otherwise agreed to by Grantor.

Grantor specifically agrees that it shall not interfere with the operation or performance of any groundwater or soil vapor collection or treatment system installed by Grantee in accordance with the terms of this License Agreement, and shall not intentionally remove, disturb, or damage any monitoring wells/points and permanent markers installed on the Property by Grantee, and shall take reasonable measures to keep vegetation and other materials clear of the permanent markers to ensure they are readily visible.

Grantor further agrees that it shall request that the City of Tecumseh Brownfield Authority apply for and seek to obtain brownfield grant monies (with no repayment obligation) to seal coat and/or caulk concrete floors, cracks, and floor joints within existing buildings on the Property, as necessary to prevent migration of VOCs from soil, groundwater, and/or the concrete material itself into the indoor air; provided, however, that CBC's cooperation to pursue such grants shall not constitute acceptance by CBC of any obligations or responsibilities for response or corrective action which TPC has agreed to be responsible for in the Purchase Agreement entered into between the parties.

Nothing in this paragraph 10 obligates Grantor to record in the future any additional environmental restrictive covenants on the Property not already set forth in the Declaration, except as follows: The parties acknowledge that the Declaration will likely need to be amended in order to conform to the final corrective measures to be undertaken at the Property, which may include a sub-slab depressurization system and related measures to restrict exposure to chemical concentrations in soil, groundwater and the building slab. To the extent consistent with the terms of this paragraph 10, amendments to the Declaration may include, without limitation, 1) prohibiting surface water impoundments or modifications of any on-site drainage features that have the potential to cause surface water to accumulate on site or otherwise have the potential to exacerbate contamination; 2) maintaining and not interfering with engineering controls as part of corrective action activities to prevent exposure to or exacerbation of existing contamination; 3) prohibiting activities on the Property that may interfere with any element of the corrective action activities, including the performance of operation and maintenance activities, monitoring, or other measures necessary to ensure the effectiveness and integrity of the corrective action activities; 4) prohibiting activities that would remove, cover, obscure, or otherwise alter or interfere with permanent markers, and maintaining vegetation and other materials clear of the permanent markers to assure that the markers are readily visible; and 5) managing all soils, media and/or debris located on the Property in accordance with applicable federal and state laws and regulations. Upon receipt of an amendment to the Declaration consistent with the terms of this Paragraph 10, Grantor agrees to execute and deliver such amendment to the Declaration as may be necessary to ensure compliance with such corrective measures and to protect such corrective measures from interference by owners or occupants of the Property.

11. If during the term of this License Agreement, Grantor intends to perform construction or modifications to Grantor's Property which may be impacted by or, conversely, may impact the

Environmental Work, Grantor and Grantee agree to timely communicate and reasonably cooperate with each other in determining how to eliminate or mitigate any such potential impacts, including preventing vapor intrusion into any new habitable spaces.

12. At the conclusion of Grantee's performance of the Environmental Work, Grantee shall remove all monitoring wells (or properly close and cap same), markers, environmental equipment and the like which are no longer required on the Property, and shall fully restore any damage to the Property caused by such removal. Thereafter, this License Agreement shall terminate in accordance with paragraph 16 below.

13. This License Agreement is not intended to and does not alter, modify or shift any obligations, responsibilities, or rights as between Grantor and Grantee relating to environmental conditions on, under, or about the Property or compliance with environmental laws other than as expressly set forth herein or as expressly set forth in the Purchase Agreement.

14. In entering into this License Agreement and completing the Environmental Work, Grantor acknowledges that Grantee is not acting as a representative of the MDEQ and U.S. EPA and the MDEQ and U.S. EPA are not responsible or liable for Grantee's actions.

15. Nothing in this License Agreement shall constitute a waiver by Grantor or Grantee of any rights or claims they may have against each other relating to the Property not expressly provided herein. Grantor's cooperation under this License Agreement shall not constitute acceptance by Grantor of the adequacy of any Environmental Work performed by Grantee.

16. All of the rights, responsibilities, terms, and provisions of this License Agreement shall be binding upon the parties, their successors and assigns, and shall inure to the benefit of their successors and assigns. Grantor shall not convey any interest in the Property to any other party without requiring that party to accept in writing and be subject to the terms of this License Agreement so long as it remains effective. Grantee may not assign its rights under this License Agreement without the prior written consent of Grantor. This License Agreement shall remain in full force and effect unless and until: 1) Grantee notifies Grantor in writing that the Environmental Work has been fully completed and provides written notice of approval of the Environmental work from the MDEQ and/or U.S. EPA; or 2) Grantee materially breaches the terms of the Purchase Agreement and/or this License Agreement and fails to cure such breach within sixty (60) days of receiving written notice of same from Grantor, or such additional time as may be necessary if such cure cannot reasonably be completed within such 60 day period. Paragraphs 6, 7, 8, and 12 shall survive the termination of this License Agreement for any reason. This License Agreement is not intended to be recorded and will not be recorded without the written consent of Grantor.

17. Any notices or other communication required to be given in writing under this Agreement shall be deemed sufficient only if delivered at least by regular mail as follows:

To Grantor:

Consolidated Biscuit Company
312 Rader Road
McComb, Ohio 45858
Attn: Mr. William H. Varney
Bill.varney@cbcbakery.com

To Grantee:

Tecumseh Products Company
1136 Oak Valley Drive
Ann Arbor, MI 48108
Attn: General Counsel

18. This License Agreement shall be governed by and construed in accordance with the laws of the State of Michigan notwithstanding any state's conflict of law or choice of rules to the contrary.

19. This License Agreement is not and shall not be construed as an admission of any issue of fact or law or as an admission or adjudication of any liability.

20. This License Agreement constitutes the parties' entire agreement on this subject. There are no written or oral representations or understandings that are not fully expressed in this License Agreement. No change, waiver, or discharge is valid unless in writing and signed by the party against whom it is sought to be enforced.

21. If any part of this License Agreement is for any reason found to be unenforceable, all other portions nevertheless remain enforceable.

22. Each person executing this License Agreement represents that the party on whose behalf the person is executing this License Agreement has duly authorized the execution of this License Agreement and that such person is authorized to execute this License Agreement on behalf of such party.

23. This License Agreement may be executed in multiple originals and counterparts, each of which shall be deemed an original and all of which will constitute one and the same instrument.

In Witness Whereof, the parties execute this License Agreement as of the date first above written:

Grantor:

Consolidated Biscuit Co. and Tecumseh Bakery, LLC

By: _____

Its: Vice President

Grantee:

Tecumseh Products Company, Inc.

By: _____
James Wainright

Its: Interim President

588626v1

EXHIBIT A

LEGAL DESCRIPTION OF PROPERTY

Real property situated in the City of Tecumseh, County of Lenawee, Michigan, described as follows:

Parcel 1

A parcel of land located in the West ½ of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan and being Lots 13, 14 and 15 of "Assessors Plat No. 6" City of Tecumseh as recorded in Liber 14, pages 15 through 17 in the Office of the Register of Deeds for Lenawee County.

402 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0130-00 (as to Parcels 1 & 2)

404 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0140-00 (as to Parcels 1 & 2)

600 S. Ottawa St., Tecumseh, MI 49286
Tax I.D. No.: 325-0150-00 (as to Parcels 1 & 2)

Parcel 2

A parcel of land located in the Southwest ¼ of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan and being a part of Lot 24 of "Assessor's Plat No. 6" City of Tecumseh as recorded in Liber 14, pages 15 through 17 in the Office of the Register of Deeds for Lenawee County, Michigan and being further described as: Beginning at the Southwest Corner of said Lot 24; thence North 00 degrees 21 minutes 54 seconds East, 959.73 feet (recorded as North 00 degrees 17 minutes East) along the West line of said Lot 24; thence North 89 degrees 21 minutes 43 seconds West, 25.00 feet; thence North 00 degrees 21 minutes 17 seconds East, 745.43 feet (recorded as North 00 degrees 17 minutes East) along the West line of said Lot 24 and its extension Southerly, to the Northwest Corner of said Lot 24; thence South 89 degrees 33 minutes 12 seconds East, 385.12 feet (recorded as South 89 degrees 37 minutes East, 384.8 feet) along the South line of Patterson Street; thence South 00 degrees 01 minutes 27 seconds East, 8.40 feet (recorded as South 00 degrees 02 minutes West, 8.4 feet) along said South line; thence North 89 degrees 40 minutes 52 seconds East, 896.23 feet (recorded as South 89 degrees 46 minutes East, 897.18 feet) along said South line to the Northeast Corner of said Lot 24; thence South 00 degrees 19 minutes 41 seconds West, 1526.83 feet (recorded as South 00 degrees 18 minutes West) along the West line of Maumee Street to the South line of said Lot 24; thence North 89 degrees 28 minutes 33 seconds West, 598.80 feet (recorded as North 89 degrees 34 minutes West) along said South line to the Northwest Corner of Lot 26 of said "Assessor's Plat No. 6" City of Tecumseh; thence South 00 degrees 42 minutes 29 seconds West, 178.06 (recorded as South 00 degrees 21 minutes West) along the West line of said Lot 24 to the Northeast Corner of Lot 25 of said "Assessor's Plat No. 6" City of Tecumseh; thence

North 89 degrees 05 minutes 50 seconds West, 657.42 feet (recorded as North 89 degrees 05 minutes West, 657.3 feet) along the South line of said Lot 24 to the point of beginning.

All bearings are derived from the bearing of the South line of Lot 24 of "Assessors Plat No. 6" City of Tecumseh as bearing North 89 degrees 04 minutes 00 seconds West as shown on the recorded plat, and KEBS, Inc. drawing of Job No. 05-B-76298.

All of the above described land also being described as follows:

Parcel "A"
Part of Lot 24 of Assessor's Plat No. 6 City of Tecumseh being part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan described as beginning at the Southwest corner of Lot 24 of "Assessor's Plat No. 6"; thence N 00 deg. 17' 00" E along the West line of said Lot 24 a distance of 959.53 feet (recorded as N 00 deg. 17' E 959.73 feet); thence N 89 deg. 03' 58" W a distance of 24.84 feet (recorded as N 89 deg. 21' 43" W 25 feet); thence N 00 deg. 15' 47" E a distance of 744.78 feet (recorded as N 00 deg. 17' E 745.43 feet) to a chiseled "X" at the South Right of Way line of Patterson Street; thence S 89 deg. 45' 16" E along the South Right of Way line of Patterson Street a distance of 385.13 feet (recorded as S 89 deg. 37' E 384.8 feet) to a found nail; thence S 00 deg. 10' 05" E a distance of 8.38 feet (recorded as S 00 deg. 01' 27" E 8.4 feet) to a chiseled "X"; thence S 89 deg. 34' 16" E along the South Right of Way line of Patterson Street a distance of 896.18 feet (recorded as S 89 deg. 46' E 897.18 feet); thence S 00 deg. 14' 44" W a distance of 1,524.10 feet (recorded as S 00 deg. 18' W 1526.83 feet); thence N 89 deg. 33' 09" W a distance of 598.85 feet (recorded as N 89 deg. 34' W 598.80 feet); thence S 00 deg. 36' 36" W a distance of 178.08 feet (recorded as S 00 deg. 21' W 177.7 feet); thence N 89 deg. 10' 17" W a distance of 657.45 feet (recorded N 89 deg. 05' W 657.3 feet) to the Point of Beginning.

Contains 2,052,326 square feet or 47.114 acres. Subject to any easements, restrictions, and Rights of Way of record if any.

100 E. Patterson St., Tecumseh, MI 49286
Tax I.D. No.: 325-0241 -00 (as to Parcels I & 2)

Parcel "B"
Part of Lots 13, 14, and 15 of Assessor's Plat No. 6 City of Tecumseh being part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan described as commencing at the Southwest corner of Lot 24 of "Assessor's Plat No. 6"; thence N 00 deg. 17' 00" E along the West line of said Lot 24 a distance of 959.53 feet; thence N 89 deg. 03' 58" W a distance of 24.84 feet; thence N 00 deg. 15' 47" E a distance of 744.78 feet to a chiseled "X" at the South Right of Way line of Patterson Street; thence N 00 deg. 15' 23" E a distance of 33.60 feet to the Northeast Right of Way intersection of Patterson Street and Evans Street and the Point of Beginning; thence N 00 deg. 14' 10" E along the East Right of Way line of Evans Street a distance of 259.97 feet (recorded as N 00 deg. 17' E 260 feet); thence N 89 deg. 04' 50" W a distance of 8.84 feet (recorded as N 89 deg. 37' W 8.55 feet); thence N 00 deg. 09' 40" W along the East Right of Way of Evans Street a distance of 169.35 feet (recorded as N 00 deg. 26' W 169.55 feet) to a point on the South Right of Way line of Cummins Street; thence S 89 deg. 49' 11" E, along the South

Right of Way line of Cummins Street a distance of 326.61 feet (recorded as S 89 deg. 46' E 327.25 feet); thence S 00 deg. 06' 38" E along the West Right of Way line of Ottawa Street a distance of 430.45 feet (recorded as S 00 deg. 02' W 430.7 feet); thence N 89 deg. 38' 19" W along the North Right of Way line of Patterson Street a distance of 319.20 feet (recorded as N 89 deg. 37' W 318.8 feet) to the Point of Beginning.

Contains 138,273 square feet or 3,174 acres. Subject to any easements, restrictions, and Rights of Way of record if any.

402 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0130-00 (as to Parcels 1 & 2)

404 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0140-00 (as to Parcels 1 & 2)

600 S. Ottawa St., Tecumseh, MI 49286
Tax I.D. No.: 325-0150-00 (as to Parcels 1 & 2)

Parcel 3

Situated in the City (formerly Township) of Tecumseh, County of Lenawee, Michigan, to wit:

All that part of the Southwest Quarter (1/4) of Section Thirty-four (34) in Town Five (5) South, Range Four (4) East, described as commencing in the center of highway at a point located Fifty-seven and five tenths (57.5) feet South Eighty-eight (88) degrees Forty-five (45) minutes East from the Southwest corner of said Section Thirty-four (34) and running thence North No (0) degrees Forty-one (41) minutes East and along the East line of land now, or formerly, owned by the New York Central Railroad Company Eight hundred forty and six tenths (840.6) feet, thence South Eighty-eight (88) degrees Forty-five (45) minutes East Six hundred fifty-seven and four tenths (657.4) feet, thence South No (0) degrees Forty-five (45) minutes West Eight hundred forty and six tenths (840.6) feet to the center of highway, thence North Eighty-eight (88) degrees Forty-five (45) minutes West Six hundred fifty-six and eight tenths (656.8) feet to the place of beginning, except the northerly One hundred seventy-seven and seven tenths (177.7) feet thereof as described in Liber 398 at Folio 146, containing Ten (10) acres of land more or less.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan:

All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Page 15, 16 and 17, Lenawee County Records) described as beginning 464.03 feet S 89 deg. 04' 00" E (along the south line of said Section 34) and 283.00 feet N 00 deg. 21' 00" E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21' 00" E 176.00 feet; thence S 89 deg. 04' 00" E 250.00 feet; thence S 00 deg. 21' 00" W 176.00 feet along the east line of said Lot 25; thence N 89 deg. 04' 00" W 250.00 feet to the place of beginning. Containing 1.01 acres.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan:

All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records), described as beginning at the Southwest corner of Lot 25, aforesaid, 57.36 feet (recorded as 57.3 feet) South 89 deg. 04' 00" East (along the South line of said Section 34) and 33.00 feet North 00 deg. 17' 00" East from the Southwest corner of said Section 34; thence North 00 deg. 17' 00" East 426.00 feet along the West line of said Lot 25; thence South 89 deg. 04' 00" East 326.97 feet; thence South 00 deg. 17' 00" West 176.00 feet; thence North 89 deg. 04' 00" West 120.00 feet; thence South 00 deg. 21' 00" West 250.00 feet to the South line of said Lot 25; thence North 89 deg. 04' 00" West 206.68 feet to the point of beginning.

SAVE AND EXCEPT:

Situated in the City of Tecumseh County of Lenawee, Michigan, to-wit:

All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (Also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Pages 15, 16 and 17, Lenawee County Records), described as beginning on the south line of Lot 25 aforesaid 464.03 feet S 89 deg. 04' 00" E (along the south line of said Section 34) and 33.00 feet N 00 deg. 21' 00" E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21' 00" E 250.00 feet; thence S 89 deg. 04' 00" 250.00 feet to the east line of said Lot 25; thence S 00 deg. 21' 00" W 250.00 feet to the southeast corner of said Lot 25; thence N 89 deg. 04' 00" W 250.00 feet to the place of beginning containing 1.435 acres.

Subject to easements and restrictions of record.

The bearings are referenced to the Assessor's Plat No. 6, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan, to-wit:

All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (Also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Pages 15, 16 and 17, Lenawee County Records), described as beginning on the south line of Lot 25 aforesaid 264.03 feet S 89 deg. 04' 00" E (along the south line of said Section 34) and 33.00 feet N 00 deg. E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21' 00" E 250.00 feet; thence S 89 deg. 04' 00" 200.00 feet; thence S 00 deg. 21' 00" W 250.00 feet to the south line of said Lot 25; thence N 89 deg. 04' 00" W 200.00 feet to the place of beginning containing 1.148 acres.

The bearings are referenced to the Assessor's Plat No. 6, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records,

805 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0250-00 (as to Parcel 3) Vacant Land

ACKNOWLEDGEMENT AND ACCEPTANCE OF THE TERMS OF THE LICENSE AGREEMENT REGARDING ENVIRONMENTAL WORK AMONG CONSOLIDATED BISCUIT CO. (n/k/a PATJIM HOLDINGS COMPANY) ("PATJIM"), TECUMSEH BAKERY, LLC AND TECUMSEH PRODUCTS COMPANY, INC. DATED DECEMBER 18, 2009

This acknowledgement and acceptance of the terms of the License Agreement (the "Agreement") is entered into by and among Patjim Holdings Company, Tecumseh Bakery, LLC, and Tecumseh Food, Machinery & Engineering, LLC ("TFME") as of the 16 day of Jan, 2012 (the "Effective Date").

WHEREAS, Consolidated Baking Co. ("CBC"),Tecumseh Bakery, LLC ("TB") and Tecumseh Products Company, Inc. ("TPC") entered into the License Agreement when TB acquired certain industrial property from TPC in the City of Tecumseh, County of Lenawee, Michigan more accurately described on Exhibit A attached hereto (the "Property"); and

WHEREAS, the terms of the License Agreement require that the owner of the Property shall not convey any interest in the Property to any other party without requiring that party to accept in writing and be subject to the terms of the License Agreement so long as it remains effective; and

WHEREAS, this Agreement is being entered into by the parties hereto in connection with and as part of the acquisition and transfer of the Property from TB to TFME.

NOW THEREFORE, in consideration of the mutual promises and covenants undertaken by the parties hereto, Patjim, TB, and TFME agree as follows:

1. TFME acknowledges that it has received and reviewed a true and correct copy of the License Agreement, as well as a true and correct copy of the Declaration of Environmental Restrictive Covenants recorded at Lenawee County Register of Deeds Liber 2396, Page 0535.

2. TFME accepts and hereby agrees to comply with and perform all of the terms and obligations required of the owner of the Property as set forth in the License Agreement and the Declaration of Environmental Restrictive Covenants.

3 TFME further agrees that it will advise and provide a copy of Declaration of Environmental Restrictive Covenants to its tenants, contractors and any other person or entity who is occupying or performing any work on or at the Property.

3. TFME further agrees to indemnify, defend and hold TB and Patjim, and their officers, directors, shareholders and employees harmless from any and all claims, losses, expenses, costs and liabilities whatsoever arising from TFME's and/or it officers', managers', employees', agents', representatives', invitees', tenants', contractors' and subcontractors' failure to comply with the terms of this Agreement, the License Agreement or the Declaration of Environmental Restrictive Covenants.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first written above.

TECUMSEH BAKERY, LLC

By: James M. Cyprall

Its: President

PATJIM HOLDINGS COMPANY

By: James M. Cyprall

Its: President

TECUMSEH FOOD, MACHINERY & ENGINEERING, LLC

By: Dave Roberts

Its: General manager.

DECLARATION OF RESTRICTIVE COVENANT

U.S. EPA Docket No: RCRA-05-2010-0012

Facility MID No: MID-005-049-440

EPA Approval Date: _____, 2016

This Declaration of Restrictive Covenant is made to protect public health, safety, or welfare, or the environment pursuant to the provisions of Part 111, Hazardous Waste Management, Michigan Compiled Laws (MCL) 324.11101 *et seq.* (Part 111) and the applicable sections of Part 201, Environmental Remediation, MCL 324.20101 *et seq.* (Part 201) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), MCL 324.101 *et seq*. and the administrative rules promulgated pursuant to those Parts, MAC R 299.9101 *et seq.* and MAC R 299.5101 *et seq*. and the Solid Waste Disposal Act, commonly referred to as the Resource Conservation and Recovery Act of 1976 (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984, 42 U.S.C. §§ 6901 *et seq*.

This Declaration of Restrictive Covenant ("Restrictive Covenant") is made on the __ day of _____, 2016, by _____ ("Grantor"), whose address is _____, for the benefit of (i) Michigan Department of Environmental Quality (MDEQ), whose address is 525 West Allegan Street, PO Box 30473, Lansing, Michigan 48909-7973, (ii) the United States Environmental Protection Agency (USEPA), whose address is 77 W. Jackson Blvd., Chicago, IL 60604-3590, and (iii) Tecumseh Products Company, whose address is 5683 Hines Drive, Ann Arbor, MI 48108 ("Grantees").

This Restrictive Covenant has been made to prohibit or restrict activities that could result in unacceptable exposure to environmental contamination present at the property located at 100 E. Patterson, City of Tecumseh, County of Lenawee, Michigan, and legally described in Exhibit 1 ("Property").

The Property is currently subject to a Declaration of Environmental Restrictive Covenants dated December 18, 2009, recorded on January 14, 2010, at Liber 2396, Page 0535, of the records of the Lenawee County Register of Deeds ("Existing Declaration"). USEPA has consented to the amendment and replacement of the Existing Declaration with this Restrictive Covenant.

The Property's Tax ID Number is XT0-325-0241-00.

The Property is associated with Tecumseh Products Site, MID 005-049-440, and is subject to a USEPA Administrative Order on Consent dated March 29, 2010 (RCRA-05-2010-0012), pursuant to which a Final Decision and Response to Comments ("Final Decision") will be issued by USEPA. The corrective measures being implemented to address environmental contamination will be fully described in the Final Decision.

The recording of this Restrictive Covenant is necessary to: 1) restrict unacceptable exposures to hazardous substances located on the Property; and 2) assure that the use of Property is consistent with the exposure assumptions utilized in the development of nonresidential cleanup criteria and the exposure control measures relied upon in the Final Decision; and 3) to prevent damage or disturbance of monitoring wells or any other element of the corrective measures constructed on the Property.

The land or resource use restrictions contained in this Restrictive Covenant are based upon information currently available to the MDEQ and USEPA. Failure of the corrective measures to achieve and maintain the cleanup criteria, exposure controls, and requirements specified in the Final Decision; future changes in the environmental condition of the Property or changes in the cleanup criteria; the discovery of environmental conditions at the Property that were not accounted for in the Final Decision; or use of the Property in a manner inconsistent with the restrictions described herein, may result in this Restrictive Covenant not being protective of public health, safety, or welfare, or the environment. Additional restrictions may become necessary. Information pertaining to the environmental conditions at the Property and the corrective actions undertaken at the Property is on file with the MDEQ, Office of Waste Management and Radiological Protection, and with USEPA, Region V.

Exhibit 2, attached hereto, provides a survey and a map that identifies those portions of the Property that are subject to land use or resource use restrictions as specified herein.

Summary of Completed Corrective Measures

Hazardous substances listed in Exhibit 3 have been found in soils or groundwater at the Property in concentrations above the cleanup criteria for unrestricted residential use for relevant exposure pathways. The Property described in Exhibit 2 contains hazardous substances in excess of the concentrations that satisfy the cleanup criteria for unrestricted residential use and have not been addressed by the corrective measures that have been undertaken to date.

The following corrective measures have been or will be undertaken at the Property:

1. Construction of a Sub-Slab Depressurization System ("SSDS") in "S" Building, depicted on Exhibit 2.

2. Construction and operation of a Soil Vapor Extraction ("SVE") system in the northern portion of the site in and around "P" Building, depicted on Exhibit 2.
3. Construction and operation of a perimeter SVE system in the southeast portion of the site, depicted on Exhibit 2.
4. Construction of a Permeable Reactive Barrier ("PRB") on the eastern edge of the property, depicted on Exhibit 2.
5. Installation of groundwater monitoring wells and soil gas monitoring points, depicted on Exhibit 2.
6. Additional corrective measures to be described in the Final Decision, which may include, without limitation:
    a. Expansion of existing SVE systems.
    b. Remediation of affected soils.
    c. Treatment of groundwater.
    d. Additional monitoring wells and/or soil gas monitoring points.

Despite these corrective measures identified above, hazardous substances will remain present in soils or groundwater at levels that require controls to prevent unacceptable exposures.

Definitions

"Grantee" shall mean MDEQ, USEPA, and Tecumseh Products Company, their respective successor entities and assigns, and those persons or entities acting on their behalf.

"Grantor" shall mean _____, the title holder of the Property at the time this Restrictive Covenant was executed, any persons or entities authorized to act on the title holder's behalf, and any future title holder of the Property or some relevant sub-portion of the Property.

"MDEQ" means the Michigan Department of Environmental Quality, its successor entities, and those persons or entities acting on its behalf.

"USEPA" means the United States Environmental Protection Agency, its successor entities, and those persons or entities acting on its behalf.

"Owner" means at any given time the then current title holder of the Property or any portion thereof, including any lessees and those persons or entities authorized to act on the title holder's behalf.

"Part 111" means Part 111, Hazardous Waste Management, of the NREPA in effect at the time of the recording of this Restrictive Covenant.

All other terms used in this document which are defined in Part 111 of the NREPA and the Part 111 Administrative Rules, or Part 201 of the NREPA and the Part 201 Administrative Rules solely to the extent not inconsistent with the definitions in Part 111 or the Part 111

Administrative Rules, shall have the same meaning in this document as in those statutes and rules as on the date this Restrictive Covenant is made.

NOW THEREFORE,

Declaration of Land Use or Resource Use Restrictions

The Grantor hereby declares and covenants that the Property shall be subject to those restrictions on use described below and intends that said restrictions and covenants shall run with the land, and may be enforced in perpetuity against the Owner by the following entities: (1) the Grantor, if it is no longer Owner; (2) Tecumseh Products Company, its successors and assigns; (3) MDEQ; and (4) USEPA.

1. Land Use Prohibitions. Owner shall prohibit all uses of the Property that are not compatible or consistent with the exposure assumptions for the nonresidential cleanup criteria. Uses that are compatible with nonresidential cleanup criteria are generally described in the Description of Allowable Uses, attached hereto as Exhibit 4.

2. Activities Prohibited. Owner shall prohibit activities on the Property that may result in exposures above cleanup levels established in the Final Decision. These prohibited activities include:

a. No drinking water wells may be installed or used on the Property.

b. No groundwater extraction wells may be installed or used on the Property except for wells and devices that are part of an MDEQ or USEPA approved corrective measure, and for short-term dewatering for construction purposes, provided the dewatering, including management and disposal of groundwater, is conducted in accordance with all applicable environmental laws and does not cause or result in a new release, exacerbation of any pre-existing environmental condition, or any other violation of environmental laws.

c. No contaminated soils, if any are present, may be relocated on the Property except as provided under Part 201, Section 20120c, MCL 324.20120c.

d. Owner shall not "treat," "store," "dispose" or release any Hazardous Substances, on, at, or below the Property, in a manner that would require a permit under RCRA, 42 U.S.C. §§ 6901 et seq. or equivalent state law, except pursuant to a plan or permit approved in writing by MDEQ or USEPA.

e. At all times, including if Owner elects to remove any slabs, pavement or other imperious surface on the Property, Owner shall comply with and be responsible for all costs associated with Owner's obligations pursuant to Section 107a of Part 201 of the Michigan Natural Resources and Environmental Protection Act (MCL

324.20107a) and Owner's obligations under §§101(40)(C – G) and §§107(q)(A)(iii – viii) of the federal Comprehensive Environmental Response, Compensation, and Liability Act (42 USC 9601(40)(C – G); 42 USC 9607(q)(A)(iii – viii).

f. Owner shall not excavate or disturb the soils in the areas depicted on the attached Exhibit 2 without a soils management plan approved in writing by USEPA, and a copy supplied to Grantee Tecumseh Products for its approval which shall not be unreasonably withheld, delayed or conditioned as long as it is consistent with this Restrictive Covenant.

g. If Owner elects to remove any slabs, pavement, or other impervious surface on the Property from the locations shown on Exhibit 2, Owner will replace the impervious surface with a comparable impervious surface or engineered barrier designed to prevent rainwater infiltration.

3. Owner shall prohibit activities on the Property that may interfere with any element of the Final Decision, including prohibiting activities that may interfere with the performance of operation and maintenance activities, monitoring, or other measures necessary to ensure the effectiveness and integrity of the Final Decision; including but not limited to:

a. Owner shall prohibit activities on the Property that interfere with the use, operation or maintenance of the Groundwater Treatment Systems or SVE Systems at the site, the approximate locations of which are depicted on Exhibit 2, except in strict accordance with the following:

i. If Owner's activities at the Property will impact the use, operation or maintenance of any aspect of a Groundwater Treatment System or SVE System, then Owner shall provide prior written notice to USEPA and Tecumseh Products, asking for consent to perform such work, and describing in detail the manner in which Owner will, at its sole cost and expense, replace or relocate the Groundwater Treatment System or SVE System, or the affected components thereof, to ensure equivalent operation.

ii. No such work shall proceed without the express prior written consent of USEPA, and a copy supplied to Grantee Tecumseh Products for its approval which shall not be unreasonably withheld, delayed or conditioned as long as the work will not impact the effectiveness of the Groundwater Treatment System or SVE System.

b. Owner shall prohibit the installation of storm water detention basins on the Property that are unlined or have the potential for infiltration that may alter groundwater flow and migration of hazardous substances at the Property.

4. Soil Vapor Management. Owner shall not build or occupy any building on the Property without first completing one of the following:

a. Option 1: Evaluate and determine in accordance with applicable environmental laws, rules, or regulations that no unacceptable vapor intrusion risks to human health exist in any existing or newly constructed site buildings; or
b. Option 2: Install, operate and maintain a vapor barrier and/or mitigation system designed to eliminate the potential for subsurface vapor phase hazardous substances to migrate into any building at concentrations greater than applicable criteria. This prohibition does not apply to short-term occupancy of a building for purposes of construction, renovation, repair, or other short-term activity as long as adequate health and safety precautions are employed during these activities, and they are performed in compliance with Section 20107a of NREPA.
c. If Option 2 above is selected, the Owner shall install and thereafter maintain a vapor barrier and/or install and thereafter operate and maintain a vapor intrusion mitigation system in accordance with applicable standards and criteria at the time, for the purposes of mitigating the potential intrusion of soil vapor below any human-occupied building constructed on the Property after the date of this Restrictive Covenant until it is determined that a vapor barrier or mitigation system is no longer necessary in accordance with Option 1, above.

5. Permanent Markers. Owner shall not remove, cover, obscure, or otherwise alter or interfere with the permanent markers placed at the locations noted in Exhibit 2. Owner shall keep vegetation and other materials clear of the permanent markers to assure that the markers are readily visible.

6. Monitoring Locations. Owner shall not remove, disturb or damage any monitoring wells or soil gas monitoring points on the Property, in the approximate locations depicted on Exhibit 2, except in strict accordance with the following:

a. If Owner's activities at the Property will impact the use, operation or maintenance of any monitoring well or soil gas monitoring point, then Owner shall provide prior written notice to USEPA and Tecumseh Products, asking for consent to perform such work, and describing in detail the manner in which Owner will, at its sole cost and expense, replace or relocate the monitoring well or soil gas monitoring point to ensure equivalent operation.
b. No such work shall proceed without the express prior written consent of USEPA and Tecumseh Products, which may include such terms and conditions as are reasonably deemed necessary by USEPA and Tecumseh Products to ensure such equivalent operation.

7. Contaminated Soil Management. Owner shall manage contaminated soils, media and/or debris and all other soils located on the Property in accordance with the requirements of Part 111, RCRA Subtitle C, the administrative rules promulgated pursuant to Part 111 and the RCRA, and all other relevant state and federal laws, including, but not limited to, MCL 324.20120c.

This includes if the Owner elects to remove any slabs, pavement or other impervious surface on the Property.

8. Access. Owner shall grant to the Grantees the right to enter the Property at reasonable times for the purpose of determining and monitoring compliance with the Final Decision and this Restrictive Covenant, including the right to take samples, inspect the operation of the corrective measures, inspect any records relating thereto, and to perform any actions necessary to maintain compliance with the Part 111 and the Final Decision.

9. Transfer of Interest. The Grantor shall provide notice at the address provided in this document to the Grantees of the Grantor's intent to transfer any interest in the Property, or any portion thereof, at least fourteen (14) business days prior to consummating the conveyance. A conveyance of title, easement, or other interest in the Property shall not be consummated by the Grantor without adequate and complete provision for compliance with the terms and conditions of this Restrictive Covenant. The Grantor shall include in any instrument conveying any interest in any portion of the Property, including, but not limited to, deeds, leases, and mortgages, a notice which is in substantially the following form:

NOTICE: THE INTEREST CONVEYED HEREBY IS SUBJECT TO A DECLARATION OF RESTRICTIVE COVENANT DATED _____ AND RECORDED WITH THE _____ COUNTY REGISTER OF DEEDS, LIBER_____, PAGE_____.

A copy of this Restrictive Covenant shall be provided to all future owners, heirs, successors, lessees, easement holders, assigns, and transferees by the person transferring the interest.

10. Notices. Any notice, demand, request, consent, approval, or communication that is required to be made or obtained under this Restrictive Covenant shall be made in writing, shall include a statement that the notice is being made pursuant to the requirements of this Restrictive Covenant, shall include the Michigan facility identification number, MID 005-049-440, and shall be served either personally, or sent via first class mail, postage prepaid, to Grantees at the addresses set forth above.

11. Term. This Restrictive Covenant shall run with the Property and shall be binding on Owner, and all current and future successors, lessees, easement holders, their assigns, and their authorized agents, employees, or persons acting under their direction and control. This Restrictive Covenant may only be modified or rescinded with the written approval of Grantees.

12. Enforcement. The Grantor is entitled to enforce the restrictions and covenants of this Restrictive Covenant by specific performance or other legal action in a court of competent jurisdiction against subsequent Owners of all or part of the Property. The Grantor, on behalf of itself, and its successors in title, intends and agrees that Grantees are entitled to enforce the restrictions and covenants in this Restrictive Covenant by specific performance or other legal action in a court of competent jurisdiction against the Grantor, as Owner, and thereafter against

subsequent Owners of all or part of the Property. All remedies available hereunder shall be in addition to any and all other remedies at law or equity.

13. Modification/Release/Rescission. The Grantor or Owner may request in writing to the Grantees, at the addresses provided herein, modifications to, or release or rescission of, this Restrictive Covenant. This Restrictive Covenant may be modified, released or rescinded only with the written approval of the Grantees. Any approved modification to, or release or rescission of, this Restrictive Covenant shall be filed with the appropriate Registrar of Deeds by the Grantor or Owner and a certified copy shall be returned to the MDEQ at the address provided herein.

14. Severability. If any provision of this Restrictive Covenant is held to be invalid by a court of competent jurisdiction, the invalidity of such provision shall not affect the validity of any other provisions of this Restrictive Covenant and all other provisions shall continue to remain in full force and effect.

16. Authority to Execute Restrictive Covenant. The undersigned person executing this Restrictive Covenant is the Owner and represents and certifies that he is duly authorized and has been empowered to execute and deliver this Restrictive Covenant.

IN WITNESS WHEREOF, _____, Inc. has caused this Restrictive Covenant to be executed on this ___day of_____, 2016.

_____, Inc., Grantor

By: _____

_____

Its: President

STATE OF MICHIGAN

COUNTY OF _____

The foregoing instrument was acknowledged before me this _____ day of _____, 2016, by _____, the President of _____, Inc., a Michigan corporation, on behalf of the corporation.

IN TESTIMONY WHEREOF, I have hereunto set my hand and seal at _____, _____, this _____ day of _____, 2016.

_____

Notary Public

My Commission Expires: _____

EXHIBIT 1

LEGAL DESCRIPTION OF PROPERTY

EXHIBIT 1

LEGAL DESCRIPTION OF PROPERTY

Real property situated in the City of Tecumseh, County of Lenawee, Michigan, described as follows:

Parcel 1

A parcel of land located in the Southwest ¼ of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan and being a part of Lot 24 of "Assessor's Plat No. 6" City of Tecumseh as recorded in Liber 14, pages 15 through 17 in the Office of the Register of Deeds for Lenawee County, Michigan and being further described as: Beginning at the Southwest Corner of said Lot 24; thence North 00 degrees 21 minutes 54 seconds East, 959.73 feet (recorded as North 00 degrees 17 minutes East) along the West line of said Lot 24; thence North 89 degrees 21 minutes 43 seconds West, 25.00 feet; thence North 00 degrees 21 minutes 17 seconds East, 745.43 feet (recorded as North 00 degrees 17 minutes East) along the West line of said Lot 24 and its extension Southerly, to the Northwest Corner of said Lot 24; thence South 89 degrees 33 minutes 12 seconds East, 385.12 feet (recorded as South 89 degrees 37 minutes East, 384.8 feet) along the South line of Patterson Street; thence South 00 degrees 01 minutes 27 seconds East, 8.40 feet (recorded as South 00 degrees 02 minutes West, 8.4 feet) along said South line; thence North 89 degrees 40 minutes 52 seconds East, 896.23 feet (recorded as South 89 degrees 46 minutes East, 897.18 feet) along said South line to the Northeast Corner of said Lot 24; thence South 00 degrees 19 minutes 41 seconds West, 1526.83 feet (recorded as South 00 degrees 18 minutes West) along the West line of Maumee Street to the South line of said Lot 24; thence North 89 degrees 28 minutes 33 seconds West, 598.80 feet (recorded as North 89 degrees 34 minutes West) along said South line to the Northwest Corner of Lot 26 of said "Assessor's Plat No. 6" City of Tecumseh; thence South 00 degrees 42 minutes 29 seconds West, 178.06 (recorded as South 00 degrees 21 minutes West) along the West line of said Lot 24 to the Northeast Corner of Lot 25 of said "Assessor's Plat No. 6" City of Tecumseh; thence North 89 degrees 05 minutes 50 seconds West, 657.42 feet (recorded as North 89 degrees 05 minutes West, 657.3 feet) along the South line of said Lot 24 to the point of beginning.

All bearings are derived from the bearing of the South line of Lot 24 of "Assessors Plat No. 6" City of Tecumseh as bearing North 89 degrees 04 minutes 00 seconds West as shown on the recorded plat, and KEBS, Inc. drawing of Job No. 05-B-76298.

All of the above described land also being described as follows:

Parcel "A"
Part of Lot 24 of Assessor's Plat No. 6 City of Tecumseh being part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, City of Tecumseh, Lenawee County, Michigan described as beginning at the Southwest corner of Lot 24 of "Assessor's Plat No. 6"; thence N 00 deg. 17' 00" E along the West line of said Lot 24 a distance of 959.53 feet (recorded as N 00 deg. 17' E 959.73 feet); thence N 89 deg. 03' 58" W a distance of 24.84 feet (recorded as N 89 deg. 21' 43" W 25 feet); thence N 00 deg. 15' 47" E a distance of 744.78 feet (recorded as N 00 deg. 17' E 745.43 feet) to a chiseled "X" at the South Right of Way line of Patterson Street; thence S 89 deg. 45' 16" E along the South Right of Way line of Patterson Street a distance of 385.13 feet (recorded as S 89

deg. 37’ E 384.8 feet) to a found nail; thence S 00 deg. 10’ 05” E a distance of 8.38 feet (recorded as S 00 deg. 01’ 27” E 8.4 feet) to a chiseled “X”; thence S 89 deg. 34’ 16” E along the South Right of Way line of Patterson Street a distance of 896.18 feet (recorded as S 89 deg. 46’ E 897.18 feet); thence S 00 deg. 14’ 44” W a distance of 1,524.10 feet (recorded as S 00 deg. 18’ W 1526.83 feet); thence N 89 deg. 33’ 09” W a distance of 598.85 feet (recorded as N 89 deg. 34’ W 598.80 feet); thence S 00 deg. 36’ 36” W a distance of 178.08 feet (recorded as S 00 deg. 21’ W 177.7 feet); thence N 89 deg. 10’ 17” W a distance of 657.45 feet (recorded N 89 deg. 05’ W 657.3 feet) to the Point of Beginning.

Contains 2,052,326 square feet or 47.114 acres. Subject to any easements, restrictions, and Rights of Way of record if any.

100 E. Patterson St., Tecumseh, Ml 49286
Tax l.D. No.: 325-0241 -00 (as to Parcels I & 2)

Parcel 2

Situated in the City (formerly Township) of Tecumseh, County of Lenawee, Michigan, to wit:

All that part of the Southwest Quarter (1/4) of Section Thirty-four (34) in Town Five (5) South, Range Four (4) East, described as commencing in the center of highway at a point located Fifty-seven and five tenths (57.5) feet South Eighty-eight (88) degrees Forty-five (45) minutes East from the Southwest corner of said Section Thirty-four (34) and running thence North No (0) degrees Forty-one (41) minutes East and along the East line of land now, or formerly, owned by the New York Central Railroad Company Eight hundred forty and six tenths (840.6) feet, thence South Eighty-eight (88) degrees Forty-five (45) minutes East Six hundred fifty-seven and four tenths (657.4) feet, thence South No (0) degrees Forty-five (45) minutes West Eight hundred forty and six tenths (840.6) feet to the center of highway, thence North Eighty-eight (88) degrees Forty-five (45) minutes West Six hundred fifty-six and eight tenths (656.8) feet to the place of beginning, except the northerly One hundred seventy-seven and seven tenths (177.7) feet thereof as described in Liber 398 at Folio 146, containing Ten (10) acres of land more or less.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan:

All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (also being part of Lot 25, Assessor’s Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Page 15, 16 and 17, Lenawee County Records) described as beginning 464.03 feet S 89 deg. 04’ 00” E (along the south line of said Section 34) and 283.00 feet N 00 deg. 21’ 00” E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21’ 00” E 176.00 feet; thence S 89 deg. 04’ 00” E 250.00 feet; thence S 00 deg. 21’ 00” W 176.00 feet along the east line of said Lot 25; thence N 89 deg. 04’ 00” W 250.00 feet to the place of beginning. Containing 1.01 acres.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan:

All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records), described as beginning at the Southwest corner of Lot 25, aforesaid, 57.36 feet (recorded as 57.3 feet) South 89 deg. 04' 00" East (along the South line of said Section 34) and 33.00 feet North 00 deg. 17' 00" East from the Southwest corner of said Section 34; thence North 00 deg. 17' 00" East 426.00 feet along the West line of said Lot 25; thence South 89 deg. 04' 00" East 326.97 feet; thence South 00 deg. 17' 00" West 176.00 feet; thence North 89 deg. 04' 00" West 120.00 feet; thence South 00 deg. 21' 00" West 250.00 feet to the South line of said Lot 25; thence North 89 deg. 04' 00" West 206.68 feet to the point of beginning.

