



December 13, 2012

Maryland Department of the Environment
1800 Washington Blvd.
Baltimore MD 21230
Attention: Ms. Jeannette DeBartolomeo, Case Manager

RE: Response to Request for Additional Pilot Testing Information
Calvert Citgo (Former Alger Country Store)
2802 Northeast Road (Ginski Residence)
2794 Northeast Road (O'Brien Residence)
North East, Maryland 21901
Facility No. 5678
REPSG Project Reference No. 005977.130.01

Dear Ms. DeBartolomeo,

On November 2, 2012, REPSG submitted a formal *Bench Test Workplan* for approval to the MDE. Permission for the requested Bench Test was denied by the MDE within correspondence dated December 4, 2012 and received by REPSG on December 7, 2012.

This correspondence indicated that a full-scale Pilot test, as detailed in the July 30, 2012 *Pilot Test Workplan*, must be conducted at the Site. Prior to the implementation of this Pilot Test, however, the MDE requested that additional information be provided to the MDE for review by December 15, 2012. The additional information requested was as follows:

- Information pertaining to additional observation points to be installed, including the total depth, well screening, and diameters; and
- Information pertaining to time intervals for monitoring vacuum pressure, groundwater levels, and vapor concentrations during pilot testing.

This response letter addresses this request in its entirety.

I. General Description

REPSG will perform a dual phase extraction (DPE) Single-Well Pilot Test, as described herein. Data obtained from the pilot test will be evaluated to determine if DPE is a feasible technology to perform source area contaminant mass removal at this Site, and whether or not it should be considered favorably for full-scale implementation at the Site.

The pilot test system will consist of the following major components:

- A mobile DPE pilot test unit;
- An extraction well; and
- Vacuum monitoring points (VMPs).

These components are described in **Section III**. The pilot test system also consists of non-major components, such as monitoring instruments, sample collection equipment and supplies, health and safety monitoring equipment and personal protective equipment (PPE) supplies.

The pilot test is planned to cover a duration period of 12 hours. The testing will include two main adjustments to test conditions:

- One or more stepped increases in applied vacuum from the pump. The first stepped increase is scheduled to occur after six (6) hours of testing. Various field observations may provoke a decision to adjust system vacuum at an earlier or later point. When practicable, the applied vacuum will be maintained until flow and vacuum conditions in the monitoring points reach or approach a steady state, and then will be increased to the next step.
- Two or more stepped increases in the groundwater extraction rate. The groundwater extraction rate via the drop tube will start at zero, and be adjusted upwards twice (or more if needed) to observe corresponding groundwater level responses in the extraction wells and nearby groundwater monitoring wells.

II. Objectives

The objectives of the pilot test are to:

- Determine the radius of influence (ROI) for vacuum and soil vapor flow at the Site utilizing various extraction conditions;
- Accumulate data in order to determine optimal remedial technology design considerations such as soil vapor recovery well spacing and design, vapor flow rates (cfm), soil vapor vacuum pressures (mmHg);

- Determine the appropriate methods of treating recovered soil vapors and contaminated fluids from the final implemented remedial system; and
- Estimate expected contaminant mass removal rates.

III. Test Components

III.1 Mobile DVE Pilot Test Unit

The vacuum pump, water knockout system, flow and pressure gauges, etc. will be mounted on a self-contained trailer designed specifically for multi-phase extraction pilot testing, to be supplied by a vendor. A mobile, trailer or skid-mounted DPE pilot testing unit will be supplied by a vendor to the Site for the pilot test. The pilot testing unit will include the components and specifications as follows:

- A liquid ring pump, capable of inducing 100 actual cubic feet per minute (acfm) at 22 inches of Hg vacuum;
- Water knockout system, including water level-actuated system to pump water into off-unit frac tanks (for off-Site disposal at the conclusion of testing);
- Vapor and liquid flow and pressure gauges and totalizers;
- Sampling ports to collect vapor and liquid samples; and
- An off-unit vapor discharge treatment system, including two (2) 400-lb vapor phase Granular Activated Carbon treatment units, to be operated in a series.

III.2 Extraction Well

Monitoring well MW-005R, located approximately 10 feet from the southeast corner of the gasoline UST field, is located within the soil source area and will be used as the pilot test extraction well. The well is constructed of 4-inch diameter PVC materials to a total depth of 25 feet below grade, and is screened from approximately 10 to 25 feet below grade (fbg).

III.3 Vacuum Monitoring Points

REPSG will periodically measure vacuum readings at selected surrounding monitoring points. This data will be used to assess the vacuum radius of influence during the testing, and to calculate air permeability of the subsurface.

