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MEMORANDUM

TO:	Jean Caufield/GM	REF. NO.:	7097-05-400041/MEMO/10
FROM:	Matt Rousseau	DATE:	April 3, 2009
C.C.:	Sylvie Eastman/CRA, Ian Richardson/CRA, Francis Ramacciotti/ENVIRON		
RE:	**Post-MPE Evaluation of Potential Exposures General Motors Pontiac Centerpoint Campus, Former Building 33, LNAPL Area 1**		

The purpose of this memorandum is to propose a scope of work to evaluate whether any potentially significant exposures exist due to residual petroleum impacts within LNAPL Area 1 at the former Building 33 following the shutdown of the remedial measure on October 15, 2008, as approved by the United States Environmental Protection Agency (U.S. EPA). This memo has been revised to address comments received from U.S. EPA via electronic mail from Mr. Dan Patulski on March 5, 2009. As such, this revised memo supersedes the original submittal to U.S. EPA dated February 10, 2009. The approved corrective measure consisted of LNAPL recovery by high vacuum multi-phase extraction (MPE) and subsequent evaluation of whether risks remain which would require additional institutional controls. A sampling and analysis program will be implemented to assess the post-MPE conditions in soil gas, soil, groundwater and LNAPL. The goals of the proposed scope of work (SOW) are to:

- Determine the potential for explosion hazard associated with the volatilization of constituents from residual LNAPL; and
- Determine the significance of potential exposures to any remaining hazardous constituents in residual LNAPL, and residual LNAPL-impacted soil and groundwater.

The proposed SOW includes soil gas, soil, groundwater and LNAPL monitoring activities as detailed below. The evaluation described herein is expected to be conducted in the second quarter of 2009. Longer-term monitoring of the stability of the residual LNAPL and groundwater quality are addressed as part of the Long-Term Monitoring Plan for the Site.

SOIL GAS EVALUATION

Soil gas monitoring is proposed at eight locations: SG-1 through SG-8 (see Figure 1). Soil gas probe location selection was primarily based upon historic and current in-well LNAPL observations, and post-MPE monitoring of well headspace volatile vapor concentrations in terms of % lower explosive limit (LEL). The most recent round of well level monitoring and well headspace LEL levels is illustrated in Figures 2 and 3, respectively. Soil gas samples will be obtained utilizing dedicated soil gas probes and analyzed for % LEL

in the field using a handheld 4-gas analyzer. Soil gas probes will be installed in the first permeable zone located above the LNAPL smear zone and water table, with a general target depth guideline of approximately 6-10′ below ground surface (bgs). Field screening of soil borings will be performed to confirm the appropriate placement of the soil gas probe screens at each location. Soil gas probes will consist of ¼″ diameter PVC tubing with a 6″ long stainless steel screen implant. Backfill will consist of a sand pack that will extend 6″ above the top of screen, with a bentonite slurry seal to surface. The probes will be fitted at the surface with a stopcock and hose barb assembly to facilitate sampling, and will be completed with flush-mount protective casings. Soil gas sampling will be performed with a tedlar bag and vacuum box sampling apparatus in accordance with GM Field Method Guideline 6.14 - Soil Vapor Monitoring Point Sampling Procedures (see Attachment I). Soil gas samples will be analyzed in the field immediately following sampling using a handheld 4-gas analyzer capable of reading %LEL. Any soil gas results at or above 100% LEL will be considered a potential explosion hazard. If this condition exists, it will be further assessed.

SOIL EVALUATION

Post-remediation soil characterization data will be obtained at the locations of the proposed soil gas probes as described above (SG-1 through SG-8). During installation of the soil gas probes, soil samples will be obtained from the following sample intervals: 0-2′ bgs and the interval directly above the water table. Soil samples will be analyzed for the following chemical constituents:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX);
- Trimethylbenzenes (TMBs); and
- Methyl tert-butyl ether (MTBE).

The significance of potential exposures to hazardous constituents remaining in residual LNAPL-impacted soil will be evaluated in a human health risk evaluation.

