Extent of Contamination Study Report
Sykesville Oil Site
Sykesville, Maryland

3 April 2006

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Environmental Resources Management, Inc.
200 Harry S. Truman Pkwy, Suite 400
Annapolis, MD 21401

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1.0 INTRODUCTION

Environmental Resources Management (ERM) has prepared this Extent of Contamination Study Report on behalf of the Respondent, Fogle's Septic Clean, Inc. (Fogle's), to summarize the investigation of oil contaminated ground water and soils at the Sykesville Oil Site (the "Site"). This document addresses the requirements under item 9.3 (c) of Section IX in the U. S. Environmental Protection Agency (EPA) Administrative Order by Consent (AOC) executed between the EPA and Fogle's (effective 28 April 2005) relative to the reported discharge of oil from the Fogle's facility ("Facility") located at 580 Obrecht Road in Sykesville, Maryland (Figure 1). The purpose of this document is to document the scope and methods employed in investigating the release, and present the findings from those investigative activities. This document was prepared in accordance with the provisions of the EPA-approved Response Action Plan (RAP), dated 27 May 2005.

1.1 Background

At one time, a 10,000-gallon aboveground storage tank (AST) was located on the northern edge of the Fogle's property. The tank was used to store #2 diesel fuel for use by the Fogle's trucks and other work equipment. During the course of a site inspection in early 2004, Maryland Occupational Safety and Health (MOSH) personnel suggested to the Fogle's that they provide secondary containment for the 10,000-gallon AST. Shortly thereafter, Fogle's relocated the AST on the property and installed secondary containment around the tank. During the relocation, fuel-impacted soils were observed beneath the tank. Reportedly, some volume of fuel-impacted soil was excavated to a depth of approximately 15 feet from where the 10,000-gallon AST was previously located and transported to and disposed on a portion of a farm, owned by the Fogle's, located at 1711 Dennings Road, New Windsor, Maryland (hereinafter referred to as the "Fogle's Farm" and considered a portion of the Site) (Figure 2).

In addition to the Facility and Fogle's Farm, the Site includes a wooded area at the bottom of a steep slope located adjacent to and north of the Fogle's property. The unimproved land is owned by Episcopal Ministries to the Aging, Inc. (EMA). An unnamed creek feeding Piney Run runs through this wooded area (the "unnamed creek") (Figure 1). In January 2004, Maryland Department of the Environment (MDE) personnel were informed of an oil seep emanating from the ground on the EMA property and impacting the unnamed creek.

Initial investigations conducted by EPA in December 2004 confirmed the presence of oil on the water table in three monitoring wells (TMW-B1, TMW-B2 and TMW-C1) located adjacent to the oil seeps area (see Figure 3). Oil thickness in these wells ranged from 0.20 feet in TMW-C1 to 4.97 feet in TMW-B1. During a follow-up investigation, 2 feet of oil was identified on the water table in one well (MW-A01) located immediately down gradient of the Facility (see Figure 4). The U.S. Army Corps of Engineers (ACOE), working on behalf of EPA, identified petroleum hydrocarbons in soils at depths between 16 and 27 feet below grade in the area of the former 10,000-gallon AST (see Table 1 and Figure 4). Total petroleum hydrocarbons (TPH) in the diesel range (DRO) were detected at concentrations from 36 mg/kg to 24,000 mg/kg.

On 8 April 2005, EPA by letter provided the Fogle's with a Notice of Federal Interest in a Pollution Incident informing the Fogle's that EPA determined a pollution incident occurred at the Fogle's property. Effective 28 April 2005, the AOC was agreed to by the Fogle's and EPA with the stated purpose "to abate, mitigate and/or eliminate any threat to public health and welfare and the environment" posed by the oil.

1.2 Objective

The primary objective of the extent of contamination study at the Site (i.e., the Fogle's facility, the undeveloped portion of the EMA land where oil has been identified in the subsurface and the Fogle's Farm) was to characterize the nature, concentration, extent and depth of oil contamination at the Site. This information would then be used to evaluate and determine the appropriate measures for removing/mitigating the oil contamination at the Site (i.e., development of the Abatement Plan).

1.3 Report Organization

The remainder of this report is organized as follows:

- *Section 2 – Methods* describes the scope of work completed to investigate the nature and extent of oil contamination at the property.

- *Section 3 – Results* presents the findings of the document review, geophysical and soil gas surveys, subsurface investigations and product recovery and fluid level monitoring.

- *Section 4 – Discussion* assimilates all of the investigative information and provides an interpretation relative to the extent

of free phase petroleum hydrocarbons and petroleum impacted soils at the Site.

2.0 METHODS

In accordance with Item 9.3 (c) of Section IX of the AOC, ERM completed an investigation of the Site which characterized the nature, concentration, extent and depth of oil contamination at the Site. The investigation followed the scope of work outlined in the EPA-approved Extent of Contamination Study Plan, dated 7 June 2005. In accordance with the Site-Specific Health and Safety Plan all ERM employees, subcontractors, and Fogle's staff performing work activities at the Site had up to date training as required by OSHA 29 C.F.R. §1910.120. The scope of work is presented in the following sections.

2.1 Document Review

A thorough review of all historical documentation relevant to the contamination at the Site was conducted. The purpose of this review was to help determine the location of buried tanks, utilities, overfill locations, and/or other locations of spills which may be present at the Site. Information regarding previous ownership of the Facility property and the history of fuel spills at the Facility was documented in response to an information request by the EPA, dated 6 October 2005, regarding the Facility's July 2005 Spill Prevention, Control and Countermeasures (SPCC) Plan. Additional information was obtained through Fogle's fuel volume purchase and use records, and supplemented through a review of historic aerial photographs provided by Environmental Data Resources, Inc. (EDR). Historic Sanborn® fire insurance maps are not available for the area. EDR also conducted a search of readily available federal, state and local databases concerning environmental issues at the Site and surrounding properties within a one mile radius of the Facility. The databases included the following:

- Registered Underground Storage Tanks;
- Oil Control Program Cases;
- Permitted Aboveground Storage Tanks;
- Historic Leaking Underground Storage Tanks;
- Historic Underground Storage Tanks;
- Permitted Solid Waste Disposal Facilities;

- Open Dump Inventory;
- Emergency Response Notification System (records information on reported releases of oil);
- Facility Index System (tracks criminal enforcement cases for all environmental statutes); and
- EDR Gas Stations.

2.2 *Geophysical Survey*

Prior to ownership by Fogle's, the Facility property was reportedly brought to its existing grade using a variety of fill material. To help determine if other potential sources of oil may be present in the fill material on the property or if underground utilities (e.g., fuel pipes, electrical conduits, etc) and their backfill materials are acting as preferential pathways for the transfer of oil, ERM subcontracted Forrest Environmental Services, Inc. (FES) to conduct an electromagnetic (EM) induction survey at the Facility. FES used an EM-31 to identify metallic and nonmetallic debris present beneath the Facility.

2.3 *Soil Gas Survey*

Soil gas surveys can provide a fast and efficient way of locating potential sources of contamination over a large, previously uninvestigated area. To determine the horizontal extent of the oil contamination in the vicinity of the former 10,000-gallon AST location, a plausible migration pathway from that location to the seep area, and if any additional contributing sources of petroleum contamination exist, ERM subcontracted Beacon Environmental Services, Inc. (Beacon) to perform a passive soil gas survey at the Facility and EMA property. The passive EMFLUX® soil gas method, an EPA-preferred investigative technology, was used for the survey. The EMFLUX® soil gas method was selected because it integrates ambient soil gas data over both space and time, which allows for the detection of very low concentrations of contaminants in the subsurface.

The soil gas survey overlapped with the EM survey to determine if any petroleum contamination was present in the areas with suspect metallic debris. A total of 80 EMFLUX® soil gas collectors were installed across the Facility and the downgradient portion of the Site. The collectors were recovered 21 days after deployment to maximize the collection of soil gas. Each collector was removed from the hole, capped, placed in the shipping

kit, and shipped to Beacon's laboratory for analysis of TPH using EPA method SW-846 8260B.

2.4 Soil Borings and Soil Samples

The soil gas survey provided a two-dimensional indication of the location, movement, composition and relative concentration of petroleum hydrocarbons across the Site. Based on the information from the soil gas survey, specific areas with elevated hydrocarbon concentrations (i.e., areas suspected of oil contamination) were targeted for collection of soil samples and installation of monitoring wells. Prior to beginning the intrusive activities, ERM notified Miss Utility of Maryland, as required by Maryland law, and retained Unlimited Locating, Inc., to identify and mark public and private utilities at the proposed drilling locations.

Sampling Activities

Seventeen (17) soil borings (EB-1 through EB-17) were completed at the Facility and EMA property to provide data used to refine the estimate of the amount of residual hydrocarbons present in soils at the Site (see Figures 3 and 4). The number and locations of the soil borings were identified based on the results of the soil gas survey. The borings were completed to the water table or to refusal, whichever occurred first. An additional six (6) soil borings (FB-1 through FB-6) were completed at the Fogle's Farm to determine the extent of oil contamination resulting from the contaminated soils reportedly placed on the property (Figure 5). These borings were completed to a maximum depth of 10 feet below grade.

ERM retained Green Services, Inc. to complete the soil borings using a Geoprobe® track-mounted direct push drill rig. Continuous soil cores were retrieved from each boring using a 5-foot long Macro-Core™ sampler (1.5-inch diameter). Following sample collection, the plastic liner was split longitudinally to expose the soil core for sample collection and visual inspection. Each soil boring was continuously logged and inspected in the field for indications of contamination (e.g., visual or olfactory) and screened using an organic vapor analyzer (OVA) to identify intervals of the core with potential volatile organic compounds (VOCs). Soil characteristics were observed and recorded in a field book dedicated to the project.

Soil borings were also completed at the Facility and on the EMA Property immediately north of the Facility to provide information for positioning additional monitoring wells to determine the extent of free product in the vicinity of MW-A01. The soil borings (labeled EB-18 through EB-22) were

drilled using an air rotary drill rig, and therefore, provided only a gross estimate of petroleum contamination through observation of the soil cuttings. The locations of these borings are shown on Figure 4.

Representative portions of the desired sample intervals (i.e., intervals representing worst-case conditions) were placed into sample containers provided by the analytical laboratory, the containers were labeled with the appropriate information, and the soil samples were stored on ice immediately after collection for delivery to the laboratory. After sampling, all boreholes were refilled with soil cuttings that had been removed during drilling, filled with additional bentonite and patched with a concrete seal (as appropriate).

All field equipment used in drilling was washed with potable water and a phosphate-free (e.g., Alconox®) detergent followed by a potable water rinse. This took place prior to arriving onsite and between each boring location. All field equipment used in sampling was disposable and dedicated to each individual sample.