SAVE AND EXCEPT:

Situated in the City of Tecumseh County of Lenawee, Michigan, to-wit:

All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (Also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Pages 15, 16 and 17, Lenawee County Records), described as beginning on the south line of Lot 25 aforesaid 464.03 feet S 89 deg. 04' 00" E (along the south line of said Section 34) and 33.00 feet N 00 deg. 21' 00" E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21' 00" E 250.00 feet; thence S 89 deg. 04' 00" 250.00 feet to the east line of said Lot 25; thence S 00 deg. 21' 00" W 250.00 feet to the southeast corner of said Lot 25; thence N 89 deg. 04' 00" W 250.00 feet to the place of beginning containing 1.435 acres.

Subject to easements and restrictions of record.

The bearings are referenced to the Assessor's Plat No. 6, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records.

SAVE AND EXCEPT:

Situated in the City of Tecumseh, County of Lenawee, Michigan, to-wit:

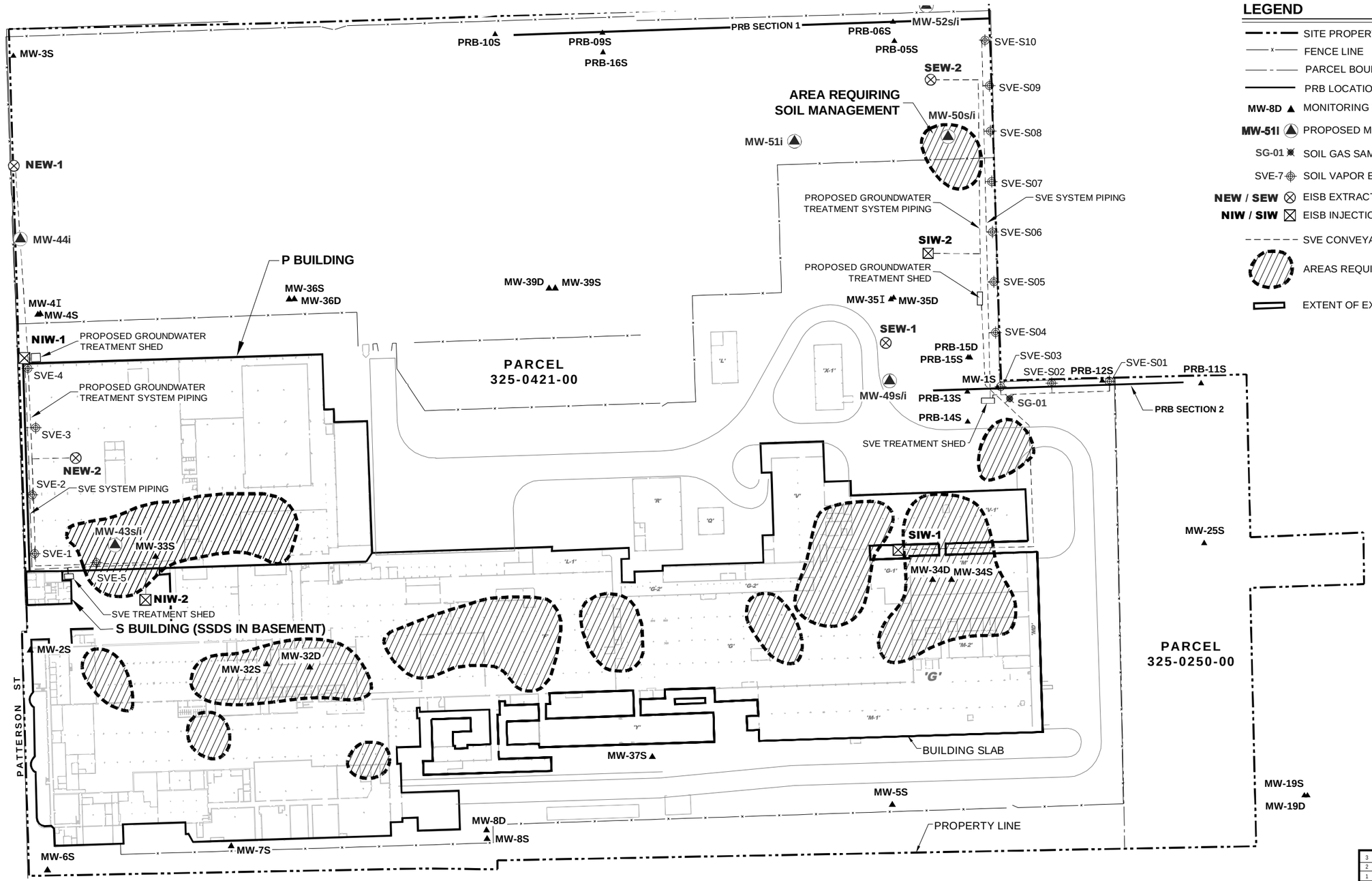
All that part of the Southwest ¼ of Section 34, Town 5 South, Range 4 East, (Also being part of Lot 25, Assessor's Plat No. 6, City of Tecumseh, as recorded in Liber 14 of Plats on Pages 15, 16 and 17, Lenawee County Records), described as beginning on the south line of Lot 25 aforesaid 264.03 feet S 89 deg. 04' 00" E (along the south line of said Section 34) and 33.00 feet N 00 deg. E from the Southwest corner of Section 34 aforesaid; thence N 00 deg. 21' 00" E 250.00 feet; thence S 89 deg. 04' 00" 200.00 feet; thence S 00 deg. 21' 00" W 250.00 feet to the south line of said Lot 25; thence N 89 deg. 04' 00" W 200.00 feet to the place of beginning containing 1.148 acres.

The bearings are referenced to the Assessor's Plat No. 6, as recorded in Liber 14 of Plats, Pages 15, 16 and 17, Lenawee County Records,

805 S. Evans St., Tecumseh, MI 49286
Tax I.D. No.: 325-0250-00 (as to Parcel 3) Vacant Land

EXHIBIT 2

LEGAL DESCRIPTION AND SURVEY OF RESTRICTED AREAS OF THE PROPERTY



LEGEND

- SITE PROPERTY LINE
- FENCE LINE
- PARCEL BOUNDARY
- PRB LOCATION
- MW-8D — MONITORING WELL LOCATION AND NUMBER
- MW-51I — PROPOSED MONITORING WELL LOCATION AND NUMBER
- SG-01 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SVE-7 — SOIL VAPOR EXTRACTION WELL LOCATION AND NUMBER
- NEW / SEW — EISB EXTRACTION WELL
- NIW / SIW — EISB INJECTION WELL
- SVE CONVEYANCE PIPING
- AREAS REQUIRING SOIL MANAGEMENT PLAN
- EXTENT OF EXISTING BUILDING SLAB

EXHIBIT 2

WORKING COPY

0 80 160 240 320
APPROXIMATE SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: DECLARATION OF RESTRICTIVE COVENANT

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.Ex02.dwg	
APPROVED BY: -	DATE PRINTED:	EXHIBIT 2	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Rpt_Restrictive Covenant\246667.0003.Ex02.dwg
Opened Name: STEHLE, DAWN
Drawing Date/Time: 1/14/2016
Drawing Type/Scale: Exhibits

Dwg Size: 1.93 Mb
Plot Date: January 27, 2016
Plot Time: 7:26 AM

Attached Xref's: tem100110 (Filed)
Attached Image: ---
Layers: E09087.02 Declaration of Res Cov

EXHIBIT 3

LIST OF HAZARDOUS SUBSTANCES ABOVE CRITERIA IN SOILS OR GROUNDWATER

Exhibit 3

List of Harzadous Substances above Criteria in Soil or Groundwater

Hazardous Substance	CAS Number	Applicable Criteria
Soil		
1,1-Dichloroethene	75-35-4	330 ug/kg
cis-1,2-Dichloroethene	156-59-2	1,200 ug/kg
Ethylbenzene	100-41-4	360 ug/kg
2-Methyl-naphthalene	91-57-6	4,200 ug/kg
Naphthalene	91-20-3	730 ug/kg
Tetrachloroethene	127-18-4	1,200 ug/kg
1,1,1-Trichloroethane	71-55-6	1,800 ug/kg
Trichloroethene	79-01-6	1,900 ug/kg
1,2,4-Trimethyl-benzene	95-63-6	570 ug/kg
1,3,5-Trimethyl-benzene	108-67-8	1,100 ug/kg
Vinyl Chloride	75-01-4	260 ug/kg
Total Xylenes	1330-20-7	828 ug/kg
Groundwater		
Benzene	71-43-2	5 ug/l
1,1-Dichloroethene	75-35-4	7 ug/l
cis-1,2-Dichloroethene	156-59-2	70 ug/l
trans-1,2-Dichloroethene	156-60-5	100 ug/l
Tetrachloroethene	127-18-4	5 ug/l
1,1,1-Trichloroethane	71-55-6	89 ug/l
1,1,2-Trichloroethane	79-00-5	5 ug/l
Trichloroethene	79-01-6	5 ug/l
1,2,4-Trimethylbenzene	95-63-6	17 ug/l
Vinyl Chloride	75-01-4	2 ug/l

EXHIBIT 4

DESCRIPTION OF ALLOWABLE USES

EXHIBIT 4

DESCRIPTION OF ALLOWABLE USES

Nonresidential Land Use: This land use is characterized by any use which is not residential in nature and is primarily characterized by industrial and commercial uses. Industrial uses typically involve manufacturing operations engaged in processing and manufacturing of materials or products. Other examples of industrial uses are utility companies, industrial research and development, and petroleum bulk storage. Commercial uses include any business or income-producing use, such as commercial warehouses, lumber yards, retail gas stations, auto dealerships and service stations, as well as, office buildings, banks, and medical/dental offices (not including hospitals). Commercial uses also include retail businesses whose principal activity is the sale of food or merchandise within an enclosed building and personal service establishments which perform services indoors, such as health clubs, barber/beauty salons, photographic studios, etc.

Any residential use is specifically prohibited from the non-residential land use category. This would include the primary use of the Property for human habitation and includes structures such as single family dwellings, multiple family structures, mobile homes, condominiums, and apartment buildings. Any uses which are intended to house, educate, or provide care for children, the elderly, the infirm, or other sensitive populations, and therefore could include day care centers, educational facilities, hospitals, elder care facilities, and nursing homes, may not fit the nonresidential exposure assumptions. Residential or site specific environmental protection standards may need to be considered. The use of any accessory building or portion of an existing building as a dwelling unit permitted for a proprietor or storekeeper and their families, located in the same building as their place of occupation, or for a watchman or caretaker is also prohibited. Any authority that allows for residential use of the Property as a legal non-conforming use is also restricted per the prohibitions contained in this restrictive covenant.

Appendix L
Groundwater Ordinance

Sec. 82-120. - Private water wells.

(a) *Definitions.* The following definitions shall apply in the interpretation of this section:

Applicant means a person who is applying under subsection 82-120(n) for an addition or modification to a restricted zone.

City means the City of Tecumseh.

City water service means the water supplied by the City of Tecumseh.

Construction site dewatering means temporary removal of ground water from an excavating site.

Owner means the person holding the legal or equitable title to real property or a lesser estate therein, a mortgagee or vendee in possession, an assignee of rents, receiver, executor, trustee, lessee or any other person, firm or corporation directly or indirectly in control of a building, structure or real property or his duly authorized agent.

Person means any individual, partnership, corporation, limited liability company, association, organization or other legal entity.

Restricted zone is the area depicted on Figure I, prepared by RMT and dated March 2010, which accompanies Ord. No. 4-11, from which this section derives, and any other areas so designated pursuant to subsection 82-120(n).

Water well means a hole drilled or bored into the earth for the purpose of removing water through mechanical or non-mechanical means.

(b) *Purpose.* The purpose of this section is to protect public health, safety and welfare by preventing public exposure to an area of likely or known groundwater contamination.

(c) *Private water wells prohibited.* Except as provided in subsection (d), no person shall install, construct, develop, maintain or use a water well within a restricted zone.

(d) *Permitted water wells.* The following water wells are not prohibited by this section:

(1) A water well used solely for the purpose of construction site dewatering or for conducting response activities, including sampling or treatment of the groundwater, provided that: (i) prior notice of the well is given to the city manager or his or her designated representative, (ii) the owner has demonstrated to the city manager or his or her designated representative's satisfaction that the use of the well will not result in exposure to contaminated groundwater, possible cross-contamination between zones of groundwater, or hydrogeological effects on contaminated groundwater plumes, and (iii) the water generated by the well is properly handled and disposed of in compliance with all applicable laws, rules, regulations, permit and license requirements, orders and directives of any governmental entity or agency of competent jurisdiction.

(2) Municipal wells operated by the city for its municipal water supply, provided such wells are subject to groundwater monitoring under the oversight of the Michigan Department of Natural Resources and Environment Drinking Water and Radiological Protection Division, and/or its

successor agency or designee, in accordance with Act 399 of 1976, The Michigan Safe Drinking Water Act, and applicable Administrative Rules promulgated thereunder.

(3) A geothermal type well for non-contact heating, cooling or processing activities, provided the well is a closed-loop design which does not allow fluid in the coils to be in direct contact with the subsurface, and further provided that owner has demonstrated to the city manager or his or her designated representative's satisfaction that the closed loop system and associated wells will not penetrate a confining clay layer and will be constructed and grouted in accordance with relevant construction criteria.

(e) *Large capacity wells.* No well may be installed or used at any place in the city if its use will cause the migration of contaminated groundwater into previously unaffected groundwater, or will adversely affect any groundwater treatment system, unless the well is part of an MDEQ or US EPA approved groundwater monitoring or remediation system.

(f) *Connection to city water service required.* The owner of any house, building, or property used for human occupancy, employment, recreation, or other purposes situated within the restricted zone or who is prohibited from installing a well by subsection 82-120(c), is hereby required at his or her expense to install suitable plumbing facilities therein, in accordance with the plumbing codes then in effect and enforced within the city and to connect such facilities directly with the City water service in accordance with the requirements of the City of Tecumseh City Code of Ordinances.

(g) *Existing wells.* Any existing well, the use of which is prohibited by subsection 82-120(c), except as permitted under subsection 82-120(d), shall be plugged or abandoned in conformance with Rules established by the Michigan Department of Environmental Quality ("MDEQ") and applicable Lenawee County ordinance and regulation.

(h) *Violations.* Any person who violates any provision of this section shall be responsible for a municipal civil infraction as defined in Public Act 12 of 1994, amending Public Act 236 of 1961, being Sections 600.101—600.9939 of Michigan Compiled Laws, and shall be subject to a fine of not more than $500.00. Each day this section is violated shall be considered a separate violation.

(i) *Enforcement officials.* The city manager or his or her designated representative is authorized to issue municipal civil infraction citations.

(j) *Nuisance per se.* A violation of this section is hereby declared to be a nuisance per se and is declared to be offensive to the public health, safety and welfare.

(k) *Civil remedies.* In addition to enforcing this section through the use of a municipal civil infraction proceeding, the city may initiate proceedings in the circuit courts to abate or eliminate the nuisance per se or any other violation of this section.

(l) *Severability.* If any provision of this section or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect any remaining portion or application of this section which can be given effect without the invalid portion or application.

(m) *Amendments.* The city shall notify the MDEQ at least 30 days prior to adopting a modification to this section or the lapsing or revocation thereof, including any modification to add to or remove property from a restricted zone.

(n) *Additions or modifications to restricted zone.*

(1) *Removing property from restricted zone.*

a. An owner of property located in the city within a restricted zone may apply to the city to remove property from the restricted zone upon a demonstration that such property need not be included in the restricted zone because of improved conditions in the affected

groundwater.

b. The application must include the MDEQ's written and specific concurrence with the requested action, as well as all documentation on which MDEQ based its concurrence.

c. The application must be accompanied by payment of an application fee established by resolution of the city council, intended to cover the city's anticipated out-of-pocket expenses to review and respond to the application.

(2) *Adding property to or establishing a restricted zone.*

a. Property may be added to a restricted zone or a new restricted zone established on a case-by-case basis following the procedures set forth in this section. An applicant shall file an application with the city to add property to a restricted zone or establish a new restricted zone. The applicant shall include a fee established by resolution of the council, intended to cover the city's anticipated out-of-pocket expenses to review and respond to the application. The application shall describe the proposed location to be added, and the nature of the proposed use restrictions.

b. The applicant shall include all documentation submitted to the MDEQ, along with a written statement from a MDEQ representative with approval authority stating that the proposed restricted zone and use regulations have received MDEQ approval as part of the response actions for groundwater contamination.

c. The applicant shall include notices provided to the Lenawee County Health Department concerning the property, and the health department's written acknowledgment that it will not issue permits for prohibited wells within the property to be added to the restricted zone.

(3) *Council action.*

a. Once the city manager, or his or her designee is satisfied that a restricted zone application is complete, the city manager or his or her designated representative shall place the matter on the city council agenda for a public hearing.

b. After the city council sets the public hearing, the city manager or his or her designated representative or his or her designee shall cause a written notice of the hearing to be sent by first class mail to all persons having an interest as owner, tenant, easement holder or mortgagee in any property included in the application. The notice shall describe the application and identify its main features and potential impact on the recipients. The notice shall be mailed at least ten days, but not more than 20 days, prior to the date of the hearing. The notice shall also be mailed to the appropriate MDEQ representatives.

c. After the public hearing, the city council shall act on the application within 30 days, unless it determines that it needs more information before it can decide. In that case, it shall act on the application within 30 days after it has received the additional information.

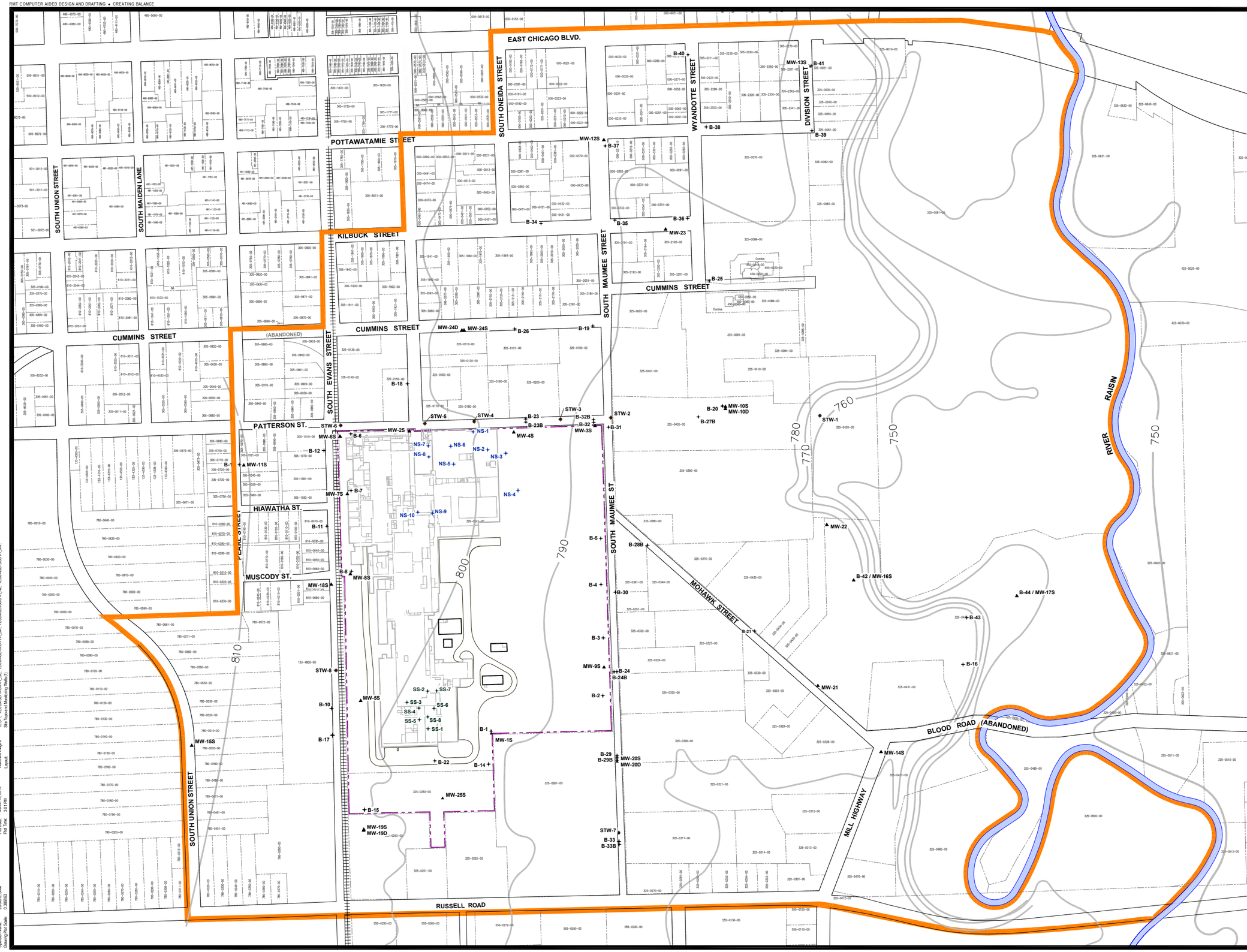
d. Within ten days of city council action modifying the restricted zone, the applicant shall cause a notice of the city council action to be recorded with the Lenawee County Register of Deeds, in a form approved by the city, and recorded in a manner designed to insure that it serves as record notice of the city council action with respect to all affected premises within the restricted zone.

e. Within 30 days of recording the notice, applicant shall provide the city clerk, the Lenawee County Health Department, and the MDEQ with copies of the recorded notice.

(Ord. No. 4-11, § 1, 6-6-2011; Ord. No. 2-14, 9-2-2014)

Editor's note—

Ord. No. 4-11, § 1, adopted June 6, 2011, included a map of the restricted zone as Figure 1, which is not set out herein but is available at the office of the city clerk.



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- NS-6 — NORTHERN SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SS-2 — SOUTHERN SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- BOUNDARY OF PROPOSED RESTRICTED AREA

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.

N

0 200' 400' 600' 800'
SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D.
5.				
4.				
3.				
2.				
1.				

FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

PROPOSED RESTRICTED AREA

DRAWN BY: SJL	DRAWING SCALE: AS INDICATED	PROJECT NO: J:\08070\07	
CHECKED BY: SEM		FILE NO: 8070.07.10.dwg	
APPROVED BY: GC	DATE PRINTED:	**FIGURE 1**	
DATE: March 2010			

RMT
3754 Ranchero Drive
Ann Arbor, MI 48108-2237
Phone: 734-971-7080 • Fax: 734-971-9022

J:\08070\07\8070.07.10.dwg
LUCIDO, SAM
0.300553
B-07.0.03a
Drawing Name:
Operator Name:
Drawing Plot Scale:

Dwg Size: 1.71Mb
Plot Date: March 10, 2010
Plot Time: 3:01 PM

Attached Xref's: tom033109 .mapp
Attached Images: TE C-1 : TECUMSEHNORTH_SE : TECUMSEHNORTH_SW : TECUMSEHSOUTH_NE : TECUMSEHSOUTH_NW :
Layout: Site Plan and Monitoring Wells (1)

LENAWEE COUNTY HEALTH DEPARTMENT

1040 SOUTH WINTER STREET, SUITE 2328, ADRIAN, MICHIGAN 49221-3871

JAMES VAN DOREN, Chairman
Board of Commissioners

HOWARD PENNINGTON, D.V.M.
Chairman, Board of Health

JOHN FRYE, Vice Chairman
Board of Health

MICHAEL KIGHT, R.S., M.S.
Health Officer

DENNIS K. CHERNIN, M.D., M.P.H.
Medical Director

MARY KILGORE VALLAD, M.S., R.N.
Director of Nursing

MARTHA E. HALL, REHS/RS, MPH
Environmental Health Director

MICHAEL ERNST, B.B.A.
Business Office Coordinator

December 15, 2009

Mr. Kevin Welch
309 E. Chicago Blvd.
Tecumseh, Mi 49286

Dear Mr. Welch,

Thank you for your recent communication regarding your concerns associated with drilling of wells in an area of known contamination within the City of Tecumseh.

As indicated during a recent phone conversation, the owner of the property of concern has yet to make application to construct a well. In the event that an application is received, the property owner will be required to provide information to the Lenawee County Health Department to demonstrate that construction of a well will not negatively impact groundwater. Additionally, the Lenawee County Health Department will work closely with our consultants at the Michigan Department of Environmental Quality to determine if construction of a well in this area might negatively impact wells that serve the City of Tecumseh water supply, or the surrounding area.

I have instructed my staff that well permits are not to be issued within the City of Tecumseh unless I have personally reviewed the file. It is my intention to work closely with the City of Tecumseh in resolving any issues regarding the issuance of well permits within the City of Tecumseh. I do however agree with state and federal officials who have suggested that implementation of government controls by the City of Tecumseh to limit the ability to drill wells within the City of Tecumseh would be the most effective means of control.

If you have any further questions regarding this matter, please feel free to contact me at (517) 264-5222.

Sincerely,

Martha Hall

Martha Hall
Director of Environmental Health
Lenawee County Health Department

Appendix M
SVE System Performance

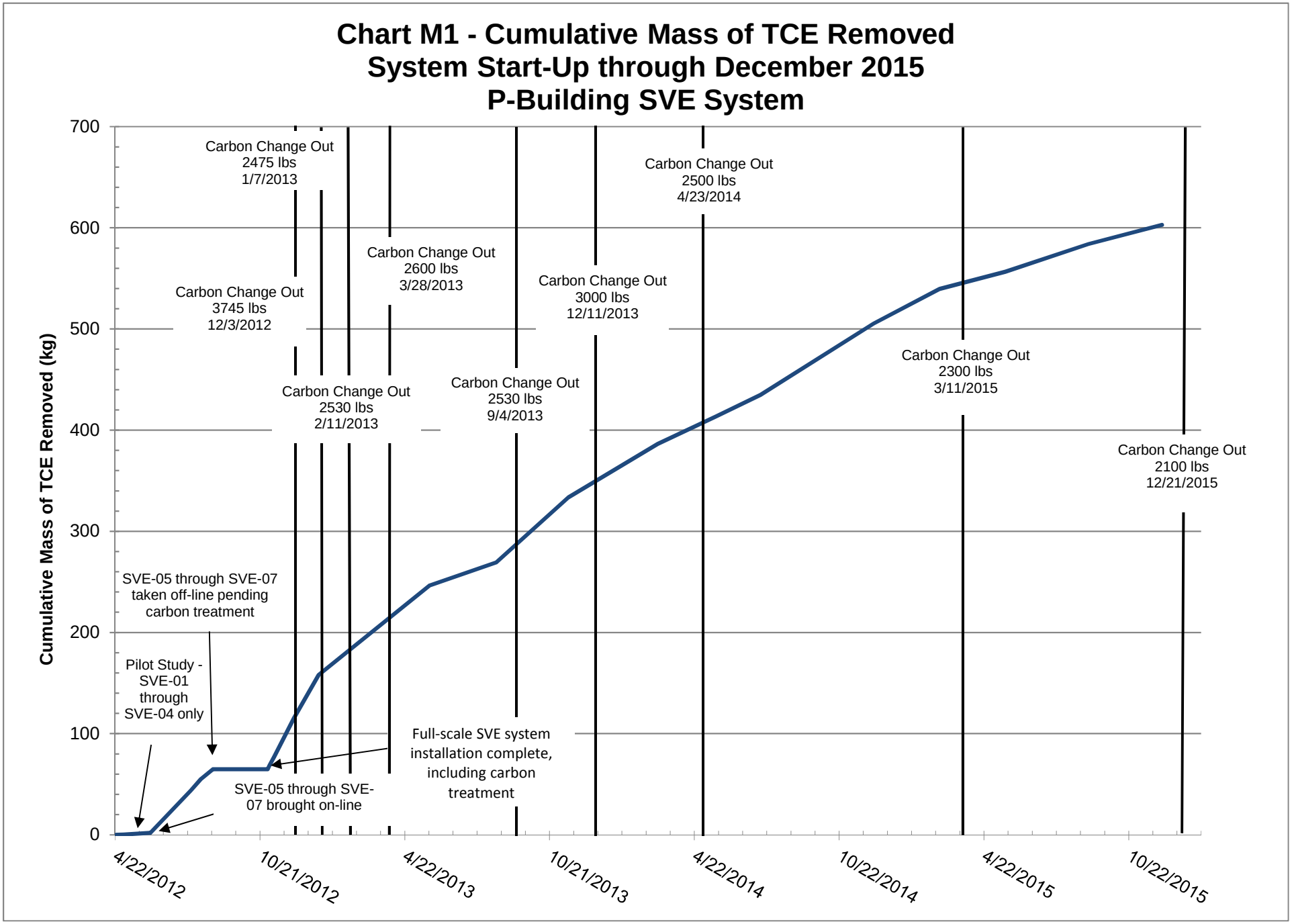


Chart M1 - Cumulative Mass of TCE Removed
System Start-Up through December 2015
P-Building SVE System
Cumulative Mass of TCE Removed (kg)
700
600
500
400
300
200
100
0
Carbon Change Out
2475 lbs
1/7/2013
Carbon Change Out
2500 lbs
4/23/2014
Carbon Change Out
2600 lbs
3/28/2013
Carbon Change Out
3000 lbs
12/11/2013
Carbon Change Out
3745 lbs
12/3/2012
Carbon Change Out
2300 lbs
3/11/2015
Carbon Change Out
2530 lbs
2/11/2013
Carbon Change Out
2530 lbs
9/4/2013
Carbon Change Out
2100 lbs
12/21/2015
SVE-05 through SVE-07
taken off-line pending
carbon treatment
Pilot Study -
SVE-01
through
SVE-04 only
Full-scale SVE system
installation complete,
including carbon
treatment
SVE-05 through SVE-
07 brought on-line
4/22/2012
10/21/2012
4/22/2013
10/21/2013
4/22/2014
10/22/2014
4/22/2015
10/22/2015

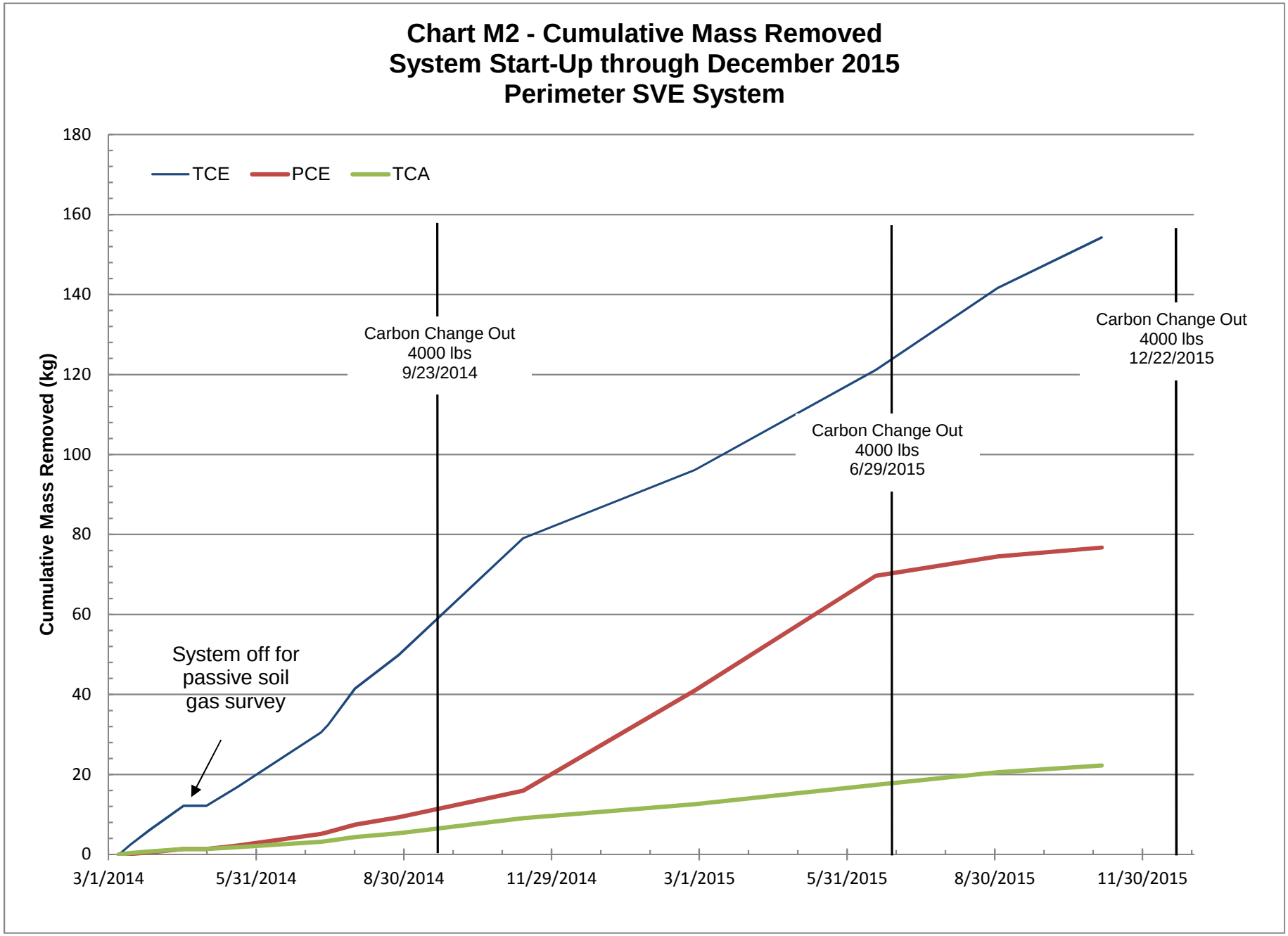


Chart M2 - Cumulative Mass Removed
System Start-Up through December 2015
Perimeter SVE System
TCE
PCE
TCA
Cumulative Mass Removed (kg)
180
160
140
120
100
80
60
40
20
0
3/1/2014
5/31/2014
8/30/2014
11/29/2014
3/1/2015
5/31/2015
8/30/2015
11/30/2015
Carbon Change Out
4000 lbs
9/23/2014
Carbon Change Out
4000 lbs
6/29/2015
Carbon Change Out
4000 lbs
12/22/2015
System off for
passive soil
gas survey

Appendix N
Exposure Assumption Tables

Table N1

Recommended Exposure Assumptions for the Current and Future On-Site Environmental Worker

Former Tecumseh Products Company Site

Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	80 kg	EPA recommended mean body weight value for adults [USEPA, 2014][USEPA, 2011; Table ES-1]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Worker, Chronic effects (noncarcinogenic)	25 yrs	EPA default [USEPA, 2014]

Surface and Subsurface Soil Exposure Assumptions	Site-specific	Reference[1]
Current/Future Worker, EF (exposure frequency)	36 days/yr	Assumes environmental worker is onsite approximately 3 days per month [professional judgement]
Current/Future Worker, ED (exposure duration)	25 yrs	EPA default [USEPA, 2014]
Incidental Ingestion		
IR (ingestion rate)	100 mg/day	EPA default [USEPA, 2014]
FI (fraction ingested)	site-specific	Consideration of site-specific work activities may result in less than 100% of soils available for contact
RAF (relative absorption factor)	100%	Conservatively assumed at 100% [USEPA, 2000]
Dermal Contact		
EV (event frequency)	site-specific	Consideration of site-specific work activities may result in less than 100% of soils available for contact
BSAE (body surface area exposed)	3,470 cm^2	Recommended skin surface area for an industrial worker [USEPA, 2014]
AF (soil adherence factor)	0.12 mg/cm^2	Recommended adherence factor for an industrial worker [USEPA, 2014]
FC (fraction of contact)	site-specific	Consideration of site-specific work activities may result in less than 100% of soils available for contact
ABS_D (dermal absorption fraction from soil)	chemical-specific	Value varies according to chemical
Inhalation of Dust/Particulates & Volatiles in Ambient Air		
ET (exposure time)	8 hr/day	EPA recommended workday [USEPA, 2014]

Groundwater Exposure Assumptions	Site-specific	Reference[1]
EF (exposure frequency)	36 days/yr	Assumes environmental worker is onsite approximately 3 days per month [professional judgement]
ED (exposure duration)	25 yrs	EPA default [USEPA, 2014]
Ingestion		
IR (ingestion rate) - adult	3.7 mL/hr	Mean default for water intake during wading for adults [USEPA, 2011; Table 3-93]
FI (fraction ingested)	100%	Worst-case assumption that all water ingested is absorbed and is impacted
Dermal Contact		
EV (event frequency)	1 events/day	Default value for worker in contact with groundwater [MDEQ, 2006]
BSAE (body surface area exposed)	990 cm^2	Surface area of adult male hands [USEPA 2004; Exhibit C-1]
ET (exposure time)	0.5 hr/event	Default value for worker in contact with groundwater [MDEQ, 2006]
PC (chemical permeability factor)	chemical-specific	Value varies according to chemical

NOTE:

1. Complete citation listed on associated reference page at the end of this Appendix.

Table N2

Recommended Exposure Assumptions for the Current and Future On-Site One-Time Building Construction Worker

Former Tecumseh Products Site

Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	80 kg	EPA recommended mean body weight value for adults [USEPA, 2014][USEPA, 2011; Table ES-1]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Worker, Chronic effects (noncarcinogenic)	1 yr	Typical duration of a single construction project is one year [USEPA, 2002]

Surface and Subsurface Soil Exposure Assumptions	Site-specific	Reference[1]
Current/Future Worker, EF (exposure frequency)	45 days/yr	Assumes construction project is short-term, lasting 1 to 2 months [professional judgement]
Current/Future Worker, ED (exposure duration)	1 yr	Typical duration of a single construction project is one year [USEPA, 2002]
Incidental Ingestion		
IR (ingestion rate)	330 mg/day	Recommended ingestion rate for construction workers [USEPA, 2002; Exhibit 1-2]
FI (fraction ingested)	100%	Worst-case assumption that all soil is impacted and available for contact
RAF (relative absorption factor)	100%	Conservatively assumed at 100% [USEPA, 2000]
Dermal Contact		
EV (event frequency)	1 event/day	Recommended value for a construction worker [USEPA, 2002; Exhibit 1-2]
BSAE (body surface area exposed)	3,470 cm^2	Recommended skin surface area for an industrial worker [USEPA, 2014]
AF (soil adherence factor)	0.3 mg/cm^2	Recommended value for a construction worker [USEPA, 2002; Exhibit 1-2]
FC (fraction of contact)	100%	Worst-case assumption that all soil is impacted and available for contact
ABS_D (dermal absorption fraction from soil)	chemical-specific	Value varies according to chemical
Inhalation of Dust/Particulates & Volatiles in Ambient Air		
IR (inhalation rate)	20 m^3/day	Default exposure factor for construction workers [USEPA 2002; Exhibit 5-1]
ET (exposure time)	8 hr/day	EPA recommended workday [USEPA, 2014]; standard default exposure factor based on typical workday [USEPA, 1989]

Groundwater Exposure Assumptions (Trenching Activities)	Site-specific	Reference[1]
ED (exposure duration)	1 yr	Typical duration of a single construction project is one year [USEPA, 2002]
EF (exposure frequency)	5 days/yr	Site specific value for excavation worker [TRC, 2012]
Incidental Ingestion		
IR (ingestion rate) - adult	3.7 mL/hr	Mean default for water intake during wading for adults [USEPA, 2011; Table 3-93]
FI (fraction ingested)	100%	Worst-case assumption that all water ingested is absorbed and is impacted
Dermal Contact		
EV (event frequency)	1 events/day	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
BSAE (body surface area exposed)	3,300 cm^2	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
ET (exposure time)	2 hr/event	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
PC (chemical permeability factor)	chemical-specific	Value varies according to chemical
Inhalation of Volatiles in Trench Air		
ET (exposure time)	2 hr/day	Default value (2 hours/event x 1 events/day) for excavation worker in contact with groundwater [MDEQ, 2006]
VF (volatilization factor)	chemical-specific (L/m^3)	Value varies according to chemical [VDEQ, 2005]

NOTE:

1. Complete citation listed on associated reference page at the end of this Appendix.

Table N3

Recommended Exposure Assumptions for the Current and Future On-Site Occasional Excavation/Maintenance Worker

Former Tecumseh Products Site

Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	80 kg	EPA recommended mean body weight value for adults [USEPA, 2014] [USEPA, 2011; Table ES-1]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Worker, Chronic effects (noncarcinogenic)	25 yrs	EPA default [USEPA, 2014]

