Groundwater & Environmental Services, Inc.

2142 Priest Bridge Court, Suite 1 • Crofton, Maryland 21114 • (800) 220-3606 • Fax (410) 721-3733

Submitted Via Mail

June 30, 2011

Mr. Christopher H. Ralston
Maryland Department of the Environment
Oil Control Program
1800 Washington Boulevard
Baltimore, Maryland 21230-1719

Re: PROPOSED CORRECTIVE ACTION PLAN (CAP) –
FEASIBILITY STUDY & DELINEATION WORKPLAN
Bel Air Xtra Fuels
RT 22- 2476 Churchville Road, Bel Air MD 21015-1705
MDE Case No. 2011-0112-HA

Dear Mr. Ralston:

Groundwater and Environmental Services, Inc. (GES), on behalf of Drake Petroleum Company, Inc. (Drake), is submitting this Proposed Corrective Action workplan for the above referenced station in response to the Maryland Department of the Environment (MDE) Final Request for Corrective Action and Notice of Referral directive dated June 1, 2011. The MDE directive requested the following requirements which are addressed in this Work Plan to below as follows:

1. **Submit a Corrective Action Plan (CAP) by July 2, 2011;**
    a. *as presented below this Work Plan is being submitted before July 2, 2011 and a CAP extension is being requested as per below.*
2. **Quarterly sampling of the monitoring well network;**
    a. Quarterly sampling will be implemented as directed.
3. **Submit results of helium testing of the Underground Storage Tank (UST) system (2005 & 2006)**
    a. to be submitted under separate cover as requested by MDE by August 30, 2011.
4. **Submit the most recent catchment basin test results**
    a. to be submitted as applicable under separate cover
5. **Annual sampling of drinking water supply wells at 2317 & 2319 Churchville Road**
    a. Annual sampling will be implemented as directed.

The purpose of this workplan is to collect sufficient data needed to further enhance the conceptual site model (CSM) for the site. This includes the installation of additional monitoring wells to provide an adequate network of observation points to be used during feasibility testing. The intention of the feasibility testing is to evaluate subsurface conditions including hydraulic and pneumatic aquifer characteristics to better understand remedial objectives and best evaluate remedial technologies and/or options to remediate methyl tertiary butyl ether (MTBE) from the groundwater at the site. Following MDE approval and implementation of this workplan a Corrective Action Plan including the results of the feasibility testing, well installation details and a proposed approach to reduce MTBE concentrations will

be submitted to the MDE. An extension request with due date of September 30, 2011 is requested for submittal of a Corrective Action Plan for this site.

Feasibility Testing

A two (2) day pilot test event to conduct vacuum enhanced groundwater extraction (VEGE) and soil vapor extraction (SVE) technologies is proposed. Testing will occur on multiple on-site monitoring wells following the installation of the proposed monitoring wells described below. The purpose of the feasibility test is to identify the appropriate potential technologies to reduce MTBE concentrations in the groundwater. The final phase of feasibility testing will include testing soil vapor extraction (SVE) on the tank field, using tank field monitoring wells. Attached to this workplan as **Appendix A,** is a ***Feasibility Test Scope of Work (SOW)*** to be used as to define the specifications for the pilot testing.

Groundwater Monitoring Well Installation

GES recommends installing five (5) new groundwater monitoring wells via hollow-stem auger. Two (2) groundwater monitoring wells (PMW-12 and PMW-13) are to be near the tank field in proximity to monitoring well MW-10, to provide optimal well spacing for observation points during feasibility testing in this area. One (1) groundwater monitoring well (PMW-14) is to be located due west of the site, and a nested pair of two (2) groundwater monitoring wells (PMW-15S and 15D) are to be located due south of the site across Churchville Road. The new off-site monitoring wells will be installed to allow further delineation of the impacted area, as well as to provide information necessary to further characterize the site and improve the CSM. The first of the two (2) nested groundwater monitoring wells is to be installed at a depth equivalent to the on-site groundwater monitoring wells (approximately 25 feet below ground surface). The second nested groundwater monitoring well is to be screened below the first, at a depth to be determined following an investigation into the approximate screen interval of nearby potable drinking water wells. A Proposed Groundwater Monitoring Well Location Map is attached as **Figure 1**, which shows the approximate locations of the monitoring wells to be installed. A public and private utility mark-out will be conducted to confirm the feasibility of the proposed locations. In addition, public and/or private off-site access will be obtained for the installation of proposed off-site monitoring wells.

