FREMONT ENVIRONMENTAL INC.

December 19, 2014

Mr. Jacob Evans
Noble Energy
1625 Broadway, Suite 2000
Denver, CO 80202

Subject: **Excavation Report**
Greenhead 18-11,12
API # 05-123-17337, 17338
NESW Sec 7, T4N, R66W
Weld County, Colorado
Fremont Project No. C014-078
Facility #311394 (Location), Spill #400738091

Dear Mr. Evans:

Enclosed please find a copy of the above referenced Excavation Report for the Greenhead 18-11,12 release site in Weld County, Colorado. The enclosed report describes excavation actions to remove impacted soil from 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

1759 REDWING LANE, BROOMFIELD, CO 80020
(303) 956-8714 (DIRECT)

EXCAVATION REPORT

NOBLE ENERGY INC.

GREENHEAD 18-11, 12

WELD COUNTY, COLORADO

FREMONT PROJECT NO. C014-078

FACILITY #311394 (LOCATION), SPILL#400738091

Prepared by:

Fremont Environmental Inc.
1759 Redwing Lane
Broomfield, CO 80020
(303) 956-8714

December 19, 2014

TABLE OF CONTENTS

Table

Figures

Appendices

EXCAVATION REPORT

NOBLE ENERGY INC.

GREENHEAD 18-11, 12

WELD COUNTY, COLORADO

FREMONT PROJECT NO. C014-078

FACILITY #311394 (LOCATION), SPILL#400738091

1.0 INTRODUCTION

The purpose of this document is to present information collected during the excavation of petroleum-impacted soil at the Greenhead 18-11,12 water vault release location in Weld County, Colorado. This one day excavation project was completed on November 21, 2014.

2.0 BACKGROUND INFORMATION

2.1 Site Location

The Greenhead 18-11,12 site is located approximately two miles east of Milliken, Colorado in Weld County as shown on Figure 1. The site is located in a rural and agricultural area one mile northwest of the intersection of County Road 46 and Highway 60. The location is further described as the NE ¼ of the SW ¼ of Section 7, Township 4N, Range 66W.

2.2 Site History

The site consists of the water vault for the Greenhead 18-11,12 natural gas wells. The Greenhead 18-11 well was drilled in 1993 to a depth of approximately 7,555 feet. Soil impacts were recently identified at the facility after the water vault failed an integrity test. This failure initiated this excavation effort.

3.0 FIELD ACTIVITIES

Remediation efforts consisted of the excavation of petroleum-impacted soil at this site. The soil consisted of roadbase which was underlain by sand to a depth of at least six feet. Ground water was encountered during the excavation work at approximately six feet. The excavated area is shown on Figure 2.

Excavation was initiated at the former water vault location on November 21, 2014. Soil removal was limited to the area immediately below the former water vault; four sidewall samples collected after the vault was removed indicated that no impacts were present on the sidewalls. However, ground water was present at the bottom of the excavation. When tested, this ground water had benzene concentrations greater than the allowable limits set forth in the Colorado Oil and Gas Conservation Commission's (COGCC's) Table 910-1.

The sidewall samples were collected as grab samples near the lower portion of the excavation wall at depths of four feet. Since ground water was encountered, one water sample was collected.

The soil samples were analyzed by eAnalytics Laboratory, Inc. of Loveland, Colorado for benzene, toluene, ethylbenzene and xylenes (BTEX), naphthalene, Total Petroleum Hydrocarbons – Gasoline Range Organics (TPH-GRO) by EPA method 8260C, and TPH – Diesel Range Organics (TPH-DRO) by EPA method 8015. The ground water sample was analyzed for BTEX by EPA method 8260C. The laboratory reports and chain-of-custody documentation are included in Appendix A.

Summaries of the laboratory data are included in Tables 1 and 2. Table 1 presents the laboratory analyses for each soil sample. In addition, a column stating whether the laboratory analyses passed or failed the COGCC limits is provided. The laboratory

analyses indicated that all four soil samples collected from the sidewalls achieved the COGCC Table 910-1 limits. Table 2 presents the ground water analytical data; the water sample (W1) exceeded the COGCC Table 910-1 allowable limits. The benzene concentration in sample W1 was 128 ug/L.