GROUNDWATER EVALUATION

Groundwater samples will be collected at the following locations (both within the historic LNAPL plume limits and on the periphery): RW33-05, RW33-13, RW33-16, RW33-27, RW33-34, RW33-36, RW33-40, RW33-46, RW33-52, RW33-55 and RW-33-56 (see Figure 1). Groundwater samples will be obtained using the low-flow sampling technique and analyzed for the following chemical constituents:

- BTEX;
- TMBs; and
- MTBE.

Should LNAPL be observed at any of these wells during the sampling program, the respective groundwater sample will be omitted.

The significance of potential exposures to hazardous constituents remaining in residual LNAPL-impacted groundwater will be evaluated in a human health risk evaluation.

LNAPL EVALUATION

LNAPL samples will be obtained from among the wells that currently have measurable product (i.e., RW33-25, RW33-32, RW33-42, RW33-45). LNAPL samples will be analyzed for the following chemical constituents:

- BTEX;
- TMBs; and
- MTBE.

The significance of potential exposures to hazardous constituents remaining in residual LNAPL will be evaluated in a human health risk evaluation.

ATTACHMENTS:

Figure 1	Proposed Post-MPE Monitoring Plan
Figure 2	Post-MPE LNAPL Thickness Monitoring
Figure 3	Post-MPE Well Headspace LEL Monitoring
Attachment I	Soil Vapor Monitoring Point Sampling Procedure