During the installation of the proposed groundwater monitoring wells, GES will supervise continuous soil sampling utilizing a two-foot split spoon. Hammer blows will be recorded in the format of number of blows per six (6) inch advancement as part of the permanent log records. Each recovered spoon will be examined by an on-site GES geologist and described to note percent recovery, lithology, color and moisture and will then be screened with a properly calibrated photoionization detector (PID). Soil samples will be collected at the depth eliciting the highest PID reading or at approximately one (1) foot above the static water level for laboratory analysis. All soil samples will be placed in laboratory supplied glassware and placed on ice in a cooler, then transported under a Chain of Custody to Accutest Laboratories (Accutest) of Dayton, New Jersey, a Maryland certified laboratory. Soil samples will be analyzed for the full suite of volatile organic compounds (VOCs) including fuel oxygenates, in accordance with United States Environmental Protection Agency (USEPA) Method 8260 and total petroleum hydrocarbons (TPH) gasoline range organics (GRO) and TPH diesel range organics (DRO) in accordance with USEPA Method 8015B.

The two (2) proposed on-site groundwater monitoring wells (PMW-12 & PMW-13) and the proposed off-site groundwater monitoring well west of the site (PMW-14) will be constructed of four-inch diameter

PVC with 0.020-inch diameter factory-slotted screen. The proposed nested pair of off-site groundwater monitoring wells across Churchville Road (PMW-15S and PMW-15D) will be constructed of two-inch diameter PVC with 0.020-inch diameter factory-slotted screen. Silica sand will be placed in the annulus from the base of the groundwater monitoring well to a height of two (2) feet above the screen, followed by a two-foot interval of hydrated bentonite chips; the annulus will then be filled to grade with a Portland cement grout. The groundwater monitoring wells will be finished with a flush mount protective steel manway. Development will be performed by a Maryland licensed driller under the supervision of a GES geologist. The general procedure would include pumping until the groundwater runs clear, then surging by agitating the pump, followed by a second round of pumping until the groundwater runs clear. Once the groundwater monitoring wells have been installed and developed the locations will be professionally surveyed and mapped.

Groundwater Sampling

Following the installation of the new groundwater monitoring wells, the entire groundwater monitoring well network, including tank field monitoring wells, will be sampled for full suite VOCs, including fuel oxygenates, in accordance with USEPA Method 8260, and TPH GRO and TPH DRO in accordance with USEPA Method 8015B. Groundwater samples will be obtained utilizing a disposable bailer and the monitoring and tank field monitoring wells will be purged three (3) volumes prior to groundwater sampling. Groundwater samples will be placed on ice in a cooler and transported under a Chain of Custody to Accutest to be analyzed within the applicable holding time with a dilution of 10% Hydrochloric Acid (HCL) as a preservative. Groundwater samples will be collected on a quarterly basis and reported in accordance with MDE requirements.

Potable Drinking Water Well Sampling

Access will be initiated with the property owners at 2317 and 2319 Churchville Road to collect samples their potable drinking water wells. Potable drinking water well samples will be submitted for laboratory analysis of full suite VOCs, including fuel oxygenates, in accordance with USEPA Method 524.2. The MDE will be provided copies of Potable Drinking Water Well Sampling Access letters in advance for review and approval. The MDE's continued assistance with residential access and/or oversight will be requested prior to scheduling sampling. Potable drinking water well samples from the potable drinking water wells located at 2317 and 2319 Churchville Road will be completed annually, in conjuction with one of the quarterly groundwater monitoring activities and will be reported annually in accordance with MDE requirements.

GES and Drake look forward to your written response to this work plan. Please contact the undersigned at (800) 220-3606 extensions 3712 and 3703, respectively, if you have any questions or require additional information.