Sample Analysis

Twenty-seven (27) soil samples were collected by ERM to quantify the extent of oil contaminated soils at the Site. All samples were delivered to Phase Separation Science, Inc. (PSSI) for the following analyses:

- TPH-DRO by EPA SW-846 Method 8015; and
- TPH-GRO (gasoline range organics) by EPA SW-846 Method 8015.

Appropriate chain-of-custody (COC) procedures were implemented to document sample handling and transfers.

2.5 Well Installation and Monitoring

Following the completion of the soil borings, ERM oversaw the installation of five monitoring wells at the Facility. The wells were drilled and installed by Fogles' Well Drilling, Inc. at locations identified based on the results of the soil gas and geophysical surveys, as well as, observations from the soil borings. Well MW-FGL-02 was placed near the Facility entrance to evaluate elevated TPH readings observed at soil gas point 14/soil boring EB-11. Four other wells (MW-A02 and A02S, and MW-A03 and A03S) were placed immediately down gradient of the Facility to assess the extent of free product around the existing well MW-A01. The wells were installed approximately 25 to 30 feet east (MW-A03/A03S) and 25 to 30 feet west (MW-A02/A02S) of well MW-A01. The locations of the new monitoring wells are shown on Figure 4.

Each monitoring well was constructed using four-inch diameter polyvinyl chloride (PVC) well casing and 15 to 20 foot long slotted (i.e., 0.02 inch) well screens. Shallow wells MW-A02S and A03S were completed with their well screens across the water table. Deep wells MW-A02 and A03 were completed with their well screens below the base of the corresponding shallow wells. The wells were then completed in accordance with Code of Maryland Regulations (COMAR) 26.04.04.07M(6). The well locations and elevations were surveyed by a Maryland-licensed land surveyor for horizontal coordinates and vertical elevation. Surveying was relative to the Maryland state plane North American Datum '83 and North American Vertical Datum '91. Coordinates were determined to the nearest 0.1 foot, and vertical elevations were determined to the nearest 0.01 foot.

Drilling tools (e.g., drilling rods, augers, etc.) used during drilling were decontaminated between each well location using pressure washing. Wash waters were treated with granular activated carbon (GAC) and discharged through the Site's National Pollution Discharge Elimination System (NPDES) permitted outfall.

Fluid Level Monitoring

Following installation of the monitoring wells, a synoptic round of water level measurements was completed. Well gauging was performed using an optical interface probe (OIP) to determine the presence or absence of oil and the static water level. If oil was encountered, the thickness was measured, and adjusted water levels were calculated. Water levels were measured to the nearest 0.01-foot.

Assessment of Free-Product Recovery

Beginning in early March 2004, and continuing since that time, a variety of response measures have been undertaken by the MDE, EPA, and their contractors (including the ACOE), and Fogle's to abate the release of oil to the stream and remove free product from the ground water. The ACOE and its contractor installed four recovery sumps (Sumps A, B, C and D) in the area just upgradient of the oil seeps (see Figure 3). The sumps were installed to capture and prevent free product from entering the unnamed creek. Since May 2005, Fogle's has performed periodic (i.e., weekly) fluid recovery events at the sumps and existing temporary monitoring wells using suction pumps. The water table and free-product in the vicinity of well MW-A01 is deep enough that the use of suction and/or vacuum pumps is not feasible. To evaluate the recovery of free-product in the vicinity of MW-A01 ERM uses submersible centrifugal pumps or air-lift pumps to assess the rate of free-product recovery.

2.6 Hydraulic Conductivity Testing

Water level drawdown tests were performed at wells MW-A01, A02 and A03 to provide data for assessing the hydraulic conductivity of the aquifer. Prior to conducting the test in each well, the static water level was measured using an electronic water level indicator. The single-well drawdown tests were performed by pumping the well at a constant rate to maintain a pre-determined drawdown. The specific capacity of the well was calculated in milliliters per second per centimeter of drawdown. The specific capacity was then multiplied by an empirical calibration factor to estimate hydraulic conductivity in centimeters per second (cm/sec).

The conductivity tests provided data which were used to assess the rate of fluid flow to the wells and contaminant migration in the aquifer. This data may also be used in the design or modification of any oil recovery system, if necessary.

3.0 INVESTIGATION RESULTS

3.1 Document Review

Fogle's Records

As discussed in Section 1.1 above, between 1989 and 2004, diesel fuel was stored in the existing 10,000-gallon AST, which was previously located at the north end of the Fogle's Facility. The former tank location consisted of a concrete pad with limited secondary containment. Reportedly, there was a short reach of pipe that connected the former tank to the fuel dispensing pump. The transfer pipe was located approximately 1.5 to 2 feet below grade.

Information regarding previous ownership of the Facility property and the history of fuel spills at the Facility was documented in response to an information request by the EPA, dated 6 October 2005, regarding the Facility's July 2005 Spill Prevention, Control and Countermeasures (SPCC) Plan. Information provided in that letter was primarily obtained through interviews conducted by the Project Coordinator with Fogle's personnel. Recent fuel purchase records indicate that the Fogle's generally have 7,500 gallons of diesel fuel delivered to the Facility every two to three weeks. Historic fuel purchase and use records for the period prior to 2004 were sparse and/or incomplete and thus did not provide any useful information on potential spills or leaks from on-site fuel systems.

As reported in the 6 October 2005 response, Fogle's purchased the Facility property from W. Martin Gross in January 1989. Mr. Gross owned and operated a general contracting business on the property for an indeterminate time. Mr. Gross conducted gasoline fueling operations there, but did not use diesel fuel for any purpose. Prior to ownership by Mr. Gross, the Facility property was owned by Kibler Construction. Kibler Construction was (and still is) engaged in highway construction work. Reportedly, Kibler Construction conducted fueling operations – including the use of diesel fuel – at the Facility property.

Although there is no written record of tanks and/or equipment buried or abandoned by others on what is now the Facility property, there is visual evidence that construction debris (i.e., concrete, blacktop, etc.) was used as fill material in the embankment in the vicinity of the former 10,000-gallon AST area. Federal law enacted in 1984 (i.e., Hazardous and Solid Waste Amendments to RCRA) required all underground storage tanks (UST) that have been used to store regulated substances [including diesel fuel]

since 1 January 1974, that are in the ground as of 8 May 1986, or that are brought into use after 8 May 1986 be registered with the State of Maryland. Given the absence of reporting requirements related to the ownership and use of ASTs and USTs prior to 1986, it is at least possible that one or more undocumented releases of diesel fuel occurred during the time Kibler Construction owned the property.

As documented in the 6 October 2005 response, several Fogle's employees recalled "an occasional incident during the period after January 1989 in which either an oil can was kicked over accidentally, a hose on a truck or backhoe (etc.) burst or leaked causing hydraulic and other oil fluids to leak on the shop floor, on the driveway and/or on the parking lot, or fuel was spilled onto the ground by vendors transferring diesel, gas or oil into our tanks." Small spills in the shop area would have been absorbed, wiped, mopped or scooped up. Spills of a small amount onto the driveway or gravel parking lot, would likely have been "left in place if operations were not affected."

Also as documented in the 6 October 2005 letter, several Fogle's personnel recalled at least one incident in either the spring or summer of 1997 or 1998 in which a driver pulled away from the 10,000-gallon diesel AST without first removing the filler nozzle and hose from the fuel tank on the truck. As the truck pulled away the hose became severed allowing fuel to spill to the ground. Based on interviews with personnel employed with Fogle's at the time of the incident, Fogle's concluded that the hose most likely could have discharged fuel to the ground for about one-half hour (and not more than 2 hours) before the fuel dispensing system pump was shut off. Fogle's estimated that during that half-hour period, at the pump discharge rate of 10 gallons/minute, approximately 300 gallons of fuel (up to a maximum of 1,200 gallons of fuel) could possibly have been discharged. At the time of discovering the discharge, Fogle's reportedly took steps deemed necessary to stop the spread of fuel and ensure that no one would be in any imminent danger if they came into contact with the spilled fuel.

Aerial Photographs

EDR provided aerial photographs from September 1969, April 1977, April 1981, and February 1998 of the area surrounding the Facility. The aerial photographs are provided in Appendix A. A summary of the photographs is as follows:

- September 1969 – The area of the Fogle's Facility is undeveloped pastureland. Two residential houses are present to the south of the property on the north side of Obrecht Road. A small structure is

visible on the EMA property north of the area of the present Facility. Several baseball fields are present to the east.

- April 1977 – Fogle's property is developed with one structure on the site. Farther north, Piney Run Lake is present.

- April 1981 – The Facility and surrounding property is more developed with a second structure on the Facility property itself. The baseball fields are also more developed.

- February 1998 – The site appears much as it does today; directly north of the site is agricultural and undeveloped wooded lands followed by Piney Run Lake. To the east and southeast are agricultural fields and numerous well developed baseball fields. To the south of the property is a light residential area. Two to three homes are present on the north side of Obrecht Road, while to the south of Obrecht Road is a residential home development that appears under construction.

EDR Report

ERM obtained a report of readily available government records concerning environmental issues at the Site and surrounding properties as of June 2005 (updated March 2006). The EDR Report is included as Appendix B. The search results identified the current MDE Oil Control Program (OCP) ground seep investigation for the Facility property, now being administered by EPA under AOC Docket No. CWA-03-2005-0150CW. Also, a historical UST was identified as belonging to Bill Groves & Son Concrete, Inc., 558 Obrecht Road. The 1,000-gallon UST was used for gasoline and was removed some time prior to 1999. The EDR search also identified a 1,000-gallon and a 500-gallon diesel UST (both removed) at the Fairhaven Facility (7200 3rd Avenue). Also at this same facility are two 8,000-gallon heating oil tanks. Based on the mapped location and area topography, these tanks are ½ to ¾-mile southeast of the Site and thus would not be suspected contributors to the Site contamination. No other diesel storage or release sites were identified within a 1-mile radius of the Site.

3.2 Geophysical Survey

The results of the geophysical survey are presented in FES Report No. 05160 (included as Appendix C). Five electromagnetic anomalies were identified at the Facility (Anomalies A, B, C, D and E). Anomaly A was believed to be reinforced concrete. Anomalies B, C and D were believed to be a result of surface debris in the area. Anomaly E, located

immediately northwest of the existing 10,000-gallon AST area, generated a signal consistent with a large mass of buried metal. As a result, ERM placed a soil gas collector over this location.

As a result of elevated soil gas detections at Anomaly E (see Section 3.3 for discussion of the soil gas results), Anomaly E was further investigated in January 2006. With EPA's consent, Fogle's used a backhoe to excavate the area of the anomaly. Four test pits were excavated to between 8 and 15 feet below grade, recovering only a metal pipe believed to be associated with fill material historically placed on the property. FES returned to the site a week later to re-survey the area which had been reported as "Anomaly E" in the FES report. The EM equipment again picked up a metallic object in that area. However, by widening the path of the scan, and as a consequence of additional excavation work, what was initially referred to as "Anomaly E" was, in fact, a length of conduit within which the electric wires that connect the pump on the 10,000-gallon AST run (from the main office).

