Imagine the result

ExxonMobil Environmental Services

Corrective Action Plan

Former ExxonMobil Site #25553
143 Frederick Road, Thurmont, MD

MDE Case No. 9-0923-FR (1989-0923-FR)

12 September 2011

ARCADIS

Corrective Action Plan

Former ExxonMobil Site #25553
143 Frederick Road, Thurmont,
Maryland

William R. Kahl, P.G.
Project Geologist

Michael S. Cleary
Project Manager

Prepared for:
ExxonMobil Environmental Services

Prepared by:
ARCADIS U.S., Inc.
1114 Benfield Boulevard
Suite A
Millersville
Maryland 21108
Tel 410 987 0032
Fax 410 987 4392

Our Ref.:
B0085851.0014

Date:
12 September 2011

This document is intended only for the use of the individual or entity for which it was prepared and may contain information that is privileged, confidential and exempt from disclosure under applicable law. Any dissemination, distribution or copying of this document is strictly prohibited.

Table of Contents

1. Introduction **1**

1.1 Site Description 1

1.2 Site Background 1

2. Conceptual Site Model **3**

2.1 Geology and Hydrogeology 3

2.2 Soil Quality 3

2.3 Groundwater Quality 3

3. Proposed Corrective Actions **5**

3.1 Two Phase Extraction Pilot Test 5

3.2 Updated Groundwater Monitoring Program 7

4. Remedial Endpoints **9**

4.1 Liquid Phase Hydrocarbon Endpoint 9

4.2 Dissolved Phase Hydrocarbon Endpoint 9

5. Monitoring and Reporting Schedules **10**

5.1 Corrective Action Implementation and Schedule 10

5.2 Reporting Schedule 10

5.3 Schedule Summary 10

6. References **11**

Figures

1 Local Area Map

2 Site Map

3 Groundwater Elevation Contour Map and Analytical Data – Shallow (9 May 2011)

4 Groundwater Elevation Contour Map and Analytical Data – Bedrock (9 May 2011)

Appendices

A MDE Correspondence

B Soil Quality Information

1. Introduction

ARCADIS U.S., Inc. (ARCADIS) on behalf of ExxonMobil Environmental Services (EMES) and ExxonMobil Corporation (ExxonMobil) is pleased to submit a Corrective Action Plan (CAP) for the former Exxon station located at 143 Frederick Road, Thurmont, Maryland. The Maryland Department of Environment (MDE) Case Number assigned to this site is 9-0923-FR. A site location map is included as **Figure 1**, and a site plan is included as **Figure 2**.

A Work Plan for Additional Assessment was submitted to MDE on 14 October 2008 (Kleinfelder 2008) that proposed the collection of additional site characterization data to be used to evaluate potential modification to the current remedial strategy. In correspondence dated 7 May 2009 a revised conceptual site model was requested by MDE. Results of these activities were present in the Site Conceptual Model / Characterization Report (SCM), submitted to MDE on 18 February 2010 (Kleinfelder 2010). Correspondence from MDE is included as **Appendix A**.

1.1 Site Description

A bank and parking area currently occupy the former Exxon site. The area surrounding the property is a commercial and residential mix use. The property is bordered by Frederick Road to the east, a restaurant to the north, a Shell gasoline station to the south, and by US Route 15 to the west. Current site use is shown in **Figure 2**.

1.2 Site Background

In 1979 two underground storage tanks (USTs) located at the former Exxon Site failed testing and four gasoline USTs located on-site were removed. No product loss was reported. In 1985 site ceased gasoline retail operations and all USTs, dispensers, and associated piping were removed from the property. The site was relocated across the street to 140 Frederick Road.

In 1983 a MDE case was opened after dissolved hydrocarbons found in Thurmont Municipal supply well located approximated 350 northeast of site. Soil borings conducted during site investigation identified the abandoned tank field (across the street) as the potential source area. A product recovery system was installed and product recovery activities were initiated. In July 1988 through February 1990 and again in October 1992 soil vapor extraction (SVE) activities were conducted utilizing a catalytic oxidizer (Cat-Ox) to treat recovered soil vapors. In 1998 an independent

groundwater treatment system was installed on recovery well RW-52 utilizing three 200 pound GAC units for groundwater treatment prior to discharge and in September 2000 a longer term SVE program was initiated.

A Work Plan for Additional Assessment was submitted to the MDE in October 2008 to refine the site characterization and evaluate potential modifications to the current remedial strategy. Site investigation activities were preformed in 2009. These activities included a trial shut down of pumping on recovery well RW-52, groundwater monitoring, downhole geophysical survey, pump testing, and a dual phase extraction (DPE) pilot test. A SCM was submitted to MDE in February 2010.

2. Conceptual Site Model

The geology and hydrogeology is based on investigative activities conducted by previous consultants and groundwater results are from the most recent sampling event conducted by ARCADIS in May 2011.

2.1 Geology and Hydrogeology

Previous subsurface investigations indicate mainly silt and clay overlying fractured limestone. Historical boring logs are included in **Appendix B**.

Previous site conceptual models identify groundwater bearing zones described as shallow, intermediate, and deep. Shallow groundwater has generally been reported at depths ranging from just below the ground surface up to 30 feet bgs. Intermediate groundwater appears to be present just above bedrock and ranges in depth from 30 to 50 feet bgs. Deep groundwater is characterized as groundwater below overburden and within the bedrock.

Depth to groundwater was measured during the most recent groundwater monitoring even in May 2011. Based on this gauging data, groundwater flow at the site appears to be to the southeast (**Figure 3**).

2.2 Soil Quality

As reported in the SCM report, soil analytical samples collected in 2006 and 2009 showed no constituent concentrations above MDE Non-Residential Cleanup Standards. A table from the 2010 SCM report summarizing historical soil analytical data is included in **Appendix B**.

2.3 Groundwater Quality

As reported in the most recent groundwater monitoring report, groundwater samples were collected in May 2011 and submitted to TestAmerica Laboratories of Nashville, Tennessee for analysis of for analysis of full list volatile organic compounds (VOCs) and fuel oxygenates using Environmental Protection Agency (EPA) Method 8260B, and total petroleum hydrocarbons – gasoline range organics (TPH-GRO) and total petroleum hydrocarbons – diesel range organics (TPH-DRO) by EPA Method 8015. No LPH was detected during this reporting period. Data for this event is shown on **Figures 3 and 4**.

Benzene, toluene, total xylenes, methyl tertiary butyl ether (MTBE), TPH-DRO, and TPH-GRO were detected at concentrations exceeding MDE Groundwater (GW) Clean-up Standards in samples collected from one or more wells:

- Benzene was detected at concentrations exceeding the MDE GW standard (5 µg/L) in 15 samples (MW-11, MW-14A, MW-51, MW-53I, MW-53S, MW-54D, MW-55I, MW-54S, MW-55S, MW-55D, DPE-1, MP-1, MP-2, MP-3, and VW-1) with a maximum concentration of 19,200 µg/L in the sample collected from MW-53S.

- Toluene was detected at concentrations exceeding the MDE GW standard (1,000 µg/L) in five samples (MW-53S, MW-55I, DPE-1, MP-1, and MP-2) with a maximum concentration of 26,000 µg/L in the sample collected from MW-53S.

- Ethylbenzene was detected at concentrations exceeding the MDE GW standard (700 µg/L) in six samples (MW-53S, MW-55I, DPE-1, MP-1, MP-2, and MP-3) with a maximum concentration of 1,970 µg/L in the sample collected from DPE-1.

- MTBE was detected at concentrations exceeding the MDE GW standard (20 µg/L) in seven samples (MW-53S, MW-53I, MW-55I, DPE-1, MP-1, MP-2, and MP-3) with a maximum concentration of 761 µg/L in the sample collected from MW-53S.

- TPH-GRO was detected above the MDE GW standard (47 µg/L) in 17 samples (MW-6, MW-11, MW-14A, MW-51, MW-53D, MW-53I, MW-53S, MW-54S, MW-55S, MW-55I, MW-55D, DPE-1, MP-1, MP-2, MP-3, VW-1, and VW-2) with a maximum concentration of 110,000 µg/L in the sample collected from MW-53S.

- TPH-DRO was detected above the MDE GW standard (47 µg/L) in 21 samples (MW-5, MW-6, MW-11, MW-14A, MW-46, MW-48, MW-51, MW-53S, MW-53I, MW-54S, MW-54D, MW-55S, MW-55I, MW-55D, DPE-1, MP-1, MP-2, MP-3, VW-1, VW-2, and VW-3) with a maximum concentration of 9,210 µg/L in the sample collected from MP-2.

3. Proposed Corrective Actions

The objective of additional corrective action at the site is to remove remaining separate phase hydrocarbons and show decreasing dissolved phase concentrations in groundwater. The proposed corrective action includes additional multi-phase extraction (MPE) pilot testing pursuant to an upgrade of the existing remedial system. The current system will be shutdown during the pilot test and system upgrade activities.

3.1 Two Phase Extraction Pilot Test

A pilot test using Two Phase Extraction (TPE) is recommended to evaluate the vacuum, air flow rate, extracted groundwater flow rate, petroleum mass removal rate, and subsurface response (system influence) of operating a TPE system with the stinger tube depth set to an appropriate depth to address highest impacted intervals and maximize mass recovery.

TPE is proposed at the site because it has proven to be an effective technique for remediation of groundwater impacted by petroleum hydrocarbons. TPE will be conducted using an existing dual-phase extraction well. The on-site well DPE-1 is located proximate to MP-1, MP-2, MP-3 and MW-53S. VW-01 is also close to DPE-1 and will be monitored for vacuum influence during the pilot test. The locations of the above mentioned wells are shown on the site map.

The pilot study will consist of an 8-hour TPE test.

<u>Pre-Test Baseline Data</u>

Prior to conducting the TPE testing, ARCADIS will collect and record pre-test baseline data from the observation wells mentioned above. The pre-test baseline data includes:

1. depth to water, wellhead pressure, and photoionization detector (PID) / lower explosive limit (LEL) readings; and

2. distances from the wellhead of DPE-1 to the applicable monitoring points.

<u>Two-Phase Extraction Tests</u>

In general, the TPE test operations will consist of extracting vapor and groundwater together through DPE-1 in a drop pipe with applied vacuum. A vacuum blower will be

connected to the drop pipe to apply the vacuum. A commercially available well cap will be used to connect the system piping and seal the well. The water will then be collected in a 6,000 gallon tank and disposed of off-site. The vapor will be treated on-site with a drum of granular activated carbon (GAC) drum (200 lbs) and vented to the atmosphere. The TPE system will be operated using step increases in applied vacuum.

During each TPE test, the wellhead and blower vacuum will be recorded. A ball valve on the blower dilution valve will be used to control the applied vacuum and airflow rate. During the TPE tests, a vacuum will be induced in DPE-1, and the corresponding vacuum, air stream temperature, and differential pressure at the Dwyer Series DS300 Flow Sensor will be recorded at least twice during each step interval of the test. Corresponding air flow rates will be determined from the recorded data. Water flow rates will be recorded via a flow meter. Total extracted water volume will be recorded after each step interval. The average extracted water flow rates will be determined from that data.

ARCADIS proposes the test will operate at an initial applied vacuum of 10 inches of mercury. Applied vacuum increases will be performed until the vacuum required to draw water from the drop tube installed at 25 feet below top of casing is determined. Each step increase in applied vacuum at the wellhead will be approximately 5 inches of mercury.

Once the required vacuum to draw water from the DPE well is determined, depth to water and wellhead pressure readings for each TPE test will be recorded in the observation wells listed above. Data will be recorded at the start of the test and at approximately half-hour intervals for the duration of the tests. PID/LEL readings of the DPE-1 air stream will also be collected at least once during each step interval of the test.

Three air samples (beginning, middle, and end) will be collected during TPE testing. The air samples will be submitted for laboratory analysis of VOCs and TPH using USEPA Method TO-3.

Three groundwater samples (beginning, middle, and end) will be collected for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) and MTBE using USEPA Method 8021B, polynuclear aromatic hydrocarbons (PAHs) using USEPA Method 8270, chemical oxygen demand (COD) using EPA Method 410.1, total hardness (as $CaCO_3$) using EPA Method 130.1, total dissolved solids using EPA Method 160.1, and iron using EPA Method 6010B. The samples will be collected within the first 30 minutes

of pumping, during the step that is considered to be most representative of the final design, and within 30 minutes of end of test.

TPE Pilot Study Goals and Objectives

- Calculate radius of influence estimates for vapor and groundwater recovery
- Determine minimum vacuum required to draw water from the impacted zone
- Identify soil gas flow rate and constituents of concern (COC) concentration data in TPE air stream for the design of the TPE emissions treatment system
- Groundwater production volume and COC concentration data in extracted groundwater for the design of the groundwater treatment system

The information from the Pilot Study will be used to prepare a CAP Addendum for upgrades to the existing system. Remedial endpoints as described in Section 4 are anticipated to be met following upgrades to the system.

3.2 Updated Groundwater Monitoring Program

ARCADIS requests a reduction of wells included in the quarterly sampling program. This includes MW-6, MW-11, MW-13A, MW-46, MW-53D, MW-55D, VW-3, MP-1, MP-3, and DPE-1. Wells proposed to be removed from the sampling program were selected based on a review of historical data, spatial distribution, well screen intervals, and well condition and age:

- MW-6 was installed in 1983 and is located in close proximity to MW-51, which was more recently installed. Both monitoring wells are screened in the shallow zone. Therefore it is recommended MW-6 be removed from quarterly sampling program.
- MW-11 has historically been dry and a soft bottom indicating potential sediment has been observed. Therefore it is recommended MW-11 be removed from quarterly sampling program.
- MW-13A was constructed with a 30-foot screen (5 – 35 feet below ground surface [ft bgs]) and located near MW-54S and MW-54D, which were constructed with screens in the shallow (13 – 18 ft bgs) and deep (31 – 42 ft bgs) water bearing

zones, respectively. Therefore it is recommended MW-13A be removed from quarterly sampling program.

- MW-46 was constructed with a 25-foot screen (5 – 30 ft bgs) and is located in close proximity to MW-54S and MW-54D. Groundwater analytical results in samples collected from MW-46 have historically been below MDE GW clean-up standards. Therefore it is recommended MW-46 be removed from quarterly sampling program.

- MW-53D is located in a cluster if with MW-53S and MW-53I. MW-53I was constructed with a 5-foot screen (33 – 38 ft bgs) while MW-53D was constructed with an open borehole (45 – 52 ft bgs). Additionally, groundwater analytical concentrations in samples collected from MW-53D have historically been higher than those in samples collected from MW-53I. Therefore it is recommended MW-53D be removed from quarterly sampling program.

- MW-55D is located in a cluster with MW-55I and MW-55S. MW-55D was constructed with a 100-foot open borehole (42 – 142) and historically groundwater samples have been below the MDE GW clean-up standards for samples collected from this well. Therefore it is recommended MW-55D be removed from quarterly sampling program.

- VW-3 is located in close proximity to VW-1 and MW-5 and has historically had concentrations below the MDE GW clean-up standards. Therefore it is recommended VW-3 be removed from quarterly sampling program.

- MP-1, MP-2, MP-3, and DPE-1 are all located in close proximity to one another and were constructed with similar screen intervals. Additionally, the field staff reported an obstruction within the well casing of MP-3. Therefore it is recommended MP-1, MP-2, and DPE-1 be removed from quarterly sampling program.

The remaining 15 wells (MW-5, MW-14A, MW-48, MW-50, MW-51, MW-53I, MW-53S, MW-54D, MW-54S, MW-55I, MW-55S, RW-52, VW-1, VW-2, and MP-2) would continue to be sampled quarterly for BTEX and MTBE by USEPA Method 8260, TPH-GRO and TPH-DRO by USEPA Method 8015.

4. Remedial Endpoints

Remedial activities will be considered complete when defined remedial endpoints are achieved. The baseline for comparison of remedial endpoints in the constituent mass as reported in the SCM (Kleinfelder 2010). The following sections describe the remedial endpoints for each phase of hydrocarbons. These endpoints are expected to be achieved following upgrades to the system that will be proposed in a CAP Addendum.

4.1 Liquid Phase Hydrocarbon Endpoint

MDE regulations require that all LPH be removed to the maximum extent practicable. LPH has not been detected in site wells since December 2010, so this end point is considered to have been achieved.

4.2 Dissolved Phase Hydrocarbon Endpoint

The MDE OCP guidance indicates that to achieve the site goal for dissolved phase remediation, risks posed by the release must be removed, contamination migration must be prevented, and asymptotic trend in dissolved-phase contamination must be established. The purpose of the TPE pilot test is to reduce dissolved-phase concentrations thereby preventing migration of contaminants and establishing long-term declining trends in constituent concentrations.

The goal of this phase of remedial action is to reduce concentrations of benzene and MTBE in groundwater samples from wells MW-14A, MW-53S, MW-54D, MW-55S, to 25% of their concentrations from the February 2010 SCM document (Kleinfelder 2010). These wells were selected because the samples from these wells have reliable historical records of data and also have the highest current concentrations of site constituents. Demonstrating concentration decreases in samples from these wells will be representative of decreasing concentrations for the entire site.

In order to demonstrate the dissolved phase hydrocarbon endpoint, groundwater monitoring will continue for the scope requested in Section 3.4 with MDE approval.

5. Monitoring and Reporting Schedules

The following schedules are proposed for the corrective action activities.

5.1 Corrective Action Implementation and Schedule

Remedial activities will begin to be implemented within 30 days of receiving final approval of the CAP. If the CAP is approved in October 2011, then remedial activities will begin by November 2011.

5.2 Reporting Schedule

A summary and evaluation report of TPE pilot testing activities and results will be submitted 30 days after receipt of the final analytical results.

