

US EPA ARCHIVE DOCUMENT



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February 20, 2012

Mr. David Roberts  
Tecumseh Food Machinery and Engineering  
100 East Patterson Street  
Tecumseh, Michigan 49286

**Subject: Sub-Slab Depressurization/Ventilation System Construction Documentation and Indoor Air Sample Results for S-Building Located at 100 East Patterson Street**

Dear Mr. Roberts:

This letter report provides a documentation of sub-slab depressurization/ventilation (SSDV) system installation conducted between October 10 and October 12, 2011, and summarizes the results of the initial indoor air sample event conducted between October 26 and October 27, 2011 in S-Building at 100 East Patterson Street in Tecumseh, Michigan. This letter includes a description of system installation activities, a summary of the initial system performance evaluation, a description of sample collection activities, a summary of indoor air sample results, and a description of proposed future performance verification and sampling activities.

## Background

In 2009, TPC retained TRC Environmental Corporation (TRC)<sup>1</sup> to investigate soil and groundwater conditions at the former TPC site located at 100 East Patterson Street in Tecumseh, Michigan. These investigation activities indicate that on-site soil and shallow groundwater are affected by chlorinated volatile organic compounds (CVOCs). As a presumptive remedy to address the potential volatilization to indoor air migration pathway, TPC opted to install a SSDV in the occupied portion of the former TPC site known as S-Building. A Workplan for the Installation of a Sub-Slab Depressurization/Ventilation System: S-Building at 100 East Patterson Street (Workplan) was prepared in September 2011.

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<sup>1</sup> 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.

## Summary of Field Activities

### System Installation

The SSDV system was installed in general accordance with the Workplan on October 10 and October 11, 2011. The suction point is located along the north wall of the basement (Figure 1). The suction point was located such that the vent pipe riser could be extended through the stairwell to the roof of the building without penetrating any interior or exterior walls. The annulus between the opening in concrete floor and the vent pipe riser was sealed with concrete.

The vent pipe riser is composed of 4-inch Schedule 20 polyvinyl chloride (PVC) pipe. From the suction point, the vent pipe riser extends vertically up the northern basement wall. PVC joints were used to route the vent pipe riser into the basement stairwell. In the stairwell, the vent pipe riser extends vertically to the fan located on the roof of the building. Supports for the vent pipe riser were installed adjacent to the roof penetration, at least every eight feet along the vertical length of the riser pipe, and at pipe joints/turns. All joints were permanently sealed with PVC pipe cement to prevent leakage from the vent pipe riser. The vent pipe discharge extends vertically approximately 2.5 feet above the roof. The vent pipe riser is equipped with the following:

- A U-tube manometer located in the basement to monitor differential pressure between the basement and the vent pipe riser;
- A system alarm, which alarms when differential pressure is not maintained between the vent pipe riser and the basement;
- A brass ball-valve sample point located just above the exhaust fan so that system exhaust may be monitored;
- A T-fitting to simplify potential future system modification, such as the addition of one or more additional suction points;
- A bypass for condensation drainage to prevent freezing or blockage of the exhaust fan; and
- A T-fitting at the top of the discharge pipe to prevent rainwater from entering the riser pipe.

The corrosion resistant, 110-watt Fan Max exhaust fan was installed on the roof near the vent pipe riser discharge point. The fan was hard-wired into the building electrical system to help ensure that the fan remains in continuous operation.

### Installation of Cross-Slab Pressure Points

Cross-slab pressure points were installed on October 11, 2011 near the two corners of the S-Building furthest from the suction point, as shown on Figure 1. Differential pressure point extensions are composed of threaded ¼-inch galvanized steel pipe. Pressure points are sealed with threaded caps when not in use.

### Elimination of Preferential Migration Pathways

On October 10, 2011, potential preferential migration pathways were identified and eliminated as follows:

- There is a sump located in the basement. To prevent preferential migration for the sump, a sheet of Lexan™ plastic was cut to fit and sealed over the open sump.
- The basement floor and walls were inspected and are in good condition, with no large cracks or openings. No floor/wall sealing was performed.

### Backdraft Evaluation

Backdrafting may occur if a building is depressurized to the extent that the suction in the building overcomes the thermal effects that draw products of combustion from gas stoves, furnaces and other open-combustion gas-powered appliances up the flues, causing combustion products including carbon monoxide to flow into the building instead of the flue. TRC evaluated the potential for backdrafting. No gas-powered appliances were identified.

### Initial Performance Verification

System performance was evaluated on October 12, 2011 approximately 24-hours after system installation was complete. The following was conducted to verify system performance:

- A system inspection was performed. No problems with the fan, piping, or wall/floor sealing were identified.
- The differential pressure at the vent pipe riser was 3.0 inches of water (750 Pascals [Pa]), measured using the U-tube manometer;
- Initial pressure readings were collected for the differential cross-slab pressure points. No differential pressure was recorded, triggering collection of an indoor air sample to verify system performance.