3.3 Soil Gas Survey

Soil gas concentration data and chromatographs are presented in Beacon Report No. EM1804 (included as Appendix D). The results of the passive soil gas survey at the Fogle's Facility and EMA property are shown on Figure 6. The results of the soil gas survey do not distinguish between petroleum hydrocarbon compounds in the soil versus those in the ground water as volatile organic compounds and semi-volatile organic compounds in both media contribute to soil gas. However, the results can be used to assess the composition and movement of contaminants in the subsurface. Specifically, the soil gas survey results indicated the following:

- TPH was detected in all but two of the soil gas samples at the Facility. The low concentrations are likely related to work vehicles moving across the property now and in the past.

- The highest soil gas concentration occurred in the seep area directly north of the current product recovery sumps and south of the stream. The highest concentration was observed at point 72, and is most likely due to the oil seep previously identified at this location.

- There are few detections on the hill slope between the seep area and the Facility area. However, a distinct signature for undecane was identified in samples 42, 46, and 52 (along the wooded hill slope) and at the seep area (samples 69 and 72).

These detections suggest a potential migration pathway for the diesel between the Facility and the seep area.

- The highest soil gas concentrations at the Facility were observed in the former area of the 10,000-gallon AST (soil gas points 18 and 26). The pattern appears to be closed (i.e., bounded or delineated by soil gas collectors from this study) suggesting that a release had occurred in this area.

- TPH contamination at sample point 80, located in the vicinity of Anomaly E", suggests that a release may have occurred in this area also. The TPH pattern at this location appears similar to the pattern observed at points 8, 14 and 15 (located east of the drain field). Relative to the TPH pattern observed in the vicinity of the former AST location, there is a greater ratio of long chain to short chain hydrocarbons present at soil gas points 8, 14 and 80. This heavier TPH pattern suggests that (1) the release has been in the ground for some period of time and is more weathered than the diesel, (2) that the release is fairly shallow and the more volatile fractions have been driven off, or (3) the source of petroleum had a component that is heavier than diesel fuel (e.g., heating oil or lubricating oil).

- The difference in TPH patterns observed in the area east of the drain field and the former area of the 10,000-gallon AST, the trace level of TPH detected at soil gas point 16, and the non-detect result at soil gas point 9 all suggest that the area east of the drain field and the former area of the 10,000-gallon AST are not associated.

3.4 Soil Borings and Sampling

Soil logs for the borings completed at the Site are included in Appendix E. The results of the soil samples submitted for laboratory analysis are summarized in Table 2. The complete laboratory analytical reports are provided in Appendix F.

Facility and Seep Area

At the seep area on the EMA property, soil samples were collected from eight borings completed to between 14 and 25 feet below ground surface (Figure 7). Three samples (EB-3 at 11 feet, EB-4 at 4 feet, and EB-6 at 17 feet) contained detectable concentrations of TPH-GRO ranging from 370 to 970 mg/kg. These same samples had detectable concentrations of TPH-DRO ranging from 620 to 2,000 mg/kg. The samples collected at these

locations suggest that TPH contamination is present at the water table and in the capillary zone (i.e., immediately above the water table where fluid is held under tension). Samples collected from borings EB-1, EB-2 and EB-5, located on the perimeter of the seep area, were non-detect for TPH, indicating that the extent of diesel fuel is defined in this area. Refusal was encountered at locations EB-7 and EB-8, located along the hill slope, prior to reaching the water table. Contamination was not observed between the ground surface and point of refusal in either EB-7 nor EB-8.

At the Facility, soil samples were collected from nine borings completed to between 22 and 33 feet below ground surface (Figure 7). Three samples (EB-16 at 10 feet, EB-17 at 23 feet, and EB-17 at 33 feet) contained detectable concentrations of TPH-GRO ranging from 5 to 1,500 mg/kg. Only one sample, EB-17 at 23 feet, had a detectable concentrations of TPH-DRO (10,000 mg/kg). The TPH results, in combination with the previous soil analytical data collected by the ACOE, suggest that the migration and accumulation of the diesel fuel in the vicinity of the former 10,000-gallon AST location was controlled by the abundant fill material and historic land surface. Observations of the soils and samples collected at borings EB-9 through EB-15 support the supposition that the TPH detected in soil gas collectors across the Facility is most likely related to historic incidental surface releases (e.g., dripping fuel or hydraulic oils from vehicles or equipment). Specifically, TPH were not detected in the soil samples from boring EB-11 in the area east of the drain field and from boring EB-12 in the area of Anomaly E.

Soil borings EB-18 through EB-21 were completed during the installation of the monitoring wells. Samples were not collected for laboratory analysis from any of these borings. However, visual observation of the soil cuttings from the boreholes at MW-A02, MW-A02S, MW-A03S, EB-18, and EB-21 did suggest the presence of petroleum hydrocarbons in the soils proximal to the water table at these locations.

Fogle's Farm

Soils transported and disposed at the Fogle's Farm were reportedly excavated from the former location of the 10,000-gallon AST. As such, these soils would likely have contained concentrations of TPH-DRO similar to what was detected at the Facility in samples collected by the ACOE (i.e., 24,000 mg/kg). To evaluate the current concentrations of TPH in the soils disposed at the Fogle's Farm, soil samples were collected from six borings completed to between 5 and 10 feet below ground surface (Figure 5). Four of the samples (FB-1 at 1.5 feet, FB-2 at 2 feet, FB-4 at 1 foot, and FB-5 at 0.5 foot) contained detectable concentrations of TPH-DRO ranging from 3.2 to 990 mg/kg. With the exception of FB-5, each of

these samples also contained TPH-GRO concentrations that ranged from 3.1 to 11 mg/kg. There were no detections of either TPH-DRO or TPH-GRO in the suspected down gradient runoff sample location (FB-6). The significant reduction in TPH concentrations in the 18 months following their deposition at the farm indicates that natural processes (i.e., biodegradation and volatilization) are serving to rapidly attenuate petroleum constituents in the soil.

3.5 Monitoring Wells

Well completion reports are presented with the soil boring logs included as Appendix E.

Fluid Level Monitoring

Measurements of fluid levels are collected from any new monitoring wells and the wells and sumps previously installed by the ACOE on a weekly basis as part of the interim response measures for the Facility and EMA property. A summary of the fluid level data for March 2006 is provided in Table 3. As shown in Table 3, the depth to ground water varies from about 30 feet below the ground surface at the Facility to about 5 feet below the ground surface at the recovery sumps (Sump A). Based on the 22 March 2006 fluid level measurements, free-product (previously characterized by laboratory analysis to be diesel fuel in the sumps and well MW-A01) is present on the water table at wells MW-A01 (0.62 feet), MW-A02S (0.49 feet) and MW-A03S (< 0.01 feet), each located immediately north of the former location of the 10,000-gallon AST. Free-product was also detected in the 4-inch diameter sumps B, C and D, located at the seep area, at thicknesses of 0.30 feet, <0.01 feet and 0.17 feet, respectively.

Measurements of the ground water table elevation indicate the direction of ground water flow from the Facility toward the seep area is approximately 45^{o} tangential from the topographic contours; which means that ground water flow is likely controlled by geologic features (e.g., bedding planes, formation strike or dip) within the weathered bedrock/saprolite aquifer. Using the ground water elevation data collected on 20 March 2006, the lateral hydraulic gradient between the Facility (MW-A01) and the seep area (TMW-B1) is about 0.059 feet/foot, which represents a moderate hydraulic gradient.

Assessment of Free-Product Recovery

Free product was recovered from well MW-A01 on 27 and 30 March 2006. The recharge of free-product to this well was 1.2 feet indicating a recharge

rate of about 0.4 feet per day (0.26 gallons per day). At well MW-A02S, recovery events conducted on 22 and 30 March 2006 indicated that free-product recharges the well at about 0.1 feet per day (0.06 gallons per day). The rapid recharge of free-product in these wells (25 feet apart) suggests that a quantity of product greater than that remaining in the seep area is present just north of the former AST area. As of the end of February 2006, pumping from the Site has recovered 3,626 gallons of free-product, of which, the majority of free-product has been recovered from the seep area.

3.6 Hydraulic Conductivity Testing

Single well hydraulic conductivity tests were completed at three wells—MW-A01, MW-A02 and MW-A03. The water-bearing unit consists of a moderately permeable sand, silt and clay unit, with a water hydraulic conductivity of about 1.1×10^{-3} cm/sec (3.1 feet/day) (see Table 4). Multiple fluid level measurements by ERM since installation of the monitoring wells indicate that the water-bearing unit is quick to stabilize.

Assuming a soil porosity of 40 percent, the ground water flow velocity is estimated to be fairly moderate, at a rate of about 170 feet per year. Using an average density for diesel fuel of 0.827 gm/cm^3 and a dynamic viscosity of 2.70 centipoise (both values are from American Petroleum Institute Publication No. 4682, *Free-Product Recovery of Petroleum Hydrocarbon Liquids*, June 1999), the oil hydraulic conductivity is estimated to be 3.8×10^{-3} cm/sec. This equates to an average travel time for free-product between the AST area and the unnamed creek of approximately 58 feet per year. As such, it is estimated that it would take as long as 17 years for free-product released at the Facility to reach the unnamed creek.

As discussed in Section 1.1 above, between 1989 and 2004, diesel fuel was stored in the existing 10,000-gallon AST, which was previously located at the north end of the property. Information obtained during the document review indicated that occasional incidents occurred in which small volumes of fuel were spilled onto the ground by personnel and vendors transferring diesel to and from the tank. Additionally, Fogle's personnel recalled at least one incident in either 1997 or 1998 in which a driver pulled away from the 10,000-gallon diesel AST spilling what was estimated to be a maximum of 1,200 gallons of diesel fuel onto the ground surface. Therefore, in light of the amount of diesel fuel that has been recovered from the Site to date through the interim response measures (approximately 3,600 gallons), the most feasible release scenario would be chronic leaks from the short reach of pipe that conveyed fuel from the AST to the dispensing pump. During the excavation of the soils beneath the AST in 2004, Fogle's personnel observed and excavated fuel impacted soils to a depth of approximately 15 feet. If over the course of 15 years (1989 through 2004), the underground pipe leaked one gallon per day (a hypothetical estimate), the potential loss of fuel (5,475 gallons) would almost certainly have gone undetected (i.e., since the Fogle's consume 130,000 to 195,000 gallons of diesel fuel a year).