5.3 Schedule Summary

The following summarizes the project schedule assuming October 2011 CAP approval:

Date	Field Event/Report
October 2011	Receive CAP approval.
November-December 2011	Perform Pilot Test
January-February 2012	Submit pilot testing report and CAP Addendum

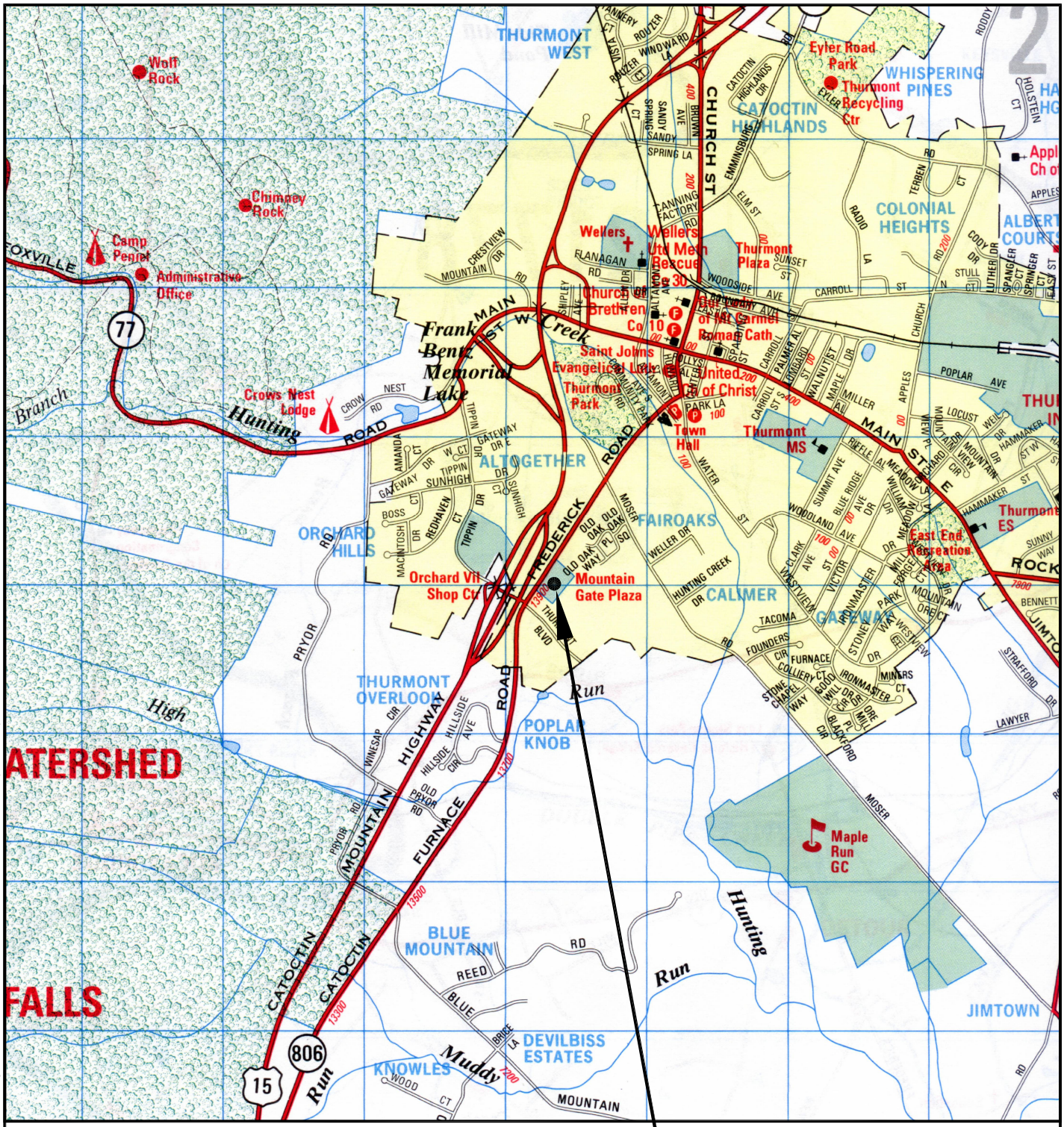
6. References

ARCADIS, 2011. Second Quarter 2011 Groundwater Monitoring Report, Former Exxon Facility #25553, 143 Frederick Road, Thurmont, Maryland. 5 August 2011.

Kleinfelder, 2008. Work Plan for Additional Assessment, Former Exxon Facility #25553, 143 Frederick Road, Thurmont, Maryland. 14 October 2008.

Kleinfelder, 2010. Conceptual Site Model / Characterization Report, Former Exxon Facility #25553, 143 Frederick Road, Thurmont, Maryland. 18 February 2010.

Figures

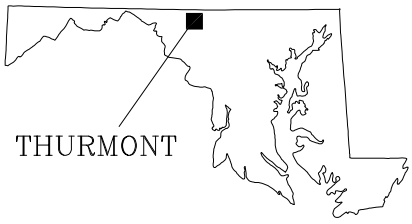


MAP SOURCE: ADC Frederick Co. MD. Street Map Book

SITE

0 1,000 2,000

SCALE: FEET



N

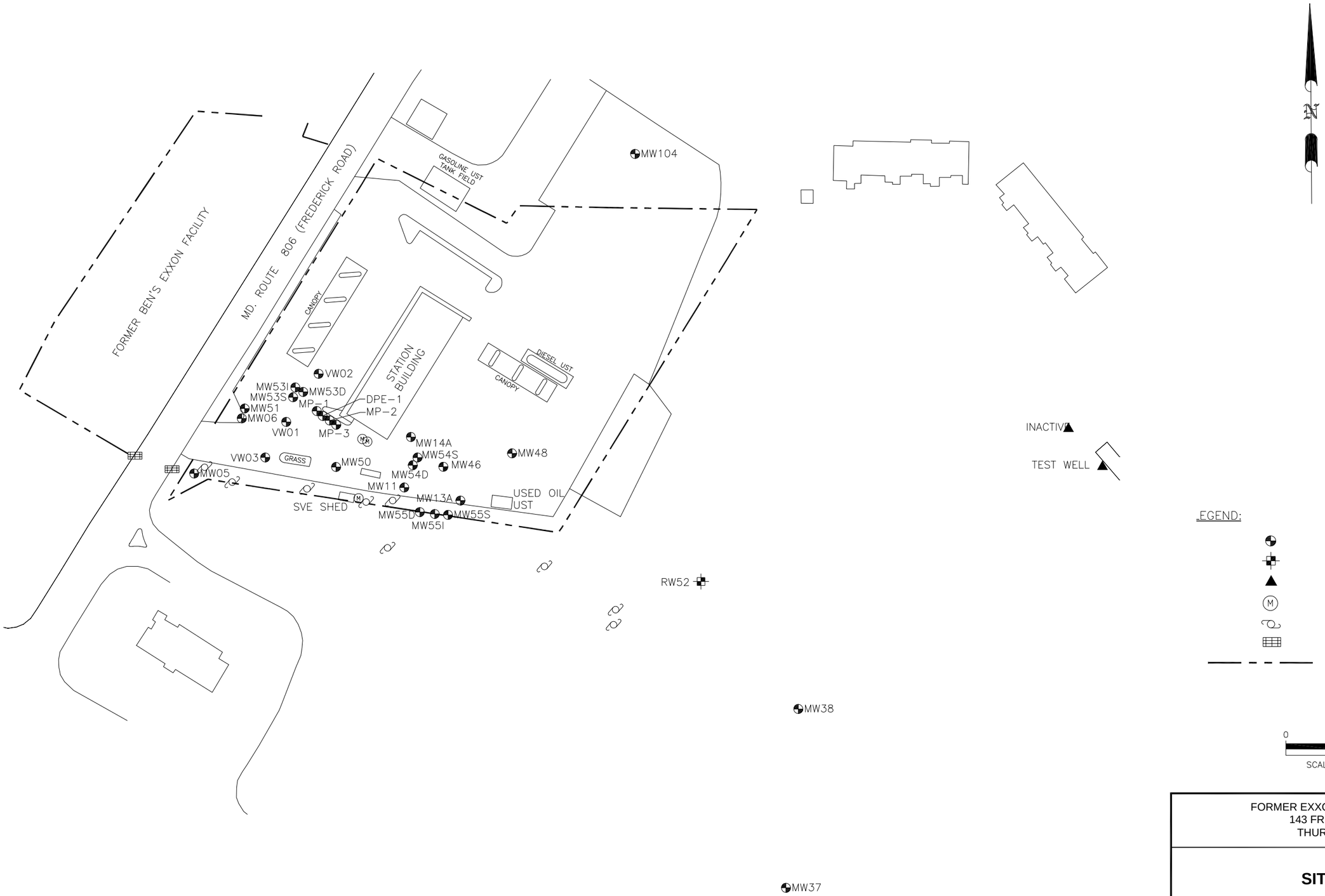
FORMER EXXON FACILITY # 25553
143 FREDERICK RD
THURMONT, MD.

LOCAL AREA MAP

ARCADIS

FIGURE
1

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\BALTIMORE\ACT\B0085851\0014\00002\143 Frederick RD-Site-Loc.dwg LAYOUT: 1 SAVED: 4/15/2011 10:11 AM ACADVER: 18.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/29/2011 12:39 PM BY: GOFORTH, JOHN



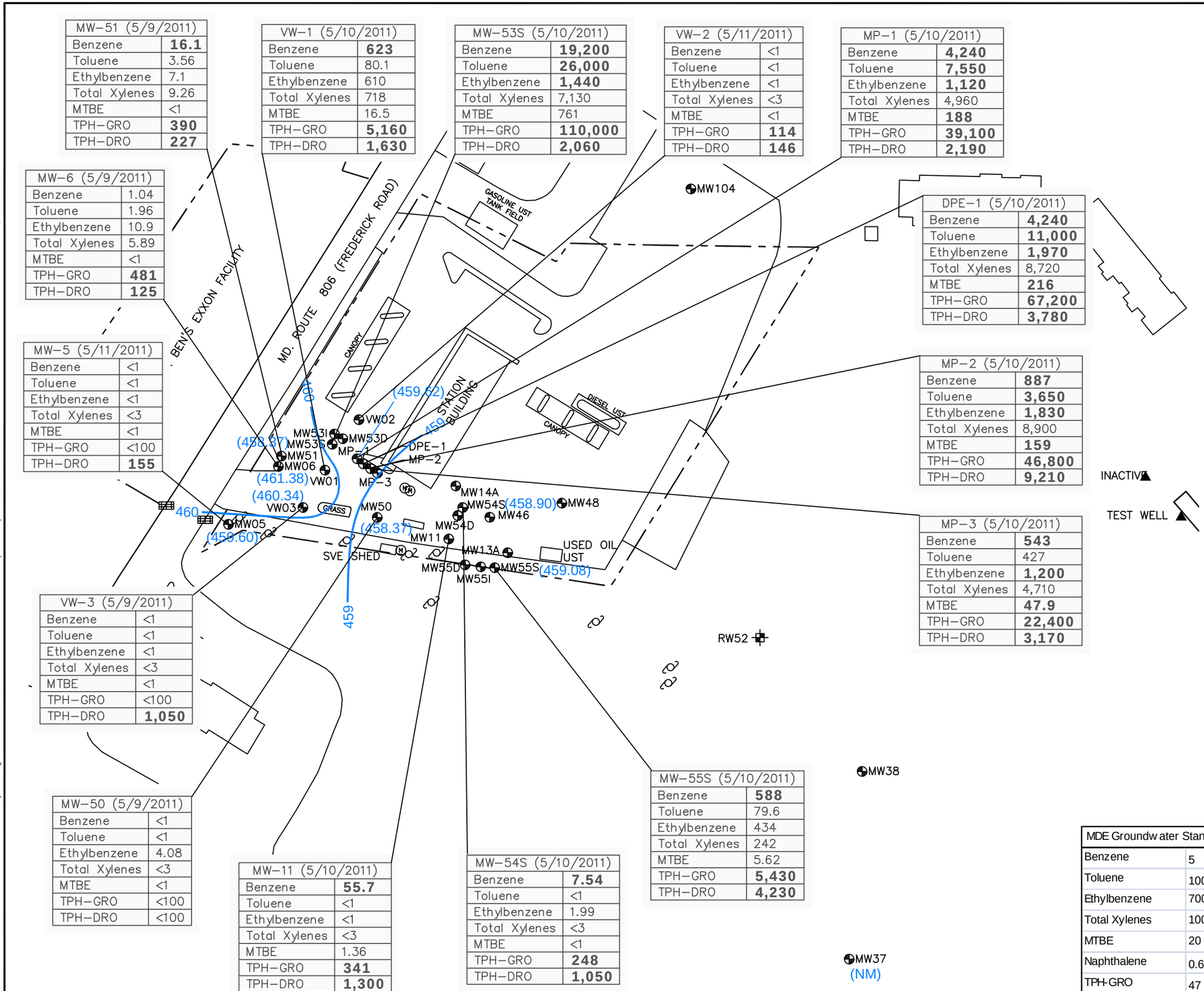
FORMER EXXON FACILITY # 25553
143 FREDERICK RD
THURMONT, MD.

SITE MAP

ARCADIS

FIGURE
2

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\BALTIMORE\ACT\B0085510\0140\00021\43 Frederick Site Base.dwg LAYOUT: 2 SAVED: 4/29/2011 12:50 PM ACADVER: 18.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/29/2011 12:50 PM BY: GOFORTH, JOHN



MW-51 (5/9/2011)	
Benzene	**16.1**
Toluene	3.56
Ethylbenzene	7.1
Total Xylenes	9.26
MTBE	<1
TPH-GRO	**390**
TPH-DRO	**227**

VW-1 (5/10/2011)	
Benzene	**623**
Toluene	80.1
Ethylbenzene	610
Total Xylenes	718
MTBE	16.5
TPH-GRO	**5,160**
TPH-DRO	**1,630**

MW-53S (5/10/2011)	
Benzene	**19,200**
Toluene	**26,000**
Ethylbenzene	**1,440**
Total Xylenes	7,130
MTBE	761
TPH-GRO	**110,000**
TPH-DRO	**2,060**

VW-2 (5/11/2011)	
Benzene	<1
Toluene	<1
Ethylbenzene	<1
Total Xylenes	<3
MTBE	<1
TPH-GRO	**114**
TPH-DRO	**146**

MP-1 (5/10/2011)	
Benzene	**4,240**
Toluene	**7,550**
Ethylbenzene	**1,120**
Total Xylenes	4,960
MTBE	**188**
TPH-GRO	**39,100**
TPH-DRO	**2,190**

MW-6 (5/9/2011)	
Benzene	1.04
Toluene	1.96
Ethylbenzene	10.9
Total Xylenes	5.89
MTBE	<1
TPH-GRO	**481**
TPH-DRO	**125**

DPE-1 (5/10/2011)	
Benzene	**4,240**
Toluene	**11,000**
Ethylbenzene	**1,970**
Total Xylenes	8,720
MTBE	**216**
TPH-GRO	**67,200**
TPH-DRO	**3,780**

MW-5 (5/11/2011)	
Benzene	<1
Toluene	<1
Ethylbenzene	<1
Total Xylenes	<3
MTBE	<1
TPH-GRO	<100
TPH-DRO	**155**

MP-2 (5/10/2011)	
Benzene	**887**
Toluene	**3,650**
Ethylbenzene	**1,830**
Total Xylenes	8,900
MTBE	**159**
TPH-GRO	**46,800**
TPH-DRO	**9,210**

MP-3 (5/10/2011)	
Benzene	**543**
Toluene	427
Ethylbenzene	**1,200**
Total Xylenes	4,710
MTBE	**47.9**
TPH-GRO	**22,400**
TPH-DRO	**3,170**

VW-3 (5/9/2011)	
Benzene	<1
Toluene	<1
Ethylbenzene	<1
Total Xylenes	<3
MTBE	<1
TPH-GRO	<100
TPH-DRO	**1,050**

MW-50 (5/9/2011)	
Benzene	<1
Toluene	<1
Ethylbenzene	4.08
Total Xylenes	<3
MTBE	<1
TPH-GRO	<100
TPH-DRO	<100

MW-11 (5/10/2011)	
Benzene	**55.7**
Toluene	<1
Ethylbenzene	<1
Total Xylenes	<3
MTBE	1.36
TPH-GRO	**341**
TPH-DRO	**1,300**

MW-54S (5/10/2011)	
Benzene	**7.54**
Toluene	<1
Ethylbenzene	1.99
Total Xylenes	<3
MTBE	<1
TPH-GRO	**248**
TPH-DRO	**1,050**

MW-55S (5/10/2011)	
Benzene	**588**
Toluene	79.6
Ethylbenzene	434
Total Xylenes	242
MTBE	5.62
TPH-GRO	**5,430**
TPH-DRO	**4,230**

LEGEND:

- MONITORING WELL
- RECOVERY WELL
- MUNICIPAL SUPPLY WELL
- UTILITY MANHOLE
- UTILITY POLE
- CATCH BASIN
- PROPERTY LINE
- 444 — GROUNDWATER ELEVATION CONTOUR (FEET ABOVE MEAN SEA LEVEL)
- (440.50) — GROUND WATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
- NM — NOT MEASURED

NOTES:

[254] – MDE Groundwater Clean-Up Standard

MDE – Maryland Department of the Environment

Boldface – results exceed MDE groundwater clean-up standards

MTBE – methyl tertiary butyl ether

TPH-GRO – total petroleum hydrocarbons – gasoline range organics

TPH-DRO – total petroleum hydrocarbons – diesle range organics

All results listed in µg/L

0 50 100
SCALE: FEET

MDE Groundwater Standards	
Benzene	5
Toluene	1000
Ethylbenzene	700
Total Xylenes	10000
MTBE	20
Naphthalene	0.65
TPH-GRO	47
TPH-DRO	47

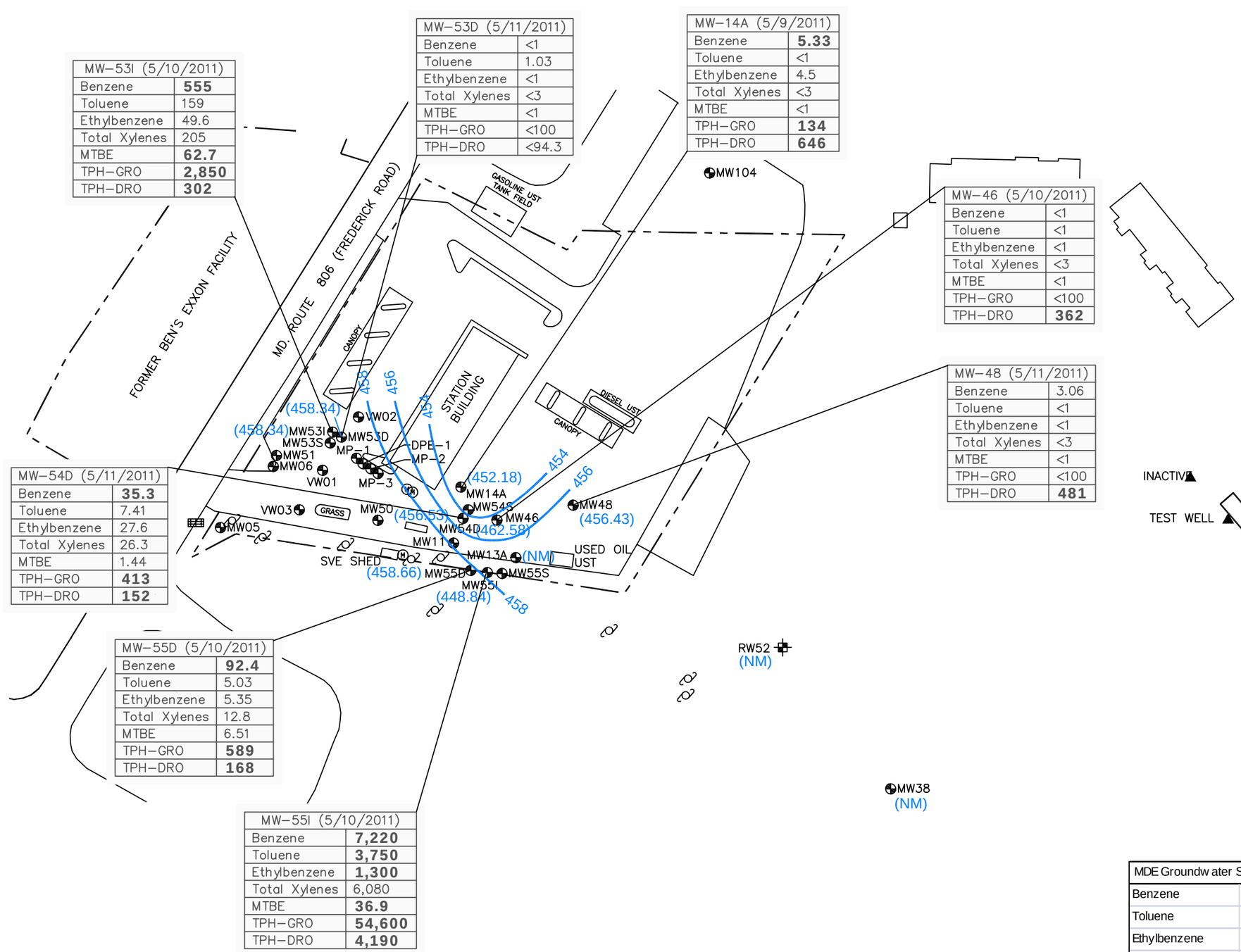
FORMER EXXON FACILITY # 25553
143 FREDERICK RD
THURMONT, MD.