### Follow-up Performance Verification and Indoor Air Sample Event

System performance was evaluated again on October 26, 2011 approximately 2-weeks after system installation was complete. The following was conducted to verify system performance:

- A system inspection was performed. No problems with the fan, piping, or wall/floor sealing were identified.
- The differential pressure at the vent pipe riser was 3.3 inches of water (820 Pa), measured using the U-tube manometer;
- Pressure readings were collected for the differential cross-slab pressure points. The vacuum at the north pressure point was 2.6 Pa. The vacuum at the southwest pressure point was 0.7 Pa.
- An indoor air sample was collected in a 6-liter SUMMA<sup>®</sup> canister which had been individually certified clean by H&P Mobile Geochemistry, Inc. (H&P), the analytical laboratory. Prior to sample collection a shut-in leak test was performed to confirm that there were no significant leaks in the sample apparatus. Sample collection was conducted in accordance with the procedures outlined in the Workplan. The sample was analyzed by the analytical laboratory for VOCs using USEPA Method TO-15.

### Evaluation of Chemistry Data

Chemistry data for the indoor air sample collected from S-Building are summarized in Table 1. The analytical report from the laboratory is included as Appendix A. These data were compared to provisional non-residential indoor air criteria, included on Table 1, as well as general background concentration information contained in the USEPA document titled "Background Indoor Air Concentrations of Volatile Organic Compounds in North American Residences (1990-2005): A Compilation of Statistics for Assessing Vapor Intrusion," dated June 2011. This USEPA document is a compilation of several studies and provides tables which list the total number of samples evaluated, detection limits, and percent detections.

Five analytes that are not constituents of concern (COCs) for the former Tecumseh Products Company facility were detected in the sample: acetone, benzene, 2-butanone, chloromethane, and trichlorofluoromethane. These compounds are components of common household products and/or gasoline and are found in more than 50-percent of background indoor air samples (USEPA, 2011). None of these compounds have consistently been detected in groundwater in the vicinity of S-Building.



**No COCs were detected above non-residential indoor air criteria.** Only one COC, trichloroethene (TCE), was detected in the sample, at a concentration of 0.57 ppbv. This concentration is below the non-residential indoor air criterion of 1.7 ppbv.

#### **Data Validation**

As indicated above, TRC collected one indoor air sample at the subject property on October 26-27, 2011. The sample was analyzed by H&P Mobile Geochemistry, Inc., in Carlsbad, California for VOCs by USEPA Method TO-15 following the procedures specified in the Quality Assurance Project Plan. TRC performed validation of the laboratory data. The data quality objectives and laboratory completeness goals for the project were met, and the data are usable. The procedures specified in the methods were implemented, and the data package contained all of the deliverables necessary for validation of the analytical data. The laboratory data validation report is included as Appendix B.

#### **Summary and Proposed Future Activities**

The system performance evaluation indicates that the SSDV system is operating as intended, controlling the volatilization to indoor air migration pathway such that COCs, particularly TCE, are not present in indoor air above non-residential indoor air criteria. In accordance with the Workplan, TRC will collect a second indoor air sample concurrent with the first quarter 2012 system performance evaluation. TRC has scheduled this sample event for February 28-29, 2012, and will contact Tecumseh Food Machinery and Engineering by phone to arrange for access to S-Building for the first quarter system performance evaluation.

If you have any questions regarding this correspondence or the upcoming system performance evaluation, please contact me at (734) 585-7813.

Sincerely,

TRC Environmental Corporation



Graham Crockford, C.P.G.  
Project Manager

Attachments

Table 1 – Summary of Volatile Organic Compounds in Indoor Air at S-Building

Figure 1 – Building Layout - S-Building

Appendix A – Laboratory Analytical Data – October 2011

Appendix B – Laboratory Data Validation Report

cc: Michelle Mullin – USEPA  
Jason Smith – Tecumseh Products Company  
Douglas McClure – Conlin, McKenney & Philbrick, PC  
Roger Jackson – Tecumseh Products Company

# Table

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Table 1  
Summary of Volatile Organic Compounds in Indoor Air at S-Building  
Tecumseh Products Company  
Tecumseh, Michigan

Analyte	Units	Non-Residential Indoor Air Criteria <sup>(1)</sup>	Nov 14-15, 2011
Acetone	ppbv	NC	120
Benzene	ppbv	NC	0.16
Bromodichloromethane	ppbv	NC	<0.20
Bromoform	ppbv	NC	<0.20
Bromomethane	ppbv	NC	<0.20
2-Butanone (MEK)	ppbv	NC	0.57
Carbon disulfide	ppbv	NC	<0.20
Carbon tetrachloride	ppbv	NC	<0.10
Chlorobenzene	ppbv	NC	<0.20
Chloroethane	ppbv	NC	<0.20
Chloroform	ppbv	NC	<0.10
Chloromethane	ppbv	NC	0.45
Dibromochloromethane	ppbv	NC	<0.20
1,2-Dibromoethane (EDB)	ppbv	NC	<0.20
1,2-Dichlorobenzene	ppbv	NC	<0.20
1,3-Dichlorobenzene	ppbv	NC	<0.20
1,4-Dichlorobenzene	ppbv	NC	<0.20
Dichlorodifluoromethane (F12)	ppbv	NC	<0.40
1,1-Dichloroethane	ppbv	19	<0.20
1,2-Dichloroethane (EDC)	ppbv	1.2	<0.20
1,1-Dichloroethene	ppbv	220	<0.20
cis-1,2-Dichloroethene	ppbv	38	<0.20
trans-1,2-Dichloroethene	ppbv	65	<0.20
1,2-Dichloropropane	ppbv	NC	<0.20
cis-1,3-Dichloropropene	ppbv	NC	<0.20
trans-1,3-Dichloropropene	ppbv	NC	<0.20
Dichlorotetrafluoroethane (F114)	ppbv	NC	<0.20
Ethylbenzene	ppbv	NC	<0.20
4-Ethyltoluene	ppbv	NC	<0.20
Hexachlorobutadiene	ppbv	NC	<0.40
2-Hexanone (MBK)	ppbv	NC	<0.40
4-Methyl-2-pentanone (MIBK)	ppbv	NC	<0.40
Methylene chloride (Dichloromethane)	ppbv	NC	<0.20
Styrene	ppbv	NC	<0.20
1,1,1,2-Tetrachloroethane	ppbv	NC	<0.20
1,1,2,2-Tetrachloroethane	ppbv	NC	<0.20
Tetrachloroethene	ppbv	3.1	<0.20
Toluene	ppbv	NC	<1.0
1,2,4-Trichlorobenzene	ppbv	NC	<0.20
1,1,1-Trichloroethane	ppbv	4,000	<0.20
1,1,2-Trichloroethane	ppbv	NC	<0.20
Trichloroethene	ppbv	1.7	0.57
Trichlorofluoromethane (F11)	ppbv	NC	0.26
1,1,2-Trichlorotrifluoroethane (F113)	ppbv	NC	<1.0
1,2,4-Trimethylbenzene	ppbv	NC	<0.20
1,3,5-Trimethylbenzene	ppbv	NC	<0.20
Vinyl chloride	ppbv	11	<0.10
m,p-Xylene	ppbv	NC	<0.20
o-Xylene	ppbv	NC	<0.20