A total of 10 cubic yards of petroleum impacted soil were removed by B&G Oilfield Services Inc. from the location over this one day project. The impacted soil was disposed of at the Waste Management Inc. Buffalo Ridge landfill in Keenesburg, Colorado as non-hazardous waste. Gypsum was placed at the water table during backfilling to promote biodegradation of any residual petroleum in the soil and ground water. Gypsum, which is also known as hydrated calcium sulfate, releases sulfate into the ground water which can enhance anaerobic biodegradation of petroleum constituents.

4.0 DISCUSSION

As demonstrated by the soil sampling, the petroleum impacted soil was removed from the site by excavation during the removal of the water vault. This was confirmed by the analyses of the soil samples collected from the excavation sidewalls which were below the COGCC Table 910-1 concentrations. Approximately 10 cubic yards of impacted soil were removed and transported to the landfill.

Ground water was encountered during the excavation and one sample (W1) was collected and analyzed for BTEX. The benzene concentration exceeded the COGCC Table 910-1 limit in this sample. The benzene concentration in sample W1 was 128 ug/L.

Since the water sample had a benzene concentration that exceeded the COGCC limit, monitoring wells will need to be installed at this site to delineate the horizontal extent

of ground water impacts. Installation and monitoring of the wells will be discussed in separate reporting.

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.**

For MVA

12/19/14

_____ Date_____

Mark Taylor
Construction Consultant

Reviewed by:

12/19/14

_____ Date_____

Paul V. Henehan, P.E.
Senior Consultant

TABLES

TABLE 1

SUMMARY OF SOIL CHEMISTRY DATA

NOBLE ENERGY INC.

GREENHEAD 18-11,12

FREMONT PROJECT NO. C014-078

Sample	Depth (ft)	Date Sampled	Location	Pass or Fail	Benzene mg/kg	Toluene mg/kg	Ethyl-Benzene mg/kg	Xylenes mg/kg	Naphth-alene mg/kg	TPH GRO mg/kg	TPH DRO mg/kg
N-4'	4	11/14/2014	Sidewall	Pass	<0.01	<0.01	<0.01	<0.01	<0.01	<50	<50
S-4'	4	11/14/2014	Sidewall	Pass	<0.01	<0.01	<0.01	<0.01	<0.01	<50	<50
E-4'	4	11/14/2014	Sidewall	Pass	<0.01	<0.01	<0.01	<0.01	<0.01	<50	<50
W-4'	4	11/14/2014	Sidewall	Pass	<0.01	<0.01	<0.01	<0.01	<0.01	<50	<50
COGCC Table 910-1 Limits					0.17	85	100	175	23	500	500

Bold faced values exceed the COGCC Table 910-1 concentrations

TABLE 2

SUMMARY OF GROUND WATER CHEMISTRY DATA

NOBLE ENERGY INC.