Sincerely,
Groundwater & Environmental Services, Inc.

Daniel R Drennan, EIT
Environmental Remediation Specialist

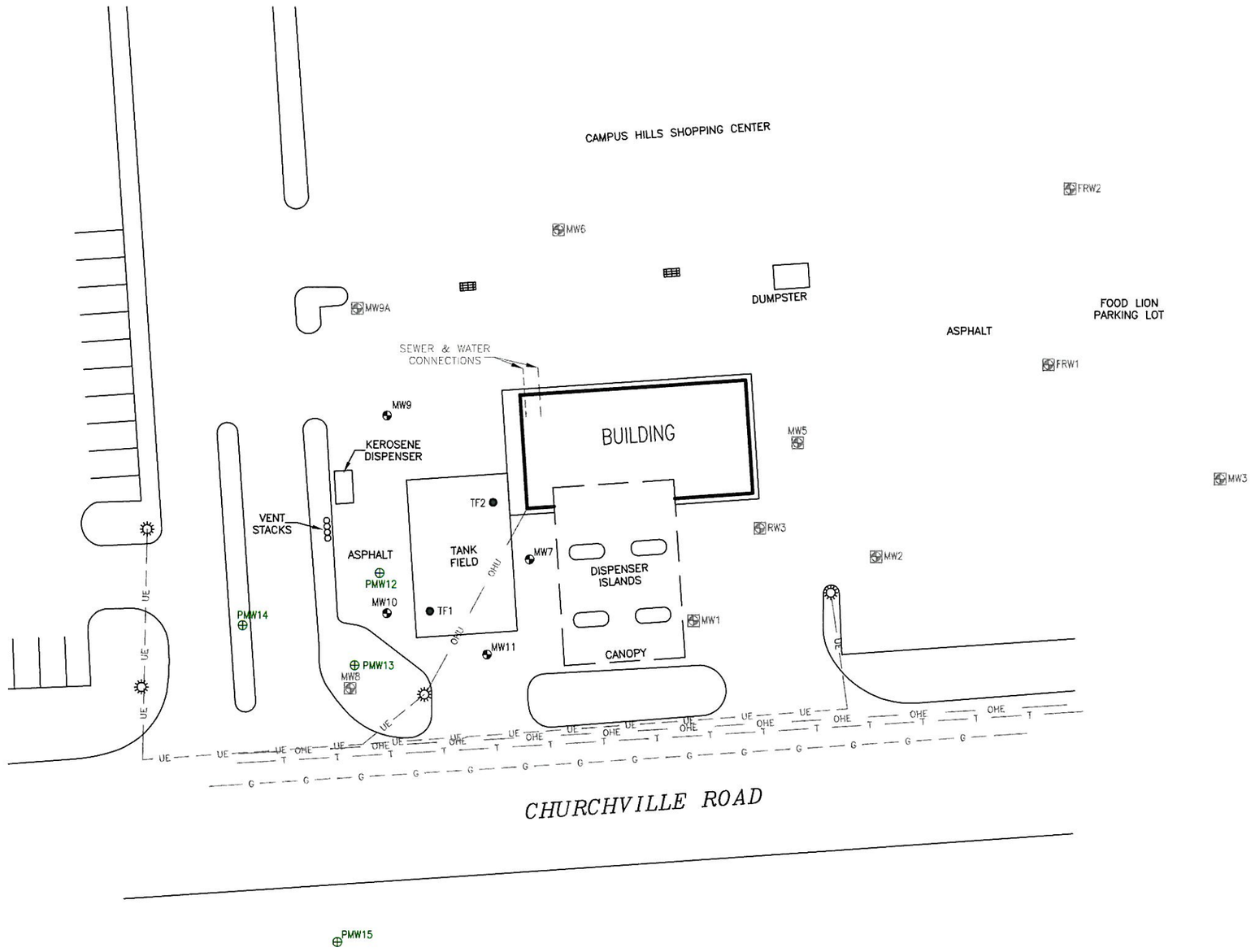
Andrea Taylorson-Collins
Project Manager/
Environmental Scientist