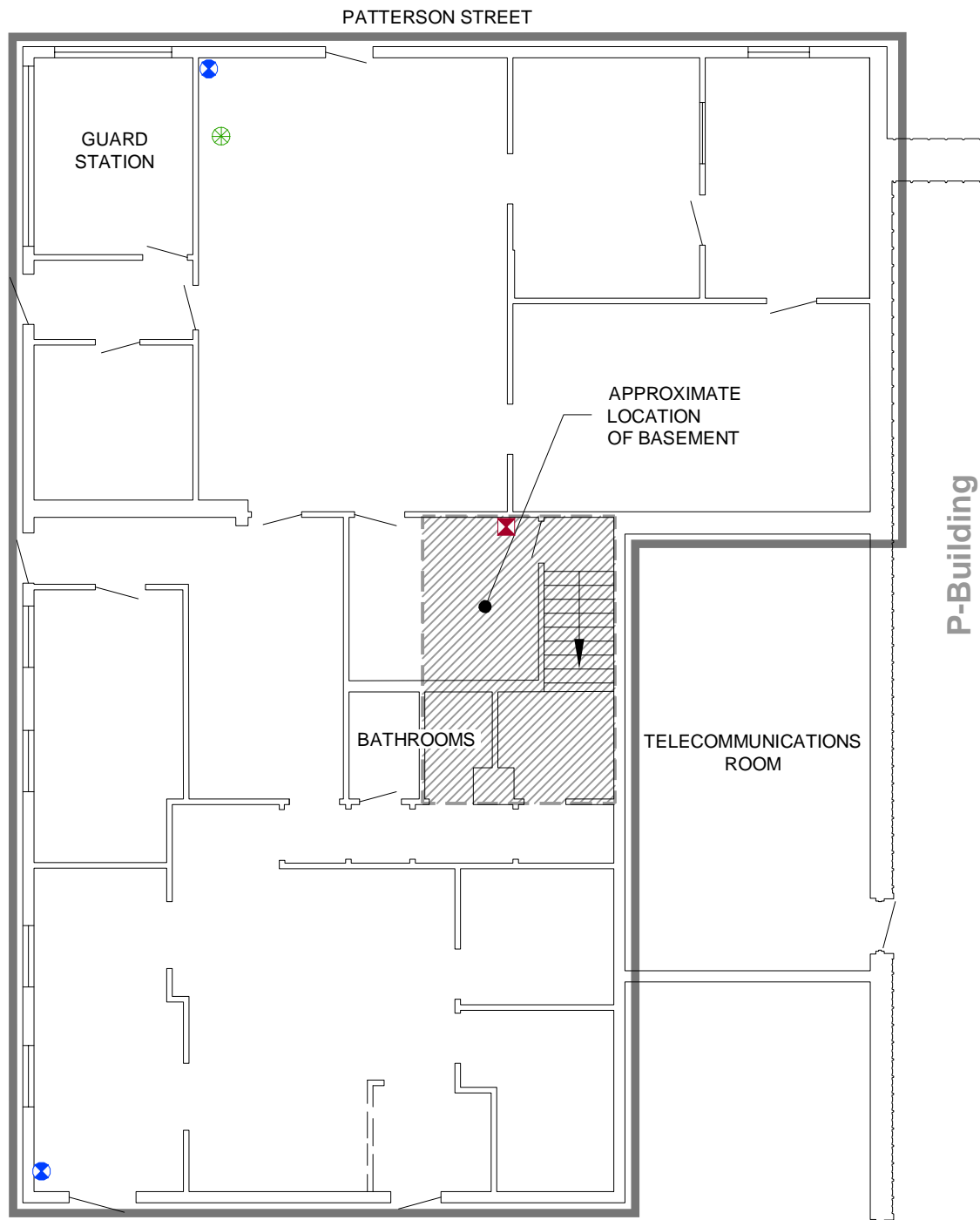
Notes:

- 1) Non-Residential Indoor Air Criteria were calculated for site constituents of concern and their degradation products according to the risk assessment equations (November 2011) provided on the USEPA website at [http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/equations.htm](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/equations.htm).  
ppbv = parts per billion by volume  
NC = No criterion was calculated because the analyte is not a constituent of concern at the site.