The document review did not reveal any other past or present diesel USTs nor diesel ASTs at or in the vicinity of the Facility that could be contributing to the diesel fuel observed in wells or seeping from the ground on the down gradient EMA property. Additionally, although a geophysical survey of the Facility did indicate a possible historical UST at the Facility, subsequent investigations determined that no UST existed at that location.

Soil Contamination

The results of the soil sampling program support the supposition that the TPH detected in the majority of soil gas collectors across the Facility is most likely related to historic incidental surface releases of diesel fuel, gasoline, and other oils to the surface. However, soil samples collected by the ACOE and ERM in the immediate vicinity of the former location of the 10,000-gallon AST suggest that a release of diesel fuel occurred in that area. Worst case conditions were observed in samples collected between 16 and 27 feet below grade; the water table is present at 28 feet below grade. The average TPH concentration in these soils was 20,000 mg/kg. Based on the soil gas and soil analytical results, the area of diesel fuel

impacted soils (above 5 mg/kg) is estimated to be between 12,500 and 13,000 square feet, although the soils with TPH concentrations greater than 5,000 mg/kg appear to be limited to an area of approximately 3,000 square feet.

Downgradient of the Facility residual TPH contamination is present in soils at or near the water table as a result of free-product migration along the water table surface. The highest concentration of TPH in soils at the seep area was 2,970 mg/kg.

During the initial investigations conducted by the EPA in February 2005, elevated levels of TPH-DRO, as high as 24,000 ppm, were detected in soils at depths between 16 and 27 feet below grade at the former AST location. Therefore, it can be logically inferred that the initial concentrations of petroleum constituents in the soils that were excavated and placed at the Fogle's Farm were comparable (or greater) to concentrations in those soils that remain in place at the former AST location. Recent analytical results for the soils placed at the Fogle's Farm indicated a maximum TPH concentration of less than 1,000 mg/kg, reflecting a significant (i.e., 20 to 30 times) reduction in the concentrations of petroleum constituents through natural attenuation from the time the soil was first placed there. As described in EPA's May 1995 document "*How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites*" (EPA Publication No. 510-B-95-007), this magnitude of reduction of TPH concentrations in soils via land farming activities is certainly feasible over a period of 18 months.

Analytical results were non-detect for petroleum compounds in soils beneath the treated material and downgradient from the landfarm, indicating no impact to underlying native soils, ground water, or the surrounding environment has occurred.

Presence and Migration of Free-Product

At the Facility, free product has never been measured in well MW-FGL-01 nor in the borehole EB-21, both located at the former location of the 10,000-gallon AST and about 80 feet south of wells MW-A01 and MW-A02S. Recent fluid level measurements at wells MW-A01, MW-A02S and MW-A03S indicate that free-product is present across an area at least 25 feet wide (distance between MW-A01 and MW-A02S) with an average thickness of 0.55 feet. Free product was not observed in well MW-A03, located 25 feet east of MW-A01, nor in borehole EB-18, located 65 feet west of well MW-A02S.

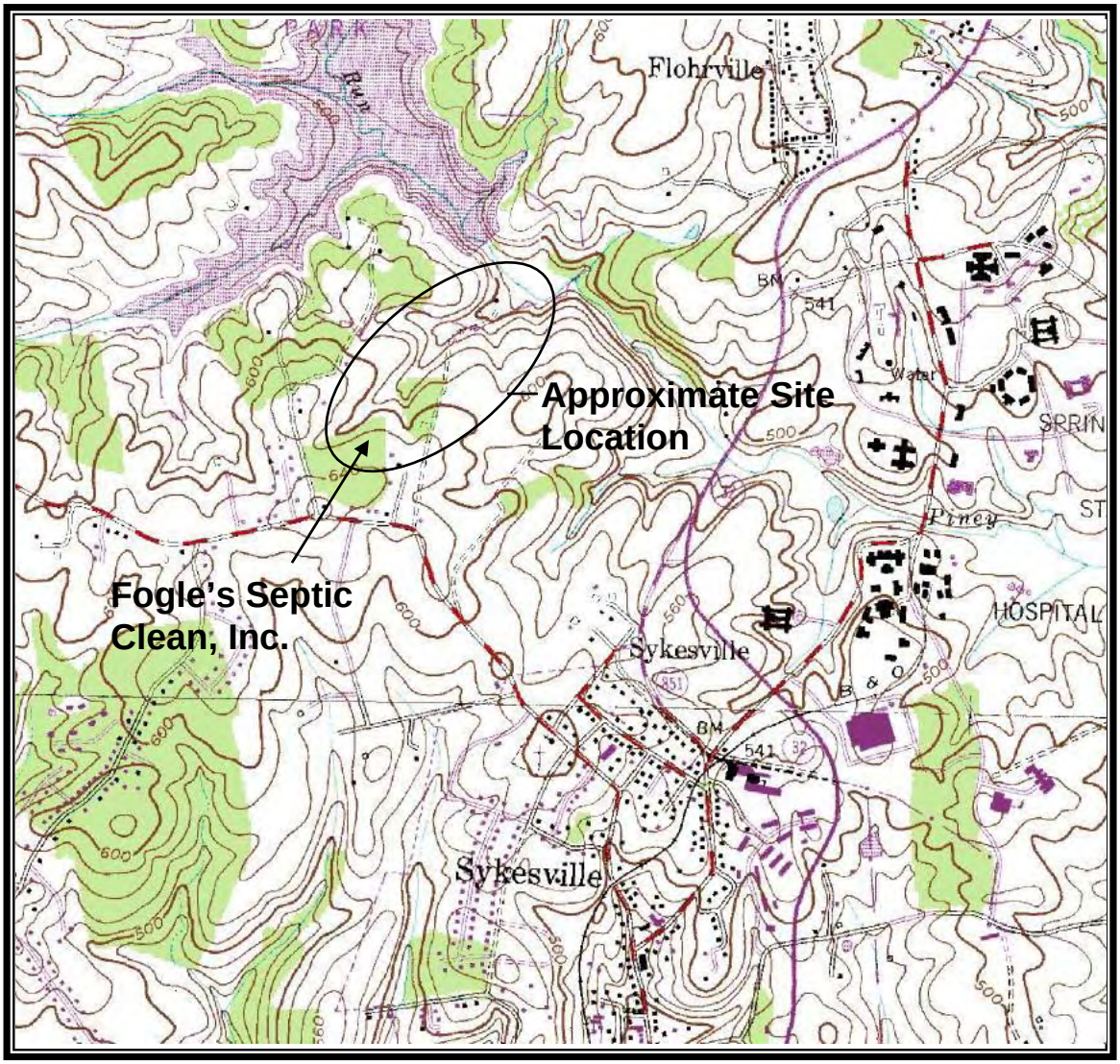
A conceptual model of the subsurface stratigraphy between the Facility and seep area was developed using information obtained during the

installation of the new monitoring wells and the refusal depths of soil borings and temporary piezometers. As shown on Figure 8, it appears that free-product at MW-A02S is pooled behind a ridge in the bedrock. Conceptually, as free product moves downgradient from the Facility along the water table it is retarded as the water table passes from the soil into the bedrock. Once in the bedrock matrix, free-product most likely travels down gradient along bedding planes and thin fractures.

In the vicinity of the seep area, free product has been measured in four sumps (Sump A, B, C and D) and three temporary monitoring wells (TMW-B1, -B2 and C1). The area with free-product present is approximately 90 feet wide and extends from the seep area up the hill slope towards the Facility. Pumping from the existing sumps has recovered 3,626 gallons of free-product as of the end of February 2006. Although the aerial extent of free-product remains the same, the measurable thickness and volume of product recovered have significantly been reduced. Currently, less than 15 gallons of free-product is recovered from the seep area during each pumping event.

Figures

Figure 1
Site Topographic Map –
580 Obrecht Road and Adjacent Properties
Sykesville Oil Site
Sykesville, Maryland



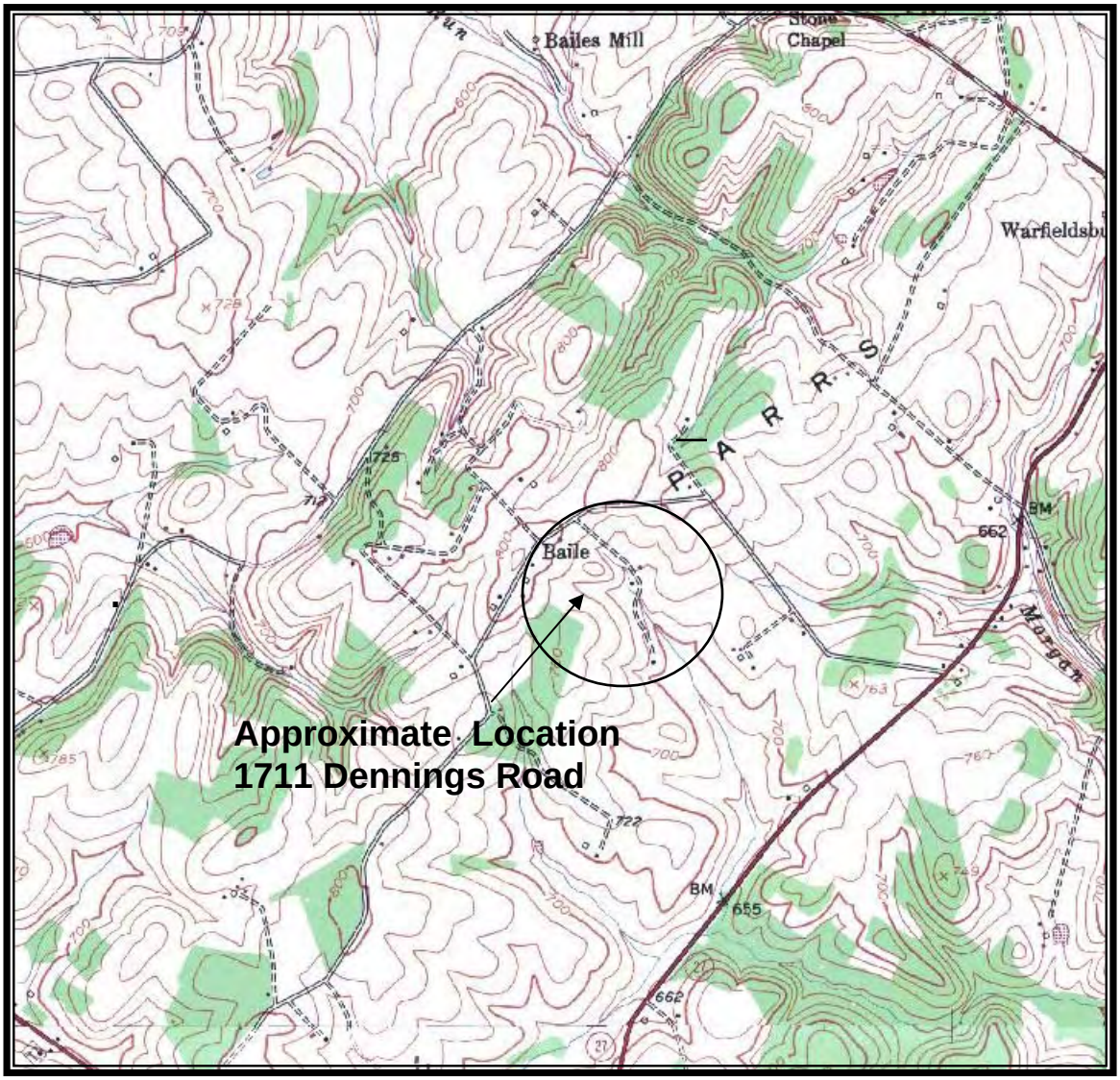
Sykesville Quadrangle
Maryland
7.5 Minute Series