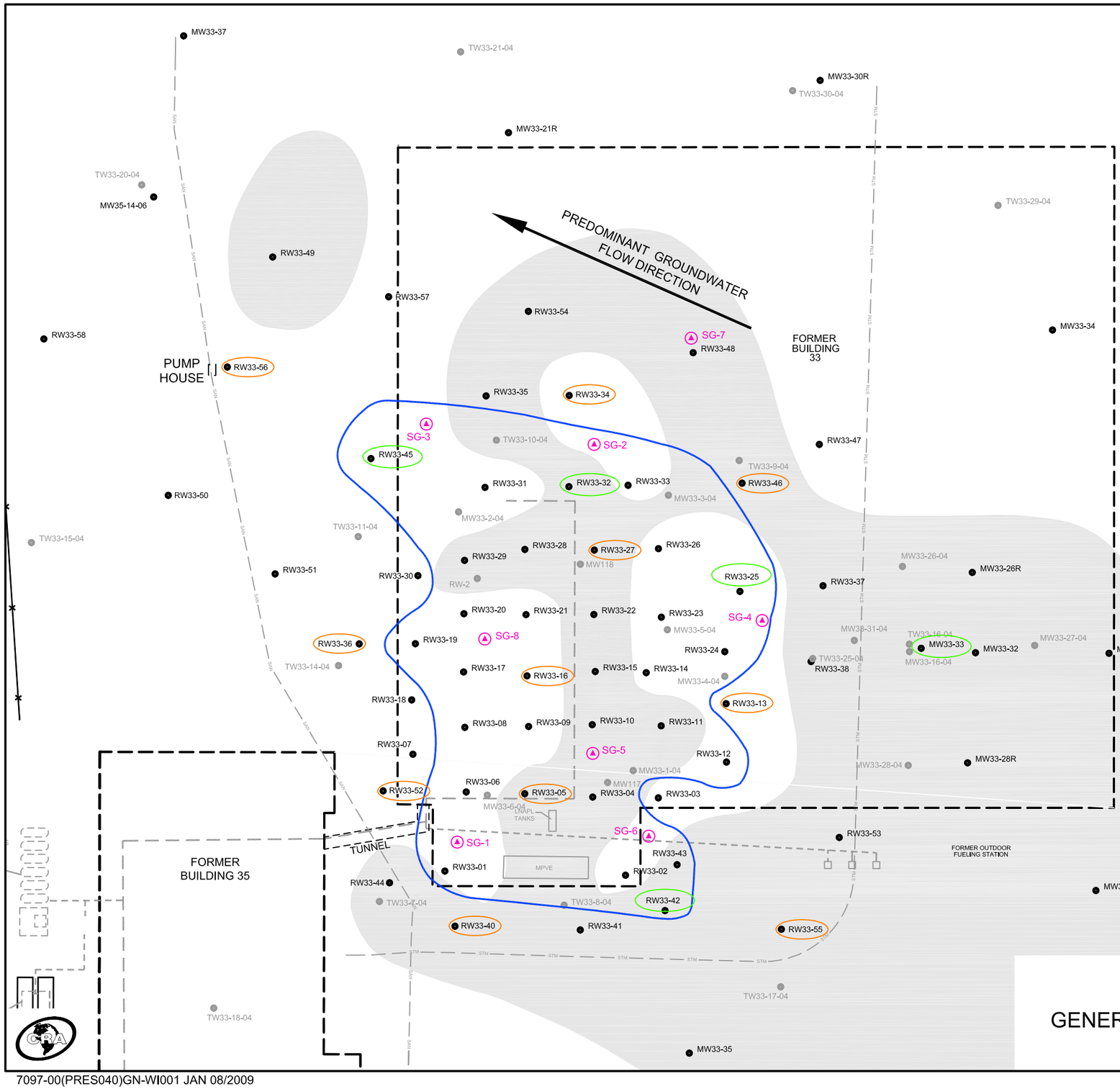

figure 1

PROPOSED POST - MPE MONITORING PLAN
GENERAL MOTORS PONTIAC CENTERPOINT CAMPUS
Pontiac, Michigan

7097-00(PRES040)GN-WI001 JAN 08/2009

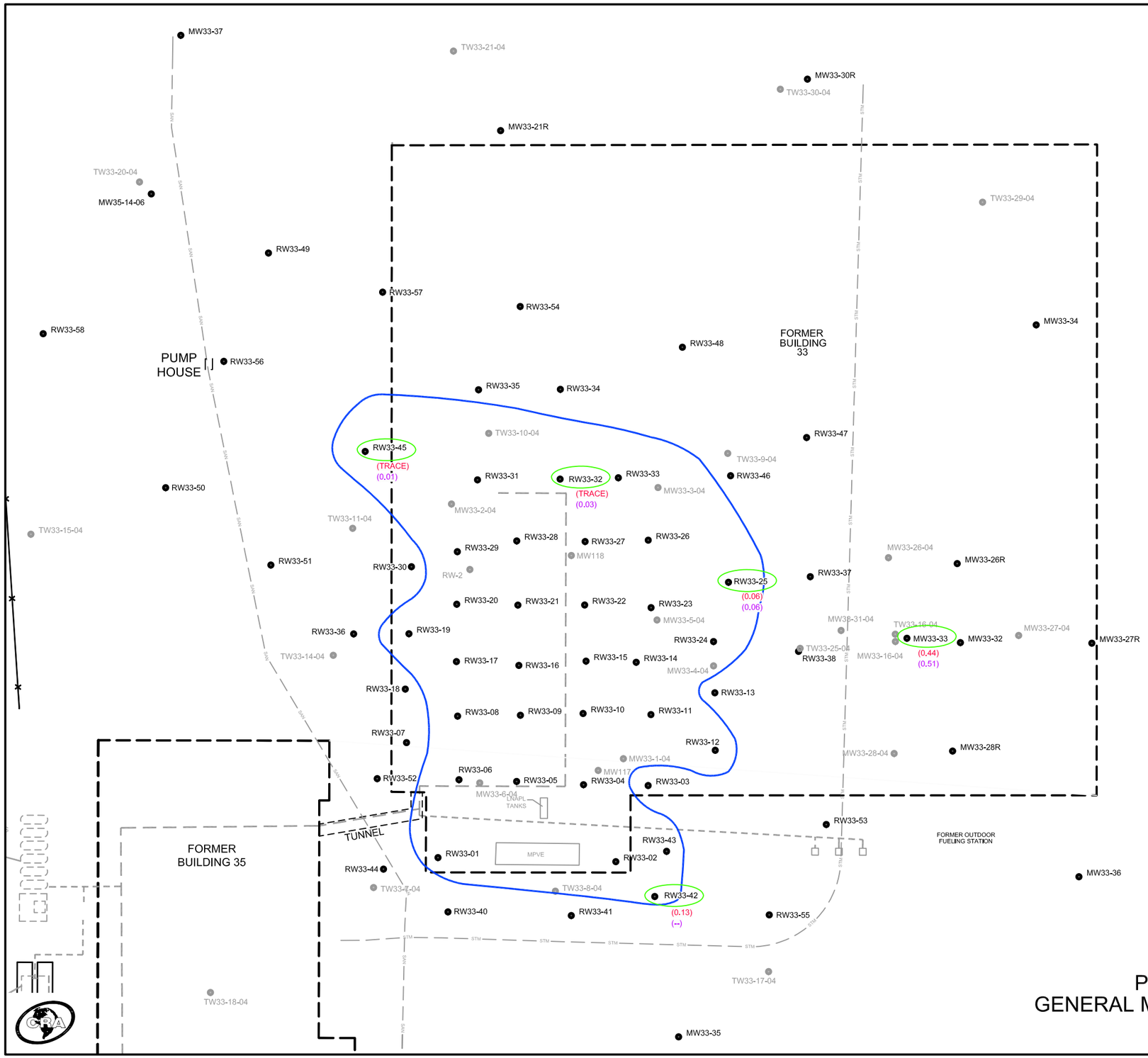

figure 2

POST MPE LNAPL THICKNESS MONITORING
GENERAL MOTORS PONTIAC CENTERPOINT CAMPUS
Pontiac, Michigan

7097-00(PRES040)GN-WI003 JAN 12/2009

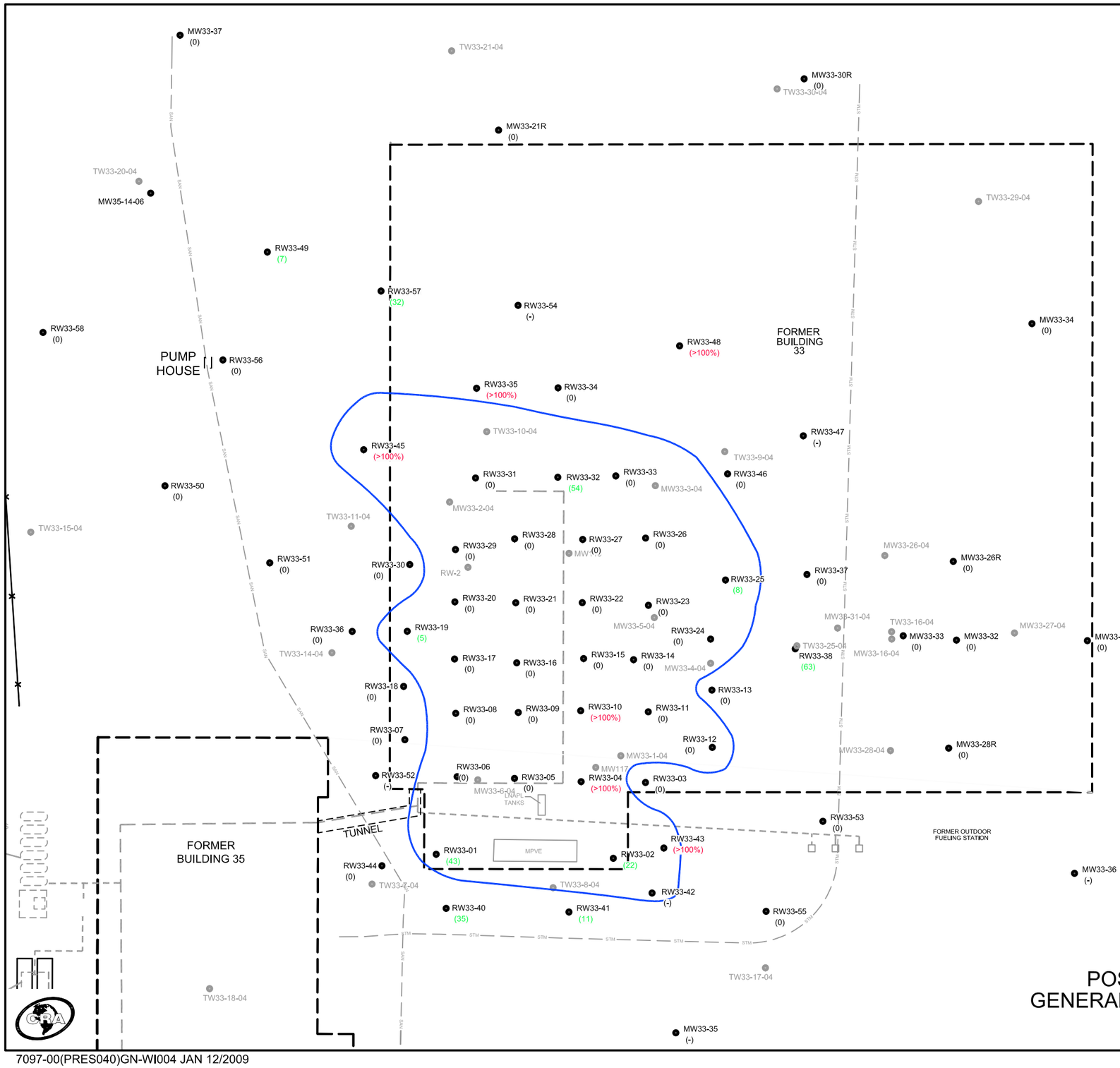

figure 3

POST MPE WELL HEADSPACE LEL MONITORING
GENERAL MOTORS PONTIAC CENTERPOINT CAMPUS
Pontiac, Michigan

7097-00(PRES040)GN-WI004 JAN 12/2009

ATTACHMENT I

GM FIELD METHOD GUIDELINE 6.14 - SOIL VAPOR MONITORING POINT SAMPLING PROCEDURES

REMEDIATION SECTION	FIELD METHOD GUIDELINE NO.: 6.14
WORLDWIDE FACILITIES GROUP	EFFECTIVE DATE: April 1, 2008
GENERAL MOTORS CORPORATION	
REVISION NO.: 0	REVISION DATE:

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SOIL VAPOR MONITORING POINT SAMPLNG PROCEDURE

LIST OF FORMS
(Following Text)

REMEDIATION SECTION	FIELD METHOD GUIDELINE NO.: FMG 6.14
WORLDWIDE FACILITIES GROUP	EFFECTIVE DATE: April 1, 2008
GENERAL MOTORS CORPORATION	
REVISION NO.: 0	REVISION DATE:

SOIL VAPOR MONITORING POINT SAMPLING PROCEDURE

INTRODUCTION