# Figure

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J:\\_TRC\Tecumseh Products\TECUMSEH\187156\01\Construction Doc Rpt\187156.01.01.dwg  
 Drawing Name: STEHLE, DIANA H  
 Operator Name: STEHLE, DIANA H  
 Drawing Plot Scale: 0.386863  
 Dwg Size: 2.20 Mb  
 Plot Date: December 13, 2011  
 Plot Time: 1:53 PM  
 Attached Xref's:  
 Attached Images:  
 Layout: FIG01 S-Bldg Layout

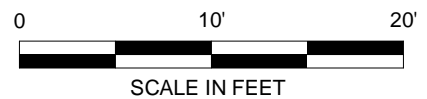


### LEGEND

-  SSDV SYSTEM SUCTION POINT LOCATION
-  CROSS SLAB DIFFERENTIAL PRESSURE POINT LOCATION
-  INDOOR AIR SAMPLE LOCATION
-  S-BUILDING PERIMETER

### NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.



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PROJECT:

TECUMSEH PRODUCTS COMPANY  
 TECUMSEH, MICHIGAN

SHEET TITLE:

BUILDING LAYOUT  
 S-BUILDING

DRAWN BY:

DGS

APPROVED BY:

SEM

PROJ. NO.

187156.01

FILE NO.

187156.01.01.dwg

DATE:

DECEMBER 2011

FIGURE 1

# Appendix A

## Laboratory Analytical Data – October 2011

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Mobile  
Geochemistry  
Inc.

09 November 2011



Ms. Stacy Metz  
TRC Environmental - MI  
3754 Ranchero Drive  
Ann Arbor, MI 48108

H&P Project: TRC102811-10  
Client Project: 187156.0000.0000/ Tecumseh, MI

Dear Ms. Stacy Metz:

Enclosed is the analytical report for the above referenced project. The data herein applies to samples as received by H&P Mobile Geochemistry, Inc. on 28-Oct-11 which were analyzed in accordance with the attached Chain of Custody record(s).

The results for all sample analyses and required QA/QC analyses are presented in the following sections and summarized in the documents:

- Sample Summary
- Case Narrative (if applicable)
- Sample Results
- Quality Control Summary
- Notes and Definitions / Appendix
- Chain of Custody

Unless otherwise noted, all analyses were performed and reviewed in compliance with our Quality Systems Manual and Standard Operating Procedures. This report shall not be reproduced, except in full, without the written approval of H&P Mobile Geochemistry, Inc.

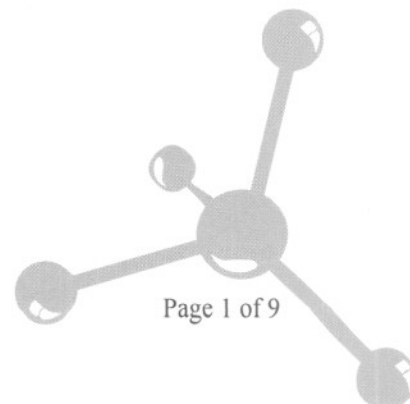
We at H&P Mobile Geochemistry, Inc. sincerely appreciate the opportunity to provide analytical services to you on this project. If you have any questions or concerns regarding this analytical report, please contact me at your convenience at 760-804-9678.

Sincerely,

*J. Villarreal*  
Janis Villarreal  
Laboratory Director

H&P Mobile Geochemistry, Inc. operates under CA Environmental Lab Accreditation Program Numbers 2579, 2740, 2741, 2742, 2743, 2745 and 2754. National Environmental Laboratory Accreditation Conference (NELAC) Standards Lab #11845

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Project: TRC102811-10  
Project Number: 187156.0000.0000/ Tecumseh, MI  
Project Manager: Ms. Stacy Metz

Reported:  
09-Nov-11 13:41

#### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
S-Building-01	E110106-01	Vapor	27-Oct-11	28-Oct-11





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Project: TRC102811-10  
Project Number: 187156.0000.0000/ Tecumseh, MI  
Project Manager: Ms. Stacy Metz