Prior to the initiation of the DPE pilot test at the Site, REPSG will install four (4) new vapor monitoring points (VMP-001 through VMP-004) located at distances of 5, 10 feet, 15, and 20 feet from the extraction well. The VMPs will be located along 2 perpendicular axes, radiating from the extraction well towards the northeast and southeast, as shown on **Figure 1**, included in the attachments of this letter. The VMPs will be constructed of 1-inch PVC materials, screened from approximately 5 fbg to a

depth of 1 to 2 feet above the water table, estimated at 17 fbg. Monitoring well MW-001R, located approximately 35 feet from the extraction well, will also be monitored for vacuum pressure.

Each of the VMPs, and monitoring well MW-001R, will be outfitted with a PVC cap containing a sampling port to facilitate the measurement of vacuum pressures during the test period.

IV. Pilot Test Procedures

Step 1) Baseline Measurements.

Baseline data will be collected prior to the start of the test. Baseline measurements will include:

- a. Water levels from Site-wide groundwater monitoring wells.
- b. Headspace VOC levels in the extraction well, and the five vapor monitoring locations.

Step 2) Setup and Startup

- a. Wells MW-001R, MW-003R, and MW-005R will be used to collect groundwater measurements throughout the test period. This will be conducted either through data-logging pressure transducers, or with access ports through the well cap to permit periodic entry of depth to water probe.
- b. The five (5) vacuum monitoring points (VMPs 1, 2, 3, and 4, and MW-001R) will be fitted with well caps containing sampling ports for vacuum measurements.
- c. The drop tube will be installed in the extraction well, to a depth of approximately 12 inches above the static water level.
- d. The pump of the pilot testing unit will be securely connected to the extraction well via above-ground tubing.
- e. The work area will be secured with appropriate barriers and signage to prevent public access to the area during testing. A health and safety briefing will be conducted for all pilot test on-Site personnel.

Step 3) Operations

The pumping system will be started and the vacuum applied to the extraction well will be increased over the course of several minutes to a level equal to approximately 75% of the maximum capacity of the system. The level of vacuum to the pump will be controlled with the variable frequency drive (VFD) of the pump motor and/or with intake of ambient air to the system. Field data via the installed transducers and other equipment, such as a photo-ionization device

(PID) and vacuum monitors, will be recorded throughout the course of this test in order to provide data regarding the effectiveness of the technology at the Site.

A program of performance monitoring will commence immediately and will include the following:

- a. Water Levels: Water levels will be measured with an electronic depth to water meter, or downhole data-logging pressure transducer (installed prior to startup) in groundwater monitoring wells MW-001R, MW-003R, and MW-005R at startup and at 30-minute intervals throughout the test.
- b. Water Discharge: Water discharge from the extraction well will be measured, at approximately 15-minute intervals, using an inline totalizing flow meter, and cross-checked by measuring volumes received in the frac tanks.

The drop tube in MW-005R will be adjusted during the testing based on changes in water levels in MW-005R and on measured water extraction rates. The objective of drop tube adjustments will be to maintain a steady state of water levels and discharge, with a drop in groundwater level of several feet in the extraction while maintaining a manageable rate of groundwater extraction of approximately 10 gallons per minute (gpm) or less.

- c. Vapor Pressure: Vapor pressure/vacuum readings will be collected at the vacuum pump, and at the well heads of the extraction well and the five vacuum monitoring points. Vacuum readings will be collected, using a differential pressure gauge (e.g., Magnehelic® gauge) at periods of 30 minutes or less, with greater frequency (approximately every 10 minutes) in the first hour of the test, or any new test conditions (e.g., change in system vacuum).
- d. Air Flow Rates: Air flow rates will be recorded from a differential flow meter that is integral to the mobile unit, and located at a point on the influent piping to the vacuum pump. Air flow rates will be recorded at approximately 15-minute intervals throughout the testing.
- e. VOC Concentrations: VOC concentrations will be measured at a sampling point on the influent piping to the vacuum pump. Samples will be collected by pumping into a tedlar bag or via collection into a summa canister under vacuum, and then discharged to a PID or similar field instrument. Samples will be collected at startup and at approximately 15-minute intervals throughout the testing.

In addition, vapor discharge samples will be collected into Summa canisters for laboratory analyses by TO-15 methods, on a period of every 3 hours of testing.

Step 4) Shutdown and Recovery

The system will be shut down after 12 hours of testing. The system may be shut down earlier, after a minimum of 8 hours of testing, under the following conditions:

- Performance monitoring shows asymptotic conditions; i.e., minimal changes in VOC concentrations, vapor pressures, flow rates, etc.
- Very poor performance; i.e., no measurable ROI, no measurable VOC concentrations in air discharge, minimal air flow rates, etc.

After shutdown, the Site-wide measurements of water levels and VOC concentrations conducted at the baseline will be repeated. All recovered investigative-derived waste materials will be properly contained throughout the course of the pilot test, and disposed of upon completion.