SCALE 1 : 24,000

1 .5 0 1 MILE

CONTOUR INTERVAL 20 FEET

Figure 2
Site Topographic Map – 1711 Dennings Road
Sykesville Oil Site
Sykesville, Maryland



N
W E
S

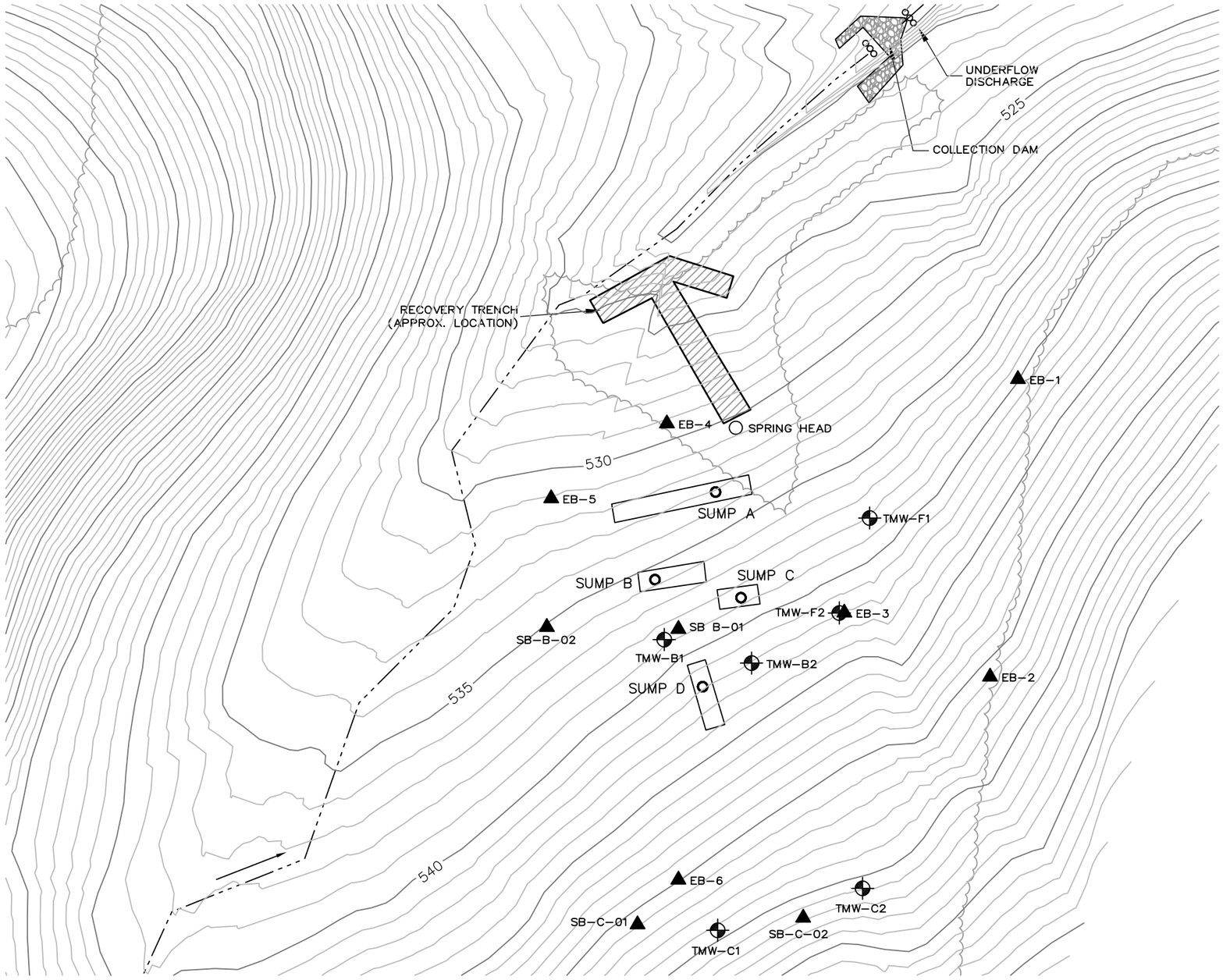
New Windsor Quadrangle
Maryland
7.5 Minute Series

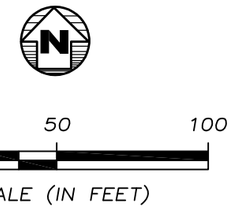
SCALE 1 : 24,000

1 .5 0 1 MILE

CONTOUR INTERVAL 20 FEET

SEEP AREA MONITORING WELL AND SOIL BORING LOCATION MAP





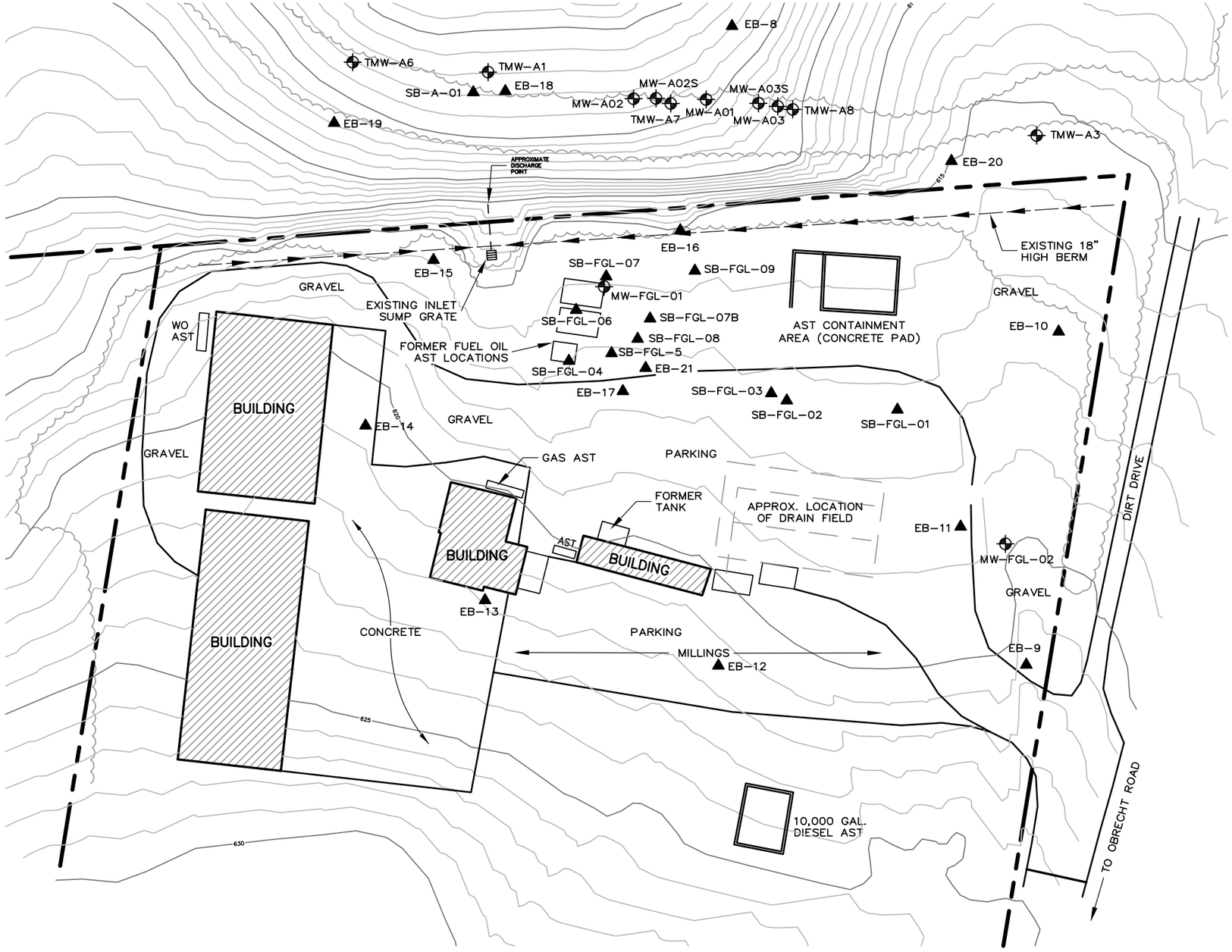
LEGEND

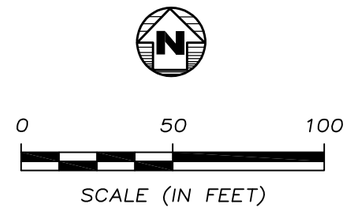
- MONITORING WELL
- SOIL BORING
- 605 — EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- EXISTING BERM
- EXISTING SWALE
- TREELINE

Drawn By FAK	ERM®	SYKESVILLE OIL SITE 580 OBRECHT ROAD SYKESVILLE, MARYLAND	CHK'D NW
CADD Review RMK			0032112
Date Drawn/Rev'd 3/14/06		Environmental Resources Management	FIGURE 3

R:\CADD\CIntE-H\Fogles\0032112\00321112-12 SEEP AREA.dwg, SEEP AREA, 3/29/2006 11:43:53 AM, RMK-Holland

FACILITY AREA MONITORING WELL AND SOIL BORING LOCATION MAP





LEGEND

- PROPERTY BOUNDARY
- MONITORING WELL
- SOIL BORING
- 605 EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- EXISTING BERM
- EXISTING SWALE
- TREELINE

Drawn By FAK	ERM®	**SYKESVILLE OIL SITE** 580 OBRECHT ROAD SYKESVILLE, MARYLAND	CHK'D NW
CADD Review RMK			0032112
Date Drawn/Rev'd 3/14/06		Environmental Resources Management	FIGURE 4