Surface and Subsurface Soil Exposure Assumptions	Site-specific	Reference[1]
Current/Future Worker, EF (exposure frequency)	45 days/yr	Assumes worker at site 5 days per month, 9 months per year [professional judgement]
Current/Future Worker, ED (exposure duration)	25 yrs	EPA default [USEPA, 2014]
Incidental Ingestion		
IR (ingestion rate)	330 mg/day	Recommended ingestion rate for construction workers [USEPA, 2002; Exhibit 1-2]
FI (fraction ingested)	100%	Worst-case assumption that all soil is impacted and available for contact
RAF (relative absorption factor)	100%	Conservatively assumed at 100% [USEPA, 2000]
Dermal Contact		
EV (event frequency)	1 event/day	Recommended value for a construction worker [USEPA, 2002; Exhibit 1-2]
BSAE (body surface area exposed)	3,470 cm^2	Recommended skin surface area for an industrial worker [USEPA, 2014]
AF (soil adherence factor)	0.3 mg/cm^2	Recommended value for a construction worker [USEPA, 2002; Exhibit 1-2]
FC (fraction of contact)	100%	Worst-case assumption that all soil is impacted and available for contact
ABS_D (dermal absorption fraction from soil)	chemical-specific	Value varies according to chemical
Inhalation of Dust/Particulates & Volatiles in Ambient Air		
ET (exposure time)	8 hr/day	EPA recommended workday [USEPA, 2014]; standard default exposure factor based on typical workday [USEPA, 1989]

Groundwater Exposure Assumptions (Trenching Activities)	Site-specific	Reference[1]
ED (exposure duration)	25 yrs	EPA default [USEPA, 2014]
EF (exposure frequency)	5 days/yr	Site specific value for excavation worker [TRC, 2012]
Incidental Ingestion		
IR (ingestion rate) - adult	3.7 mL/hr	Mean default for water intake during wading for adults [USEPA, 2011; Table 3-93]
FI (fraction ingested)	100%	Worst-case assumption that all water ingested is absorbed and is impacted
Dermal Contact		
EV (event frequency)	1 events/day	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
BSAE (body surface area exposed)	3,300 cm^2	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
ET (exposure time)	2 hr/event	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
PC (chemical permeability factor)	chemical-specific	Value varies according to chemical
Inhalation of Volatiles in Trench Air		
ET (exposure time)	2 hr/day	Default value (2 hours/event x 1 events/day) for excavation worker in contact with groundwater [MDEQ, 2006]
VF (volatilization factor)	chemical-specific (L/m^3)	Value varies according to chemical [VDEQ, 2005]

NOTE:

1. Complete citation listed on associated reference page at the end of this Appendix.

Table N4

Recommended Exposure Assumptions for the Current and Future On-Site Routine Outdoor Worker

Former Tecumseh Products Company Site

Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	80 kg	EPA recommended mean body weight value for adults [USEPA, 2014][USEPA, 2011; Table ES-1]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Worker, Chronic effects (noncarcinogenic)	25 yrs	EPA default [USEPA, 2014]

Surface and Subsurface Soil Exposure Assumptions	Site-specific	Reference[1]
Current/Future Worker, EF (exposure frequency)	174 days/yr	174 days/year = EPA default [USEPA, 2014] of **225 days/year -** average number of days with measurable snow depth 1 inch or more (71 days/year), which is equivalent to **51 days/year** when extrapolated for 5-day work week (www.ncdc.noaa.gov/cdo-web/search).
Current/Future Worker, ED (exposure duration)	25 yrs	EPA default [USEPA, 2014]
Incidental Ingestion		
IR (ingestion rate)	100 mg/day	EPA default [USEPA, 2014]
FI (fraction ingested)	site-specific	Consideration of site-specific work activities may result in less than 100% of soils available for contact
RAF (relative absorption factor)	100%	Conservatively assumed at 100% [USEPA, 2000]
Dermal Contact		
EV (event frequency)	site-specific	Consideration of site-specific work activities may result in less than 100% of soils available for contact
BSAE (body surface area exposed)	3,470 cm^2	Recommended skin surface area for an industrial worker [USEPA, 2014]
AF (soil adherence factor)	0.12 mg/cm^2	Recommended adherence factor for an industrial worker [USEPA, 2014]
FC (fraction of contact)	site-specific	Consideration of site-specific work activities may result in less than 100% of soils available for contact
ABS_D (dermal absorption fraction from soil)	chemical-specific	Value varies according to chemical
Inhalation of Dust/Particulates & Volatiles in Ambient Air		
IR (inhalation rate)	20 m^3/day	Standard default value for commercial/industrial workers - 20m^3/day divided by an 8 hr workday [USEPA 1991; 2000]
ET (exposure time)	8 hr/day	EPA recommended workday [USEPA, 2014]

NOTE:

1. Complete citation listed on associated reference page at the end of this Appendix.

Table N5

Recommended Exposure Assumptions for the Current and Future On-Site Redevelopment Worker

Former Tecumseh Products Company

Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	80 kg	EPA recommended mean body weight value for adults [USEPA, 2014][USEPA, 2011; Table ES-1]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Worker, Chronic effects (noncarcinogenic)	1 yr	Typical duration of a single construction project is one year [USEPA, 2002]

Surface and Subsurface Soil Exposure Assumptions	Site-specific	Reference[1]
Current/Future Worker, EF (exposure frequency)	174 days/yr	174 days/year = EPA default [USEPA, 2014] of **225 days/year -** average number of days with measurable snow depth 1 inch or more (71 days/year), which is equivalent to **51 days/year** when extrapolated for 5-day workweek (www.ncdc.noaa.gov/cdo-web/search).
Current/Future Worker, ED (exposure duration)	1 yr	Typical duration of a single construction project is one year [USEPA, 2002]
Incidental Ingestion		
IR (ingestion rate)	330 mg/day	Recommended ingestion rate for construction workers [USEPA, 2002; Exhibit 1-2]
FI (fraction ingested)	100%	Worst-case assumption that all soil is impacted and available for contact
RAF (relative absorption factor)	100%	Conservatively assumed at 100% [USEPA, 2000]
Dermal Contact		
EV (event frequency)	1 event/day	Recommended value for a construction worker [USEPA, 2002; Exhibit 1-2]
BSAE (body surface area exposed)	3,470 cm^2	Recommended skin surface area for an industrial worker [USEPA, 2014]
AF (soil adherence factor)	0.3 mg/cm^2	Recommended value for a construction worker [USEPA, 2002; Exhibit 1-2]
FC (fraction of contact)	100%	Worst-case assumption that all soil is impacted and available for contact
ABS_D (dermal absorption fraction from soil)	chemical-specific	Value varies according to chemical
Inhalation of Dust/Particulates & Volatiles in Ambient Air		
ET (exposure time)	8 hr/day	EPA recommended workday [USEPA, 2014]; standard default exposure factor based on typical workday [USEPA, 1989]

Groundwater Exposure Assumptions (Trenching Activities)	Site-specific	Reference[1]
ED (exposure duration)	1 yr	Typical duration of a single construction project is one year [USEPA, 2002]
EF (exposure frequency)	5 days/yr	Site specific value for excavation worker [TRC, 2012]
Incidental Ingestion		
IR (ingestion rate) - adult	3.7 mL/hr	Mean default for water intake during wading for adults [USEPA, 2011; Table 3-93]
FI (fraction ingested)	100%	Worst-case assumption that all water ingested is absorbed and is impacted
Dermal Contact		
EV (event frequency)	1 events/day	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
BSAE (body surface area exposed)	3,300 cm^2	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
ET (exposure time)	2 hr/event	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
PC (chemical permeability factor)	chemical-specific	Value varies according to chemical
Inhalation of Volatiles in Trench Air		
ET (exposure time)	2 hr/day	Default value (2 hours/event x 1 events/day) for excavation worker in contact with groundwater [MDEQ, 2006]
VF (volatilization factor)	chemical-specific (L/m^3)	Value varies according to chemical [VDEQ, 2005]

NOTE:

1. Complete citation listed on associated reference page at the end of this Appendix.

Table N6

Recommended Exposure Assumptions for the Current and Future On-Site Adolescent Trespasser (10-16 years old)

Former Tecumseh Products Company Site

Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	57	EPA recommended mean body weight value for children 11-16 [USEPA, 2011; Table ES-1]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Trespasser, Chronic effects (noncarcinogenic)	6 yrs	Adolescent aged 10 to 16 or 6 years [professional judgement]
Mutagenic Age-Dependent Adjustment Factor (ADAF)	3	Based on adolescent aged 10 to 16 years old [USEPA, 2005]

Surface Soil Exposure Assumptions	Site-specific	Reference[1]
Current/Future Trespasser, EF (exposure frequency)	84 days/yr	Assumes trespasser is onsite 7 days/month [professional judgement]
Current/Future Trespasser, ED (exposure duration)	6 yrs	Adolescent aged 10 to 16 or 6 years [professional judgement]
Incidental Ingestion		
IR (ingestion rate)	200 mg/day	EPA default [USEPA, 2014]
FI (fraction ingested)	site-specific	Consideration of site-specific work activities may result in less than 100% of soils available for contact
RAF (relative absorption factor)	100%	Conservatively assumed at 100% [USEPA, 2000]
Dermal Contact		
EV (event frequency)	site-specific	Consideration of site-specific work activities may result in less than 100% of soils available for contact
BSAE (body surface area exposed)	3,720 cm^2	Mean surface area for head, arms and hands of child 11 to 16 years old [USEPA, 2011; T 7-2]
AF (soil adherence factor)	0.2 mg/cm^2	Recommended adherence factor for a child [USEPA, 2014]
FC (fraction of contact)	site-specific	Consideration of site-specific work activities may result in less than 100% of soils available for contact
ABS_D (dermal absorption fraction from soil)	chemical-specific	Value varies according to chemical
Inhalation of Dust/Particulates & Volatiles in Ambient Air		
ET (exposure time)	2 hr/day	Based on reasonable amount of time trespasser may be present onsite [professional judgement]

NOTE:

1. Complete citation listed on associated reference page at the end of this Appendix.

Table N7

Recommended Exposure Assumptions for the Current and Future On-Site Indoor Worker
Former Tecumseh Products Company Site
Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	70 kg	RBCA Tool Kit Default [GSI Environmental, Inc., 2007]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Worker, Chronic effects (noncarcinogenic)	25 yrs	EPA default [USEPA, 2014]

Vapor Intrusion Exposure Assumptions	Site-specific	Reference[1]
ED (exposure duration)	25 yrs	EPA default [USEPA, 2014]
EF (exposure frequency)	150 days/yr	EPA default [USEPA, 2014]
τ (averaging time for vapor flux)	30 yrs	RBCA Tool Kit Default [GSI Environmental, Inc., 2007]
Inhalation of Volatiles		
ET (exposure time)	8 hr/day	EPA default [USEPA, 2014]
VF (volatilization factor)	chemical-specific (L/m^3)	Value varies according to chemical [VDEQ, 2005]

NOTE:

1. Complete citation listed on associated reference page at the end of this Appendix.

Table N8

Recommended Exposure Assumptions for the Current and Future Off-Site Environmental Worker

Former Tecumseh Products Company Site

Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	80 kg	EPA recommended mean body weight value for adults [USEPA, 2014][USEPA, 2011; Table ES-1]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Worker, Chronic effects (noncarcinogenic)	25 yrs	EPA default [USEPA, 2014]

Groundwater Exposure Assumptions	Site-specific	Reference[1]
EF (exposure frequency)	36 days/yr	Assumes environmental worker is onsite approximately 3 days per month [professional judgement]
ED (exposure duration)	25 yrs	EPA default [USEPA, 2014]
Ingestion		
IR (ingestion rate) - adult	3.7 mL/hr	Mean default for water intake during wading for adults [USEPA, 2011; Table 3-93]
FI (fraction ingested)	100%	Worst-case assumption that all water ingested is absorbed and is impacted
Dermal Contact		
EV (event frequency)	1 events/day	Default value for worker in contact with groundwater [MDEQ, 2006]
BSAE (body surface area exposed)	990 cm^2	Surface area of adult male hands [USEPA 2004; Exhibit C-1]
ET (exposure time)	0.5 hr/event	Default value for worker in contact with groundwater [MDEQ, 2006]
PC (chemical permeability factor)	chemical-specific	Value varies according to chemical

NOTE:

1. Complete citiation listed on associated reference page at the end of this Appendix.

Table N9

Recommended Exposure Assumptions for the Current and Future Off-Site One-Time Building Construction Worker

Former Tecumseh Products Company Site

Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	80 kg	EPA recommended mean body weight value for adults [USEPA, 2014][USEPA, 2011; Table ES-1]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Worker, Chronic effects (noncarcinogenic)	1 yr	Typical duration of a single construction project is one year [USEPA, 2002]

Groundwater Exposure Assumptions (Trenching Activities)	Site-specific	Reference[1]
ED (exposure duration)	1 yr	Typical duration of a single construction project is one year [USEPA, 2002]
EF (exposure frequency)	5 days/yr	Site specific value for excavation worker [TRC, 2012]
Incidental Ingestion		
IR (ingestion rate) - adult	3.7 mL/hr	Mean default for water intake during wading for adults [USEPA, 2011; Table 3-93]
FI (fraction ingested)	100%	Worst-case assumption that all water ingested is absorbed and is impacted
Dermal Contact		
EV (event frequency)	1 events/day	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
BSAE (body surface area exposed)	3,300 cm^2	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
ET (exposure time)	2 hr/event	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
PC (chemical permeability factor)	chemical-specific	Value varies according to chemical
Inhalation of Volatiles in Trench Air		
ET (exposure time)	2 hr/day	Default value (2 hours/event x 1 events/day) for excavation worker in contact with groundwater [MDEQ, 2006]
VF (volatilization factor)	chemical-specific (L/m^3)	Value varies according to chemical [VDEQ, 2005]

NOTE:

1. Complete citation listed on associated reference page at the end of this Appendix.

Table N10

Recommended Exposure Assumptions for the Current and Future Off-Site Occasional Excavation/Maintenance Worker

Former Tecumseh Products Company Site

Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	80 kg	EPA recommended mean body weight value for adults [USEPA, 2014][USEPA, 2011; Table ES-1]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Worker, Chronic effects (noncarcinogenic)	25 yrs	EPA default [USEPA, 2014]

Groundwater Exposure Assumptions (Trenching Activities)	Site-specific	Reference[1]
ED (exposure duration)	25 yrs	EPA default [USEPA, 2014]
EF (exposure frequency)	5 days/yr	Site specific value for excavation worker [TRC, 2012]
Incidental Ingestion		
IR (ingestion rate) - adult	3.7 mL/hr	Mean default for water intake during wading for adults [USEPA, 2011; Table 3-93]
FI (fraction ingested)	100%	Worst-case assumption that all water ingested is absorbed and is impacted
Dermal Contact		
EV (event frequency)	1 events/day	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
BSAE (body surface area exposed)	3,300 cm^2	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
ET (exposure time)	2 hr/event	Default value for excavation worker in contact with groundwater [MDEQ, 2006]
PC (chemical permeability factor)	chemical-specific	Value varies according to chemical
Inhalation of Volatiles in Trench Air		
ET (exposure time)	2 hr/day	Default value (2 hours/event x 1 events/day) for excavation worker in contact with groundwater [MDEQ, 2006]
VF (volatilization factor)	chemical-specific (L/m^3)	Value varies according to chemical [VDEQ, 2005]

NOTE:

1. Complete citation listed on associated reference page at the end of this Appendix.

Table N11

Recommended Exposure Assumptions for the Current and Future Off-Site Indoor Worker

Former Tecumseh Products Company Site

Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	70 kg	RBCA Tool Kit Default [GSI Environmental, Inc., 2007]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Worker, Chronic effects (noncarcinogenic)	25 yrs	EPA default [USEPA, 2014]

Vapor Intrusion Exposure Assumptions	Site-specific	Reference[1]
ED (exposure duration)	25 yrs	EPA default [USEPA, 2014]
EF (exposure frequency)	150 days/yr	EPA default [USEPA, 2014]
τ (averaging time for vapor flux)	30 yrs	RBCA Tool Kit Default [GSI Environmental, Inc., 2007]
Inhalation of Volatiles		
ET (exposure time)	8 hr/day	EPA default [USEPA, 2014]
VF (volatilization factor)	chemical-specific (L/m^3)	Value varies according to chemical [VDEQ, 2005]

NOTE:

1. Complete citation listed on associated reference page at the end of this Appendix.

Table N12

Recommended Exposure Assumptions for the Current and Future Off-Site Indoor Resident

Former Tecumseh Products Company Site

Tecumseh, Michigan

General Assumptions	Site-specific	Reference[1]
BW (body weight)	15 kg	RBCA Tool Kit Default for a child [GSI Environmental, Inc., 2007]
AT (averaging times):		
Carcinogenic effects	70 yrs	EPA recommended life expectancy value [USEPA, 2014]
Current/Future Child, Chronic effects (noncarcinogenic)	6 yrs	RBCA Tool Kit Default for a child [GSI Environmental, Inc., 2007]

Vapor Intrusion Exposure Assumptions	Site-specific	Reference[1]
ED (exposure duration)	6 yrs	RBCA Tool Kit Default for a child [GSI Environmental, Inc., 2007]
EF (exposure frequency)	350 days/yr	RBCA Tool Kit Default for a child [GSI Environmental, Inc., 2007]
τ (averaging time for vapor flux)	30 yrs	RBCA Tool Kit Default [GSI Environmental, Inc., 2007]
Inhalation of Volatiles		
ET (exposure time)	24 hr/day	RBCA Tool Kit Default for a child [GSI Environmental, Inc., 2007]
VF (volatilization factor)	chemical-specific (L/m^3)	Value varies according to chemical [VDEQ, 2005]

NOTE:

1. Complete citation listed on associated reference page at the end of this Appendix.

REFERENCES

MDEQ 2006. RRD Operation Memorandum No. 1, Technical Support Document - Attachment 4 Part 201 Groundwater Contact Criteria. Michigan Department of Environmental Quality, Remediation and Redevelopment Division. July.

GSI Environmental, Inc., 2007. RBCA Tool Kit for Chemical Releases Software Guidance Manual. Groundwater Services, Inc. Houston, Texas. Available at: http://www.gsi-net.com/en/software/rbca-software-tool-kit-for-chemical-releases-version-2-6.html

TRC 2012. Remedial Investigation and Groundwater Environmental Indicator Report, RCRA-05-2010-0012, Former Tecumseh Products Company Site, Appendix G - TCE Groundwater Contact Criteria Calculations. September.

USEPA 2000. Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment Bulletins.

USEPA 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December 2002.

USEPA 2004. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment). Final. Office of Emergency and Remedial Response, Washington D.C. EPA/540/R/99/005. July 2004.

USEPA 2005. Guidelines for Carcinogen Risk Assessment. Risk Assessment Forum, U.S. Environmental Protection Agency, Washington, D.C. EPA/630/P-03/001F. March.

USEPA 2011. Exposure Factors Handbook, 2011 Edition. National Center for Environmental Assessment, Office of Research and Development, Washington D.C. EPA/600/R-09/052F. September 2011.

USEPA 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9200.1-120. February 6.

VDEQ 2005. Voluntary Remediation Program Risk Assessment Guidance. Virginia Department of Environmental Quality. Waste Management. Section 3.2.2 Exposure Of Workers to Volatiles in a Construction/Utility Trench. On-line at http://www.deq.state.va.us/vrprisk/raguide.html

Appendix O
Trench Calculations

Table O1

Summary of VDEQ Trench Worker Volatilization Factor Calculation Inputs

Former Tecumseh Products Company Site

Tecumseh, Michigan

For Mass-Transfer Coefficients			For Emission Flux and Concentration in Trench			Trench Dimensions		
K_g,H_2O	0.833	cm/s	CF1	1.00E-03	L/cm^3	Length	3.0	ft
MW H_2O	18	g/mol	CF2	1.00E+04	cm^2/m^2		0.91	m
K_l,O_2	0.002	cm/s	CF3	3,600	s/hr	Width	8.0	ft
MW O_2	32	g/mol	F*	1	unitless		2.44	m
T	77	F	ACH	360	hr^{-1}	Depth	7.0	ft
T	298	K					2.13	m
R	8.20E-05	$atm\text{-}m^3/mol\text{-}K$				Width/Depth	1.14	unitless

Notes:

CF = conversion factor

F = Fahrenheit

F* = fraction of bottom of trench through which groundwater vapors can emanate

K = Kalvin

K_g = gas mass transfer coefficient

K_l = liquid mass transfer coefficient

MW = molecular weight

R = ideal gas constant

T = temperature

Table O2

Summary of VDEQ Trench Worker Volatilization Factor Calculation Inputs

Former Tecumseh Products Company Site

Tecumseh, Michigan

Exposure-point concentrations (inhalation) for construction/utility workers in a trench: Groundwater less than 15 feet deep	CAS No.	Molecular Weight	Henry's Law Constant	Gas-Phase Mass Transfer Coefficient	Liquid-Phase Mass Transfer Coefficient	Overall Mass Transfer Coefficient	Volatilization Factor
		MW_i	H_i	K_{iG}	K_{iL}	K_i	VF
		g/mol	atm-m^3/mol	cm/s	cm/s	cm/s	L/m^3
Acetone	67-64-1	58.08	3.88E-05	5.63E-01	1.48E-03	5.58E-04	2.61E-02
2-Butanone (methyl ethyl ketone)	78-93-3	72.11	5.59E-05	5.23E-01	1.33E-03	6.31E-04	2.96E-02
1,1-Dichloroethane	75-34-3	98.96	5.62E-03	4.71E-01	1.14E-03	1.13E-03	5.28E-02
1,1-Dichloroethene	75-35-4	96.94	2.61E-02	4.74E-01	1.15E-03	1.15E-03	5.37E-02
cis-1,2-Dichloroethene	156-59-2	96.94	4.08E-03	4.74E-01	1.15E-03	1.13E-03	5.31E-02
Ethylbenzene	100-41-4	106.17	7.88E-03	4.60E-01	1.10E-03	1.09E-03	5.11E-02
Tetrachloroethene	127-18-4	165.83	1.84E-02	3.96E-01	8.79E-04	8.76E-04	4.11E-02
Toluene	108-88-3	92.14	6.64E-03	4.82E-01	1.18E-03	1.17E-03	5.47E-02
1,1,1-Trichloroethane	71-55-6	133.40	1.72E-02	4.26E-01	9.80E-04	9.76E-04	4.58E-02
Trichloroethene	79-01-6	131.39	1.03E-02	4.28E-01	9.87E-04	9.82E-04	4.60E-02
Vinyl Chloride	75-01-4	62.50	2.70E-02	5.49E-01	1.43E-03	1.43E-03	6.69E-02
Total Xylenes	1330-20-7	106.16	5.18E-03	4.60E-01	1.10E-03	1.09E-03	5.09E-02
1,2,4-trimethylbenzene	95-63-6	120.19	6.16E-03	4.41E-01	1.03E-03	1.02E-03	4.79E-02

Table O3

Summary of Toxicity and Chemical-Specific Information for Health Risk Drivers[1]

Former Tecumseh Products Company Site

Tecumseh, Michigan

Soil and Groundwater Constituent of Concern	CAS Number	Media of Concern	Chronic Toxicity Values (Outdoor Worker)						Subchronic Toxicity Values (Excavation Worker Only)			Chemical-Specific Parameters								
			Cancer Slope Factor $(mg/kg/d)^{-1}$	Cancer Slope Factor $(mg/kg/d)^{-1}$	Unit Risk $(ug/m^3)^{-1}$	Reference Dose (mg/kg/d)	Reference Dose (mg/kg/d)	Reference Concentration (mg/m^3)	Reference Dose (mg/kg/d)	Reference Dose (mg/kg/d)	Reference Concentration (mg/m^3)	VOC	Soil VF (kg/m^3)	Mutagen	GI_{ABS}	ABS	B (unitless)	τ_{event} (hr/event)	t* (hr)	K_p (cm/hr)
			(Oral)	(Dermal) = Oral CSF / GIABS	(Inhalation)	(Oral)	(Dermal) = Oral RfD x GIABS	(Inhalation)	(Oral)	(Dermal) = Oral RfD x GIABS	(Inhalation)									
1,1,1-Trichloroethane	71-55-6	GW	NV	NV	NV	2.0E+00	2.0E+00	5.0E+00	7.0E+00	7.0E+00	5.0E+00	V	NA	--	1.00	NA	5.60E-02	5.87E-01	1.41E+00	1.26E-02
1,1-Dichloroethane	75-34-3	GW	5.7E-03	5.7E-03	1.6E-06	2.0E-01	2.0E-01	NA	2.0E+00	2.0E+00	NV	V	NA	--	1.00	NA	2.58E-02	3.77E-01	9.04E-01	6.75E-03
1,1-Dichloroethene	75-35-4	GW	NV	NV	NV	5.0E-02	5.0E-02	2.0E-01	9.0E-03	9.0E-03	7.9E-02	V	NA	--	1.00	NA	4.43E-02	3.67E-01	8.81E-01	1.17E-02
1,2,4-Trimethylbenzene	95-63-6	GW	NV	NV	NV	NV	NV	7.0E-03	NV	NV	7.0E-02	V	NA	--	1.00	NA	3.61E-01	4.95E-01	1.19E+00	8.57E-02
2-Butanone	78-93-3	GW	NV	NV	NV	6.0E-01	6.0E-01	5.0E+00	2.0E+00	2.0E+00	1.0E+00	V	NA	--	1.00	NA	3.14E-03	2.66E-01	6.40E-01	9.62E-04
Acetone	67-64-1	GW	NV	NV	NV	9.0E-01	9.0E-01	3.1E+01	2.0E+00	2.0E+00	3.1E+01	V	NA	--	1.00	NA	1.50E-03	2.22E-01	5.34E-01	5.12E-04
cis-1,2-Dichloroethene	156-59-2	GW	NV	NV	NV	2.0E-03	2.0E-03	NA	2.0E-02	2.0E-02	NV	V	NA	--	1.00	NA	4.17E-02	3.67E-01	8.81E-01	1.10E-02
Ethylbenzene	100-41-4	GW	1.1E-02	1.1E-02	2.5E-06	1.0E-01	1.0E-01	1.0E+00	5.0E-02	5.0E-02	9.0E+00	V	NA	--	1.00	NA	1.95E-01	4.13E-01	9.92E-01	4.93E-02
Tetrachloroethene	127-18-4	GW, Soil	2.1E-03	2.1E-03	2.6E-07	6.0E-03	6.0E-03	4.0E-02	1.0E-01	1.0E-01	4.0E-02	V	4.3E-04	--	1.00	NA	1.65E-01	8.92E-01	2.14E+00	3.34E-02
Toluene	108-88-3	GW	NV	NV	NV	8.0E-02	8.0E-02	5.0E+00	8.0E-01	8.0E-01	5.0E+00	V	NA	--	1.00	NA	1.15E-01	3.45E-01	8.28E-01	3.11E-02
Trichloroethene	79-01-6	GW, Soil	4.6E-02	4.6E-02	4.1E-06	5.0E-04	5.0E-04	2.0E-03	5.0E-04	5.0E-04	2.0E-03	V	4.5E-04	M	1.00	NA	5.11E-02	5.72E-01	1.37E+00	1.16E-02
Vinyl Chloride	75-01-4	GW	7.2E-01	7.2E-01	4.4E-06	3.0E-03	3.0E-03	1.0E-01	3.0E-03	3.0E-03	7.7E-02	V	NA	M	1.00	NA	2.55E-02	2.35E-01	5.65E-01	8.38E-03
Xylenes, Total	1330-20-7	GW	NV	NV	NV	2.0E-01	2.0E-01	1.0E-01	4.0E-01	4.0E-01	4.0E-01	V	NA	--	1.00	NA	1.98E-01	4.13E-01	9.92E-01	5.00E-02

Notes:

(1) References for toxicity and chemical-specific parameters are taken from USEPA's Regional Screening Level (RSL) Table, Updated November 2015. Available online at: http://www.epa.gov/region9/superfund/prg/

ABS = absorption factor

B = simplying constant taken from USEPA's Regional Screening Level (RSL) Table, Updated November 2015. Available online at: http://www.epa.gov/region9/superfund/prg/

CFS = cancer slope factor

FV = volatilization factor

GIABS = gastrointestinal absorption factor

M = indicates chemical is a mutagen

N = indicates chemical is not volatile

NV = No Value

NA = Not Available

RfD = reference dose

V = indicates chemical is volatile

VF = volatilization factor

VOC = Volatile Organic Compound

Appendix P
Cleanup Level Calculations

Appendix P
Calculation of Risk-Based Screening Levels (Non-Vapor Intrusion)

Former Tecumseh Products Company Site
Tecumseh, Michigan

In order to determine soil and groundwater concentrations protective of potentially complete and significant exposure pathways, a quantitative risk evaluation was conducted for on-site and off-site receptors to calculate site-specific Risk-Based Cleanup Levels (RBCLs) for soil and groundwater. The remainder of this section details input assumptions and algorithms used to calculate these site-specific RBCL for soil and groundwater.

Exposure Assessment Overview

Section 7 of the main report details the exposure pathways of concern for both on-site and off-site receptors, including exposure assumptions for each receptor. The exposure pathway evaluation identifies human health and ecological receptors potentially exposed to constituents of concern (COCs) associated with the site, assuming the site will be redeveloped into a commercial/industrial area, with continued environmental groundwater monitoring. Off-site land use will include residential, commercial/industrial, and ecological/wetland habitat which a recreational user would encounter. The following section describes how the exposure assumptions presented in Section 7 are used to calculate soil and groundwater intakes for each exposure pathway.

Exposure Intake

The purpose of this section is to present the intake equations used to calculate RBCLs for soil and groundwater for each potentially complete exposure pathway, as presented below.

Soil Intake Equations

The incidental ingestion intake factor for soil is calculated with Equation 1:

$$IF_{s-ing} = \frac{IR * FI * ABS * EF * ED * CF}{BW * AT * 365 \ \ days / year} \qquad [1]$$

Where:

$IF_{s\text{-}ing}$ = Ingestion intake factor (kg soil/ kg BW-day)

IR = Ingestion rate for soil (mg/day)

FI = Fraction of soil ingested (unitless)

ABS = Ingestion absorption factor (unitless)

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

CF = Conversion factor (10^{-6} kg/mg)

BW = Average body weight of the receptor (kg)

AT = Averaging time of the exposure (years), 70 years for carcinogens and equal to the ED for non-carcinogens

The intake factor for the soil dermal exposure route is calculated with Equation 2:

[2]

$$IF_{s-derm} = \frac{BSAE * FC * AF * ABS * EF * ED * CF}{BW * AT * 365\ days / year}$$

Where:

$IF_{s\text{-}derm}$ = Dermal intake factor (kg soil/ kg BW-day)

BSAE = Surface area of the body parts exposed to soil or sediment (cm^2/day)

AF = Adherence factor (mg/cm^2)

ABS = Dermal absorption factor (unitless)

FC = Fraction in contact with soil (unitless)

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

CF = Conversion factor (10^{-6} kg/mg)

BW = Average body weight of the receptor (kg)

AT = Averaging time of the exposure (years), 70 years for carcinogens and equal to the ED for non-carcinogens

As only volatiles were identified as soil COC (PCE and TCE), the intake factor for the inhalation of volatiles from soil exposure route is calculated with Equation 3:

[3]

$$\boldsymbol{IF}_{s\text{-}inhal} = [(ET/24\ hr/day)\ x\ FI\ x\ ABS\ x\ EF\ x\ ED\ x\ VF]\ /\ [AT\ x\ 365\ d/yr]$$

Where:

$IF_{s\text{-}inhal}$ = Soil inhalation intake factor (Kg-soil/m^3-air)

ET = Exposure time (hr/day)

ABS = Inhalation absorption factor; conservatively assumed to be 1.0 for all chemicals (unitless)

FI = Fraction inhaled of daily total (unitless), assumed = 1

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

AT = Averaging time of the exposure (years), 70 years for carcinogens and equal to the ED for non-carcinogens

VF = Soil volatilization factor for volatile COC (kg/m^3)

Table P1 presents soil volatilization factors (VFs) for PCE and TCE, which were calculated using USEPA's Regional Screening Level (RSL) online calculator, which is available online at: http://www.epa.gov/region9/superfund/prg/.

Groundwater Intake Equations

The intake factor for ingestion of groundwater exposure route is generally calculated with Equation 4:

$$IF_{w-ing} = \frac{IR * FI * EF * ED}{BW * AT * 365 days / year} \quad [4]$$

Where:

$IF_{w\text{-}ing}$ = Ingestion intake factor (L groundwater / kg BW-day)

IR = Ingestion rate for groundwater (L/day)

FI = Fraction of groundwater or surface water ingested (unitless)

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

BW = Average body weight of the receptor (kg)

AT = Averaging time of the exposure (years), 70 years for carcinogens and equal to the ED for non-carcinogens

The intake factor for dermal contact with groundwater exposure route is generally calculated with Equation 5:

$$IF_{w-derm} = \frac{BSAE * ET * EF * ED * Kp * CF}{BW * AT * 365 days / year} \quad [5]$$

Where:

$IF_{w\text{-}derm}$ = Dermal intake factor (L groundwater /kg BW-day)

BSAE = Surface area of the body parts exposed (cm^2)

ET = Exposure time (hr/day)

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

Kp = Permeability Constant (cm/hr)

CF = Conversion factor (10^{-3} L/cm^3)

BW = Average BW of the receptor (kg)

AT = Averaging time of the exposure (years), 70 years for carcinogens and equal to the ED for non-carcinogens

The intake factor for the inhalation of volatiles from groundwater exposure route is calculated with Equation 6:

[6]

$$\boldsymbol{IF}_{w\text{-}inhal} = [(ET/24\ hr/day) \times FI \times ABS \times EF \times ED \times VF)] / [AT \times 365\ d/yr]$$

Where:

$IF_{w\text{-}inhal}$ = Inhalation intake factor (L/m^3)

IR = Inhalation rate (m^3/hr)

ET = Exposure time (hr/day)

ABS = Inhalation absorption factor; conservatively assumed to be 1.0 for all chemicals (unitless)

FI = Fraction inhaled of daily total (unitless), assumed = 1

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

AT = Averaging time of the exposure (years), 70 years for carcinogens and equal to the ED for non-carcinogens

VF = Volatilization Factor for volatile groundwater COC (L/m^3)

As described in Appendix O, Groundwater VFs for each COC are calculated using Virginia Department of Environmental Quality (VDEQ) 2005 guidance to characterize volatilization of groundwater while working a trench environment. Subsequent calculations determined that groundwater concentrations are below site-specific risk-based screening levels for the inhalation of groundwater volatiles in trench air. Nevertheless, these calculations were included when determining RGCLs for groundwater.

Toxicity Assessment

An integral part of a risk evaluation involves identifying toxicity information for each COC. Toxicity is described in terms of dose-response where the observed or potential toxic effects in humans and/or laboratory animals are associated with a given chemical exposure and include both carcinogenic and non-carcinogenic response endpoints. Non-carcinogen toxicity information is provided as an oral reference dose (RfD) or inhalation reference concentration (RfC), while carcinogen dose-response data is presented as an oral Slope Factor (SF) or inhalation unit risk factor (URF).

The primary source of toxicity information is USEPA's Integrated Risk Information System (IRIS), which is available online (www.epa.gov/iris). This information, along with other sources of toxicity information is summarized in USEPA's RSL Table, which was last updated in November 2015 and is available online (http://www.epa.gov/region9/superfund/prg/).

Because many of the construction/excavation-type workers are considered a short-term worker with an Exposure Duration (ED) of just one (1) year, use of non-cancer sub-chronic toxicity information is appropriate when evaluating this worker. Non-cancer sub-chronic toxicity information is summarized in **Table N1**, when available. If a sub-chronic toxicity value is not available, conventional non-cancer chronic toxicity information is assumed.

Methodology for Calculation of Risk-Based Cleanup Levels

The methodology for calculating non-cancer and cancer RBCLs of soil and groundwater is presented below. Once calculated, RBCLs are compared against soil and groundwater data to determine whether they are a health concern and require additional evaluation or remediation. Note, for COCs where both non-cancer and cancer endpoints are present, the lower RBCL is selected for comparison to site data.

Risk-Based Cleanup Levels for Non-Carcinogenic Compounds

The equation to calculate the non-cancer RBCL for ingestion is presented below.

$$RBRG_{ing-nc} = \frac{THI}{IF_{ing} / RfD_{oral}} \quad [7]$$

Where:

$RBRG_{ing-nc}$ = Risk-based cleanup level for ingestion, non-cancer effects (mg/kg-soil or mg/L-gw)

THI = Target hazard index (unitless) = 1

IF_{ing} = Ingestion Intake Factor (kg-soil/kg-BW-day or L-gw/kg-BW-day)

RfD_{oral} = Oral Reference Dose (mg/kg-day)

The equation to calculate the non-cancer RBCL for dermal contact is presented below.

$$RBRG_{der-nc} = \frac{THI}{IF_{der} / RfD_{dermal}} \quad [8]$$

Where:

$RBRG_{der-nc}$ = Risk-based cleanup level for dermal contact, non-cancer effects (mg/kg-soil or mg/L-gw)

THI = Target hazard index (unitless) = 1

IF_{der} = Dermal Intake Factor (kg-soil/kg-BW-day or L-gw/kg-BW-day)

RfD_{dermal} = Dermal Reference Dose (mg/kg-day)

The equation to calculate the non-cancer RBCL for inhalation of particulates or volatiles in air is presented below.

$$RBRG_{inh-nc} = \frac{THI}{IF_{inh} / RfC_{inh}} \quad [9]$$

Where:

$RBRG_{inh-nc}$ = Risk-based cleanup level for inhalation, non-cancer effects (mg/kg-soil or mg/L-gw)

THI = Target hazard index (unitless) = 1

IF_{inh} = Inhalation Intake Factor (unitless)

RfC_{inh} = Inhalation Reference Concentration (mg/m^3)

Risk-Based Cleanup Levels for Carcinogenic Compounds

The carcinogenic target risk level (TRL) is set to 1E-05, which is the MDEQ recommended acceptable target cancer risk level.

The equation to calculate the carcinogenic RBCL for ingestion is presented below.

[10]

$$RBRG_{ing-c} = \frac{TRL}{IF_{ing} * CSF_{oral}}$$

Where:

$RBRG_{ing-c}$	=	Risk-based cleanup level for ingestion, cancer effects (mg/kg soil or mg/L-gw)
TRL	=	Target risk level (unitless) = 10^{-5}
IF_{ing}	=	Ingestion Intake Factor (kg-soil/kg-BW-day or L-gw/kg-BW-day)
CSF_{oral}	=	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$

The equation to calculate the carcinogenic RBCL for dermal contact is presented below.

[11]

$$RBRG_{der-c} = \frac{TRL}{IF_{der} * CSF_{dermal}}$$

Where:

$RBRG_{der-c}$	=	Risk-based cleanup level for dermal contact, cancer effects (mg/kg soil or mg/L-gw)
TRL	=	Target risk level (unitless) = 10^{-5}
IF_{der}	=	Dermal Intake Factor (kg-soil/kg-BW-day or L-gw/kg-BW-day)
CSF_{dermal}	=	Dermal Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$

The equation to calculate the carcinogenic RBCL for inhalation of particulates or volatiles in air is presented below.

[12]

$$RBRG_{inh-c} = \frac{TRL}{IF_{inh} * UR_{inh} * CF}$$

Where:

$RBRG_{inh-c}$	=	Risk-based cleanup level for inhalation, cancer risk (mg/kg soil or mg/L-gw)
TRL	=	Target Risk Level (unitless) = 10^{-5}
IF_{inh}	=	Inhalation intake factor (unitless)

UR_{inh} = Inhalation Unit Risk $(\mu g/m^3)^{-1}$

CF = Conversion Factor (1,000 μg/mg)

Risk-Based Cleanup Levels for all Pathways Combined

The equation used to calculate the final RBCL that combines all exposure pathways for non-carcinogenic and carcinogenic compounds is presented below.

Combined RBCL:

[13]

$$RBRG_{comb} = \frac{1}{\frac{1}{RBRG_{ing}} + \frac{1}{RBRG_{der}} + \frac{1}{RBRG_{inh}}}$$

Where:

$RBRG_{comb}$ = Combined risk-based cleanup level, (mg/kg soil or mg/L-gw)

$RBRG_{ing}$ = Risk-based cleanup level, ingestion pathway, (mg/kg soil or mg/L-gw)

$RBRG_{der}$ = Risk-based cleanup level, dermal pathway, (mg/kg soil or mg/L-gw)

$RBRG_{inh}$ = Risk-based cleanup level, inhalation pathway, (mg/kg soil or mg/L-gw)

A summary of soil RBCLs are provided in **Table P2,** while groundwater RBCLs are presented in **Table P3**. The minimum RBCL across the various receptors is highlighted in these tables and would be the appropriate RBCL to compare against soil and groundwater data. Spreadsheets which illustrate intermediate calculations are included in Attachment 1 for soil and Attachment 2 for groundwater.

References

United States Environmental Protection Agency (USEPA). 2015. *Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites*. June 2015. Internet website: http://epa-prgs.ornl.gov/chemicals/download.shtml.

