

FREMONT ENVIRONMENTAL INC.

September 1, 2014

Mr. Phil Wright
Homestead Oil Inc.
16880 Wild Plum Circle
Morrison, CO 80465

Subject: **Site Investigation Report**
 Stephens #1
 API # 05-123-11552
 SENW Sec 15, T4N, R66W
 Weld County, Colorado
 Fremont Project No. C014-027
 Facility #243760, Remediation # 8307, Spill #2148350

Dear Mr. Wright:

Enclosed please find a copy of the above referenced Site Investigation Report for the Stephens #1 site in Weld County, Colorado. The enclosed report describes site investigation and sampling efforts to assess soil and ground water quality at the site.

Please contact me at (303) 956-8714 if you require any additional information.

Fremont appreciates the opportunity to provide this service.

Sincerely,
FREMONT ENVIRONMENTAL INC.



Paul V. Henehan, P.E.
Senior Consultant

Enclosure

SITE INVESTIGATION REPORT
HOMESTEAD OIL INC.
STEPHENS #1 WATER VAULT RELEASE
WELD COUNTY, COLORADO
FREMONT PROJECT NO. C014-027
FACILITY #243760, REMEDIATION #8307, SPILL #2148350

Prepared by:

Fremont Environmental Inc.
12061 Pennsylvania Street, Suite A-105
Thornton, CO 80241
(303) 956-8714

September 1, 2014

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 BACKGROUND INFORMATION	1
2.1 Site Location	1
2.2 Site History	1
3.0 SITE INVESTIGATION ACTIVITIES.....	2
3.1 Soil Borings/Monitoring Wells.....	2
3.2 Ground Water Monitoring	3
3.3 Ground Water Sampling and Analysis	4
4.0 DISCUSSION	4
5.0 REMARKS.....	5

Tables

Table 1:	Summary of Soil Chemistry
Table 2:	Summary of Ground Water Chemistry and Elevation Data

Figures

Figure 1:	Site Location Map
Figure 2:	Site Map
Figure 3:	Cross Sections
Figure 4:	Soil Chemistry Map
Figure 5:	Inferred Ground Water Contour Map
Figure 6:	Ground Water Chemistry Map

Appendices

Appendix A:	Boring Logs
Appendix B:	Sampling Plan
Appendix C:	Laboratory Documentation

SITE INVESTIGATION REPORT
HOMESTEAD OIL INC.
STEPHENS #1 WATER VAULT RELEASE
WELD COUNTY, COLORADO
FREMONT PROJECT NO. C014-027
FACILITY #243760

1.0 INTRODUCTION

The purpose of this document is to present soil and ground water quality data collected during a site investigation at Homestead Oil Inc.'s (Homestead's) Stephens #1 site in Weld County, Colorado. Impacted soil and ground water were identified at this location due to a release from the produced water vault as the well and facility were being plugged and abandoned. Eight monitoring wells were installed at this site on August 20, 2014 to delineate the magnitude and extent of subsurface impacts.

2.0 BACKGROUND INFORMATION

2.1 Site Location

The Stephens #1 site is located approximately 1.5 miles north of Gilcrest, Colorado in Weld County as shown on Figure 1. The site is located in a rural and agricultural area 0.5 miles southeast of the intersection of County Road 31 and County Road 46. The location is further described as the SE $\frac{1}{4}$ of the NW $\frac{1}{4}$ of Section 15, Township 4N, Range 66W.

2.2 Site History

The site consists of the former water vault and aboveground storage tank (AST) for the Stephens #1 natural gas well. The well was drilled in 1984 to a depth of 7,850 feet. Soil impacts were recently identified during the plugging and abandoning of this well and ancillary equipment. Those observations initiated the site investigation at this location to determine the extent of subsurface impacts.

An excavation to remediate the source impacts was undertaken on May 5, 2014 by Fremont Environmental Inc. (Fremont). Approximately 120 cubic yards of impacted soil were excavated and removed from the storage tank and water vault area. One ground water sample was collected from the excavation and analyzed for petroleum constituents. The laboratory analysis of the water sample indicated that the ground water exhibited a dissolved petroleum concentration of benzene of 4,112 ug/L which is greater than the Colorado Oil and Gas Conservation Commission's (COGCC's) Table 910-1 limit of 5 ug/L. As a result, a site investigation to determine the extent of ground water impacts was required.

3.0 SITE INVESTIGATION ACTIVITIES

3.1 Soil Borings/Monitoring Wells

A site investigation was conducted at the site on August 20, 2014. Eight soil borings were advanced utilizing a Geoprobe rig. All of these borings were completed as flush-mounted, 1-inch diameter monitoring wells. These monitoring wells were used to delineate the extent of soil and ground water impacts at the site. The locations of these monitoring wells are illustrated on the attached figures.

Generally, the subsurface consists of sand with some silty sand to a depth of approximately 36 feet. Ground water is present across the site at a depth of approximately 18 feet. The maximum depth of one of the borings (MW-1) was 36 feet. Geologic cross sections are presented on Figure 3.

The 1-inch diameter monitoring wells were constructed with 10 foot sections of well screen that were placed at a total depth of approximately 25 feet and completed at the ground surface with flush-mounted vaults. Soil samples from each of the borings were

evaluated in the field using a photoionization detector (PID). Logs of the monitoring wells are presented in Appendix A.

Soil samples were collected from each of the borings and sent to eAnalytics Laboratory in Loveland, Colorado for the analyses of benzene, toluene, ethylbenzene and xylenes (BTEX), naphthalene, total petroleum hydrocarbons-gasoline range organics (TPH-GRO), and TPH-diesel range organics (TPH-DRO).

Soil impacts were observed in the vadose zone in only one of the eight borings above the COGCC's Table 910-1 limits for TPH-GRO and TPH-DRO. Elevated concentrations of TPH-GRO and TPH-DRO were present in monitoring well MW-1 at a depth of 16 feet. A soil sample collected from this same boring at a depth of 28 feet had concentrations that were less than the COGCC Table 910-1 limits. These data suggest that the previous excavation was partially successful in removing the impacted soil in the unsaturated zone. The soil chemistry is presented on Figure 4 and summarized on Table 1. The laboratory's report is provided in Appendix C.

3.2 Ground Water Monitoring

Ground water levels were measured in the eight monitoring wells on August 20, 2014 in accordance with the Sampling Plan included in Appendix B. The ground water data are summarized in Table 2.

Water table contours inferred from the August 2014 data are illustrated on Figure 5. Based on these data, ground water is inferred to flow to the northeast. The water table gradient was calculated at approximately 0.003 feet per foot (ft/ft) for the August 2014 data.

3.3 Ground Water Sampling and Analysis

Ground water samples were collected from the eight monitoring wells on August 20, 2014. All ground water samples were submitted to eAnalytics Laboratory, Inc. for analyses of benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8260C.

The ground water samples from MW-1, MW-3 and MW-5 had benzene concentrations of 2,616, 8.1, and 1,755 ug/L, respectively, which are above the COGCC Table 910-1 limit of 5 ug/L for benzene. The ground water chemistry of the other monitoring wells were below their respective COGCC Table 910-1 values. The ground water chemistry is shown on Figure 6.

The ground water analytical data are summarized in Table 2. A copy of the laboratory's report is presented in Appendix C.

4.0 DISCUSSION

A site investigation was conducted at the Stephens #1 location on August 20, 2014 as a result of a historical release that occurred at the produced water vault. These impacts were discovered during the plugging and abandoning of this well and facility. Eight monitoring wells were installed at the site to delineate the magnitude and extent of soil and ground water impacts.

Soil impacts above the COGCC Table 910-1 limits were observed in one of the eight monitoring wells at a depth of approximately 16 feet. As noted above, an excavation project was conducted in May 2014 to remove impacted soil from the source area at this location. Approximately 120 cubic yards of impacted soil were excavated and removed from the site at that time.

The data collected from the monitoring wells indicates that the ground water flow direction is to the northeast. Further, the benzene concentrations for monitoring wells MW-1, MW-3 and MW-5 were above the COGCC Table 910-1 allowable levels with concentrations of 2,616, 8.1, and 1,755 ug/L, respectively. Monitoring well MW-1 is located in approximately the location of the former aboveground storage tank and water vault; well MW-5 is located downgradient from MW-1 but still within the impacted ground water plume. Monitoring well MW-3 was installed upgradient from the former water vault; however, low concentrations of benzene were still present within this well. These data, as well as the ground water chemistry data for the other monitoring wells, are illustrated on Figure 6.

Homestead is currently evaluating the remedial options available to address residual ground water impacts. In the interim, Homestead will sample the ground water at this site on a quarterly basis to evaluate the BTEX concentrations relative (COGCC's) Table 910-1 requirements.

5.0 REMARKS

The discussion and conclusions contained in this report represent our professional opinions. These opinions are based on currently available information and are arrived at in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

This report was prepared by **FREMONT ENVIRONMENTAL INC.**



Paul V. Henehan, P.E.