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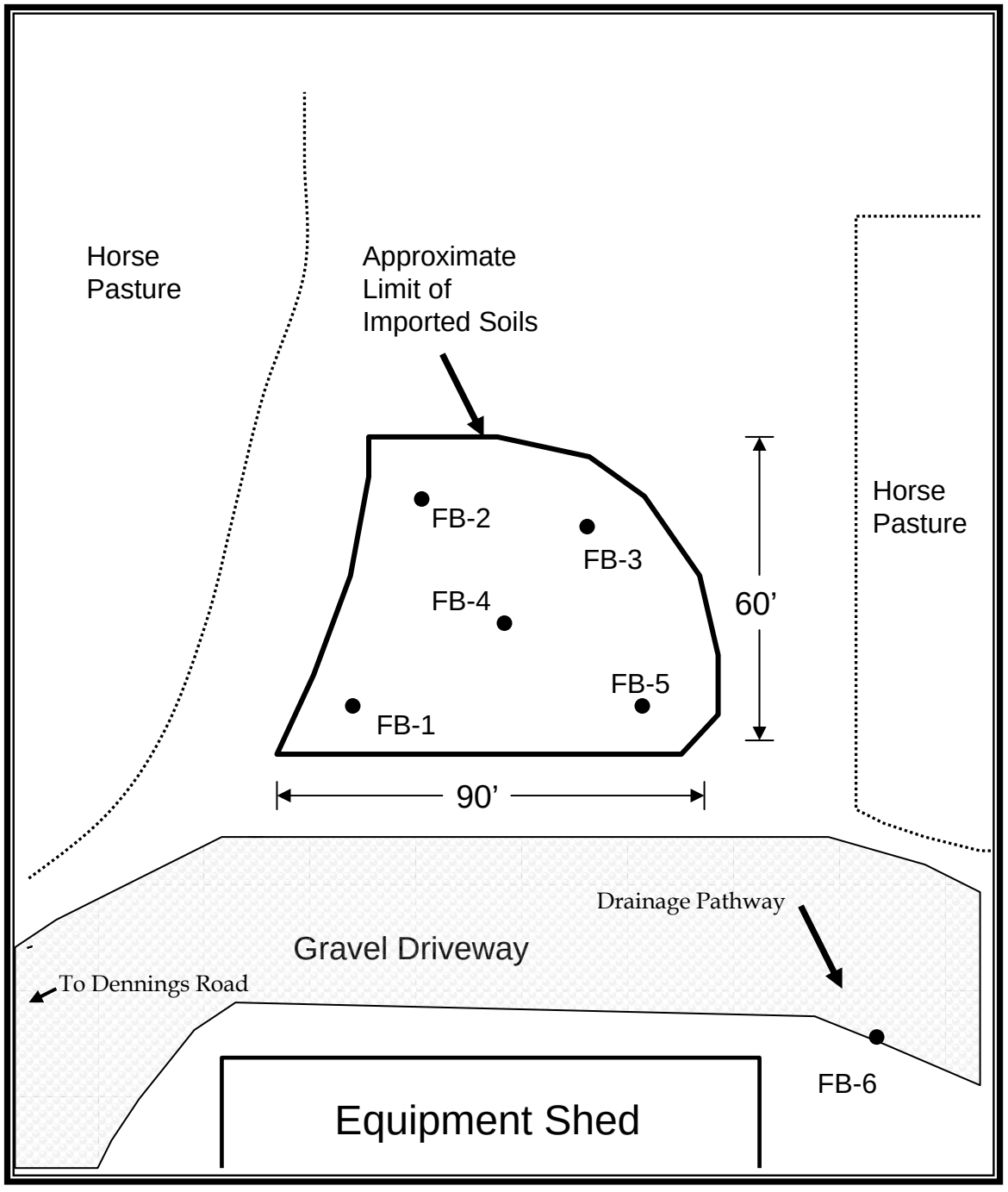
Figure 5
Fogle's Farm Soil Boring Location Map
1711 Dennings Road
New Windsor, Maryland



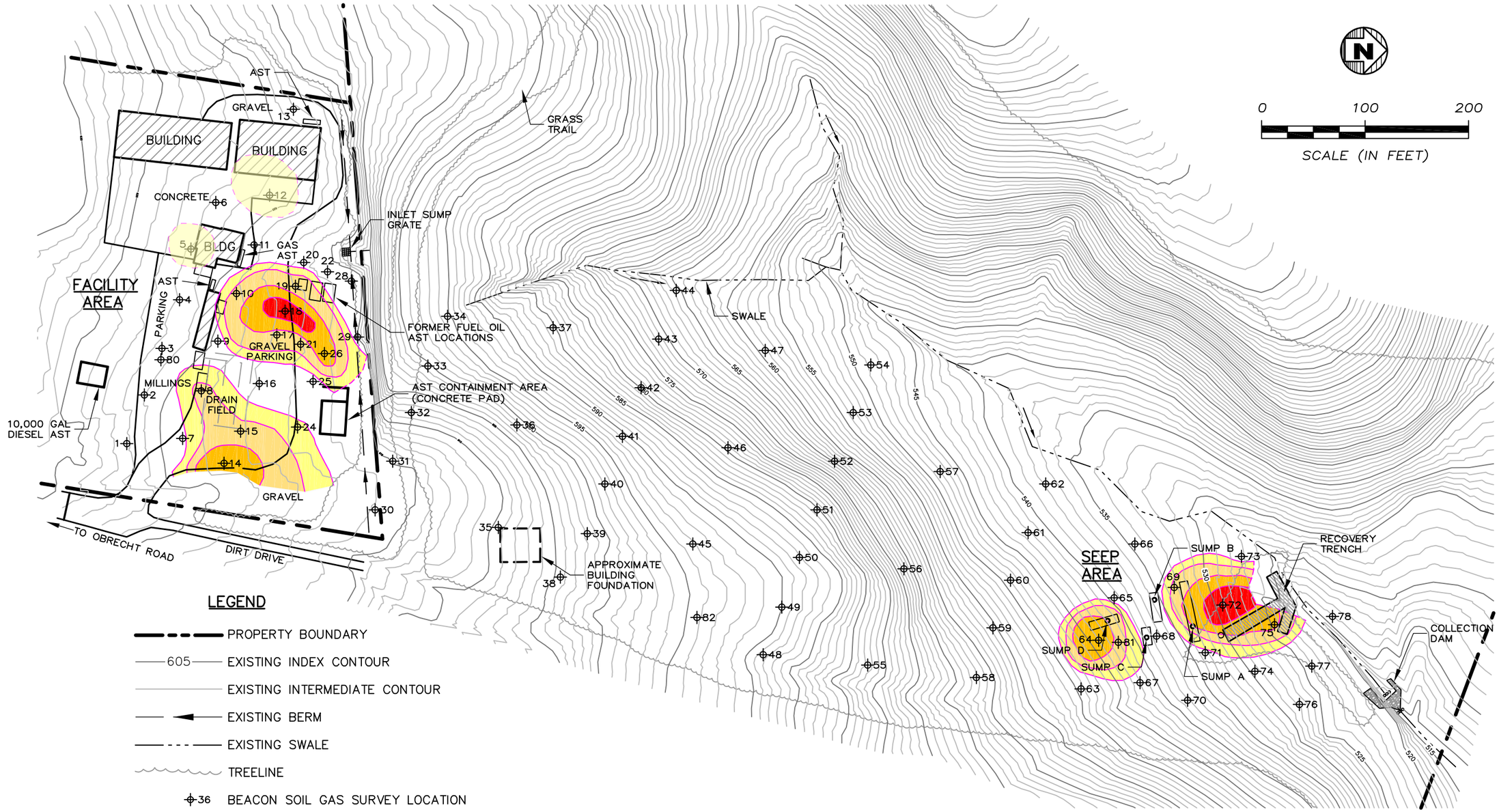
Not to Scale

Notes:

..... Fence

● FB-1 Soil Boring Location

PASSIVE SOIL GAS SURVEY RESULTS



LEGEND

- PROPERTY BOUNDARY
- 605 EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- EXISTING BERM
- EXISTING SWALE
- TREELINE
- 36 BEACON SOIL GAS SURVEY LOCATION
- 100,000 nanograms
- 50,000 nanograms
- 20,000 nanograms
- 10,000 nanograms

Drawn By FAK	ERM®	**SYKESVILLE OIL SITE** 580 OBRECHT ROAD SYKESVILLE, MARYLAND	CHK'D NW
CADD Review RMK			0032112
Date Drawn/Rev'd 3/13/06		Environmental Resources Management	FIGURE 6

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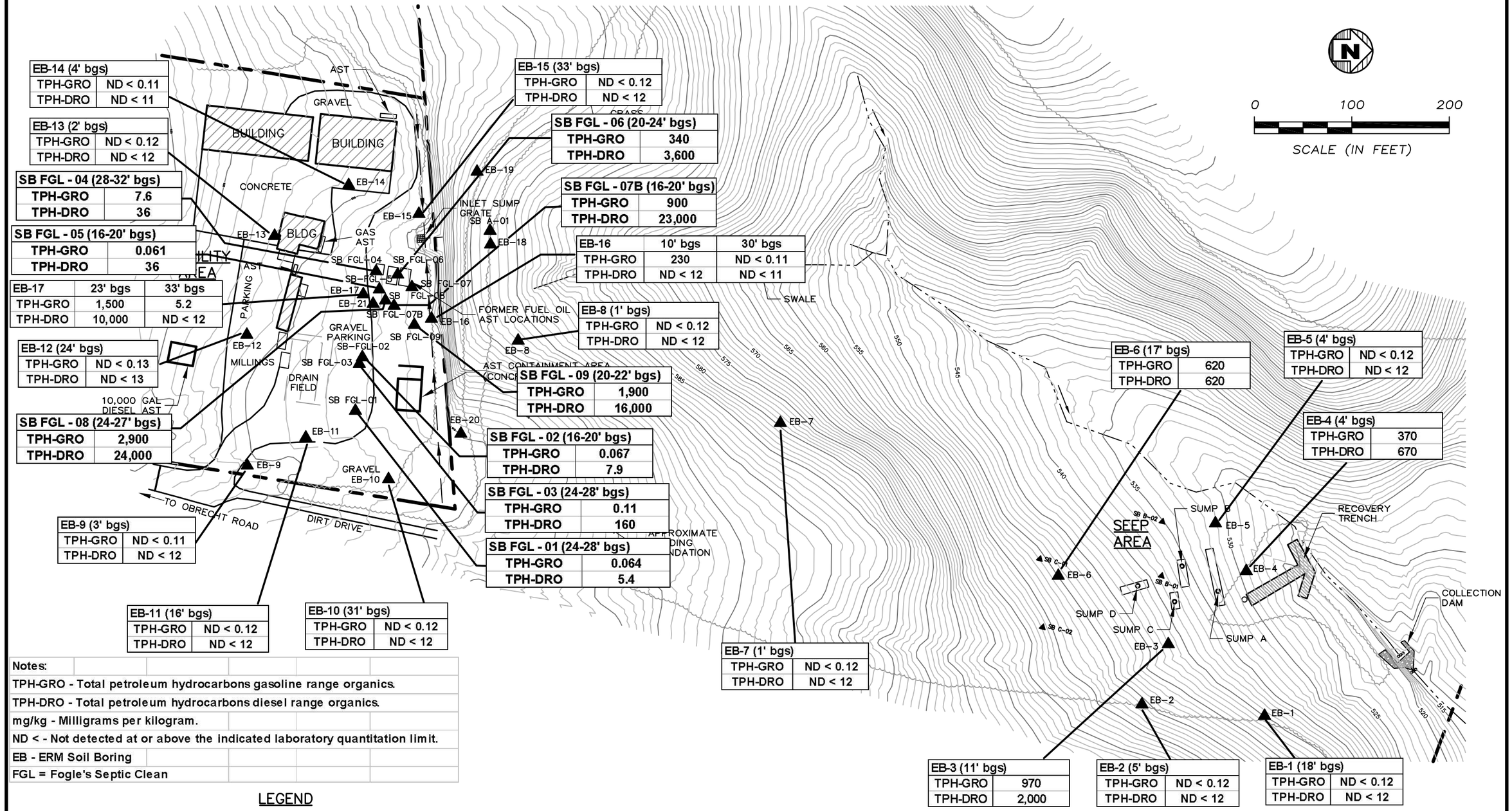
SOIL BORINGS AND TPH RESULTS



