MEMO

ARCADIS Design & Consultancy for natural and built assets

To:
Nate Nemani
USEPA Region 5
77 West Jackson Boulevard
Mail Code: LU-9J
Chicago, Illinois 60604-3507

Copies:
Grant Trigger, RACER Trust
Dave Favero, RACER Trust

Arcadis of Michigan, LLC
28550 Cabot Drive
Suite 500
Novi
Michigan 48377
Tel 248 994 2240
Fax 248 994 2241

From:
Patrick Curry, Senior Geologist
Christi Kiker, Project Manager

ENVIRONMENT

Date:
November 21, 2016

ARCADIS Project No.:
B0064607.2016

Subject:
Work Plan to Investigate the Presence of 1,4-Dioxane, RACER Pontiac North Campus Site, Pontiac, Michigan

---

This work plan was prepared by Arcadis of Michigan, LLC (Arcadis) on behalf of Revitalizing Auto Communities Environmental Response Trust (RACER) for the Pontiac North Campus Site (Site) located in Pontiac, Michigan (**Figure 1**) to further assess the presence of 1,4-dioxane in groundwater. The data collected will be used to update the conceptual site model (CSM) for the Site in support of evaluating potential exposure pathways and subsequent development and evaluation of corrective measures in the Corrective Measures Study (CMS).

1. BACKGROUND

As part of ongoing Site investigation and data evaluation activities 1,4-dioxane was detected in Site groundwater at two separate areas: the Former Fiero Assembly Site (Fiero) and extending to the downgradient property boundary, and the Former Demolition Area, specifically LNAPL Area 1/7 (AOI W-1) and LNAPL Area 10 (AOI W-8). These areas are shown on **Figure 2** along with corresponding 1,4-dioxane concentrations in groundwater. Although the 1,4-dioxane concentrations found in groundwater at the southern Fiero property boundary do not exceed the current applicable Michigan Department of

Environmental Quality (MDEQ) Part 201 criteria, 1,4-dioxane does exceed the 2016 proposed drinking water criteria and the investigation outlined below is designed to help assess the potential strength and transport mechanism for the associated 1,4-dioxane impacts. It is noted that based on a 2013 well survey for the area south of the Fiero Site, no wells were identified. A Groundwater Ordinance currently exists that restricts use of groundwater in the area south of the Fiero Site so there are no known receptors to groundwater and no future groundwater use should occur in this area to create receptors.

All groundwater samples proposed for laboratory analyses will be collected in laboratory-prepared sample containers and submitted to Merit Laboratories in Lansing, Michigan (Merit Labs) for analysis of 1,4-dioxane and volatile organic compounds (VOCs).

2. PROPOSED INVESTIGATIONS

The proposed investigation activities include completing soil borings and vertical aquifer profiling near the downgradient Fiero property boundary, collecting groundwater samples from existing upgradient wells north and west of MWF7-02 (Fiero), and collecting groundwater samples from existing Site wells in LNAPL Area 1/7 (AOI W-1) and LNAPL Area 10 (AOI W-8).

2.1 Mass Flux Investigation

Soil borings will be completed near the southern property boundary of Fiero to further characterize the nature and extent of 1,4-dioxane impacts and other VOCs. The results of the investigation will be used to map the hydrostratigraphy and groundwater impacts in this area at high-resolution, to identify preferential flow paths, and to evaluate the strength of associated 1,4-dioxane concentrations migrating off-site. This information can then be used to gauge the potential risk associated with these impacts, as well as plan for additional investigation or monitoring, as appropriate.

In the Fiero area, borings will be completed along a transect using the Geoprobe® Hydraulic Profiling Tool (HPT) to map zones of higher permeability within the saturated zone. Based on the HPT results, vertical aquifer profile (VAP) sampling will be completed at each boring location. Groundwater sample collection will be biased to the more permeable zones.

2.1.1 Pre-Investigation Activities

The field activities will be completed at the transect shown on **Figure 2**. The transect is composed of HPT/VAP borings spaced approximately 100 feet apart. The transect is approximately 800 feet in length, and is composed of 10 borings located near the southern property boundary of Fiero. Pre-clearing of each borehole location will be completed with ground penetrating radar (GPR) and electromagnetic (EM) locators to minimize the potential for an underground utility strike. The location of the borings may be

adjusted in accordance with the results of the GPR/EM survey, as well as conditions encountered in the field. Final boring locations will be surveyed using a hand-held GPS unit.

