

August 30, 2012

Ms. Susan Bull  
Maryland Department of the Environment  
Oil Control Program  
1800 Washington Boulevard  
Baltimore, Maryland 21230-1719

Re: **SUPPLEMENTAL SUBSURFACE INVESTIGATION WORK PLAN**  
Bel Air Xtra Fuels  
2476 Churchville Road, Bel Air MD  
MDE Case No. 2013-0007-HA and 2011-0112-HA

Dear Ms. Bull:

Groundwater and Environmental Services, Inc. (GES), on behalf of Drake Petroleum Company, Inc. (Drake), is submitting this Supplemental Subsurface Investigation Work Plan for the above referenced Site in response to the Maryland Department of the Environment (MDE) Request for Granular Activated Carbon Installation and Additional Activities directive dated August 14, 2012. The MDE directive requested the installation of two additional bedrock well/shallow monitoring well pairs to further investigate subsurface conditions in the area.

### **Bedrock Well Installation**

GES will install four (4) new groundwater monitoring wells via air rotary drill rig. One (1) nested pair of two (2) groundwater monitoring wells (tentatively MW-21S and MW-21D) are to be located due west of the site along Churchville Road, in front of La Tolteca Restaurant. One (1) pair of nested wells, proposed groundwater monitoring wells MW-22S and MW-22D, will be located along Churchville Road, in front of the property located at 1 Meadow Spring Drive. The proposed locations, directed by the MDE, are shown on **Figure 1**. Please note, that exact locations will be confirmed once public markouts indicate that the proposed locations are ten (10) feet from all utilities, access agreements have been signed granting permission to drill in these locations and any applicable right-of-way permits have been granted.

Each pair or “cluster” will consist of one shallow overburden monitoring well and one (1) bedrock monitoring well. The shallow and bedrock wells within each cluster would be approximately 5-7 feet apart. The two (2) shallow groundwater monitoring wells, MW-21S and MW-22S, will be installed at a depth equivalent to the on-site groundwater monitoring wells, to a depth of ten (10) feet below first groundwater. The two (2) deep nested groundwater monitoring wells will be drilled to a depth of 200 feet below grade, as directed by the MDE.

In addition, GES requests the option to construct “nested” screen intervals within each of the two bedrock wells. The exact screen intervals for these discrete bedrock zones would be determined by corresponding downhole geophysical testing and confirmed with the MDE prior to well completion. The geophysical testing would occur after the bedrock well outer casing is set but prior to final completion of the bedrock

well construction. Each bedrock well would be drilled, via air rotary, to a sufficient diameter allowing up to two discrete and isolated screen intervals to be placed in the same casing.

During the installation of the proposed groundwater monitoring wells, GES will supervise continuous soil sampling utilizing a two (2) foot split spoon in the shallow groundwater monitoring wells MW-21S and MW-22S. In the deep groundwater monitoring wells, MW-21D and MW-22D soil sampling will begin at the depth where the nested shallow groundwater monitoring well ended and continue every five (5) feet using a two-foot split spoon until the tool can no longer be advanced. 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 retained from 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 bedrock wells (MW-21D and MW-22D) will consist of a six (6) inch casing seated approximately five (5) feet into competent rock. From the bottom of the steel casing to the terminal depth (tentatively to 200 feet below grade), the bedrock wells will exist as an open borehole. If the corresponding geophysical investigation identifies specific zones of interest in regard to groundwater flow for each bedrock wells, then one (1) to two (2) 2-inch wells may be installed within the each of the six (6) inch steel bedrock casings. Each of these “nested” internal wells would have a limited screen interval across an identified fracture or flow zone at depth. These internal, nested wells would be constructed in a similar fashion to the shallow overburden wells described previously; however, the discrete screen intervals would be separated with a minimum of ten (10) feet of grout/bentonite sealant to provide isolation within the shared bedrock outer casing.

The groundwater monitoring wells will be finished with a flush-mount protective steel manhole cover. 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 surveyed and mapped.

### **Geophysics**

After the installation of the two (2) bedrock boreholes, a complete down-hole geophysical survey will be conducted to evaluate bedrock structure, orientation and potential water bearing zones as directed by the MDE. As previously noted, results of the geophysical tests will influence the specific construction of the bedrock wells and the selection of potential discrete screen zones placed within these wells. The geophysical survey will log:

- **3-Arm Caliper** (CAL or 3ACS): Records borehole diameter.
- **Fluid Temperature** (T): Records water temperature.

- **Fluid Conductivity:** Records electrical conductivity of groundwater, and can identify and discriminate between different water-bearing zones if the total dissolved solid (TDS) or ionic content of the water in the two (2) zones is different.

- **Natural gamma:** Records clay content of the formation(s), and can therefore detect clay-enriched soils and saprolite, weathered fracture zones, and hydrogeological boundaries.

- **High-Resolution Acoustic Borehole Televiewer (HRAT) or Optical Borehole Televiewer (OPTV):** Records an accurately-scaled image of the borehole walls, allowing identification of features such as fractures and solution openings, and semi-quantitative estimation of fracture orientation and thickness using visible light (optical) or sonar pulses (acoustic).

- **Heat Pulse Flowmeter (HPFM):** Records the rate of vertical water flow at depth intervals in a boring. A flowmeter is used to record the vertical flow rate at selected depths in a borehole, as well as the magnitude and direction of flow (up/down). Flowmeter data can often be used to determine which fractures may be conduits for water (into or out-of a well), as well as their relative water production rates.