Senior Consultant

9/1/14
Date _____

Reviewed by:



9/1/14

Date _____

Michael R. Gerstner

Senior Geologist

TABLES

TABLE 1
SUMMARY OF SOIL CHEMISTRY DATA
HOMESTEAD OIL COMPANY
STEPHENS #1, WELD COUNTY, COLORADO
FREMONT PROJECT NO. C014-027

SAMPLE LOCATION	DATE SAMPLED	DEPTH ft	BENZENE mg/kg	TOLUENE mg/kg	ETHYL BENZENE mg/kg	TOTAL XYLENES mg/kg	NAPHTH-ALENE mg/kg	TPH-GRO mg/kg	TPH-DRO mg/kg
MW-1	08/20/14	16	<0.01	0.053	0.79	24.0	2.49	884	734
MW-1	08/20/14	28	<0.01	<0.01	0.037	0.191	0.063	<50	56.2
MW-2	08/20/14	16	<0.01	<0.01	<0.01	<0.01	<0.01	<50	<50
MW-3	08/20/14	16	<0.01	<0.01	<0.01	<0.01	<0.01	<50	<50
MW-4	08/20/14	16	<0.01	<0.01	<0.01	<0.01	<0.01	<50	<50
MW-5	08/20/14	16	<0.01	<0.01	<0.01	<0.01	<0.01	<50	<50
MW-6	08/20/14	16	<0.01	<0.01	<0.01	<0.01	<0.01	<50	<50
MW-7	08/20/14	16	<0.01	<0.01	<0.01	<0.01	<0.01	<50	<50
MW-8	08/20/14	16	<0.01	<0.01	<0.01	<0.01	<0.01	<50	<50
COGCC Table 910-1 Concentrations			0.17	85	100	175	23	500*	500*

The TPH-GRO and TPH-DRO concentrations are added together; if the sum of the two is >500 mg/kg, this exceeds the COGCC Table 910-1 limit

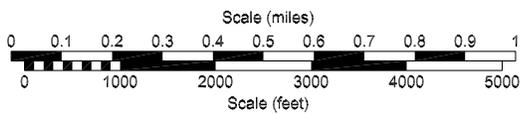
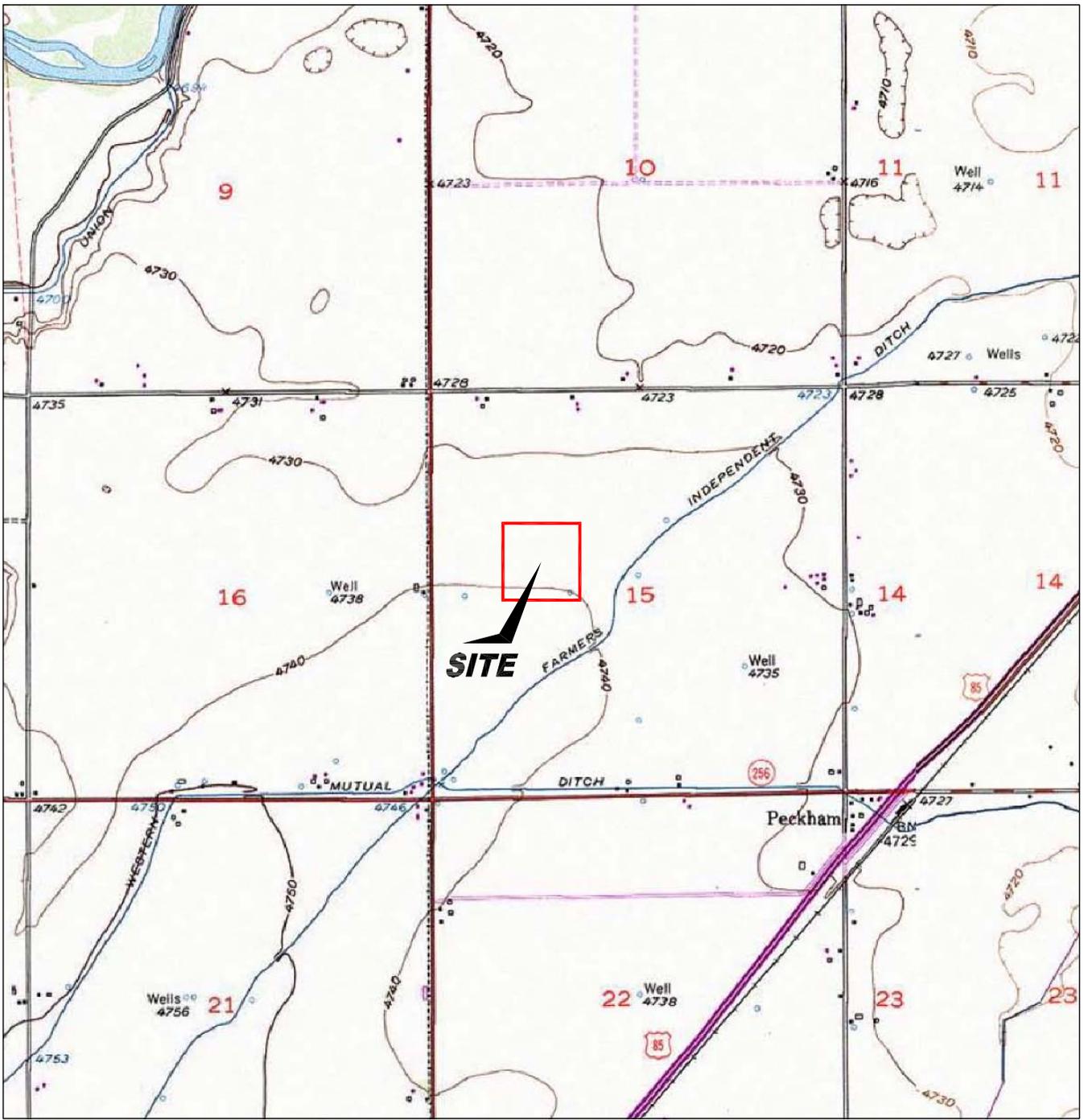
TABLE 2
SUMMARY OF GROUND WATER ELEVATION DATA AND CHEMISTRY DATA
HOMESTEAD OIL INC.
STEPHENS #1, WELD COUNTY, COLORADO
FREMONT PROJECT NO. C014-027

SAMPLE LOCATION	DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL BENZENE (µg/L)	TOTAL XYLENES (µg/L)	TOC ELEVATION (feet)	DEPTH TO GROUND WATER (ft)	GROUND WATER ELEVATION (ft)	FREE PRODUCT THICKNESS (ft)
MW-1	08/20/14	2616	3751	4182	96434	99.22	17.94	81.28	NP
MW-2	08/20/14	<1.0	<1.0	<1.0	<1.0	99.43	18.11	81.32	NP
MW-3	08/20/14	8.1	<1.0	<1.0	<1.0	99.81	18.39	81.42	NP
MW-4	08/20/14	<1.0	<1.0	<1.0	<1.0	99.89	18.63	81.26	NP
MW-5	08/20/14	1755	3134	454	10854	99.68	18.55	81.13	NP
MW-6	08/20/14	<1.0	<1.0	<1.0	<1.0	99.51	18.3	81.21	NP
MW-7	08/20/14	<1.0	<1.0	<1.0	<1.0	100.00	19.00	81.00	NP
MW-8	08/20/14	<1.0	<1.0	<1.0	<1.0	99.29	18.33	80.96	NP
Table 910-1 Limits		5	560	700	1,400				