2.1.2 Hydraulic Profiling Tool Characterization

Continuous real-time profiling of relative permeability will be completed using the Geoprobe® HPT. The HPT utilizes standard direct push drilling equipment to advance the HPT probe into the soil. The probe injects a small continuous jet of water into the soil while simultaneously measuring the fluid back pressure due to injection and the flow rate at a high frequency. Since the HPT pressure response is analogous to relative changes in permeability, the HPT data can be used to locate and define potential migration pathways in the aquifer. The results of the HPT borings will be used to determine the groundwater VAP sampling intervals described below.

2.1.3 HPT Field Procedures

Before the HPT work is initiated, pre-test calibration will be performed to ensure the HPT pressure response and electrical conductivity (EC) response are consistent between borings. The response test will be completed before and after the first log, and after each subsequent log to verify the system is responding appropriately.

In addition to the response tests, HPT dissipation tests will be completed at each boring. A dissipation test consists of pausing the HPT boring, turning off the flow, and allowing the pressure to return to a static condition. This data is used to verify the elevation of the water table, correct for hydrostatic pressure, and in the calculation that provides an estimate of hydraulic conductivity (Est K). Dissipation tests will be completed at two depths per boring, one within a relatively shallow portion of the saturated zone and one within a deeper interval of the saturated zone near the total depth of the boring. The tests will be biased to more conductive zones to insure a static condition can be achieved within a reasonable timeframe.

A minimum of one calibration soil boring with continuous soil descriptions will be advanced adjacent to an HPT boring to verify correlation between soil type and HPT data. An HPT boring will also be co-located with an existing monitoring well where possible to enable a comparison of the monitoring well analytical data to the subsequent VAP sampling results.

Continuous logging of EC, pressure, and flow will be completed at each boring location until the lower glacial till is encountered at a depth estimated to be approximately 45 feet below grade.

2.1.4 HPT Data Management and Evaluation

The HPT probe will be linked to a control box where the signal will be received by a field computer. The HPT parameters such as transducer pressure, flow rate, EC, line pressure, probe rate, and diagnostic

parameters are recorded and available for export and evaluation immediately following borehole completion.

The Geoprobe® *DI Viewer* software will be used to view the data, and to complete corrections for hydrostatic and atmospheric pressure effects, if needed. Once corrected, the software can provide a continuous log of Est. K. The HPT results will then be evaluated to identify potential VAP sampling intervals.

2.1.5 Vertical Aquifer Profile Sampling

Based on the results of the HPT borings, the VAP sampling will be completed in an adjacent borehole and target zones of higher permeability, where applicable. It is anticipated that 4-5 discrete depth intervals will be sampled at each location. The VAP samples will be collected using a direct push drilling rig using a 4-foot long, sheathed screen point sampler driven to the specified sampling interval. The drive rod tool string will be then retracted up to 4 feet, exposing a stainless-steel screen to the formation and allowing water to enter the screened section and the rods.

Groundwater sample intervals will be purged with a reciprocating or peristaltic pump until relatively free of fine grained sediments. Groundwater samples will be collected and sent to Merit Labs for analysis of VOCs using (USEPA Method 8260C) and 1,4-dioxane (USEPA Method 8260C SIM). Purge water will be containerized in drums and stored on Site for characterization and off-site disposal.

2.2 Additional Monitoring Well Sampling for 1-4 Dioxane

2.2.1 Fiero

Groundwater samples will be collected from existing monitoring wells (Table 1) in the Fiero area, north and west of MWF7-02. The current condition of the monitoring wells in this area is unknown. If a monitoring well is damaged or cannot be located, a nearby well will be selected as a replacement. Groundwater level measurements will be measured from selected monitoring wells prior to sampling. Groundwater samples will be collected using low-flow sampling procedures. During sampling, purge water will be monitored for dissolved oxygen (DO), temperature, specific conductivity, turbidity, oxygen reduction potential (ORP), and pH. These water quality measurements will be used to determine groundwater sample stability prior to collection of the groundwater samples

2.2.2 LNAPL Area 1/7 (AOI W-1) and LNAPL Area 10 (AOI W-8)

Groundwater samples will be collected from existing monitoring wells (Table 1) downgradient of LNAPL Area 1/7(AOI W-1) and within LNAPL Area 10 (AOI W-8). Groundwater level measurements will be measured from selected monitoring wells prior to sampling. Groundwater samples will be collected using

low-flow sampling procedures. During sampling, purge water will be monitored for dissolved oxygen (DO), temperature, specific conductivity, turbidity, oxygen reduction potential (ORP), and pH. These water quality measurements will be used to determine groundwater sample stability prior to collection of the groundwater samples.