### **Groundwater Sampling**

Two (2) weeks following the installation of the new groundwater monitoring wells, the 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/ or a pump with dedicated tubing and the groundwater monitoring wells will be purged three (3) volumes prior to groundwater sampling. Groundwater samples will be shipped to Accutest of Dayton, New Jersey for analyses.

### **Waste**

All soil and groundwater generated during drilling, development and borehole geophysics will be containerized and transported off-site for proper disposal.

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

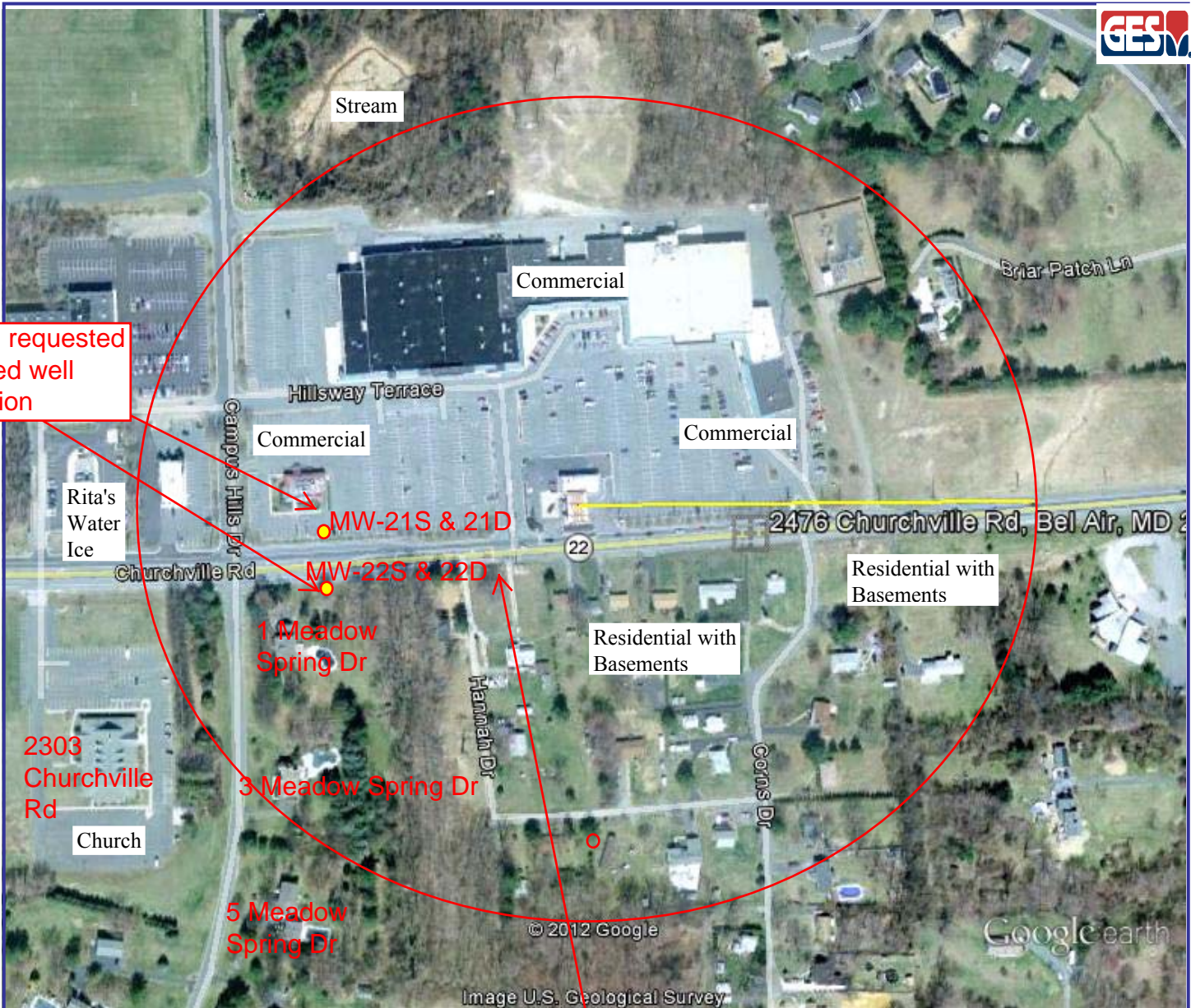
Sincerely,  
**Groundwater & Environmental Services, Inc.**



Andrea Taylorson-Collins  
Project Manager/Environmental Scientist

Attachments

cc: Jeanette DeBartolomeo, MDE via Fed Ex  
Eric Harvey, Drake Petroleum Company, Inc. via Apec Lite  
GES PSID#390070



MDE requested nested well location

MW-15S & MW-15D

DRAFTED BY: JM	<b>LOCAL AREA MAP: 300 METERS</b> March 20, 2012		
CHECKED BY: NK	<b>BEL AIR XTRA FUELS</b> 2476 CHURCHVILLE ROAD BEL AIR, MARYLAND		
REVIEWED BY: ATC	<b>Groundwater &amp; Environmental Services, Inc.</b> 2142 Priest Bridge Ct. Suite 1, Crofton, Maryland 21114		
NORTH 	SCALE IN FEET	DATE 8-20-12	FIGURE 1