Attachments

cc: Susan Bull, MDE
Eric Harvey, Drake Petroleum Company, Inc. via electronic submittal
File, GES - MD

FIGURE 1

Proposed Groundwater Monitoring Well Location Map



LEGEND

- CATCH BASIN
- LIGHT POLE
- MONITORING WELL
- ABANDONED MONITORING WELL
- TANK FIELD WELL
- SS — UNDERGROUND SANITARY SEWER
- W — UNDERGROUND WATER LINE
- G — UNDERGROUND GAS LINE
- T — UNDERGROUND TELEPHONE
- UE — UNDERGROUND ELECTRIC
- OHU — OVERHEAD UTILITIES
- PROPOSED MONITORING WELL LOCATION

DRAFTED BY: B.C.S. (N.J.)	PROPOSED MONITORING WELL LOCATION MAP
CHECKED BY: DD	**BEL AIR XTRA FUELS** **2476 CHURCHVILLE ROAD** **BEL AIR, MARYLAND**
REVIEWED BY: RE	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114
NORTH	SCALE IN FEET: 0 APPROXIMATE 40 / DATE: 6/20/2011 / FIGURE: 1

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APPENDIX A

Feasibility Test Scope of Work

Groundwater & Environmental Services, Inc.

2142 Priest Bridge Court, Suite 1 • Crofton, Maryland 21114 • (800) 220-3606 • Fax (410) 721-3733

APPENDIX A

FEASIBILITY TEST SCOPE OF WORK (SOW)
BEL AIR XTRA FUELS
RT 22 – 2476 CHURCHVILLE RD
BEL AIR, MARYLAND
MDE CASE # 2011-0112-HA
JUNE 2011

This workplan provides the procedures and site activities associated with conducting a vacuum-enhanced groundwater extraction (VEGE) and soil vapor extraction (SVE) feasibility test at the Drake Petroleum Company, Inc Xtra Fuels station, located at 2476 Churchville Rd, Bel Air, Maryland (the Site). GES proposes to conduct this feasibility test to determine the effectiveness of the remediation technologies noted above.

PRE TEST ACTIVITIES:

Prior to conducting the feasibility test activities, five (5) additional on-site and off-site groundwater monitoring wells (MW-12, MW-13, MW-14, MW-15S and MW-15D) will be installed to provide additional delineation, as well as optimal monitoring well spacing for observation points during testing. **Figure 1, Proposed Groundwater Monitoring Well Location Map** indicates the approximate locations of the monitoring wells to be installed. **Table 1, Groundwater Monitoring Well Construction** shows the details of the individual groundwater monitoring well completions.

FEASIBILITY TEST OVERVIEW:

Day 1:

Test #1	SVE: MW-10 VEGE: MW-10
Test #2	SVE: MW-7
Test #3	SVE: MW-12 or MW-13 based on assessment results VEGE: MW-12 or MW-13
Test #4	SVE: TF-2

REQUIRED EQUIPMENT:

Mobile Remediation Vehicle
Photoionization Detector (PID)
Air Velocity Meter
Three Gas Meter, Lower Explosive Limit Meter (LEL), O_2, CO

Wireless Liquid Level Transducers
Wireless Well Vacuum/Pressure Transducers
Multi-parameter Groundwater Quality Meter
Pressure\Vacuum Gauges
Water\Product Interface Probe

FEASIBILITY TEST FIELD PROCEDURES:

Background Data:

Before activities begin on each day of testing and at the end of the day, liquid levels [depth to product (DTP)/depth to water (DTW)] will be gauged with an interface probe at groundwater monitoring wells MW-7, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15S and MW-15D, and tank field monitoring wells TF-1 and TF-2.

Day 1, Test #1: **SVE and VEGE**

Test Well: MW-10
Monitoring wells used for observation: MW-9, MW-11, MW-12, MW-13, MW-14 and TF-1;

SVE Phase of Testing:

Objective: Determine the vadose zone vapor-phase hydrocarbon recovery rate; determine the relationship between applied vacuum and vapor flow rate; and estimate the approximate vacuum radius-of-influence.

Duration of Test: 30 to 60 minutes.