SHALLOW GROUNDWATER ELEVATION CONTOURS AND ANALYTICAL DATA 9 MAY 2011

ARCADIS

FIGURE
3

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=REF* PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 8/4/2011 5:12 PM BY: GOFORTH, JOHN
G:\ENVCAD\BALTIMORE\ACT\B0085851\0014\00002\Frederick Site May-2011.dwg LAYOUT: 3 SAVED: 6/17/2011 3:56 PM ACADVER: 18.0S (LMS TECH)



MW-53I (5/10/2011)	
Benzene	**555**
Toluene	159
Ethylbenzene	49.6
Total Xylenes	205
MTBE	**62.7**
TPH-GRO	**2,850**
TPH-DRO	**302**

MW-53D (5/11/2011)	
Benzene	<1
Toluene	1.03
Ethylbenzene	<1
Total Xylenes	<3
MTBE	<1
TPH-GRO	<100
TPH-DRO	<94.3

MW-14A (5/9/2011)	
Benzene	**5.33**
Toluene	<1
Ethylbenzene	4.5
Total Xylenes	<3
MTBE	<1
TPH-GRO	**134**
TPH-DRO	**646**

MW-46 (5/10/2011)	
Benzene	<1
Toluene	<1
Ethylbenzene	<1
Total Xylenes	<3
MTBE	<1
TPH-GRO	<100
TPH-DRO	**362**

MW-48 (5/11/2011)	
Benzene	3.06
Toluene	<1
Ethylbenzene	<1
Total Xylenes	<3
MTBE	<1
TPH-GRO	<100
TPH-DRO	**481**

MW-54D (5/11/2011)	
Benzene	**35.3**
Toluene	7.41
Ethylbenzene	27.6
Total Xylenes	26.3
MTBE	1.44
TPH-GRO	**413**
TPH-DRO	**152**

MW-55D (5/10/2011)	
Benzene	**92.4**
Toluene	5.03
Ethylbenzene	5.35
Total Xylenes	12.8
MTBE	6.51
TPH-GRO	**589**
TPH-DRO	**168**

MW-55I (5/10/2011)	
Benzene	**7,220**
Toluene	**3,750**
Ethylbenzene	**1,300**
Total Xylenes	6,080
MTBE	**36.9**
TPH-GRO	**54,600**
TPH-DRO	**4,190**

N

LEGEND:

- MONITORING WELL
- RECOVERY WELL
- MUNICIPAL SUPPLY WELL
- UTILITY MANHOLE
- UTILITY POLE
- CATCH BASIN
- PROPERTY LINE
- 444 — GROUNDWATER ELEVATION CONTOUR (FEET ABOVE MEAN SEA LEVEL)
- (440.50) — GROUND WATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
- NM — NOT MEASURED

NOTES:

[254] – MDE Groundwater Clean-Up Standard

MDE – Maryland Department of the Environment

Boldface – results exceed MDE groundwater clean-up standards

MTBE – methyl tertiary butyl ether

TPH-GRO – total petroleum hydrocarbons – gasoline range organics

TPH-DRO – total petroleum hydrocarbons – diesle range organics

All results listed in µg/L

0 50 100

SCALE: FEET

MDE Groundwater Standards	
Benzene	5
Toluene	1000
Ethylbenzene	700
Total Xylenes	10000
MTBE	20
Naphthalene	0.65
TPH-GRO	47
TPH-DRO	47

FORMER EXXON FACILITY # 25553
143 FREDERICK RD
THURMONT, MD.

DEEP GROUNDWATER ELEVATION CONTOURS AND ANALYTICAL DATA 9 MAY 2011

ARCADIS

FIGURE **4**

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\BALTIMORE\ACT\B0085851\0014\00002\Frederick Site May 2011.dwg LAYOUT: 4 SAVED: 6/17/2011 3:56 PM ACADVER: 18.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 8/4/2011 5:11 PM BY: GOFORTH, JOHN

Appendix A

MDE Correspondence

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Oil Control Program, Suite 620, 1800 Washington Blvd., Baltimore MD 21230-1719
410-537-3442 • 410-537-3092 (fax) 1-800-633-6101

MDE

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

SEP 30 2009

Mr. Mike Geci
Project Manager
ExxonMobil Corporation
P.O. Box 221436
Chantilly VA 20153

RE: APPROVAL FOR ADDITIONAL ASSESSMENT
Case No. 1989-0923-FR
Exxon Service Station No. 2-5553
143 Frederick Road, Thurmont
Frederick County, Maryland
Facility I.D. No. 7446

RECEIVED
OCT 01 2009
BY: Upapsun

Dear Mr. Geci:

The Oil Control Program recently completed a review of the case file, including the *Results of Borehole Geophysical Analysis and Scheduled Tasks - July 29, 2009* for the above-referenced property. In June 2009, your consultant conducted a borehole geophysical analysis of monitoring wells MW- 53D, MW-54D, and MW-55D, which was previously approved by the Oil Control Program. The Department understands that the approved trial shutdown of RW-52 for two quarters was tentatively scheduled to begin on August 6, 2009 and that a step-drawdown pilot test would then be conducted on RW-52. As stated in the *Approval for Additional Assessment - May 7, 2009*, the existing monitoring well network is sufficient. The Department does not approve the installation of three additional monitoring well clusters at this time. Your consultant requested an extension until December 31, 2009 to submit an updated Site Conceptual Model (SCM). The Department hereby approves the *Results of Borehole Geophysical Analysis and Scheduled Tasks - July 29, 2009* contingent upon the following modifications:

Monitoring Well Installation and Abandonment:

1. The Department understands that monitoring wells MW-23, MW-47, and MW-49 have been abandoned as previously approved in accordance with Code of Maryland Regulations (COMAR) 26.04.04.11. Please provide copies of the well abandonment reports to both the Oil Control Program (Attn: Rob Hill) and the Water Management Administration (Attn: Denise Swatzbaugh).

Revised Site Conceptual Model:

2. The Department hereby approves the extension to submit a revised SCM until December 31, 2009.

Future Reporting:

3. Continue to submit *Remedial Action Progress Reports* to the Oil Control Program on quarterly basis (**every three months**). When submitting sampling results, include detailed data summary tables and scaled site maps showing actual sampling locations. In the discussion of supplemental sampling events, include details on sampling procedures and describe analytical results in terms of media sampled. Reports must also include groundwater contour maps, site-specific detailed hydrogeology, groundwater flow, product thickness, and dissolved concentration maps, cumulative amount of LPH recovered, and qualitative and/or quantitative discussions.

Please ensure that at least three hard copies and one copy on a compact disc (CD) of all future reports are submitted to the Oil Control Program to the attention of the case manager at the above letterhead address. Include the case number (9-0923-FR) on all documents submitted for this site

Failure to perform the advised actions could result in enforcement proceedings, including the issuance of civil penalties and other legal sanctions. We encourage you to continue working with the Oil Control Program and the Allegany County Health Department to ensure the protection of State groundwater.

Notify the case manager at least five (5) working days prior to conducting any scheduled field activities. If you have any questions, please contact the case manager, Mr. Rob Hill, at 301-665-2857 (email: rhill@mde.state.md.us) or Regional Supervisor Susan Bull at 410-537-3499 (email: sbull@mde.state.md.us).

Sincerely,

FOR

Susan R. Bull, Western Region Section Head
Remediation and State-Lead Division
Oil Control Program

RJH/nln

cc: Ms. Leslie D. Schulties (Kleinfelder)
Mr. George Keller (Frederick County Health Department)
Mr. Christopher H. Ralston
Mr. Herbert M. Meade
Mr. Horacio Tablada

MDE

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Oil Control Program, Suite 620, 1800 Washington Blvd., Baltimore MD 21230-1719
410-537-3442 • 410-537-3092 (fax) 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

May 7, 2009

Mr. Mike Geci, Project Manager
ExxonMobil Corporation
P.O. Box 221436
Chantilly VA 20153

RE: APPROVAL FOR ADDITIONAL ASSESSMENT
Case No. 1989-0923-FR
Exxon Service Station No. 2-5553
143 Frederick Road, Thurmont
Frederick County, Maryland
Facility I.D. No. 7446

RECEIVED
MAY 08 2009
BY: lpapson

Dear Mr. Geci:

The Oil Control Program recently completed a review of the *Work Plan for Additional Assessment - October 14, 2008,* the *Second Half 2008 Remedial Action Progress Report - January 30, 2009*, and the *Well Survey - March 27, 2009* for the above-referenced property. Groundwater samples collected in October 2008 detected the continuing presence of benzene at 5,600 parts per billion (ppb) and methyl tertiary-butyl ether (MTBE) at 866 ppb. A dual phase extraction (DPE) system continues to operate on monitoring well MW-52, originally installed to protect Thurmont Town Well #5, and a soil vapor extraction (SVE) system continues to operate on MW-14A and MW-51.

The *Work Plan for Additional Assessment - October 14, 2008* proposes: conducting down hole geophysics of wells MW-53D, MW-54D, and MW-55D; pumping recovery well RW-52 to determine its connectivity with the overburden; installation of up to three additional nested well clusters; conducting a high vacuum DPE pilot test to determine the potential effectiveness of DPE in the overburden and the abandonment of three monitoring wells (MW-23, MW-48 and MW-49).

Please be advised that the Department was notified by the Town of Thurmont that Town Well #5 collapsed during an attempt to redevelop and was never brought on line. The Department understands that a total of 18 residential and 3 commercial wells are within a half-mile radius of this site. The Department also understands this site is located in a designated well head protection area.

The highest concentrations of dissolved hydrocarbons appear to be localized to the front of the building in MW-53S, MW-53I, and MW-14A. Based on our review, the Department has determined that future remedial activities should concentrate in the area of residual contamination. The Department conditionally approves the *Work Plan for Additional Assessment - October 14, 2008* contingent upon the following modifications:

Interim Corrective Actions and Future Groundwater Monitoring:

1. The Department hereby approves conducting a bore hole geophysical analysis of monitoring wells MW-53D, MW-54D, and MW-55D.

2. The Department hereby approves conducting the proposed high vacuum DPE pilot test in conjunction with an SVE sparge pilot test concentrated within the remaining source zone and adjacent to the station building (in the vicinity of MW-53S, MW-53I, and MW-14A), following receipt and review of the geophysical analysis of monitoring wells MW-53D, MW-54D, and MW-55D.

3. The Department recommends trial shutdown of pumping on monitoring well MW-52. For a period of **two quarters** MW-52 must be gauged and sampled. All samples collected must be analyzed for full-suite volatile organic compounds (VOCs), including fuel oxygenates, using EPA Method 8260B and for total petroleum hydrocarbons/diesel and gasoline-range organics (TPH-DRO and TPH-GRO) using EPA Method 8015B.

Monitoring Well Installation and Abandonment

4. Although the current monitoring well network presently on-site is sufficient, the Department reserves the right to re-evaluate this position upon receipt of the geophysical analysis.

5. The Department hereby approves the abandonment of monitoring wells MW-23, MW-47, and MW-49. The wells must be properly abandoned in accordance with Code of Maryland Regulations (COMAR) 26.04.04.11. Please provide copies of the well abandonment reports to both the Oil Control Program (Attn: Mr. Rob Hill) and the Water Management Administration (Attn: Ms. Denise Swatzbaugh)

Revised Site Conceptual Model:

6. Update the preliminary *Site Assessment/Risk Assessment Work Plan - October 11, 2006* with an updated Site Conceptual Model (*SCM*). Please note that an *SCM* for any site investigation requires continual revision with the acquisition of new data until closure. A comprehensive and detailed *SCM* for this site must:

   (a) Evaluate current or residual source(s) of petroleum contamination;
   (b) Examine surface and subsurface features and pathways that may have influenced the transport of groundwater and contaminants, including the results of borehole geophysics and pilot testing;
   (c) Discuss the fate and transport (known and/or predicted) of contaminants; and
   (d) Propose the acquisition of supplemental data to fill in data gaps to refine the *SCM*.

   The Oil Control Program anticipates receiving a revised *SCM* no later than August 31, 2009.

Future Reporting:

7. Continue to submit *Remedial Action Progress Reports* to the Oil Control Program on a quarterly basis (**every three months**). When submitting sampling results, include detailed data summary tables and scaled site maps showing actual sampling locations. In the discussion of supplemental sampling events, include details on sampling procedures and describe analytical results in terms of media sampled. Reports must also include groundwater contour maps, site-specific detailed hydrogeology, groundwater flow, product thickness and dissolved concentration maps, cumulative amount of LPH recovered, and qualitative and/or quantitative discussions.

Please ensure that at least three copies of future reports are submitted to the Oil Control Program to the attention of the case manager at the above letterhead address. Include the case number (9-0923-FR) on all documents submitted for this site. If you have any questions, please contact the case manager, Mr. Rob Hill, at 301-665-2857 (email: rhill@mde.state.md.us) or me at 410-537-3488 (email: sbull@mde.state.md.us).

Sincerely,

Susan R. Bull, Western Region Section Head
Remediation and State-Lead Division
Oil Control Program

RJH/nln

cc: Ms. Leslie D. Schulties (Kleinfelder)
Mr. George Keller (Frederick County Health Department)
Mr. Christopher H. Ralston
Mr. Herbert M. Meade
Mr. Horacio Tablada

Appendix B

Soil Quality Information

TABLE 2

HISTORIC SOIL ANALYTICAL DATA

FORMER EXXON FACILITY #25553
143 FREDERICK ROAD
THURMONT, MARYLAND

SAMPLE #	COLLECTION YEAR	COLLECTION DEPTH (feet)	BENZENE (µg/kg)	TOLUENE (µg/kg)	ETHYL-BENZENE (µg/kg)	TOTAL XYLENES (µg/kg)	TOTAL BTEX (µg/kg)	MtBE (µg/kg)	TPH (mg/kg)	TPH-GRO (µg/kg)	TPH-DRO (µg/kg)	Acetone (µg/kg)	2-Butanone (MEK) (µg/kg)	n-Butylbenzene (µg/kg)	sec-Butylbenzene (µg/kg)	Isopropyl benzene (µg/kg)	p-Isopropyltoluene (µg/kg)	Napthalene (µg/kg)	n-Propyl benzene (µg/kg)	1,2,4-Tri methylbenzene (µg/kg)	1,3,5-Tri methylbenzene (µg/kg)
UST Field	1989	Unknown	ND	ND	ND	ND	BRL	NS	69	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-53	2006	3-5	10.1	11	2.7	21.4	45.2	ND	NS	35.2	48	83.9	ND	ND	ND	1.9	ND	ND	2.6	4.5	3.3
MW-53	2006	18-20	39.4	2,450	3,470	17,200	23,159	ND	NS	424	89	ND	ND	1,490	488	964	361	4,190	3,390	22,700	6,510
MW-54	2006	5-7	2	17.2	5.1	19.3	43.6	ND	NS	ND	NA	29.5	ND	ND	ND	ND	ND	ND	1.1	4.5	1.7
MW-54	2006	15-17	ND	ND	8.3	30.5	38.8	ND	NS	37.1	NA	ND	ND	120	32.1	23.1	24.9	6	128	2,070	299
MW-54	2006	25-27	51.8	1,090	1,870	966	3,978	ND	NS	396	NA	2,230	1,100	795	220	494	158	485	1,760	1,140	331
MW-55	2006	13-15	ND	ND	153	779	932	ND	NS	487	NA	ND	ND	417	61.8	117	63.9	749	422	2,790	948
MW-55	2006	21-23	6,510	81,700	35,700	163,000	286,910	ND	NS	2,020	NA	ND	ND	4,750	1,630	5,010	1,170	11,400	17,100	110,000	32,700
MW-55	2006	35-37	160	790	242,000	90,200	333,150	ND	NS	2,550	NA	ND	ND	6,500	2,270	6,710	1,700	14,200	23,900	157,000	46,600
SB-56	2006	13-15	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DPE-1	2009	19-21	17,700	192,000	74,300	325,000	609,000	290	NS	2,400	296	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

MW-53 formerly known as MW-101
MW-54 formerly known as MW-102
MW-55 formerly known as MW-103
SB-56 formerly known as MW-104
NS - Not sampled for that constituent
BTEX = Benzene, Toluene, Ethylbenzene and Xylenes
MTBE - Methyl Tert-Butyl Ether
TPH = Total Petroleum Hydrocarbons
TPH-GRO = Total Petroleum Hydrocarbons - Gasoline Range Organics
TPH-DRO = Total Petroleum Hydrocarbons - Diesel Range Organics
Concentrations expressed in parts per billion (ppb)
Results reported on a dry weight basis.

KLEINFELDER
Bright People. Right Solutions.

1340 Charwood Road, Suite I
Hanover, MD 21076
(410) 850-0404

BORING LOG

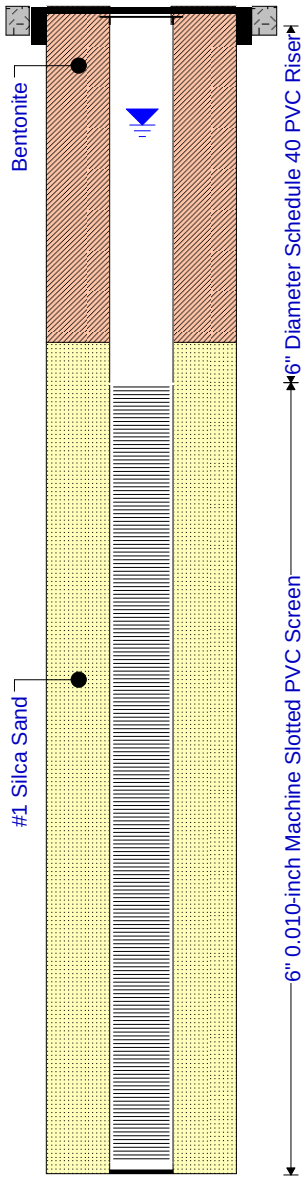
Boring No. DPE-1

Project Name: Former Exxon Facility # 25553
Site Location: 140 & 143 Frederick Rd, Thurmont, MD
Kleinfelder Project No: 100736
Client: ExxonMobil
Drilling Company: Eichelberger
Driller: T. Coleman
Drill Rig Type: Schramm 450
Drilling Method: Air Rotary
Sampling Method: Split spoon/Direct Push

Start Date: 10-20-09
End Date: 10-27-09
Total Hole Depth: 29.5 feet
Hole Diameter: 12 inches
Depth to Bedrock: Not encountered
Surface Elevation: 0
Water Level (Initial): 3 feet
Water Level (Static): 3 feet
Logged By (Geol.): M. Bauer

Permit No.: NA
License No.: NA
Checked By:
Notes:

SUBSURFACE PROFILE			SAMPLE			
Depth (feet)	Graphic Log	Soil/Geologic Description (Unified Soil Classification System)	PID (ppm)	Recovery (in)	Well Construction	Depth (feet)
		Ground Surface				
0		Concrete				0
1		***Fill*** Concrete, brick, rock, sand, clay, crushed stone Water entering boring at 3 feet				1
2						2
3						3
4		***Fill*** Large cobbles/boulders and concrete				4
5		Silt, gravel, sand, cobbles, boulders *Logged from cuttings				5
6						6
7						7
8						8
9						9
10						10
11						11
12						12
13						13
14		***MH*** SILT, some sand and gravel, brown, wet, firm	657	9		14
15						15
16						16
17						17
18						18
19		***ML*** SILT, some sand and clay, trace fine gravel, brown, wet hard	1542	17		19
20						20
21		Silt and clay, some gravel, cobbles, brown, wet *Logged from cuttings				21
22						22
23						23
24						24
25						25
26						26
27						27
28						28
29						29
30		End of Borehole				30



PID - Photoionization Detector
NA - Not Applicable
NS - Not Sampled
NM - Not Measured
MU - Meter Units
PP - Pocket Penetrometer Reading (tons/sq. foot)

KLEINFELDER
Bright People. Right Solutions.