Virginia Department of Environmental Quality (VDEQ). 2005. *Voluntary Remediation Program Risk Assessment Guidance.* Virginia Department of Environmental Quality. Waste Management. Section 3.2.2 Exposure of Workers to Volatiles in a Construction/Utility Trench. On-line at http://www.deq.state.va.us/vrprisk/raguide.html

Attachments

Tables

Attachment 1 – Intermediate Calculation Sheets for Soil

Attachment 2 – Intermediate Calculation Sheets for Groundwater

Tables

Table P1

Summary of Toxicity and Chemical-Specific Information for Health Risk Drivers[1]

Former Tecumseh Products Company Site

Tecumseh, Michigan

Soil and Groundwater Constituent of Concern	CAS Number	Media of Concern	Chronic Toxicity Values (Outdoor Worker)						Subchronic Toxicity Values (Excavation Worker Only)			Chemical-Specific Parameters								
			Cancer Slope Factor $(mg/kg/d)^{-1}$	Cancer Slope Factor $(mg/kg/d)^{-1}$	Unit Risk $(ug/m^3)^{-1}$	Reference Dose (mg/kg/d)	Reference Dose (mg/kg/d)	Reference Concentration (mg/m^3)	Reference Dose (mg/kg/d)	Reference Dose (mg/kg/d)	Reference Concentration (mg/m^3)	VOC	Soil VF (kg/m^3)	Mutagen	GI_{ABS}	ABS	B (unitless)	τ_{event} (hr/event)	t* (hr)	K_p (cm/hr)
			(Oral)	(Dermal) = Oral CSF / GIABS	(Inhalation)	(Oral)	(Dermal) = Oral RfD x GIABS	(Inhalation)	(Oral)	(Dermal) = Oral RfD x GIABS	(Inhalation)									
1,1,1-Trichloroethane	71-55-6	GW	NV	NV	NV	2.0E+00	2.0E+00	5.0E+00	7.0E+00	7.0E+00	5.0E+00	V	NA	--	1.00	NA	5.60E-02	5.87E-01	1.41E+00	1.26E-02
1,1-Dichloroethane	75-34-3	GW	5.7E-03	5.7E-03	1.6E-06	2.0E-01	2.0E-01	NA	2.0E+00	2.0E+00	NV	V	NA	--	1.00	NA	2.58E-02	3.77E-01	9.04E-01	6.75E-03
1,1-Dichloroethene	75-35-4	GW	NV	NV	NV	5.0E-02	5.0E-02	2.0E-01	9.0E-03	9.0E-03	7.9E-02	V	NA	--	1.00	NA	4.43E-02	3.67E-01	8.81E-01	1.17E-02
1,2,4-Trimethylbenzene	95-63-6	GW	NV	NV	NV	NV	NV	7.0E-03	NV	NV	7.0E-02	V	NA	--	1.00	NA	3.61E-01	4.95E-01	1.19E+00	8.57E-02
2-Butanone	78-93-3	GW	NV	NV	NV	6.0E-01	6.0E-01	5.0E+00	2.0E+00	2.0E+00	1.0E+00	V	NA	--	1.00	NA	3.14E-03	2.66E-01	6.40E-01	9.62E-04
Acetone	67-64-1	GW	NV	NV	NV	9.0E-01	9.0E-01	3.1E+01	2.0E+00	2.0E+00	3.1E+01	V	NA	--	1.00	NA	1.50E-03	2.22E-01	5.34E-01	5.12E-04
cis-1,2-Dichloroethene	156-59-2	GW	NV	NV	NV	2.0E-03	2.0E-03	NA	2.0E-02	2.0E-02	NV	V	NA	--	1.00	NA	4.17E-02	3.67E-01	8.81E-01	1.10E-02
Ethylbenzene	100-41-4	GW	1.1E-02	1.1E-02	2.5E-06	1.0E-01	1.0E-01	1.0E+00	5.0E-02	5.0E-02	9.0E+00	V	NA	--	1.00	NA	1.95E-01	4.13E-01	9.92E-01	4.93E-02
Tetrachloroethene	127-18-4	GW, Soil	2.1E-03	2.1E-03	2.6E-07	6.0E-03	6.0E-03	4.0E-02	1.0E-01	1.0E-01	4.0E-02	V	4.3E-04	--	1.00	NA	1.65E-01	8.92E-01	2.14E+00	3.34E-02
Toluene	108-88-3	GW	NV	NV	NV	8.0E-02	8.0E-02	5.0E+00	8.0E-01	8.0E-01	5.0E+00	V	NA	--	1.00	NA	1.15E-01	3.45E-01	8.28E-01	3.11E-02
Trichloroethene	79-01-6	GW, Soil	4.6E-02	4.6E-02	4.1E-06	5.0E-04	5.0E-04	2.0E-03	5.0E-04	5.0E-04	2.0E-03	V	4.5E-04	M	1.00	NA	5.11E-02	5.72E-01	1.37E+00	1.16E-02
Vinyl Chloride	75-01-4	GW	7.2E-01	7.2E-01	4.4E-06	3.0E-03	3.0E-03	1.0E-01	3.0E-03	3.0E-03	7.7E-02	V	NA	M	1.00	NA	2.55E-02	2.35E-01	5.65E-01	8.38E-03
Xylenes, Total	1330-20-7	GW	NV	NV	NV	2.0E-01	2.0E-01	1.0E-01	4.0E-01	4.0E-01	4.0E-01	V	NA	--	1.00	NA	1.98E-01	4.13E-01	9.92E-01	5.00E-02

Notes:

(1) References for toxicity and chemical-specific parameters are taken from USEPA's Regional Screening Level (RSL) Table, Updated November 2015. Available online at: http://www.epa.gov/region9/superfund/prg/

ABS = absorption factor

B = simplying constant taken from USEPA's Regional Screening Level (RSL) Table, Updated November 2015. Available online at: http://www.epa.gov/region9/superfund/prg/

CFS = cancer slope factor

FV = volatilization factor

GIABS = gastrointestinal absorption factor

M = indicates chemical is a mutagen

N = indicates chemical is not volatile

NV = No Value

NA = Not Available

RfD = reference dose

V = indicates chemical is volatile

VF = volatilization factor

VOC = Volatile Organic Compound

Table P2

Summary of Soil Risk-Based Clean-up Levels

Former Tecumseh Products Company Site

Tecumseh, Michigan

Soil Constituent of Concern	CAS	On-Site Environmental Worker		On-Site One Time Construction Worker		On-Site Occassional Excavation Maintenance Worker		On-Site Routine Outdoor Worker		On-Site Redevelopment Worker		On-Site Adolescent Trespasser	
		Soil RBCL (mg/kg)	Basis	Soil RBCL (mg/kg)	Basis	Soil RBCL (mg/kg)	Basis	Soil RBCL (mg/kg)	Basis	Soil RBCL (mg/kg)	Basis	Soil RBCL (mg/kg)	Basis
Tetrachloroethene	127-18-4	48,667	NC	196,633	NC	11,798	NC	10,069	NC	50,853	NC	7,430	NC
Trichloroethene (total)	79-01-6	130	NC	97	NC	97	NC	27	NC	25	NC	168	NC

Notes:

RBCL = Risk Based Cleanup Level

C = based on carcinogenic effects and a cancer, Target Risk Level (TRL) of 1E-05

NC = based on noncarcinogenic effects and a noncancer, Target Hazard Quotient (HQ) of 1.0

Shaded Soil RBCL indicates the most protective soil RBCL to use to compare against soil data.

Table P3
Summary of Groundwater Risk-Based Clean-up Levels
Former Tecumseh Products Company Site
Tecumseh, Michigan

Groundwater Constituent of Concern	CAS	MCL (ug/L)	On-Site Environmental Worker		On-Site One Time Construction Worker		On-Site Occasional Excavation Maintenance Worker		On-Site Routine Outdoor Worker		On-Site Redevelopment Worker		On-Site Adolescent Trespasser		Off-Site Environmental Worker		Off-Site One Time Construction Worker		Off-Site Occasional Excavation Maintenance Worker	
			GW RBCL (ug/L)	Basis	GW RBCL (ug/L)	Basis	GW RBCL (ug/L)	Basis	GW RBCL (ug/L)	Basis	GW RBCL (ug/L)	Basis	GW RBCL (ug/L)	Basis	GW RBCL (ug/L)	Basis	GW RBCL (ug/L)	Basis	GW RBCL (ug/L)	Basis
1,1,1-Trichloroethane	71-55-6	200	8.35E+07	NC	7.24E+07	NC	4.50E+07	NC	NA		7.24E+07	NC	NA		8.35E+07	NC	7.24E+07	NC	4.50E+07	NC
1,1-Dichloroethane	75-34-3	NA	4.55E+05	C	4.30E+06	C	1.72E+05	C	NA		4.30E+06	C	NA		4.55E+05	C	4.30E+06	C	1.72E+05	C
1,1-Dichloroethene	75-35-4	7	2.81E+06	NC	3.47E+05	NC	1.46E+06	NC	NA		3.47E+05	NC	NA		2.81E+06	NC	3.47E+05	NC	1.46E+06	NC
1,2,4-Trimethylbenzene	95-63-6	NA	NA		1.28E+06	NC	1.28E+05	NC	NA		1.28E+06	NC	NA		NA		1.28E+06	NC	1.28E+05	NC
Methyl ethyl ketone (2-Butanone)	78-93-3	NA	2.86E+08	NC	2.85E+07	NC	8.97E+07	NC	NA		2.85E+07	NC	NA		2.86E+08	NC	2.85E+07	NC	8.97E+07	NC
Acetone	67-64-1	NA	6.05E+08	NC	5.12E+08	NC	3.17E+08	NC	NA		5.12E+08	NC	NA		6.05E+08	NC	5.12E+08	NC	3.17E+08	NC
cis-1,2-Dichloroethene	156-59-2	70	1.19E+05	NC	1.11E+06	NC	1.11E+05	NC	NA		1.11E+06	NC	NA		1.19E+05	NC	1.11E+06	NC	1.11E+05	NC
Ethylbenzene	100-41-4	700	33,300	C	6.61E+05	NC	28,700	C	NA		6.61E+05	NC	NA		33,300	C	6.61E+05	NC	28,748	C
Tetrachloroethene	127-18-4	5	78,769	NC	5.32E+05	NC	76,900	NC	NA		5.32E+05	NC	NA		78,800	NC	5.32E+05	NC	76,940	NC
Toluene	108-88-3	1,000	1.80E+06	NC	1.42E+07	NC	1.69E+06	NC	NA		1.42E+07	NC	NA		1.80E+06	NC	1.42E+07	NC	1.69E+06	NC
Trichloroethene (Total)	79-01-6	5	22,900	NC	14,400	NC	14,400	NC	NA		14,400	NC	NA		22,900	NC	14,400	NC	14,386	NC
Vinyl Chloride	75-01-4	2	3,660	C	73,300	C	2,930	C	NA		73,000	C	NA		3,660	C	73,300	C	2,934	C
Xylenes, Total	1330-20-7	10,000	2.58E+06	NC	2.98E+06	NC	1.04E+06	NC	NA		2.98E+06	NC	NA		2.58E+06	NC	2.98E+06	NC	1.04E+06	NC

Notes:
RBCL = Risk Based Cleanup Level
C = based on carcinogenic effects and a cancer, Target Risk Level (TRL) of 1E-05 mg/L
NC = based on noncarcinogenic effects and a noncancer, Target Hazard Quotient (HQ) of 1.0
GW = Groundwater
MCL = maximum contaminant level
NA = not available
Shaded Groundwater RBCL indicates the most protective groundwater RBCL to use to compare against groundwater data. Note, if minimum groundwater RBCL < MCL, MCL is assumed as the groundwater remedial goal.

Attachment 1
Intermediate Calculation Sheets for Soil

RECEPTOR: **On-Site Environmental Worker**

General Assumptions		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	25
ADAF	Age-dependent adjustment factor (mutagens)	1
Incidental Ingestion		
IR	Incidental Ingestion Rate (mg-soil/day):	100
FI	Fraction Ingested of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	36
ED	Exposure Duration (years):	25
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil/Kg-BW-day)	**4.40E-08**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**1.23E-07**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	3,470
AF	Adherence Factor (mg-soil/cm^2-event):	0.12
FC	Fraction Contacted of Daily Total (unitless):	1
EV	Event Frequency (events/day)	1
EF	Exposure Frequency (days/year):	36
ED	Exposure Duration (years):	25
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil-/Kg-BW-day)	**1.83E-07**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**5.13E-07**
Inhalation		
ET	Exposure Time (hours/day):	8
FI	Fraction Inhaled of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	36
ED	Exposure Duration (years):	25
	Intake Factor (carc, unitless)	**1.17E-02**
	Intake Factor (noncarc, unitless)	**3.29E-02**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	1

HQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor ($(mg/kg/day)^{-1}$	Cancer Slope Factor $(mg/kg/day)^{-1}$	Unit Risk $(ug/m^3)^{-1}$	Reference Dose (mg/kg/day)	Reference Dose (mg/kg/day)	Reference Concentration (mg/m^3)	Volatile	MUTAGENIC	USEPA Mutagenic ADAF	ABS	2002 SSL Default PEF	Soil VF	NON CANCER INTAKES			CANCER INTAKES			Risk-Based Remedial Goals: Noncancer Effects				Risk-Based Remedial Goals: Cancer Effects				Minimum Soil Risk-Based Remedial Goal (mg/kg)	
	(Oral)	(Dermal)	(Inhalation)	(Oral)	(Dermal)	(Inhalation)	V = Volatile N = Not Volatile	M = Mutagenic N = Nonmutagenic	Unitless	(Dermal)	(kg/m^3)	(kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW-day)	Inhalation Soil Intake (kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW)	Inhalation Soil Intake (kg/m^3)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)		
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	6.00E-03	6.00E-03	4.00E-02	V	M	1	NA	7.35E-10	NA	1.23E-07	NA	NA	4.40E-08	NA	NA	4.87E+04	NA	NA	4.87E+04	1.08E+05	NA	NA	1.08E+05	**48,666.67**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	M	1	NA	7.35E-10	4.52E-04	1.23E-07	NA	1.49E-05	4.40E-08	NA	5.31E-06	4.06E+03	NA	1.34E+02	1.30E+02	4.94E+03	NA	4.59E+02	4.20E+02	**130.13**	**NC**

Incidental Ingestion:

IF_{carc} = (IR*FI*EF*ED*CF)/(BW*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = (IR*FI*EF*ED*CF)/(BW*$AT_{noncarc}$*365)

Dermal Contact:

IF_{carc} = (BSAE*AF*ABS_{der}*FC*EF*ED*EV*CF)/(BW*AT_{carc}*365) * ADAF

$IFnon_{carc}$ = (BSAE*AF*ABS_{der}*EF*ED*EV*CF)/(BW*$AT_{noncarc}$*365)

Inhalation:

IF_{carc} = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*$AT_{noncarc}$*365)

RECEPTOR: **On-Site One Time Construction Worker**

General Assumptions		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	1
ADAF	Age-dependent adjustment factor (mutagens)	1
Incidental Ingestion		
IR	Incidental Ingestion Rate (mg-soil/day):	330
FI	Fraction Ingested of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	45
ED	Exposure Duration (years):	1
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil/Kg-BW-day)	**7.27E-09**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**5.09E-07**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	3,470
AF	Adherence Factor (mg-soil/cm^2-event):	0.30
FC	Fraction Contacted of Daily Total (unitless):	1
EV	Event Frequency (events/day)	1
EF	Exposure Frequency (days/year):	45
ED	Exposure Duration (years):	1
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil-/Kg-BW-day)	**2.29E-08**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**1.60E-06**
Inhalation		
ET	Exposure Time (hours/day):	8
FI	Fraction Inhaled of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	45
ED	Exposure Duration (years):	1
	Intake Factor (carc, unitless)	**5.87E-04**
	Intake Factor (noncarc, unitless)	**4.11E-02**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	2

HQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor ($(mg/kg/day)^{-1}$	Cancer Slope Factor $(mg/kg/day)^{-1}$	Unit Risk $(ug/m^3)^{-1}$	Reference Dose (mg/kg/day)	Reference Dose (mg/kg/day)	Reference Concentration (mg/m^3)	Volatile	MUTAGENIC	USEPA Mutagenic ADAF	ABS	2002 SSL Default PEF	Soil VF	NON CANCER INTAKES			CANCER INTAKES			Risk-Based Remedial Goals: Noncancer Effects				Risk-Based Remedial Goals: Cancer Effects				Minimum Soil Risk-Based Remedial Goal (mg/kg)	
	(Oral)	(Dermal)	(Inhalation)	(Oral)	(Dermal)	(Inhalation)	V = Volatile N = Not Volatile	M = Mutagenic N = Nonmutagenic	Unitless	(Dermal)	(kg/m^3)	(kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW-day)	Inhalation Soil Intake (kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW)	Inhalation Soil Intake (kg/m^3)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)		
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	1.00E-01	1.00E-01	4.00E-02	V	M	1	NA	7.35E-10	NA	5.09E-07	NA	NA	7.27E-09	NA	NA	1.97E+05	NA	NA	1.97E+05	6.55E+05	NA	NA	6.55E+05	**196,633.00**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	M	1	NA	7.35E-10	4.52E-04	5.09E-07	NA	1.86E-05	7.27E-09	NA	2.66E-07	9.83E+02	NA	1.08E+02	9.69E+01	2.99E+04	NA	9.18E+03	7.03E+03	**96.95**	**NC**

Incidental Ingestion:

IF_{carc} = (IR*FI*EF*ED*CF)/(BW*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = (IR*FI*EF*ED*CF)/(BW*$AT_{noncarc}$*365)

Dermal Contact:

IF_{carc} = (BSAE*AF*ABS_{der}*FC*EF*ED*EV*CF)/(BW*AT_{carc}*365) * ADAF

$IFnon_{carc}$ = (BSAE*AF*ABS_{der}*EF*ED*EV*CF)/(BW*$AT_{noncarc}$*365)

Inhalation:

IF_{carc} = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*$AT_{noncarc}$*365)

RECEPTOR: **On-Site Occassional Exc Maint Worker**

General Assumptions		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	25
ADAF	Age-dependent adjustment factor (mutagens)	1
Incidental Ingestion		
IR	Incidental Ingestion Rate (mg-soil/day):	330
FI	Fraction Ingested of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	45
ED	Exposure Duration (years):	25
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil/Kg-BW-day)	**1.82E-07**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**5.09E-07**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	3,470
AF	Adherence Factor (mg-soil/cm^2-event):	0.30
FC	Fraction Contacted of Daily Total (unitless):	1
EV	Event Frequency (events/day)	1
EF	Exposure Frequency (days/year):	45
ED	Exposure Duration (years):	25
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil-/Kg-BW-day)	**5.73E-07**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**1.60E-06**
Inhalation		
ET	Exposure Time (hours/day):	8
FI	Fraction Inhaled of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	45
ED	Exposure Duration (years):	25
	Intake Factor (carc, unitless)	**1.47E-02**
	Intake Factor (noncarc, unitless)	**4.11E-02**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	1

HQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor ($(mg/kg/day)^{-1}$	Cancer Slope Factor $(mg/kg/day)^{-1}$	Unit Risk $(ug/m^3)^{-1}$	Reference Dose (mg/kg/day)	Reference Dose (mg/kg/day)	Reference Concentration (mg/m^3)	Volatile	MUTAGENIC	USEPA Mutagenic ADAF	ABS	2002 SSL Default PEF	Soil VF	NON CANCER INTAKES			CANCER INTAKES			Risk-Based Remedial Goals: Noncancer Effects				Risk-Based Remedial Goals: Cancer Effects				Minimum Soil Risk-Based Remedial Goal (mg/kg)	
	(Oral)	(Dermal)	(Inhalation)	(Oral)	(Dermal)	(Inhalation)	V = Volatile N = Not Volatile	M = Mutagenic N = Nonmutagenic	Unitless	(Dermal)	(kg/m^3)	(kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW-day)	Inhalation Soil Intake (kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW)	Inhalation Soil Intake (kg/m^3)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)		
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	6.00E-03	6.00E-03	4.00E-02	V	M	1	NA	7.35E-10	NA	5.09E-07	NA	NA	1.82E-07	NA	NA	1.18E+04	NA	NA	1.18E+04	2.62E+04	NA	NA	2.62E+04	**11,797.98**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	M	1	NA	7.35E-10	4.52E-04	5.09E-07	NA	1.86E-05	1.82E-07	NA	6.64E-06	9.83E+02	NA	1.08E+02	9.69E+01	1.20E+03	NA	3.67E+02	2.81E+02	**96.95**	**NC**

Incidental Ingestion:

IF_{carc} = (IR*FI*EF*ED*CF)/(BW*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = (IR*FI*EF*ED*CF)/(BW*$AT_{noncarc}$*365)

Dermal Contact:

IF_{carc} = (BSAE*AF*ABS_{der}*FC*EF*ED*EV*CF)/(BW*AT_{carc}*365) * ADAF

$IFnon_{carc}$ = (BSAE*AF*ABS_{der}*EF*ED*EV*CF)/(BW*$AT_{noncarc}$*365)

Inhalation:

IF_{carc} = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*$AT_{noncarc}$*365)

RECEPTOR: **On-Site Routine Outdoor Worker**

General Assumptions		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	25
ADAF	Age-dependent adjustment factor (mutagens)	1
Incidental Ingestion		
IR	Incidental Ingestion Rate (mg-soil/day):	100
FI	Fraction Ingested of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	174
ED	Exposure Duration (years):	25
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil/Kg-BW-day)	**2.13E-07**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**5.96E-07**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	3,470
AF	Adherence Factor (mg-soil/cm^2-event):	0.12
FC	Fraction Contacted of Daily Total (unitless):	1
EV	Event Frequency (events/day)	1
EF	Exposure Frequency (days/year):	174
ED	Exposure Duration (years):	25
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil-/Kg-BW-day)	**8.86E-07**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**2.48E-06**
Inhalation		
ET	Exposure Time (hours/day):	8
FI	Fraction Inhaled of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	174
ED	Exposure Duration (years):	25
	Intake Factor (carc, unitless)	**5.68E-02**
	Intake Factor (noncarc, unitless)	**1.59E-01**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	1

HQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor ($(mg/kg/day)^{-1}$	Cancer Slope Factor $(mg/kg/day)^{-1}$	Unit Risk $(ug/m^3)^{-1}$	Reference Dose (mg/kg/day)	Reference Dose (mg/kg/day)	Reference Concentration (mg/m^3)	Volatile	MUTAGENIC	USEPA Mutagenic ADAF	ABS	2002 SSL Default PEF	Soil VF	NON CANCER INTAKES			CANCER INTAKES			Risk-Based Remedial Goals: Noncancer Effects				Risk-Based Remedial Goals: Cancer Effects				Minimum Soil Risk-Based Remedial Goal (mg/kg)	
	(Oral)	(Dermal)	(Inhalation)	(Oral)	(Dermal)	(Inhalation)	V = Volatile N = Not Volatile	M = Mutagenic N = Nonmutagenic	Unitless	(Dermal)	(kg/m^3)	(kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW-day)	Inhalation Soil Intake (kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW)	Inhalation Soil Intake (kg/m^3)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)		
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	6.00E-03	6.00E-03	4.00E-02	V	M	1	NA	7.35E-10	NA	5.96E-07	NA	NA	2.13E-07	NA	NA	1.01E+04	NA	NA	1.01E+04	2.24E+04	NA	NA	2.24E+04	**10,068.97**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	M	1	NA	7.35E-10	4.52E-04	5.96E-07	NA	7.19E-05	2.13E-07	NA	2.57E-05	8.39E+02	NA	2.78E+01	2.69E+01	1.02E+03	NA	9.50E+01	8.69E+01	**26.92**	**NC**

Incidental Ingestion:

IF_{carc} = (IR*FI*EF*ED*CF)/(BW*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = (IR*FI*EF*ED*CF)/(BW*$AT_{noncarc}$*365)

Dermal Contact:

IF_{carc} = (BSAE*AF*ABS_{der}*FC*EF*ED*EV*CF)/(BW*AT_{carc}*365) * ADAF

$IFnon_{carc}$ = (BSAE*AF*ABS_{der}*EF*ED*EV*CF)/(BW*$AT_{noncarc}$*365)

Inhalation:

IF_{carc} = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*$AT_{noncarc}$*365)

RECEPTOR: **On-Site Redevelopment Worker**

General Assumptions		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	1
ADAF	Age-dependent adjustment factor (mutagens)	1
Incidental Ingestion		
IR	Incidental Ingestion Rate (mg-soil/day):	330
FI	Fraction Ingested of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	174
ED	Exposure Duration (years):	1
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil/Kg-BW-day)	**2.81E-08**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**1.97E-06**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	3,470
AF	Adherence Factor (mg-soil/cm^2-event):	0.30
FC	Fraction Contacted of Daily Total (unitless):	1
EV	Event Frequency (events/day)	1
EF	Exposure Frequency (days/year):	174
ED	Exposure Duration (years):	1
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil-/Kg-BW-day)	**8.86E-08**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**6.20E-06**
Inhalation		
ET	Exposure Time (hours/day):	8
FI	Fraction Inhaled of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	174
ED	Exposure Duration (years):	1
	Intake Factor (carc, unitless)	**2.27E-03**
	Intake Factor (noncarc, unitless)	**1.59E-01**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	2

HQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor ($(mg/kg/day)^{-1}$	Cancer Slope Factor ($(mg/kg/day)^{-1}$	Unit Risk ($(ug/m^3)^{-1}$	Reference Dose (mg/kg/day)	Reference Dose (mg/kg/day)	Reference Concentration (mg/m^3)	Volatile	MUTAGENIC	USEPA Mutagenic ADAF	ABS	2002 SSL Default PEF	Soil VF	NON CANCER INTAKES			CANCER INTAKES			Risk-Based Remedial Goals: Noncancer Effects				Risk-Based Remedial Goals: Cancer Effects				Minimum Soil Risk-Based Remedial Goal (mg/kg)	
	(Oral)	(Dermal)	(Inhalation)	(Oral)	(Dermal)	(Inhalation)	V = Volatile N = Not Volatile	M = Mutagenic N = Nonmutagenic	Unitless	(Dermal)	(kg/m^3)	(kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW-day)	Inhalation Soil Intake (kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW)	Inhalation Soil Intake (kg/m^3)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)		
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	1.00E-01	1.00E-01	4.00E-02	V	M	1	NA	7.35E-10	NA	1.97E-06	NA	NA	2.81E-08	NA	NA	5.09E+04	NA	NA	5.09E+04	1.70E+05	NA	NA	1.70E+05	**50,853.36**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	M	1	NA	7.35E-10	4.52E-04	1.97E-06	NA	7.19E-05	2.81E-08	NA	1.03E-06	2.54E+02	NA	2.78E+01	2.51E+01	7.74E+03	NA	2.37E+03	1.82E+03	**25.07**	**NC**

Incidental Ingestion:

IF_{carc} = (IR*FI*EF*ED*CF)/(BW*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = (IR*FI*EF*ED*CF)/(BW*$AT_{noncarc}$*365)

Dermal Contact:

IF_{carc} = (BSAE*AF*ABS_{der}*FC*EF*ED*EV*CF)/(BW*AT_{carc}*365) * ADAF

$IFnon_{carc}$ = (BSAE*AF*ABS_{der}*EF*ED*EV*CF)/(BW*$AT_{noncarc}$*365)

Inhalation:

IF_{carc} = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*$AT_{noncarc}$*365)

RECEPTOR: **On-Site Adolescent Trespasser**

General Assumptions		
BW	Mean Body Weight (Kg):	57
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	6
ADAF	Age-dependent adjustment factor (mutagens)	3
Incidental Ingestion		
IR	Incidental Ingestion Rate (mg-soil/day):	200
FI	Fraction Ingested of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	84
ED	Exposure Duration (years):	6
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil/Kg-BW-day)	**6.92E-08**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**8.07E-07**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	3,720
AF	Adherence Factor (mg-soil/cm^2-event):	0.20
FC	Fraction Contacted of Daily Total (unitless):	1
EV	Event Frequency (events/day)	1
EF	Exposure Frequency (days/year):	84
ED	Exposure Duration (years):	6
CF	Conversion Factor (Kg-soil/mg-soil):	1.00E-06
	Intake Factor (carc, Kg-soil-/Kg-BW-day)	**2.57E-07**
	Intake Factor (noncarc, Kg-soil/Kg-BW-day)	**3.00E-06**
Inhalation		
ET	Exposure Time (hours/day):	2
FI	Fraction Inhaled of Daily Total (unitless):	1
EF	Exposure Frequency (days/year):	84
ED	Exposure Duration (years):	6
	Intake Factor (carc, unitless)	**1.64E-03**
	Intake Factor (noncarc, unitless)	**1.92E-02**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	1

HQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor ($mg/kg/day)^{-1}$	Cancer Slope Factor ($mg/kg/day)^{-1}$	Unit Risk ($ug/m^3)^{-1}$	Reference Dose (mg/kg/day)	Reference Dose (mg/kg/day)	Reference Concentration (mg/m^3)	Volatile	MUTAGENIC	USEPA Mutagenic ADAF	ABS	2002 SSL Default PEF	Soil VF	NON CANCER INTAKES			CANCER INTAKES			Risk-Based Remedial Goals: Noncancer Effects				Risk-Based Remedial Goals: Cancer Effects				Minimum Soil Risk-Based Remedial Goal (mg/kg)	
	(Oral)	(Dermal)	(Inhalation)	(Oral)	(Dermal)	(Inhalation)	V = Volatile N = Not Volatile	M = Mutagenic N = Nonmutagenic	Unitless	(Dermal)	(kg/m^3)	(kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW-day)	Inhalation Soil Intake (kg/m^3)	Oral Soil Intake (Kg-soil/Kg-BW-day)	Dermal Soil Intake (Kg-soil/Kg-BW)	Inhalation Soil Intake (kg/m^3)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)	Ingestion (mg/kg)	Dermal (mg/kg)	Inhalation (mg/kg)	Combined (mg/kg)		
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	6.00E-03	6.00E-03	4.00E-02	V	M	3	NA	7.35E-10	NA	8.07E-07	NA	NA	2.08E-07	NA	NA	7.43E+03	NA	NA	7.43E+03	2.29E+04	NA	NA	2.29E+04	**7,430.36**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	M	3	NA	7.35E-10	4.52E-04	8.07E-07	NA	8.68E-06	2.08E-07	NA	2.23E-06	6.19E+02	NA	2.30E+02	1.68E+02	1.05E+03	NA	1.09E+03	5.35E+02	**167.96**	**NC**

Incidental Ingestion:

IF_{carc} = (IR*FI*EF*ED*CF)/(BW*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = (IR*FI*EF*ED*CF)/(BW*$AT_{noncarc}$*365)

Dermal Contact:

IF_{carc} = (BSAE*AF*ABS_{der}*FC*EF*ED*EV*CF)/(BW*AT_{carc}*365) * ADAF

$IFnon_{carc}$ = (BSAE*AF*ABS_{der}*EF*ED*EV*CF)/(BW*$AT_{noncarc}$*365)

Inhalation:

IF_{carc} = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*AT_{carc}*365) *ADAF

$IF_{noncarc}$ = [VF (volatiles)] * [(ET*FI*EF*ED)]/(24*$AT_{noncarc}$*365)

Attachment 2
Intermediate Calculation Sheets for Groundwater

RECEPTOR: **On-Site Environmental Worker**

2

General		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	25
ADAF	Age-dependent adjustment factor (mutagens)	1
Ingestion		
IR	Ingestion Rate (L-H2O/day):	0.00074
EF	Exposure Frequency (days/year)	36
ED	Exposure Duration (years)	25
	Intake Factor (carc L/Kg-day)	**3.26E-07**
	Intake Factor (noncarc L/Kg-day)	**9.12E-07**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	990
EV	Event Frequency (events/day)	1
t_{event}	Event Duration (hours/event)	0.5
EF	Exposure Frequency (days/year):	36
ED	Exposure Duration (years):	25
CF	Conversion Factor (L/cm^3)	1.00E-03
	Intake Factor (carc L-hr/Kg-day-cm)	**2.18E-04**
	Intake Factor (non-carc L-hr/Kg-day-cm)	**6.10E-04**
Inhalation of Volatiles in Ambient Air		
ET	Exposure Time (hours/day):	NA
EF	Exposure Frequency (days/year)	36
ED	Exposure Duration (years)	25
	Intake Factor (carc, unitless)	**NA**
	Intake Factor (noncarc, unitless)	**NA**
Inhalation of Volatiles in Indoor Air		
ET	Exposure Time (hours/day):	NA
EF	Exposure Frequency (days/year)	NA
ED	Exposure Duration (years)	NA
	Intake Factor (carc, unitless)	**NA**
	Intake Factor (noncarc, unitless)	**NA**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	1

Y = Derm IF/Oral IF >= 0.1

N = Derm IF/Oral IF < 0.1

THQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor $(mg/kg/day)^{-1}$	Cancer Slope Factor $(mg/kg/day)^{-1}$	Unit Risk $(ug/m^3)^{-1}$	Reference Dose (mg/kg/day)	Reference Dose (mg/kg/day)	Reference Concentration (mg/m^3)	VOLATILE	*Ambient Air Only* CW Trench VF	DA_{event}	Chemical to be Assessed Dermally?	NON CANCER INTAKES			CANCER INTAKES			Risk-Based Remedial Goals: Noncancer Effects				Risk-Based Remedial Goals: Cancer Effects				Minimum RBRG (mg/L)	
	(Oral)	(Dermal)	(Inhalation)	(Oral)	(Dermal)	(Inhalation)	V = Volatile N = Non volatile	L/m^3	mg/cm^2-event		Ingestion Groundwater Intake (L/kg-day)	DAD (dermal absorbed dose) (mg/kg-day)	Ambient Air Inhalation Groundwater Intake (L/m^3)	Ingestion Groundwater Intake (L/Kg-day)	DAD (dermal absorbed dose) (mg/kg-day)	Ambient Air Inhalation Groundwater Intake (L/m^3)	Ingestion (mg/L)	Dermal (mg/L)	Ambient Air Inhalation (mg/L)	Combined (mg/L)	Ingestion (mg/L)	Dermal (mg/L)	Ambient Air Inhalation (mg/L)	Combined (mg/L)		
1,1-Dichloroethane	5.70E-03	5.70E-03	1.60E-06	2.00E-01	2.00E-01	NA	V	5.28E-02	8.10E-06	Y	9.12E-07	9.88E-06	NA	3.26E-07	3.53E-06	NA	2.19E+05	2.02E+04	NA	1.85E+04	5.38E+03	4.97E+02	NA	4.55E+02	**455.04**	**C**
1,1-Dichloroethene	NA	NA	NA	5.00E-02	5.00E-02	2.00E-01	V	5.37E-02	1.39E-05	Y	9.12E-07	1.69E-05	NA	3.26E-07	6.04E-06	NA	5.48E+04	2.96E+03	NA	2.81E+03	NA	NA	NA	NA	**2,805.59**	**NC**
cis-1,2-Dichloroethene	NA	NA	NA	2.00E-03	2.00E-03	NA	V	5.31E-02	1.30E-05	Y	9.12E-07	1.59E-05	NA	3.26E-07	5.68E-06	NA	2.19E+03	1.26E+02	NA	1.19E+02	NA	NA	NA	NA	**118.98**	**NC**
1,1,1-Trichloroethane	NA	NA	NA	2.00E+00	2.00E+00	5.00E+00	V	4.58E-02	1.89E-05	Y	9.12E-07	2.30E-05	NA	3.26E-07	8.23E-06	NA	2.19E+06	8.68E+04	NA	8.35E+04	NA	NA	NA	NA	**83,511.96**	**NC**
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	7.00E-03	V	4.79E-02	1.18E-04	Y	9.12E-07	1.44E-04	NA	3.26E-07	5.14E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**	
Acetone	NA	NA	NA	9.00E-01	9.00E-01	3.10E+01	V	2.61E-02	4.72E-07	Y	9.12E-07	5.76E-07	NA	3.26E-07	2.06E-07	NA	9.86E+05	1.56E+06	NA	6.05E+05	NA	NA	NA	NA	**604,721.70**	**NC**
Ethylbenzene	1.10E-02	1.10E-02	2.50E-06	1.00E-01	1.00E-01	1.00E+00	V	5.11E-02	6.20E-05	Y	9.12E-07	7.56E-05	NA	3.26E-07	2.70E-05	NA	1.10E+05	1.32E+03	NA	1.31E+03	2.79E+03	3.37E+01	NA	3.33E+01	**33.26**	**C**
Methyl ethyl ketone (2-Butanone)	NA	NA	NA	6.00E-01	6.00E-01	5.00E+00	V	2.96E-02	9.71E-07	Y	9.12E-07	1.18E-06	NA	3.26E-07	4.23E-07	NA	6.58E+05	5.06E+05	NA	2.86E+05	NA	NA	NA	NA	**286,132.51**	**NC**
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	6.00E-03	6.00E-03	4.00E-02	V	4.11E-02	6.17E-05	Y	9.12E-07	7.53E-05	NA	3.26E-07	2.69E-05	NA	6.58E+03	7.97E+01	NA	7.88E+01	1.46E+04	1.77E+02	NA	1.75E+02	**78.77**	**NC**
Toluene	NA	NA	NA	8.00E-02	8.00E-02	5.00E+00	V	5.47E-02	3.57E-05	Y	9.12E-07	4.36E-05	NA	3.26E-07	1.56E-05	NA	8.77E+04	1.84E+03	NA	1.80E+03	NA	NA	NA	NA	**1,798.20**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	4.60E-02	1.72E-05	Y	9.12E-07	2.09E-05	NA	3.26E-07	7.48E-06	NA	5.48E+02	2.39E+01	NA	2.29E+01	6.67E+02	2.91E+01	NA	2.79E+01	**22.89**	**NC**
Vinyl chloride	7.20E-01	7.20E-01	4.40E-06	3.00E-03	3.00E-03	1.00E-01	V	6.69E-02	7.95E-06	Y	9.12E-07	9.70E-06	NA	3.26E-07	3.46E-06	NA	3.29E+03	3.09E+02	NA	2.83E+02	4.26E+01	4.01E+00	NA	3.66E+00	**3.66**	**C**
Xylenes, total	NA	NA	NA	2.00E-01	2.00E-01	1.00E-01	V	5.09E-02	6.28E-05	Y	9.12E-07	7.67E-05	NA	3.26E-07	2.74E-05	NA	2.19E+05	2.61E+03	NA	2.58E+03	NA	NA	NA	NA	**2,577.23**	**NC**

RECEPTOR: **On-Site One Time Construction Worker** 2

General		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	1
ADAF	Age-dependent adjustment factor (mutagens)	1
Ingestion		
IR	Ingestion Rate (L-H2O/day):	0.0074
EF	Exposure Frequency (days/year)	5
ED	Exposure Duration (years)	1
	Intake Factor (carc L/Kg-day)	**1.81E-08**
	Intake Factor (noncarc L/Kg-day)	**1.27E-06**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	3300
EV	Event Frequency (events/day)	1
t_{event}	Event Duration (hours/event)	2
EF	Exposure Frequency (days/year):	5
ED	Exposure Duration (years):	1
CF	Conversion Factor (L/cm^3)	1.00E-03
	Intake Factor (carc L-hr/Kg-day-cm)	**1.61E-05**
	Intake Factor (non-carc L-hr/Kg-day-cm)	**1.13E-03**
Inhalation of Volatiles in Ambient Air		
ET	Exposure Time (hours/day):	2
EF	Exposure Frequency (days/year)	5
ED	Exposure Duration (years)	1
	Intake Factor (carc, unitless)	**1.63E-05**
	Intake Factor (noncarc, unitless)	**1.14E-03**
Inhalation of Volatiles in Indoor Air		
ET	Exposure Time (hours/day):	NA
EF	Exposure Frequency (days/year)	NA
ED	Exposure Duration (years)	NA
	Intake Factor (carc, unitless)	**NA**
	Intake Factor (noncarc, unitless)	**NA**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	2

Y = Derm IF/Oral IF >= 0.1

N = Derm IF/Oral IF < 0.1

THQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor $(mg/kg/day)^{-1}$	Cancer Slope Factor $(mg/kg/day)^{-1}$	Unit Risk $(ug/m^3)^{-1}$	Reference Dose (mg/kg/day)	Reference Dose (mg/kg/day)	Reference Concentration (mg/m^3)	VOLATILE	*Ambient Air Only* CW Trench VF	DA_{event}	Chemical to be Assessed Dermally?	NON CANCER INTAKES			CANCER INTAKES			Risk-Based Remedial Goals: Noncancer Effects				Risk-Based Remedial Goals: Cancer Effects				Minimum RBRG (mg/L)	
	(Oral)	(Dermal)	(Inhalation)	(Oral)	(Dermal)	(Inhalation)	V = Volatile N = Non volatile	L/m^3	mg/cm^2-event		Ingestion Groundwater Intake (L/kg-day)	DAD (dermal absorbed dose) (mg/kg-day)	Ambient Air Inhalation Groundwater Intake (L/m^3)	Ingestion Groundwater Intake (L/Kg-day)	DAD (dermal absorbed dose) (mg/kg-day)	Ambient Air Inhalation Groundwater Intake (L/m^3)	Ingestion (mg/L)	Dermal (mg/L)	Ambient Air Inhalation (mg/L)	Combined (mg/L)	Ingestion (mg/L)	Dermal (mg/L)	Ambient Air Inhalation (mg/L)	Combined (mg/L)		
1,1-Dichloroethane	5.70E-03	5.70E-03	1.60E-06	2.00E+00	2.00E+00	NA	V	5.28E-02	1.84E-05	Y	1.27E-06	1.04E-05	6.02E-05	1.81E-08	1.48E-07	8.60E-07	1.58E+06	1.93E+05	NA	1.72E+05	9.69E+04	1.18E+04	7.27E+03	4.30E+03	**4,300.80**	**C**
1,1-Dichloroethene	NA	NA	NA	9.00E-03	9.00E-03	7.93E-02	V	5.37E-02	3.14E-05	Y	1.27E-06	1.77E-05	6.13E-05	1.81E-08	2.53E-07	8.76E-07	7.10E+03	5.08E+02	1.29E+03	3.47E+02	NA	NA	NA	NA	**346.71**	**NC**
cis-1,2-Dichloroethene	NA	NA	NA	2.00E-02	2.00E-02	NA	V	5.31E-02	2.95E-05	Y	1.27E-06	1.67E-05	6.06E-05	1.81E-08	2.38E-07	8.66E-07	1.58E+04	1.20E+03	NA	1.11E+03	NA	NA	NA	NA	**1,113.94**	**NC**
1,1,1-Trichloroethane	NA	NA	NA	7.00E+00	7.00E+00	5.00E+00	V	4.58E-02	3.95E-05	Y	1.27E-06	2.23E-05	5.22E-05	1.81E-08	3.19E-07	7.46E-07	5.52E+06	3.14E+05	9.57E+04	7.24E+04	NA	NA	NA	NA	**72,375.49**	**NC**
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	7.00E-02	V	4.79E-02	2.39E-04	Y	1.27E-06	1.35E-04	5.47E-05	1.81E-08	1.93E-06	7.82E-07	NA	NA	1.28E+03	1.28E+03	NA	NA	NA	NA	**1,279.55**	**NC**
Acetone	NA	NA	NA	2.00E+00	2.00E+00	3.09E+01	V	2.61E-02	1.25E-06	Y	1.27E-06	7.07E-07	2.98E-05	1.81E-08	1.01E-08	4.26E-07	1.58E+06	2.83E+06	1.04E+06	5.12E+05	NA	NA	NA	NA	**512,143.80**	**NC**
Ethylbenzene	1.10E-02	1.10E-02	2.50E-06	5.00E-02	5.00E-02	9.00E+00	V	5.11E-02	1.31E-04	Y	1.27E-06	7.40E-05	5.83E-05	1.81E-08	1.06E-06	8.33E-07	3.95E+04	6.75E+02	1.54E+05	6.61E+02	5.02E+04	8.60E+02	4.80E+03	7.19E+02	**661.24**	**NC**
Methyl ethyl ketone (2-Butanone)	NA	NA	NA	2.00E+00	2.00E+00	1.00E+00	V	2.96E-02	2.43E-06	Y	1.27E-06	1.37E-06	3.37E-05	1.81E-08	1.96E-08	4.82E-07	1.58E+06	1.46E+06	2.96E+04	2.85E+04	NA	NA	NA	NA	**28,525.27**	**NC**
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	1.00E-01	1.00E-01	4.00E-02	V	4.11E-02	1.23E-04	Y	1.27E-06	6.97E-05	4.69E-05	1.81E-08	9.96E-07	6.70E-07	7.89E+04	1.44E+03	8.53E+02	5.32E+02	2.63E+05	4.78E+03	5.74E+04	4.34E+03	**531.57**	**NC**
Toluene	NA	NA	NA	8.00E-01	8.00E-01	5.00E+00	V	5.47E-02	7.97E-05	Y	1.27E-06	4.50E-05	6.25E-05	1.81E-08	6.43E-07	8.93E-07	6.31E+05	1.78E+04	8.00E+04	1.42E+04	NA	NA	NA	NA	**14,210.01**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	4.60E-02	3.60E-05	Y	1.27E-06	2.04E-05	5.25E-05	1.81E-08	2.91E-07	7.50E-07	3.95E+02	2.46E+01	3.81E+01	1.44E+01	1.20E+04	7.48E+02	3.25E+03	5.78E+02	**14.39**	**NC**
Vinyl chloride	7.20E-01	7.20E-01	4.40E-06	3.00E-03	3.00E-03	7.67E-02	V	6.69E-02	2.04E-05	Y	1.27E-06	1.15E-05	7.64E-05	1.81E-08	1.65E-07	1.09E-06	2.37E+03	2.60E+02	1.00E+03	1.90E+02	7.67E+02	8.44E+01	2.08E+03	7.33E+01	**73.34**	**C**
Xylenes, total	NA	NA	NA	4.00E-01	4.00E-01	4.00E-01	V	5.09E-02	1.33E-04	Y	1.27E-06	7.50E-05	5.81E-05	1.81E-08	1.07E-06	8.30E-07	3.16E+05	5.33E+03	6.89E+03	2.98E+03	NA	NA	NA	NA	**2,976.45**	**NC**