Bold face values exceed the COGCC limits

NP - No Free Product

FIGURES



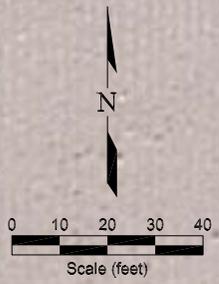
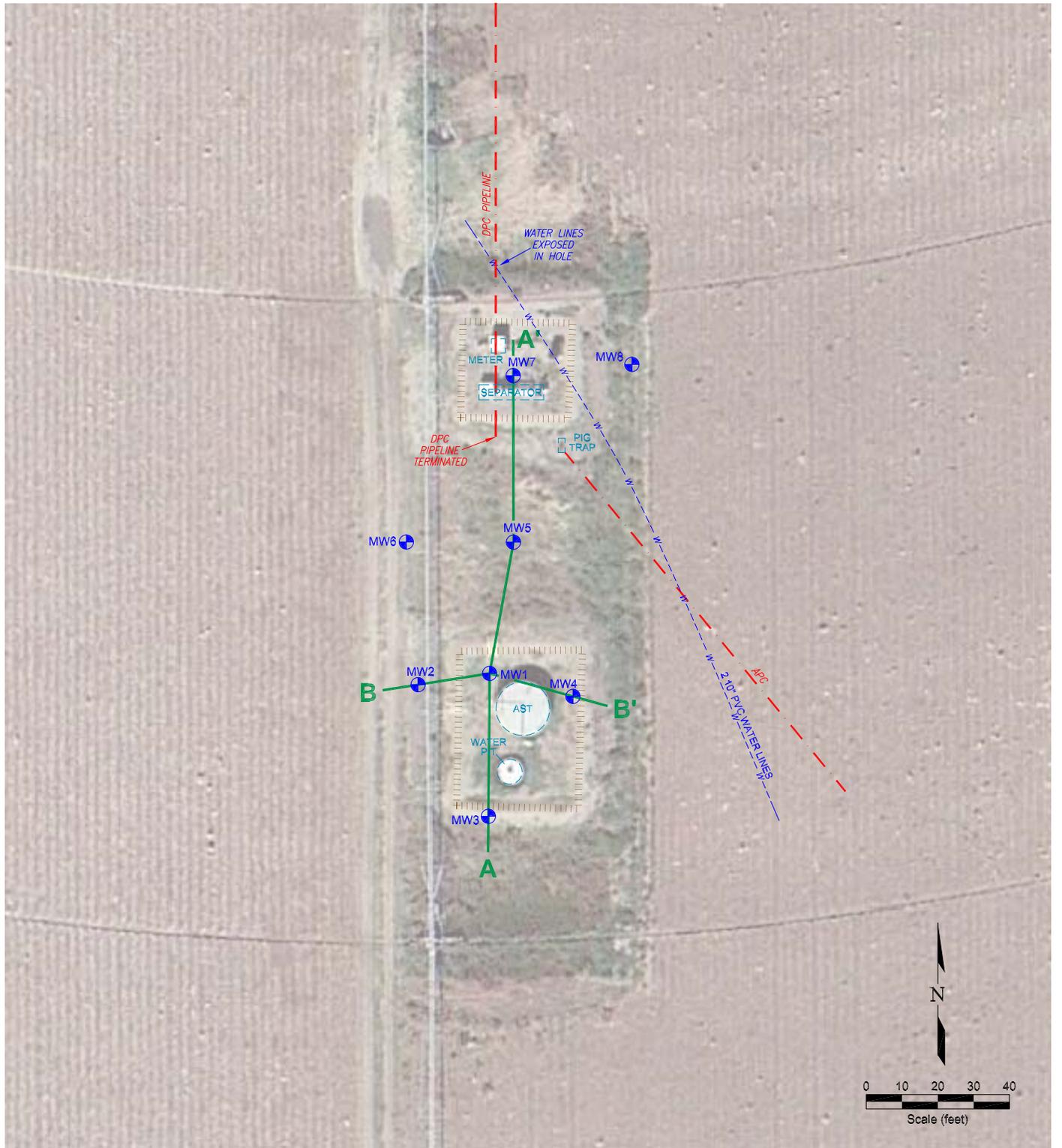
USGS 7.5 MINUTE SERIES (TOPOGRAPHIC)

Figure 1
SITE LOCATION MAP

Homestead Oil - Stephens 1
SW NW Section 15, T4N, R66W
Weld County, Colorado

Project No. C014-027	Prepared by	Drawn by JMA
Date 8/22/14	Reviewed by	Filename 14027T





LEGEND

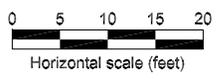
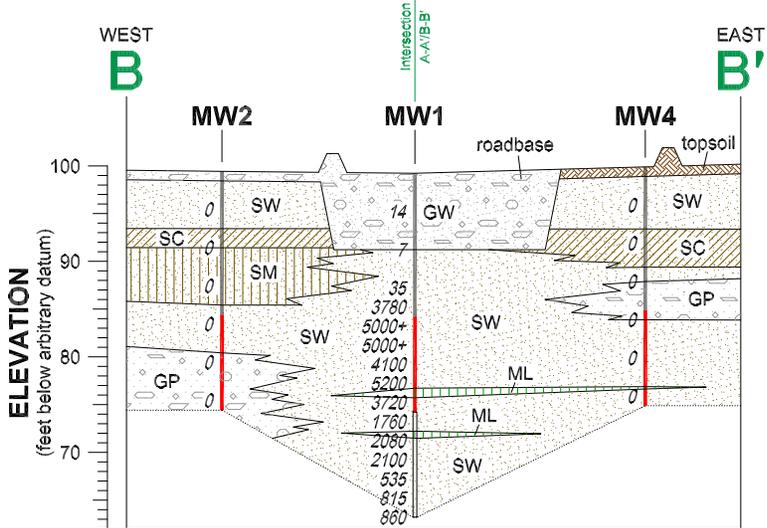
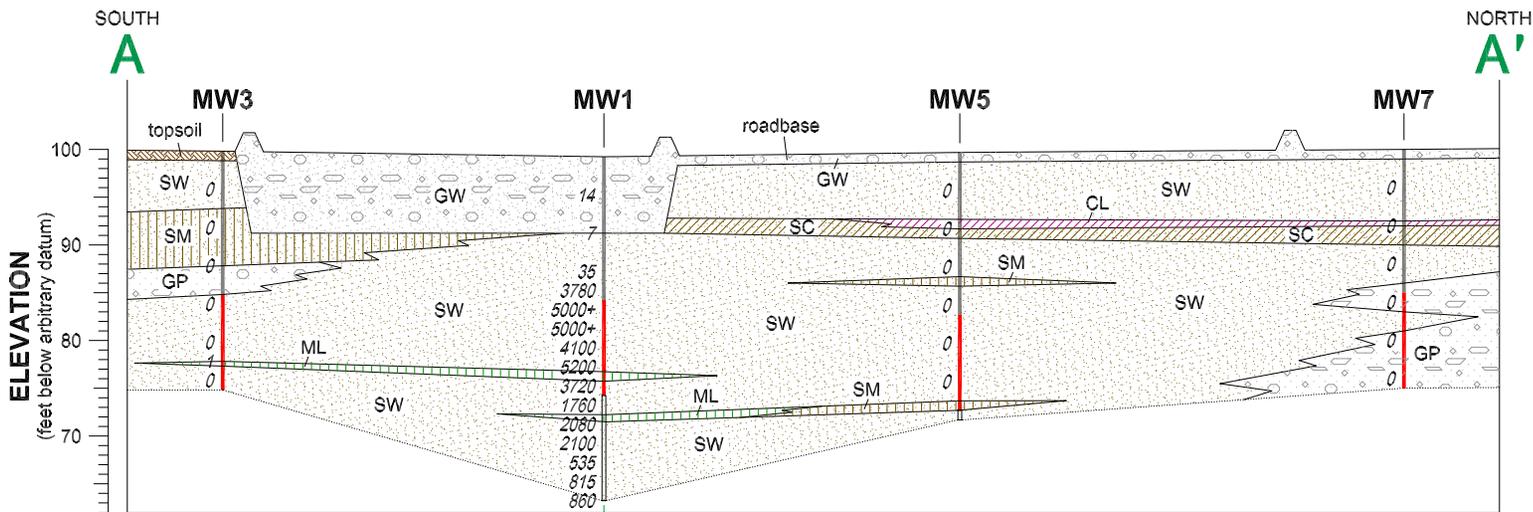
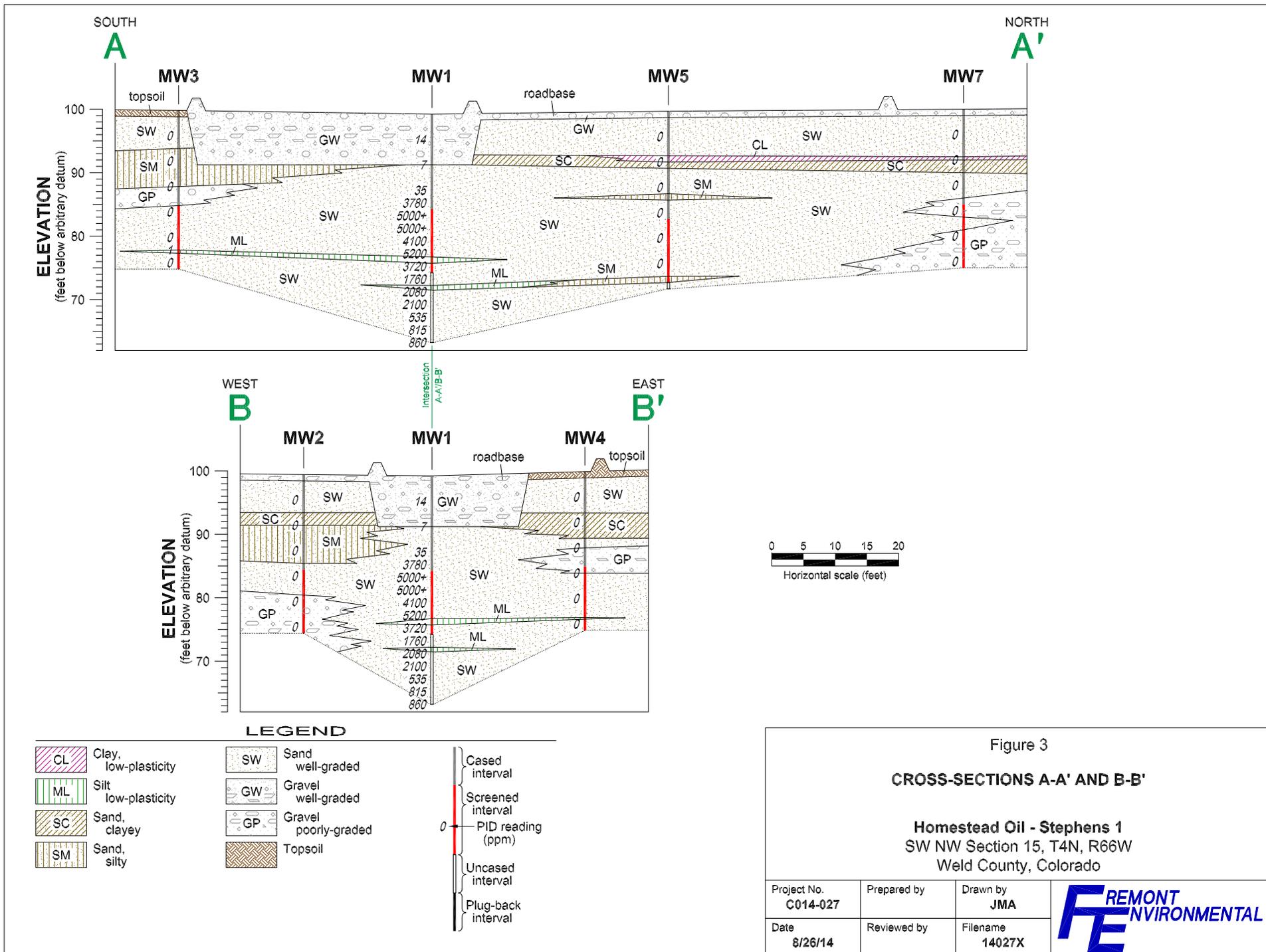
-  MONITORING WELL
-  CONTAINMENT
-  FORMER FACILITY
-  PIPELINE
-  WATER LINE (buried)