1340 Charwood Road, Suite I
Hanover, MD 21076
(410) 850-0404

BORING LOG

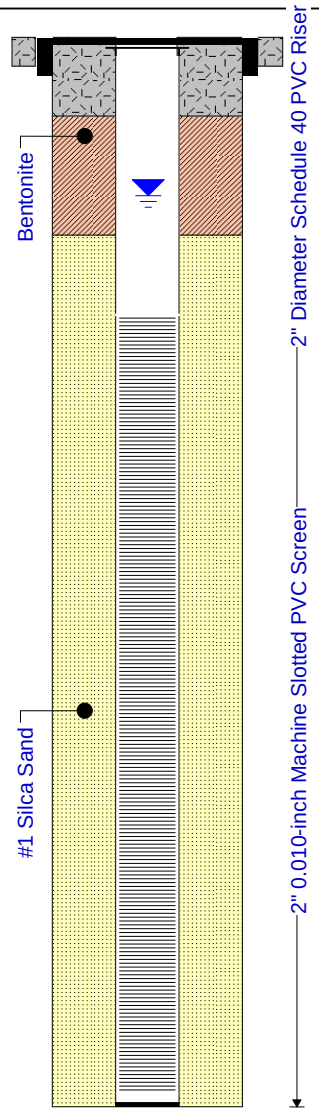
Boring No. MP-1

Project Name: Former Exxon Facility # 25553
Site Location: 140 & 143 Frederick Rd, Thurmont, MD
Kleinfelder Project No: 100736
Client: ExxonMobil
Drilling Company: Eichelberger
Driller: S. Taylor
Drill Rig Type: Schramm 450
Drilling Method: Hollow Stem Auger
Sampling Method: NA

Start Date: 10-20-09
End Date: 10-22-09
Total Hole Depth: 27 feet
Hole Diameter: 6 inches
Depth to Bedrock: Not encountered
Surface Elevation: NA
Water Level (Initial): 4 feet
Water Level (Static): 4 feet
Logged By (Geol.): M. Bauer

Permit No.: NA
License No.: NA
Checked By:
Notes:

SUBSURFACE PROFILE			SAMPLE			
Depth (feet)	Graphic Log	Soil/Geologic Description (Unified Soil Classification System)	PID (ppm)	Recovery (in)	Well Construction	Depth (feet)
0		Ground Surface				0
1		Concrete				1
2		***Fill*** Rocks, concrete, sand, clay Water in the fill				2
3						3
4		***Fill*** Concrete and boulders				4
5		***ML*** Silty CLAY, cobbles, and boulders, wet				5
6						6
7						7
8						8
9						9
10						10
11						11
12						12
13						13
14						14
15						15
16						16
17						17
18						18
19						19
20						20
21						21
22						22
23						23
24						24
25						25
26						26
27		End of Borehole				27
28						28
29						29
30						30



PID - Photoionization Detector
NA - Not Applicable
NS - Not Sampled
NM - Not Measured
MU - Meter Units
PP - Pocket Penetrometer Reading (tons/sq. foot)

KLEINFELDER
Bright People. Right Solutions.

1340 Charwood Road, Suite I
Hanover, MD 21076
(410) 850-0404

BORING LOG

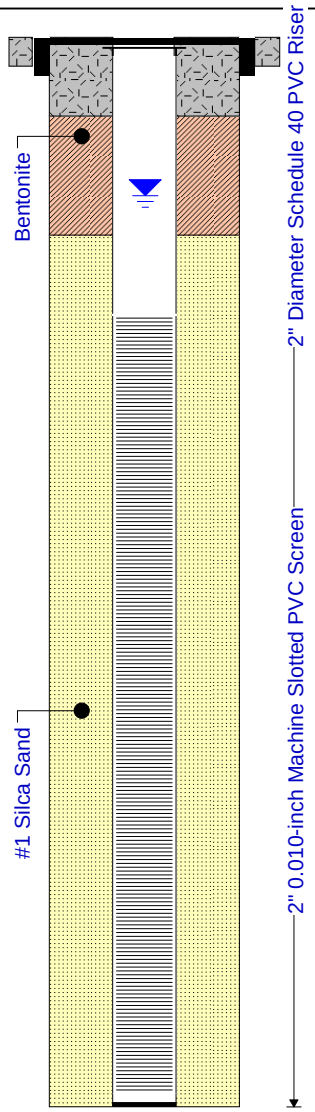
Boring No. MP-2

Project Name: Former Exxon Facility # 25553
Site Location: 140 & 143 Frederick Rd, Thurmont, MD
Kleinfelder Project No: 100736
Client: ExxonMobil
Drilling Company: Eichelberger
Driller: A. Coleman
Drill Rig Type: Schramm 450
Drilling Method: Air Hammer
Sampling Method: NA

Start Date: 10-20-09
End Date: 10-26-09
Total Hole Depth: 27 feet
Hole Diameter: 6 inches
Depth to Bedrock: Not encountered
Surface Elevation: NA
Water Level (Initial): 4 feet
Water Level (Static): 9 feet
Logged By (Geol.): M. Bauer

Permit No.:
License No.: NA
Checked By:
Notes:

SUBSURFACE PROFILE			SAMPLE			
Depth (feet)	Graphic Log	Soil/Geologic Description (Unified Soil Classification System)	PID (ppm)	Recovery (in)	Well Construction	Depth (feet)
0		Ground Surface				0
		Concrete				
1		***Fill***				1
2		Crushed stone, boulders, concrete, brick, gravel, sand, clay				2
3		Water into boring at 4 feet				3
4						4
5						5
6						6
7		***ML***				7
8		Clayey SILT, cobbles, and boulders, wet				8
9		*Logged from cuttings				9
10						10
11						11
12						12
13						13
14						14
15						15
16						16
17						17
18						18
19						19
20						20
21						21
22						22
23						23
24						24
25						25
26						26
27		End of Borehole				27
28						28
29						29
30						30



PID - Photoionization Detector
NA - Not Applicable
NS - Not Sampled
NM - Not Measured
MU - Meter Units
PP - Pocket Penetrometer Reading (tons/sq. foot)

KLEINFELDER
Bright People. Right Solutions.

1340 Charwood Road, Suite I
Hanover, MD 21076
(410) 850-0404

BORING LOG

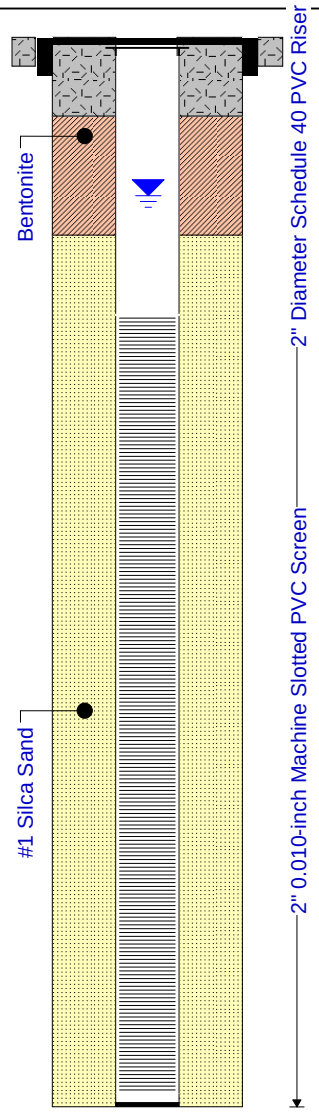
Boring No. MP-3

Project Name: Former Exxon Facility # 25553
Site Location: 140 & 143 Frederick Rd, Thurmont, MD
Kleinfelder Project No: 100736
Client: ExxonMobil
Drilling Company: Eichelberger
Driller: S. Taylor
Drill Rig Type: CME 75
Drilling Method: Hollow Stem Auger
Sampling Method: NA

Start Date: 10-21-09
End Date: 10-22-09
Total Hole Depth: 27 feet
Hole Diameter: 6 inches
Depth to Bedrock: Not encountered
Surface Elevation: NA
Water Level (Initial): 4 feet
Water Level (Static): 4 feet
Logged By (Geol.): M. Bauer

Permit No.: NA
License No.: NA
Checked By:
Notes:

SUBSURFACE PROFILE			SAMPLE			
Depth (feet)	Graphic Log	Soil/Geologic Description (Unified Soil Classification System)	PID (ppm)	Recovery (in)	Well Construction	Depth (feet)
0		Ground Surface				0
1		Concrete				1
2		***Fill*** Crushed stone, cobbles, sand, and clay Water into boring at 4 feet				2
3						3
4						4
5						5
6						6
7		***ML*** Clayey SILT, some gravel, dark brown, moist/wet *Logged from cuttings				7
8						8
9						9
10						10
11						11
12						12
13						13
14						14
15						15
16						16
17						17
18						18
19						19
20						20
21						21
22						22
23						23
24						24
25						25
26						26
27		End of Borehole				27
28						28
29						29
30						30



PID - Photoionization Detector
NA - Not Applicable
NS - Not Sampled
NM - Not Measured
MU - Meter Units
PP - Pocket Penetrometer Reading (tons/sq. foot)

LITHOLOGY / NESTED WELL COMPLETION LOG - MW-53 S. I, & D

Groundwater & Environmental Services, Inc.

PROJECT ID - FORMER EXXON SERVICE STATION No. 2-5553, 143 FREDERICK RD., THURMONT, MD

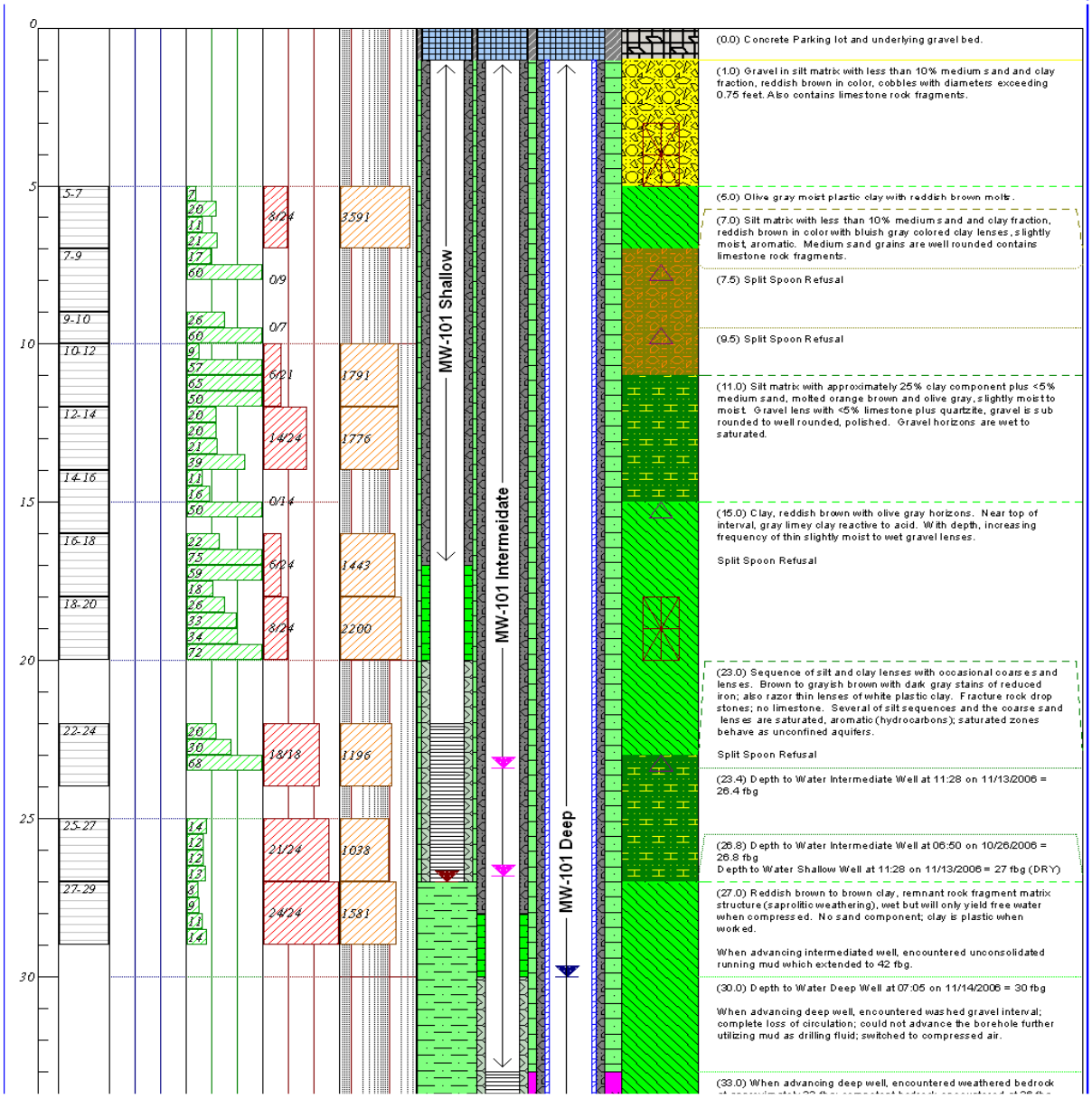
GES JOB #: 0401417
START DATE: Oct-25-2006
COMPLETION DATE: Nov-11-2006
GES GEOLOGIST: William Bohrer & Brian McGrath
DRILLING COMPANY: SGS Environmental Services, Inc.
DRILLER: Wes Eichfeld
DRILL RIG: Foremost B-90
FIELD SCREENING METHOD: Photoionization Detector (PID)

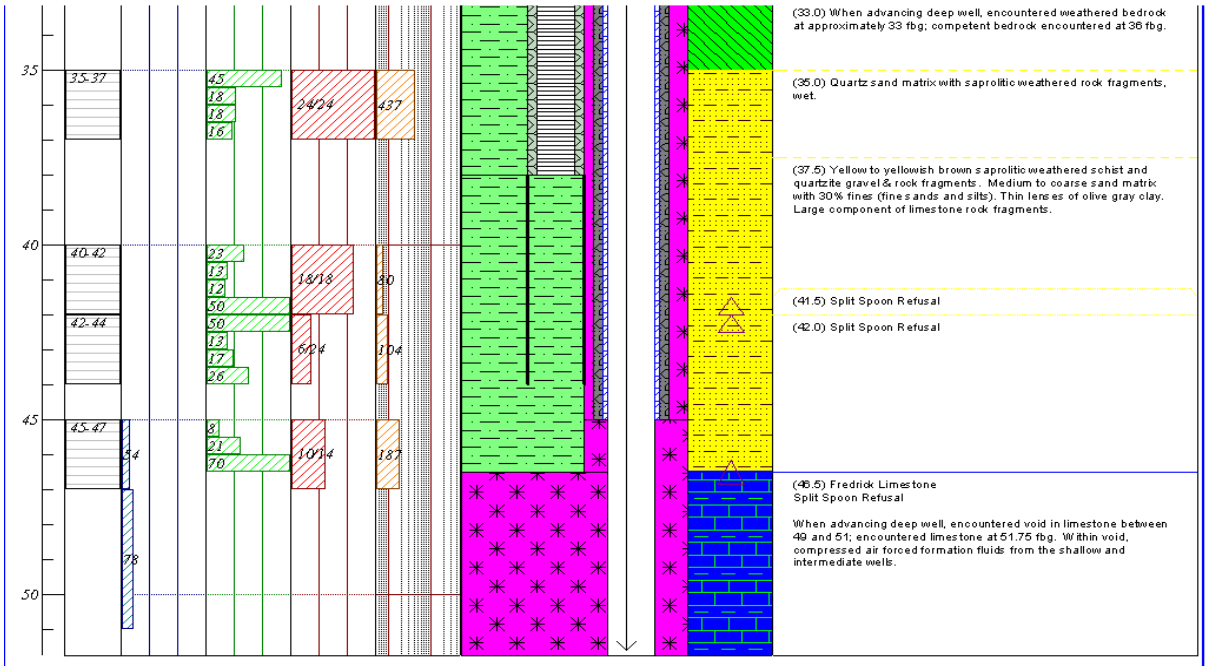
DEEPEST ADVANCE (fbg): 51.75
SURFACE ELEV (NAVD).: 469.09
NUMBER OF COMPLETIONS: 3
NESTED WELL ID(s): S. I, & D
TOP OF BEDROCK (fbg): 36
SPLIT SPOON LENGTH (inches): 24
SPLIT SPOON DIAMETER (inches): 3.0

MONTIORING WELL COMPLETION PARAMETERS

SHALLOW WELL	INTERMEDIATE WELL	DEEP WELL
TOTAL DEPTH (fbg): 27	TOTAL DEPTH (fbg): 44	TOTAL DEPTH (fbg): 51.75
SET SCREEN DEPTH (fbg): 27	SET SCREEN DEPTH (fbg): 38	BOREHOLE DIAMETER (inches): 8.25
SCREEN LENGTH (ft): 5	SCREEN LENGTH (ft) 5	COMPLETION CASING ID (inches): 6
SCREEN SLOT SIZE: 20	SCREEN SLOT SIZE: 20	SET CASING DEPTH: (fbg): 45
SCREEN DIAMETER (inches): 4	SCREEN DIAMETER (inches): 4	TOP OF GROUTED ANNULUS (fbg): 1
BOREHOLE DIAMETER (inches): 6.25	BOREHOLE DIAMETER (inches): 6.25	
TOP OF NUMBER 2 SAND (fbg): 20	TOP OF NUMBER 2 SAND (fbg): 30	
TOP OF BENTONITE SEAL (fbg): 17	TOP OF BENTONITE SEAL (fbg): 28	

Depth (fbg)	Sample Interval	Drill Rate (seconds) 0 500	Blows (per 0.5 ft) 0 50	Recovery (in/in) 0 24	Total Organic Vapor (ppm) 50 5000	Nested Well Construction	Lithology	Lithologic Description





EXPLANATION OF LITHOLOGY

Concrete Apron (Concrete & Crushed Rock Foundation)

Lawn

Gravel lens comprised of coarse to medium angular to sub rounded gravel (quartzite & schist derived from adjacent highlands), with <10% medium sand plus trace silt.