Groundwater samples will be collected and sent to Merit Labs for analysis of VOCs (USEPA Method 8260C) and 1,4-dioxane (USEPA Method 8260C SIM). Purge water will be containerized in drums and stored on Site for characterization and off- Site disposal

3. REPORTING AND DOCUMENTATION

The HPT data and VAP groundwater sampling results will be evaluated using the Environmental Visualization System software package (Ctech Development Corporation) to produce a three-dimensional depiction of 1,4-dioxane and VOC mass flux, as appropriate. Mass flux (J) is the product of the hydraulic conductivity, concentration and horizontal gradient such that:

$$J = K\ i\ C\ (\text{mass/time/unit area})$$

K – Hydraulic conductivity

i – Horizontal gradient

C – Groundwater concentration

The gradient term can be dropped as it varies little relative to K. The Est K from the HPT can be multiplied by VAP concentrations to produce a relative measure of mass flux that is useful for evaluating were the contaminant mass is focused and mobile, as well as give an indication of source strength and location.

The transect results will be summarized in a memorandum that includes analytical summary tables, HPT logs and soil boring logs, and figures that illustrate the mass flux transect results.

This memorandum will also summarize the results of the groundwater sampling in all areas and will propose follow-up activities, if necessary.

4. SCHEDULE

Scheduling of investigation activities will begin upon receipt of USEPA approval of this Scope. The following summarizes the steps and estimated time frames to implement the proposed work.

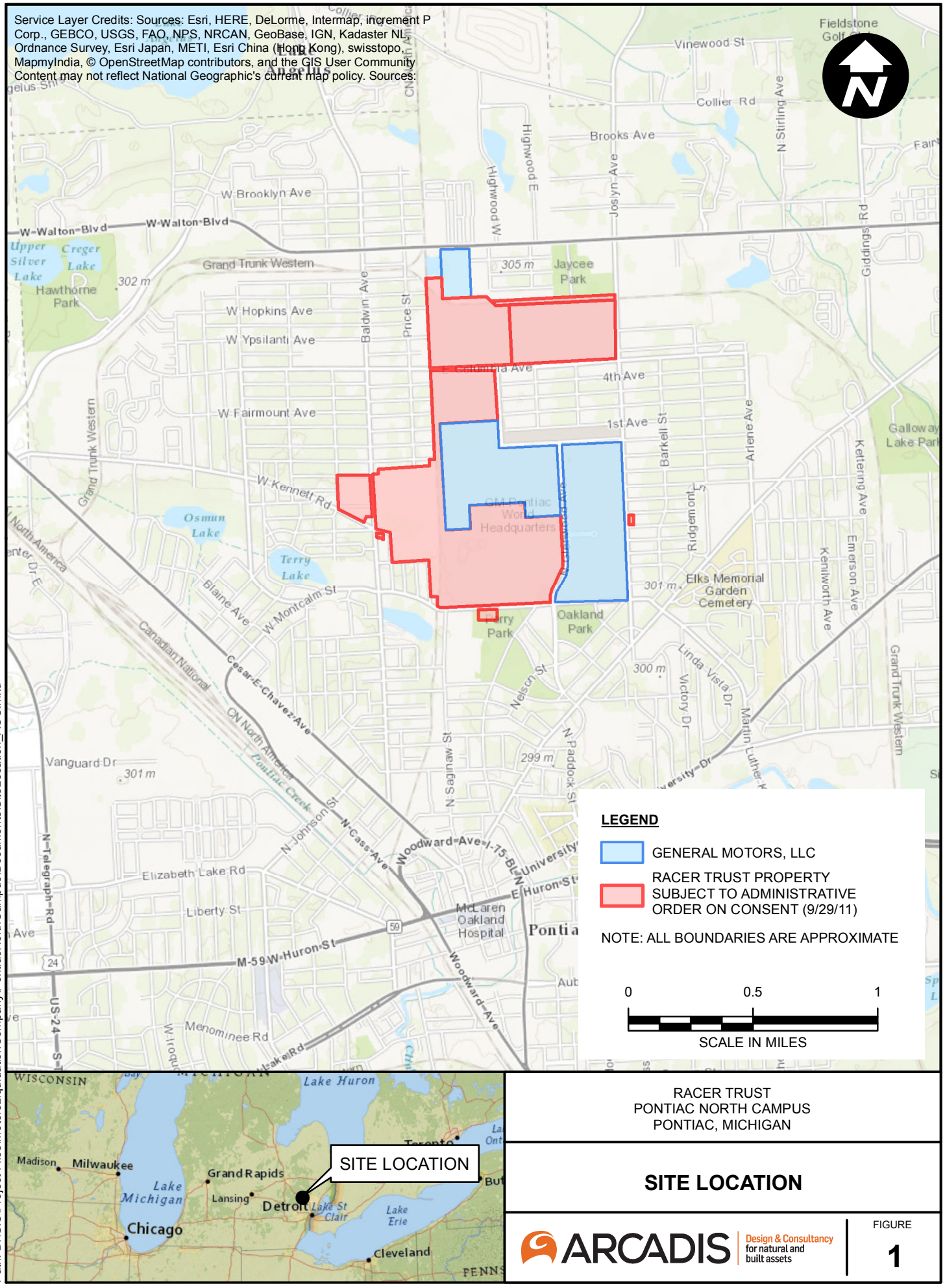
1. Coordinate access with DTE (current lessee of Fiero property) – immediately upon Work Plan approval.
2. Schedule subcontractors (utility locating and drilling) – immediately upon Work Plan approval.