**Figure 2
SITE MAP**

Homestead Oil - Stephens 1
SW NW Section 15, T4N, R66W
Weld County, Colorado

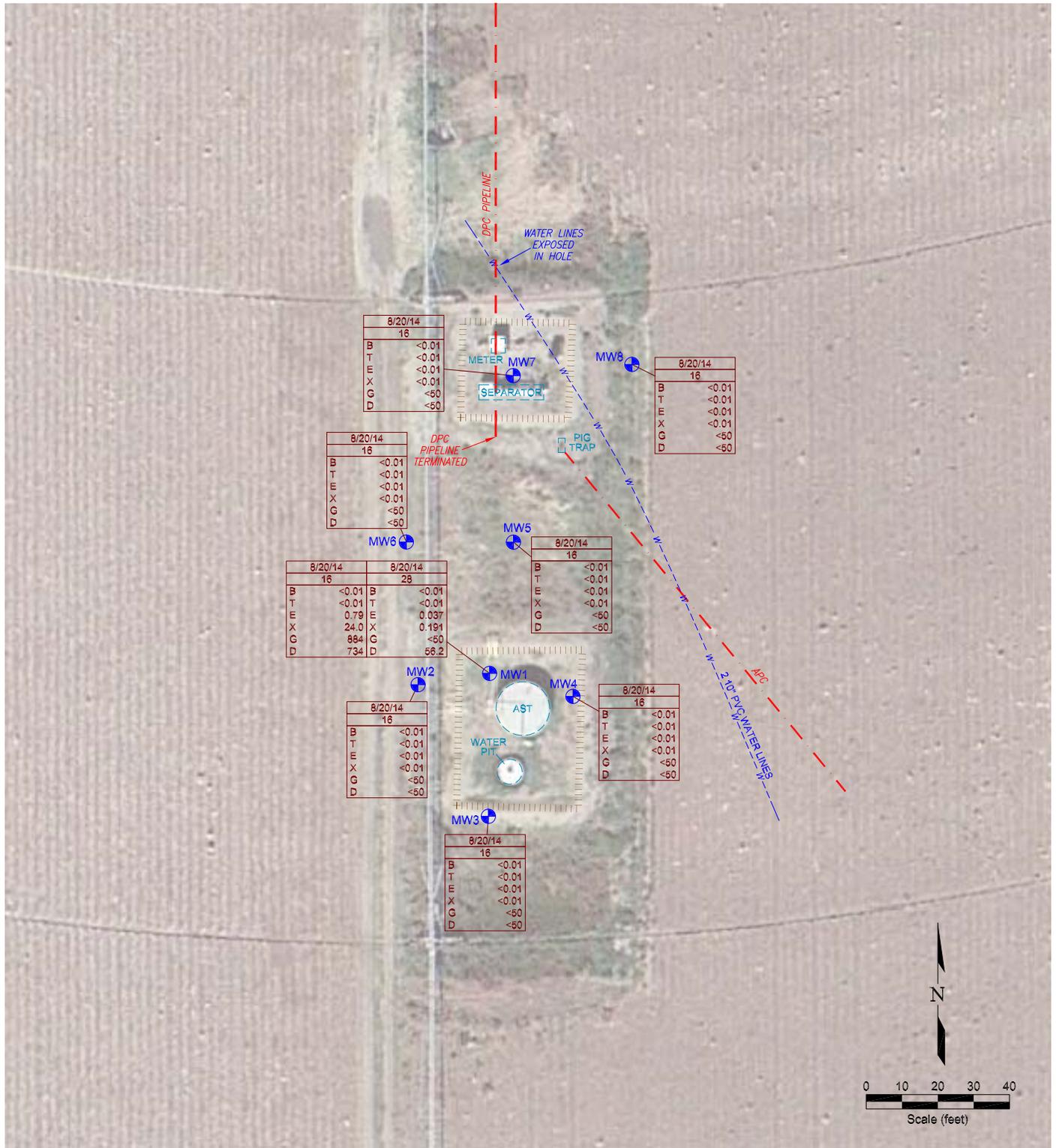
Project No. C014-027	Prepared by	Drawn by JMA
Date 8/28/14	Reviewed by	Filename 14027Q





LEGEND

CL	Clay, low-plasticity	SW	Sand well-graded	<p>Cased interval</p> <p>Screened interval</p> <p>0 PID reading (ppm)</p> <p>Uncased interval</p> <p>Plug-back interval</p>
ML	Silt low-plasticity	GW	Gravel well-graded	
SC	Sand, clayey	GP	Gravel poorly-graded	
SM	Sand, silty		Topsoil	



LEGEND

- MONITORING WELL
- CONTAINMENT
- FORMER FACILITY
- PIPELINE
- WATER LINE (buried)

8/20/14	
16	
B	<0.01
T	<0.01
E	<0.01
X	<0.01
G	<50
D	<50

DATE SAMPLED
 SAMPLE DEPTH (ft)
 BENZENE (mg/kg)
 TOLUENE (mg/kg)
 ETHYLBENZENE (mg/kg)
 TOTAL XYLENES (mg/kg)
 TPH-GRO (mg/kg)
 TPH-DRO (mg/kg)