Lens of bimodal sand comprised of well rounded fine quartz with <20% sub angular medium sand and trace silts and/or clay.

Silt, 10% medium sand and clay plus trase limestone fragments.

Lens of clay and silts, moderate stratification, may include thin lenses of sand and/or gravel (storm deposit).

Clay

Fracture

Frederick Limestone - Upper Cambrian carbonates dominated by monotonously thick sequences of basin facies: Blue, graded, slabby, thin-bedded limestone and minor shale, interbedded with massive peloidal grainstones and beds of breccia up to 480 feet thick.

EXPLANATION OF GENERAL SYMBOLS

Water Table

Possible Water Zone

Split Spoon Refusal

Depth of Laboratory Soil Sample

EXPLANATION OF WELL CONSTRUCTION SYMBOLS

Road Box

Surface Casing

Overburden

Bentonite Seal

Grout

Screen

Bedrock

Well Pack

Comments

Na = Not Available, ID = Inside Diameter, fbg = feet blow grade, PID = Photoionization detector calibrated to 100 parts per million (ppm) isobutyl-benzene. Blows are equivalent to 140 pound hammer dropped 30 inches.
Overburden completed with 4-inch ID Schedule 40 polyvinyl-chloride (PVC) riser and No. 20 slot screen. Sand pack of No. 2 washed sand. NAVD = North American Vertical Datum (ft), TOC = Top of Casing (ft).
Four boreholes were advanced, the first one was abandoned (grouted to grade) when the auger severed at total depth of 49
The location is characterized by a steeply sloping bedrock interface which rises to the NE from 49 fbg to 36 fbg.

LITHOLOGY / NESTED WELL COMPLETION LOG - MW-54 S & D

Groundwater & Environmental Services, Inc.

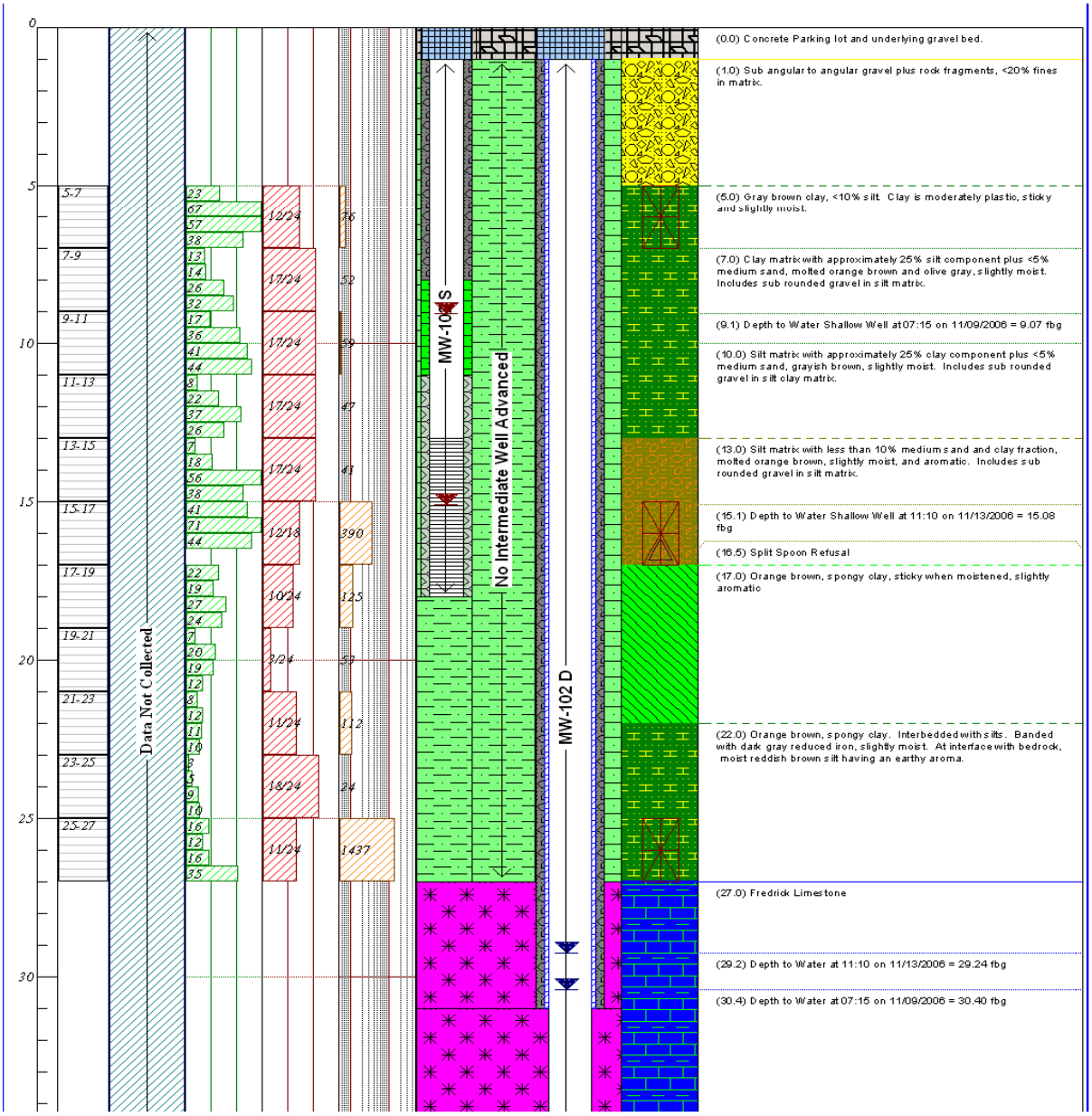
PROJECT ID - FORMER EXXON SERVICE STATION No. 2-5553, 143 FREDERICK RD., THURMONT, MD

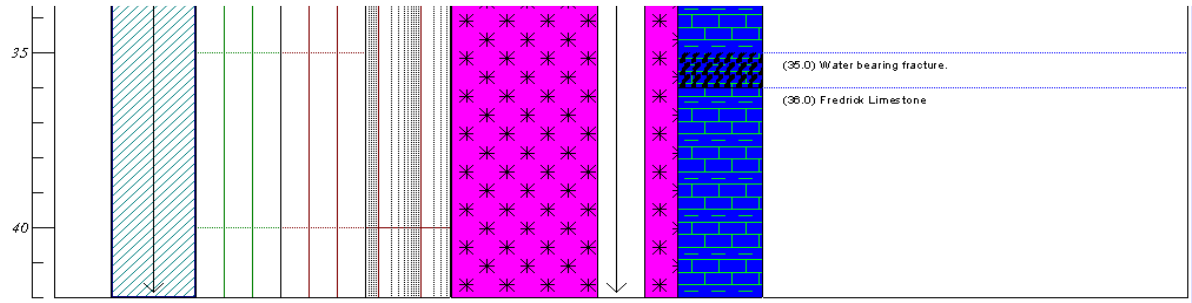
GES JOB #: 0401417
START DATE: Nov-06-2006
COMPLETION DATE: Nov-07-2006
GES GEOLOGIST: William Bohrer & Brian McGrath
DRILLING COMPANY: SGS Environmental Services, Inc.
DRILLER: Wes Eichfeld
DRILL RIG: Foremost B-90
FIELD SCREENING METHOD: Photoionization Detector (PID)

DEEPEST ADVANCE (fbg): 42
SURFACE ELEV (NAVD).: 467.84
NUMBER OF COMPLETIONS: 2
NESTED WELL ID(s): S & D
TOP OF BEDROCK (fbg): 27
SPLIT SPOON LENGTH (inches): 24
SPLIT SPOON DIAMETER (inches): 3.0

MONTIORING WELL COMPLETION PARAMETERS

SHALLOW WELL	INTERMEDIATE WELL	DEEP WELL
TOTAL DEPTH (fbg): 18	TOTAL DEPTH (fbg): NA	TOTAL DEPTH (fbg): 42
SET SCREEN DEPTH (fbg): 18	SET SCREEN DEPTH (fbg): NA	BOREHOLE DIAMETER (inches): 42
SCREEN LENGTH (ft): 5	SCREEN LENGTH (ft) NA	COMPLETION CASING ID (inches): 6
SCREEN SLOT SIZE: 20	SCREEN SLOT SIZE: NA	SET CASING DEPTH: (fbg): 31
SCREEN DIAMETER (inches): 4	SCREEN DIAMETER (inches): NA	TOP OF GROUTED ANNULUS (fbg): 1
BOREHOLE DIAMETER (inches): 8.75	BOREHOLE DIAMETER (inches): NA	
TOP OF NUMBER 2 SAND (fbg): 11	TOP OF NUMBER 2 SAND (fbg): NA	
TOP OF BENTONITE SEAL (fbg): 8	TOP OF BENTONITE SEAL (fbg): NA	





EXPLANATION OF LITHOLOGY

Concrete Apron (Concrete & Crushed Rock Foundation)

Lawn

Gravel lens comprised of coarse to medium angular to sub rounded gravel (quartzite & schist derived from adjacent highlands), with <10% medium sand plus trace silt.

Lens of bimodal sand comprised of well rounded fine quartz with <20% sub angular medium sand and trace silts and/or clay.

Silt, 10% medium sand and clay plus trase limestone fragments.

Lens of clay and silts, moderate stratification, may include thin lenses of sand and/or gravel (storm deposit).

Clay

Fracture

Frederick Limestone - Upper Cambrian carbonates dominated by monotonously thick sequences of basin facies: Blue, graded, slabby, thin-bedded limestone and minor shale, interbedded with massive peloidal grainstones and beds of breccia up to 480 feet thick.

EXPLANATION OF GENERAL SYMBOLS

Water Table

Possible Water Zone

Split Spoon Refusal

Depth of Laboratory Soil Sample

EXPLANATION OF WELL CONSTRUCTION SYMBOLS

Road Box

Surface Casing

Overburden

Bentonite Seal

Grout

Screen

Bedrock

Well Pack

Comments

Na = Not Available, ID = Inside Diameter, fbg = feet blow grade, PID = Photoionization detector calibrated to 100 parts per million (ppm) isobutyl-benzene. Blows are equivalent to 140 pound hammer dropped 30 inches.
Overburden completed with 4-inch ID Schedule 40 polyvinyl-chloride (PVC) riser and No. 20 slot screen. Sand pack of No. 2 washed sand. NAVD = North American Vertical Datum (ft), TOC = Top of Casing (ft).
All completions included grout to grade above bentonite seal.

LITHOLOGY / NESTED WELL COMPLETION LOG - MW-55 S, I, & D

Groundwater & Environmental Services, Inc.

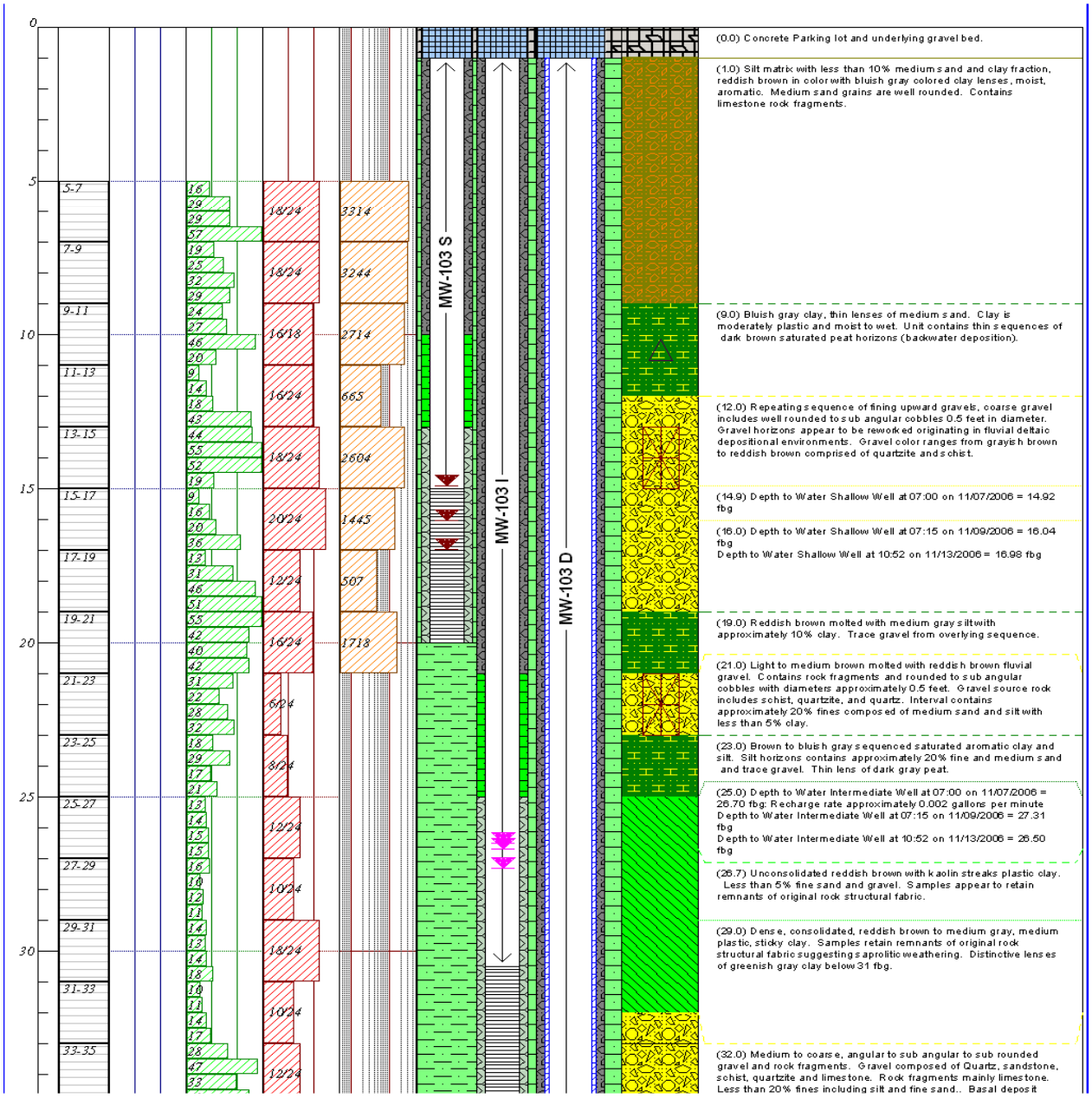
PROJECT ID - FORMER EXXON SERVICE STATION No. 2-5553, 143 FREDERICK RD., THURMONT, MD

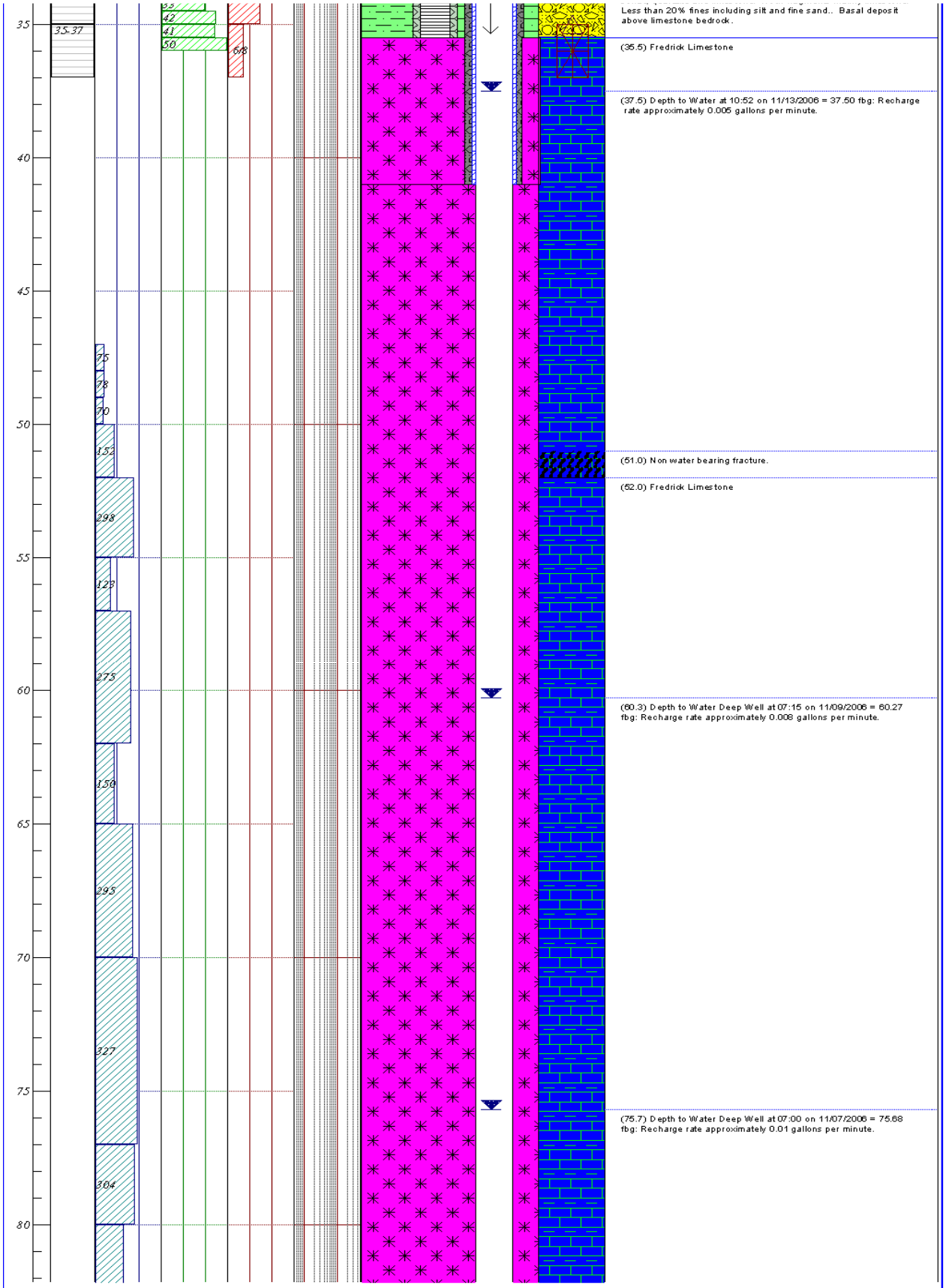
GES JOB #: 0401417
START DATE: Oct-27-2006
COMPLETION DATE: Nov-03-2006
GES GEOLOGIST: William Bohrer & Brian McGrath
DRILLING COMPANY: SGS Environmental Services, Inc.
DRILLER: Wes Eichfeld
DRILL RIG: Foremost B-90
FIELD SCREENING METHOD: Photoionization Detector (PID)

DEEPEST ADVANCE (fbg): 142
SURFACE ELEV (NAVD).: 466.24
NUMBER OF COMPLETIONS: 3
NESTED WELL ID(s): S, I, & D
TOP OF BEDROCK (fbg): 35.5
SPLIT SPOON LENGTH (inches): 24
SPLIT SPOON DIAMETER (inches): 3.0

MONTIORING WELL COMPLETION PARAMETERS

SHALLOW WELL	INTERMEDIATE WELL	DEEP WELL
TOTAL DEPTH (fbg): 20	TOTAL DEPTH (fbg): 35.5	TOTAL DEPTH (fbg): 142
SET SCREEN DEPTH (fbg): 20	SET SCREEN DEPTH (fbg): 35.5	BOREHOLE DIAMETER (inches): 8.25
SCREEN LENGTH (ft): 5	SCREEN LENGTH (ft) 5	COMPLETION CASING ID (inches): 6
SCREEN SLOT SIZE: 20	SCREEN SLOT SIZE: 20	SET CASING DEPTH: (fbg): 41
SCREEN DIAMETER (inches): 4	SCREEN DIAMETER (inches): 4	TOP OF GROUTED ANNULUS (fbg): 2
BOREHOLE DIAMETER (inches): 6.25	BOREHOLE DIAMETER (inches): 6.25	
TOP OF NUMBER 2 SAND (fbg): 13	TOP OF NUMBER 2 SAND (fbg): 25	
TOP OF BENTONITE SEAL (fbg): 10	TOP OF BENTONITE SEAL (fbg): 21	




35
40
45
50
55
60
65
70
75
80
35-37
42
41
50
6/8
75
78
70
152
298
129
275
150
295
327
304
Less than 20% fines including silt and fine sand.. Basal deposit above limestone bedrock.
(35.5) Fredrick Limestone
(37.5) Depth to Water at 10:52 on 11/13/2006 = 37.50 fbg: Recharge rate approximately 0.005 gallons per minute.
(51.0) Non water bearing fracture.
(52.0) Fredrick Limestone
(60.3) Depth to Water Deep Well at 07:15 on 11/09/2006 = 60.27 fbg: Recharge rate approximately 0.008 gallons per minute.
(75.7) Depth to Water Deep Well at 07:00 on 11/07/2006 = 75.68 fbg: Recharge rate approximately 0.01 gallons per minute.