RECEPTOR: **On-Site Occassional Exc Maint Worker** 2

General		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	25
ADAF	Age-dependent adjustment factor (mutagens)	1
Ingestion		
IR	Ingestion Rate (L-H2O/day):	0.0074
EF	Exposure Frequency (days/year)	5
ED	Exposure Duration (years)	25
	Intake Factor (carc L/Kg-day)	**4.53E-07**
	Intake Factor (noncarc L/Kg-day)	**1.27E-06**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	3300
EV	Event Frequency (events/day)	1
t_{event}	Event Duration (hours/event)	2
EF	Exposure Frequency (days/year):	5
ED	Exposure Duration (years):	25
CF	Conversion Factor (L/cm^3)	1.00E-03
	Intake Factor (carc L-hr/Kg-day-cm)	**4.04E-04**
	Intake Factor (non-carc L-hr/Kg-day-cm)	**1.13E-03**
Inhalation of Volatiles in Ambient Air		
ET	Exposure Time (hours/day):	2
EF	Exposure Frequency (days/year)	5
ED	Exposure Duration (years)	25
	Intake Factor (carc, unitless)	**4.08E-04**
	Intake Factor (noncarc, unitless)	**1.14E-03**
Inhalation of Volatiles in Indoor Air		
ET	Exposure Time (hours/day):	NA
EF	Exposure Frequency (days/year)	NA
ED	Exposure Duration (years)	NA
	Intake Factor (carc, unitless)	**NA**
	Intake Factor (noncarc, unitless)	**NA**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	1

Y = Derm IF/Oral IF >= 0.1

N = Derm IF/Oral IF < 0.1

THQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor $(mg/kg/day)^{-1}$ (Oral)	Cancer Slope Factor $(mg/kg/day)^{-1}$ (Dermal)	Unit Risk $(ug/m^3)^{-1}$ (Inhalation)	Reference Dose (mg/kg/day) (Oral)	Reference Dose (mg/kg/day) (Dermal)	Reference Concentration (mg/m^3) (Inhalation)	VOLATILE V = Volatile N = Non volatile	*Ambient Air Only* CW Trench VF L/m^3	DA_{event} mg/cm^2-event	Chemical to be Assessed Dermally?	NON CANCER INTAKES Ingestion Groundwater Intake (L/kg-day)	NON CANCER INTAKES DAD (dermal absorbed dose) (mg/kg-day)	NON CANCER INTAKES Ambient Air Inhalation Groundwater Intake (L/m^3)	CANCER INTAKES Ingestion Groundwater Intake (L/Kg-day)	CANCER INTAKES DAD (dermal absorbed dose) (mg/kg-day)	CANCER INTAKES Ambient Air Inhalation Groundwater Intake (L/m^3)	Risk-Based Remedial Goals: Noncancer Effects Ingestion (mg/L)	Risk-Based Remedial Goals: Noncancer Effects Dermal (mg/L)	Risk-Based Remedial Goals: Noncancer Effects Ambient Air Inhalation (mg/L)	Risk-Based Remedial Goals: Noncancer Effects Combined (mg/L)	Risk-Based Remedial Goals: Cancer Effects Ingestion (mg/L)	Risk-Based Remedial Goals: Cancer Effects Dermal (mg/L)	Risk-Based Remedial Goals: Cancer Effects Ambient Air Inhalation (mg/L)	Risk-Based Remedial Goals: Cancer Effects Combined (mg/L)	Minimum RBRG (mg/L)	
1,1-Dichloroethane	5.70E-03	5.70E-03	1.60E-06	2.00E-01	2.00E-01	NA	V	5.28E-02	1.84E-05	Y	1.27E-06	1.04E-05	6.02E-05	4.53E-07	3.71E-06	2.15E-05	1.58E+05	1.93E+04	NA	1.72E+04	3.88E+03	4.73E+02	2.91E+02	1.72E+02	**172.03**	**C**
1,1-Dichloroethene	NA	NA	NA	5.00E-02	5.00E-02	2.00E-01	V	5.37E-02	3.14E-05	Y	1.27E-06	1.77E-05	6.13E-05	4.53E-07	6.33E-06	2.19E-05	3.95E+04	2.82E+03	3.26E+03	1.46E+03	NA	NA	NA	NA	**1,456.36**	**NC**
cis-1,2-Dichloroethene	NA	NA	NA	2.00E-03	2.00E-03	NA	V	5.31E-02	2.95E-05	Y	1.27E-06	1.67E-05	6.06E-05	4.53E-07	5.96E-06	2.16E-05	1.58E+03	1.20E+02	NA	1.11E+02	NA	NA	NA	NA	**111.39**	**NC**
1,1,1-Trichloroethane	NA	NA	NA	2.00E+00	2.00E+00	5.00E+00	V	4.58E-02	3.95E-05	Y	1.27E-06	2.23E-05	5.22E-05	4.53E-07	7.97E-06	1.87E-05	1.58E+06	8.96E+04	9.57E+04	4.50E+04	NA	NA	NA	NA	**44,964.98**	**NC**
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	7.00E-03	V	4.79E-02	2.39E-04	Y	1.27E-06	1.35E-04	5.47E-05	4.53E-07	4.83E-05	1.95E-05	NA	NA	1.28E+02	1.28E+02	NA	NA	NA	NA	**127.96**	**NC**
Acetone	NA	NA	NA	9.00E-01	9.00E-01	3.10E+01	V	2.61E-02	1.25E-06	Y	1.27E-06	7.07E-07	2.98E-05	4.53E-07	2.52E-07	1.07E-05	7.10E+05	1.27E+06	1.04E+06	3.17E+05	NA	NA	NA	NA	**316,892.29**	**NC**
Ethylbenzene	1.10E-02	1.10E-02	2.50E-06	1.00E-01	1.00E-01	1.00E+00	V	5.11E-02	1.31E-04	Y	1.27E-06	7.40E-05	5.83E-05	4.53E-07	2.64E-05	2.08E-05	7.89E+04	1.35E+03	1.71E+04	1.23E+03	2.01E+03	3.44E+01	1.92E+02	2.87E+01	**28.75**	**C**
Methyl ethyl ketone (2-Butanone)	NA	NA	NA	6.00E-01	6.00E-01	5.00E+00	V	2.96E-02	2.43E-06	Y	1.27E-06	1.37E-06	3.37E-05	4.53E-07	4.91E-07	1.20E-05	4.74E+05	4.37E+05	1.48E+05	8.97E+04	NA	NA	NA	NA	**89,688.35**	**NC**
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	6.00E-03	6.00E-03	4.00E-02	V	4.11E-02	1.23E-04	Y	1.27E-06	6.97E-05	4.69E-05	4.53E-07	2.49E-05	1.67E-05	4.74E+03	8.61E+01	8.53E+02	7.69E+01	1.05E+04	1.91E+02	2.30E+03	1.74E+02	**76.94**	**NC**
Toluene	NA	NA	NA	8.00E-02	8.00E-02	5.00E+00	V	5.47E-02	7.97E-05	Y	1.27E-06	4.50E-05	6.25E-05	4.53E-07	1.61E-05	2.23E-05	6.31E+04	1.78E+03	8.00E+04	1.69E+03	NA	NA	NA	NA	**1,691.39**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	4.60E-02	3.60E-05	Y	1.27E-06	2.04E-05	5.25E-05	4.53E-07	7.27E-06	1.88E-05	3.95E+02	2.46E+01	3.81E+01	1.44E+01	4.80E+02	2.99E+01	1.30E+02	2.31E+01	**14.39**	**NC**
Vinyl chloride	7.20E-01	7.20E-01	4.40E-06	3.00E-03	3.00E-03	1.00E-01	V	6.69E-02	2.04E-05	Y	1.27E-06	1.15E-05	7.64E-05	4.53E-07	4.11E-06	2.73E-05	2.37E+03	2.60E+02	1.31E+03	1.99E+02	3.07E+01	3.38E+00	8.33E+01	2.93E+00	**2.93**	**C**
Xylenes, total	NA	NA	NA	2.00E-01	2.00E-01	1.00E-01	V	5.09E-02	1.33E-04	Y	1.27E-06	7.50E-05	5.81E-05	4.53E-07	2.68E-05	2.07E-05	1.58E+05	2.67E+03	1.72E+03	1.04E+03	NA	NA	NA	NA	**1,039.05**	**NC**

RECEPTOR: **On-Site Redevelopment Worker** 2

General		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	1
ADAF	Age-dependent adjustment factor (mutagens)	1
Ingestion		
IR	Ingestion Rate (L-H2O/day):	0.0074
EF	Exposure Frequency (days/year)	5
ED	Exposure Duration (years)	1
	Intake Factor (carc L/Kg-day)	**1.81E-08**
	Intake Factor (noncarc L/Kg-day)	**1.27E-06**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	3300
EV	Event Frequency (events/day)	1
t_{event}	Event Duration (hours/event)	2
EF	Exposure Frequency (days/year):	5
ED	Exposure Duration (years):	1
CF	Conversion Factor (L/cm^3)	1.00E-03
	Intake Factor (carc L-hr/Kg-day-cm)	**1.61E-05**
	Intake Factor (non-carc L-hr/Kg-day-cm)	**1.13E-03**
Inhalation of Volatiles in Ambient Air		
ET	Exposure Time (hours/day):	2
EF	Exposure Frequency (days/year)	5
ED	Exposure Duration (years)	1
	Intake Factor (carc, unitless)	**1.63E-05**
	Intake Factor (noncarc, unitless)	**1.14E-03**
Inhalation of Volatiles in Indoor Air		
ET	Exposure Time (hours/day):	NA
EF	Exposure Frequency (days/year)	NA
ED	Exposure Duration (years)	NA
	Intake Factor (carc, unitless)	**NA**
	Intake Factor (noncarc, unitless)	**NA**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	2

Y = Derm IF/Oral IF >= 0.1

N = Derm IF/Oral IF < 0.1

THQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor $(mg/kg/day)^{-1}$	Cancer Slope Factor $(mg/kg/day)^{-1}$	Unit Risk $(ug/m^3)^{-1}$	Reference Dose (mg/kg/day)	Reference Dose (mg/kg/day)	Reference Concentration (mg/m^3)	VOLATILE	*Ambient Air Only* CW Trench VF	DA_{event}	Chemical to be Assessed Dermally?	NON CANCER INTAKES			CANCER INTAKES			Risk-Based Remedial Goals: Noncancer Effects				Risk-Based Remedial Goals: Cancer Effects				Minimum RBRG (mg/L)	
	(Oral)	(Dermal)	(Inhalation)	(Oral)	(Dermal)	(Inhalation)	V = Volatile N = Non volatile	L/m^3	mg/cm^2-event		Ingestion Groundwater Intake (L/kg-day)	DAD (dermal absorbed dose) (mg/kg-day)	Ambient Air Inhalation Groundwater Intake (L/m^3)	Ingestion Groundwater Intake (L/Kg-day)	DAD (dermal absorbed dose) (mg/kg-day)	Ambient Air Inhalation Groundwater Intake (L/m^3)	Ingestion (mg/L)	Dermal (mg/L)	Ambient Air Inhalation (mg/L)	Combined (mg/L)	Ingestion (mg/L)	Dermal (mg/L)	Ambient Air Inhalation (mg/L)	Combined (mg/L)		
1,1-Dichloroethane	5.70E-03	5.70E-03	1.60E-06	2.00E+00	2.00E+00	NA	V	5.28E-02	1.84E-05	Y	1.27E-06	1.04E-05	6.02E-05	1.81E-08	1.48E-07	8.60E-07	1.58E+06	1.93E+05	NA	1.72E+05	9.69E+04	1.18E+04	7.27E+03	4.30E+03	**4,300.80**	**C**
1,1-Dichloroethene	NA	NA	NA	9.00E-03	9.00E-03	7.93E-02	V	5.37E-02	3.14E-05	Y	1.27E-06	1.77E-05	6.13E-05	1.81E-08	2.53E-07	8.76E-07	7.10E+03	5.08E+02	1.29E+03	3.47E+02	NA	NA	NA	NA	**346.71**	**NC**
cis-1,2-Dichloroethene	NA	NA	NA	2.00E-02	2.00E-02	NA	V	5.31E-02	2.95E-05	Y	1.27E-06	1.67E-05	6.06E-05	1.81E-08	2.38E-07	8.66E-07	1.58E+04	1.20E+03	NA	1.11E+03	NA	NA	NA	NA	**1,113.94**	**NC**
1,1,1-Trichloroethane	NA	NA	NA	7.00E+00	7.00E+00	5.00E+00	V	4.58E-02	3.95E-05	Y	1.27E-06	2.23E-05	5.22E-05	1.81E-08	3.19E-07	7.46E-07	5.52E+06	3.14E+05	9.57E+04	7.24E+04	NA	NA	NA	NA	**72,375.49**	**NC**
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	7.00E-02	V	4.79E-02	2.39E-04	Y	1.27E-06	1.35E-04	5.47E-05	1.81E-08	1.93E-06	7.82E-07	NA	NA	1.28E+03	1.28E+03	NA	NA	NA	NA	**1,279.55**	**NC**
Acetone	NA	NA	NA	2.00E+00	2.00E+00	3.09E+01	V	2.61E-02	1.25E-06	Y	1.27E-06	7.07E-07	2.98E-05	1.81E-08	1.01E-08	4.26E-07	1.58E+06	2.83E+06	1.04E+06	5.12E+05	NA	NA	NA	NA	**512,143.80**	**NC**
Ethylbenzene	1.10E-02	1.10E-02	2.50E-06	5.00E-02	5.00E-02	9.00E+00	V	5.11E-02	1.31E-04	Y	1.27E-06	7.40E-05	5.83E-05	1.81E-08	1.06E-06	8.33E-07	3.95E+04	6.75E+02	1.54E+05	6.61E+02	5.02E+04	8.60E+02	4.80E+03	7.19E+02	**661.24**	**NC**
Methyl ethyl ketone (2-Butanone)	NA	NA	NA	2.00E+00	2.00E+00	1.00E+00	V	2.96E-02	2.43E-06	Y	1.27E-06	1.37E-06	3.37E-05	1.81E-08	1.96E-08	4.82E-07	1.58E+06	1.46E+06	2.96E+04	2.85E+04	NA	NA	NA	NA	**28,525.27**	**NC**
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	1.00E-01	1.00E-01	4.00E-02	V	4.11E-02	1.23E-04	Y	1.27E-06	6.97E-05	4.69E-05	1.81E-08	9.96E-07	6.70E-07	7.89E+04	1.44E+03	8.53E+02	5.32E+02	2.63E+05	4.78E+03	5.74E+04	4.34E+03	**531.57**	**NC**
Toluene	NA	NA	NA	8.00E-01	8.00E-01	5.00E+00	V	5.47E-02	7.97E-05	Y	1.27E-06	4.50E-05	6.25E-05	1.81E-08	6.43E-07	8.93E-07	6.31E+05	1.78E+04	8.00E+04	1.42E+04	NA	NA	NA	NA	**14,210.01**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	4.60E-02	3.60E-05	Y	1.27E-06	2.04E-05	5.25E-05	1.81E-08	2.91E-07	7.50E-07	3.95E+02	2.46E+01	3.81E+01	1.44E+01	1.20E+04	7.48E+02	3.25E+03	5.78E+02	**14.39**	**NC**
Vinyl chloride	7.20E-01	7.20E-01	4.40E-06	3.00E-03	3.00E-03	7.67E-02	V	6.69E-02	2.04E-05	Y	1.27E-06	1.15E-05	7.64E-05	1.81E-08	1.65E-07	1.09E-06	2.37E+03	2.60E+02	1.00E+03	1.90E+02	7.67E+02	8.44E+01	2.08E+03	7.33E+01	**73.34**	**C**
Xylenes, total	NA	NA	NA	4.00E-01	4.00E-01	4.00E-01	V	5.09E-02	1.33E-04	Y	1.27E-06	7.50E-05	5.81E-05	1.81E-08	1.07E-06	8.30E-07	3.16E+05	5.33E+03	6.89E+03	2.98E+03	NA	NA	NA	NA	**2,976.45**	**NC**

RECEPTOR: **Off-Site Environmental Worker** 2

General		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	25
ADAF	Age-dependent adjustment factor (mutagens)	1
Ingestion		
IR	Ingestion Rate (L-H2O/day):	0.00074
EF	Exposure Frequency (days/year)	36
ED	Exposure Duration (years)	25
	Intake Factor (carc L/Kg-day)	**3.26E-07**
	Intake Factor (noncarc L/Kg-day)	**9.12E-07**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	990
EV	Event Frequency (events/day)	1
t_{event}	Event Duration (hours/event)	0.5
EF	Exposure Frequency (days/year):	36
ED	Exposure Duration (years):	25
CF	Conversion Factor (L/cm^3)	1.00E-03
	Intake Factor (carc L-hr/Kg-day-cm)	**2.18E-04**
	Intake Factor (non-carc L-hr/Kg-day-cm)	**6.10E-04**
Inhalation of Volatiles in Ambient Air		
ET	Exposure Time (hours/day):	NA
EF	Exposure Frequency (days/year)	9
ED	Exposure Duration (years)	25
	Intake Factor (carc, unitless)	**NA**
	Intake Factor (noncarc, unitless)	**NA**
Inhalation of Volatiles in Indoor Air		
ET	Exposure Time (hours/day):	NA
EF	Exposure Frequency (days/year)	NA
ED	Exposure Duration (years)	NA
	Intake Factor (carc, unitless)	**NA**
	Intake Factor (noncarc, unitless)	**NA**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	1

Y = Derm IF/Oral IF >= 0.1

N = Derm IF/Oral IF < 0.1

Ambient Air Only

THQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor $(mg/kg/day)^{-1}$	Cancer Slope Factor $(mg/kg/day)^{-1}$	Unit Risk $(ug/m^3)^{-1}$	Reference Dose (mg/kg/day)	Reference Dose (mg/kg/day)	Reference Concentration (mg/m^3)	VOLATILE	CW Trench VF	DA_{event}	Chemical to be Assessed Dermally?	NON CANCER INTAKES			CANCER INTAKES			Risk-Based Remedial Goals: Noncancer Effects				Risk-Based Remedial Goals: Cancer Effects				Minimum RBRG (mg/L)	
	(Oral)	(Dermal)	(Inhalation)	(Oral)	(Dermal)	(Inhalation)	V = Volatile N = Non volatile	L/m^3	mg/cm^2-event		Ingestion Groundwater Intake (L/kg-day)	DAD (dermal absorbed dose) (mg/kg-day)	Ambient Air Inhalation Groundwater Intake (L/m^3)	Ingestion Groundwater Intake (L/Kg-day)	DAD (dermal absorbed dose) (mg/kg-day)	Ambient Air Inhalation Groundwater Intake (L/m^3)	Ingestion (mg/L)	Dermal (mg/L)	Ambient Air Inhalation (mg/L)	Combined (mg/L)	Ingestion (mg/L)	Dermal (mg/L)	Ambient Air Inhalation (mg/L)	Combined (mg/L)		
1,1-Dichloroethane	5.70E-03	5.70E-03	1.60E-06	2.00E-01	2.00E-01	NA	V	5.28E-02	8.10E-06	Y	9.12E-07	9.88E-06	NA	3.26E-07	3.53E-06	NA	2.19E+05	2.02E+04	NA	1.85E+04	5.38E+03	4.97E+02	NA	4.55E+02	**455.04**	**C**
1,1-Dichloroethene	NA	NA	NA	5.00E-02	5.00E-02	2.00E-01	V	5.37E-02	1.39E-05	Y	9.12E-07	1.69E-05	NA	3.26E-07	6.04E-06	NA	5.48E+04	2.96E+03	NA	2.81E+03	NA	NA	NA	NA	**2,805.59**	**NC**
cis-1,2-Dichloroethene	NA	NA	NA	2.00E-03	2.00E-03	NA	V	5.31E-02	1.30E-05	Y	9.12E-07	1.59E-05	NA	3.26E-07	5.68E-06	NA	2.19E+03	1.26E+02	NA	1.19E+02	NA	NA	NA	NA	**118.98**	**NC**
1,1,1-Trichloroethane	NA	NA	NA	2.00E+00	2.00E+00	5.00E+00	V	4.58E-02	1.89E-05	Y	9.12E-07	2.30E-05	NA	3.26E-07	8.23E-06	NA	2.19E+06	8.68E+04	NA	8.35E+04	NA	NA	NA	NA	**83,511.96**	**NC**
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	7.00E-03	V	4.79E-02	1.18E-04	Y	9.12E-07	1.44E-04	NA	3.26E-07	5.14E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**	
Acetone	NA	NA	NA	9.00E-01	9.00E-01	3.10E+01	V	2.61E-02	4.72E-07	Y	9.12E-07	5.76E-07	NA	3.26E-07	2.06E-07	NA	9.86E+05	1.56E+06	NA	6.05E+05	NA	NA	NA	NA	**604,721.70**	**NC**
Ethylbenzene	1.10E-02	1.10E-02	2.50E-06	1.00E-01	1.00E-01	1.00E+00	V	5.11E-02	6.20E-05	Y	9.12E-07	7.56E-05	NA	3.26E-07	2.70E-05	NA	1.10E+05	1.32E+03	NA	1.31E+03	2.79E+03	3.37E+01	NA	3.33E+01	**33.26**	**C**
Methyl ethyl ketone (2-Butanone)	NA	NA	NA	6.00E-01	6.00E-01	5.00E+00	V	2.96E-02	9.71E-07	Y	9.12E-07	1.18E-06	NA	3.26E-07	4.23E-07	NA	6.58E+05	5.06E+05	NA	2.86E+05	NA	NA	NA	NA	**286,132.51**	**NC**
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	6.00E-03	6.00E-03	4.00E-02	V	4.11E-02	6.17E-05	Y	9.12E-07	7.53E-05	NA	3.26E-07	2.69E-05	NA	6.58E+03	7.97E+01	NA	7.88E+01	1.46E+04	1.77E+02	NA	1.75E+02	**78.77**	**NC**
Toluene	NA	NA	NA	8.00E-02	8.00E-02	5.00E+00	V	5.47E-02	3.57E-05	Y	9.12E-07	4.36E-05	NA	3.26E-07	1.56E-05	NA	8.77E+04	1.84E+03	NA	1.80E+03	NA	NA	NA	NA	**1,798.20**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	4.60E-02	1.72E-05	Y	9.12E-07	2.09E-05	NA	3.26E-07	7.48E-06	NA	5.48E+02	2.39E+01	NA	2.29E+01	6.67E+02	2.91E+01	NA	2.79E+01	**22.89**	**NC**
Vinyl chloride	7.20E-01	7.20E-01	4.40E-06	3.00E-03	3.00E-03	1.00E-01	V	6.69E-02	7.95E-06	Y	9.12E-07	9.70E-06	NA	3.26E-07	3.46E-06	NA	3.29E+03	3.09E+02	NA	2.83E+02	4.26E+01	4.01E+00	NA	3.66E+00	**3.66**	**C**
Xylenes, total	NA	NA	NA	2.00E-01	2.00E-01	1.00E-01	V	5.09E-02	6.28E-05	Y	9.12E-07	7.67E-05	NA	3.26E-07	2.74E-05	NA	2.19E+05	2.61E+03	NA	2.58E+03	NA	NA	NA	NA	**2,577.23**	**NC**

RECEPTOR: **Off-Site One Time Construction Worker** 2

General		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	1
ADAF	Age-dependent adjustment factor (mutagens)	1
Ingestion		
IR	Ingestion Rate (L-H2O/day):	0.0074
EF	Exposure Frequency (days/year)	5
ED	Exposure Duration (years)	1
	Intake Factor (carc L/Kg-day)	**1.81E-08**
	Intake Factor (noncarc L/Kg-day)	**1.27E-06**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	3300
EV	Event Frequency (events/day)	1
t_{event}	Event Duration (hours/event)	2
EF	Exposure Frequency (days/year):	5
ED	Exposure Duration (years):	1
CF	Conversion Factor (L/cm^3)	1.00E-03
	Intake Factor (carc L-hr/Kg-day-cm)	**1.61E-05**
	Intake Factor (non-carc L-hr/Kg-day-cm)	**1.13E-03**
Inhalation of Volatiles in Ambient Air		
ET	Exposure Time (hours/day):	2
EF	Exposure Frequency (days/year)	5
ED	Exposure Duration (years)	1
	Intake Factor (carc, unitless)	**1.63E-05**
	Intake Factor (noncarc, unitless)	**1.14E-03**
Inhalation of Volatiles in Indoor Air		
ET	Exposure Time (hours/day):	NA
EF	Exposure Frequency (days/year)	NA
ED	Exposure Duration (years)	NA
	Intake Factor (carc, unitless)	**NA**
	Intake Factor (noncarc, unitless)	**NA**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	2

Y = Derm IF/Oral IF >= 0.1

N = Derm IF/Oral IF < 0.1

THQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor $(mg/kg/day)^{-1}$ (Oral)	Cancer Slope Factor $(mg/kg/day)^{-1}$ (Dermal)	Unit Risk $(ug/m^3)^{-1}$ (Inhalation)	Reference Dose (mg/kg/day) (Oral)	Reference Dose (mg/kg/day) (Dermal)	Reference Concentration (mg/m^3) (Inhalation)	VOLATILE V = Volatile N = Non volatile	*Ambient Air Only* CW Trench VF L/m^3	DA_{event} mg/cm^2-event	Chemical to be Assessed Dermally?	NON CANCER INTAKES Ingestion Groundwater Intake (L/kg-day)	NON CANCER INTAKES DAD (dermal absorbed dose) (mg/kg-day)	NON CANCER INTAKES Ambient Air Inhalation Groundwater Intake (L/m^3)	CANCER INTAKES Ingestion Groundwater Intake (L/Kg-day)	CANCER INTAKES DAD (dermal absorbed dose) (mg/kg-day)	CANCER INTAKES Ambient Air Inhalation Groundwater Intake (L/m^3)	Risk-Based Remedial Goals: Noncancer Effects Ingestion (mg/L)	Risk-Based Remedial Goals: Noncancer Effects Dermal (mg/L)	Risk-Based Remedial Goals: Noncancer Effects Ambient Air Inhalation (mg/L)	Risk-Based Remedial Goals: Noncancer Effects Combined (mg/L)	Risk-Based Remedial Goals: Cancer Effects Ingestion (mg/L)	Risk-Based Remedial Goals: Cancer Effects Dermal (mg/L)	Risk-Based Remedial Goals: Cancer Effects Ambient Air Inhalation (mg/L)	Risk-Based Remedial Goals: Cancer Effects Combined (mg/L)	Minimum RBRG (mg/L)	
1,1-Dichloroethane	5.70E-03	5.70E-03	1.60E-06	2.00E+00	2.00E+00	NA	V	5.28E-02	1.84E-05	Y	1.27E-06	1.04E-05	6.02E-05	1.81E-08	1.48E-07	8.60E-07	1.58E+06	1.93E+05	NA	1.72E+05	9.69E+04	1.18E+04	7.27E+03	4.30E+03	**4,300.80**	**C**
1,1-Dichloroethene	NA	NA	NA	9.00E-03	9.00E-03	7.93E-02	V	5.37E-02	3.14E-05	Y	1.27E-06	1.77E-05	6.13E-05	1.81E-08	2.53E-07	8.76E-07	7.10E+03	5.08E+02	1.29E+03	3.47E+02	NA	NA	NA	NA	**346.71**	**NC**
cis-1,2-Dichloroethene	NA	NA	NA	2.00E-02	2.00E-02	NA	V	5.31E-02	2.95E-05	Y	1.27E-06	1.67E-05	6.06E-05	1.81E-08	2.38E-07	8.66E-07	1.58E+04	1.20E+03	NA	1.11E+03	NA	NA	NA	NA	**1,113.94**	**NC**
1,1,1-Trichloroethane	NA	NA	NA	7.00E+00	7.00E+00	5.00E+00	V	4.58E-02	3.95E-05	Y	1.27E-06	2.23E-05	5.22E-05	1.81E-08	3.19E-07	7.46E-07	5.52E+06	3.14E+05	9.57E+04	7.24E+04	NA	NA	NA	NA	**72,375.49**	**NC**
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	7.00E-02	V	4.79E-02	2.39E-04	Y	1.27E-06	1.35E-04	5.47E-05	1.81E-08	1.93E-06	7.82E-07	NA	NA	1.28E+03	1.28E+03	NA	NA	NA	NA	**1,279.55**	**NC**
Acetone	NA	NA	NA	2.00E+00	2.00E+00	3.09E+01	V	2.61E-02	1.25E-06	Y	1.27E-06	7.07E-07	2.98E-05	1.81E-08	1.01E-08	4.26E-07	1.58E+06	2.83E+06	1.04E+06	5.12E+05	NA	NA	NA	NA	**512,143.80**	**NC**
Ethylbenzene	1.10E-02	1.10E-02	2.50E-06	5.00E-02	5.00E-02	9.00E+00	V	5.11E-02	1.31E-04	Y	1.27E-06	7.40E-05	5.83E-05	1.81E-08	1.06E-06	8.33E-07	3.95E+04	6.75E+02	1.54E+05	6.61E+02	5.02E+04	8.60E+02	4.80E+03	7.19E+02	**661.24**	**NC**
Methyl ethyl ketone (2-Butanone)	NA	NA	NA	2.00E+00	2.00E+00	1.00E+00	V	2.96E-02	2.43E-06	Y	1.27E-06	1.37E-06	3.37E-05	1.81E-08	1.96E-08	4.82E-07	1.58E+06	1.46E+06	2.96E+04	2.85E+04	NA	NA	NA	NA	**28,525.27**	**NC**
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	1.00E-01	1.00E-01	4.00E-02	V	4.11E-02	1.23E-04	Y	1.27E-06	6.97E-05	4.69E-05	1.81E-08	9.96E-07	6.70E-07	7.89E+04	1.44E+03	8.53E+02	5.32E+02	2.63E+05	4.78E+03	5.74E+04	4.34E+03	**531.57**	**NC**
Toluene	NA	NA	NA	8.00E-01	8.00E-01	5.00E+00	V	5.47E-02	7.97E-05	Y	1.27E-06	4.50E-05	6.25E-05	1.81E-08	6.43E-07	8.93E-07	6.31E+05	1.78E+04	8.00E+04	1.42E+04	NA	NA	NA	NA	**14,210.01**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	4.60E-02	3.60E-05	Y	1.27E-06	2.04E-05	5.25E-05	1.81E-08	2.91E-07	7.50E-07	3.95E+02	2.46E+01	3.81E+01	1.44E+01	1.20E+04	7.48E+02	3.25E+03	5.78E+02	**14.39**	**NC**
Vinyl chloride	7.20E-01	7.20E-01	4.40E-06	3.00E-03	3.00E-03	7.67E-02	V	6.69E-02	2.04E-05	Y	1.27E-06	1.15E-05	7.64E-05	1.81E-08	1.65E-07	1.09E-06	2.37E+03	2.60E+02	1.00E+03	1.90E+02	7.67E+02	8.44E+01	2.08E+03	7.33E+01	**73.34**	**C**
Xylenes, total	NA	NA	NA	4.00E-01	4.00E-01	4.00E-01	V	5.09E-02	1.33E-04	Y	1.27E-06	7.50E-05	5.81E-05	1.81E-08	1.07E-06	8.30E-07	3.16E+05	5.33E+03	6.89E+03	2.98E+03	NA	NA	NA	NA	**2,976.45**	**NC**

RECEPTOR: **Off-Site Occassional Exc Maint Worker** 2

General		
BW	Mean Body Weight (Kg):	80
AT	Averaging time (years):	
	Carcinogenic	70
	Noncarcinogenic	
	Days/year	365
	Years	25
ADAF	Age-dependent adjustment factor (mutagens)	1
Ingestion		
IR	Ingestion Rate (L-H2O/day):	0.0074
EF	Exposure Frequency (days/year)	5
ED	Exposure Duration (years)	25
	Intake Factor (carc L/Kg-day)	**4.53E-07**
	Intake Factor (noncarc L/Kg-day)	**1.27E-06**
Dermal Contact		
BSAE	Body Surface Area Exposed (cm^2):	3300
EV	Event Frequency (events/day)	1
t_{event}	Event Duration (hours/event)	2
EF	Exposure Frequency (days/year):	5
ED	Exposure Duration (years):	25
CF	Conversion Factor (L/cm^3)	1.00E-03
	Intake Factor (carc L-hr/Kg-day-cm)	**4.04E-04**
	Intake Factor (non-carc L-hr/Kg-day-cm)	**1.13E-03**
Inhalation of Volatiles in Ambient Air		
ET	Exposure Time (hours/day):	2
EF	Exposure Frequency (days/year)	5
ED	Exposure Duration (years)	25
	Intake Factor (carc, unitless)	**4.08E-04**
	Intake Factor (noncarc, unitless)	**1.14E-03**
Inhalation of Volatiles in Indoor Air		
ET	Exposure Time (hours/day):	NA
EF	Exposure Frequency (days/year)	NA
ED	Exposure Duration (years)	NA
	Intake Factor (carc, unitless)	**NA**
	Intake Factor (noncarc, unitless)	**NA**
Toxicity Value Source		
TV	Enter 1 for chronic; 2 for subchronic toxicity values	1

Y = Derm IF/Oral IF >= 0.1

N = Derm IF/Oral IF < 0.1

THQ = **1** **TRL =** **1.00E-05**

COPC	Cancer Slope Factor $(mg/kg/day)^{-1}$	Cancer Slope Factor $(mg/kg/day)^{-1}$	Unit Risk $(ug/m^3)^{-1}$	Reference Dose (mg/kg/day)	Reference Dose (mg/kg/day)	Reference Concentration (mg/m^3)	VOLATILE	*Ambient Air Only* CW Trench VF	DA_{event}	Chemical to be Assessed Dermally?	NON CANCER INTAKES			CANCER INTAKES			Risk-Based Remedial Goals: Noncancer Effects				Risk-Based Remedial Goals: Cancer Effects				Minimum RBRG (mg/L)	
	(Oral)	(Dermal)	(Inhalation)	(Oral)	(Dermal)	(Inhalation)	V = Volatile N = Non volatile	L/m^3	mg/cm^2-event		Ingestion Groundwater Intake (L/kg-day)	DAD (dermal absorbed dose) (mg/kg-day)	Ambient Air Inhalation Groundwater Intake (L/m^3)	Ingestion Groundwater Intake (L/Kg-day)	DAD (dermal absorbed dose) (mg/kg-day)	Ambient Air Inhalation Groundwater Intake (L/m^3)	Ingestion (mg/L)	Dermal (mg/L)	Ambient Air Inhalation (mg/L)	Combined (mg/L)	Ingestion (mg/L)	Dermal (mg/L)	Ambient Air Inhalation (mg/L)	Combined (mg/L)		
1,1-Dichloroethane	5.70E-03	5.70E-03	1.60E-06	2.00E-01	2.00E-01	NA	V	5.28E-02	1.84E-05	Y	1.27E-06	1.04E-05	6.02E-05	4.53E-07	3.71E-06	2.15E-05	1.58E+05	1.93E+04	NA	1.72E+04	3.88E+03	4.73E+02	2.91E+02	1.72E+02	**172.03**	**C**
1,1-Dichloroethene	NA	NA	NA	5.00E-02	5.00E-02	2.00E-01	V	5.37E-02	3.14E-05	Y	1.27E-06	1.77E-05	6.13E-05	4.53E-07	6.33E-06	2.19E-05	3.95E+04	2.82E+03	3.26E+03	1.46E+03	NA	NA	NA	NA	**1,456.36**	**NC**
cis-1,2-Dichloroethene	NA	NA	NA	2.00E-03	2.00E-03	NA	V	5.31E-02	2.95E-05	Y	1.27E-06	1.67E-05	6.06E-05	4.53E-07	5.96E-06	2.16E-05	1.58E+03	1.20E+02	NA	1.11E+02	NA	NA	NA	NA	**111.39**	**NC**
1,1,1-Trichloroethane	NA	NA	NA	2.00E+00	2.00E+00	5.00E+00	V	4.58E-02	3.95E-05	Y	1.27E-06	2.23E-05	5.22E-05	4.53E-07	7.97E-06	1.87E-05	1.58E+06	8.96E+04	9.57E+04	4.50E+04	NA	NA	NA	NA	**44,964.98**	**NC**
1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA	7.00E-03	V	4.79E-02	2.39E-04	Y	1.27E-06	1.35E-04	5.47E-05	4.53E-07	4.83E-05	1.95E-05	NA	NA	1.28E+02	1.28E+02	NA	NA	NA	NA	**127.96**	**NC**
Acetone	NA	NA	NA	9.00E-01	9.00E-01	3.10E+01	V	2.61E-02	1.25E-06	Y	1.27E-06	7.07E-07	2.98E-05	4.53E-07	2.52E-07	1.07E-05	7.10E+05	1.27E+06	1.04E+06	3.17E+05	NA	NA	NA	NA	**316,892.29**	**NC**
Ethylbenzene	1.10E-02	1.10E-02	2.50E-06	1.00E-01	1.00E-01	1.00E+00	V	5.11E-02	1.31E-04	Y	1.27E-06	7.40E-05	5.83E-05	4.53E-07	2.64E-05	2.08E-05	7.89E+04	1.35E+03	1.71E+04	1.23E+03	2.01E+03	3.44E+01	1.92E+02	2.87E+01	**28.75**	**C**
Methyl ethyl ketone (2-Butanone)	NA	NA	NA	6.00E-01	6.00E-01	5.00E+00	V	2.96E-02	2.43E-06	Y	1.27E-06	1.37E-06	3.37E-05	4.53E-07	4.91E-07	1.20E-05	4.74E+05	4.37E+05	1.48E+05	8.97E+04	NA	NA	NA	NA	**89,688.35**	**NC**
Tetrachloroethene	2.10E-03	2.10E-03	2.60E-07	6.00E-03	6.00E-03	4.00E-02	V	4.11E-02	1.23E-04	Y	1.27E-06	6.97E-05	4.69E-05	4.53E-07	2.49E-05	1.67E-05	4.74E+03	8.61E+01	8.53E+02	7.69E+01	1.05E+04	1.91E+02	2.30E+03	1.74E+02	**76.94**	**NC**
Toluene	NA	NA	NA	8.00E-02	8.00E-02	5.00E+00	V	5.47E-02	7.97E-05	Y	1.27E-06	4.50E-05	6.25E-05	4.53E-07	1.61E-05	2.23E-05	6.31E+04	1.78E+03	8.00E+04	1.69E+03	NA	NA	NA	NA	**1,691.39**	**NC**
Trichloroethene (total)	4.60E-02	4.60E-02	4.10E-06	5.00E-04	5.00E-04	2.00E-03	V	4.60E-02	3.60E-05	Y	1.27E-06	2.04E-05	5.25E-05	4.53E-07	7.27E-06	1.88E-05	3.95E+02	2.46E+01	3.81E+01	1.44E+01	4.80E+02	2.99E+01	1.30E+02	2.31E+01	**14.39**	**NC**
Vinyl chloride	7.20E-01	7.20E-01	4.40E-06	3.00E-03	3.00E-03	1.00E-01	V	6.69E-02	2.04E-05	Y	1.27E-06	1.15E-05	7.64E-05	4.53E-07	4.11E-06	2.73E-05	2.37E+03	2.60E+02	1.31E+03	1.99E+02	3.07E+01	3.38E+00	8.33E+01	2.93E+00	**2.93**	**C**
Xylenes, total	NA	NA	NA	2.00E-01	2.00E-01	1.00E-01	V	5.09E-02	1.33E-04	Y	1.27E-06	7.50E-05	5.81E-05	4.53E-07	2.68E-05	2.07E-05	1.58E+05	2.67E+03	1.72E+03	1.04E+03	NA	NA	NA	NA	**1,039.05**	**NC**

Appendix Q
Microbial Insights Laboratory Report

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
Web: www.microbe.com

SITE LOGIC Report

QuantArray® (Chlor) Study

Contact: Stacy Metz
Address: TRC Environmental Solutions
1540 Eisenhower Pl.
Ann Arbor, MI 48108

Phone: (734) 971-7080
Email: smetz@trcsolutions.com

MI Identifier: 030ME

Report Date: 06/10/2015

Project: TPC SI, 220003.0000

Comments: Final Report

NOTICE: This report is intended only for the addressee shown above and may contain confidential or privileged information. If the recipient of this material is not the intended recipient or if you have received this in error, please notify Microbial Insights, Inc. immediately. The data and other information in this report represent only the sample(s) analyzed and are rendered upon condition that it is not to be reproduced without approval from Microbial Insights, Inc. Thank you for your cooperation.