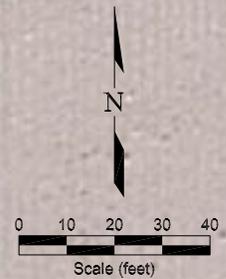
NA

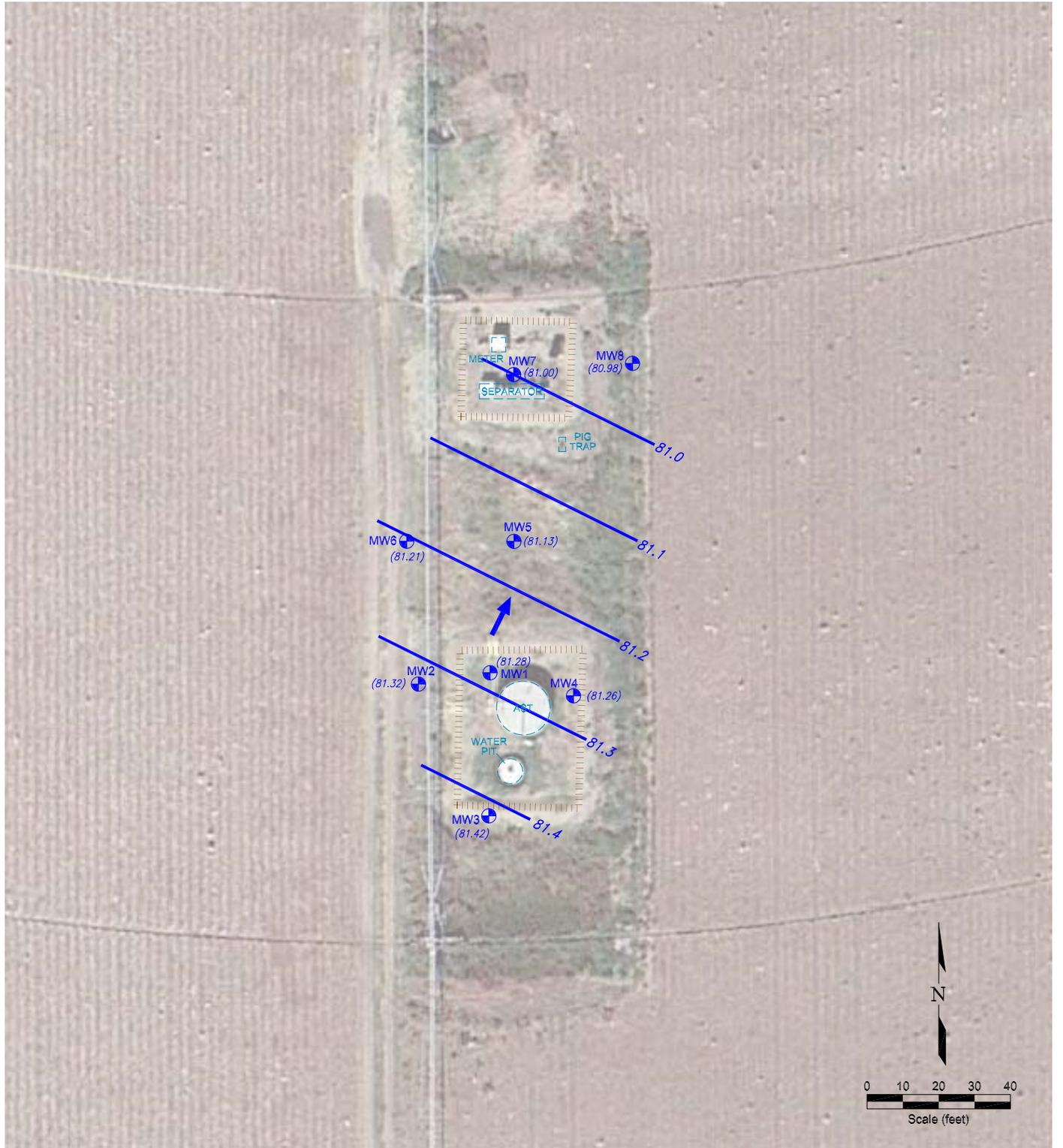
NOT ANALYZED

Figure 4
SOIL CHEMISTRY

Homestead Oil - Stephens 1
 SW NW Section 15, T4N, R66W
 Weld County, Colorado

Project No. C014-027	Prepared by	Drawn by JMA
Date 8/28/14	Reviewed by	Filename 14027Q





LEGEND

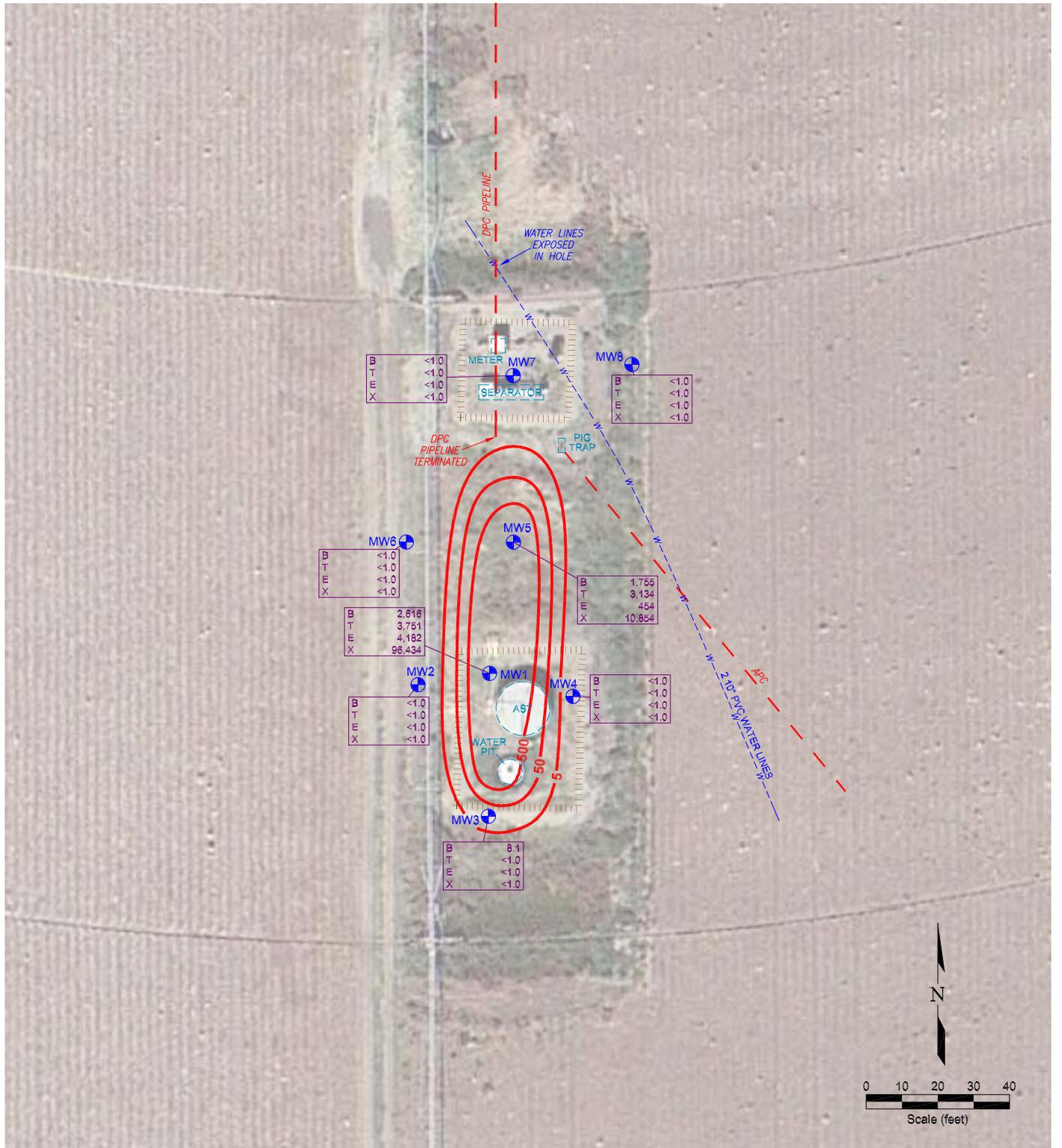
-  MONITORING WELL
-  CONTAINMENT
-  FORMER FACILITY
-  GROUND WATER ELEVATION (ft above arbitrary datum)
-  WATER TABLE CONTOUR
-  GROUND WATER FLOW DIRECTION

Figure 5
INFERRED GROUNDWATER CONTOUR
AUGUST 20, 2014

Homestead Oil - Stephens 1
 SW NW Section 15, T4N, R66W
 Weld County, Colorado

Project No. C014-027	Prepared by	Drawn by JMA
Date 8/28/14	Reviewed by	Filename 14027Q





LEGEND

	MONITORING WELL								
	CONTAINMENT								
	FORMER FACILITY								
	PIPELINE								
	WATER LINE (buried)								
<table border="1"><tr><td>B</td><td><1.0</td></tr><tr><td>T</td><td><1.0</td></tr><tr><td>E</td><td><1.0</td></tr><tr><td>X</td><td><1.0</td></tr></table>	B	<1.0	T	<1.0	E	<1.0	X	<1.0	BENZENE (ug/L) TOLUENE (ug/L) ETHYLBENZENE (ug/L) TOTAL XYLENES (ug/L)
B	<1.0								
T	<1.0								
E	<1.0								
X	<1.0								
	BENZENE ISOCONCENTRATION (ug/L) Dashed where inferred								

Figure 6
GROUND WATER CHEMISTRY MAP
AUGUST 20, 2014

Homestead Oil - Stephens 1
 SW NW Section 15, T4N, R66W
 Weld County, Colorado

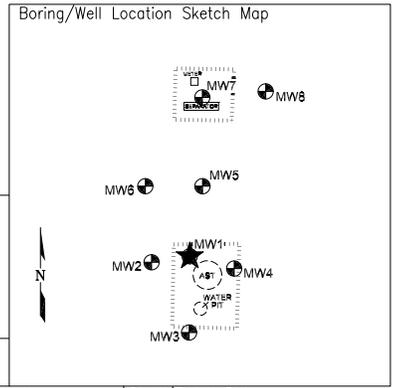
Project No. C014-027	Prepared by	Drawn by JMA
Date 8/28/14	Reviewed by	Filename 14027Q



APPENDIX A
BORING LOGS



BORING/WELL CONSTRUCTION LOG



Page 1 of 2

Boring/Well No. MW1		Total Depth 36'	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado			
Project No./Name C014-027/Homestake Oil Stevens 1		Drilling Contractor/Driller DrillPro				
Geologist/Office PVH		Approved By				
Drilling Equipment/Method Hurricane		Size/Type of Bit 2.5" direct push	Sampling Method direct push	Start/Finish Date 8/20/14		
Well Installed? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Casing Mtrl./Dia. PVC/1"	Screen: Type slotted Mtrl. PVC Length 10' Dia. 1" Slot Size 0.010"			
Elevation of: (ft. above datum)	Ground Surface .	Top of Well Casing 99.22	Top of Screen 84.22	Bottom of Screen 74.22	Ground Water Surface/Date Measured 81.28 8/20/14	

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
5	Bentonite	1" Blank	 GW	Roadbase, sandy pit-run fill, light odor, no stain		4	14
					Sand, no stain, no odor		8
10				coarse			
				light brown w/small gravel, moderate petroleum odor		12	35
15	#10-20 Silica Sand	1" Screen	 SW	brown		14	3780
				Water level 17.94'		16	5000+
				moist, gray		18	5000+
20				wet, moderate odor		20	4100