Testing Procedure Summary:

The feasibility test shall progress in the manner described below. Vacuum extraction on the monitoring well will be slowly increased during each of the vacuum steps, while collecting flow and volatile organic compound (VOC) concentration data. Each vacuum step will be performed for a minimum of 10-20 minutes. The vacuum level may need to be adjusted during SVE testing to ensure that significant upwelling does not occur as a result of the vacuum applied to the monitoring well. Extracted vapors will be discharged to the atmosphere. The feasibility test shall progress as follows:

a. step-1 (approximately 25 inches of water (i.w.) vacuum)
b. step-2 (approximately 50 i.w. vacuum)
c. *step-3(approximately 75 i.w. vacuum)

* - denotes step to collect vapor sample

If VOC concentrations are increasing, the test will be continued until they stabilize, at which point an air bag sample will be collected. If testing indicates that a higher vacuum can be applied, the vacuum steps will be modified.

Pumping Phase of Testing:

Objective: Determine the baseline groundwater extraction rate in the absence of applied vacuum; determine the influence of pumping-only on surrounding monitoring wells; and lower the groundwater table prior to the start of VEGE testing.

Duration of Test: 30 to 90 minutes.

Testing Procedure Summary:

After the SVE testing is complete, any upwelling that occurred in the monitoring well used of extraction or surrounding monitoring wells will be allowed to stabilize before the start of pumping. A pneumatic pump will be used to recover groundwater from the monitoring well used for extraction testing, as well as any product that enters the monitoring well during testing. The pump intake will be positioned at approximately twenty (20) feet below grade. Because a pneumatic pump will be used, the groundwater recovery rate will not be set, and the pump will draw the groundwater table down to the intake of the pump if the yield of the monitoring well does not exceed the maximum pumping rate of the pump. The test will continue until the groundwater recovery rate and the drawdown in the extraction well stabilize. Extracted groundwater will be transported offsite for proper disposal.

VEGE Phase of Testing:

Objective: Determine the relationship between induced vacuum, SVE flow rate and hydrocarbon concentrations; determine groundwater and vapor recovery rates; determine vapor-phase and dissolved-phase hydrocarbon recovery rates; estimate pneumatic and hydraulic radius-of-influence; and obtain analytical and field data to characterize groundwater properties.

Duration of Test: 2 to 4 hours.

Testing Procedure Summary:

At the conclusion of the pumping only phase of testing, vacuum extraction will be applied while pumping continues. Vacuum on the monitoring well used for extraction will be slowly increased during each of the three (3) vacuum steps, and flow and VOC concentration data will be collected throughout each step. Each vacuum step will be performed for at least 30 minutes. Hydraulic drawdown will be maintained throughout this test in the extraction well. If SVE testing indicates that higher or lower vacuum should be applied, the vacuum steps will be modified. Extracted groundwater will be transported offsite for proper disposal. Extracted vapors will be discharged to the atmosphere. The test methodology is described below.

a. step-1 (low vacuum – approximately 40 i.w. vacuum)
b. step-2 (medium vacuum – approximately 60 -80 i.w. vacuum)
c. *step-3 (high vacuum – approximately 120-200 i.w. vacuum or up to fifteen 15 " mercury (Hg))

* - denotes step to collect vapor sample

If VOC concentrations are increasing, the test will be continued until they stabilize, at which point an air bag sample will be collected.

Test #2: **SVE**

Test Well: MW-7

Monitoring wells used for Observation: MW-9, MW-10, MW-11, MW-12, TF-1 and TF-2;

SVE Phase of Testing:

Objective: Determine the vadose zone vapor-phase hydrocarbon recovery rate; determine the relationship between applied vacuum and vapor flow rate; and estimate the approximate vacuum radius-of-influence.

Duration of Test: 90 to 120 minutes.