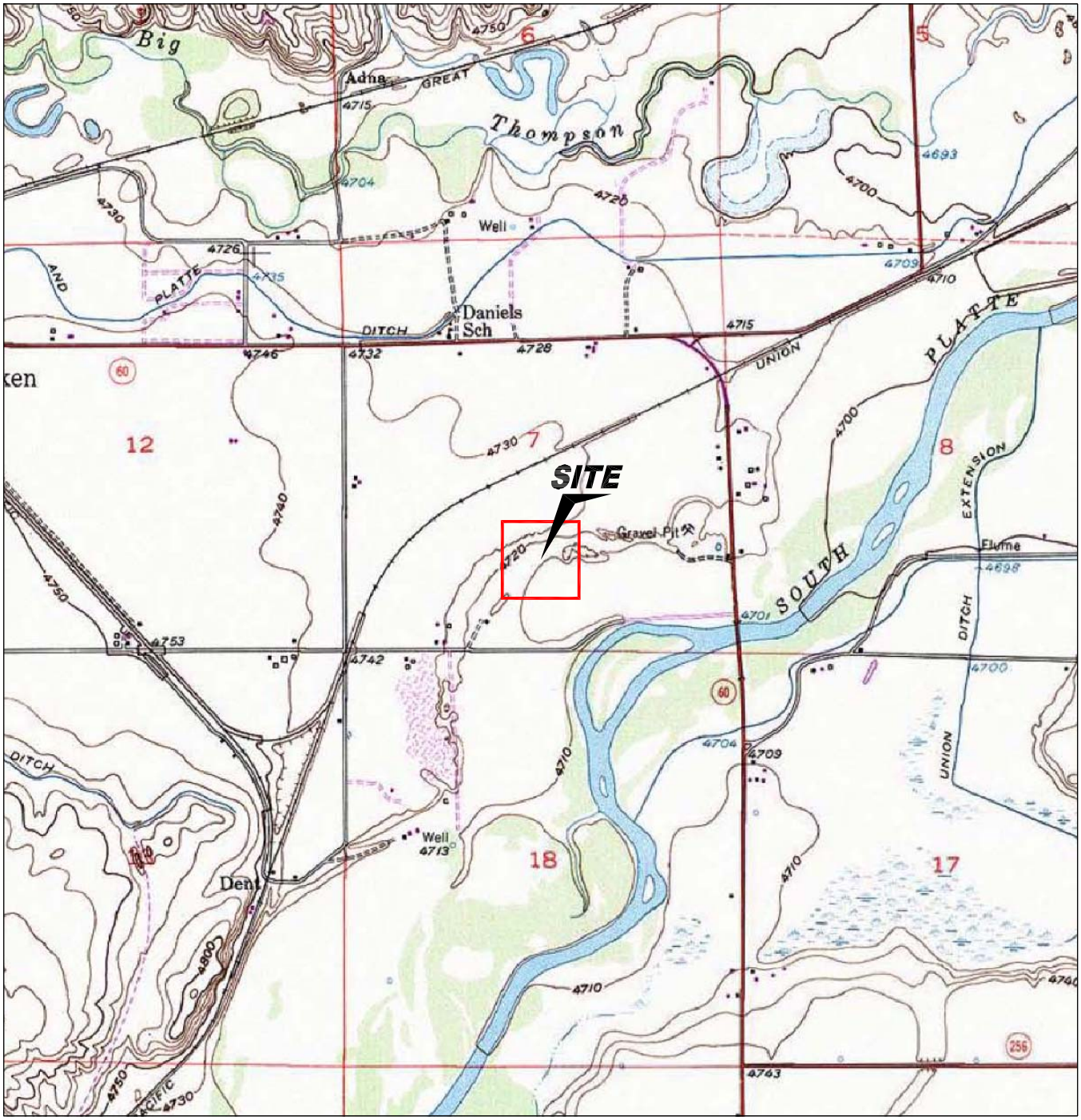
GREENHEAD 18-11,12

FREMONT PROJECT NO. C014-078

SAMPLE LOCATION	DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL BENZENE (µg/L)	TOTAL XYLENES (µg/L)
W1	11/14/14	**128**	369	69.4	932
Table 910-1 Limits		5	560	700	1,400

Bold face values exceed the COGCC limits

FIGURES



N

Scale (miles)
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
0 1000 2000 3000 4000 5000
Scale (feet)

USGS 7.5 MINUTE SERIES (TOPOGRAPHIC)

Figure 1
SITE LOCATION MAP

Noble Greenhead 18-11 & 18-12
SW SE Section 7, T4N, R66W
Weld County, Colorado

Project No.	Prepared by	Drawn by	
C014-078		JMA	FREMONT ENVIRONMENTAL
Date	Reviewed by	Filename	
11/21/14		14078T	

LEGEND

CONTAINMENT BERM

ABOVE GROUND STORAGE TANK

Figure 2

SITE MAP

Noble Greenhead 18-11 & 18-12
SW SE Section 7, T4N, R66W
Weld County, Colorado

Project No.	Prepared by	Drawn by
C014-078		JMA
Date	Reviewed by	Filename
12/11/14		14078Q

FREMONT ENVIRONMENTAL

LEGEND

CONTAINMENT BERM

ABOVE GROUND STORAGE TANK

SOIL SAMPLE LOCATION

11/14/14	
4	
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)

WATER SAMPLE LOCATION

11/14/14	
B	126
T	369
E	69.4
X	932

DATE SAMPLED
BENZENE (ug/L)
TOLUENE (ug/L)
ETHYLBENZENE (ug/L)
TOTAL XYLENES (ug/L)

Figure 3

EXCAVATION SOIL & WATER CHEMISTRY

Noble Greenhead 18-11 & 18-12
SW SE Section 7, T4N, R66W
Weld County, Colorado

Project No.	Prepared by	Drawn by
C014-078		JMA
Date	Reviewed by	Filename
12/21/14		14078Q