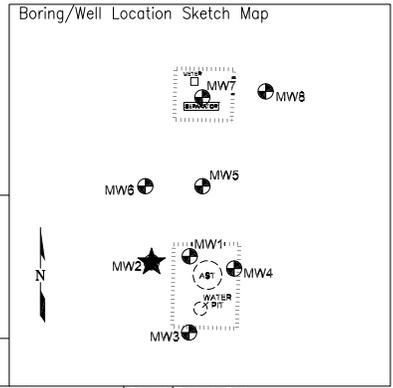
BORING/WELL CONSTRUCTION LOG

Boring/Well No. MW1	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado
Project No./Name C014-027/Homestake Oil Stephens 1	

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
			SW	Sand, continued		22	5200
			ML	Silt, sandy			
25	#10-20 Silica Sand	1" Screen	SW	Sand, coarse, gray, light to moderate petroleum odor gray, wet same -> brown color		24	3720
			ML	Silt, sandy		26	1760
			SW	Sand, coarse, black, with weathered odor moderate odor		28	2080
30			SW			30	2100
			SW	could be slough		32	535
35						34	815
				TD 36'		36	860
40							
45							



BORING/WELL CONSTRUCTION LOG



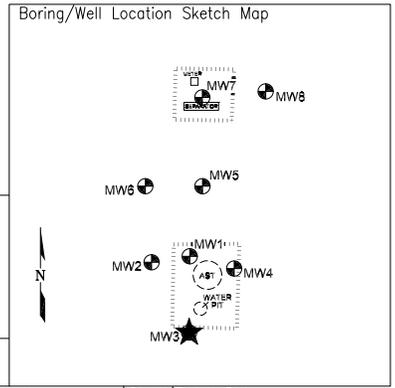
Page 1 of 2

Boring/Well No. MW2		Total Depth 25'	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado			
Project No./Name C014-027/Homestake Oil Stephens 1		Drilling Contractor/Driller DrillPro				
Geologist/Office PVH		Approved By				
Drilling Equipment/Method Hurricane		Size/Type of Bit 2.5" direct push	Sampling Method direct push	Start/Finish Date 8/20/14		
Well Installed? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Casing Mtrl./Dia. PVC/1"	Screen: Type slotted Mtrl. PVC Length 10' Dia. 1" Slot Size 0.010"			
Elevation of: (ft. above datum)	Ground Surface .	Top of Well Casing 99.43	Top of Screen 84.43	Bottom of Screen 74.43	Ground Water Surface/Date Measured 81.32 8/20/14	

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
5	Bentonite	1" Blank	GW	Roadbase			
			SW	Sand, brown, moist, no stain, no odor		4	0
			SC	Sand, clayey, no stain, no odor		8	0
			SM	Sand, silty, moist, no stain, no odor		12	7
15	#10-20 Silica Sand	1" Screen	SW	Sand, coarse, brown, no stain, no odor		16	0
				Water level 18.11' wet			
20			GP	Sand and gravel, brown, no stain, no odor		20	0



BORING/WELL CONSTRUCTION LOG



Page 1 of 2

Boring/Well No. MW3		Total Depth 25'	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado			
Project No./Name C014-027/Homestake Oil Stevens 1		Drilling Contractor/Driller DrillPro		Approved By		
Geologist/Office PVH		Drilling Equipment/Method Hurricane		Size/Type of Bit 2.5" direct push	Sampling Method direct push	
Start/Finish Date 8/20/14						
Well Installed? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Casing Mtrl./Dia. PVC/1"	Screen: Type slotted Mtrl. PVC Length 10' Dia. 1" Slot Size 0.010"			
Elevation of: (ft. above datum)		Ground Surface .	Top of Well Casing 99.91	Top of Screen 84.81	Bottom of Screen 74.81	
		Ground Water Surface/Date Measured 81.42		8/20/14		

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
	Bentonite	1" Blank		Topsoil			
				Sand, brown, fine, no stain, no odor		4	0
5							
				Sand, silty, no stain, no odor		8	0
10							
				Sand and gravel		12	0
15	#10-20 Silica Sand	1" Screen		Sand, coarse, no stain, no odor		16	0
20						20	0

Water level 18.39'
wet



BORING/WELL CONSTRUCTION LOG

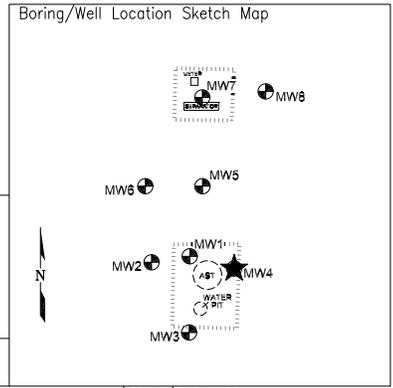
Page 2 of 2

Boring/Well No. MW3	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado
Project No./Name C014-027/Homestake Oil Stephens 1	

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
			SW	Sand, continued			
			ML	Silt, sandy, gray and black		22	1
			SW	Sand, coarse		24	0
25			TD 25'				
30							
35							
40							
45							



BORING/WELL CONSTRUCTION LOG



Page 1 of 2

Boring/Well No. MW4		Total Depth 25'	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado		
Project No./Name C014-027/Homestake Oil Stephens 1		Drilling Contractor/Driller DrillPro			
Geologist/Office PVH		Approved By			
Drilling Equipment/Method Hurricane		Size/Type of Bit 2.5" direct push	Sampling Method direct push	Start/Finish Date 8/20/14	
Well Installed? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Casing Mtrl./Dia. PVC/1"	Screen: Type slotted Mtrl. PVC Length 10' Dia. 1" Slot Size 0.010"		
Elevation of: (ft. above datum)		Ground Surface .	Top of Well Casing 99.89	Top of Screen 84.89	Bottom of Screen 74.89
				Ground Water Surface/Date Measured 81.26	8/20/14

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
	Bentonite	1" Blank		Topsoil			
5				Sand, fine, brown, no stain, no odor		4	0
10				Sand, clayey, brown, no stain, no odor		8	0
15	#10-20 Silica Sand	1" Screen		Sand, coarse		12	0
				Sand and gravel, dry, no stain, no odor			
20				Sand, coarse, no stain, no odor		16	0
				Water level 18.63' wet			



BORING/WELL CONSTRUCTION LOG

Page 2 of 2

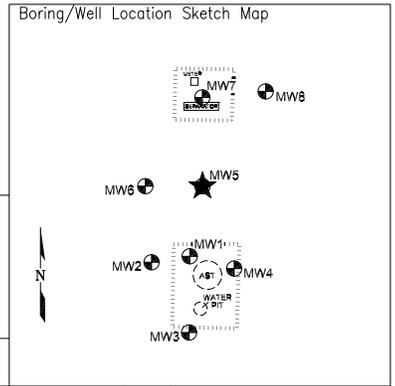
Boring/Well No. MW4	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado
Project No./Name C014-027/Homestake Oil Stephens 1	

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
<div style="text-align: center;">25</div>	<p style="font-size: small; margin-top: 10px;">#10-20 Silica Sand 1" Screen</p>		<div style="text-align: center;">SW</div> <div style="text-align: center; margin-top: 20px;">SW</div>	Sand, brown, wet, no stain, no odor Silt lens		24 — 0	
<div style="text-align: center;">30</div>							
<div style="text-align: center;">35</div>							
<div style="text-align: center;">40</div>							
<div style="text-align: center;">45</div>							

TD 25'



BORING/WELL CONSTRUCTION LOG



Page 1 of 2

Boring/Well No. MW5		Total Depth 28'	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado			
Project No./Name C014-027/Homestake Oil Stevens 1			Drilling Contractor/Driller DrillPro			
Geologist/Office PVH			Approved By			
Drilling Equipment/Method Hurricane			Size/Type of Bit 2.5" direct push	Sampling Method direct push	Start/Finish Date 8/20/14	
Well Installed? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Casing Mtrl./Dia. PVC/1"	Screen: Type slotted Mtrl. PVC Length 10' Dia. 1" Slot Size 0.010"			
Elevation of: (ft. above datum)		Ground Surface .	Top of Well Casing 99.68	Top of Screen 82.68	Bottom of Screen 72.68	Ground Water Surface/Date Measured 81.13 8/20/14

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
	Bentonite	1" Blank	GW	Roadbase			
5			SW	Sand, brown, no stain, no odor		4	0
			CL	Clay, sandy, firm			
			SC	Sand, clayey		8	0
10			SW	Sand, no stain, no odor		12	0
			SM	Sand, silty			
15			SW	Sand, coarse, no stain, no odor		16	0
	#10-20 Silica Sand	1" Screen	SW	wet Water level 18.55'			
20						20	0

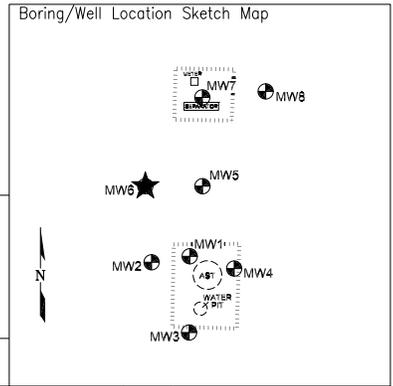
BORING/WELL CONSTRUCTION LOG

Boring/Well No. MW5	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado
Project No./Name C014-027/Homestake Oil Stephens 1	