EB-14 (4' bgs)	
TPH-GRO	ND < 0.11
TPH-DRO	ND < 11

EB-13 (2' bgs)	
TPH-GRO	ND < 0.12
TPH-DRO	ND < 12

SB FGL - 04 (28-32' bgs)	
TPH-GRO	**7.6**
TPH-DRO	**36**

SB FGL - 05 (16-20' bgs)	
TPH-GRO	**0.061**
TPH-DRO	**36**

EB-17	23' bgs	33' bgs
TPH-GRO	1,500	5.2
TPH-DRO	10,000	ND < 12

EB-12 (24' bgs)	
TPH-GRO	ND < 0.13
TPH-DRO	ND < 13

SB FGL - 08 (24-27' bgs)	
TPH-GRO	**2,900**
TPH-DRO	**24,000**

EB-9 (3' bgs)	
TPH-GRO	ND < 0.11
TPH-DRO	ND < 12

EB-11 (16' bgs)	
TPH-GRO	ND < 0.12
TPH-DRO	ND < 12

EB-10 (31' bgs)	
TPH-GRO	ND < 0.12
TPH-DRO	ND < 12

EB-15 (33' bgs)	
TPH-GRO	ND < 0.12
TPH-DRO	ND < 12

SB FGL - 06 (20-24' bgs)	
TPH-GRO	**340**
TPH-DRO	**3,600**

SB FGL - 07B (16-20' bgs)	
TPH-GRO	**900**
TPH-DRO	**23,000**

EB-16	10' bgs	30' bgs
TPH-GRO	230	ND < 0.11
TPH-DRO	ND < 12	ND < 11

EB-8 (1' bgs)	
TPH-GRO	ND < 0.12
TPH-DRO	ND < 12

SB FGL - 09 (20-22' bgs)	
TPH-GRO	**1,900**
TPH-DRO	**16,000**

SB FGL - 02 (16-20' bgs)	
TPH-GRO	**0.067**
TPH-DRO	**7.9**

SB FGL - 03 (24-28' bgs)	
TPH-GRO	**0.11**
TPH-DRO	**160**

SB FGL - 01 (24-28' bgs)	
TPH-GRO	**0.064**
TPH-DRO	**5.4**

EB-7 (1' bgs)	
TPH-GRO	ND < 0.12
TPH-DRO	ND < 12

EB-6 (17' bgs)	
TPH-GRO	620
TPH-DRO	620

EB-5 (4' bgs)	
TPH-GRO	ND < 0.12
TPH-DRO	ND < 12

EB-4 (4' bgs)	
TPH-GRO	370
TPH-DRO	670

EB-3 (11' bgs)	
TPH-GRO	970
TPH-DRO	2,000

EB-2 (5' bgs)	
TPH-GRO	ND < 0.12
TPH-DRO	ND < 12

EB-1 (18' bgs)	
TPH-GRO	ND < 0.12
TPH-DRO	ND < 12

Notes:
TPH-GRO - Total petroleum hydrocarbons gasoline range organics.
TPH-DRO - Total petroleum hydrocarbons diesel range organics.
mg/kg - Milligrams per kilogram.
ND < - Not detected at or above the indicated laboratory quantitation limit.
EB - ERM Soil Boring
FGL = Fogle's Septic Clean

LEGEND

- PROPERTY BOUNDARY
- 605 EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- EXISTING BERM
- EXISTING SWALE
- TREELINE
- SOIL BORING

Drawn By FAK	ERM®	**SYKESVILLE OIL SITE** 580 OBRECHT ROAD SYKESVILLE, MARYLAND	CHK'D NW
CADD Review RMK			0032112
Date Drawn/Rev'd 3/13/06		Environmental Resources Management	FIGURE 7

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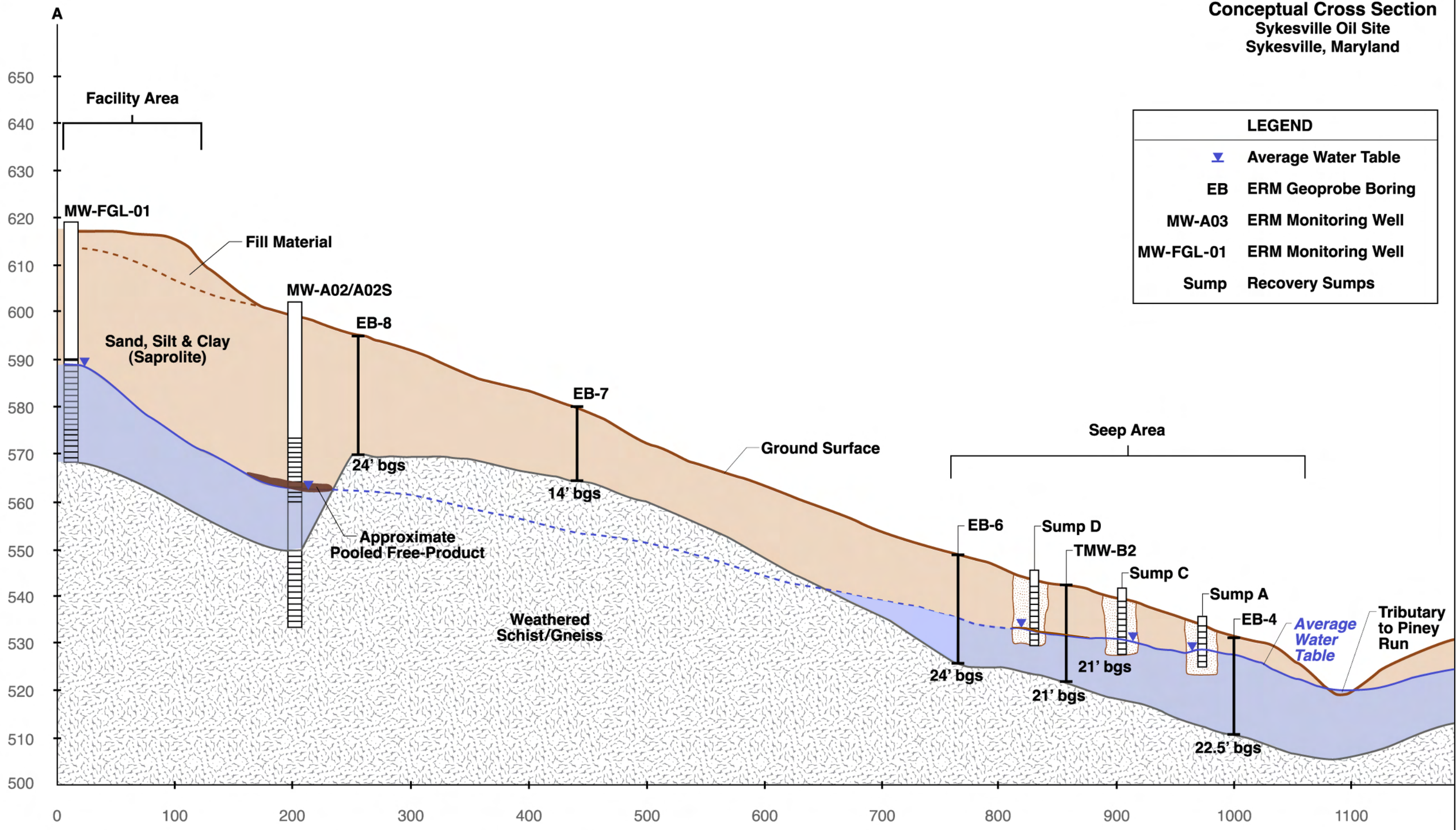
Figure 8
Conceptual Cross Section
Sykesville Oil Site
Sykesville, Maryland



Note: Schist/Gneiss elevation inferred from Geoprobe refusal at EB locations and observation of cuttings at MW locations.

Tables

Table 1. Total Petroleum Hydrocarbons in Soils (U.S. Army Corps of Engineers Soil Borings)
Sykesville Oil Site, Sykesville, Maryland

Sample Location	Sample Name	Date	Sampling Depth Below Ground Surface (feet)	TPH-GRO (mg/kg)	TPH-DRO (mg/kg)
Fogle Soil Boring 1	FGL-SS-1-24-28	10-Feb-05	24-28	0.064 J	5.4
Fogle Soil Boring 2	FGL-SS-2-16-20	10-Feb-05	16-20	0.067 J	7.9
Fogle Soil Boring 3	FGL-SS-3-24-28	10-Feb-05	24-28	0.110 J	160
Fogle Soil Boring 4	FGL-SS-4-28-32	10-Feb-05	28-32	7.6	36
Fogle Soil Boring 5	FGL-SS-5-16-20	10-Feb-05	16-20	0.061 J	36
Fogle Soil Boring 6	FGL-SS-6-20-24	11-Feb-05	20-24	340	3,600
Fogle Soil Boring 7B	FGL-SS-7B-16-20	11-Feb-05	16-20	900	23,000
Fogle Soil Boring 8	FGL-SS-8-24-27	11-Feb-05	24-27	2,900	24,000
Fogle Soil Boring 9	FGL-SS-9-20-22	11-Feb-05	20-22	1,900	16,000

Notes:
TPH- GRO = Total Petroleum Hydrocarbons - Gasoline Range Organics
TPH- DRO = Total Petroleum Hydrocarbons - Desiel Range Organics
mg/kg = Milligrams per Kilogram
J - Estimaed, result is below the reporting limit.

