RMT

Technical Memorandum

Date: February 10, 2011

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Project No.: 02751.16.001

Subject: Workplan for Groundwater Investigation to Support Permeable Reactive Barrier Evaluation and Design
Tecumseh Products Company, Tecumseh Michigan

Background and Project Objectives

This Workplan outlines the activities RMT will undertake to collect data to support a cost-benefit analysis of a permeable reactive barrier (PRB) to treat shallow groundwater affected by volatile organic compounds (VOCs) downgradient of the former Tecumseh Products Company (TPC) manufacturing facility property. As shown by groundwater monitoring data, constituents of concern are migrating in groundwater from the southern portion of the former manufacturing facility to the east towards the River Raisin. A PRB installed parallel along the east property line could be an expeditious, efficient, and cost effective means of treating shallow VOC-affected groundwater before it migrates off-site, and reducing concentrations in groundwater to levels below potentially applicable screening levels; in particular the groundwater volatilization to indoor air screening levels. This Workplan describes the field investigation RMT intends to undertake to obtain data to support the engineering analysis and design.

Field Investigation and Sampling Plan

Groundwater flow rate is an important factor to consider during PRB design. Therefore, RMT will collect hydraulic conductivity data and gradient data to support the engineering design.

Aquifer Testing

RMT will conduct in-situ slug tests in two monitoring wells (MW-1s and MW-9s) located near the potential location of the proposed PRB to assess hydraulic conductivity in the investigation area. Aquifer testing will be conducted as outlined below:

— Each well will be opened and allowed to equilibrate prior to recording a static water level and measured depth to bottom;

- A pressure transducer which measures temperature and water column height will be pre-programmed and installed into each well to record any incremental changes to these parameters;
- A poly-vinyl chloride (PVC) slug will be instantaneously lowered into a well to displace water in the well (falling head slug test). Any changes to the height of the water column, in the well, will be recorded on the pressure transducer;
- After verifying that the water level has returned to the initial static measurement, the slug will be instantaneously removed from the well to displace the water in the well (rising head slug test). Again, the change in water column height will be recorded on the pressure transducer;
- Data collected during the rising and falling head slug tests in each well will be pre-screened in the field to ensure adequate data was obtained for computer modeling purposes. If it is determined that the data from any particular slug test is insufficient, the process will be repeated in that particular location until a valid data set has been acquired.

Determination of Local Horizontal Gradient

To more accurately assess hydraulic gradient along the eastern perimeter of the property, RMT will install two piezometers in the right-of-way on the east side of Maumee Street. Proposed locations of the piezometers (PZ-01 and PZ-02) are shown on Figure 1. Piezometers will be installed in general accordance with the shallow well installation procedures outlined in the Quality Assurance Project Plan (QAPP), submitted to USEPA for review in August 2010. Piezometers will be constructed of 1-inch PVC pipe rather than the 2-inch PVC pipe typical of standard monitoring wells.

Piezometers will be allowed to equilibrate for at least 12-hours after installation before, initial water level measurements are collected. Static water levels will be collected at MW-9s, PZ-01 and PZ-02 in accordance with the procedures outlined in the QAPP.

Geoprobe® Investigation

Soil borings will be conducted along the eastern perimeter of the site in two locations 1) approximately 7 borings will be installed between Mohawk Street and the southern property line along Maumee Street and 2) two borings will be installed south of MW-1s and B-14. Proposed boring locations are shown on Figure 1. Additional locations may be added based on preliminary data from the proposed borings.

At each boring location one or more temporary monitoring wells will be installed and sampled in accordance with procedures outlined in the QAPP. RMT field personnel will determine the depth to set temporary monitoring wells based on observed depth to groundwater and available boring data. Typically 3 samples will be collected at each location along Maumee Street and 2 samples will be collected at each location along the property line south of B-14.

Constituents of Concern

Grab groundwater samples will be analyzed for volatile organic compounds (VOCs) by Trimatrix Laboratories (Trimatrix) in Grand Rapids, Michigan. Trimatrix will analyze samples in accordance with the analytical procedures outlined in QAPP.