3. The HPT/VAP event will begin with the utility clearance which is tentatively scheduled to begin the week of November 28th and will continue until complete. The groundwater sampling event is tentatively scheduled the week of December 19th.
4. Receive all laboratory electronic data reports (EDR) - 3 weeks after completion of field work.
5. Enter data in database, evaluate data, revise CSM as necessary, prepare summary memo, and determine next steps – 3 to 4 weeks after receipt of laboratory data.

Table 1
Proposed Wells for VOC and 1,4 Dioxane Groundwater Sampling
RACER Trust Pontiac North Campus
Pontiac, Michigan

Well ID
Fiero*
MWF16-23
MWF 16-18
MWF16-06
MWF16-21
Downgradient of LNAPL Area 1/7 (W-1) and LNAPL Area 10 (W-8)
TW-MD-01
TW-MD-03
TW-MD-05
TW-MD-07
MW-40-99
Off Site
MW0S-04
MWW1-04

VOC - Volatile organic compound
* - Current condition of the monitoring wells listed is unknown. If a monitoring well is damaged or cannot be located, a nearby well will be selected as a replacement.



RACER TRUST
PONTIAC NORTH CAMPUS
PONTIAC, MICHIGAN

SITE LOCATION

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

PROJECT NUMBER: B0064411.0001.00145
CITY:NOVI DIV/GROUP:ENV DB: PIC: PM: TM: TR:
Path: D:\GIS\Project Files\MotorsLiquidationCompany\PontiacNorthCampus\Documents\SiteLocation_AOC.mxd

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

FORMER FIERO PLANT 17

FORMER FIERO POWERHOUSE

LNAPL #1/7

LNAPL #2

LNAPL #3

LNAPL #10

LNAPL #11

SWDF

F-1 F-3 F-6 F-7 F-8 F-10 F-11 F-12 F-13 F-14 F-15 F-16 F-17

M-1 M-2 M-7 M-9 M-13 M-19 M-21 M-26 M-27 M-29

P-9 P-10 P-11

W-1 W-3 W-5 W-6 W-8 W-9 W-10 W-11 W-13

MWF1R (4)

MWF12-01 (9.3)

MWF12-02 (3)

MWF7-01 (29)

MWF7-02 (540)

MWF7-03 (ND)

MWF16-13 (CNL)

MWF16-15 (13)

MW0S-01 (ND)

MW0S-02 (ND)

MW0S-03 (ND)

MWW10-04 (ND)

MWW10-SEN02 (14)

MWW10-SEN03 (10)

MWW10-SEN04 (ND)

MWW5-01 (10)

TW-01-03 (38)

TW-10-01 (3)

TW-10-02 (62)

LEGEND

- EXISTING MONITORING WELL
- PROPOSED GROUNDWATER SAMPLE LOCATION
- PROPOSED HPT/VAP TRANSECT
- USPS DISTRIBUTION CENTER PROPERTY BOUNDARY
- FORMER DTE POWER HOUSE BOUNDARY
- FORMER WASTE MANAGEMENT UNIT
- APPROXIMATE RACER TRUST PROPERTY BOUNDARY (NOWAK & FRAUS, JUNE 2012)
- AREAS OF INTEREST
- EXTENT OF LIF RESPONSE > 25% BASED ON 2007 MOBILITY STUDY
- (62) 1,4-DIOXANE RESULT (µg/L), MAY 2016
- (3) 1,4-DIOXANE RESULT (µg/L), SEPTEMBER 2016
- µg/L MICROGRAMS PER LITER
- ND NON-DETECT
- J ESTIMATED VALUE

0 260 520

SCALE IN FEET

RACER TRUST
PONTIAC NORTH CAMPUS
PONTIAC, MICHIGAN

PROPOSED 1,4 DIOXANE INVESTIGATION

ARCADIS Design & Consultancy for natural and built assets

FIGURE 2

CITY: NOVI, MI DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet
D:\GIS\Project Files\Motors\LiquidationCompany\PontiacNorthCampus\Documents\Dioxane_20160516Results_C.mxd PLOTTED: 11/21/2016 11:33:54 AM BY: TYarbrough