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
25				Sand, coarse, no stain, no odor gray/black		24	0
				Sand, silty			
				Sand, coarse, dark gray and black TD 28'			
30							
35							
40							
45							



BORING/WELL CONSTRUCTION LOG



Page 1 of 2

Boring/Well No. MW6		Total Depth 25'	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado		
Project No./Name C014-027/Homestake Oil Stephens 1		Drilling Contractor/Driller DrillPro			Approved By
Geologist/Office PVH		Drilling Equipment/Method Hurricane		Size/Type of Bit 2.5" direct push	Sampling Method direct push
Well Installed? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Casing Mtrl./Dia. PVC/1"	Screen: Type slotted Mtrl. PVC Length 10' Dia. 1" Slot Size 0.010"		Start/Finish Date 8/20/14
Elevation of: (ft. above datum)		Ground Surface .	Top of Well Casing 99.51	Top of Screen 84.51	Bottom of Screen 74.51
				Ground Water Surface/Date Measured 81.21	8/20/14

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
	Bentonite	1" Blank	GW	Roadbase			
5			SW	Sand, brown, moist, no stain, no odor		4	0
			CL	Clay, sandy, firm			
10			SC	Sand, clayey		8	0
			SW	Sand, no stain, no odor			
15	#10-20 Silica Sand	1" Screen	GP	Sand and gravel			
			SW	Sand, no stain, no odor brown		16	0
				Water level 18.30'			
20			GP	Sand and gravel, wet, no stain, no odor		20	0



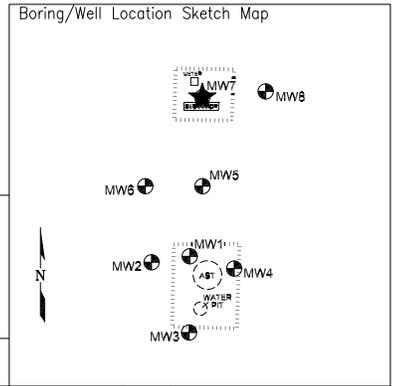
BORING/WELL CONSTRUCTION LOG

Boring/Well No. MW6	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado
Project No./Name C014-027/Homestake Oil Stephens 1	

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
25			Sand and gravel, continued			24	0
30			TD 25'				
35							
40							
45							



BORING/WELL CONSTRUCTION LOG



Page 1 of 2

Boring/Well No. MW7		Total Depth 25'	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado			
Project No./Name C014-027/Homestake Oil Stephens 1		Drilling Contractor/Driller DrillPro				
Geologist/Office PVH		Approved By				
Drilling Equipment/Method Hurricane		Size/Type of Bit 2.5" direct push	Sampling Method direct push	Start/Finish Date 8/20/14		
Well Installed? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Casing Mtrl./Dia. PVC/1"	Screen: Type slotted Mtrl. PVC Length 10' Dia. 1" Slot Size 0.010"			
Elevation of: (ft. above datum)		Ground Surface .	Top of Well Casing 100.00	Top of Screen 85.00	Bottom of Screen 75.00	Ground Water Surface/Date Measured 81.00 8/20/14

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
5			GW	Roadbase			
			SW	Sand, brown, no stain, no odor		4	0
10			CL	Clay, sandy			
			SC	Sand, clayey		8	0
15			SW	Sand, no stain, no odor			
			GP	Sand and gravel		12	0
20			GP	Sand and gravel			
			SW	Sand wet, no stain, no odor Water level 19.00'		16	0
			GP	Sand and gravel, wet, no stain, no odor			
						20	0



BORING/WELL CONSTRUCTION LOG

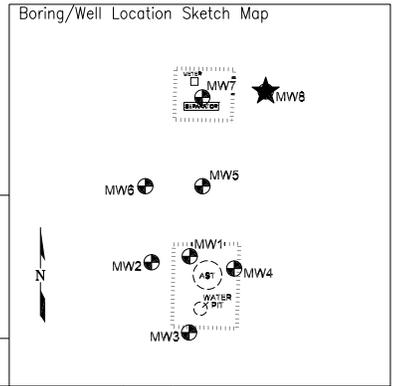
Page 2 of 2

Boring/Well No. MW7	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado
Project No./Name C014-027/Homestake Oil Stephens 1	

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
25			Sand and gravel, continued		24	0	
30							
35							
40							
45							



BORING/WELL CONSTRUCTION LOG



Page 1 of 2

Boring/Well No. MW8		Total Depth 25'	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado			
Project No./Name C014-027/Homestake Oil Stevens 1		Drilling Contractor/Driller DrillPro				
Geologist/Office PVH		Approved By				
Drilling Equipment/Method Hurricane		Size/Type of Bit 2.5" direct push	Sampling Method direct push	Start/Finish Date 8/20/14		
Well Installed? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Casing Mtrl./Dia. PVC/1"	Screen: Type slotted Mtrl. PVC Length 10' Dia. 1" Slot Size 0.010"			
Elevation of: (ft. above datum)	Ground Surface .	Top of Well Casing 99.29	Top of Screen 84.29	Bottom of Screen 74.29	Ground Water Surface/Date Measured 80.96 8/20/14	

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
	Bentonite	1" Blank		Topsoil			
5				Sand, fine, brown, moist, no stain, no odor		4	0
						8	0
10				Sand, silty			
				Sand, no stain, no odor		12	0
15	#10-20 Silica Sand	1" Screen		Sand and gravel, no stain, no odor		16	0
20				wet, brown, no stain, no odor Water level 18.33'		20	0

BORING/WELL CONSTRUCTION LOG

Boring/Well No. MW8	Location Homestake Oil Stevens 1 SW NW Sec 15, T4N, R66W Weld County, Colorado
Project No./Name C014-027/Homestake Oil Stephens 1	

DEPTH (feet)	WELL CONSTRUCTION		LITHOLOGY		Penetration Rate (blows/ft)	Sample Interval (feet)	PID Values (ppm)
			GRAPHIC LOG	VISUAL DESCRIPTION			
25			Sand and gravel, continued		24	0	
30							
35							
40							
45							

APPENDIX B

SAMPLING PLAN

SAMPLING METHODS AND PROCEDURES

Water Level Measurements

All ground water level measurements will be obtained using an electric measuring device, which indicates when a probe is in contact with ground water. Measurements will be obtained by lowering the device into the well until the water surface had been encountered, and by measuring the distance from the top of the inside riser pipe to the probe. All of the measurements will be recorded to the nearest 0.01 ft. To minimize cross-contamination, the water level indicator will be decontaminated with isopropyl alcohol and distilled water between each well.

Monitoring Well Sampling

All monitoring wells were sampled from the “cleanest” to the “most contaminated” according to the protocols listed below.

Field Protocol

- Step 1 Measure water level in each well.
- Step 2 Purge each monitoring well by evacuating a minimum of three well bore volumes using a disposable polyethylene bailer.
- Step 3 Collect water samples using a disposable polyethylene bailer.
- Step 4 Cool samples to approximately 4°C for transportation.
- Step 5 Store water samples and transport to a specific laboratory, following all documentation and chain-of-custody procedures.

Upon completion of ground water sampling, a chain-of-custody log will be completed. Chain-of-custody records include the following information: project, project number, shipped by, shipped to, suspected hazard, sampling point, location, field identification number, date collected, sample type, number of containers, analysis required, and sampler's signature.

The chain-of-custody records will be shipped with the samples to the laboratory. Upon arrival at the laboratory the samples will be checked in and signed by the appropriate laboratory personnel. Laboratory identification numbers will be noted on the chain-of-custody record. Upon completion of the laboratory analysis, the completed chain-of-custody record will be returned to the project manager.

Analytical Methods

The following list identifies the various chemical constituents and analytical methods which will be used for their quantification.

<u>Chemical Parameter</u>	<u>Method</u>
Benzene, Toluene, Ethylbenzene and Total Xylenes (BTEX)	EPA Method - 8260C

APPENDIX C

LABORATORY DOCUMENTATION

Test Report



August 24, 2014

Client: Fremont Environmental
Project: Homestead Oil / Noble Stephens #1
Lab ID: 2002
Date Samples Received: 8/20/2014
Number of Samples: 17
Sample Condition: Samples arrived intact and in appropriate sample containers
Sample Temperature: Within acceptable range of 2-6° C, or as specified in EPA Method

The quality control procedures associated with the requested analyses were satisfactorily passed before the samples were run.

Thank you for allowing eAnalytics Laboratory to provide laboratory services for you.

Sincerely,

A handwritten signature in black ink, appearing to read "Chris Dieken".

Christopher Dieken
Quality Assurance Manager

A handwritten signature in black ink, appearing to read "Todd Rhea".