FREMONT ENVIRONMENTAL

APPENDIX A

LABORATORY DOCUMENTATION

Test Report

eANALYTICS LABORATORY

November 14, 2014

Client:	Fremont Environmental / Noble Energy
Project:	Greenhead 18-11, 12
Lab ID:	2458
Date Samples Received:	11/14/2014
Number of Samples:	5
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,

Christopher Dieken
Quality Assurance Manager

Todd Rhea
Laboratory Manager

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

(*New Clients please fill out completely)

Company: Fremont Environmental

Project: GREENHEAD 18-11, 12

Project Manager: Paul Henehan

Sampler: [illegible]

Phone/Email: 303-956-8714

Address: P.O. Box 1289

Wellington CO 80549

ANALYSIS INFORMATION

(Select analysis by checking box on corresponding sample line)

Lab ID	Sample Name	Sampling Date/Time	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
1	W1	11/14/14 AM/PM			✓						
2	N-4 FT	AM/PM				✓	✓	✓	✓	✓	
3	S-4 FT	AM/PM				✓	✓				HOLD
4	E-4 FT	AM/PM				✓	✓				HOLD
5	W-4 FT	AM/PM				✓	✓				HOLD
		AM/PM									BASED ON
		AM/PM									WATER RESU
		AM/PM									
		AM/PM									
		AM/PM									
		AM/PM									
		AM/PM									
		AM/PM									
		AM/PM									
		AM/PM									

Comments:

Turnaround Time (Business Days)

TAT begins when sample is received by eANALYTICS

- ○ Normal (5-10 Days)
- ○ 3 Day (1.25x)
- ○ 2 Day (1.5x)
- ○ 1 Day (2x)
- ☒ Next Bus Morning (Noble Pricing)

For eANALYTICS Use

Samples Received Intact	(Yes) / No	
Received Within Temperature Range (2-6°C)	(Yes) / No	
Sample Preservative	(Ice) / None	Acid / Other

Record of Custody

Relinquished by: [signature] Date 11/14/14

Company: FREMONT ENVIRONMENTAL Time

Received by: Date

Company: Time

Relinquished by: Date

Company: Time

Received by: Date 11-14-14

Company: eANALYTICS Time 1030 PM

WO # 2458

eANALYTICS: Environmental testing made Easy

Page 1 of 1

eANALYTICS LABORATORY

Client:	Fremont Environmental / Noble Energy	Lab ID:	2458
Project:	Greenhead 18-11, 12		
Analysis:	Volatile Organics TPH	Method:	EPA8260 EPA8260/8015

Sample Name	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Napth-thalene	TPH GRO C6-C10	TPH DRO C10-C28	Date Sampled	Date Analyzed	Lab ID	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg				
N-4 FT	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	11/14/14	11/14/14	2458	2

eANALYTICS
LABORATORY

Client:	Fremont Environmental / Noble Energy	Lab ID:	2458
Project:	Greenhead 18-11, 12		
Analysis:	pH EC SAR	Method:	EPA9045D USDA 60 (3) USDA 60 (20B)

Sample Name	pH	EC	SAR	Date Sampled	Date Analyzed	Lab ID	
	su	mmhos/cm	ratio				
N-4 FT	**8.0**	**0.108**	**0.47**	11/14/14	11/14/14	2458	2

eANALYTICS
LABORATORY

Client:	Fremont Environmental / Noble Energy	Lab ID:	2458
Project:	Greenhead 18-11, 12		
Analysis:	Volatile Organics	Method:	EPA8260

Sample Name	Benzene ug/L	Toluene ug/L	Ethyl-benzene ug/L	Total Xylenes ug/L	Date Sampled	Date Analyzed	Lab ID	
W1	**128**	**369**	**69.4**	**932**	11/14/14	11/14/14	2458	1

Soil
Quality Control - Surrogate Recoveries

eANALYTICS LABORATORY

Client:	Fremont Environmental / Noble Energy	Lab ID:	2458
Project:	Greenhead 18-11, 12	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	
N-4 FT	101	93	105	107	11/14/14	11/14/14	2458	2

Water
Quality Control - Surrogate Recoveries

eANALYTICS LABORATORY

Client:	Fremont Environmental / Noble Energy	Lab ID:	2458
Project:	Greenhead 18-11, 12	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	
W1	91	88	93	86	11/14/14	11/14/14	2458	1