Reported:  
09-Nov-11 13:41

## Volatile Organic Compounds by EPA TO-15

### H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
<b>S-Building-01 (E110106-01) Vapor Sampled: 27-Oct-11 Received: 28-Oct-11</b>									
Dichlorodifluoromethane (F12)	ND	0.40	ppbv	2	EK10205	01-Nov-11	02-Nov-11	EPA TO-15	
<b>Chloromethane</b>	<b>0.45</b>	0.20	"	"	"	"	"	"	
Dichlorotetrafluoroethane (F114)	ND	0.20	"	"	"	"	"	"	
Vinyl chloride	ND	0.10	"	"	"	"	"	"	
Bromomethane	ND	0.20	"	"	"	"	"	"	
Chloroethane	ND	0.20	"	"	"	"	"	"	
<b>Trichlorofluoromethane (F11)</b>	<b>0.26</b>	0.20	"	"	"	"	"	"	
<b>Acetone</b>	<b>120</b>	10	"	20	"	"	"	"	
1,1-Dichloroethene	ND	0.20	"	2	"	"	"	"	
1,1,2-Trichlorotrifluoroethane (F113)	ND	1.0	"	"	"	"	"	"	
Methylene chloride (Dichloromethane)	ND	0.20	"	"	"	"	"	"	
Carbon disulfide	ND	0.20	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.20	"	"	"	"	"	"	
1,1-Dichloroethane	ND	0.20	"	"	"	"	"	"	
<b>2-Butanone (MEK)</b>	<b>0.57</b>	0.40	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.20	"	"	"	"	"	"	
Chloroform	ND	0.10	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.20	"	"	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	0.20	"	"	"	"	"	"	
<b>Benzene</b>	<b>0.16</b>	0.10	"	"	"	"	"	"	
Carbon tetrachloride	ND	0.10	"	"	"	"	"	"	
<b>Trichloroethene</b>	<b>0.57</b>	0.20	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.20	"	"	"	"	"	"	
Bromodichloromethane	ND	0.20	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.20	"	"	"	"	"	"	
4-Methyl-2-pentanone (MIBK)	ND	0.40	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.20	"	"	"	"	"	"	
Toluene	ND	1.0	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.20	"	"	"	"	"	"	
2-Hexanone (MBK)	ND	0.40	"	"	"	"	"	"	
Dibromochloromethane	ND	0.20	"	"	"	"	"	"	
Tetrachloroethene	ND	0.20	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.20	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	0.20	"	"	"	"	"	"	
Chlorobenzene	ND	0.20	"	"	"	"	"	"	
Ethylbenzene	ND	0.20	"	"	"	"	"	"	
m,p-Xylene	ND	0.20	"	"	"	"	"	"	
Styrene	ND	0.20	"	"	"	"	"	"	



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Project: TRC102811-10  
 Project Number: 187156.0000.0000/ Tecumseh, MI  
 Project Manager: Ms. Stacy Metz

Reported:  
 09-Nov-11 13:41

## Volatile Organic Compounds by EPA TO-15

### H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
<b>S-Building-01 (E110106-01) Vapor Sampled: 27-Oct-11 Received: 28-Oct-11</b>									
o-Xylene	ND	0.20	ppbv	2	EK10205	01-Nov-11	02-Nov-11	EPA TO-15	
Bromoform	ND	0.20	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.20	"	"	"	"	"	"	
4-Ethyltoluene	ND	0.20	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.20	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.20	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.20	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.20	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.20	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	0.20	"	"	"	"	"	"	
Hexachlorobutadiene	ND	0.40	"	"	"	"	"	"	
<i>Surrogate: 1,2-Dichloroethane-d4</i>		95.2 %	76-134		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		98.6 %	78-125		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		100 %	77-127		"	"	"	"	



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Project Number: 187156.0000.0000/ Tecumseh, MI  
Project Manager: Ms. Stacy Metz

Reported:  
09-Nov-11 13:41

**Volatile Organic Compounds by EPA TO-15 - Quality Control**  
**H&P Mobile Geochemistry, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch EK10205 - TO-15**

**Blank (EK10205-BLK1)**

Prepared & Analyzed: 01-Nov-11

Dichlorodifluoromethane (F12)	ND	0.20	ppbv
Chloromethane	ND	0.10	"
Dichlorotetrafluoroethane (F114)	ND	0.10	"
Vinyl chloride	ND	0.050	"
Bromomethane	ND	0.10	"
Chloroethane	ND	0.10	"
Trichlorofluoromethane (F11)	ND	0.10	"
Acetone	ND	0.50	"
1,1-Dichloroethene	ND	0.10	"
1,1,2-Trichlorotrifluoroethane (F113)	ND	0.50	"
Methylene chloride (Dichloromethane)	ND	0.10	"
Carbon disulfide	ND	0.10	"
trans-1,2-Dichloroethene	ND	0.10	"
1,1-Dichloroethane	ND	0.10	"
2-Butanone (MEK)	ND	0.20	"
cis-1,2-Dichloroethene	ND	0.10	"
Chloroform	ND	0.050	"
1,1,1-Trichloroethane	ND	0.10	"
1,2-Dichloroethane (EDC)	ND	0.10	"
Benzene	ND	0.050	"
Carbon tetrachloride	ND	0.050	"
Trichloroethene	ND	0.10	"
1,2-Dichloropropane	ND	0.10	"
Bromodichloromethane	ND	0.10	"
cis-1,3-Dichloropropene	ND	0.10	"
4-Methyl-2-pentanone (MIBK)	ND	0.20	"
trans-1,3-Dichloropropene	ND	0.10	"
Toluene	ND	0.50	"
1,1,2-Trichloroethane	ND	0.10	"
2-Hexanone (MBK)	ND	0.20	"
Dibromochloromethane	ND	0.10	"
Tetrachloroethene	ND	0.10	"
1,2-Dibromoethane (EDB)	ND	0.10	"
1,1,1,2-Tetrachloroethane	ND	0.10	"



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Reported:  
09-Nov-11 13:41

**Volatile Organic Compounds by EPA TO-15 - Quality Control**  
**H&P Mobile Geochemistry, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch EK10205 - TO-15**