The QuantArray® Approach

Quantification of *Dehalococcoides* spp., the only known bacterial group capable of complete reductive dechlorination of PCE and TCE to ethene, has become an indispensable component of assessment, remedy selection, and performance monitoring at sites impacted by chlorinated solvents. While undeniably a key group of halorespiring bacteria, *Dehalococcoides* spp. are not the only bacteria of interest in the subsurface because reductive dechlorination is not the only potential biodegradation pathway operative at contaminated sites, and chlorinated ethenes are not always the primary contaminants of concern. The Chlorinated QuantArray® not only includes a variety of halorespiring bacteria (*Dehalococcoides*, *Dehalobacter*, *Dehalogenimonas*, etc.) to assess the potential for reductive dechlorination of chloroethenes, chloroethanes, chlorobenzenes, chlorophenols, and chloroform, but also provides quantification of functional genes involved in aerobic (co)metabolic pathways for biodegradation of chlorinated solvents and even competing biological processes. Thus, the QuantArray® will give site managers the ability to simultaneously yet economically evaluate the potential for biodegradation of a spectrum of common chlorinated contaminants through a multitude of anaerobic and aerobic (co)metabolic pathways to give a much more clear and comprehensive view of contaminant biodegradation.

The Chlorinated QuantArray® is used to quantify specific microorganisms and functional genes to evaluate the following:

Anaerobic Reductive Dechlorination

- Quantification of important halorespiring bacteria (e.g. *Dehalococcoides*, *Dehalobacter*, *Dehalogenimonas*, *Desulfitobacterium* spp.) and key functional genes (e.g vinyl chloride reductases, TCE reductase, 1,2-DCP reductase) responsible for reductive dechlorination of a broad spectrum of chlorinated solvents.

Aerobic Cometabolism

- Several different types of bacteria including methanotrophs and some toluene/phenol utilizing bacteria can co-oxidize TCE, DCE, and vinyl chloride. The Chlorinated QuantArray® quantifies functional genes like soluble methane monooxygenase encoding enzymes capable of co-oxidation of chlorinated ethenes.

Aerobic (Co)metabolism of Vinyl chloride

- Ethene oxidizing bacteria are capable of cometabolism of vinyl chloride. In some cases, ethenotrophs can also utilize vinyl chloride as a growth supporting substrate. The QuantArray® targets key functional genes in ethene metabolism.

How do QuantArrays® work?

The QuantArray® in many respects is a hybrid technology combining the highly parallel detection of microarrays with the accurate and precise quantification provided by qPCR into a single platform. The key to highly parallel qPCR reactions is the nanoliter fluidics platform for low volume, solution phase qPCR reactions.

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

How are QuantArray® results reported?

One of the primary advantages of the Chlorinated QuantArray® is the simultaneous quantification of a broad spectrum of different microorganisms and key functional genes involved in a variety of pathways for chlorinated hydrocarbon biodegradation. However, highly parallel quantification combined with the various metabolic and cometabolic capabilities of different target organisms can complicate data presentation. Therefore, in addition to Summary Tables, QuantArray® results will be presented as Microbial Population Summary and Comparison Figures to aid in data interpretation and subsequent evaluation of site management activities.

Types of Tables and Figures:

Microbial Population Summary	• Figure presenting the concentrations of QuantArray® target populations (e.g. *Dehalococcoides* spp.) and functional genes (e.g. vinyl chloride reductase) relative to typically observed values.
Summary Tables	• Tables of target population concentrations grouped by biodegradation pathway and contaminant type.
Comparison Figures	• Depending on the project, sample results can be presented to compare changes over time or examine differences in microbial populations for along a transect of the dissolved plume.

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Results

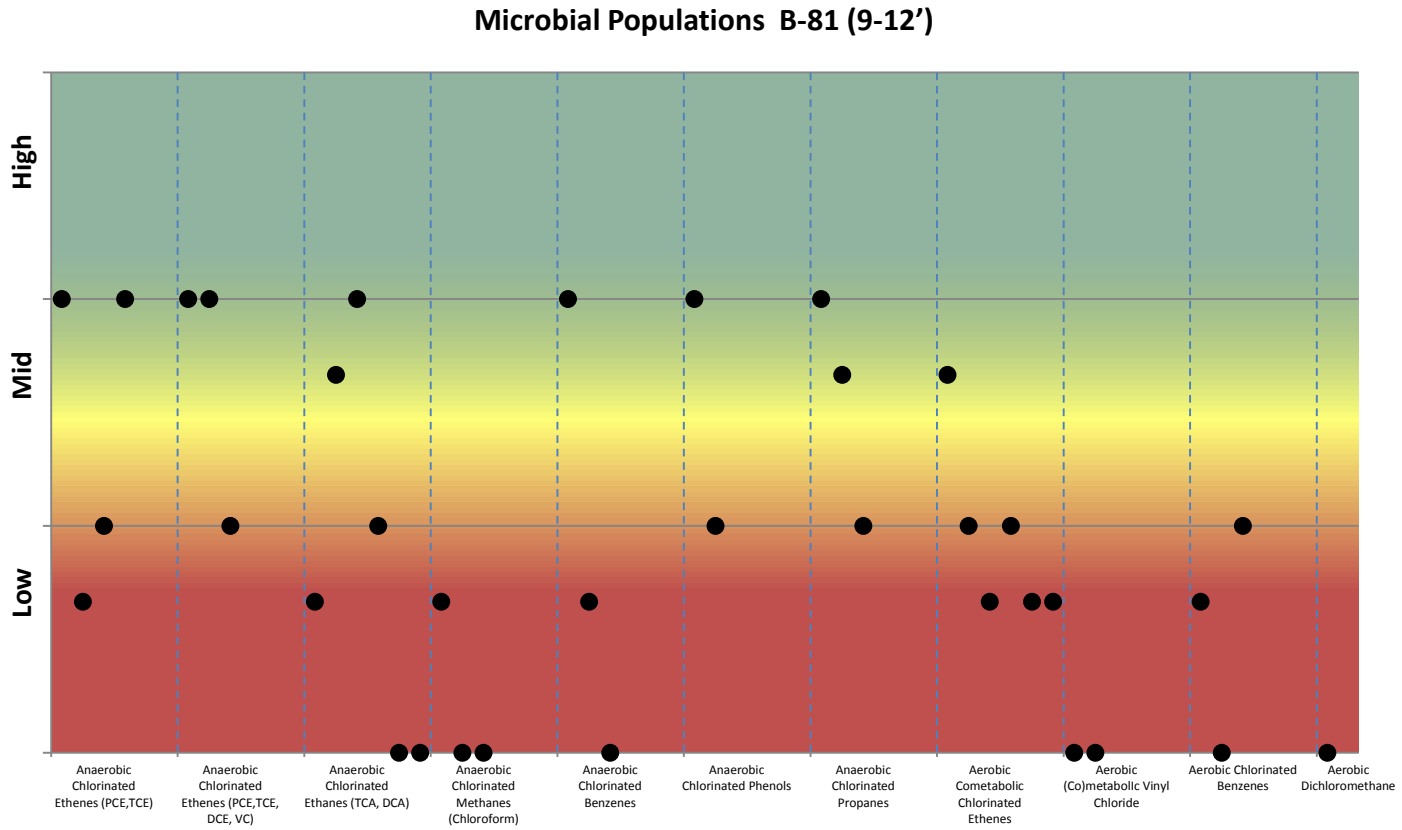
Table 1. Summary of the QuantArray® results obtained for monitoring wells.

Sample Name	B-81 (9-12')	SB-MIP-38 (23-26')	SB-MIP-40 (29.5-32.5')	MIP-48 (9.5-12.5')
Reductive Dechlorination	**(cells/mL)**	**(cells/mL)**	**(cells/mL)**	**(cells/mL)**
Dehalococcoides spp. (DHC)	**4.20E+04**	**8.23E+01**	**2.01E+04**	**3.78E+03**
tceA Reductase (TCE)	<4.00E-01	<3.00E-01	<3.00E-01	<5.00E-01
BAV1 Vinyl Chloride Reductase (BVC)	**1.45E+04**	<3.00E-01	**7.39E+03**	**1.50E+03**
Vinyl Chloride Reductase (VCR)	**4.45E+02**	<3.00E-01	<3.00E-01	<5.00E-01
Dehalobacter spp. (DHBt)	**3.01E+02**	**1.10E+00 (J)**	<3.30E+00	<5.00E+00
Dehalobacter DCM (DCM)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
Dehalogenimonas spp. (DHG)	**3.50E+04**	**1.98E+03**	**3.18E+03**	**2.56E+03**
Desulfitobacterium spp. (DSB)	**1.45E+03**	**6.95E+01**	<3.30E+00	<5.00E+00
Dehalobium chlorocoercia (DECO)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
Desulfuromonas spp. (DSM)	**2.77E+04**	<2.50E+00	<3.30E+00	<5.00E+00
Chloroform reductase (CFR)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
1,1 DCA Reductase (DCA)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
1,2 DCA Reductase (DCAR)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
Aerobic (Co)Metabolic				
Soluble Methane Monooxygenase (SMMO)	**1.44E+04**	**1.28E+02**	**1.21E+03**	**3.05E+02**
Particulate Methane Monooxygenase (PMMO)	**4.48E+03**	**1.16E+01**	**4.20E+00**	**5.40E+01**
Toluene Dioxygenase (TOD)	**3.62E+02**	**7.95E+01**	**1.20E+02**	**2.35E+02**
Phenol Hydroxylase (PHE)	**3.68E+03**	<2.50E+00	**2.15E+01**	**1.38E+02**
Trichlorobenzene Dioxygenase (TCBO)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
Toluene Monooxygenase 2 (RDEG)	**3.42E+02**	<2.50E+00	<3.30E+00	**3.32E+02**
Toluene Monooyxgenase (RMO)	**7.30E+02**	<2.50E+00	<3.30E+00	**3.70E+00 (J)**
Ethene Monooxygenase (EtnC)	<4.00E+00	<2.50E+00	<3.30E+00	**1.13E+01**
Epoxyalkane transferase (EtnE)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
Dichloromethane dehalogenase (DCMA)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
Other (cells/bd)				
Total Eubacteria (EBAC)	**6.41E+05**	**1.62E+05**	**3.43E+05**	**1.06E+05**
Sulfate Reducing Bacteria (APS)	**6.98E+04**	**5.97E+04**	**2.00E+00 (J)**	**3.20E+00 (J)**
Methanogens (MGN)	**1.37E+04**	**3.28E+02**	**9.54E+03**	**1.77E+01**

Legend:
NA = Not Analyzed NS = Not Sampled J = Estimated gene copies below PQL but above LQL I = Inhibited < = Result not detected

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Figure 1. Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

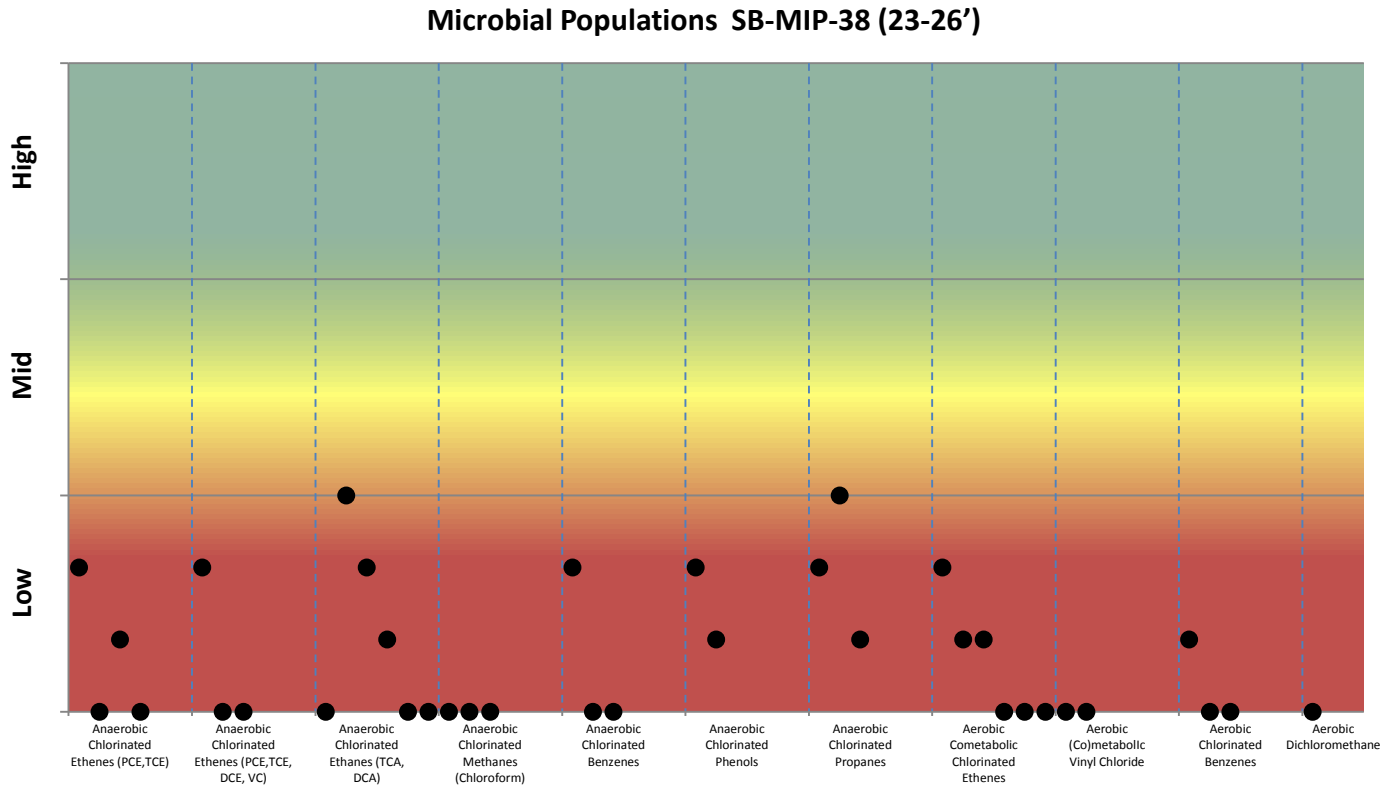


Anaerobic – Reductive Dechlorination or Dichloroelimination		Aerobic – (Co)metabolism	
Chlorinated Ethenes (PCE, TCE)	DHC, DHBt, DSB, DSM	Chlorinated ethenes (TCE, DCE, VC)	sMMO, pMMO, TOD, PHE, RDEG, RMO
Chlorinated Ethenes (PCE, TCE, DCE, VC)	DHC, BVC, VCR	(Co)metabolic vinyl chloride	etnC, etnE
Chlorinated Ethanes (TCA and 1,2-DCA)	DHBt, DHG, DHC, DSB[1], DCA, DCAR	Chlorinated Benzenes	TOD, TCBO, PHE
Chlorinated Methanes (Chloroform)	DHBt, DCM, CFR	Dichloromethane	DCMA
Chlorinated Benzenes	DHC, DHBt[2], DECO		
Chlorinated Phenols	DHC, DSB		
Chlorinated Propanes	DHC, DHG, DSB[1]		

[1] *Desulfitobacterium dichloroeliminans* DCA1. [2] Implicated in reductive dechlorination of dichlorobenzene and potentially chlorobenzene

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Figure 2. Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

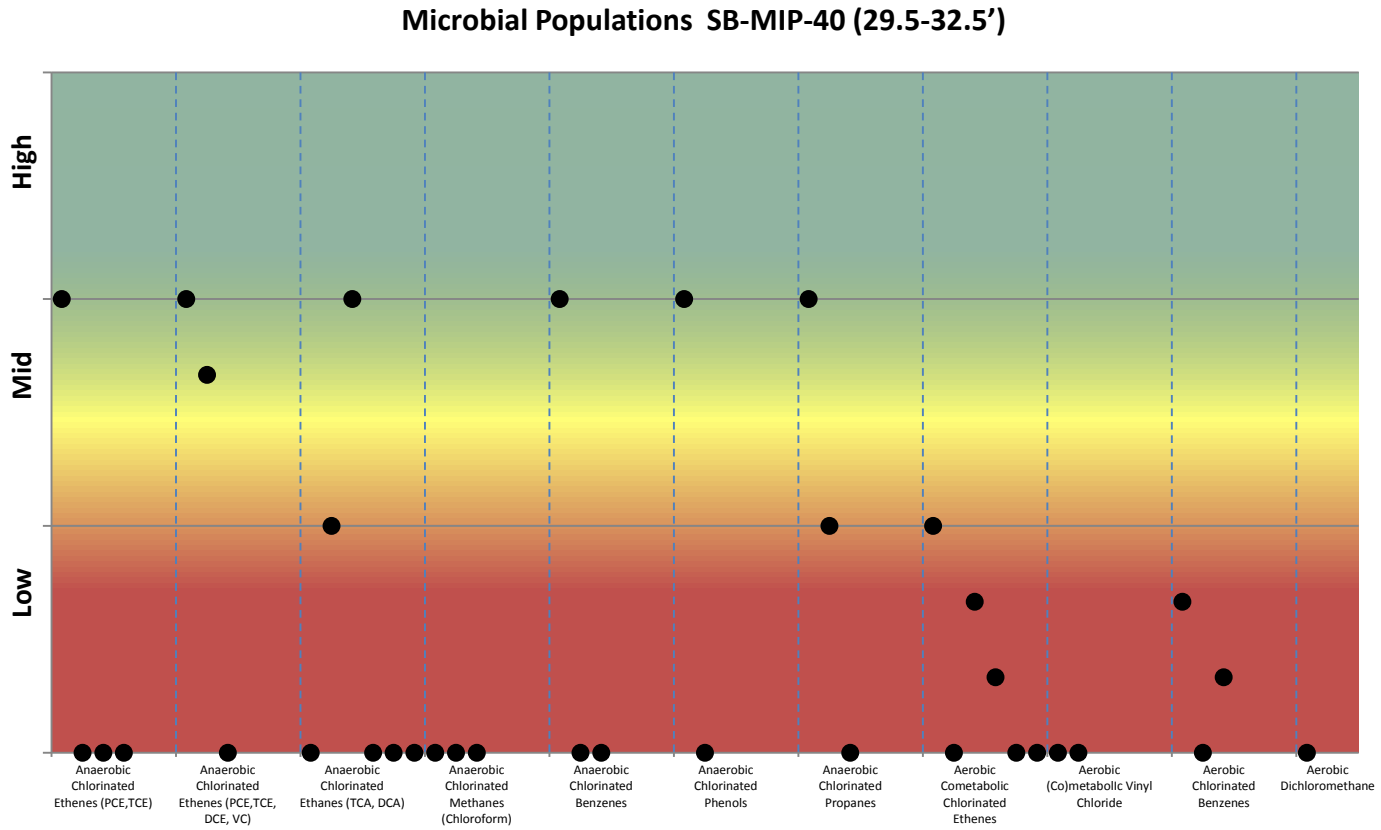


Anaerobic – Reductive Dechlorination or Dichloroelimination		Aerobic – (Co)metabolism	
Chlorinated Ethenes (PCE, TCE)	DHC, DHBt, DSB, DSM	Chlorinated ethenes (TCE, DCE, VC)	sMMO, pMMO, TOD, PHE, RDEG, RMO
Chlorinated Ethenes (PCE, TCE, DCE, VC)	DHC, BVC, VCR	(Co)metabolic vinyl chloride	etnC, etnE
Chlorinated Ethanes (TCA and 1,2-DCA)	DHBt, DHG, DHC, DSB[1], DCA, DCAR	Chlorinated Benzenes	TOD, TCBO, PHE
Chlorinated Methanes (Chloroform)	DHBt, DCM, CFR	Dichloromethane	DCMA
Chlorinated Benzenes	DHC, DHBt[2], DECO		
Chlorinated Phenols	DHC, DSB		
Chlorinated Propanes	DHC, DHG, DSB[1]		

[1] *Desulfitobacterium dichloroeliminans* DCA1. [2] Implicated in reductive dechlorination of dichlorobenzene and potentially chlorobenzene

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Figure 3. Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

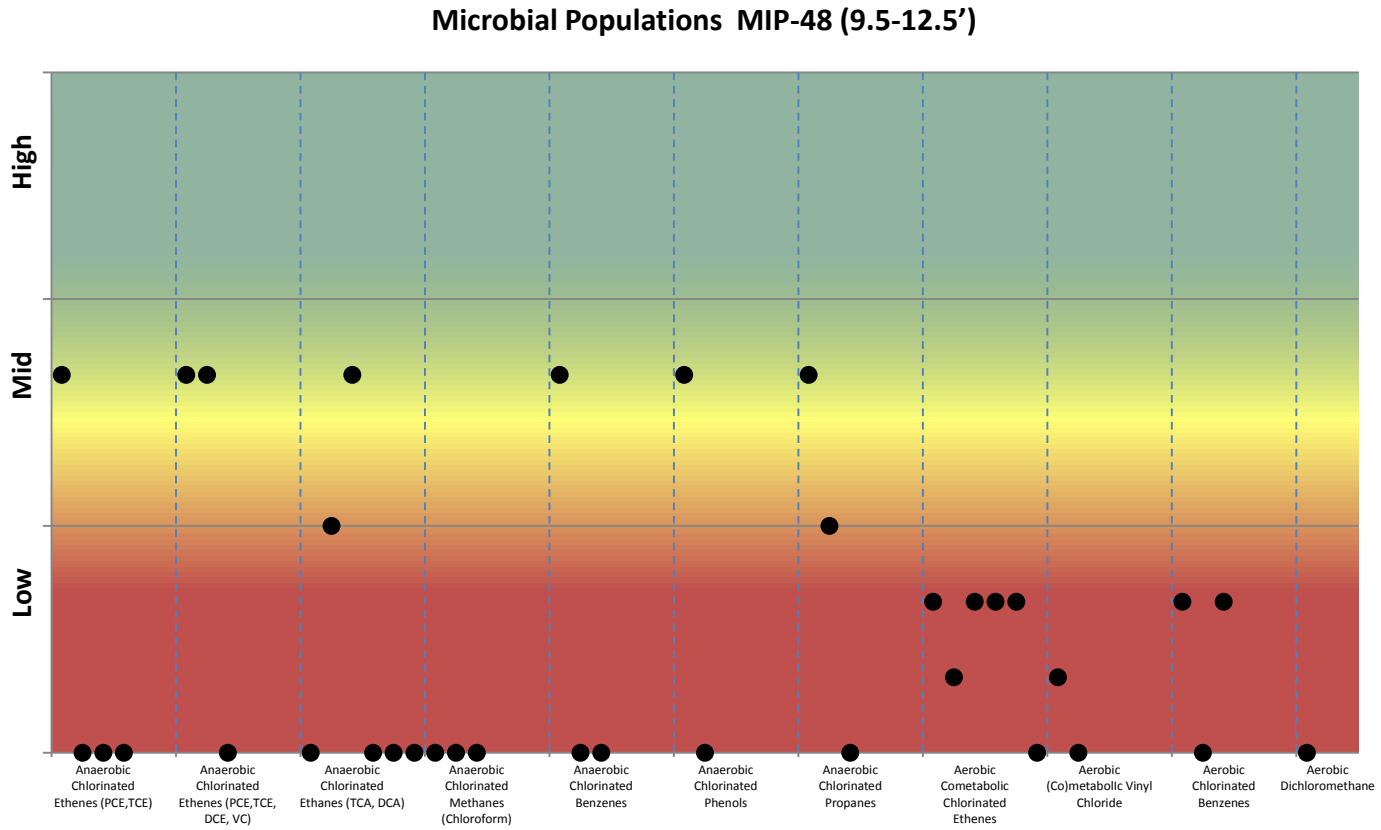


Anaerobic – Reductive Dechlorination or Dichloroelimination		Aerobic – (Co)metabolism	
Chlorinated Ethenes (PCE, TCE)	DHC, DHBt, DSB, DSM	Chlorinated ethenes (TCE, DCE, VC)	sMMO, pMMO, TOD, PHE, RDEG, RMO
Chlorinated Ethenes (PCE, TCE, DCE, VC)	DHC, BVC, VCR	(Co)metabolic vinyl chloride	etnC, etnE
Chlorinated Ethanes (TCA and 1,2-DCA)	DHBt, DHG, DHC, DSB[1], DCA, DCAR	Chlorinated Benzenes	TOD, TCBO, PHE
Chlorinated Methanes (Chloroform)	DHBt, DCM, CFR	Dichloromethane	DCMA
Chlorinated Benzenes	DHC, DHBt[2], DECO		
Chlorinated Phenols	DHC, DSB		
Chlorinated Propanes	DHC, DHG, DSB[1]		

[1] *Desulfitobacterium dichloroeliminans* DCA1. [2] Implicated in reductive dechlorination of dichlorobenzene and potentially chlorobenzene

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Figure 4. Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.



Anaerobic – Reductive Dechlorination or Dichloroelimination		Aerobic – (Co)metabolism	
Chlorinated Ethenes (PCE, TCE)	DHC, DHBt, DSB, DSM	Chlorinated ethenes (TCE, DCE, VC)	sMMO, pMMO, TOD, PHE, RDEG, RMO
Chlorinated Ethenes (PCE, TCE, DCE, VC)	DHC, BVC, VCR	(Co)metabolic vinyl chloride	etnC, etnE
Chlorinated Ethanes (TCA and 1,2-DCA)	DHBt, DHG, DHC, DSB[1], DCA, DCAR	Chlorinated Benzenes	TOD, TCBO, PHE
Chlorinated Methanes (Chloroform)	DHBt, DCM, CFR	Dichloromethane	DCMA
Chlorinated Benzenes	DHC, DHBt[2], DECO		
Chlorinated Phenols	DHC, DSB		
Chlorinated Propanes	DHC, DHG, DSB[1]		

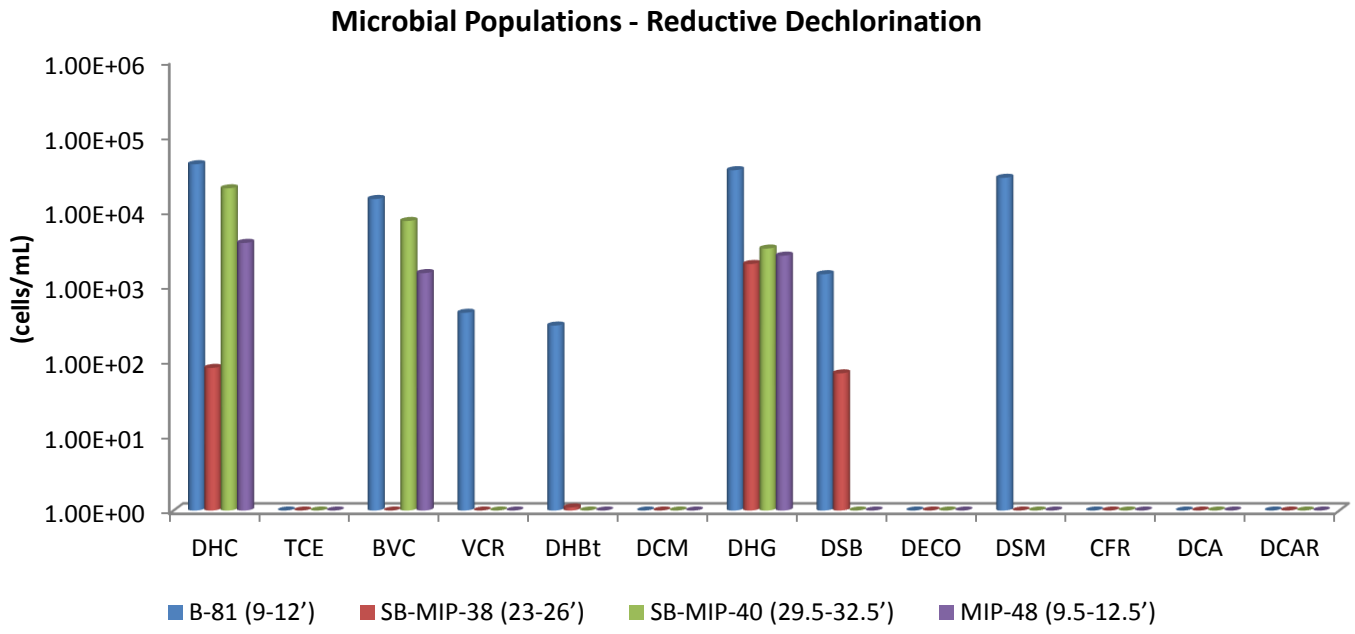
[1] *Desulfitobacterium dichloroeliminans* DCA1. [2] Implicated in reductive dechlorination of dichlorobenzene and potentially chlorobenzene

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Table 2. Summary of the QuantArray® results for microorganisms responsible for reductive dechlorination.

Sample Name	B-81 (9-12')	SB-MIP-38 (23-26')	SB-MIP-40 (29.5-32.5')	MIP-48 (9.5-12.5')
Reductive Dechlorination	**(cells/mL)**	**(cells/mL)**	**(cells/mL)**	**(cells/mL)**
Dehalococcoides spp. (DHC)	**4.20E+04**	**8.23E+01**	**2.01E+04**	**3.78E+03**
tceA Reductase (TCE)	<4.00E-01	<3.00E-01	<3.00E-01	<5.00E-01
BAV1 Vinyl Chloride Reductase (BVC)	**1.45E+04**	<3.00E-01	**7.39E+03**	**1.50E+03**
Vinyl Chloride Reductase (VCR)	**4.45E+02**	<3.00E-01	<3.00E-01	<5.00E-01
Dehalobacter spp. (DHBt)	**3.01E+02**	**1.10E+00 (J)**	<3.30E+00	<5.00E+00
Dehalobacter DCM (DCM)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
Dehalogenimonas spp. (DHG)	**3.50E+04**	**1.98E+03**	**3.18E+03**	**2.56E+03**
Desulfitobacterium spp. (DSB)	**1.45E+03**	**6.95E+01**	<3.30E+00	<5.00E+00
Dehalobium chlorocoercia (DECO)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
Desulfuromonas spp. (DSM)	**2.77E+04**	<2.50E+00	<3.30E+00	<5.00E+00
Chloroform reductase (CFR)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
1,1 DCA Reductase (DCA)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
1,2 DCA Reductase (DCAR)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00

Figure 5. Comparison - Microbial populations involved in reductive dechlorination

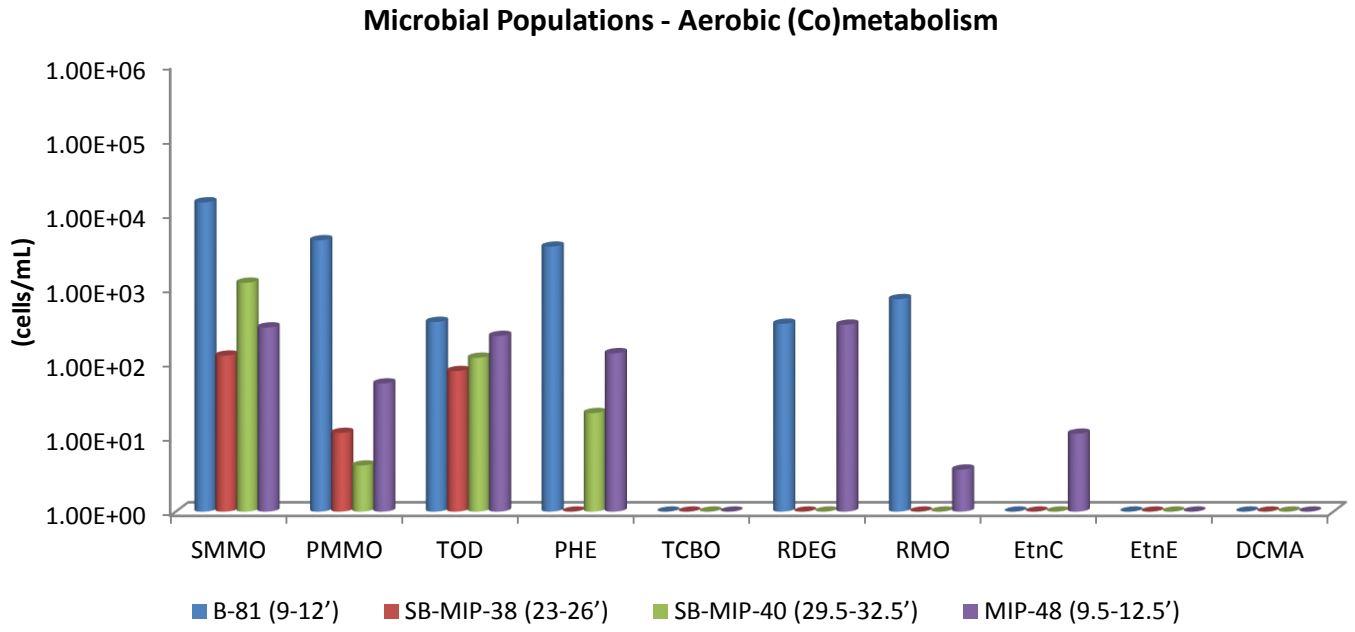


10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Table 3. Summary of the QuantArray® results for microorganisms responsible for aerobic (Co)metabolism.

Sample Name	B-81 (9-12')	SB-MIP-38 (23-26')	SB-MIP-40 (29.5-32.5')	MIP-48 (9.5-12.5')
Aerobic (Co)Metabolic	**(cells/mL)**	**(cells/mL)**	**(cells/mL)**	**(cells/mL)**
Soluble Methane Monooxygenase (SMMO)	**1.44E+04**	**1.28E+02**	**1.21E+03**	**3.05E+02**
Particulate Methane Monooxygenase (PMMO)	**4.48E+03**	**1.16E+01**	**4.20E+00**	**5.40E+01**
Toluene Dioxygenase (TOD)	**3.62E+02**	**7.95E+01**	**1.20E+02**	**2.35E+02**
Phenol Hydroxylase (PHE)	**3.68E+03**	<2.50E+00	**2.15E+01**	**1.38E+02**
Trichlorobenzene Dioxygenase (TCBO)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
Toluene Monooxygenase 2 (RDEG)	**3.42E+02**	<2.50E+00	<3.30E+00	**3.32E+02**
Toluene Monooyxgenase (RMO)	**7.30E+02**	<2.50E+00	<3.30E+00	**3.70E+00 (J)**
Ethene Monooxygenase (EtnC)	<4.00E+00	<2.50E+00	<3.30E+00	**1.13E+01**
Epoxyalkane transferase (EtnE)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00
Dichloromethane dehalogenase (DCMA)	<4.00E+00	<2.50E+00	<3.30E+00	<5.00E+00

Figure 6. Comparison - Microbial populations involved in aerobic (Co)metabolism.

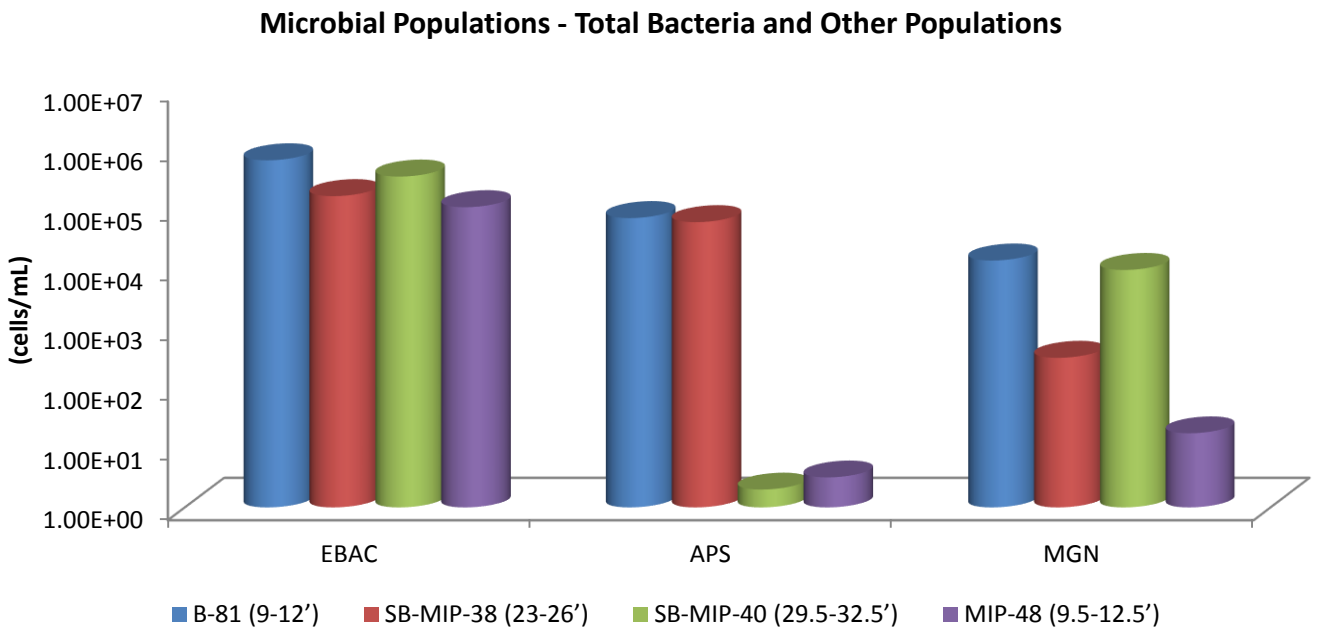


10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Table 4. Summary of the QuantArray® results for total bacteria and other populations.

Sample Name	B-81 (9-12')	SB-MIP-38 (23-26')	SB-MIP-40 (29.5-32.5')	MIP-48 (9.5-12.5')
Other	(cells/mL)	(cells/mL)	(cells/mL)	(cells/mL)
Total Eubacteria (EBAC)	**6.41E+05**	**1.62E+05**	**3.43E+05**	**1.06E+05**
Sulfate Reducing Bacteria (APS)	**6.98E+04**	**5.97E+04**	**2.00E+00 (J)**	**3.20E+00 (J)**
Methanogens (MGN)	**1.37E+04**	**3.28E+02**	**9.54E+03**	**1.77E+01**

Figure 7. Comparison - Microbial populations



10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Interpretation

The overall purpose of the Chlorinated QuantArray® is to give site managers the ability to simultaneously yet economically evaluate the potential for biodegradation of a spectrum of common chlorinated contaminants through a multitude of anaerobic and aerobic (co)metabolic pathways in order to provide a clearer and more comprehensive view of contaminant biodegradation. The following discussion describes interpretation of results in general terms and is meant to serve as a guide.

Reductive Dechlorination – Chlorinated Ethenes: While a number of bacterial cultures including *Dehalococcoides*, *Dehalobacter*, *Desulfitobacterium*, and *Desulfuromonas* spp. capable of utilizing PCE and TCE as growth-supporting electron acceptors have been isolated [1-5], *Dehalococcoides* spp. may be the most important because they are the only bacterial group that has been isolated to date which is capable of complete reductive dechlorination of PCE to ethene [6]. In fact, the presence of *Dehalococcoides* spp. has been associated with complete reductive dechlorination to ethene at sites across North America and Europe [7]. More recently, Lu et al. [8] have proposed using a *Dehalococcoides* concentration of 1 x 10^4 cells/mL as a screening criterion to identify sites where biological reductive dechlorination is predicted to proceed at "generally useful" rates.

A "stall" (i.e., where daughter products *cis*-DCE and vinyl chloride accumulate) can occur at PCE- and TCE-impacted sites especially under MNA conditions. The accumulation of vinyl chloride, generally considered more carcinogenic than the parent compounds, is particularly problematic. Although elevated *Dehalococcoides* concentrations correspond to ethene production in numerous studies, the range of chlorinated ethenes metabolized and cometabolized varies by species and strains within the *Dehalococcoides* genus. For example, *Dehalococcoides ethenogenes* str. 195 metabolizes PCE, TCE, and *cis*-DCE and cometabolizes vinyl chloride [6] to produce ethene. Conversely, *Dehalococcoides* sp. CBDB1 utilizes PCE and TCE, but does not cometabolize additional chloroethenes [9]. Quantification of reductive dehalogenase genes is used to more definitively confirm the potential for reductive dechlorination of TCE, *cis*-DCE, and vinyl chloride [10-13].

Reductive Dechlorination – Chlorinated Ethanes: Under anaerobic conditions, chlorinated ethanes are susceptible to reductive dechlorination by several groups of halorespiring bacteria including *Dehalobacter*, *Dehalogenimonas*, and *Dehalococcoides* spp. While the reported range of chlorinated ethanes utilized varies by genus, species, and sometimes at the strain level, several general observations can be made regarding biodegradation pathways and daughter product formation. *Dehalobacter* spp. have been isolated that are capable of sequential reductive dechlorination of 1,1,1-TCA through 1,1-DCA to chloroethane. Biodegradation of 1,1,2-TCA by several halorespiring bacteria including *Dehalobacter* and *Dehalogenimonas* spp. proceeds via dichloroelimination producing vinyl chloride. Similarly, 1,2-DCA biodegradation by *Dehalobacter*, *Dehalogenimonas*, and *Dehalococcoides* spp. occurs via dichloroelimination producing ethene. While not utilized by many *Desulfitobacterium* isolates, at least one strain, *Desulfitobacterium dichloroeliminans* strain DCA1, is also capable of dichloroelimination of 1,2-DCA [14].

Reductive Dechlorination – Chlorinated Methanes: Chloroform is a common co-contaminant at chlorinated solvent sites and can inhibit reductive dechlorination of chlorinated ethenes. Grostern et al. demonstrated that a *Dehalobacter* population was capable of reductive dechlorination of chloroform to produce dichloromethane [15]. The *cfrA* gene encodes the reductase which catalyzes this initial step in chloroform biodegradation [16]. Justicia-Leon et al. have since shown that dichloromethane can support growth of a distinct group of *Dehalobacter* strains via fermentation [17]. The *Dehalobacter* DCM assay targets the 16S rRNA gene of these strains.