Testing Procedure Summary:

The feasibility test shall progress in the manner described below. Vacuum on the extraction well will be slowly increased during each of the vacuum steps, while collecting flow and VOC concentration data. Each vacuum step will be performed for approximately 30 minutes. The vacuum level may need to be adjusted during SVE-only testing to ensure that significant upwelling does not occur as a result of the vacuum applied to the well. Extracted vapors will be discharged to the atmosphere. The feasibility test shall progress as follows:

a. step-1 (approximately 25 i.w. vacuum)
b. step-2 (approximately 50 i.w. vacuum)
c. *step-3(approximately 75 i.w. vacuum)

* - denotes step to collect vapor sample

If VOC concentrations are increasing, the test will be continued until they stabilize, at which point an air bag sample will be collected. If testing indicates that a higher vacuum can be applied, the vacuum steps will be modified.

Test #3: SVE and VEGE

Test Well: MW-12
Monitoring wells used for observation: MW-9, MW-10, MW-11, MW-13, MW-14 and TF-1;

Alternate Test Well: MW-13
Monitoring wells used for observation: MW-10, MW-11, MW-12, MW-13, MW-14 and TF-1;

SVE Phase of Testing:

Objective: Determine the vadose zone vapor-phase hydrocarbon recovery rate; determine the relationship between applied vacuum and vapor flow rate; and estimate the approximate vacuum radius-of-influence.

Duration of Test: 30 to 60 minutes.

Testing Procedure Summary:

The feasibility test shall progress in the manner described below. Vacuum on the monitoring well used for extraction will be slowly increased during each of the vacuum steps, while collecting flow and VOC concentration data. Each vacuum step will be performed for a minimum of 10-20 minutes. The vacuum level may need to be adjusted during SVE-only testing to ensure that significant upwelling does not occur as a result of the vacuum applied to the well. Extracted vapors will be discharged to the atmosphere. The feasibility test shall progress as follows:

a. step-1 (approximately 25 i.w. vacuum)
b. step-2 (approximately 50 i.w. vacuum)
c. *step-3(approximately 75 i.w. vacuum)

* - denotes step to collect vapor sample

If VOC concentrations are increasing, the test will be continued until they stabilize, at which point an air bag sample will be collected. If testing indicates that a higher vacuum can be applied, the vacuum steps will be modified.

Pumping Phase of Testing:

Objective: Determine the baseline groundwater extraction rate in the absence of applied vacuum; determine the influence of pumping only on surrounding monitoring wells; and lower the groundwater table prior to the start of VEGE testing.

Duration of Test: 30 to 90 minutes.

Testing Procedure Summary:

A pneumatic pump will be used to recover groundwater from the monitoring well used for extraction , as well as any product that enters the well during testing. The pump intake will be positioned at approximately twenty (20) feet below grade. Because a pneumatic pump will be used, the groundwater recovery rate will not be set, and the pump will draw the water table down to the intake of the pump if the yield of the monitoring well does not exceed the maximum pumping rate of the pump. The test will continue until the groundwater recovery rate and the drawdown in the extraction well stabilize. Extracted groundwater will be transported offsite for proper disposal.

VEGE Phase of Testing:

Objective: Determine relationship between induced vacuum, SVE flow rate and hydrocarbon concentrations; determine groundwater and vapor recovery rates; determine vapor-phase and dissolved-phase hydrocarbon recovery rates; estimate pneumatic and hydraulic radius-of-influence; and obtain analytical and field data to characterize groundwater properties.

Duration of Test: 2 to 4 hours.

Testing Procedure Summary:

At the conclusion of the pumping only phase of testing, vacuum extraction will be applied while pumping continues. Vacuum on the extraction well will be slowly increased during each of the three vacuum steps, and flow and VOC concentration data will be collected throughout each step. Each vacuum step will be performed for at least 30 minutes. Hydraulic drawdown will be maintained throughout this test in the monitoring well used for extraction. If SVE testing indicates that higher or lower vacuum should be applied, the vacuum steps will be modified. Extracted groundwater will be transported offsite for proper disposal. Extracted vapors will be discharged to the atmosphere. The test methodology is described below.

a. step-1 (low vacuum – approximately 40 i.w. vacuum)
b. step-2 (medium vacuum – approximately 60-80 i.w. vacuum)
c. *step-3 (high vacuum – approximately 120-200 i.w. vacuum or up to 15 “Hg)

* - denotes step to collect vapor sample

If VOC concentrations are increasing, the test will be continued until they stabilize, at which point an air bag sample will be collected.