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 1 Application No. _____ Permit No. FR-73-8857

Date Drilled Sept. 19, 1983 County Frederick Use monitor

Location Rt. 15, Thurmont, MD

Owner Exxon Co., U.S.A. Address P.O. Box 5197, Baltimore, MD 21224

Drilling Method air rotary Sampling Method cuttings

Hole Diameter 6.75" Total Depth 17'

Casing:

Type PVC Diameter 4" Length 1'

Screen:

Type PVC Slot .020 Diameter 4" Length 16'

Gravel Pack Size #1 Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6" Asphalt
				6"-1' Concrete, wet right under concrete, sealed off
				1'-17' Light brown silt, little fine sand, little coarse to fine gravel
10'			20 slot well screen	8'-12' Hard
				12'-15' soft
				15'-17' fractured limestone
20'				
30'				
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 2 Application No. _____ Permit No. FR-73-8858

Date Drilled Sept. 19, 1983 County Frederick Use monitor

Location Rt. 15, Thurmont, MD

Owner Exxon co., U.S.A. Address Box 5197, Baltimore, MD 21224

Drilling Method air rotary Sampling Method cuttings

Hole Diameter 6.75" Total Depth 13'6"

Casing:

Type PVC Diameter 4" Length 1'

Screen:

Type PVC Slot 020 Diameter 4" Length 12'6"

Gravel Pack Size #1 Casing Seal Bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0"-6" Asphalt and gravel
				6"-1' Cement
				1'-2' Gray gravel, wet
				2'-14' Brown clayey silt, little coarse to fine gravel to cobbles, trace boulders Soft layers, no cobbles or boulders
			well screen	
				7'-14' Hard
10'				
20'				
30'				
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 3 Application No. _____ Permit No. PR-73-8859

Date Drilled Sept. 19, 198 County Frederick Use monitor

Location Rt. 15, Thurmont, MD

Owner Exxon Co., U.S.A. Address P.O. Box 5197, Baltimore, MD

Drilling Method air rotary Sampling Method cuttings Total Depth 35'

Hole Diameter 6.75"

Casing: Type PVC Diameter 4" Length 15'

Screen: Type PVC Slot .020 Diameter 4" Length 20'

Gravel Pack Size #1 Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6" Asphalt and gravel
				6"-35' Brown silt, little coarse to fine sand, trace+ cobbles
10'				10'-26' Trace boulders
20'			20 slot well screen	
				26'-35' soft
30'				
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 4 Application No. _____ Permit No. FR-73-8860
Date Drilled Sept. 19, 1983 County Frederick Use monitor
Location Rt. 15, Thurmont, MD
Owner Exxon Co., U.S.A. Address P.O. Box 5197, Baltimore, MD 21224
Drilling Method air rotary Sampling Method cuttings
Hole Diameter 6.75" Total Depth 35'

Casing:
Type PVC Diameter 4" Length 15'

Screen:
Type PVC Slot .020 Diameter 4" Length 20'
Gravel Pack Size #1 Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6"
				6"-27' Soft, brown clayey silt, little coarse to fine gravel, trace cobbles, trace boulders
10'				
				12'-27' Boulders
20'				
			20 Slot well screen	27'-35' Soft
30'				
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 5 Application No. _____ Permit No. FR-73-8861

Date Drilled Sept. 19, 1983 County Frederick Use monitor

Location Rt. 15, Thurmont, MD

Owner Exxon Co., U.S.A. Address P.O. Box 5197, Baltimore, MD 21224

Drilling Method air rotary Sampling Method cuttings

Hole Diameter 6.75" Total Depth 29'

Casing:

Type PVC Diameter 4" Length 11'

Screen:

Type PVC Slot .020 Diameter 4" Length 20'

Gravel Pack Size #1 Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6" Topsoil
				6"-4' Gray medium to fine sand, little silt
				4'-29' Brown medium to fine sand, little silt, little coarse to fine gravel, trace cobbles, trace boulders
10'				
			20 slot well screen	
20'				
30'				
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Drill No. 6 Application No. _____ Permit No. FR-73-8862

Date Drilled sept. 20, 1983 County Frederick Use monitor

Location Rt. 15, Thurmont, MD

Owner Exxon Co., U.S.A. Address P.O. Box 5197, Baltimore, MD 21224

Drilling Method air rotary Sampling Method cuttings

Hole Diameter 6.75" Total Depth 28'6"

Casing:

Type PVC Diameter 4" Length 18'6"

Screen:

Type PVC Slot 20 Diameter 4" Length 10'

Gravel Pack Size #1 Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6" asphalt and gravel
				6"-5' Gray medium to fine sand, little silt
				5'-28'6" Light Brown clayey silt, little coarse to fine sand, little coarse to fine gravel, trace cobbles and boulders
0'				Note: Strong gas odor
0'			well screen	
0'				
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

BORING LOG

Well No. 7 Application No. _____ Permit No. FR-73-8863

Date Drilled Sept. 20, 1983 County Frederick Use monitor

Location Rt. 15, Thurmont, MD

Owner Exxon Co., U.S.A. Address P.O. Box 5197, Baltimore, MD 21224

Drilling Method air rotary Sampling Method cuttings

Hole Diameter 6.75" Total Depth 32'

Casing:

Type PVC Diameter 4" Length 22'

Screen:

Type PVC Slot .020 Diameter 4" Length 10'

Gravel Pack Size #1 Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6" Asphalt and gravel
				6"-2' Fill
				2'-6' Brown, medium to fine sand, little silt
				6'-32' Light brown clayey silt, little coarse to fine sand, trace coarse to fine gravel, trace cobbles, trace boulders
10'				
20'				
30'			well screen	
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

RING LOG

Well No. 8 Application No. _____ Permit No. FR-73-8864

Date Drilled Sept. 20, 1983 County Frederick Use monitor

Location Rt. 15, Thurmont, MD

Owner Exxon co., U.S.A. Address P.O. BOx 5197, Baltimore, MD 21224

Drilling Method air rotary Sampling Method cuttings

Hole Diameter 6.75" Total Depth 29'

ing:

Type PVC Diameter 4" Length 21'

Screen:

Type PVC Slot .020 Diameter 4" Length 10'

Gravel Pack Size #1 Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-14' Brown clayey silt, little coarse to fine gravel, trace cobbles, trace boulders
10'				
				14'-25' Gray limestone
20'			well screen	
				25'-29' Cavern Note: Odor, much water
30'				
40'				

Handex

HANDEX CORP., P.O Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

BORING LOG

Well No. 9 Application No. _____ Permit No. FR-73-8865

Date Drilled Sept. 20, 1983 County Frederick Use monitor

Location Rt. 15, Thurmont, MD

Owner Exxon Co., U.S.A. Address P.O. Box 5197, Baltimore, MD 21224

Drilling Method air rotary Sampling Method cuttings

Hole Diameter 6.75" Total Depth 23'

Casing:

Type PVC Diameter 4" Length 15'

Screen:

Type PVC Slot .020 Diameter 4" Length 10'

Gravel Pack Size #1 Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-23' Brown clayey silt, little coarse to fine sand, little coarse to fine gravel, trace cobbles, trace boulders.
				Rock at 22'6", water on top of rock
				Note: Odor at 6'
10'				
			well screen	
20'				
30'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 10 Application No. _____ Permit No. FR-73-8866
Date Drilled Sept. 20, 1983 County Frederick Use monitor
Location Rt. 15, Thurmont, MD
Owner Exxon Co., U.S.A. Address P.O. BOX 5197, Baltimore, MD 21224
Drilling Method air rotary Sampling Method cuttings
Hole Diameter 6.75" Total Depth 31'

Casing:
Type PVC Diameter 4" Length 16'

Screen:
Type PVC Slot .020 Diameter 4" Length 15'
Gravel Pack Size #1 Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6" Asphalt and gravel
				6"-4' Gray medium to fine sand and silt
				4'-31' Brown clayey silt, little coarse to fine sand, fine gravel, trace cobbles, trace boulders
				27'-31' soft and moist
				note: gas odor
10'				
20'			20 slot well screen	
30'				
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

BORING LOG

Permit No. FR-73-8867

Well No. 11 Application No. _____ Use monitor

Date Drilled Sept. 21, 198 County Frederick

Location Rt. 15, Thurmont, MD

Owner Exxon Co., U.S.A. Address P.O. Box 5197, Baltimore, MD 21224

Drilling Method air rotary Sampling Method cuttings

Hole Diameter 6.75" Total Depth 31'

Casing:

Type PVC Diameter 4" Length 16'

Screen:

Type PVC Slot .020 Diameter 4" Length 15'

Gravel Pack Size #1 Casing Seal Bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6" Asphalt and gravel
				6"-4' Gray medium to fine sand, little silt
				4'-31' Brown clayey silt, little coarse to fine sand, little coarse to fine gravel, trace cobbles, trace boulders
				20'-31' soft note: odor
10'				
20'			20 slot well screen	
30'				
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 12 Application No. _____ Permit No. FR-73-8868

Date Drilled Sept. 21, 1983 County Frederick Use monitor

Location Rt. 15, Thurmont, MD

Owner Exxon Co., U.S.A. Address P.O. Box 5197, Baltimore, MD 21224

Drilling Method air rotary Sampling Method cuttings

Hole Diameter 6.75" Total Depth 32'

Casing: Type PVC Diameter 4" Length 17

Screen: Type PVC Slot .020 Diameter 4" Length 15

Gravel Pack Size #1 Casing Seal ~~bentonite~~

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6" Asphalt and gravel
				6"-4' Gray medium to fine sand, little silt note: odor
				4'-32' Brown clayey silt, little coarse to fine sand, little coarse to fine gravel no soft spots clean at bottom
10'				
20'			20 slot well screen	
30'				
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

BORING LOG

Well No. 13 Application No. _____ Permit No. FR-73-8869
Date Drilled Sept. 21, 1983 County Frederick Use monitor
Location Rt. 15, Thurmont, MD
Owner Exxon Co., Baltimore, MD Address P.O. Box 5197, Baltimore, MD 21224
Drilling Method air rotary Sampling Method cuttings
Hole Diameter 6.75" Total Depth 31'

Casing:
Type PVC Diameter 4" Length 18'

Screen:
Type PVC Slot .020 Diameter 4" Length 15'
Gravel Pack Size #1 Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
10'				0'-31' Brown clayey silt, little coarse to fine sand, little coarse to fine gravel 17-31' soft 27-31' gas, blew water, very soft
20'				
30'			well screen	
40'				

Handex®

Handex of Maryland, Inc., 360 Morgan Road, P.O. Box K, Odenton, Maryland 21113-0369 (301) 674-3100

FR-73-8869

BORING LOG

Well No. 13A Application No. _____ Permit No. Same
Date Drilled 7/25/90 County Frederick Use monitoring
Location Exxon Station, 143 Frederick Rd. Thurmont, Maryland
Owner Exxon Company, U.S.A. Address Houston, TX
Drilling Method air rotary Sampling Method _____
Hole Diameter 6.88" Total Depth 40'

Casing: Type PVC Schedule 40 Diameter 4" Length 5'

Screen: Type PVC Schedule 40 Slot .020" Diameter 4" Length 35'
Gravel Pack Size #1 Morie Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
			Casing	1'-6' Black fill
			Screen	6'-10' Light brown silt and sand
10'				10'-11' Hard sandstone
				11'-13' Tan silt and clay
				13'-17' Boulder
				17'-40' Brown silts with some gravel
20'				
30'				
40'				Logged By: B. Christian

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

BORING LOG

Permit No. FR-73-8870

Well No. 14 Application No. _____ Use monitor

Date Drilled Sept. 22, 1983 County Frederick

Location Rt. 15, Thurmont, MD

Owner Exxon Co., U.S.A. Address P.O. BOx 5197, Baltimore, MD 21224

Drilling Method air rotary Sampling Method cuttings

Hole Diameter 6.75" Total Depth 35'

Casing:

Type PVC Diameter 4" Length 20'

Screen:

Type PVC Slot 020 Diameter 4" Length 15'

Gravel Pack Size #1 Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6" Asphalt and gravel
				6"-16' Brown clayey silt, little coarse to fine gravel
10'				
				16'-19' soft, trace cobbles and boulders
				19'-35' Rock gray limestone slight odor
20'			20 slot well screen	
30'				

Handex®

Handex of Maryland, Inc., 360 Morgan Road, P.O. Box K Odenton, Maryland 21113-0369 (301) 674-3100

BORING LOG

Well No. 14A Application No _____ Permit No. FR-73-8870
Date Drilled 7/25/90 County Frederick Use monitoring
Location Exxon Station, 143 Frederick Rd. Thurmont, Maryland
Owner Exxon Company, U.S.A. Address Houston, TX
Drilling Method air rotary Sampling Method _____ Total Depth 35'
Hole Diameter 6.88"

Casing:
Type PVC Schedule 40 Diameter 4" Length 5'

Screen:
Type PVC Schedule 40 Slot .020" Diameter 4" Length 30'
Gravel Pack Size #1 Morie Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
			Casing	0'-6" Asphalt and gravel
				6"-16' Brown clayey silt, little coarse to fine gravel
10'				
				16'-19' Soft, trace cobbles and boulders
			Screen	19'-35' Rock gray limestone, slight odor
20'				
30'				
40'				Logged By: B. Christian

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

...NG LOG

...o. 15 Application No. _____ Permit No. FR-73-8871

...e Drilled Sept. 22, 1983 County Frederick Use monitor

...ation Rt. 15, Thurmont, MD

... Exxon Co. U.S.A. Address P.O. BOX 5197, Baltimore, MD 21224

...ing Method air rotary Sampling Method cuttimgs

...le Diameter 6.75" Total Depth 27'

...g: Diameter 4" Length 19'

...ype PVC

...reen: Slot .020 Diameter 4" Length 10'

...e PVC Casing Seal bentonite

... Pack Size #1 Geologic Formation

...atic Water Level

...RFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-17' Brown clayey silt, little coarse to fine sand, little coarse to fine gravel, trace cobbles, trace boulders
10'				
				17'-25' Red brown silty clay, trace coarse to fin sand, trace fine gravel
20'			20 slot well screen	
				25'-27' Rock Clean
30'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 16 Application No. _____ Permit No. FR-73-8872
Date Drilled Sept. 22, 1983 County Frederick Use monitor
Location Rt. 15, Thurmont, MD
Owner Exxon Co., U.S.A. Address P.O. Box 5197, Baltimore, MD 21224
Drilling Method air rotary Sampling Method cuttings
Hole Diameter 6.75" Total Depth 33'

Casing:
Type PVC Diameter 4" Length 18'

Screen:
Type PVC Slot .020 Diameter 4" Length 15'
Gravel Pack Size #1 Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6" Asphalt and gravel
				6"-33' Brown clayeyssilt, little coarse to fine sand, little coarse to fine gravel, trace cobbles, trace boulders no soft spots clean
10'				
20'				
30'			well screen	
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 17 Application No. _____ Permit No. FR-73-8873
Date Drilled Sept. 22, 1983 County Frederick Use monitor
Location Rt. 5, Thurmont, MD
Owner Exxon Co., U.S.A. Address P.O. Box 5197, Baltimore, MD 21224
Drilling Method air rotary Sampling Method cuttings
Hole Diameter 6.75" Total Depth 15'

Casing:
Type PVC Diameter 4" Length 5'

Screen:
Type PVC Slot .020 Diameter 4" Length 10'
Gravel Pack Size #1 Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-1' Asphalt and gravel
				1'-15' Brown clayey silt, little coarse to fine sand, little coarse to fine gravel, trace cobbles, trace boulders
10'			20 slot well screen	
20'				15'-18' Brown coarse to fine gravel, little silt note: blew water pull back to 15'
30'				
40'				

Handex

HANDEX CORP., P.O Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 18 Application No. _____ Permit No. FR-73-8874
Date Drilled Sept. 22, 1983 County Frederick Use monitor
Location Rt. 15, Thurmont, MD
Owner Exxon Co., U.S.A. Address P.O. BOx 5197, Baltimore, MD 21224
Drilling Method air rotary Sampling Method cuttings
Hole Diameter 6.75" Total Depth 29'

Casing:
Type PVC Diameter 4" Length 16'

Screen:
Type PVC Slot .020 Diameter 4" Length 15'
Gravel Pack Size #1 Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-15' Brown clayey silt, little coarse to fine sand, little coarse to fine gravel, trace cobbles, trace boulders
10'				
			well screen	15'-22' Gravel coarse to fine, little silt
20'				
				22'-29' Dark brown silt, wet clay soft clean
30'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Permit No. FR-73-8875

Well No. 19 Application No. _____ Use monitor

Date Drilled 10-8-83 County _____

Location Ben's Exxon, 143 Frederick Rd., Rt. 15, Thurmont, Md.

Owner Exxon co. U.S.A. Address 1270 Kuhn Rd., Boiling Springs, Pa.