Soil
Quality Control - Analyses

eANALYTICS LABORATORY

Client:	Fremont Environmental / Noble Energy	Lab ID:	2458
Project:	Greenhead 18-11, 12		
Analysis:	Volatile Organics TPH	Method:	EPA8260 EPA8260/8015

Sample Name	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Napth-thalene	TPH GRO C6-C10	TPH DRO C10-C28	Date Analyzed		Lab ID
	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec			
Laboratory Control Sample	94	99	90	102	103	89	99	11/14/14	LCS	2458 1
(70-130%)										
Method Blank	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	11/14/14	MB	2458 1
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg			

eANALYTICS
LABORATORY

Client:	Fremont Environmental / Noble Energy	Lab ID:	2458
Project:	Greenhead 18-11, 12		
Analysis:	Volatile Organics	Method:	EPA8260

Sample Name	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Date Analyzed		Lab ID	
	% Rec	% Rec	% Rec	% Rec				
Laboratory Control Sample	94	98	102	90	11/14/14	LCS	2458	1
(70-130%)								
Method Blank	< 1.0	< 1.0	< 1.0	< 1.0	11/14/14	MB	2458	1
	ug/L	ug/L	ug/L	ug/L				

Test Report

eANALYTICS LABORATORY

November 15, 2014

Client:	Fremont Environmental / Noble Energy
Project:	Greenhead 18-11,12
Lab ID:	2458
Date Samples Received:	11/14/2014
Number of Samples:	5
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.