**Blank (EK10205-BLK1)**

Prepared & Analyzed: 01-Nov-11

Chlorobenzene	ND	0.10	ppbv
Ethylbenzene	ND	0.10	"
m,p-Xylene	ND	0.10	"
Styrene	ND	0.10	"
o-Xylene	ND	0.10	"
Bromoform	ND	0.10	"
1,1,2,2-Tetrachloroethane	ND	0.10	"
4-Ethyltoluene	ND	0.10	"
1,3,5-Trimethylbenzene	ND	0.10	"
1,2,4-Trimethylbenzene	ND	0.10	"
1,3-Dichlorobenzene	ND	0.10	"
1,4-Dichlorobenzene	ND	0.10	"
1,2-Dichlorobenzene	ND	0.10	"
1,2,4-Trichlorobenzene	ND	0.10	"
Hexachlorobutadiene	ND	0.20	"

<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>47.6</i>		<i>"</i>	<i>50.2</i>	<i>94.9</i>	<i>76-134</i>
<i>Surrogate: Toluene-d8</i>	<i>49.0</i>		<i>"</i>	<i>49.8</i>	<i>98.4</i>	<i>78-125</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>50.9</i>		<i>"</i>	<i>50.2</i>	<i>101</i>	<i>77-127</i>

**LCS (EK10205-BS1)**

Prepared & Analyzed: 01-Nov-11

Dichlorodifluoromethane (F12)	2.12	0.20	ppbv	2.01	105	65-135
Vinyl chloride	1.92	0.050	"	2.02	94.8	65-135
Chloroethane	1.90	0.10	"	2.00	95.1	65-135
Trichlorofluoromethane (F11)	2.07	0.10	"	1.99	104	65-135
1,1-Dichloroethene	2.01	0.10	"	2.01	100	65-135
1,1,2-Trichlorotrifluoroethane (F113)	2.15	0.50	"	2.01	107	65-135
Methylene chloride (Dichloromethane)	2.05	0.10	"	2.01	102	65-135
trans-1,2-Dichloroethene	2.15	0.10	"	2.01	107	65-135
1,1-Dichloroethane	2.11	0.10	"	2.01	105	65-135
cis-1,2-Dichloroethene	2.04	0.10	"	1.99	102	65-135
Chloroform	2.05	0.050	"	2.00	102	65-135
1,1,1-Trichloroethane	1.96	0.10	"	2.02	97.2	65-135
1,2-Dichloroethane (EDC)	2.07	0.10	"	2.01	103	65-135



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TRC Environmental - MI  
3754 Ranchero Drive  
Ann Arbor, MI 48108

Project: TRC102811-10  
Project Number: 187156.0000.0000/ Tecumseh, MI  
Project Manager: Ms. Stacy Metz

Reported:  
09-Nov-11 13:41

**Volatile Organic Compounds by EPA TO-15 - Quality Control**  
**H&P Mobile Geochemistry, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch EK10205 - TO-15**

**LCS (EK10205-BS1)**

Prepared & Analyzed: 01-Nov-11

Benzene	1.92	0.050	ppbv	2.00		95.8	65-135			
Carbon tetrachloride	2.05	0.050	"	2.01		102	65-135			
Trichloroethene	2.02	0.10	"	2.01		100	65-135			
Toluene	1.89	0.50	"	2.01		93.9	65-135			
1,1,2-Trichloroethane	1.91	0.10	"	2.02		94.9	65-135			
Tetrachloroethene	1.77	0.10	"	2.01		87.9	65-135			
1,1,1,2-Tetrachloroethane	1.95	0.10	"	2.01		97.2	65-135			
Ethylbenzene	2.11	0.10	"	2.01		105	65-135			
m,p-Xylene	4.50	0.10	"	4.02		112	65-135			
o-Xylene	2.33	0.10	"	2.01		116	65-135			
1,1,2,2-Tetrachloroethane	2.41	0.10	"	2.01		120	65-135			

Surrogate: 1,2-Dichloroethane-d4	55.6		"	50.2		111	76-134			
Surrogate: Toluene-d8	49.5		"	49.8		99.3	78-125			
Surrogate: 4-Bromofluorobenzene	54.2		"	50.2		108	77-127			

**LCS Dup (EK10205-BSD1)**

Prepared & Analyzed: 01-Nov-11

Dichlorodifluoromethane (F12)	2.19	0.20	ppbv	2.01		109	65-135	3.43	35	
Vinyl chloride	2.19	0.050	"	2.02		108	65-135	13.5	35	
Chloroethane	2.05	0.10	"	2.00		103	65-135	7.53	35	
Trichlorofluoromethane (F11)	2.12	0.10	"	1.99		107	65-135	2.43	35	
1,1-Dichloroethene	2.14	0.10	"	2.01		107	65-135	6.36	35	
1,1,2-Trichlorotrifluoroethane (F113)	2.07	0.50	"	2.01		103	65-135	3.56	35	
Methylene chloride (Dichloromethane)	2.19	0.10	"	2.01		109	65-135	6.89	35	
trans-1,2-Dichloroethene	2.17	0.10	"	2.01		108	65-135	0.881	35	
1,1-Dichloroethane	2.07	0.10	"	2.01		103	65-135	2.06	35	
cis-1,2-Dichloroethene	2.02	0.10	"	1.99		101	65-135	1.13	35	
Chloroform	2.00	0.050	"	2.00		99.6	65-135	2.52	35	
1,1,1-Trichloroethane	1.95	0.10	"	2.02		96.6	65-135	0.665	35	
1,2-Dichloroethane (EDC)	2.00	0.10	"	2.01		99.8	65-135	3.24	35	
Benzene	1.91	0.050	"	2.00		95.6	65-135	0.209	35	
Carbon tetrachloride	2.00	0.050	"	2.01		99.9	65-135	2.02	35	
Trichloroethene	2.09	0.10	"	2.01		104	65-135	3.60	35	
Toluene	1.79	0.50	"	2.01		89.1	65-135	5.22	35	