Drilling Method air rotary Sampling Method cuttings

Hole Diameter 6-7/8" Total Depth 35'

Casing: Type PVC Diameter 4" Length 7'

Screen: Type PVC Slot 020 Diameter 4" Length 28'

Gravel Pack Size _____ Casing Seal bentonite

Static Water Level _____ Geologic Formation sedimentary

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-1'6" Red brown packed clay and gravel
				1'6"-4' Boulders
				4'-6' Grey-brown sandy silt and medium to coars grain gravel
				6'-8'6" Boulders, some grey-brown clayey silt and red-brown clay
10'				8'-11' Medium to coarse grain gravel, little sedimentary brown sand, some boulders
				11'-14' Boulders
				14'-27' Red-brown sand with medium to coarse grai gravel and boulders Note: Strong gas odor at 19'
20'				
			20 slot well screen	27'-29' Boulders
30'				29'-31' Soft material, very little blowing out
				31'-35' Boulders, nothing blowing out. Note: Very strong gas smell
				Note: When breaking off first rod, water gushed out under very high pressure
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road Gambrills MD 21054 (301) 923-2990

BORING LOG

Well No. 20 Application No. _____ Permit No. FR-73-8876
Date Drilled 10-8-83 County _____ Use monitor
Location Ben's Exxon, 143 Frederick Rd., Rt. 15, Thurmont, Md.
Owner Exxon Co., U.S.A. Address 1270 Kuhn Rd., Boiling Springs, Pa.
Drilling Method air rotary Sampling Method cuttings
Hole Diameter 6-7/8" Total Depth 32'

Casing:
Type PVC Diameter 4" Length 12'

Screen:
Type PVC Slot .020 Diameter 4" Length 20'
Gravel Pack Size _____ Casing Seal bentonite
Static Water Level _____ Geologic Formation sedimentary

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-1' Topsoil
				1'-8' Brown sandy silt and medium to coarse grain gravel
10'				8'-18' Boulders and grey clayey sand, some medium to coarse grain gravel
20'			20 slot well screen	18'-23' Boulders
30'				23'-32' Fine to medium grain gravel and brown silt, some boulders
40'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

BORING LOG

Well No. 21 Application No. _____ Permit No. FR-73-8877
Date Drilled 10-10-83 County _____ Use monitor
Location 143 Frederick Rd., Rt. 15, Thurmont, Md.
Owner Exxon Co., U.S.A. Address 1270 Kuhn Rd., Boiling Springs, Pa.
Drilling Method air rotary Sampling Method cuttings
Hole Diameter 6-7/8" Total Depth 50'

Casing:
Type PVC Diameter 4" Length 12'

Screen:
Type PVC Slot .020 Diameter 4" Length 40'
Gravel Pack Size #1 Casing Seal bentonite
Static Water Level _____ Geologic Formation sedimentary

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-1' Topsoil
				1'-5' Brown sandy silt and medium to coarse grain gravel
				5'-7' Brown sandy silt, boulders, some gravel
				7'-15' Grey clayey sand, medium grain, and medium to coarse grain gravel
15'				15'-17' Grey clayey silt, little medium to coarse grain gravel
				17'-23' Boulders and medium to coarse grain gravel some grey clayey sand
				23'-25' Fine to medium grain gravel and brown silt
				25'-34' Fine to medium brown silt, little boulder
30'				
				34'-36' Boulders and brown silt
				36'-42' Brown clayey silt and gravel
				42'-44' Boulders
45'				44'-50' Added 10' rod, went back down and water gushed out boulders and mud
			20 slot well screen	
60'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

BORING LOG

Well No. 23 Application No. _____ Permit No. FR-73-8879

Date Drilled 10-13-83 County _____ Use _____

Location Ben's Exxon, Rt. 15, Thurmont, MD (150' in easement from trans. pole at Owner Exxon Co., U.S.A. Address 1270 Kuhn Rd., Boiling Springs, (well #5) PA

Drilling Method in hole hammer Sampling Method _____ Total Depth 50'

Hole Diameter 8"

Casing:

Type PVC Diameter 4" Length 11'

Screen:

Type PVC Slot 50 Diameter 4" Length 40'

Gravel Pack Size #1 Casing Seal bentonite

Static Water Level 26' Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				Brown clay and boulders, trace gravel 0'-10'
				Brown clay 10'-22'
20'				
				22'-43' Hard Gray limestone (water)
			50 slot well screen	
40'				
				43'-47' Soft brown limestone and sand-(water)
				47'-50' Hard gray limestone-(dry)
60'				
80'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

BORING LOG

Well No. 24 Application No. _____ Permit No. FR-73-8880

Date Drilled 10-13-83 County _____ Use Ben's Exxon

Location Driveway easement on Mosser Rd. opposite city well #4 Rt. 15, Thurmont MI

Owner Exxon Co., U.S.A. Address 1270 Kuhn Rd., Boiling Springs, PA

Drilling Method in hole hammer Sampling Method _____

Hole Diameter 8" Total Depth 52'

Casing: Type PVC Diameter 4" Length 11'6"

Screen: Type PVC Slot _____ Diameter 4" Length 40'

Gravel Pack Size #1 Casing Seal bentonite

Static Water Level 22'8" Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-30' Layers of clay, sand, mud and boulders Trace seepage of water 5'6"
20'				
				30'-38' Hard gray limestone
			well screen	38'-52' Water, soft limestone with lenses of sand and gravel
40'				
60'				
80'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

BORING LOG

Permit No. FR-73-8881

Well No. 25 Application No. _____ Use _____

Date Drilled 10-14-83 County _____

Location Ben's Exxon, Rt. 15, Thurmont, MD(1st well in easement behind const. yard

Owner Exxon Oil Co., U.S.A. Address 1270 Kuhn Rd., Boiling Springs, Pa.

Drilling Method in hole hammer Sampling Method _____ Total Depth 68'

Hole Diameter 8"

Casing: Type None Diameter _____ Length _____

Screen: Type None Slot _____ Diameter _____ Length _____

Gravel Pack Size None Casing Seal None

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-19' Hard, dry, brown clay and boulders, trace gravel
20'				19'-43' Hard gray limestone
40'				
				43'-45' Softer brown rock
				45'-63' Hard gray limestone
60'				
				63'-68' Softer brown rock
80'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 25 Application No _____ Permit No. FR-73-8881
Date Drilled 10-14-83 County _____ Use _____
Location Ben's Exxon, Rt. 15, Thurmont, MD
Owner Exxon Co., U.S.A. Address 1270 Kuhn Rd., Boiling Springs, PA
Drilling Method in hole hammer Sampling Method _____ Total Depth 155'
Hole Diameter 8"

Casing:
Type None Diameter _____ Length _____

Screen:
Type None Slot _____ Diameter _____ Length _____
Gravel Pack Size None Casing Seal _____
Static Water Level None Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
40'				
80'				68'-110' Hard Gray limestone Note: Let hole sit for 20 Minutes at 110', No water
120'				110'-123' Gray limeatone, small amount of water between 110'-123'
160'				123'-155' Hard dry limestone, gray

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road Gambrills, MD 21054 (301) 923-2990

BORING LOG

Permit No. FR-73-8882

Well No. 26 Application No. _____ Use monitor

Date Drilled 10-15-83 County _____

Location Ben's Exxon, Rt. 15, Thurmont, MD (in wood ~~easement ½ between creek~~ and

Owner Exxon Co., U.S.A. Address 1270 Kuhn Rd., Boiling Springs, Pa. #5)

Drilling Method in hole hammer Sampling Method _____

Hole Diameter 8" Total Depth 51'

Casing: Diameter 4" Length 11'

Type PVC

Screen: Slot 50 Diameter 4" Length 40'

Type PVC Casing Seal bentonite

Gravel Pack Size #1 Geologic Formation _____

Static Water Level _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-18' Brown clay and cobbles
20'				18'-28' Brown clay, some gravel
40'			50 slot well screen	28'-51' Hard gray limestone
60'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 27 Application No. _____ Permit No. FR-73-8883

Date Drilled 10-15-83 County _____ Use monitor

Location Ben's Exxon, Rt. 15, Thurmont, MD (midway down power line easement)

Owner Exxon Co., U.S.A. Address 1270. Kuhn Rd., Boiling Springs, PA 17007

Drilling Method in hole hammer Sampling Method _____

Hole Diameter 8" Total Depth 50'

Casing: Type P.V.C. Diameter 4" Length 10'

Screen: Type P.V.C. Slot 50 Diameter 4" Length 40'

Gravel Pack Size #1 Casing Seal _____

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-27' Brown clay and cobbles, mud
				Note: water and strong odor at 24'
20'				
			50 slot well screen	27'-50' Hard gray limestone
40'				
60'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills MD 21054 (301) 923-2990

RING LOG

Permit No. FR-73-8884

No. 28 Application No. _____ Use monitor

Date Drilled 10-16-83 County _____

ation Ben's Exxon, Rt. 15, Thurmont, MD (next to creek in power line easement

ner Exxon Co., U.S.A. Address 1270 Kuhn Rd., Boiling Springs, PA 17007

Drilling Method in hole hammer Sampling Method _____ Total Depth 50'

Hole Diameter 6"

sing: Diameter 4" Length 0'

Type PVC

Screen: Slot 50 Diameter 4" Length 33'

Type PVC Casing Seal bentonite

vel Pack Size #1 Geologic Formation _____

Static Water Level _____

PTH LOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-30' Brown wet clay and gravel and cobbles note: some water at 28' Note: strong odor at 30'
20'				
			50 slot well screen	30'-33' Hard limestone
				33'-37' Gravel, some clay
40'				37'-50' Gravel, some clay, lens of limestone Note: well blew in to 33'
60'				

Handex

HANDEX CORP., 360 Morgan Road, P.O. Box 522, Odenton, Maryland 21113 (301) 674-3100

BORING LOG

Well No. 28 Application No. (redrilled) Permit No. FR-73-8884
Date Drilled Aug 18-19, 1987 County Frederick Use monitor
Location Exxon S/S, 143 Frederick Road, Thurmont, Maryland
Owner Exxon Company, USA Address Houston, Texas
Drilling Method air rotary Sampling Method cuttings
Hole Diameter 12" to 20', 10" to 27', 8" to 41'; 6" to 56' Total Depth 56'6"

Casing:
Type PVC Flush Joint Diameter 4" Length 10'

Screen:
Type PVC Flush Joint Slot 20 Diameter 4" Length 50'
Gravel Pack Size 1/8" pea gravel Casing Seal granular bentonite 2'6"-4'
Static Water Level 12' Geologic Formation

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
			Casing	0'-27' LIMESTONE and quartzite GRAVEL, cobbles and boulders, brown sandy and clayey matrix poor return of drill cuttings, caving at 20' and 24' Wet at 12', slight gasoline odor
20'				
			Well Screen	27'-30' LIMESTONE, (hard) 30'-32'6" Brown LIMESTONE with solution channels, increased water yield, increased gasoline odor 32'6"-36' Fractured LIMESTONE
40'				36'-56' Grey LIMESTONE (hard) 41'-54' Drilled within previous borehold
60'				NOTE: Well yield estimated greater than 30gpm Well extends 3'6" above grade
80'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Permit No. FR-73-8885

Well No. 29 Application No. _____ Use _____

Date Drilled 10-16-83 County _____

Location Ben's Exxon, Rt. 15, Thurmont, MD (in wooded easement closest to #5)

Owner Exxon Co., U.S.A. Address 1270 Kuhn Rd., Boiling Springs, PA 17007

Drilling Method in hole hammer Sampling Method _____ Total Depth 50'

Hole Diameter 6"

Casing: Type PVC Diameter _____ Length 0'

Screen: Type PVC Slot 50 Diameter 4" Length 4'

Gravel Pack Size _____ Casing Seal _____

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-20' Brown clay and cobbles, some gravel
20'				20'-30' Brown clay, wet
				30'-33' Fractured limestone, water
				33'-40' Opening
40'				40'-48' Clay and gravel
				48'-50' Limestone
				Note: Well blew in to 40' while setting casing
60'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Permit No. FR-73-8886

Well No. 30 Application No. _____ Use _____

Date Drilled 10-16-83 County _____

Location Ben's Exxon, Rt. 15, Thurmont, MD (in sewer easement) Address 1270 Kuhn Rd., Boiling Springs, PA 17007

Owner Exxon Co., U.S.A. Sampling Method _____ Total Depth 50'

Drilling Method in hole hammer

Hole Diameter 6"

Casing: Diameter 4" Length 10'

Type PVC

Screen: Slot 50 Diameter 4" Length 40'

Type PVC Casing Seal bentonite

Gravel Pack Size #1 Geologic Formation _____

Static Water Level _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-20' Dark brown clay and cobbles, some water
20'				20'-38' Hard limestone
			50 slot well screen	38'-44' Soft rock, some gravel, water opening
40'				44'-50' Hard limestone
60'				

Handex

HANDEX CORP., P.O Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Permit No. FR-73-8887

Well No. 31 Application No. _____ Use monitor

Date Drilled 10-16-83 County _____

Location Ben's Exxon, RT. 15, Thurmont, MD (in yard next to well #18)

Owner Exxon Co. U.S.A. Address 1270 Kuhn Rd., Boiling Springs, PA

Drilling Method in hole hammer Sampling Method _____ Total Depth 56'

Hole Diameter 6"

Casing: Diameter 4' Length 16'

Type PVC

Screen: Slot 50 Diameter 4' Length 40'

Type PVC Casing Seal bentonite

Gravel Pack Size #1 Geologic Formation _____

Static Water Level _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-20' Brown clay and gravel
20'				20'-26' Gravel bed
				26'-47' Gray limestone
			50 slot well screen	47'-49' Soft clay, water
40'				49'-56' Limestone
60'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 32 Application No. _____ Permit No. FR-73-8888

Date Drilled 10-16-83 County _____ Use monitor

Location Ben's Exxon, Rt. 15, Thurmont, MD

Owner Exxon CO., U.S.A. Address 1270 Kuhn Rd., Boiling Springs, PA

Drilling Method in hole hammer Sampling Method _____ Total Depth 50'

Hole Diameter 6"

Casing:

Type PVC Diameter 4" Length 12'

Screen:

Type PVC Slot 50 Diameter 4" Length 40'

Gravel Pack Size #1 Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-15' Brown clay and cobbles
				15'-22' Brown clay, some gravel
20'				22'-50' Limestone, little water
40'			50 slot well screen	
60'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD. 21054 (301) 923-2990

BORING LOG

Well No. 34 Application No. _____ Permit No. FR-81-1600

Date Drilled 8-6-84 County Frederick Use monitor

Location Ben's Exxon, Thurmont, Md. Address 1270 Kuhn Rd. R.D. 2, Boiling Springs, Pa.

Owner Exxon Sampling Method from cuttings

Drilling Method Air Rotary Total Depth 25 ft.

Hole Diameter 7 inches

Casing: Type PVC (no glue) Diameter 4" Length 5 ft.

Screen: Type PVC (no glue) Slot .020 Diameter 4" Length 20 ft.

Gravel Pack Size #1 Casing Seal BENTONITE

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0-8" Dark brown silty Top Soil 8"-11' Light brown coarse to fine (+) SAND, little (-) silt, some medium to fine quartz gravel, shale fragments and limestone fragments, Fill?
10			well screen	11'-24' Brown Clayey SILT trace(-), medium to fine Sand, little fine angular limestone fragments, soft, occassional limestone cobbles, cuttings wet 17' to 18' boulder
20				24'-25' Gray and light gray fractured limestone, hard bottom of screen set at 25', rapid recovery

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Permit No. FR-81-1601

Well No. 35 Application No. _____ Use monitor

Date Drilled 8-6-84 County Frederick

Location Ben's Exxon, Thurmont, Md. Address 1270 Kuhn Rd. R.D. 2, Boiling Springs, Pa.

Owner Exxon Sampling Method from cuttings

Drilling Method Air Rotary/Down hole ham. Total Depth 30 ft.

Hole Diameter 7 inches

Casing: Type PVC (no glue) Diameter 4 in. Length 12 ft.

Screen: Type PVC (no glue) Slot .020 Diameter 4 in. Length 20 ft.

Gravel Pack Size #1 Casing Seal BENTONITE

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN (2 ft)	IDENTIFICATION OF SOILS/REMARKS
				0-8' Light brown Clayey SILT trace, fine limestone and quartz fragments
10				8'-16' Dark brown Silty CLAY trace(-), limestone fragments, soft, cuttings moist to wet
20				16'-30' Light gray and gray fractured limestone, hard
30				bottom of screen set at 30' moderate recovery rate

Handex

HANDEX CORP., P.O. Box 261 773 Annapolis Road Gambrills MD 21054 (301) 923-2990

BORING LOG

Permit No. FR-81-1602

Well No. 36 Application No. _____ Use monitor

Date Drilled 8-7-84 County Frederick

Location Ben's Exxon, Thurmont, Md.

Owner Exxon Address 1270 Kuhn Rd. R.D. 2, Boiling Springs, Pa.

Drilling Method Air Rotary Sampling Method - from cuttings

Hole Diameter 7 inches Total Depth 18 ft

Casing: Type PVC (no glue) Diameter 4 in. Length 5 ft

Screen: Type PVC (no glue) Slot .020 Diameter 4 in. Length 15 ft.

Gravel Pack Size #1 Casing Seal BENTONITE

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0-8' Light brown and brown clayey SILT little to trace, coarse to fine Sand, some angular limestone fragments, trace quartz gravel and sandstone fragments, occassional limestone cobbles, cuttings wet at 11'
10			well screen	
20				bottom of screen set at 18', rapid recovery

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 37 Application No. _____ Permit No. FR-81-1603

Date Drilled 8-7-84 County Frederick Use monitor

Location Ben's Exxon, Thurmont, Md.

Owner Exxon Address 1270 Kuhn Rd. R.D. 2, Boiling Springs, Pa.

Drilling Method Air Rotary Sampling Method from cuttings

Hole Diameter 7 inches Total Depth 25 ft.

Casing: Type PVC (no glue) Diameter 4 in. Length 7 ft.

Screen: Type PVC (no glue) Slot .020 Diameter 4 in. Length 20 ft.

Gravel Pack Size #1 Casing Seal BENTONITE

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0-17' Light brown Clayey SILT little to trace, coarse to fine Sand, some angular limestone fragments, trace to little quartz gravel and sandstone fragments, occassional limestone cobbles, cuttings wet at 10', possible very slight gasoline odor
10			well screen	
				17'-25' Dark brown Silty CLAY trace(-), limestone fragments, soft
20				
				bottom of screen set at 25', rapid recovery

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

RING LOG

ll No. 38 Application No _____ Permit No. _____

Date Drilled 8-7-84 County Frederick Use monitor

cation Ben's Exxon, Thurmont, Md.

ner Exxon Address 1270 Kuhn Rd, R.D. 2, Boiling Springs, Pa.

Drilling Method Air Rotary Sampling Method from cuttings

Hole Diameter 7 inches Total Depth 25 ft.

sing:

Type PVC (no glue) Diameter 4 in Length 7 ft.