Todd Rhea
Laboratory Manager

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538

Chain of Custody

eANALYTICS

LABORATORY

Chain of Custody Form

eANALYTICS LABORATORY		1767 Rocky Mountain Avenue Loveland CO 80538		Phone: (970) 667-6975	Fax: (970) 669-0941	www.eAnalyticsLab.com						
CLIENT INFORMATION <small>(*New Clients please fill out completely)</small>				ANALYSIS INFORMATION <small>(Select analysis by checking box on corresponding sample line)</small>								
Company: Fremont Environmental				Number of Containers Matrix: (S) Soil (W) Water (V) Vapor (O) Other	BTEX (EPA 8260)	BTEX Naphthalene (EPA 8260)	TPH - GRO/DRO (EPA 8260/8015)	SAR (US Dept of Ag Method 20B)	EC (US Dept of Ag Method 3)	pH (EPA 9045D)	Other Analysis:	
Project: <u>HOMESTEAD OIL / NOBLE STEPHENS #1</u>												
Project Manager: Paul Henehan												
Sampler:												
Phone/Email: 303-956-8714												
Address: P.O. Box 1289 Wellington CO 80549												
Lab ID	Sample Name	Sampling Date/Time										
1	MW-1	8/20/14	AM/PM	2W	✓							
2	MW-2	↓	AM/PM		✓							
3	MW-3		AM/PM		✓							
4	MW-4		AM/PM		✓							
5	MW-5		AM/PM		✓							
6	MW-6		AM/PM		✓							
7	MW-7		AM/PM		✓							
8	MW-8		AM/PM	2W	✓							
9	MW-1 16 FT		AM/PM	1S		✓	✓					
10	MW-1 28 FT		AM/PM									
11	MW-2 16 FT		AM/PM									
12	MW-3 16 FT		AM/PM									
13	MW-4 16 FT		AM/PM									
14	MW-5 16 FT		AM/PM									
15	MW-6 16 FT		AM/PM	1S		✓	✓					
Comments: <u>BILL FREMONT</u>												
Turnaround Time (Business Days) <small>TAT begins when sample is received by eANALYTICS</small> <input checked="" type="checkbox"/> Normal (5-10 Days) <input type="checkbox"/> 3 Day (1,25x) <input type="checkbox"/> 2 Day (1,5x) <input type="checkbox"/> 1 Day (2x) <input type="checkbox"/> Next Bus Morning (Noble Pricing)						Record of Custody Relinquished by: _____ Date: _____ Company: FREMONT ENVIRONMENTAL Received by: <u>[Signature]</u> Date: <u>8/20/14</u> Company: _____ Time: _____						
For eANALYTICS Use Samples Received Intact <input checked="" type="radio"/> Yes <input type="radio"/> No Received Within Temperature Range (2-6°C) <input checked="" type="radio"/> Yes <input type="radio"/> No Sample Preservative <input checked="" type="radio"/> None <input type="radio"/> Acid <input type="radio"/> Other						Relinquished by: _____ Date: _____ Company: _____ Time: _____ Received by: <u>[Signature]</u> Date: <u>8/20/14</u> Company: eANALYTICS Time: _____						

WO # 2002

eANALYTICS: Environmental testing made Easy

Page 1 of 2

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538



Client: Fremont Environmental Lab ID: 2002

Project: Homestead Oil / Noble Stephens #1

Analysis: Volatile Organics Method: EPA8260
TPH EPA8260/8015

Sample Name	Benzene mg/kg	Toluene mg/kg	Ethyl- benzene mg/kg	Total Xylenes mg/kg	Naph- thalene mg/kg	TPH GRO C6-C10 mg/kg	TPH DRO C10-C28 mg/kg	Date	Date	Lab ID
								Sampled	Analyzed	
MW-1 16 Ft	< 0.01	0.053	0.790	24.0	2.49	884	734	08/20/14	08/20/14	2002 9
MW-1 28 Ft	< 0.01	< 0.01	0.037	0.191	0.063	< 50	56.2	08/20/14	08/20/14	2002 10
MW-2 16 Ft	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	08/20/14	08/20/14	2002 11
MW-3 16 Ft	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	08/20/14	08/20/14	2002 12
MW-4 16 Ft	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	08/20/14	08/20/14	2002 13
MW-5 16 Ft	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	08/20/14	08/20/14	2002 14
MW-6 16 Ft	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	08/20/14	08/20/14	2002 15
MW-7 16 Ft	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	08/20/14	08/20/14	2002 16
MW-8 16 Ft	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	08/20/14	08/20/14	2002 17

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538



eANALYTICS
LABORATORY

Client: Fremont Environmental Lab ID: 2002
 Project: Homestead Oil / Noble Stephens #1
 Analysis: Volatile Organics Method: EPA8260

Sample Name	Benzene ug/L	Toluene ug/L	Ethyl- benzene ug/L	Total Xylenes ug/L	Date	Date	Lab ID
					Sampled	Analyzed	
MW-1	2616	3751	4182	96434	08/20/14	08/20/14	2002 1
MW-2	< 1.0	< 1.0	< 1.0	< 1.0	08/20/14	08/20/14	2002 2
MW-3	8.1	< 1.0	< 1.0	< 1.0	08/20/14	08/20/14	2002 3
MW-4	< 1.0	< 1.0	< 1.0	< 1.0	08/20/14	08/20/14	2002 4
MW-5	1755	3134	454	10854	08/20/14	08/20/14	2002 5
MW-6	< 1.0	< 1.0	< 1.0	< 1.0	08/20/14	08/20/14	2002 6
MW-7	< 1.0	< 1.0	< 1.0	< 1.0	08/20/14	08/20/14	2002 7
MW-8	< 1.0	< 1.0	< 1.0	< 1.0	08/20/14	08/20/14	2002 8

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538



Client: Fremont Environmental Lab ID: 2002
 Project: Homestead Oil / Noble Stephens #1 Method: EPA8260

Sample Name	Dibromo-fluoromethane % Recovery	1,2 Dichloro-ethane-D4 % Recovery	Toluene-D8 % Recovery	Bromo-fluorobenzene % Recovery	Date Sampled	Date Analyzed	Lab ID
MW-1 16 Ft	97	90	95	95	08/20/14	08/20/14	2002 9
MW-1 28 Ft	105	109	86	109	08/20/14	08/20/14	2002 10
MW-2 16 Ft	87	86	90	110	08/20/14	08/20/14	2002 11
MW-3 16 Ft	86	105	105	100	08/20/14	08/20/14	2002 12
MW-4 16 Ft	107	105	105	109	08/20/14	08/20/14	2002 13
MW-5 16 Ft	95	87	88	111	08/20/14	08/20/14	2002 14
MW-6 16 Ft	103	89	88	98	08/20/14	08/20/14	2002 15
MW-7 16 Ft	111	110	106	100	08/20/14	08/20/14	2002 16
MW-8 16 Ft	102	94	90	107	08/20/14	08/20/14	2002 17



Client: Fremont Environmental Lab ID: 2002
 Project: Homestead Oil / Noble Stephens #1 Method: EPA8260

Sample Name	Dibromo-fluoromethane % Recovery	1,2 Dichloro-ethane-D4 % Recovery	Toluene-D8 % Recovery	Bromo-fluorobenzene % Recovery	Date Sampled	Date Analyzed	Lab ID
MW-1	91	87	102	99	08/20/14	08/20/14	2002 1
MW-2	105	90	101	108	08/20/14	08/20/14	2002 2
MW-3	93	98	107	100	08/20/14	08/20/14	2002 3
MW-4	93	87	107	99	08/20/14	08/20/14	2002 4
MW-5	99	108	98	105	08/20/14	08/20/14	2002 5
MW-6	101	97	108	92	08/20/14	08/20/14	2002 6
MW-7	106	86	94	106	08/20/14	08/20/14	2002 7
MW-8	86	100	103	109	08/20/14	08/20/14	2002 8

eANALYTICS
LABORATORY

Client: Fremont Environmental Lab ID: 2002

Project: Homestead Oil / Noble Stephens #1

Analysis: Volatile Organics Method: EPA8260
TPH EPA8260/8015

Sample Name	Benzene % Rec	Toluene % Rec	Ethyl- benzene % Rec	Total Xylenes % Rec	Naph- thalene % Rec	TPH GRO C6-C10 % Rec	TPH DRO C10-C28 % Rec	Date Analyzed	Lab ID
Laboratory Control Sample (70-130%)	94	90	93	92	103	101	92	08/20/14	LCS 2002 1
Method Blank	< 0.01 mg/kg	< 0.01 mg/kg	< 0.01 mg/kg	< 0.01 mg/kg	< 0.01 mg/kg	< 50 mg/kg	< 50 mg/kg	08/20/14	MB 2002 1

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538

eANALYTICS
LABORATORY

Client: Fremont Environmental Lab ID: 2002
 Project: Homestead Oil / Noble Stephens #1
 Analysis: Volatile Organics Method: EPA8260

Sample Name	Benzene % Rec	Toluene % Rec	Ethyl- benzene % Rec	Total Xylenes % Rec	Date Analyzed	Lab ID
Laboratory Control Sample (70-130%)	90	93	97	99	08/20/14	LCS 2002 1
Method Blank	< 1.0	< 1.0	< 1.0	< 1.0	08/20/14	MB 2002 1
	ug/L	ug/L	ug/L	ug/L		

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538