Reductive Dechlorination – Chlorinated Benzenes: Chlorinated benzenes are an important class of industrial solvents and chemical intermediates in the production of drugs, dyes, herbicides, and insecticides. The physical-chemical properties of chlorinated benzenes as well as susceptibility to biodegradation are functions of their degree of chlorination and the positions of chlorine substituents. Under anaerobic conditions, reductive dechlorination of higher chlorinated benzenes including hexachlorobenzene (HCB),

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

pentachlorobenzene (PeCB), tetrachlorobenzene (TeCB) isomers, and trichlorobenzene (TCB) isomers by halorespiring bacteria has been well documented [18]. For example, although biodegradation of individual compounds and specific isomers does vary somewhat between isolates, *Dehalococcoides* spp. such as strain CBDB1 have been identified which reductively dechlorinate HCB, PeCB, all three TeCB isomers, 1,2,3-TCB, and 1,2,4-TCB [9, 19]. *Dehalobium chlorocoercia* DF-1 has been shown to be capable of reductive dechlorination of HCB, PeCB, and 1,2,3,5-TeCB [20]. The dichlorobenzene (DCB) isomers and chlorobenzene (CB) were considered relatively recalcitrant under anaerobic conditions. However, new evidence has demonstrated reductive dechlorination of DCBs to CB and CB to benzene [21] with corresponding increases in concentrations of *Dehalobacter* spp. [22].

Reductive Dechlorination – Chlorinated Phenols: Pentachlorophenol (PCP) was one of the most widely used biocides in the U.S. and despite residential use restrictions, is still extensively used industrially as a wood preservative. Along with PCP, the tetrachlorophenol and trichlorophenol isomers were also used as fungicides in wood preserving formulations. 2,4-dichlorophenol and 2,4,5-TCP were used as chemical intermediates in herbicide production (e.g. 2,4-D) and chlorophenols are known byproducts of chlorine bleaching in the pulp and paper industry. While the range of compounds utilized varies by strain, some *Dehalococcoides* isolates are capable of reductive dechlorination of PCP and other chlorinated phenols. For example, *Dehalococcoides* strain CBDB1 is capable of utilizing pentachlorophenol (PCP), all three tetrachlorophenol (TeCP) congeners, all six trichlorophenol (TCP) congeners, and 2,3-dichlorophenol (2,3-DCP). PCP dechlorination by strain CBDB1 produces a mixture of 3,5-DCP, 3,4-DCP, 2,4-DCP, 3-CP, and 4-CP [23]. In the same study, however, *Dehalococcoides ethenogenes* strain 195 dechlorinated a more narrow spectrum of chlorophenols which included 2,3-DCP, 2,3,4-TCP, and 2,3,6-TCP, but no other TCPs or PCP. Similar to *Dehalococcoides*, some species and strains of *Desulfitobacterium* are capable of utilizing PCP and other chlorinated phenols. *Desulfitobacterium hagniense* PCP-1 is capable of reductive dechlorination of PCP to 3-CP [24]. However, the ability to biodegrade PCP is not universal among *Desulfitobacterium* isolates. *Desulfitobacterium* sp. strain PCE1 and *D. chlororespirans* strain Co23, for example, can utilize some TCP and DCP isomers, but not PCP for growth [2, 25].

Reductive Dechlorination – Chlorinated Propanes: *Dehalogenimonas* is a recently described bacterial genus of the phylum *Chloroflexi* which also includes the well-known chloroethene-respiring *Dehalococcoides* spp [26]. The *Dehalogenimonas* isolates characterized to date are also halorespiring bacteria, but utilize a rather unique range of chlorinated compounds as electron acceptors including chlorinated propanes (1,2,3-TCP and 1,2-DCP) and a variety of other vicinally chlorinated alkanes including 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, and 1,2-dichloroethane [26].

Aerobic – Chlorinated Ethene Cometabolism: Under aerobic conditions, several different types of bacteria including methane-oxidizing bacteria (methanotrophs), ammonia-oxidizing bacteria, and some toluene/phenol-utilizing bacteria can cometabolize or co-oxidize trichloroethene (TCE), dichloroethene (DCE), and vinyl chloride (VC). In general, cometabolism of chlorinated ethenes is mediated by monooxygenase enzymes with "relaxed" specificity that oxidize a primary (growth supporting) substrate and co-oxidize the chlorinated compound. Most methanotrophs are only capable of producing particulate methane monooxygenase (pMMO) which is capable of aerobic cometabolism but often at lower rates. Other methanotrophs are capable of producing both pMMO and soluble methane monooxygenase (sMMO) enzymes, which in general are believed to be capable of greater rates of aerobic cometabolism.

Aerobic – Vinyl Chloride Cometabolism: Beginning in the early 1990s, numerous microcosm studies demonstrated aerobic oxidation of vinyl chloride under MNA conditions without the addition of exogenous primary substrates. Since then, strains of *Mycobacterium*, *Nocardioides*, *Pseudomonas*, *Ochrobactrum*, and *Ralstonia* species have been isolated which are capable of aerobic growth on both ethene and vinyl chloride (see Mattes et al. [27] for a review). The initial steps in the pathway are the monooxygenase (*etn*ABCD) catalyzed conversion of ethene and vinyl chloride to their respective epoxyalkanes (epoxyethane and chlorooxirane), followed by epoxyalkane:CoM transferase (*etn*E) mediated conjugation and breaking of the epoxide [28].

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

Aerobic – Chlorinated Benzenes: In general, chlorobenzenes with four or less chlorine groups are susceptible to aerobic biodegradation and can serve as growth-supporting substrates. Toluene dioxygenase (TOD) has a relatively relaxed substrate specificity and mediates the incorporation of both atoms of oxygen into the aromatic ring of benzene and substituted benzenes (toluene and chlorobenzene). Comparison of TOD levels in background and source zone samples from a CB-impacted site suggested that CBs promoted growth of TOD-containing bacteria [29]. In addition, aerobic biodegradation of some trichlorobenzene and even tetrachlorobenzene isomers is initiated by a group of related trichlorobenzene dioxygenase genes (TCBO). Finally, phenol hydroxylases catalyze the continued oxidation and in some cases, the initial oxidation of a variety of monoaromatic compounds. In an independent study, significant increases in numbers of bacteria containing PHE genes corresponded to increases in biodegradation of DCB isomers [29].

1,2 Dichloroethane Reductive Dehalogenase: Targets the 1,2 dichloroethane reductive dehalogenase gene from members of Desulfitobacterium and Dehalobacter which dechlorinate 1,2 DCA to ethene.

1,1 Dichloroethane Reductive Dehalogenase: Targets the 1,1 dichloroethane reductive dehalogenase gene found in some strains of Dehalobacter..

Dichloromethane Dehalogenase: Targets the dcmA gene responsible for aerobic biodegradation of dichloromethane by methylotrophs..

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

References

1. Gerritse, J.; Drzyzga, O.; Kloetstra, G.; Keijmel, M.; Wiersum, L. P.; Hutson, R.; Collins, M. D.; Gottschal, J. C., Influence of Different Electron Donors and Acceptors on Dehalorespiration of Tetrachloroethene byDesulfitobacterium frappieri TCE1. *Applied and Environmental Microbiology* **1999,** *65*, (12), 5212-5221.
2. Gerritse, J.; Renard, V.; Gomes, T. M. P.; Lawson, P. A.; Collins, M. D.; Gottschal, J. C., Desulfitobacterium sp. strain PCE1, an anaerobic bacterium that can grow by reductive dechlorination of tetrachloroethene or ortho-chlorinated phenols. *Archives of Microbiology* **1996,** *165*, (2), 132-140.
3. Holliger, C.; Schraa, G.; Stams, A. J.; Zehnder, A. J., A highly purified enrichment culture couples the reductive dechlorination of tetrachloroethene to growth. *Applied and Environmental Microbiology* **1993,** *59*, (9), 2991-2997.
4. Krumholz, L. R.; Sharp, R.; Fishbain, S. S., A freshwater anaerobe coupling acetate oxidation to tetrachloroethylene dehalogenation. *Applied and Environmental Microbiology* **1996,** *62*, (11), 4108-13.
5. Loffler, F. E.; Sanford, R. A.; Tiedje, J. M., Initial Characterization of a Reductive Dehalogenase from Desulfitobacterium chlororespirans Co23. *Applied and Environmental Microbiology* **1996,** *62*, (10), 3809-13.
6. Maymó-Gatell, X.; Anguish, T.; Zinder, S. H., Reductive Dechlorination of Chlorinated Ethenes and 1,2-Dichloroethane by "*Dehalococcoides ethenogenes*" 195. *Applied and Environmental Microbiology* **1999,** *65*, (7), 3108-3113.
7. Hendrickson, E. R.; Payne, J. A.; Young, R. M.; Starr, M. G.; Perry, M. P.; Fahnestock, S.; Ellis, D. E.; Ebersole, R. C., Molecular Analysis of *Dehalococcoides* 16S Ribosomal DNA from Chloroethene-Contaminated Sites throughout North America and Europe. *Applied and Environmental Microbiology* **2002,** *68*, (2), 485-495.
8. Lu, X.; Wilson, J. T.; Kampbell, D. H., Relationship between *Dehalococcoides* DNA in ground water and rates of reductive dechlorination at field scale. *Water Research* **2006,** *40*, (16), 3131-3140.
9. Adrian, L.; Szewzyk, U.; Wecke, J.; Gorisch, H., Bacterial dehalorespiration with chlorinated benzenes. *Nature* **2000,** *408*, (6812), 580-583.
10. Holmes, V. F.; He, J.; Lee, P. K. H.; Alvarez-Cohen, L., Discrimination of Multiple Dehalococcoides Strains in a Trichloroethene Enrichment by Quantification of Their Reductive Dehalogenase Genes. *Applied and Environmental Microbiology* **2006,** *72*, (9), 5877-5883.
11. Lee, P. K. H.; Johnson, D. R.; Holmes, V. F.; He, J.; Alvarez-Cohen, L., Reductive Dehalogenase Gene Expression as a Biomarker for Physiological Activity of Dehalococcoides spp. *Applied and Environmental Microbiology* **2006,** *72*, (9), 6161-6168.
12. Müller, J. A.; Rosner, B. M.; von Abendroth, G.; Meshulam-Simon, G.; McCarty, P. L.; Spormann, A. M., Molecular Identification of the Catabolic Vinyl Chloride Reductase from Dehalococcoides sp. Strain VS and Its Environmental Distribution. *Applied and Environmental Microbiology* **2004,** *70*, (8), 4880-4888.
13. Ritalahti, K. M.; Amos, B. K.; Sung, Y.; Wu, Q.; Koenigsberg, S. S.; Löffler, F. E., Quantitative PCR Targeting 16S rRNA and Reductive Dehalogenase Genes Simultaneously Monitors Multiple Dehalococcoides Strains. *Applied and Environmental Microbiology* **2006,** *72*, (4), 2765-2774.
14. De Wildeman, S.; Diekert, G.; Van Langenhove, H.; Verstraete, W., Stereoselective Microbial Dehalorespiration with Vicinal Dichlorinated Alkanes. *Applied and Environmental Microbiology* **2003,** *69*, (9), 5643-5647.
15. Grostern, A.; Duhamel, M.; Dworatzek, S.; Edwards, E. A., Chloroform respiration to dichloromethane by a Dehalobacter population. *Environmental Microbiology* **2010,** *12*, (4), 1053-1060.
16. Tang, S.; Edwards, E. A., Identification of Dehalobacter reductive dehalogenases that catalyse dechlorination of chloroform, 1,1,1-trichloroethane and 1,1-dichloroethane. *Philosophical Transactions of the Royal Society B: Biological Sciences* **2013,** *368*, (1616).
17. Justicia-Leon, S. D.; Ritalahti, K. M.; Mack, E. E.; Löffler, F. E., Dichloromethane Fermentation by a Dehalobacter sp. in an Enrichment Culture Derived from Pristine River Sediment. *Applied and Environmental Microbiology* **2012,** *78*, (4), 1288-1291.
18. Field, J.; Sierra-Alvarez, R., Microbial degradation of chlorinated benzenes. *Biodegradation* **2008,** *19*, (4), 463-480.

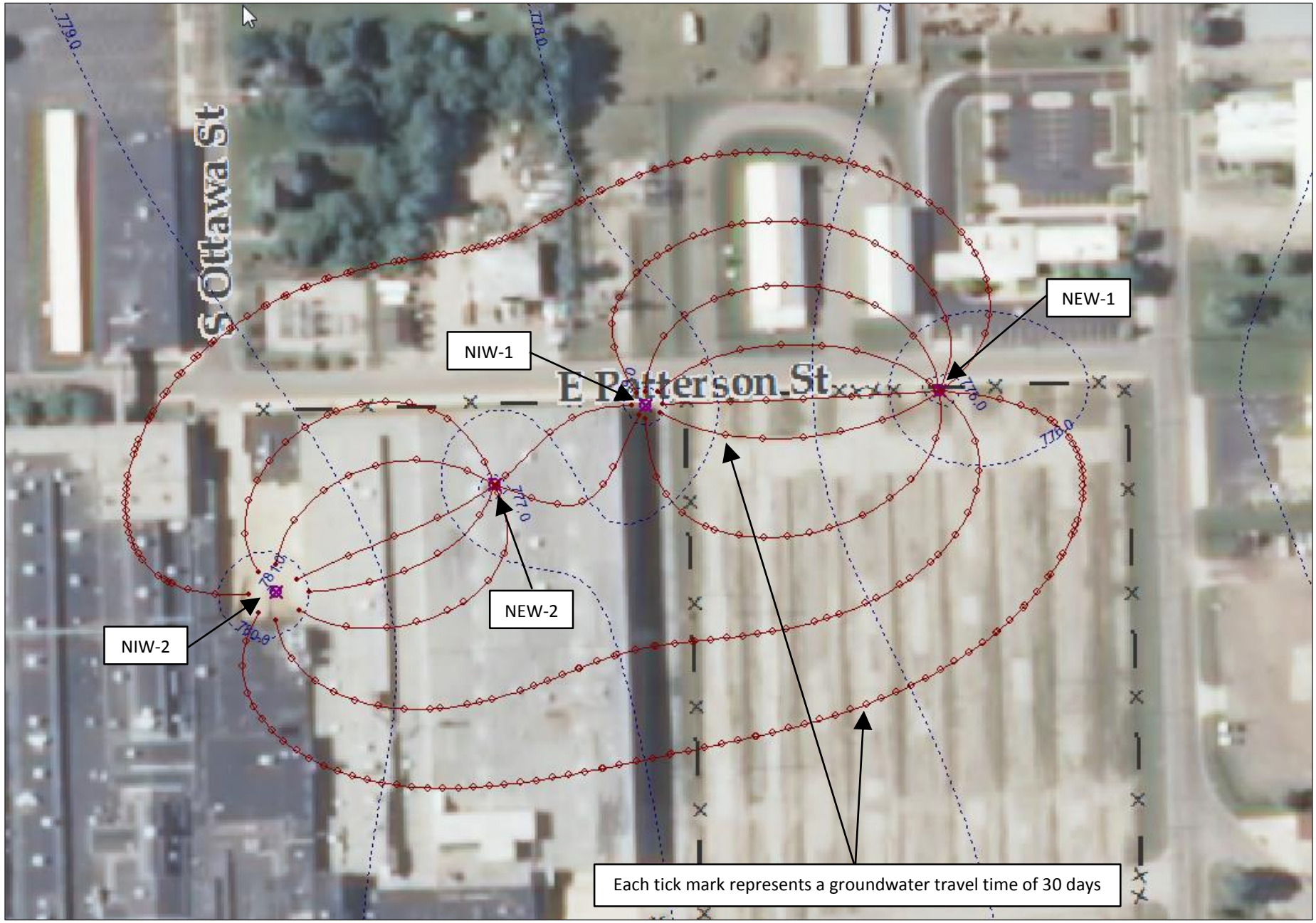
10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

19. Jayachandran, G.; Görisch, H.; Adrian, L., Dehalorespiration with hexachlorobenzene and pentachlorobenzene by *Dehalococcoides* sp. strain CBDB1. *Archives of Microbiology* **2003,** *180*, (6), 411-416.
20. Wu, Q.; Milliken, C. E.; Meier, G. P.; Watts, J. E. M.; Sowers, K. R.; May, H. D., Dechlorination of Chlorobenzenes by a Culture Containing Bacterium DF-1, a PCB Dechlorinating Microorganism. *Environmental Science & Technology* **2002,** *36*, (15), 3290-3294.
21. Fung, J. M.; Weisenstein, B. P.; Mack, E. E.; Vidumsky, J. E.; Ei, T. A.; Zinder, S. H., Reductive Dehalogenation of Dichlorobenzenes and Monochlorobenzene to Benzene in Microcosms. *Environmental Science & Technology* **2009,** *43*, (7), 2302-2307.
22. Nelson, J. L.; Fung, J. M.; Cadillo-Quiroz, H.; Cheng, X.; Zinder, S. H., A Role for Dehalobacter spp. in the Reductive Dehalogenation of Dichlorobenzenes and Monochlorobenzene. *Environmental Science & Technology* **2011,** *45*, (16), 6806-6813.
23. Adrian, L.; Hansen, S. K.; Fung, J. M.; Görisch, H.; Zinder, S. H., Growth of Dehalococcoides Strains with Chlorophenols as Electron Acceptors. *Environmental Science & Technology* **2007,** *41*, (7), 2318-2323.
24. Bourchard, B.; Beaudet, R.; Villemur, R.; McSween, G.; Lepine, F.; Bisaillon, J.-G., Isolation and Characterization of Desulfitobacterium frappieri sp. nov., an Anaerobic Bacterium Which Reductively Dechlorinates Pentachlorophenol to 3-Chlorophenol. *International Journal of Systematic Bacteriology* **1996,** *46*, (4), 1010-1015.
25. Sanford, R. A.; Cole, J. R.; Löffler, F. E.; Tiedje, J. M., Characterization of Desulfitobacterium chlororespirans sp. nov., which grows by coupling the oxidation of lactate to the reductive dechlorination of 3-chloro-4-hydroxybenzoate. *Applied and Environmental Microbiology* **1996,** *62*, (10), 3800-8.
26. Moe, W. M.; Yan, J.; Nobre, M. F.; da Costa, M. S.; Rainey, F. A., Dehalogenimonas lykanthroporepellens gen. nov., sp. nov., a reductively dehalogenating bacterium isolated from chlorinated solvent-contaminated groundwater. *International Journal of Systematic and Evolutionary Microbiology* **2009,** *59*, (11), 2692-2697.
27. Mattes, T. E.; Alexander, A. K.; Coleman, N. V., Aerobic biodegradation of the chloroethenes: pathways, enzymes, ecology, and evolution. *FEMS Microbiology Reviews* **2010,** *34*, (4), 445-475.
28. Coleman, N. V.; Spain, J. C., Epoxyalkane:Coenzyme M Transferase in the Ethene and Vinyl Chloride Biodegradation Pathways of Mycobacterium Strain JS60. *Journal of Bacteriology* **2003,** *185*, (18), 5536-5545.
29. Dominguez, R.; da Silva, M.; McGuire, T.; Adamson, D.; Newell, C.; Alvarez, P., Aerobic bioremediation of chlorobenzene source-zone soil in flow-through columns: performance assessment using quantitative PCR. *Biodegradation* **2008,** *19*, (4), 545-553.

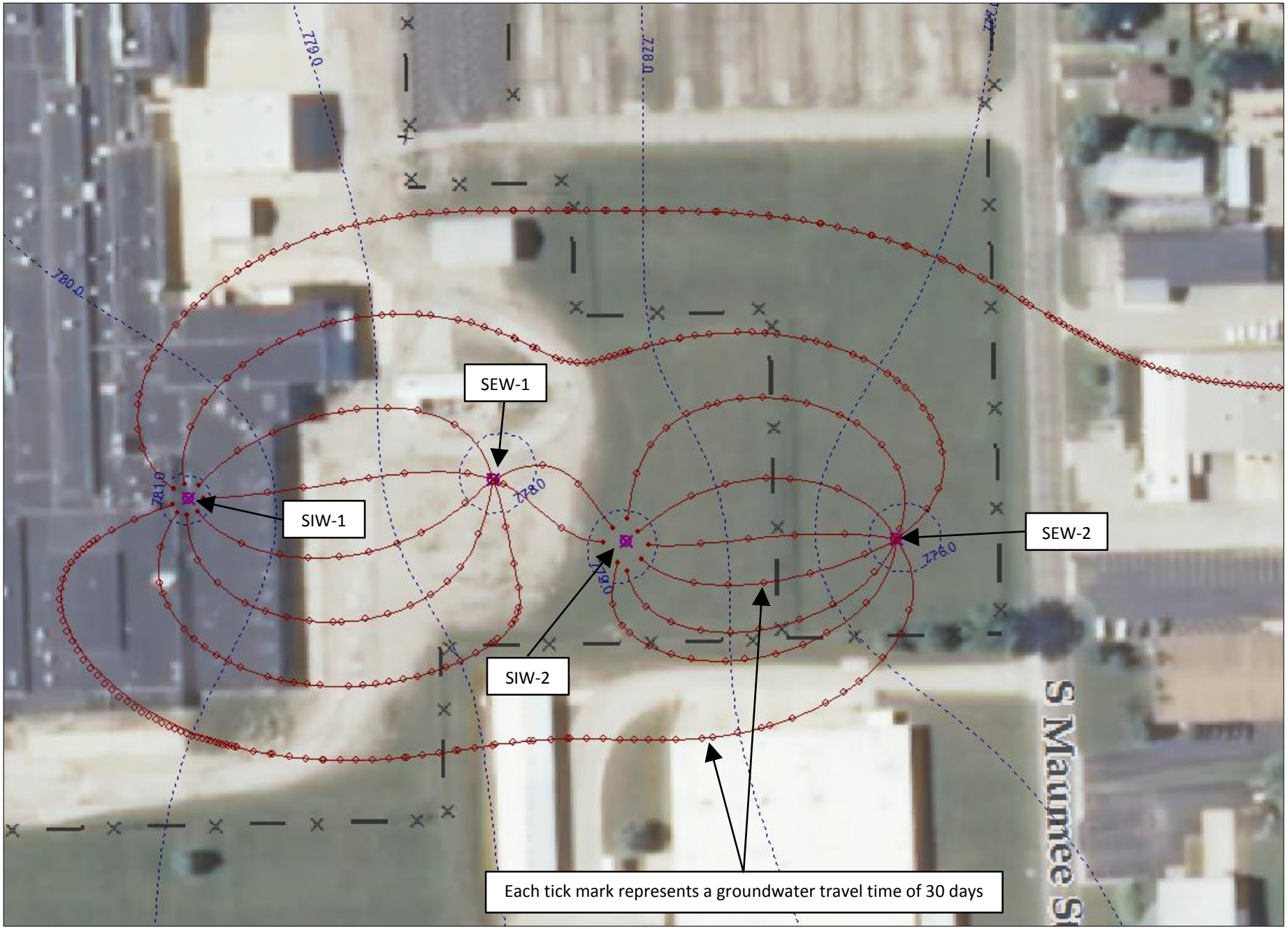
10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
www.microbe.com

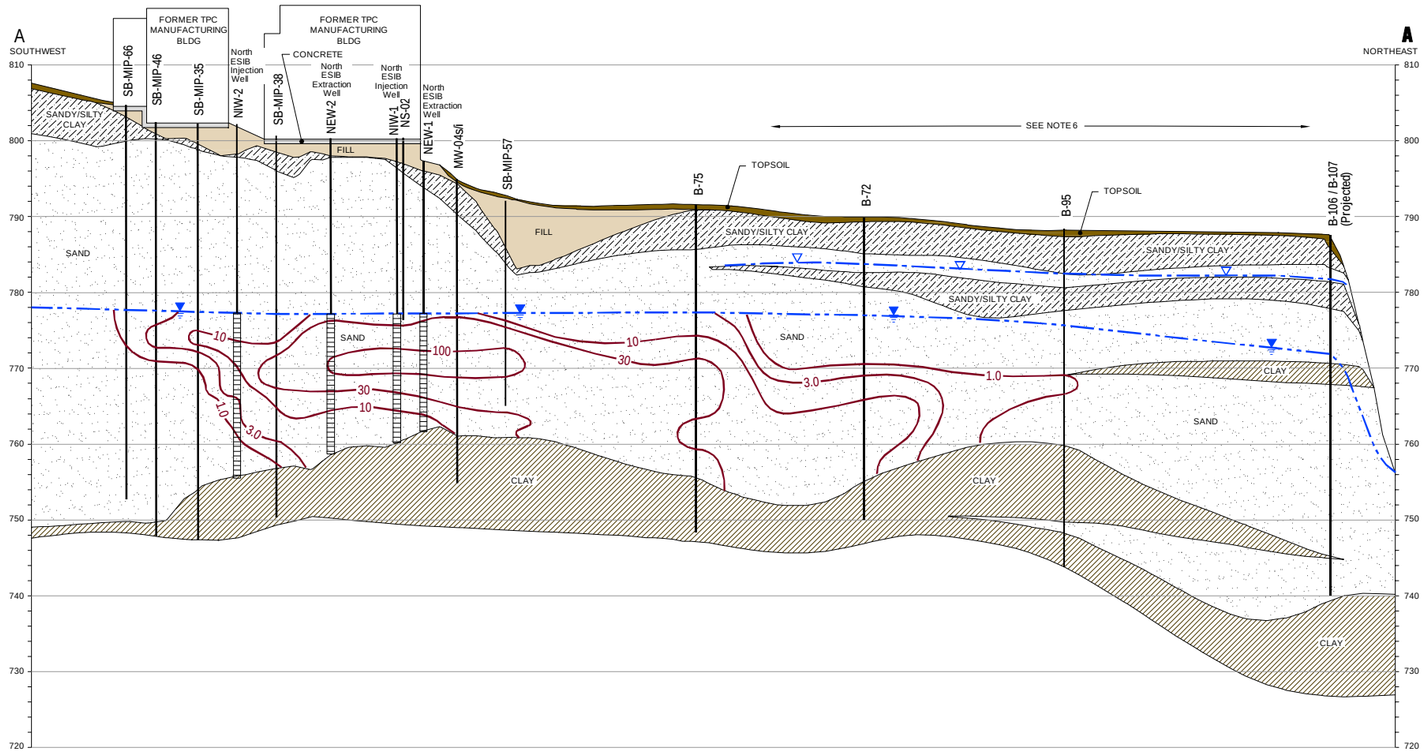
Appendix R
Supporting Documentation for EISB

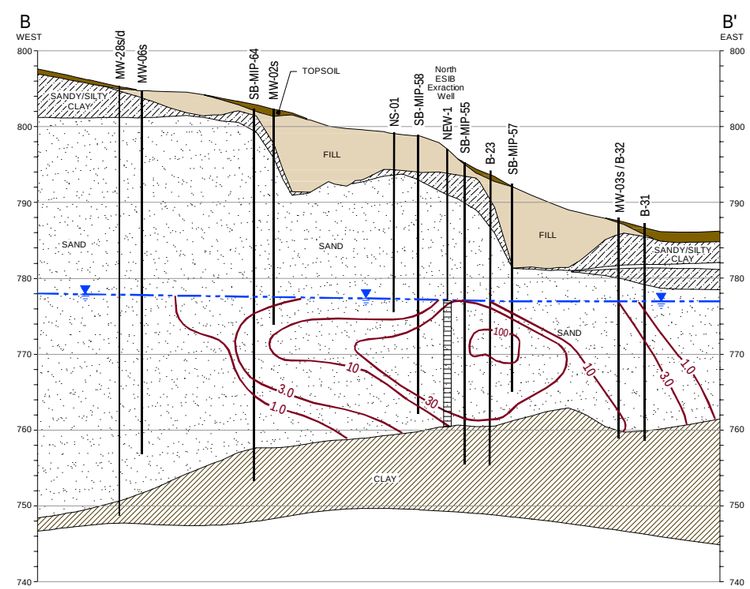
Flow Model for Proposed Recirculation Cells – Northern Treatment Area



Flow Model for Proposed Recirculation Cells – Southern Treatment Area







LEGEND

- TOPSOIL
- FILL
- SAND
- CLAY
- SANDY / SILTY CLAY
- CONCRETE
- APPROXIMATE GROUNDWATER ELEVATION
- PERCHED GROUNDWATER ELEVATION
- 100 — TOTAL CHLORINATED ETHENES ISOCONCENTRATION LINE (SEE NOTES 2, 3 AND 4)

NOTES

1. GROUNDWATER ELEVATIONS REFLECT ELEVATION DATA COLLECTED DURING THE MAY 2015 SAMPLING EVENT.
2. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
3. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE OUTPUTS AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.
5. ISOCONCENTRATION LINES REPRESENT THE TOTAL CONCENTRATION (IN MICROMOLES PER LITER [uM]) OF CHLORINATED ETHENES (TETRACHLOROETHENE [PCE], TRICHLOROETHENE [TCE], cis-1,2-DICHLOROETHENE [cis-DCE], AND VINYL CHLORIDE [VC]) IN GROUNDWATER. MOLAR CONCENTRATIONS ARE USEFUL IN ILLUSTRATING TOTAL CONTAMINANT MASS. THE TABLE BELOW PROVIDES A COMPARISON BETWEEN MOLARITY AND MASS BASED CONCENTRATION UNITS.

MOLAR CONCENTRATION	PCE (ug/L)	TCE (ug/L)	cis-DCE (ug/L)	VC (ug/L)
1.0 uM	166	131	97.0	62.5
3.0 uM	497	394	291	188
10 uM	1,660	1,310	970	625
30 uM	4,970	3,940	2,910	1,880
100 uM	16,600	13,100	9,700	6,250

6. THE SURFICIAL SANDY/SILTY CLAY AND ASSOCIATED PERCHED GROUNDWATER HAS A THICKNESS GREATER THAN 8 FEET THROUGHOUT THIS AREA.

VERTICAL SCALE 0 10' 40'

APPROXIMATE HORIZONTAL SCALE 0 200' 400'

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

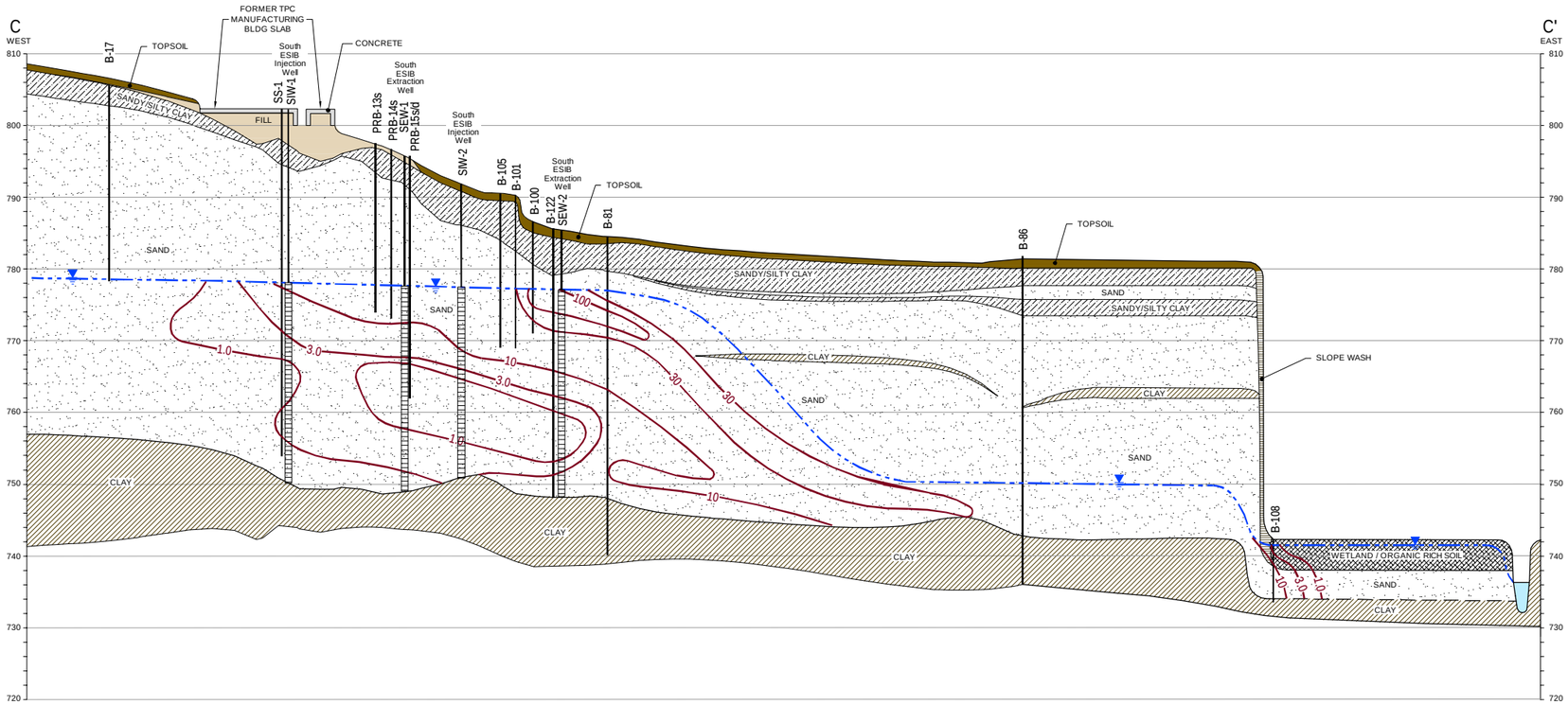
PROJECT: **FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN**

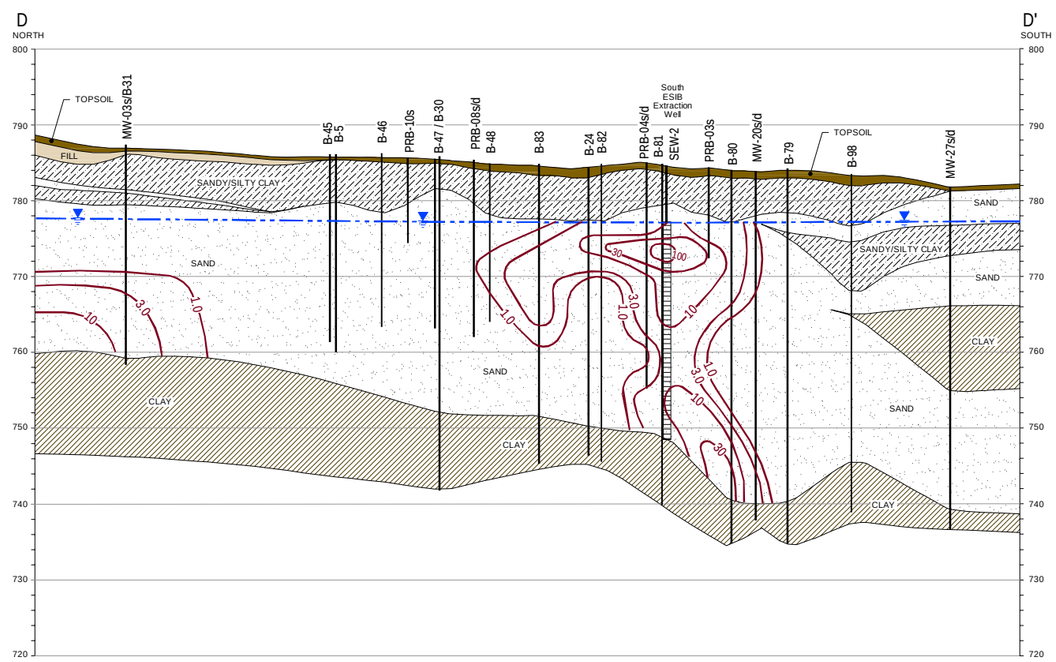
TITLE: **PROFILE VIEW OF PROPOSED RECIRCULATION CELLS NORTHERN TRTMEAENT AREA**

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.R1-R2.dwg	
APPROVED BY: GC	DATE PRINTED:	**FIGURE R1**	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh MI\246667\0003_CMP Rpt_APPENDIX R\246667.0003.R1-R2.dwg
Operator Name: STRAILE, DAWN
Drawing Pat Name: 22MX36
Drawing Size: 2.57 Mb
Plot Date: February 1, 2016
Plot Time: 10:24 AM
Attached Xref's:
Attached Images: 20 in wide, 30 cm wide, 20 SD wide;
Layout: R2.R1 A-Size Horiz





LEGEND

- TOPSOIL
- FILL
- SAND
- CLAY
- SANDY / SILTY CLAY
- ORGANIC RICH WETLAND SOIL / MUCK
- SLOPE WASH
- CONCRETE
- APPROXIMATE GROUNDWATER ELEVATION
- 100 — TOTAL CHLORINATED ETHENES ISOCONCENTRATION LINE (SEE NOTES 2, 3 AND 4)

NOTES

1. GROUNDWATER ELEVATIONS REFLECT ELEVATION DATA COLLECTED DURING THE MAY 2015 SAMPLING EVENT.
2. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
3. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE OUTPUTS AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.
5. ISOCONCENTRATION LINES REPRESENT THE TOTAL CONCENTRATION (IN MICROMOLES PER LITER [uM]) OF CHLORINATED ETHENES (TETRACHLOROETHENE [PCE], TRICHLOROETHENE [TCE], cis-1,2-DICHLOROETHENE [cis-DCE], AND VINYL CHLORIDE [VC]) IN GROUNDWATER. MOLAR CONCENTRATIONS ARE USEFUL IN ILLUSTRATING TOTAL CONTAMINANT MASS. THE TABLE BELOW PROVIDES A COMPARISON BETWEEN MOLARITY AND MASS BASED CONCENTRATION UNITS.

MOLAR CONCENTRATION	PCE (ug/L)	TCE (ug/L)	cis-DCE (ug/L)	VC (ug/L)
1.0 uM	166	131	97.0	62.5
3.0 uM	497	394	291	188
10 uM	1,660	1,310	970	625
30 uM	4,970	3,940	2,910	1,880
100 uM	16,600	13,100	9,700	6,250

VERTICAL SCALE 0 10' 20'

APPROXIMATE HORIZONTAL SCALE 0 200' 400'

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJECT: FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN

TITLE: PROFILE VIEW OF PROPOSED RECIRCULATION CELLS SOUTHERN TREATMENT AREAS

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 246667.0003	
CHECKED BY: SEM		FILE NO. 246667.0003.R1-R2.dwg	
APPROVED BY: GC	DATE PRINTED:	FIGURE R2	
DATE: JANUARY 2016			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PLOT DATA
Drawing Name: J:_TRC\Tecumseh Products\Tecumseh WA\246667\0003_CMP RpA_APPENDIX R\246667.0003.R1-R2.dwg
Operator Name: STEWALE, DAWNH
Drawing Plot Date: 01/28/2016

ABC-CH4™ Liquid, Antimethanogenic ERD Reagent

TECHNOLOGY DESCRIPTION

In 2003, Redox Tech, LLC introduced Anaerobic BioChem (ABC®) as a patented (Rice *et al,* 1999) mixture of hydrogen donors, nutrients, and buffer to accelerate the anaerobic biodegradation of halogenated solvents in groundwater. Since then, millions of pounds of ABC have been used on hundreds of sites throughout the world. Over time the essential ingredients of ABC have been refined, and the materials formulated specifically for the unique geochemistry, biology, and hydrogeology of a given site.

ABC-CH4™ represents the most significant technology advancement in over a decade: it combines the proven chemistry of ABC with the power of the Provect-CH4™ methanogen inhibitors to yield a truly unique liquid, antimethanogenic ERD reagent that contains 60% water soluble carbon:

- Provect-CH4™ methanogenic inhibitor
- Glycerin as fast-release H donors
- Soluble lactic acid as mid-release H donors
- Ethyl lactate as a green solvent and H donor
- Dissolved Fatty acids as long-term release H donors
- Dipotassium Phosphate for micronutrients and pH buffering
- Potash or bicarbonate for pH control

ABC-CH4™ is only liquid ERD reagent designed **to actively control the production of methane** in a safe, reliable and predictable manner (US Patent Office Scalzi *et al*, 2013, 2014). In addition to the safety issues, associated with elevated methane in groundwater, soil gas, and indoor air, this effect also promotes more efficient use of the hydrogen donor.

WHAT IS THE PROBLEM WITH METHANE?

There are recognized benefits to methanogens and of limited methanogenesis. For example, i) methanogens are known to play important roles in synergistic microbial ecology, ii) their metabolic activity can help maintain anoxic conditions in treatment zones (through seasonal changes), and iii) the activity of methane mono-oxygenases and other enzymes can stimulate co-metabolic activity of TCE/DCE/VC in redox-recovery zones. Hence, limited production of methane is part of a healthy ERD/ISCR application. However, excessive methane production can be dangerous and represents a costly waste of amendment.

Cost and Efficiency Issues: Production of methane is a direct indication that hydrogen generated from the electron donor amendments was used by methanogens instead of the target microbes (*e.g., Dehalococcoides spp.*), substantially reducing application efficiency. **Table 1** (below) presents a site example where hydrogen demand is calculated for a highly aerobic and oxidized source area measuring approximately 1,850 cubic yards. Hydrogen demand for complete dechlorination of all PCE and TCE mass to ethene within this source area example, including both adsorbed and dissolved contaminants, is less than the amendment consumed to generate 20 mg/L of methane. The same is true of reducing all dissolved oxygen, nitrate, sulfate, and bio-available iron and manganese competing electron acceptors within the hypothetical treatment zone. So, even though this example site is highly

Provect-IR, Provect-IRM, Provect-OX, Provect-CH4, and ABC-CH4 are registered trademarks of Provectus Environmental Products, Inc.
v4 – Sept. 4th, 2014 • Copyright ©2014 Provectus Environmental Products, Inc.

oxidized with relatively high total concentrations of PCE and TCE, generating just 20 mg/L of methane constitutes greater than 33% of the total amendment consumption based on moles of H2.