Screen:

Type PVC (no glue) Slot .020 Diameter 4 in Length 20 ft.

vel Pack Size #1 Casing Seal BENTONITE

Static Water Level _____ Geologic Formation _____

EPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0-14' Light brown and brown Clayey Silt and angular limestone fragments, trace coarse to fine Sand, trace to little quartz gravel and sandstone fragments, occassional limestone cobbles, cuttings wet at 9'
10				
				14'-23' Dark brown Silty CLAY trace(-), limestone fragments, soft
20				
				23'-25' Gray and light gray limestone, hard
				bottom of screen set at 25', rapid recovery

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

ORING LOG

No. 40 Application No. _____ Permit No. FR-81-1984

Drilled 2-14-85 County Frederick Use monitor

ocation Ben's Exxon, Rt. 15, Thurmont, Maryland

wner Exxon Address 1270 Kuhn Rd., Boiling Springs, PA 17007

ng Method Air Rotary Sampling Method split spoon

ole Diameter 7" Total Depth 21'

asing:

ype PVC Diameter 4" Length 8'

reen:

Type PVC Slot .020 Diameter 4" Length 15'

el Pack Size #1 Casing Seal Bentonite & Portland

c Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0-6" Topsoil 6"-21' multi-colored washed, rounded medium to fine gravel, little coarse to fine sand
			well screen	

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills, MD 21054 (301) 923-2990

RING LOG

ll No. 41 Application No. _____ Permit No. FR-81-1985

ate Drilled 2-14-85 County Frederick Use monitor

cation Ben's Exxon, Rt. 15, Thurmont, Maryland

ner Exxon Address 1270 Kuhn Rd., Boiling Springs, PA 17007

rilling Method Air Rotary Sampling Method split spoon

le Diameter 7" Total Depth 25

sing: Type PVC Diameter 4" Length 5'

creen: Type PVC Slot .020 Diameter 4" Length 20'

vel Pack Size #1 Casing Seal Bentonite & Portland

tatic Water Level _____ Geologic Formation _____

PTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0-6" topsoil 6"-10' Dark Brown silty clay, trace medium to fine sand, trace coarse to fine gravel, trace cobbles
10				10'-23' light Brown clayey silt, trace fine sand
20			well screen	

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road Gambrills, MD 21054 (301) 923-2990

DRING LOG

Permit No. F12-81-1987

ell No. 43 Application No. _____ Use monitor

Date Drilled 2-15-85 County Frederick

ocation Ben's Exxon, Rt. 15, Thurmont, Maryland

wner Exxon Address 1270 Kuhn Rd., Boiling springs, PA 17007

Drilling Method Air Rotary Sampling Method split spoon

Hole Diameter 7" Total Depth 25'

sing:

Type PVC Diameter 4" Length 10'

Screen:

Type PVC Slot .020 Diameter 4" Length 15'

avel Pack Size #1 Casing Seal Bentonite and Portland

Static Water Level _____ Geologic Formation _____

EPTH ELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0-6" Topsoil 6"-13' dark Brown silty clay, trace medium to fine sand, trace coarse to fine gravel, trace cobbles
10				
			well screen	13'-23' light Brown clayey silt, trace fine sand
25				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road, Gambrills MD 21054 (301) 923-2990

NG LOG

ell No. 45 Application No. _____ Permit No. FR-81-1989

ate Drilled 2-15-85 County Frederick Use monitor

on Ben's Exxon, Rt. 15, Thurmont, Maryland

wner Exxon Address 1270 Kuhn Rd., Boiling springs, PA 17007

illing Method Air Rotary Sampling Method split spoon

Diameter 7" Total Depth 22'

ing:

Type PVC Diameter 4" Length 4'

n:

pe PVC Slot .020 Diameter 4" Length 20'

avel Pack Size #1 Casing Seal Bentonite and Portland

atic Water Level _____ Geologic Formation _____

DEPTH BELOW GRADE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL ~~DESIGN~~	IDENTIFICATION OF SOILS/REMARKS
				0-6" topsoil 6"-14' dark Brown silty clay, trace medium to fine sand, trace coarse to fine gravel, trace cobbles
10				
			well screen	14'-22' Reddish -Brown clayey silt, little fine sand
20				

Handex®

Handex of Maryland, Inc., 360 Morgan Road P.O. Box K Odenton Maryland 21113-0369 (301) 674-3100

BORING LOG

Well No. 46 Application No _____ Permit No FR-88-1449

Date Drilled 6/11/90 County Frederick Use monitor

Location Exxon Station, 143 Frederick Rd. Thurmont, Maryland

Owner Exxon Company, U.S.A. Address Houston, TX

Drilling Method air rotary Sampling Method _____ Total Depth 33'6"

Hole Diameter 6"

Casing: Type PVC Schedule 40 Diameter 4" Length 5'

Screen: Type PVC Schedule 40 Slot .020" Diameter 4" Length 28'6"

Gravel Pack Size #1 Morie Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
			Casing	0'-5" Concrete
				5"-8" Stone fill
				8"-12' Brown silt, some gravel, organic material, slight product odor 2'-5'
10'				
				12'-15' Light brown silt, some clay, gravel
				15'-18' Light brown silt, some sand, less gravel, less clay, moist at 14', wet at 18'
				18'-34'6" Light reddish brown clay, some sand, some gravel (interbedded phyllite and sandstone bedrock)
20'			Screen	
30'				
40'				

Note: Free product in well upon completion

Logged By: T. Keffer

Handex®

Handex of Maryland, Inc., 360 Morgan Road, P.O. Box K, Odenton, Maryland 21113-0369 (301) 674-3100

BORING LOG

Well No. 47 Application No. _____ Permit No. FR-88-1450
Date Drilled 7/25/90 County Frederick Use monitor
Location Exxon Station, 143 Frederick Rd. Thurmont, Maryland
Owner Exxon Company, U.S.A. Address Houston, TX
Drilling Method air rotary Sampling Method _____ Total Depth 40'
Hole Diameter 6.88"

Casing:
Type PVC Schedule 40 Diameter 4" Length 5'

Screen:
Type PVC Schedule 40 Slot .020" Diameter 4" Length 35'
Gravel Pack Size #1 Morie Casing Seal bentonite & grout
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
			Casing	0'-4' Olive rock
				4'-13' Brown silty sand and Olive rock fragments
10'				
				13'-20' Brown silt and cobbles, trace boulders
20'				20'-26' Hard Limestone
			Screen	
				26'-34' Hard Limestone with fractures
30'				
				34'-40' Hard Limestone
40'				Logged By: B. Christian

Handex®

Handex of Maryland, Inc., 360 Morgan Road P.O. Box K Odenton, Maryland 21113-0369 (301) 674-3100

[illegible]ING LOG

[illegible] No 48 Application No _____ Permit No FR-88-1451

Date Drilled 7/25/90 County Frederick Use monitor

[illegible]ocation Exxon Station, 143 Frederick Rd. Thurmont, Maryland

[illegible]er Exxon Company, U.S.A. Address Houston, TX

[illegible]ing Method air rotary Sampling Method _____ Total Depth 40'6"

Hole Diameter 6.88"

[illegible]ing: [illegible]ype PVC Schedule 40 Diameter 4" Length 5'

Screen: [illegible]ype PVC Schedule 40 Slot .020" Diameter 4" Length 35'6"

[illegible]el Pack Size #1 Morie Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

[illegible]TH [illegible]OW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
			Casing	0'-1' Concrete and fill
				1'-5' Black silt with trace gravel
				5'-8' Cobbles and brown silt
				8'-9' Brown clay with silt
				9'-10' Brown silt and clay with gravel
10'				10'-20' Light brown silt with gravel
20'				20'-22' Red Clay
			Screen	22'-40' Hard black limestone, no fractures
30'				
40'				

Logged By: B. Christian

Handex®

Handex of Maryland, Inc., 360 Morgan Road P.O. Box K Odenton Maryland 21113-0369 (301) 674-3100

BORING LOG

Boring No. 49 Application No. _____ Permit No. FR-88-1453
Date Drilled 7/30/90 County Frederick Use monitor
Location Exxon Station, 143 Frederick Rd. Thurmont, Maryland
Owner Exxon Company, U.S.A. Address Houston, TX
Drilling Method air rotary Sampling Method _____ Total Depth 25'
Hole Diameter 6.88"

Casing: Type PVC Schedule 40 Diameter 4" Length 5'

Screen: Type PVC Schedule 40 Slot .020" Diameter 4" Length 20'
Gravel Pack Size #1 Morie Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
			Casing	0'-1' Concrete and fill
				1'-20' Light brown silt and clay
10'			Screen	
20'				20'-25' Limestone
30'				

Note: Product odor at 22'

Logged By: Brent Christian

Handex®

Handex of Maryland, Inc., 360 Morgan Road P.O. Box K Odenton, Maryland 21113-0369 (301) 674-3100

BORING LOG

Well No. 50 Application No. _____ Permit No. _____
Date Drilled 7/31/90 County Frederick Use monitor
Location Exxon Station, 143 Frederick Rd. Thurmont, Maryland
Owner Exxon Company, U.S.A. Address Houston, TX
Drilling Method air rotary Sampling Method _____
Hole Diameter 6.88" Total Depth 28'

Casing:
Type PVC Schedule 40 Diameter 4" Length 4'

Screen:
Type PVC Schedule 40 Slot .020" Diameter 4" Length 24'
Gravel Pack Size #1 Morie Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
			Casing	0'-1' Concrete and fill
				1'-5' Brown silt and clay with Gravel
			Screen	5'-12' Light gray clay and silt
10'				
				12'-13' Light gray clay and silt with gravel
				13'-14' Cobbles
				14'-15' Gray silty clay with gravel
				15'-17' Boulder
				17'-20' Red silty clay
20'				20'-35' Cobbles and red silt
30'				
40'				Logged By: Brent Christian

Handex®

Handex of Maryland, Inc., 360 Morgan Road, P.O. Box K Odenton, Maryland 21113-0369 (301) 674-3100

BORING LOG

Well No. 51 Application No _____ Permit No. FR-88-1452
Date Drilled 8/01/90 County Frederick Use monitor
Location Exxon Station, 143 Frederick Rd. Thurmont, Maryland
Owner Exxon Company, U.S.A. Address Houston, TX
Drilling Method air rotary Sampling Method _____
Hole Diameter 6.88" Total Depth 24'

Casing:
Type PVC Schedule 40 Diameter 4" Length 4'

Screen:
Type PVC Schedule 40 Slot .020" Diameter 4" Length 20'
Gravel Pack Size #1 Morie Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS	
			Casing	0'-1'	Concrete and crushed stone
				1'-3'	Light brown silt and clay with gravel
				3'-4'	Rust colored clay and silt
			Screen	4'-5'	Crushed rock
				5'-6'	Brown silt and sand, some gravel
				6'-7'	Black silt and clay, no gravel
				7'-8'	Olive colored silt and clay
				8'-10'	Light brown sand and silt
10'				10'-25'	Light brown silt, small amount of gravel
20'					
				25'-30'	Cobbles
30'					

Note: Well bridged to 24'

Logged By: B. Christian

Handex®

HANDEX CORP., 360 Morgan Road P.O. Box 522 Odenton, Maryland 21113 (301) 674-3100

BORING LOG

Permit No. FR-81-5042

Well No. 1 Application No. _____ Use vent

Date Drilled 06-3-87 County Frederick

Location 143 Frederick Road, Thurmont, Md.

Owner Exxon Company, USA Address Houston, Texas

Drilling Method Air Rotary Sampling Method cuttings

Hole Diameter 8-5/8" Total Depth 13'6"

Casing:

Type PVC Flush Joint Diameter 4" Length 2'

Screen:

Type PVC Flush Joint Slot 20 Diameter 4" Length 10'

Gravel Pack Size #1 Morie Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0"-7" Concrete
			Casing	7"-3'5" Medium grey to dark grey SILT and coarse to medium GRAVEL
				3'5"-12' Red brown silty CLAY, some fine sand
5'				
10'			Well Screen	
				12'-13'6" Dark grey to medium grey LIMESTONE
15'				NOTE: Well set 1'6" below grade
20'				

Handex®

HANDEX CORP., 360 Morgan Road P O Box 522 Odenton, Maryland 21113 (301) 674-3100

BORING LOG

Well No. 2 Application No. _____ Permit No. FR-81-5043
Date Drilled 06-3-87 County Frederick Use vent
Location 143 Frederick Road, Thurmont, Md.
Owner Exxon Company, USA Address Houston, Texas
Drilling Method Air Rotary Sampling Method cuttings
Hole Diameter 8-5/8" Total Depth 13'6"

Casing:
Type PVC Flush Joint Diameter 4" Length 2'

Screen:
Type PVC Flush Joint Slot 20 Diameter 4" Length 10'
Gravel Pack Size #1 Morie Casing Seal bentonite
Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-7" Concrete
			Casing	7"-10' Dark grey to medium grey SILT, some medium gravel
5'				
10'			Well Screen	10'-12' Red to redbrown silty CLAY
				12'-13'6" Dark grey to medium grey LIMESTONE
15'				
				NOTE: Well set 1'6" below grade
20'				

Handex®

HANDEX CORP., 360 Morgan Road, P.O. Box 522, Odenton, Maryland 21113 (301) 674-3100

BORING LOG

Permit No. FR-81-5044

Well No. 3 Application No. _____ Use vent

Date Drilled 06-3-87 County Frederick

Location 143 Frederick Road, Thurmont, Md.

Owner Exxon Company, USA Address Houston, Texas

Drilling Method Air Rotary Sampling Method cuttings

Hole Diameter 8-5/8" Total Depth 13'6"

Casing: Type PVC Flush Joint Diameter 4" Length 2'

Screen: Type PVC Flush Joint Slot 20 Diameter 4" Length 10'

Gravel Pack Size #1 Morie Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-6" Concrete
			Casing	6"-5' Dark grey SILT, some medium gravel
5'				5'-13'6" Red to red brown silty CLAY
10'			Well Screen	
15'				
20'				

NOTE: Well set 1'6" below grade

Handex®

HANDEX CORP., 360 Morgan Road, P.O. Box 522, Odenton, Maryland 21113 (301) 674-3100

BORING LOG

Well No. 4 Application No. _____ Permit No. FR-81-5045

Date Drilled 06-3-87 County Frederick Use vent

Location 143 Frederick Road, Thurmont, Md.

Owner Exxon Company, USA Address Houston, Texas

Drilling Method Air Rotary Sampling Method cuttings

Hole Diameter 8-5/8" Total Depth 13'6"

Casing:

Type PVC Flush Joint Diameter 4" Length 2'

Screen:

Type PVC Flush Joint Slot 20 Diameter 4" Length 10'

Gravel Pack Size #1 Morie Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-3' Tan to redbrown silty CLAY
			Casing	3'-13'6" Red to redbrown silty CLAY
5'				
10'			Well Screen	NOTE: Well set 1'6" below grade slight odor at 3' strong odor at 10'
15'				
20'				

Handex®

HANDEX CORP., 360 Morgan Road, P O Box 522 Odenton Maryland 21113 (301) 674-3100

BORING LOG

Permit No. FR-81-5046

Well No. 5 Application No. _____ Use vent

Date Drilled 06-3-87 County Frederick

Location 143 Frederick Road, Thurmont, Md.

Owner Exxon Company, USA Address Houston, Texas

Drilling Method Air Rotary Sampling Method cuttings

Hole Diameter 8-5/8" Total Depth 13'6"

Casing: Type PVC Flush Joint Diameter 4" Length 2'

Screen: Type PVC Flush Joint Slot 20 Diameter 4" Length 10'

Gravel Pack Size #1 Morie Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-5" Concrete
			Casing	5"-2' Green brown SILT, trace sand
5'				5'-11' Red brown SILT, some very fine sand
			Well Screen	
10'				11'-13'6" Brown to redbrown SILT, some sand
15'				NOTE: Well set 1'6" below grade

Handex®

HANDEX CORP., 360 Morgan Road, P O Box 522, Odenton, Maryland 21113 (301) 674-3100

BORING LOG

Permit No. FR-81-5047

Well No. 6 Application No. _____ Use vent

Date Drilled 06-3-87 County Frederick

Location 143 Frederick Road, Thurmont, Md.

Owner Exxon Company, USA Address Houston, Texas

Drilling Method Air Rotary Sampling Method cuttings

Hole Diameter 8-5/8" Total Depth 13'6"

Casing: Type PVC Flush Joint Diameter 4" Length 2'

Screen: Type PVC Flush Joint Slot 20 Diameter 4" Length 10'

Gravel Pack Size #1 Morie Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
			Casing	0'-5" Asphalt 5"-4' Medium grey to dark grey SILT, some coarse to medium gravel
5'			Well Screen	4'-13'6" Brown to red brown SILT, trace sand
10'				
15'				NOTE: Well set 1'6" below grade
20'				

Handex®

HANDEX CORP., 360 Morgan Road, P.O. Box 522, Odenton, Maryland 21113 (301) 674-3100

BORING LOG

Permit No. FR-81-5048

Well No. 7 Application No. _____ Use vent

Date Drilled 06-3-87 County Frederick

Location 143 Frederick Road, Thurmont, Md.

Owner Exxon Company, USA Address Houston, Texas

Drilling Method Air Rotary Sampling Method cuttings

Hole Diameter 8-5/8" Total Depth 13'6"

Casing:

Type PVC Flush Joint Diameter 4" Length 2'

Screen:

Type PVC Flush Joint Slot 20 Diameter 4" Length 10'

Gravel Pack Size #1 Morie Casing Seal bentonite

Static Water Level _____ Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
			Casing	0'-5" Asphalt 5"-5' Medium grey to dark grey SILT, some coarse to medium gravel
5'			Well Screen	5'-11' Brown to redbrown SILT, trace sand
10'				11'-13'6" Red to dark brown SILT
15'				NOTE: Well set 1'6" below grade
20'				

Handex

HANDEX CORP., P.O. Box 261, 773 Annapolis Road Gambrills, MD 21054 (301) 923-2990

BORING LOG

Well No. 22 Application No. _____ Permit No. FR-73-8878

Date Drilled 10/10-10/11/83 County _____ Use _____

Location Ben's Exxon, Rt. 15, Thurmont, MD

Owner Exxon Co., U.S.A. Address 1270 Kuhn Rd., Boiling Springs, Pa.17007

Drilling Method air rotary Sampling Method _____

Hole Diameter 6" Total Depth _____

Casing:

- Type None Diameter _____ Length _____

Screen:

Type None Slot _____ Diameter _____ Length _____

Gravel Pack Size _____ Casing Seal _____

Static Water Level None Geologic Formation _____

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
				0'-20' Brown Clay and cobbles, some gravel
20'				20'-43' Hard Gray Limestone
40'				
				43'-50' Softer Brown formation
				50'-74' Hard gray limestone, no water
60'				
				Note: Abandoned well
80'				

Handex

HANDEX CORP., 360 Morgan Road, P O Box 522, Odenton Maryland 21113 (301) 674-3100

BORING LOG Renamed RW-52

Well No. 28 Application No (redrilled) Permit No. FR-73-8884
Date Drilled Aug 18-19, 1987 County Frederick Use monitor
Location Exxon S/S, 143 Frederick Road, Thurmont, Maryland
Owner Exxon Company, USA Address Houston, Texas
Drilling Method air rotary Sampling Method cuttings
Hole Diameter 12" to 20', 10" to 27',8" to 41';6" to 56' Total Depth 56'6"

Casing:
Type PVC Flush Joint Diameter 4" Length 10'

Screen:
Type PVC Flush Joint Slot 20 Diameter 4" Length 50'
Gravel Pack Size 1/8" pea gravel Casing Seal granular bentonite 2'6"-4'
Static Water Level 12' Geologic Formation

DEPTH BELOW SURFACE	SAMPLE NUMBER	BLOWS PER 6" ON SAMPLER	WELL DESIGN	IDENTIFICATION OF SOILS/REMARKS
			Casing	0'-27' LIMESTONE and quartzite GRAVEL, cobbles and boulders, brown sandy and clayey matrix poor return of drill cuttings, caving at 20' and 24' Wet at 12',slight gasoline odor
20'				
			Well Screen	27'-30' LIMESTONE, (hard) 30'-32'6" Brown LIMESTONE with solution channels, increased water yield, increased gasoline odor 32'6"-36' Fractured LIMESTONE
40'				36'-56' Grey LIMESTONE (hard) 41'-54' Drilled within previous borehold
60'				NOTE: Well yield estimated greater than 30gpm Well extends 3'6" above grade
80'				