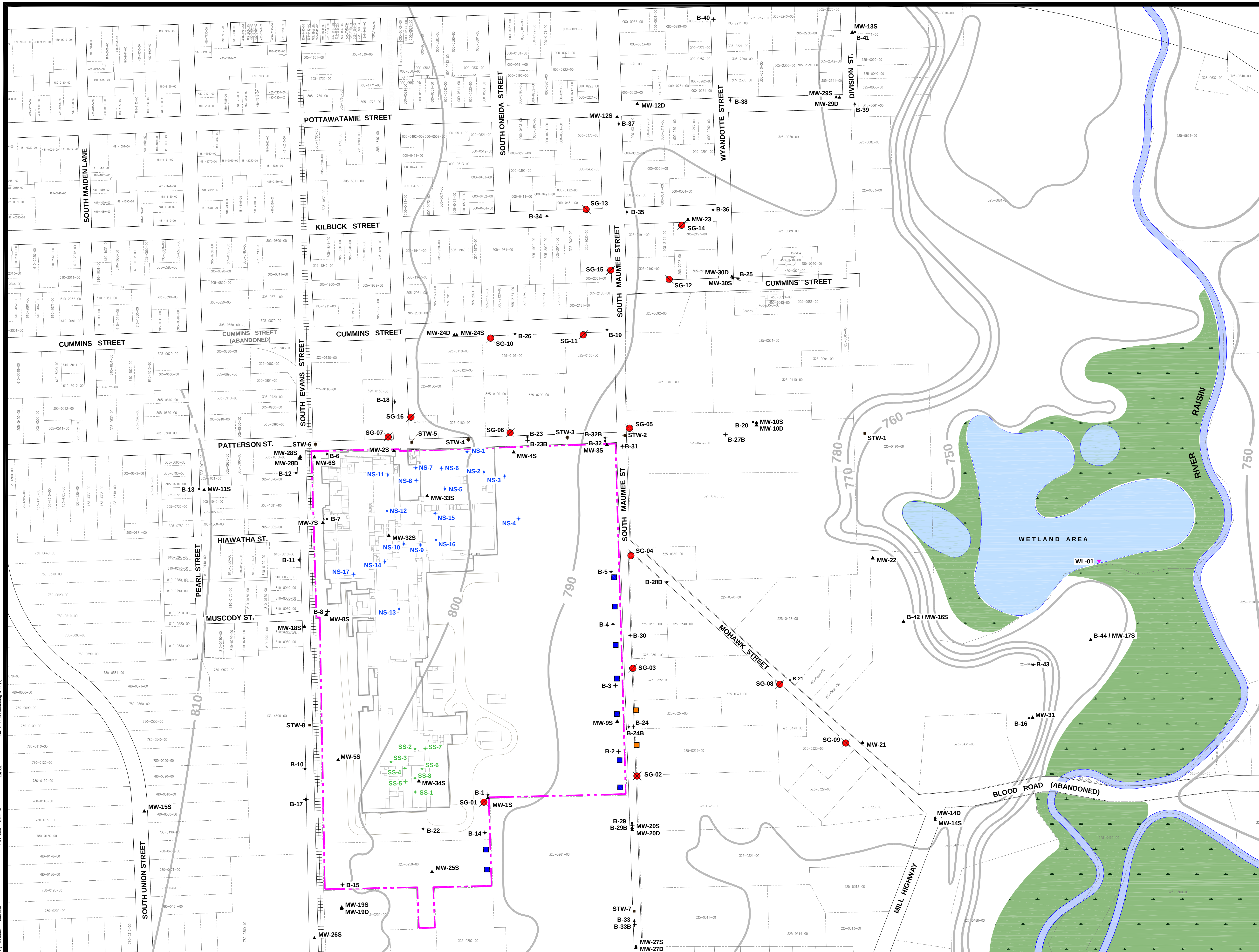
Data Quality Objectives

Data collected will be used for engineering and design purposes. The data reviewer will ensure that data meet Level 3 data quality objectives, as described in the QAPP.

Data Analysis

RMT will use field data to develop PRB design parameters. These design parameters will be used to conduct a cost-benefit analysis of a PRB to treat groundwater downgradient of the southern source area.

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
- FLOODPLAIN / WOODED WETLAND AREA
- 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
- WL-01 — WETLAND SURFACE WATER SAMPLE LOCATION
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- APPROXIMATE LOCATION OF PROPOSED BORING
- APPROXIMATE LOCATION OF PROPOSED PIEZOMETER

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.

0 200' 400' 600' 800'
SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D.
5.				
4.				
3.				
2.				
1.				

FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

PROPOSED INVESTIGATION LOCATIONS IN SUPPORT OF PERMEABLE REACTIVE BARRIER DESIGN

DRAWN BY: SJL	DRAWING SCALE: AS INDICATED	PROJECT NO:	J:\02751\16
CHECKED BY: SEM		FILE NO:	02751.16.01.dwg
APPROVED BY: GC	DATE PRINTED:	FIGURE 1	
DATE: February 2011			

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