If you have any questions or concerns, please do not hesitate to contact our office at 215-729-3220.

Sincerely,



Suzanne Shourds
Environmental Risk Analyst



Brenda MacPhail Kellogg
Project Manager

React Environmental Professional Services Group, Inc

Enclosures

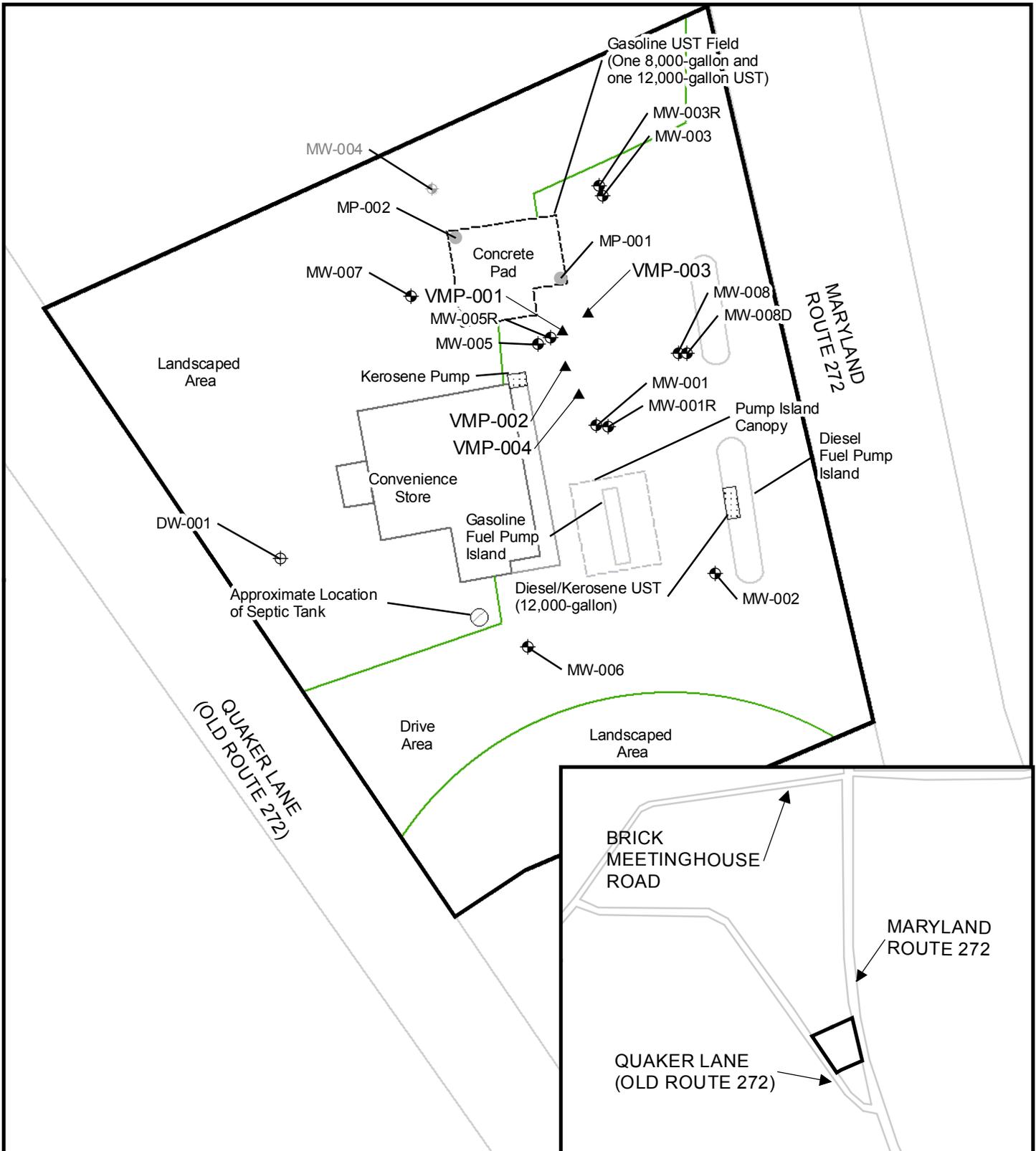


Figure 8: Proposed Vapor Monitoring Points

- ▲ Proposed Vapor Monitoring Points
- Leak Detection Well
- ⊕ Potable Well
- ⊕ Lost/Abandoned Monitoring Well
- ⊕ Monitoring Well
- Site Boundary

REPSG
 React Environmental
 Professional Services Group, Inc.

MAP SCALE: 1 inch = 45 feet

0 10 20 40 60 80 Feet

PROJECT NAME: CALVERT CITGO
PROJECT ADDRESS: 2815 NORTH EAST ROAD, NORTH EAST, MD
PROJECT NUMBER: 005977
DATE: DECEMBER 2012