This document includes procedures for sampling soil vapor monitoring points and performing soil vapor monitoring point integrity testing.

PROCEDURES REFERENCED

- *FMG 3.10 – Installation Procedure for Soil Vapor Monitoring Points*
- *FMG 9.0 – Equipment Decontamination*
- *FMG-10.0 – Waste Characterization*

EQUIPMENT/MATERIALS

The following equipment and materials are used for the sampling of a soil vapor monitoring point:

1. Appropriate personal protective equipment (PPE) as required by the site specific Health and Safety Plan.

2. Site Plan, Field Sampling Plan, and/or Work Plan, with specific sampling objectives and analytical methods.

3. Sample media, typically consisting of SUMMA®-Type Canisters with pre-calibrated laboratory supplied time integrated flow controllers, pressure gauges, and associated stainless steel Swagelok fittings, ferrules, and "T" apparatus for duplicate sampling. The canisters should be certified clean by the laboratory in accordance with US EPA Method TO-15.

4. Portable vacuum pump.

5. Helium detector.

6. Helium leak testing materials: helium gas, surface testing shroud, Tedlar® bags, sealing agent (i.e. modeling clay), additional nylon tubing for splicing if necessary (typically ¼-inch I.D).

7. Nylon, Teflon, or stainless steel tubing.

VACUUM AND LEAK TESTING

In accordance with both state and federal guidelines (see References below) for sampling soil vapor, it is necessary to perform leak testing on the Soil Vapor Monitoring Point (SVP) to insure that ambient air is not being drawn through the surface seal of the SVP (also known as short-circuiting) during sample collection. Using helium as an indicator gas, the following steps should be followed to successfully complete leak testing:

- Obtain a surface shroud with two sealed penetrations and a pressure gauge. The surface shroud should have an outside diameter large enough to cover the SVP flush mount opening is placed on top of the SVP. It should be noted that there is no standard for the type or configuration of the surface shroud. Any container that can accommodate the components mentioned above, has the capability of being sealed at all openings, and does not introduce contamination or other adverse effects to the SVP or sample quality is an acceptable surface shroud. A container with the smallest possible volume is recommended to reduce the amount of helium that is needed.