Table 2. Total Petroleum Hydrocarbons in Soils (ERM Soil Borings)
Sykesville Oil Site, Sykesville, Maryland

Area:		Seeps	Seeps	Seeps	Seeps	Seeps	Seeps	Hill Slope	Hill Slope
Location ID:		EB-1	EB-2	EB-3	EB-4	EB-5	EB-6	EB-7	EB-8
Sample Depth (bgs):		18 ft	5 ft	11 ft	4 ft	4 ft	17 ft	1 ft	1 ft
Boring Depth (bgs):		18.5 ft	18 ft	25 ft	22.5 ft	20 ft	24 ft	14 ft	24 ft
	Units								
TPH-GRO	mg/kg	ND < 0.12	ND < 0.12	**970**	**370**	ND < 0.12	**620**	ND < 0.12	ND < 0.12
TPH-DRO	mg/kg	ND < 12	ND < 12	**2,000**	**670**	ND < 12	**620**	ND < 12	ND < 12
Soil Gas ID		--	--	67	72	--	60	46	33
Soil Gas TPH	ng	--	--	8,894	268,541	--	831	1,846	785

Area:		Facility	Facility	Facility	Facility	Facility	Facility	Facility	Facility	Facility	Facility	Facility
Location ID:		EB-9	EB-10	EB-11	EB-12	EB-13	EB-14	EB-15	EB-16	EB-16	EB-17	EB-17
Sample Depth (bgs):		3 ft	31 ft	16 ft	24 ft	2 ft	4 ft	33 ft	10 ft	30 ft	23 ft	33 ft
Boring Depth (bgs):		24 ft	34 ft	35 ft	33 ft	24 ft	22.5 ft	33 ft	30 ft	30 ft	33 ft	33 ft
	Units											
TPH-GRO	mg/kg	ND < 0.11	ND < 0.12	ND < 0.12	ND < 0.13	ND < 0.12	ND < 0.11	ND < 0.12	**230**	ND < 0.11	**1,500**	**5.2**
TPH-DRO	mg/kg	ND < 12	ND < 12	ND < 12	ND < 13	ND < 12	ND < 11	ND < 12	ND < 12	ND < 11	**10,000**	ND < 12
Soil Gas ID		--	--	14	80	5	12	--	29	29	18	18
Soil Gas TPH	ng	--	--	87,757	5,196	14,664	19,797	--	1,521	1,521	137,021	137,021

Area:		Farm	Farm	Farm	Farm	Farm	Farm	Farm	Farm
Location ID:		FB-1	FB-2	FB-3	FB-4	FB-4	FB-5	FB-5	FB-6
Sample Depth (bgs):		1.5 ft	2 ft	2 ft	1 ft	5 ft	0.5 ft	2 ft	0.5 ft
Boring Depth (bgs):		5 ft	5 ft	5 ft	5 ft	5 ft	10 ft	10 ft	5 ft
	Units								
TPH-GRO	mg/kg	**3.1**	**12**	ND < 0.12	**11**	ND < 0.12	ND < 0.11	ND < 0.12	ND < 0.11
TPH-DRO	mg/kg	**990**	**210**	ND < 12	**3.2**	ND < 12	**380**	ND < 12	ND < 11
Soil Gas ID		--	--	--	--	--	--	--	--
Soil Gas TPH	ng	--	--	--	--	--	--	--	--

TPH-GRO - Total petroleum hydrocarbons gasoline range organics.
TPH-DRO - Total petroleum hydrocarbons diesel range organics.
Soil Gas ID - Corresponding Emflux soil gas sample location.
Soil Gas TPH - Total petroleum hydrocarbons detected in soil gas.
mg/kg - Milligrams per kilogram.
ng - Nanograms (equivalent to 10^{-6} milligrams).
ND < - Not detected at or above the indicated laboratory quantitation limit.

Table 3. Fluid Level Measurements for March 2006
Sykesville Oil Site, Sykesville, Maryland

Location	Reference Point Elevation (ft msl)	2-Mar-06 Depth to Product (ft bre)	2-Mar-06 Depth to Water (ft bre)	2-Mar-06 Product Thickness (ft)	2-Mar-06 Corrected Ground Water Elevation (ft msl)	6-Mar-06 Depth to Product (ft bre)	6-Mar-06 Depth to Water (ft bre)	6-Mar-06 Product Thickness (ft)	6-Mar-06 Corrected Ground Water Elevation (ft msl)	13-Mar-06 Depth to Product (ft bre)	13-Mar-06 Depth to Water (ft bre)	13-Mar-06 Product Thickness (ft)	13-Mar-06 Corrected Ground Water Elevation (ft msl)
MW-A01	601.70	32.91	33.61	0.70	568.67	33.01	33.40	0.39	568.62	32.97	33.55	0.58	568.63
MW-A02	600.47	--	37.34	--	563.13	--	37.32	--	563.15	--	37.31	0.00	563.16
MW-A02S	600.30	--	34.24	--	566.06	34.20	34.50	0.30	566.05	32.30	32.55	0.00	567.75
MW-A03	603.97	--	25.60	--	578.37	--	25.74	--	578.23	--	25.80	0.00	578.17
MW-A03S	603.10	--	33.14	--	569.96	--	33.20	--	569.90	--	32.20	0.00	570.90
MWFGL-01	618.91	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MWFGL-02	620.78	--	34.89	--	585.89	--	34.78	0.00	586.00	NM	NM	NM	NM
TMW-B1	541.62	10.51	13.73	3.22	530.55	10.70	12.70	2.00	530.57	10.43	14.30	3.87	530.52
TMW-B2	545.01	14.00	14.00	<0.01	531.01	14.14	14.14	<0.01	530.87	--	14.30	0.00	530.71
SUMP "A"	--	--	6.20	--	--	--	6.35	0.00	--	--	6.46	0.00	--
SUMP "B"	--	7.82	7.82	<0.01	--	7.93	8.00	0.07	--	8.06	8.08	0.00	--
SUMP "C"	--	--	10.20	--	--	10.35	10.35	<0.01	--	10.47	10.47	0.00	--
SUMP "D"	--	11.00	11.09	0.09	--	11.18	11.34	0.16	--	11.28	11.40	0.12	--

Location	Reference Point Elevation (ft msl)	20-Mar-06 Depth to Product (ft bre)	20-Mar-06 Depth to Water (ft bre)	20-Mar-06 Product Thickness (ft)	20-Mar-06 Corrected Ground Water Elevation (ft msl)	22-Mar-06 Depth to Product (ft bre)	22-Mar-06 Depth to Water (ft bre)	22-Mar-06 Product Thickness (ft)	22-Mar-06 Corrected Ground Water Elevation (ft msl)	30-Mar-06 Depth to Product (ft bre)	30-Mar-06 Depth to Water (ft bre)	30-Mar-06 Product Thickness (ft)	30-Mar-06 Corrected Ground Water Elevation (ft msl)
MW-A01	601.70	33.10	33.72	0.62	568.49	33.10	33.82	0.72	568.48	33.10	33.82	0.72	568.48
MW-A02	600.47	--	37.43	0.00	563.04	--	37.44	0.00	563.03	--	37.44	0.00	563.03
MW-A02S	600.30	34.33	34.82	0.49	565.89	34.35	34.84	0.49	565.87	34.35	34.84	0.49	565.87
MW-A03	603.97	--	26.00	0.00	577.97	--	26.09	0.00	577.88	--	26.04	0.00	577.93
MW-A03S	603.10	33.31	33.31	<0.01	570.00	34.78	34.78	0.00	568.32	NM	NM	NM	NM
MWFGL-01	618.91	NM	NM	NM	NM	--	39.90	0.00	579.01	--	39.90	0.00	579.01
MWFGL-02	620.78	NM	NM	NM	NM	--	35.10	0.00	585.68	--	35.10	0.00	585.68
TMW-B1	541.62	10.31	13.66	3.35	530.73	11.10	13.50	2.40	530.10	11.10	13.50	2.40	530.10
TMW-B2	545.01	13.41	13.41	<0.01	531.60	--	14.57	0.00	530.44	--	14.57	0.00	530.44
SUMP "A"	--	--	6.62	0.00	--	--	6.70	--	--	--	6.70	0.00	--
SUMP "B"	--	8.21	8.24	0.03	--	8.26	8.34	0.08	--	8.26	8.34	0.08	--
SUMP "C"	--	10.61	10.61	<0.01	--	10.96	10.96	<0.01	--	10.96	10.96	0.00	--
SUMP "D"	--	11.41	11.58	0.17	--	11.54	11.65	0.11	--	11.54	11.65	0.11	--

Notes:

1. Assumes the product density is 0.827 gm/cm^3 (API Publication No. 4682, June 1999) for calculating Corrected Ground Water Elevation.
2. -- Not applicable. Free-product was not detected.
3. NM - No Measurements taken

Table 4. Field Estimates of Hydraulic Conductivity
Sykesville Oil Site, Sykesville, Maryland

Well ID	Well Radius cm	Borehole Radius cm	Flow Rate ml/sec	Drawdown cm	Specific Capacity ml/sec/cm
Onsite Monitoring Wells					
FGL-02	10.16	20.96	29.17	30.48	0.96
MW-A01	10.16	20.96	8.33	15.24	0.55
MW-A02	10.16	20.96	30.83	30.48	1.01
MW-A03	10.16	20.96	33.33	30.48	1.09

Well ID	Depth to Water cm	Well Depth cm	Constant cm^{-1}	ERM 2005 Field Test (a) Hydraulic Conductivity cm/sec	ft/day
Onsite Monitoring Wells					
FGL-02	1066.80	2133.60	0.001	1.13 E-3	3.20 E+0
MW-A01	1060.70	1371.60	0.002	8.52 E-4	2.42 E+0
MW-A02	1152.75	2133.60	0.001	1.19 E-3	3.39 E+0
MW-A03	801.62	2133.60	0.001	1.29 E-3	3.66 E+0
Statistics					
Maximum				1.29 E-3	3.66 E+0
Minimum				8.52 E-4	2.42 E+0
Arithmetic Mean				1.12 E-3	3.17 E+0

Notes:
(a) Field estimates of hydraulic conductivity based on method developed by Wilson et al., 1997.

Appendix A
Aerial Photographs

Appendix B
EDR Report for
Fogle's Septic Clean, Inc.

Appendix C
Forrest Environmental Services
Geophysical Survey Report

Appendix D
Beacon Environmental Services
Soil Gas Survey Report

Appendix E
Logs for Soil Borings and Monitoring Wells Completed by ERM, Inc.

Appendix F
Laboratory Reports for ERM, Inc.
Soil Samples