Test #4: SVE

Test Well: TF-1

Monitoring wells used for observation: MW-7, MW-10, MW-11, MW-12 andTF-2

SVE Phase of Testing:

Objective: Determine the vadose zone vapor-phase hydrocarbon recovery rate; determine the relationship between applied vacuum and vapor flow rate; and observe vacuum influence in surrounding observation wells.

Duration of Test: 90 to 180 minutes.

Testing Procedure Summary:

The feasibility test shall progress in the manner described below. Vacuum on the tank field well will be slowly increased during each of the vacuum steps, while collecting flow and VOC concentration data. Each vacuum step will be performed for a minimum of 30 minutes. The vacuum level may need to be adjusted during SVE-only testing to ensure that significant upwelling does not occur as a result of the vacuum applied to the monitoring well. Extracted vapors will be discharged to the atmosphere. The feasibility test shall progress as follows:

a. step-1 (approximately 20 i.w. vacuum)
b. step-2 (approximately 40 i.w. vacuum)
c. *step-3(approximately 60 i.w. vacuum)

* - denotes step to collect vapor sample

If VOC concentrations are increasing, the test will be continued until they stabilize, at which point an air bag sample will be collected.

WIRELESS TRANSDUCER AND AUTOMATED DATA COLLECTION:

During testing, wireless transducers and automated data collection will be used to continuously obtain the following:

- Water table elevation change in the extraction well and the observation wells;
- Vacuum at the blower inlet;
- Extraction well casing vacuum;
- Vapor flow rate from the extraction well; and
- Vacuum/pressure influence readings at the observation wells.

TEST DATA COLLECTION AND SAMPLING METHOLOGY

1. Initial liquid levels (prior to test) and final liquid levels (upon test conclusion) will be gauged from local observation wells with an interface probe.
2. The following data will be obtained during testing at approximately 15- to 30-minute intervals:
   - Groundwater extraction flow rates;
   - Vapor flow rate at blower;
   - Applied vacuum at the extraction well;
   - PID, LEL and O_2 of recovered vapor stream;
   - Observation well vacuum/pressure influence; and
   - Liquid levels.
3. Extracted groundwater will be collected and submitted for laboratory analysis of full suite VOCs, including fuel oxygenates, in accordance with United States Environmental Protection Agency (USEPA) Method 8260, and total petroleum hydrocarbons (TPH) gasoline range organics (GRO) and TPH diesel range organics (DRO) via USEPA Method 8015B. The extracted groundwater will also

be analyzed for transition metals (calcium (dissolved/total), magnesium (dissolved/total), iron (dissolved/total), manganese (dissolved/total), via USEPA Method 6020.

4. Vapor samples (in duplicate) will be analyzed for benzene, toluene, ethylbenzene and total xylenes (BTEX), methyl tert butyl ether (MTBE), TPH $C_1 – C_4$, and TPH $>C_4 – C_{10}$ by USEPA Method 18M. These analytical results will be used to determine the most appropriate SVE off-gas treatment technology.

Table 1
Groundwater Monitoring Well Construction

Monitoring Well ID	Installation Date	Diameter (inches)	Depth to Bottom	Casing Interval (fbg)	Screen Interval (fbg)	Depth to Groundwater Average Range (fbg)
MW-7	1995	4	22.02	TBD	TBD	13.6
MW-9	1995	4	20.55	TBD	TBD	12.5
MW-10	11/19/2009	4	25	0 - -5	5 - 25	11.84
MW-11	12/14/2009	4	25	0 - 5	4 - 24	11.85
MW-12*	TBD	4	25	0 - 5	5 - 25	TBD
MW-13*	TBD	4	25	0 - 5	5 - 25	TBD
MW-14*	TBD	4	25	0 - 5	5 - 25	TBD
MW-15S*	TBD	2	25	0 - 5	5 - 25	TBD
MW-15D	TBD	2	TBD	TBD	TBD	TBD

* Total depth and screen interval may change based on field observations
fbg- feet below grade
TBD- to be dated