- The sample tubing from the SVP that is securely connected to the associated subsurface vapor screen implant is extended using flexible tubing through a sealed penetration in the surface shroud and connected to the purge pump.

Step 1 – Vacuum Test

- The personal sampling pump will be used to conduct the vacuum test. The vacuum test will consist of opening the valve to the personal sampling pump while leaving closed the valves to the SUMMA™ canister and the soil gas probe. The pump will then be operated to ensure that it draws no air from the sampling assembly (i.e., creates a negative pressure, or vacuum, within the sampling assembly), thus establishing that all assembly connections are air-tight. The sampling pump low-flow detect switch will likely activate within 10 to 15 seconds, turning the pump off. A negative pressure, or vacuum, should be established within the sampling assembly, and should be sustained for at least 1 minute.
- If the pump is capable of drawing flow, or if the vacuum is not sustained for a least 1 minute, all fittings and tubing will be checked for tightness (or replaced), and the vacuum test will be repeated.

- The reading from the vacuum gauge pressure will be recorded in a field logbook to demonstrate that the pump is able to create a vacuum within the sampling assembly (it will also be noted whether the low-flow detect switch on the pump was activated), and that the vacuum is sustained for a least 1 minute.

Step 2 – Leak Test

- Using either lab supplied or consumer grade helium gas, ¼-inch diameter flexible tubing connected to the helium gas source is inserted from the outside of the surface shroud through a sealed penetration allowing the injection of helium gas within the void of the surface shroud. Pressurization of the shroud should be avoided so helium is not forced into the annulus of the borehole.

- Once the tubing is situated and sealed at the penetrations, the surface shroud must have an air tight seal against the SVP surface pad or flush mount opening. As noted with the surface shroud itself, the sealing agent can be anything that maintains an air-tight seal, does not introduce contamination or other adverse effects to the SVP or sample quality (i.e. modeling clay).

- Once a stable helium concentration is maintained, the portable purge pump connected to the SVP sample tubing can be turned on to purge the appropriate volume of air out of the SVP in accordance with the purge calculation illustrated in *FMG 3.10 – Installation Procedure for Soil Vapor Monitoring Points.* The purged air should be collected in a Tedlar® bag. The Tedlar® bag sample is then connected to a pre-calibrated hand held helium detector (Dielectric MGD-2002, Mark Model 9522, or equivalent) to verify the integrity of the surface seal.

While maintaining the stable helium concentration, the portable purge pump is disconnected and the sampling apparatus is connected to the SVP dedicated sample tubing. Typically 6-liter, 1-liter or smaller SUMMA®-Type canisters equipped with low volume (100-200 ml/min) flow controllers are utilized for this type of soil vapor sampling. The preference is for smaller volume samples (and, thus smaller canisters) unless larger canisters are specified by applicable guidance or the project specific Sampling and Analysis Plan. Sample collection procedures are discussed in detail below.

(Note: If the leak test fails the SVP should be evaluated and repaired, and/or abandoned and re-installed.)

SAMPLE COLLECTION

Soil gas sampling should not be performed during or within 48 hours of a significant rainfall event. Soil vapor samples are collected using certified SUMMA®-Type Canisters with dedicated time integrated flow controllers. The applicable regulatory guidance and project specific Sampling and Analysis Plan will dictate the size of the canister and the flow rate requirements. Prior to connecting the SUMMA® canister to the dedicated sample tubing for any SVP, the identification number from both the SUMMA® canister and flow controller and the beginning vacuum reading must be recorded in the field book, on the sampling log, and analytical Chain of Custody (COC). If the beginning vacuum is less than -25 inches of mercury (e.g., -20 in. Hg), the canister should not be used for sample collection.

During the installation of the SVP, the dedicated tubing (stainless steel, Nylaflow® or similar) should be equipped with the appropriate steel Swagelok® fittings and ferrules necessary to connect to the specified flow controller/SUMMA® canister. Connect the SVP tubing to the flow controllers using Swagelok compression fittings so that the ferrule seals to the tubing. Turn the SUMMA® canister valve to the "open" position, and immediately record the time as the sample start time in a field book or on a sampling log form, and on the Chain of Custody (COC). For field duplicate sample collection, the procedure described above is followed except for the addition of another flow controller/SUMMA® canister connected to a "T" apparatus designed specifically for duplicate sampling that is provided by the analytical laboratory.