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Project: TRC102811-10  
 Project Number: 187156.0000.0000/ Tecumseh, MI  
 Project Manager: Ms. Stacy Metz

Reported:  
 09-Nov-11 13:41

**Volatile Organic Compounds by EPA TO-15 - Quality Control**  
**H&P Mobile Geochemistry, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch EK10205 - TO-15**

**LCS Dup (EK10205-BS1)**

Prepared & Analyzed: 01-Nov-11

1,1,2-Trichloroethane	1.81	0.10	ppbv	2.02		89.8	65-135	5.48	35	
Tetrachloroethene	1.69	0.10	"	2.01		83.9	65-135	4.69	35	
1,1,1,2-Tetrachloroethane	1.95	0.10	"	2.01		97.0	65-135	0.205	35	
Ethylbenzene	2.06	0.10	"	2.01		103	65-135	2.11	35	
m,p-Xylene	4.51	0.10	"	4.02		112	65-135	0.155	35	
o-Xylene	2.31	0.10	"	2.01		115	65-135	0.647	35	
1,1,2,2-Tetrachloroethane	2.34	0.10	"	2.01		116	65-135	3.03	35	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>55.5</i>		<i>"</i>	<i>50.2</i>		<i>111</i>	<i>76-134</i>			
<i>Surrogate: Toluene-d8</i>	<i>48.4</i>		<i>"</i>	<i>49.8</i>		<i>97.1</i>	<i>78-125</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>54.0</i>		<i>"</i>	<i>50.2</i>		<i>108</i>	<i>77-127</i>			





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Project Manager: Ms. Stacy Metz

Reported:  
09-Nov-11 13:41

### Notes and Definitions

DET Analyte DETECTED

ND Analyte NOT DETECTED at or above the reporting limit

NR Not Reported

dry Sample results reported on a dry weight basis

RPD Relative Percent Difference

### Appendix

H&P Mobile Geochemistry, Inc. is approved as an Environmental Laboratory in conformance with the Environmental Laboratory Accreditation Program (CA) for the category of Volatile and Semi-Volatile Organic Chemistry of Hazardous Waste for the following methods:

Certificate# 2741, 2743, 2579, 2754 & 2740 approved for EPA 8260 and LUFT GC/MS  
Certificate# 2742, 2745, & 2741 approved for LUFT  
Certificate# 2745 & 2742 approved for EPA 418.1

H&P Mobile Geochemistry, Inc. is approved as an Environmental Laboratory in conformance with the National Environmental Accreditation Conference Standards for the category Environmental Analysis Air and Emissions for the following analytes and methods:

1,2,4-Trichlorobenzene by EPA TO-15 & TO-14A  
Hexachlorobutadiene by EPA TO-15 & TO-14A  
1,2,4-Trimethylbenzene by EPA TO -14A  
1,2-Dichlorobenzene by EPA TO-15 & TO-14A  
1,3,5-Trimethylbenzene by EPA TO -14A  
1,4-Dichlorobenzene by EPA TO-15 & TO-14A  
Benzene by EPA TO-15 & TO-14A  
Chlorobenzene by EPA TO-15 & TO-14A  
Ethyl benzene by EPA TO-15 & TO-14A  
Styrene by EPA TO-15 & TO-14A  
Toluene by EPA TO-15 & TO-14A  
Total Xylenes by EPA TO-15 & TO-14A  
1,1,1-Trichloroethane by EPA TO-15 & TO-14A  
1,1,2,2-Tetrachloroethane by EPA TO-15 & TO-14A  
1,1,2-Trichloroethane by EPA TO-15 & TO-14A  
1,1-Dichloroethane by EPA TO-15 & TO-14A  
1,1-Dichloroethene by EPA TO-15 & TO-14A  
1,2-Dichloroethane by EPA TO-15 & TO-14A  
1,2-Dichloropropane by EPA TO-15 & TO-14A  
Bromoform by EPA TO-15  
Bromomethane by EPA TO-15 & TO-14A  
Carbon tetrachloride by EPA TO-15 & TO-14A  
Chloroethane by EPA TO-15  
Chloroform by EPA TO-15 & TO-14A  
Chloromethane by EPA TO-15 & TO-14A  
cis-1,2-Dichloroethene by EPA TO-15  
cis-1,2-Dichloropropene by EPA TO-15 & TO-14A  
Methylene chloride by EPA TO -15 & TO-14A  
Tetrachloroethane by EPA TO-15 & TO-14A  
trans-1,2-Dichloroethene by EPA TO-15  
trans-1,2-Dichloropropene by EPA TO-15 & TO-14A  
Trichloroethene by EPA TO-15 & TO-14A  
Vinyl chloride by EPA TO -15 & TO-14A  
2-Butanone by EPA TO-15  
4-Methyl-2-Pentanone by EPA TO-15  
Hexane by EPA TO-15  
Methyl tert-butyl ether by EPA TO-15  
Vinyl acetate by EPA TO-15

This certification applies to samples analyzed in summa canisters.