Table 1. H Demand for Complete Dechlorination of PCE/TCE in Hypothetical Source Area

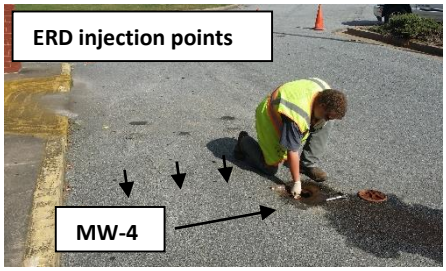
Constituent	Groundwater Concentration (mg/L)	Molecular Weight (g/mol)	Moles of H_2 to Reduce Mole Analyte	Moles of H_2 Acceptor In Treatment Area
Contaminant Electron Acceptors (To End Product Ethene)				
Tetrachloroethene (PCE)	10.0	165.8	4	1,393
Trichloroethene (TCE)	7.0	131.4	3	364
cis-1,2-Dichloroethene (cDCE)	0.0	96.9	2	0
Vinyl Chloride (VC)	0.0	62.5	1	0
			Complete Dechlorination (Soil+Groundwater) Subtotal	**1,757**
Native Electron Acceptors				
Dissolved Oxygen	9.0	32	2	199
Nitrate (as Nitrogen)	9.0	62	3	682
Sulfate	50.0	96.1	4	736
Fe^{+2} Formation from Fe^{+3}	20.0	55.8	0.5	63
Mn^{+2} Formation from Mn^{+4}	10.0	54.9	1	64
			Baseline Geochemistry Subtotal	**1,745**
Hydrogen Waste for Methane Formation				
Methane Formed	20.0	16	4	**1,769**
			Initial Treatment Area Hydrogen Usage	**5,271**

Potential Health and Safety Issues: Methane is considered to be a major greenhouse gas. It is explosive, with an LEL of 5% and an UEL of 15%. As a result of the microbial fermentation process, methane will be produced in most situations following the addition of any conventional ERD or ISCR amendment. Excessive and extended production of methane can result in elevated in groundwater concentrations (as high as 1,000 ppm have been reported) which can lead to accumulation in soil gas subsequently impacting indoor air. While this is perhaps more relevant in urban settings where methane can accumulate in basements, under slabs/foundations and/or migrate along utility corridors, excessive methane production has also been observed in more rural settings and other open spaces.

New and Emerging Regulatory Issues: State specific regulations for methane in groundwater have been promulgated, with others pending for soil gas and indoor air. For example, current regulations for methane in groundwater vary from *ca*. 10 to 28 mg CH_4/L (Indiana Department of Environmental Management, 2014). Notably, several ERD projects which intended to use liquid carbon (emulsified oils) sources have failed to receive regulatory approval due to issues associated with excessive production of methane during previous technology applications (Personal Communication - State of California; State of Minnesota). As a result, many remedial practitioners proactively design contingencies for conventional ERD/ISCR implementation in the event that methane exceeds a threshold level ranging from 1 to 10 ppm groundwater. These contingencies often entail expensive and extensive systems for treating methane in soil gas/vapor captured via SVE systems.

Provect-IR, Provect-IRM, Provect-OX, Provect-CH4, and ABC-CH4 are registered trademarks of Provectus Environmental Products, Inc.
v4 – Sept. 4th, 2014 • Copyright ©2014 Provectus Environmental Products, Inc.

ABC-CH4™ PROOF OF CONCEPT – FIELD CASE STUDY:



In August 2014, ABC-CH4 was added proximal to existing monitoring well MW-207s to treat groundwater at an active shopping mall in Georgia, USA that was impacted by PCE and its catabolites (TCE, DCE and VC) from a former dry cleaning operation. At the same time, the same amount of a standard ERD amendment (no methane inhibitors) was added proximal to existing monitoring well MW-4 which was located ca. 200 feet cross gradient.

Prior to amendment application, baseline groundwater analysis were conducted for dissolved methane and COIs. Six weeks post application, groundwater samples were collected for similar analysis. At that same time, analysis of the head space gases in MW-4 and MW-207s was conducted by Field Environmental Instruments (Pittsburgh, PA) using both a Thermo/Foxboro TVA-1000B PID/FID Analyzer (PID sensitive to 2,000 ppm CH4; FID sensitive to 50,000 ppm CH4) and a LandTec GEM5000 Landfill Gas (LFG) Meter (infrared detector calibrated to 15% methane). Well head space gases were analyzed from top of the well heads immediately upon opening the well caps with readings recorded every minute for 5 minutes.

As summarized in **Table 2,** the MW-4 (water depth 11.9 ft bgs; pressure 0.11 in) treated with an ERD substrate only had over 30% CH4 in the headspace gas as measured by the GEM5000 LFG meter (note – TVA detectors exceeded their level of sensitivity and shut down). By comparison, the well headspace gas in MW-207s (water depth 18 ft bgs; pressure 0.24 in) had only 0.5% CH4.

Table 2a. Well Head Gas Analysis at a Former Dry Cleaner Site in Georgia (6 weeks post ERD application).

Well Location	CH4 PID (ppm)	CH4 FID (ppm)	CH4 TGA %	CO2 %	O2 %	Balance (N) %
MW-4						
0 min	297	>50,000	34.8	65.2	0.0	0.0
5 min	439	>50,000	35.6	61.0	0.2	3.2
MW-207s						
0 min	82	Out of range	0.5	1.0	12.7	85.8
5 min	41	1,599	0.4	0.7	20.2	78.7

Table 2b. Dissolved Gas Analysis at a Former Dry Cleaner Site in Georgia (Method RSK 175).

Well Location	Pre-injection (ppm)		6 weeks Post-Injection (ppm)	
	CH4	PCE	CH4	PCE
MW-4	13,700	170		
MW-207s	11.8	1,200		

Provect-IR, Provect-IRM, Provect-OX, Provect-CH4, and ABC-CH4 are registered trademarks of Provectus Environmental Products, Inc.
v4 – Sept. 4th, 2014 • Copyright ©2014 Provectus Environmental Products, Inc.

ABC-CH4™ PRIMARY FEATURES:

ABC-CH4™ is the only ERD Reagent that includes Provect-CH4™ to rapidly improve remedial performance while simultaneously minimizing the production of methane. The benefits are notable:

- More Efficient = More Cost Effective: Production of methane is a direct indication that the hydrogen generated from the organic carbon amendments was used by methanogens and the amendment has been wasted because it was not utilized by acetogens or dehalorespiration. By inhibiting the growth and proliferation of methane producing Archaea, chlororespiring bacteria can become the more dominant bacterial populations and **at least 30% less ERD amendment can be applied**.
- Safer: Methane is explosive with an LEL of 5% and an UEL of 15%. Production of methane will result from the addition of any conventional ERD or ISCR amendment: excessive and extended production of methane can result in elevated in groundwater concentrations (as high as 1,000 ppm have been reported) which can lead to accumulation in soil gas subsequently impacting indoor air. State specific regulations for methane in groundwater have been promulgated, with others pending for soil gas and indoor air.
- Green and Sustainable Technology: Formulated with byproducts from "green" energy processes, so it is better for the environment.
- Patented Technologies: Technology end users and their clients are fully protected from all Patent and other legal issues.
- Ease of Use:
  - Completely soluble in water hence no need for extensive and time consuming "water chase".
  - No need to emulsify the product with specialize tooling and equipment
  - No laborious material transfers and dilutions
  - No worry about an emulsion breaking.
  - Lower injection pressures
  - No soap formation from bringing pH up too high
  - ABC-CH4 is formulated for each site specific application
  - Avoids cost and need for contingency planning to manage excessive methane production (SVE/AS off gas treatment)
- Longevity (> 2 years): Contains C14 to C18 fatty acids that have been shown in the field to last for over two years. Emulsified oils eventually break down into bioavailable C18 fatty acids through hydrolysis, so we are essentially using the same long-lived components of emulsified oils without having to emulsify or wait for hydrolysis to occur.
- Natural Co-Solvent: Through a license with Oregon State University, ABC-CH4™ includes ethyl lactate which is a "green" co-solvent. This helps dissolve fatty acids, and it also serves as a solvent for sites that may have DNAPL, because the ethyl lactate solvates the DNAPL and promotes rapid treatment.
- Cost Competitive: At a list price of $1.85/lb (Volume Discounts will Apply) for ABC-CH4™ containing 60% carbon + methane inhibitor, this is the most cost efficient way of procuring the combined technologies. When all factors are considered ABC-CH4™ is an excellent value.
- Saves on Least 10% When Compared to ERD Alone: Using the site scenario summarized below, 67,500 lbs of ABC-CH4™ (which includes the methane inhibitors) cost $121,500 which is an excellent value when compared to a cost of $135,000 for 90,000 lbs of a conventional ERD amendment that does not include methane inhibitors.

Provect-IR, Provect-IRM, Provect-OX, Provect-CH4, and ABC-CH4 are registered trademarks of Provectus Environmental Products, Inc.
v4 – Sept. 4th, 2014 • Copyright ©2014 Provectus Environmental Products, Inc.

ABC-CH4™ What Does it Cost?

Treatment Zone Dimensions		
Width of targeted zone (perpendicular to gw flow)	266	ft
Length of targeted zone (parallel to gw flow)	266	ft
Depth to top of treatment zone	20	ft
Depth to bottom of treatment zone	45	ft
Treatment zone thickness	25	ft
Calculated Volume	1768900	ft3
Methane Inhibitor Calculations		
Estimated Porosity	30	%
Calculated impacted liquid	530,670	ft3
Targeted RYR Conc in GW	50	ppm
Methane Inhibitor for Project	1,656	lbs
ROUND TO 55 lb units (25 kg drums)	30	
Unit Price as ERD Supplement (VOLUME DISCOUNTS APPLY)	$35/lb	1,650 lbs
TOTAL (excludes shipping)	**$57,750**	

- Calculated at least 30% less ERD Amendment required = cost offsets.
  - 90,000 lbs ERD required x $1.50/lb = $135,000
  - Can use 30% less ERD = 67,500 lbs x $1.50/lb = $101,250 (saves $33,750)
  - ERD Plus 1,650 lbs Provect-CH4 x $35/lb = $57,750 → $159,000 (adds $24,000 or *ca.* 15%)
  - 67,500 lbs ABC-CH4 x $1.80/lb = $121,500 **($13,500 less than ERD alone)**
- Avoids need for contingency planning; Safety and Efficacy assurance

CONFIDENTIAL

APPLICATION GUIDELINES:

We calculate the theoretical hydrogen demand of a subsurface system based on the redox equations specified in Stumm and Morgan (1996) using site-specific data for the parameters that participate in redox reactions: dissolved oxygen, nitrate, sulfate, ferrous hydroxide, manganese dioxide, contaminant species (*e.g.,* PCE, TCE, *et cetera*), as well as pH and redox potential. From our experience, this value is usually a significant underestimate of the amount of hydrogen required for the system, nevertheless it provides a lower boundary for the range of hydrogen that should be applied to the target volume.

Factors that increase the required hydrogen dose over the theoretical dose include compound concentration heterogeneity (both ambient species and contaminant species), relevant bacteria heterogeneity (presence, viability and density), dynamic conditions (groundwater recharge and flow), application limitations (inherently non uniform distribution of hydrogen due to access methods like injection), hydrogen conversion inefficiencies (hydrogen in a molecule of amendment is rarely converted with 100% efficiency), and others. From our experience of successfully applying enhanced reduction (both biological and abiotic) at hundreds of sites, we have developed an application range that incorporates site specific analytical data as well as knowledge of successful application rates from similar sites under similar conditions. Typically our successful application dose ranges from approximately 0.05 to 0.15 lbs of amendment per cubic foot of aquifer for injections.

- Viscosity = 10 cP at 20 C
- Specific Gravity = 1.14

Provect-IR, Provect-IRM, Provect-OX, Provect-CH4, and ABC-CH4 are registered trademarks of Provectus Environmental Products, Inc.
v4 – Sept. 4th, 2014 • Copyright ©2014 Provectus Environmental Products, Inc.

ORDERING:

All orders for ABC-CH4™ are processed through Redox Tech, LLC at the following address:

REDOX TECH, LLC
"Providing Innovative In Situ Soil and Groundwater Treatment"

200 Quade Drive
CARY NC 27513
Phone: (919) 678.0140 Fax: (919) 678.0150
www.redox-tech.com

Literature Cited:

Rice *et al,* 1999. *In Situ* Anaerobic Dehalogenation, US Patent 6,001,252.

Scalzi, M. and A. Karachalios. 2013 and 2014. Inhibition of Methane Production during Anaerobic Reductive Dechlorination. US PTO 13/ 785,840 and CIP 14/268,637.

Stumm and Morgan, 1996 (Aquatic Chemistry, 3rd Ed. pp 464-498).

CONTACT US FOR A COMPLIMENTARY SITE EVALUATION

REDOX TECH, LLC.

200 QUADE DRIVE | CARY, NC 27513

Tel: (919) 678-0140 | Fax: (9195) 678-0150 | haselow@redox-tech.com

Provect-IR, Provect-IRM, Provect-OX, Provect-CH4, and ABC-CH4 are registered trademarks of Provectus Environmental Products, Inc.
v4 – Sept. 4th, 2014 • Copyright ©2014 Provectus Environmental Products, Inc.

MATERIAL SAFETY DATA SHEET
ABC-CH4
(Anaerobic BioChem ABC with methane inhibitor)

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **ABC-CH4**
GENERAL USE: **Bioremediation with methane inhibitor**

MANUFACTURER:

Redox Tech, LLC
200 Quade Drive
Cary, NC 27513
919-678-0140

EMERGENCY TELEPHONE:

Within USA and Canada: 1-800-424-9300
+1 703-527-3887 (collect calls accepted)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Product is generally recognized as safe. May cause irritation exposure to eyes. Long term contact to skin may cause some drying and minor irritation.

3. COMPOSITION INFORMATION ON INGREDIENTS

Proprietary mixture of fatty acids, glycerol, statins, lactates and dipotassium phosphate.

4. FIRST AID MEASURES

EYES: Immediately flush with water for up to 15 minutes. If irritation persists, seek medical attention.

SKIN: Rinse with water. Irritation is unlikely, but if irritation occurs or persists, seek medical attention.

INGESTION: Generally safe to ingest but not recommended.

INHALATION: No first aid required.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Deluge with water

FIRE/EXPLOSION HAZARDS: Product is combustible only at temperatures above 600C

FIRE FIGHTING PROCEDURES: Use flooding with plenty of water, carbon dioxide or other inert gasses. Wear full protective clothing and self-contained breathing apparatus. Deluging with water is the best method to control combustion of the product.

FLAMMABILITY LIMITS: non-combustible

SENSITIVITY TO IMPACT: non-sensitive

SENSITIVITY TO STATIC DISCHARGE: non-sensitive

6. ACCIDENTAL RELEASE MEASURES

Confine and collect spill. Transfer to an approved DOT container and properly dispose. Do not dispose of or rinse material into sewer, stormwater or surface water. Discharge of product to surface water could result in depressed dissolved oxygen levels and subsequent biological impacts.

7. HANDLING AND STORAGE

HANDLING: Protective gloves and safety glasses are recommended.

STORAGE: Use first in, first out storage system. Keep container tightly closed when not in use. Avoid contact with oxidizing agents.

8. EXPOSURE CONTROLS – PERSONAL PROTECTION

EXPOSURE LIMITS

Chemical Name	ACGIH	OSHA	Supplier
ABC-CH4	**NA**	**NA**	**NA**

ENGINEERING CONTROLS: None are required

PERSONAL PROTECTIVE EQUIPMENT

EYES and FACE: Safety glasses recommended
RESPIRATOR: none necessary
PROTECTIVE CLOTHING: None necessary
GLOVES: rubber, latex or neoprene recommended but not required

9. PHYSICAL AND CHEMICAL PROPERTIES

Odor:	none to mild pleasant organic odor
Appearance:	milky to light red amber
Auto-ignition Temperature	Non-combustible

Boiling Point	>600 C
Melting Point	NA
Density	1.15 gram/cc
Solubility	infinite
pH	7-9

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: Do not contact with strong oxidizers
STABILITY: product is stable
POLYMERIZATION: will not occur
INCOMPATIBLE MATERIALS: strong oxidizers
HAZARDOUS DECOMPOSITION PRODUCTS:

11. TOXICOLOGICAL INFORMATION

Acute Toxicity
A: General Product Information
Acute exposure may cause mild skin and eye irritation.
B: Component Analysis - LD50/LC50

No information available.

B: Component Analysis - TDLo/LDLo
TDLo (Oral-Man) none

Carcinogenicity
A: General Product Information
No information available.
B: Component Carcinogenicity
Product is not listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

Epidemiology
No information available.

Neurotoxicity
No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity
Discharge to water may cause depressed dissolved oxygen and subsequent ecological stresses
Environmental Fate
No potential for food chain concentration

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Material is not considered hazardous, but consult with local, state and federal agencies prior to disposal to ensure all applicable laws are met.

14. TRANSPORT INFORMATION

NOTE: The shipping classification information in this section (Section 14) is meant as a guide to the overall classification of the product. However, transportation classifications may be subjectto change with changes in package size. Consult shipperrequirements under I.M.O., I.C.A.O. (I.A.T.A.) and 49 CFR to assure regulatory compliance.

US DOT Information
Shipping Name: Not Regulated
Hazard Class: Not Classified
UN/NA #: Not Classified
Packing Group:None
Required Label(s):None

50th Edition International Air Transport Association (IATA):
Not hazardous and not regulated

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

Material is not regulated under IMDG

15. REGULATORY INFORMATION

SARA TITLE III

SECTION 311 No Hazard for Immediate health Hazard
SECTION 312 No Threshold Quanitity
SECTION 313 Not listed

CERCLA NOT REGULATED UNDER CERCLA

TSCA NOT REGULATED UNDER TSCA

CANADA (WHIMS): NOT REGULATED

16. OTHER INFORMATION

HMIS:

Health	1
Flammability	0
Physical Hazard	0
Personal Protection	E

E: Safety Glasses, gloves

Appendix S
Supporting Information for Cost Estimate

Table S-1
Cost Estimate Summary of Soil and Groundwater Treatment Alternatives
Former Tecumseh Products Company Site
Tecumseh, Michigan

No.	Approach/Components	Capital Cost	Annual O&M Cost	Extended Cumulative Lifetime Project Costs (Present Value), yrs of operation				
		$	$	2	4	6	8	10
Soil and Groundwater Treatment Alternatives Summary								
	Treatment Option							
	Soil Vapor Extraction (SVE) / Air Sparge (AS)	$ 1,603,440	$ 266,500	$ 2,126,190	$ 2,609,502	$ 2,970,870	$ 3,222,783	**$ 3,455,690**
	In Situ Thermal Desorption (ISTD)	$ 20,422,440	$ -	$ 20,566,440	$ 20,566,440	$ 20,566,440	$ 20,566,440	**$ 20,566,440**
	In Situ Chemical Oxidation (ISCO)	$ 8,526,690	$ -	$ 8,526,690	$ 8,526,690	$ 8,526,690	$ 8,526,690	**$ 8,526,690**
	Enhanced Reductive Dechlorination (ERD)- Direct Push	$ 3,766,860	$ -	$ 3,766,860	$ 3,766,860	$ 3,766,860	$ 3,766,860	**$ 3,766,860**
	SVE (existing system) ERD with Enhanced In Situ Bioremediation (EISB)	$ 598,740	$ 600,000	$ 1,775,663	$ 1,886,610	$ 1,886,610	$ 1,886,610	**$ 2,326,185**
	PCE Source Area Soil Treatment (Interim Measure)	$ 175,000						

Table S-2
Cost Estimate Breakdown for Soil Treatment Alternatives
Former Tecumseh Products Company Site
Tecumseh, Michigan

No.	Approach/Components	Capital Cost	Annual O&M Cost	Extended Cumulative Lifetime Project Costs (Present Value), yrs of operation				
		$	$	2	4	6	8	10
Soil Treatment Alternatives								
1	**Soil Vapor Extraction (SVE)[1]**	**$ 756,840**	**$ 104,000**	**$960,840**	**$1,149,449**	**$1,238,349**	**$1,238,349**	**$1,238,349**
	System Construction							
	Design/Permitting	$ 10,000	$ -	$10,000	$10,000	$10,000	$10,000	$10,000
	Mobilization/Demobilization	$ 5,000	$ -	$5,000	$5,000	$5,000	$5,000	$5,000
	SVE Extraction well install (12 wells @ 100 foot well spacing)	$ 240,000	$ -	$240,000	$240,000	$240,000	$240,000	$240,000
	Extraction well network construction (general/underground)	$ 54,000	$ -	$54,000	$54,000	$54,000	$54,000	$54,000
	Extraction system construction (mechanical)	$ 55,000	$ -	$55,000	$55,000	$55,000	$55,000	$55,000
	Equipment	$ 225,000	$ -	$225,000	$225,000	$225,000	$225,000	$225,000
	Paving	$ 40,000	$ -	$40,000	$40,000	$40,000	$40,000	$40,000
	Electrical	$ 20,000	$ -	$20,000	$20,000	$20,000	$20,000	$20,000
	Construction Oversight	$ 75,000	$ -	$75,000	$75,000	$75,000	$75,000	$75,000
	System Start-Up	$ 18,000	$ -	$18,000	$18,000	$18,000	$18,000	$18,000
	System Annual O&M (4 Years of Operation)							
	System O&M: Electric	$ -	$ 30,000	$58,846	$113,253	$138,897	$138,897	$138,897
	System O&M: Labor & Expenses	$ -	$ 30,000	$58,846	$113,253	$138,897	$138,897	$138,897
	System O&M: GAC replacement (vapor phase)	$ -	$ 25,000	$49,038	$94,377	$115,747	$115,747	$115,747
	System O&M: Equipment Maintenance/Refurbishment (5%)	$ -	$ 13,000	$25,500	$49,076	$60,189	$60,189	$60,189
	System O&M: NPDES/Liquid Phase Lab Analyses	$ -	$ 3,000	$5,885	$11,325	$13,890	$13,890	$13,890
	System O&M: Vapor Phase Lab Analyses	$ -	$ 3,000	$5,885	$11,325	$13,890	$13,890	$13,890
	Project Management & Coordination (2%)	$ 14,840	$ -	$14,840	$14,840	$14,840	$14,840	$14,840

Notes:
4% Assumed interest rate
Cost estimates are based on subcontractor quotes, site-specific knowledge, and project experience from similar tasks at other sites. Cost estimates are ±10%.
All treatment options will contain a groundwater monitoring program. Costs for the groundwater monitoring program are not included in this table.
(1) Assumes that SVE is complimentary of the air sparge system (Groundwater Treatment Alternative #1); if SVE is combined with EISB (Soil Treatment Alternative #6), the SVE capture area will be significantly smaller (soil source areas).

2	**In Situ Thermal Desorption (ISTD)**	**$ 7,140,000**	**$ -**	**$7,212,000**	**$7,212,000**	**$7,212,000**	**$7,212,000**	**$7,212,000**
	Design/Permitting	$ 50,000	$ -	$50,000	$50,000	$50,000	$50,000	$50,000
	ISTD System Construction							
	Northern Soil Areas[1]	$ 4,150,000	$ -	$4,150,000	$4,150,000	$4,150,000	$4,150,000	$4,150,000
	Southern Soil Areas[2]	$ 2,750,000	$ -	$2,750,000	$2,750,000	$2,750,000	$2,750,000	$2,750,000
	Construction Oversight	$ 50,000	$ -	$50,000	$50,000	$50,000	$50,000	$50,000
	System Annual O&M (12 months)							
	System O&M: Electric and Natural Gas *(w/Capital Costs)*	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Labor & Expenses	$ -	$ 72,000	$72,000	$72,000	$72,000	$72,000	$72,000
	System O&M: Equipment Maintenance/Refurbishment *(w/Capital Costs)*	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: System Efficiency Sampling & Reporting *(w/Capital Costs)*	$ -	$ -	$0	$0	$0	$0	$0
	Project Management & Coordination (2%)	$ 140,000	$ -	$140,000	$140,000	$140,000	$140,000	$140,000

Notes:
4% Assumed interest rate
Cost estimates are based on subcontractor quotes, site-specific knowledge, and project experience from similar tasks at other sites. Cost estimates are ±10%.
All treatment options will contain a groundwater monitoring program. Costs for the groundwater monitoring program are not included in this table.
(1) Soil treatment area assumed to be 30,000 ft^2 area to depth of groundwater; used in combination with Groundwater Treatment Alternative #2: ISTD. Includes costs for 1 polishing injection event at 50% of initial event.
(2) Soil treatment area assumed to be 20,000 ft^2 to depth of groundwater; used in combination with Groundwater Treatment Alternative #2: ISTD. Includes costs for 1 polishing injection event at 50% of initial event.

Table S-2
Cost Estimate Breakdown for Soil Treatment Alternatives
Former Tecumseh Products Company Site
Tecumseh, Michigan

No.	Approach/Components	Capital Cost	Annual O&M Cost	Extended Cumulative Lifetime Project Costs (Present Value), yrs of operation				
		$	$	2	4	6	8	10
Soil Treatment Alternatives								
3	**In Situ Chemical Oxidation (ISCO)**	**$ 1,376,235**	**$ -**	**$1,376,235**	**$1,376,235**	**$1,376,235**	**$1,376,235**	**$1,376,235**
	Design/Permitting	$ 75,000	$ -	$75,000	$75,000	$75,000	$75,000	$75,000
	ISCO Injections							
	Northern Soil Areas(1)	$ 682,500	$ -	$682,500	$682,500	$682,500	$682,500	$682,500
	Southern Soil Areas(2)	$ 456,750	$ -	$456,750	$456,750	$456,750	$456,750	$456,750
	Construction Oversight	$ 135,000	$ -	$135,000	$135,000	$135,000	$135,000	$135,000
	System Annual O&M							
	System O&M: Electric and Natural Gas	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Labor & Expenses	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Chemical Expenses	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Equipment Maintenance/Refurbishment	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: System Efficiency Sampling & Reporting	$ -	$ -	$0	$0	$0	$0	$0
	Project Management & Coordination (2%)	$ 26,985	$ -	$26,985	$26,985	$26,985	$26,985	$26,985

Notes:
4% Assumed interest rate
Cost estimates are based on subcontractor quotes, site-specific knowledge, and project experience from similar tasks at other sites. Cost estimates are ±10%.
All treatment options will contain a groundwater monitoring program. Costs for the groundwater monitoring program are not included in this table.
(1) Soil treatment area assumed to be 30,000 ft^2 area to depth of groundwater; 71,800 lbs of potassium permanganate. Used in combination with Groundwater Treatment Alternative #3: ISCO. Includes costs for 1 polishing injection event at 50% of initial ev
(2) Soil treatment area assumed to be 20,000 ft^2 and ~12 foot vertical silt interval; 48,000 lbs of potassium permanganate. Used in combination with Groundwater Treatment Alternative #3: ISCO. Includes costs for 1 polishing injection event at 50% of initial

4	**Enhanced Reductive Dechlorination (ERD) - Direct Push**	**$ 666,060**	**$ -**	**$666,060**	**$666,060**	**$666,060**	**$666,060**	**$666,060**
	Design/Permitting	$ 75,000	$ -	$75,000	$75,000	$75,000	$75,000	$75,000
	ISCO Injections							
	Northern Soil Areas(1)	$ 310,000	$ -	$310,000	$310,000	$310,000	$310,000	$310,000
	Southern Soil Areas(2)	$ 205,000	$ -	$205,000	$205,000	$205,000	$205,000	$205,000
	Construction Oversight	$ 63,000	$ -	$63,000	$63,000	$63,000	$63,000	$63,000
	System Annual O&M							
	System O&M: Electric and Natural Gas	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Labor & Expenses	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Chemical Expenses	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Equipment Maintenance/Refurbishment	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: System Efficiency Sampling & Reporting	$ -	$ -	$0	$0	$0	$0	$0
	Project Management & Coordination (2%)	$ 13,060	$ -	$13,060	$13,060	$13,060	$13,060	$13,060

Notes:
4% Assumed interest rate
Cost estimates are based on subcontractor quotes, site-specific knowledge, and project experience from similar tasks at other sites. Cost estimates are ±10%.
All treatment options will contain a groundwater monitoring program. Costs for the groundwater monitoring program are not included in this table.
(1) Soil treatment area assumed 30,000 ft^2 area to depth of groundwater; 57,600 lbs of ABC+. Used in combination with Groundwater Treatment Alternative #4: ERD. Includes costs for 1 polishing injection event at 50% of initial event.
(2) Soil treatment area assumed to be 20,000 ft^2 area and ~12 foot vertical silt interval; 38,400 lbs of ABC+. Used in combination with Groundwater Treatment Alternative #4:ERD. Includes costs for 1 polishing injection event at 50% of initial event.

Table S-2
Cost Estimate Breakdown for Soil Treatment Alternatives
Former Tecumseh Products Company Site
Tecumseh, Michigan

No.	Approach/Components	Capital Cost	Annual O&M Cost	Extended Cumulative Lifetime Project Costs (Present Value), yrs of operation				
		$	$	2	4	6	8	10
Soil Treatment Alternatives								
6	**Soil Vapor Extraction (SVE) Expansion of Existing[1]**	**$ 208,080**	**$ 50,000**	**$306,157**	**$396,835**	**$439,575**	**$439,575**	**$439,575**
	System Construction							
	Design/Permitting	$ 10,000	$ -	$10,000	$10,000	$10,000	$10,000	$10,000
	Mobilization/Demobilization	$ 5,000	$ -	$5,000	$5,000	$5,000	$5,000	$5,000
	SVE Extraction well install (6 wells @ 100 foot well spacing)	$ 120,000	$ -	$120,000	$120,000	$120,000	$120,000	$120,000
	Extraction well network construction (general/underground)	$ 26,000	$ -	$26,000	$26,000	$26,000	$26,000	$26,000
	Extraction system construction (mechanical)	$ 10,000	$ -	$10,000	$10,000	$10,000	$10,000	$10,000
	Equipment	$ -	$ -	$0	$0	$0	$0	$0
	Paving	$ -	$ -	$0	$0	$0	$0	$0
	Electrical	$ 10,000	$ -	$10,000	$10,000	$10,000	$10,000	$10,000
	Construction Oversight	$ 15,000	$ -	$15,000	$15,000	$15,000	$15,000	$15,000
	System Start-Up	$ 8,000	$ -	$8,000	$8,000	$8,000	$8,000	$8,000
	System Annual O&M							
	System O&M: Electric	$ -	$ 13,000	$25,500	$49,076	$60,189	$60,189	$60,189
	System O&M: Labor & Expenses	$ -	$ 11,500	$22,558	$43,414	$53,244	$53,244	$53,244
	System O&M: GAC replacement (vapor phase)	$ -	$ 16,000	$31,385	$60,401	$74,078	$74,078	$74,078
	System O&M: Equipment Maintenance/Refurbishment (5%)	$ -	$ 6,500	$12,750	$24,538	$30,094	$30,094	$30,094
	System O&M: Vapor Phase Lab Analyses	$ -	$ 3,000	$5,885	$11,325	$13,890	$13,890	$13,890
	Project Management & Coordination (2%)	$ 4,080	$ -	$4,080	$4,080	$4,080	$4,080	$4,080

Notes:
4% Assumed interest rate
Cost estimates are based on subcontractor quotes, site-specific knowledge, and project experience from similar tasks at other sites. Cost estimates are ±10%.
All treatment options will contain a groundwater monitoring program. Costs for the groundwater monitoring program are not included in this table.
(1) SVE is combined with EISB (Groundwater Treatment Alternative #5), the SVE capture area for soil source areas is approximately 30,000 ft^2

Table S-3
Cost Estimate Breakdown for Groundwater Treatment Alternatives
Former Tecumseh Products Company Site
Tecumseh, Michigan

No.	Approach/Components	Capital Cost	Annual O&M Cost	Extended Cumulative Lifetime Project Costs (Present Value), yrs of operation				
		$	$	2	4	6	8	10
Groundwater Treatment Alternatives								
1	**Air Sparge (AS)**	**$ 846,600**	**$ 162,500**	**$1,165,350**	**$1,460,052**	**$1,732,521**	**$1,984,434**	**$2,217,341**
	AS System Construction[1]							
	Design/Permitting	$ 50,000	$ -	$50,000	$50,000	$50,000	$50,000	$50,000
	Mobilization/Demobilization	$ 30,000	$ -	$30,000	$30,000	$30,000	$30,000	$30,000
	Construction Oversight	$ 80,000	$ -	$80,000	$80,000	$80,000	$80,000	$80,000
	Air Sparge Injection Well install	$ 100,000	$ -	$100,000	$100,000	$100,000	$100,000	$100,000
	Air Sparge Injection Well Network Construction	$ 260,000	$ -	$260,000	$260,000	$260,000	$260,000	$260,000
	Equipment (e.g., blowers)	$ 180,000	$ -	$180,000	$180,000	$180,000	$180,000	$180,000
	Paving	$ 60,000	$ -	$60,000	$60,000	$60,000	$60,000	$60,000
	Electrical	$ 50,000	$ -	$50,000	$50,000	$50,000	$50,000	$50,000
	System Start-Up	$ 20,000	$ -	$20,000	$20,000	$20,000	$20,000	$20,000
	System Annual O&M (10 years)							
	System O&M: Electric	$ -	$ 75,000	$147,115	$283,132	$408,887	$525,154	$632,650
	System O&M: Labor & Expenses	$ -	$ 80,000	$156,923	$302,007	$436,146	$560,164	$674,827
	System O&M: Equipment Maintenance/Refurbishment (5%)	$ -	$ 7,500	$14,712	$28,313	$40,889	$52,515	$63,265
	System O&M: Vapor Phase Lab Analyses	$ -	$ -	$0	$0	$0	$0	$0
	Project Management & Coordination (2%)	$ 16,600	$ -	$16,600	$16,600	$16,600	$16,600	$16,600

Notes:
4% Assumed interest rate
Cost estimates are based on subcontractor quotes, site-specific knowledge, and project experience from similar tasks at other sites. Cost estimates are ±10%.
All treatment options will contain a groundwater monitoring program. Costs for the groundwater monitoring program are not included in this table.
(1) Includes 60 AS wells (6 lines perpendicular to groundwater flow, spaced 100 feet apart, with 10 wells in each line at a 30 foot spacing). Combined with Soil Treatment Alternative #1:SVE.

2	**In Situ Thermal Desorption (ISTD)**	**$ 13,282,440**	**$ -**	**$13,354,440**	**$13,354,440**	**$13,354,440**	**$13,354,440**	**$13,354,440**
	Design/Permitting	$ 50,000	$ -	$50,000	$50,000	$50,000	$50,000	$50,000
	ISTD System Construction							
	Northern Groundwater Areas[1]	$ 8,300,000	$ -	$8,300,000	$8,300,000	$8,300,000	$8,300,000	$8,300,000
	Southern Groundwater Areas[2]	$ 4,600,000	$ -	$4,600,000	$4,600,000	$4,600,000	$4,600,000	$4,600,000
	Construction Oversight	$ 72,000	$ -	$72,000	$72,000	$72,000	$72,000	$72,000
	System Annual O&M (12 months)							
	System O&M: Electric and Natural Gas *(w/Capital Costs)*	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Labor & Expenses	$ -	$ 72,000	$72,000	$72,000	$72,000	$72,000	$72,000
	System O&M: Equipment Maintenance/Refurbishment *(w/Capital Costs)*	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: System Efficiency Sampling & Reporting *(w/Capital Costs)*	$ -	$ -	$0	$0	$0	$0	$0
	Project Management & Coordination (2%)	$ 260,440	$ -	$260,440	$260,440	$260,440	$260,440	$260,440

Notes:
4% Assumed interest rate
Cost estimates are based on subcontractor quotes, site-specific knowledge, and project experience from similar tasks at other sites. Cost estimates are ±10%.
All treatment options will contain a groundwater monitoring program. Costs for the groundwater monitoring program are not included in this table.
(1) Groundwater treatment area assumed to be 60,000 ft^2; focused on areas of the plume with highest concentrations. Combined with Soil Treatment Alternative #2:ISTD.
(2) Groundwater treatment area assumed to be 40,000 ft2; focused on areas of the plume with highest concentrations. Combined with Soil Treatment Alternative #2:ISTD.

Table S-3
Cost Estimate Breakdown for Groundwater Treatment Alternatives
Former Tecumseh Products Company Site
Tecumseh, Michigan

No.	Approach/Components	Capital Cost	Annual O&M Cost	Extended Cumulative Lifetime Project Costs (Present Value), yrs of operation				
		$	$	2	4	6	8	10
Groundwater Treatment Alternatives								
3	**In Situ Chemical Oxidation (ISCO)**	**$ 7,150,455**	**$ -**	**$7,150,455**	**$7,150,455**	**$7,150,455**	**$7,150,455**	**$7,150,455**
	Design/Permitting	$ 75,000	$ -	$75,000	$75,000	$75,000	$75,000	$75,000
	ISCO Injections							
	Northern Groundwater Areas(1)	$ 2,537,500	$ -	$2,537,500	$2,537,500	$2,537,500	$2,537,500	$2,537,500
	Southern Groundwater Areas(2)	$ 3,662,750	$ -	$3,662,750	$3,662,750	$3,662,750	$3,662,750	$3,662,750
	Construction Oversight	$ 735,000	$ -	$735,000	$735,000	$735,000	$735,000	$735,000
	System Annual O&M							
	System O&M: Electric and Natural Gas	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Labor & Expenses	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Chemical Expenses	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Equipment Maintenance/Refurbishment	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: System Efficiency Sampling & Reporting	$ -	$ -	$0	$0	$0	$0	$0
	Project Management & Coordination (2%)	$ 140,205	$ -	$140,205	$140,205	$140,205	$140,205	$140,205

Notes:
4% Assumed interest rate
Cost estimates are based on subcontractor quotes, site-specific knowledge, and project experience from similar tasks at other sites. Cost estimates are ±10%.
All treatment options will contain a groundwater monitoring program. Costs for the groundwater monitoring program are not included in this table.
(1) Groundwater treatment area assumed to be 160,000 ft^2 and ~20 foot vertical interval; 269,000 lbs of potassium permanganate. Combined with Soil Treatment Alternative #3:ISCO. Includes costs for 1 polishing injection event at 50% of initial event.
(2) Groundwater treatment area assumed to be 180,000 ft^2 and ~28 foot vertical silt interval; 386,700 lbs of potassium permanganate. Combined with Soil Treatment Alternative #3:ISCO. Includes costs for 1 polishing injection event at 50% of initial event.

4	**Enhanced Reductive Dechlorination (ERD) - Direct Push**	**$ 3,100,800**	**$ -**	**$3,100,800**	**$3,100,800**	**$3,100,800**	**$3,100,800**	**$3,100,800**
	Design/Permitting	$ 75,000	$ -	$75,000	$75,000	$75,000	$75,000	$75,000
	ERD Injections							
	Northern Groundwater Areas(1)	$ 1,100,000	$ -	$1,100,000	$1,100,000	$1,100,000	$1,100,000	$1,100,000
	Southern Groundwater Areas(2)	$ 1,640,000	$ -	$1,640,000	$1,640,000	$1,640,000	$1,640,000	$1,640,000
	Construction Oversight	$ 225,000	$ -	$225,000	$225,000	$225,000	$225,000	$225,000
	System Annual O&M							
	System O&M: Electric and Natural Gas	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Labor & Expenses	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Chemical Expenses	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: Equipment Maintenance/Refurbishment	$ -	$ -	$0	$0	$0	$0	$0
	System O&M: System Efficiency Sampling & Reporting	$ -	$ -	$0	$0	$0	$0	$0
	Project Management & Coordination (2%)	$ 60,800	$ -	$60,800	$60,800	$60,800	$60,800	$60,800

Notes:
4% Assumed interest rate
Cost estimates are based on subcontractor quotes, site-specific knowledge, and project experience from similar tasks at other sites. Cost estimates are ±10%.
All treatment options will contain a groundwater monitoring program. Costs for the groundwater monitoring program are not included in this table.
(1) Groundwater treatment area assumed to be 160,000 ft^2 and ~20 foot vertical interval; 216,000 lbs of ABC+. Combined with Soil Treatment Alternative #4:ERD. Includes costs for 1 polishing injection event at 50% of initial event.
(2) Groundwater treatment area assumed to be 180,000 ft^2 area and ~28 foot vertical silt interval; 317,000 lbs of ABC+. Combined with Soil Treatment Alternative #4:ERD. Includes costs for 1 polishing injection event at 50% of initial event.

Table S-3
Cost Estimate Breakdown for Groundwater Treatment Alternatives
Former Tecumseh Products Company Site
Tecumseh, Michigan

No.	Approach/Components	Capital Cost	Annual O&M Cost	Extended Cumulative Lifetime Project Costs (Present Value), yrs of operation				
		$	$	2	4	6	8	10
Groundwater Treatment Alternatives								
5	**ERD with Enhanced In Situ Bioremediation (EISB)(1)**	**$ 598,740**	**$ 600,000**	**$1,775,663**	**$1,886,610**	**$1,886,610**	**$1,886,610**	**$1,886,610**
	Design/Permitting	$ 45,000	$ -	$45,000	$45,000	$45,000	$45,000	$45,000
	ESIB Construction							
	Northern Groundwater Area	$ 255,000	$ -	$255,000	$255,000	$255,000	$255,000	$255,000
	Southern Groundwater Area	$ 245,000	$ -	$245,000	$245,000	$245,000	$245,000	$245,000
	Construction Oversight	$ 42,000	$ -	$42,000	$42,000	$42,000	$42,000	$42,000
	System Annual O&M							
	System O&M: Electric and Natural Gas	$ -	$ 30,000	$58,846	$86,583	$86,583	$86,583	$86,583
	System O&M: Labor & Expenses	$ -	$ 50,000	$98,077	$144,305	$144,305	$144,305	$144,305
	System O&M: Chemical Expenses	$ -	$ 480,000	$941,538	$941,538	$941,538	$941,538	$941,538
	System O&M: Equipment Maintenance/Refurbishment	$ -	$ 40,000	$78,462	$115,444	$115,444	$115,444	$115,444
	System O&M: System Efficiency Sampling & Reporting	$ -		$0	$0	$0	$0	$0
	Project Management & Coordination (2%)	$ 11,740	$ -	$11,740	$11,740	$11,740	$11,740	$11,740

Notes:
4% Assumed interest rate
Cost estimates are based on subcontractor quotes, site-specific knowledge, and project experience from similar tasks at other sites. Cost estimates are ±10%.
All treatment options will contain a groundwater monitoring program. Costs for the groundwater monitoring program are not included in this table.
(1) See Corrective Measures Proposal for basis of design.