Termination of sample collection is achieved by turning the SUMMA® canister valve to the "close" position. The sample time and vacuum gauge on the flow controller must be monitored to insure that the vacuum is not completely released. In high permeability soils, the canister should fill sufficiently within the designated sampling period (period set by the flow controller). In low permeability soils, it may be necessary to allow the canister to collect the sample for a longer period of time to insure a sufficient volume is collected. The final vacuum should be 5 in. Hg or less, but greater than zero; 2 in. Hg is a sufficient target vacuum to reach before termination of sample collection. If the SUMMA® canister is allowed to equilibrate to atmospheric pressure (i.e. the vacuum is completely released) sample quality may be compromised. In the event that the vacuum gauge on the flow controller is not accurate (damaged in shipping , etc.), field personnel will need to use their best judgment on when to terminate the sample based on knowledge of soil type, the sample duration, and the vacuum gauge. Excessive vacuum remaining in a canister may result in elevated reporting limits.
Immediately following sampling, the helium source should be disconnected and the tubing used to inject the helium should be used to draw a sample of the gas from within the shroud to determine the source concentration of helium within the shroud. This sample should also be collected in a Tedlar bag, and the helium concentration should be measured with the pre-calibrated hand-held helium detector. This source concentration is used to ensure the helium concentration in the sample does not exceed 10% of the source concentration during sample collection.

Although a flow regulator has a given flow rate and time associated with sampling, sample times are dependent on soil properties. Cohesive soils (silts and clays) with relatively less interconnected air voids within the soil matrix will not allow the vacuum to pull the soil vapor as readily as a granular soil type (clean sand and gravel). Further, soil moisture can affect the sample time as well. The sampler should monitor the sample tubing and apparatus during collection, to ensure that water incursion (from soil moisture) does not occur. Should water incursion occur the sample integrity is compromised and may result in the permanent fouling of the SUMMA® canister. A wide range of sample times should be expected. Ensuring that the final vacuum is between 2 and 5 inches of Hg is more important than the amount of time it takes to collect the sample unless simultaneous sampling is a requirement of the Sampling and Analysis Plan. In certain situations, such as extremely tight soils, if an appropriate 1-liter sample

cannot be obtained within 60 minutes, the location may be described as not yielding soil vapor and sampling should be abandoned.

WASTE MANAGEMENT

The waste materials generated by these activities should be minimal. Personal protective equipment, such as gloves, disposable clothing, and other disposable equipment will be disposed of in accordance with *FMG-10.0 – Waste Characterization.*

REFERENCE

1. United States Environmental Protection Agency (USEPA) (2002), Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), OSWER-530-D-02-0004

2. IDEM Draft Vapor Intrusion Pilot Program Guidance (2006)

3. API, 2004. Collecting and Interpreting Soil Gas Samples from the Vadose Zone: A Practical Strategy for Assessing the Subsurface-Vapor-to-Indoor –Air Migration Pathway at Petroleum Hydrocarbon Sites. American Petroleum Institute, Final Draft, October 2004.

4. State of California, 2003. State of California Advisory – Active Soil Gas Investigations. Department of Toxic Substances Control and California Regional Water Quality Control Board, Los Angeles Region. January 28, 2003.

5. State of New York, 2006. Guidance for Evaluating Soil Vapor Intrusion in The State of New York. New York State Department of Health (NYSDOH), Center for Environmental Health, Bureau of Environmental Exposure Investigation. October 2006.

Air/Vapor Sampling Form

Client: _____

Location: _____

Project No.: _____

Sample ID	Location	Start Date	Lab	Canister					Flow Controller			Purging		Tedlar Bag		Leak/Tracer Test		Start Time	End Time
				No.	Size	Type	Pressure (in Hg)		No.	Type	Flow Rate (±5%)	Purge Rate	Purge Volume	Size	Fill Rate	Initial Reading	End Reading		
							Intial	Final											

Climate

Date	Time	Temp. (°F)		Humidity	Wind (mph)	Press. (in.)	Precip. (in.)
		Indoor	Outdoor				

Notes

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