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☐ 1855 Coronado Ave., Signal Hill, CA 90755 • ph 800.834.9888

# Chain of Custody Record

Date: 10/27/2011  
H&P Project # TRC102811-10  
Outside Lab: \_\_\_\_\_

Client: TRC ENV. CORP Collector: J. Bacon Page: 1 of 1  
Address: 1540 Eisenhower Place Client Project # 187156.0000.0000 Project Contact: Stacy Metz  
Ann Arbor, MI 48108 Location: Tecumseh Michigan  
Email: smetz@trcsolutions.com Phone: 734 971 7080 Fax: 734 971 9022 Turn around time: Standard

Geotracker EDF: Yes ☐ No ☐

Global ID: \_\_\_\_\_

Excel EDD: Yes ☒ No ☐

## Sample Receipt

Intact: ☒ Yes ☐ No  
Seal Intact: ☒ Yes ☐ No ☐ N/A  
Cold: ☐ Yes ☐ No ☒ N/A  
Temperature: RT

Special Instructions:

Call Stacy Metz for assistance if you have any questions (734) 971-7080

Level IV, Report in DPHV → Reservoir  
UPS TRACK# 1Z 93T 6184 4877 5557

Lab Work Order # E0106

STANDARD LEL RLS

Sample Name	Field Point Name	Purge Vol	Time	Date	Sample Type	Container Type	Total # of containers	8260B Full List	8260B	8015M TPH	418.1 TRPH	VOC's: Full List	VOC's: Short List/DTSC	VOC's: SAM, 8260B	Naphthalene	Oxygenates	TPHV gas	Ketones	Other	Leak Check Compound	Methane	Fixed Gases	Other
S-BUILDING-01	—	(6L?)	1501	10/27/11	Air	Summa	1	<input type="checkbox"/> BTEX/OXY <input type="checkbox"/> TPH gas	<input type="checkbox"/> g <input type="checkbox"/> d <input type="checkbox"/> ext	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15	<input type="checkbox"/> TO-15
								<input type="checkbox"/> VOC's: Full List	<input type="checkbox"/> VOC's: Short List/DTSC	<input type="checkbox"/> VOC's: SAM, 8260B	<input type="checkbox"/> Naphthalene	<input type="checkbox"/> Oxygenates	<input type="checkbox"/> TPHV gas	<input type="checkbox"/> Ketones	<input type="checkbox"/> Other	<input type="checkbox"/> Leak Check Compound	<input type="checkbox"/> Methane	<input type="checkbox"/> Fixed Gases	<input type="checkbox"/> Other	<input type="checkbox"/> CAN#	<input type="checkbox"/> VAC#		

Relinquished by: (Signature)

(company)

Received by: (Signature)

(company)

Date:

Time:

Relinquished by: (Signature)

(company)

Received by: (Signature)

(company)

Date:

Time:

Relinquished by: (Signature)

(company)

Received by: (Signature)

(company)

Date:

Time:

\*Signature constitutes authorization to proceed with analysis and acceptance of condition on back.

Sample disposal instruction:

☐ Disposal

☐ Return to client

☐ Pickup

# Appendix B

## Laboratory Data Validation Report

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## Laboratory Data Validation

### October 2011 Indoor Air Sample Event – S-Building Former Tecumseh Products Company Site Tecumseh, Michigan

One indoor air sample was collected on October 27, 2011 and analyzed by H&P Mobile Geochemistry, Inc., located in Carlsbad, California. The sample was analyzed for volatile organic analytes by USEPA Method TO-15 following the protocols specified in the Quality Assurance Project Plan (QAPP) for the Tecumseh Products Company Site in Tecumseh, Michigan. TRC validated the laboratory data. The following sections summarize the data validation procedure and the results of the validation.

#### Validation Procedure

The analytical data were validated using the USEPA National Functional Guidelines for Organic Data Review (USEPA, 2008) and the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air (USEPA, 1999). The USEPA National Functional Guidelines for Organic Data Review were written for solid and aqueous samples. Professional judgment was used in applying the guidance to the soil gas sample matrix. The data validation included a review of the duplicate and blank results from the laboratory, as well as verification that the sample holding times were met. TRC reviewed additional QC information to check for appropriate matrix performance using the analytical methods specified by the laboratory. The procedures TRC used to evaluate data in general included the following items:

- Checked technical holding times for analyses
- Reviewed data for blanks, laboratory duplicates, and laboratory control samples
- Determined field precision from blind field duplicate data, if applicable
- Assessed the usability of the data

The data validation report addresses the following items:

- Usability of the data if QC results suggest potential problems with all or some of the data
- Potential sample contamination due to blank contributions
- Actions regarding specific QC criteria exceedences

TRC reviewed internal standard areas and retention times, method blanks, field duplicate relative percent differences (RPDs), Laboratory Control Sample (LCS) recoveries and RPDs, and holding times. In addition, the 24-hour calibration clock was checked for each sample.

## Findings

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable. The procedures specified in the methods were implemented, and the data packages were found to contain all of the deliverables necessary for validation of the analytical data. The discussion that follows describes the QA/QC results and evaluation.

- The laboratory met the technical holding time for the sample.
- Internal standard areas and retention times were reviewed and found to be within acceptable QC limits according to the USEPA National Functional Guidelines for Organic Data Review (USEPA, 2008). In addition, the 24-hour calibration clock was not exceeded for any analyte.
- Surrogate recoveries met QC limits.
- Contaminants were not detected in the method blank.
- The laboratory performed an LCS and LCSD. All recoveries and RPDs were within the laboratory control limits.
- Field and laboratory duplicates were not performed.

Prepared by: Jennifer Meek

Reviewed by: Terry Hertz