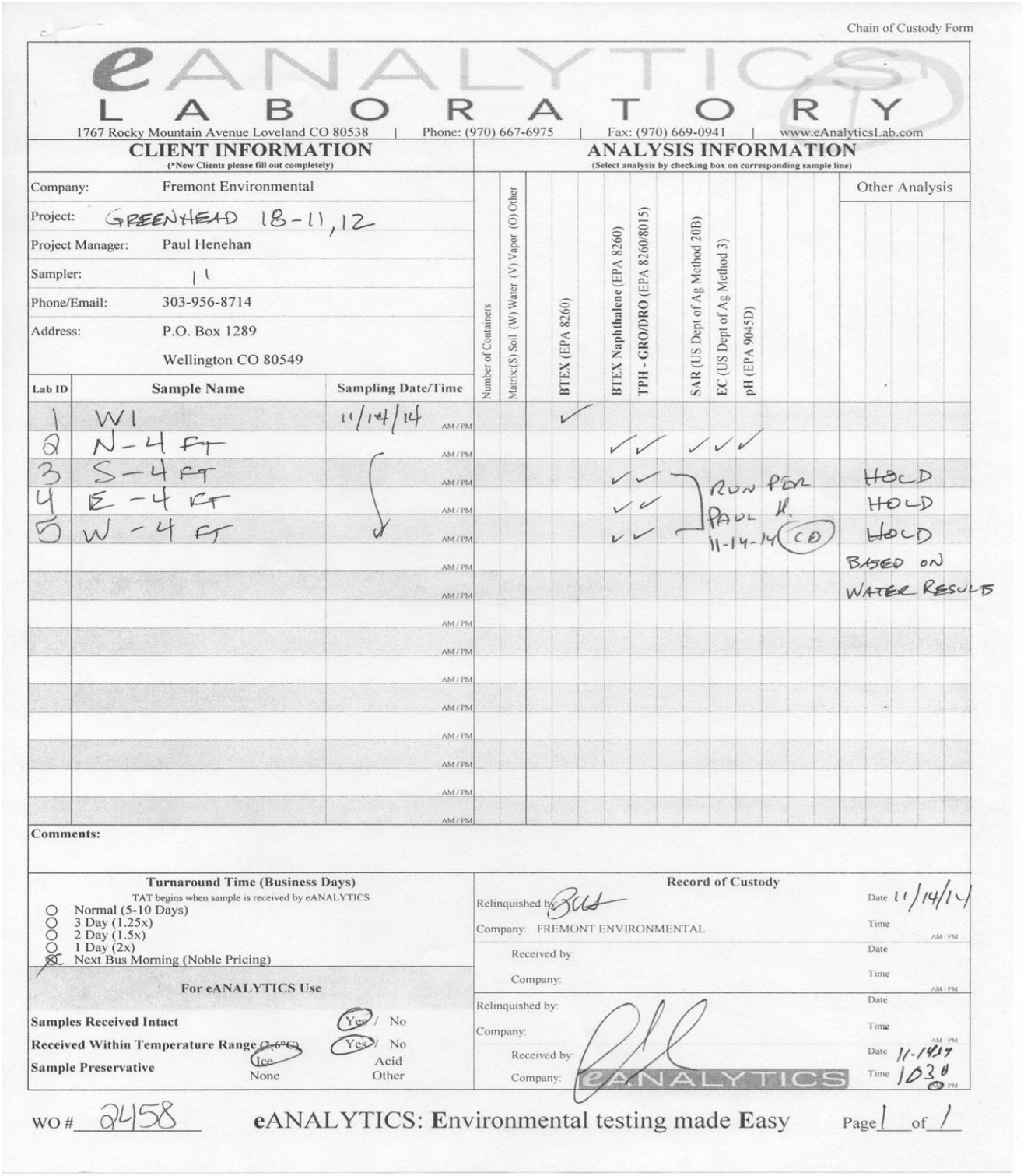
Sincerely,

Christopher Dieken
Quality Assurance Manager

Todd Rhea
Laboratory Manager

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 (*New Clients please fill out completely)

Company: Fremont Environmental
Project: GREENHEAD 18-11,12
Project Manager: Paul Henehan
Sampler: IL
Phone/Email: 303-956-8714
Address: P.O. Box 1289
Wellington CO 80549

ANALYSIS INFORMATION (Select analysis by checking box on corresponding sample line)

Lab ID	Sample Name	Sampling Date/Time	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
1	W1	11/14/14 AM/PM			✓						
2	N-4 FT	AM/PM				✓	✓	✓	✓	✓	HOLD
3	S-4 FT	AM/PM				✓	✓	RUN PER			HOLD
4	E-4 FT	AM/PM				✓	✓	PAUL H.			HOLD
5	W-4 FT	AM/PM				✓	✓	11-14-14 (CD)			BASED ON WATER RESULTS

Comments:

Turnaround Time (Business Days)
TAT begins when sample is received by eANALYTICS
- ○ Normal (5-10 Days)
- ○ 3 Day (1.25x)
- ○ 2 Day (1.5x)
- ○ 1 Day (2x)
- ☒ Next Bus Morning (Noble Pricing)

For eANALYTICS Use
Samples Received Intact (Yes) / No
Received Within Temperature Range (2-6°C) (Yes) / No
Sample Preservative (Ice) None Acid Other

Record of Custody
Relinquished by: [signature] Date 11/14/14
Company: FREMONT ENVIRONMENTAL Time
Received by: Date
Company: Time
Relinquished by: Date
Company: Time
Received by: [signature] Date 11-14-14
Company: eANALYTICS Time 1030

WO # 2458 eANALYTICS: Environmental testing made Easy Page 1 of 1

Soil
Sample Analysis

eANALYTICS LABORATORY

Client:	Fremont Environmental / Noble Energy	Lab ID:	2458
Project:	Greenhead 18-11,12		
Analysis:	Volatile Organics TPH	Method:	EPA8260 EPA8260/8015

Sample Name	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Napth-thalene	TPH GRO C6-C10	TPH DRO C10-C28	Date Sampled	Date Analyzed	Lab ID	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg				
S-4 FT	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	11/14/14	11/14/14	2458	3
E-4 FT	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	11/14/14	11/14/14	2458	4
W-4 FT	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	11/14/14	11/14/14	2458	5

Soil
Quality Control - Surrogate Recoveries

eANALYTICS LABORATORY

Client:	Fremont Environmental / Noble Energy	Lab ID:	2458
Project:	Greenhead 18-11,12	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	
S-4 FT	90	86	109	109	11/14/14	11/14/14	2458	3
E-4 FT	99	93	92	100	11/14/14	11/14/14	2458	4
W-4 FT	97	99	105	110	11/14/14	11/14/14	2458	5

Soil
Quality Control - Analyses

eANALYTICS LABORATORY

Client:	Fremont Environmental / Noble Energy	Lab ID:	2458
Project:	Greenhead 18-11,12		
Analysis:	Volatile Organics TPH	Method:	EPA8260 EPA8260/8015

Sample Name	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Napth-thalene	TPH GRO C6-C10	TPH DRO C10-C28	Date Analyzed		Lab ID
	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec			
Laboratory Control Sample	94	99	90	102	103	89	99	11/14/14	LCS	2458 1
(70-130%)										
Method Blank	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	11/14/14	MB	2458 1
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg			