

FREMONT ENVIRONMENTAL INC.

August 1, 2014

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

Subject: **Ground Water Monitoring Report**
Noble Energy Inc.
Libsack R G27-15
SWSE Sec 27, T4N, R65W
API # 05-123-13256
Weld County, Colorado
Fremont Project No. C013-009
Facility ID# 323601

Dear Mr. Jacobs:

Enclosed please find a copy of the above referenced Ground Water Monitoring Report for the Libsack R G27-15 site in Weld County, Colorado. The enclosed report describes monitoring and sampling efforts to assess 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

cc/enc:

GROUND WATER MONITORING REPORT

NOBLE ENERGY INC.

LIBSACK R G27-15

WELD COUNTY, COLORADO

FREMONT PROJECT NO. C013-009

FACILITY #323601

Prepared by:

**Fremont Environmental Inc.
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August 1, 2014

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 BACKGROUND INFORMATION 1

 2.1 Site Location 1

 2.2 Site History 2

 2.3 Remediation by Chemical Injection 2

3.0 GROUND WATER MONITORING ACTIVITIES..... 3

 3.1 Ground Water Level Measurements 3

 3.2 Ground Water Sampling and Analysis 4

4.0 DISCUSSION 4

5.0 REMARKS..... 5

Table

Table 1: Summary of Ground Water Elevation and Chemistry Data

Figures

- Figure 1: Site Location Map
- Figure 2: Site Map
- Figure 3: Inferred Ground Water Contours
- Figure 4: Ground Water Chemistry Map
- Figure 5: Benzene Isoconcentration Map

Appendices

- Appendix A: Sampling Plan
- Appendix B: Laboratory Documentation
- Appendix C: Remington Technologies Report

GROUND WATER MONITORING REPORT

NOBLE ENERGY INC.

LIBSACK R G27-15

WELD COUNTY, COLORADO

FREMONT PROJECT NO. C013-009

FACILITY #323601

1.0 INTRODUCTION

The purpose of this document is to present ground water quality data collected subsequent to excavation and remediation efforts at the Libsack R G27-15 tank battery site. Impacted soil and ground water were identified at this location due to a release from a buried flow line between the well and the separator. Excavation of the impacted soil was completed in June 2013. Further, 30 monitoring wells were installed at this site between June 14, 2013 and July 19, 2013 to delineate the magnitude and extent of subsurface impacts.

Due to the continued presence of elevated dissolved petroleum constituents in the ground water in several monitoring wells, Noble proceeded with the application of chemical injection into the subsurface during the week of November 11, 2013 in an effort to reduce those concentrations. The chemical injection did not appear to be as beneficial as had been anticipated, therefore, another injection event occurred on May 6, 2014. The initial results from that event indicate that petroleum impacts remain in the ground water.

2.0 BACKGROUND INFORMATION

2.1 Site Location

The Libsack R G27-15 facility is located approximately seven miles east of Gilcrest, Colorado in Weld County as shown on Figure 1. The site includes one storage tank as well as separation and metering equipment.

The facility is located in an agricultural area 0.2 miles west of County Road 45 and 0.1 miles north of County Road 40. The location is further described as the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of section 27, township 4N, range 65W. A Site Map is included as Figure 2.

2.2 Site History

The site is a natural gas production and oil storage facility for the Libsack R G27-15 natural gas well. This well was drilled in 1986 to a depth of approximately 7,225 feet. Surface impacts were identified at the facility during routine operations when stained soil was observed near the flow line adjacent to the separator.

Remediation efforts included the excavation of impacted soil adjacent to the flow line and separator. A total of 1,860 cubic yards of soil were removed in June 2013; the impacted soil was disposed of as non-hazardous waste. Ground water was present in the excavation at a depth of approximately four feet.

2.3 Remediation by Chemical Injection

Due to the continued presence of dissolved petroleum constituents downgradient from the area of excavation, Noble authorized the injection of a 14% solution of chemically oxygenated granular activated carbon (COGAC) which is a combination of calcium peroxide and granulated activated carbon (GAC). Calcium peroxide is utilized to provide dissolved oxygen to ground water. The GAC is used to absorb residual organics and prevent them from migrating with ground water movement.

During the week of November 11, 2013, 107 borings were advanced by Remington Technologies Inc. (RemTech) to a depth of seven feet with a Geoprobe rig to facilitate the injection of the COGAC solution. After the borehole was advanced, an inflatable packer was placed in the borehole and inflated such that the borehole was sealed below

four feet. The 14% COGAC solution was then injected under pressure and forced into the interval between four and seven feet. This work was undertaken during November 2013.

A second injection event took place on May 6, 2014. On that date, approximately 1,200 gallons of 12% COGAC slurry were injected into the subsurface via 14 temporary injection points. Additional details regarding this work are provided in RemTech's report which is provided in Appendix C.

Based on the quarterly sampling that has taken place since the COGAC injections, the effectiveness of this approach is unclear. The monitoring wells will continue to be sampled to determine the long term effectiveness of this remedial approach.

3.0 GROUND WATER MONITORING ACTIVITIES

3.1 Ground Water Level Measurements

As part of the quarterly monitoring program for this site, ground water levels were measured in 29 of the 30 monitoring wells on July 15, 2014 in accordance with the Sampling Plan included in Appendix A. It appears that MW-12 has been destroyed by agricultural operations at this location. The water level data are summarized in Table 1. Water table contours inferred from the July 2014 data are illustrated on Figure 3.

Based on these data, ground water is inferred to flow generally to the northeast with several localized variances. The water table gradient was calculated at approximately 0.003 feet per foot (ft/ft) for the July 2014 data. A center pivot sprinkler system is present at this location; it is possible that the application of a significant amount of water at this location may be causing some of the localized variances.

3.2 Ground Water Sampling and Analysis

Ground water samples were collected from the 29 remaining monitoring wells on July 15, 2014. The ground water samples were submitted to eAnalytics Laboratory, Inc. in Loveland, Colorado for analyses of benzene, toluene, ethylbenzene and xylenes (BTEX) by EPA Method 8260C. The ground water chemistry is illustrated on Figures 4 and 5.

The laboratory data indicated that the BTEX constituents were above their respective Colorado Oil and Gas Conservation Commission (COGCC) limits for water samples collected from MW-13, MW-17, MW-20 and MW-25. The maximum benzene concentration was observed in MW-17 which had a concentration of 1,081 ug/L.

The ground water analytical data are summarized in Table 1. A copy of the laboratory reports, quality control data, and chain-of-custody documentation are presented in Appendix B.

4.0 DISCUSSION

As a result of a release from the flow line near the separator at the Libsack R G27-15 location, an excavation was conducted in June 2013 to remove petroleum impacted soil. A total of 1,860 cubic yards of impacted soil was removed and transported to a landfill as non-hazardous waste. Subsequent to the excavation, a total of 30 monitoring wells have been advanced at the site to determine the extent of subsurface impacts in ground water. One of these monitoring wells, MW-12, was recently destroyed during agricultural operations.

As a result of elevated dissolved petroleum constituents in several monitoring wells, a chemical injection application was conducted during November 2013. Approximately 1,645 gallons of a 14% COGAC solution were injected into the sand formation at a depth of four to seven feet below grade. The COGAC is intended to increase dissolved oxygen content with the calcium peroxide component as well as absorb dissolved petroleum

constituents with the granular activated carbon (GAC) component. Another COGAC injection event was conducted in May 2014. Subsequent ground water sampling suggests that this remedial approach has had limited success.

Ground water samples were collected in July 2014 from the 29 remaining monitoring wells; BTEX concentrations were below the COGCC Table 910-1 levels in 25 of the 29 monitoring wells. However, benzene concentrations exceeding the COGCC Table 910-1 limit were present in the other four wells. Monitoring well MW-17 had the highest benzene concentration with a level of 1,081 ug/L. During the October 2013 sampling event, which was prior to the first COGAC application, the benzene concentration in this well was 961 ug/L.

Noble will continue to sample the ground water on a quarterly basis to monitor the ground water quality at this location. If warranted, additional remediation will be conducted. After four consecutive quarters of COGCC-compliant BTEX concentrations, Noble will request closure of this site.

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.**



8/1/14

Date _____

Paul V. Henehan, P.E.

Senior Consultant

TABLE

TABLE 1
SUMMARY OF GROUND WATER ELEVATION DATA AND CHEMISTRY DATA
NOBLE ENERGY INC.
LIBSACK R G27-15, WELD COUNTY, COLORADO
FREMONT PROJECT NO. C013-009

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	06/14/13	<1.0	<1.0	<1.0	<1.0	99.89	2.93	96.96	NP
	06/24/13	NS	NS	NS	NS		2.66	97.23	NP
	07/09/13	NS	NS	NS	NS		2.53	97.36	NP
	07/19/13	NS	NS	NS	NS		Inundated	Inundated	Inundated
	10/18/13	<1	<1	<1	<1		1.66	98.23	NP
	01/13/14	<1	<1	<1	<1		2.25	97.64	NP
	04/02/14	<1	<1	<1	<1		2.74	97.15	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.52	97.37	NP
MW-2	06/14/13	<1.0	<1.0	<1.0	<1.0	100.00	3.01	96.99	NP
	06/24/13	NS	NS	NS	NS		2.75	97.25	NP
	07/09/13	NS	NS	NS	NS		2.62	97.38	NP
	07/19/13	NS	NS	NS	NS		1.95	98.05	NP
	10/18/13	<1	<1	<1	<1		1.75	98.25	NP
	01/13/14	<1	<1	<1	<1		2.36	97.64	NP
	04/02/14	<1	<1	<1	<1		2.82	97.18	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.61	97.39	NP
MW-3	06/14/13	<1.0	<1.0	<1.0	<1.0	99.92	3.05	96.87	NP
	06/24/13	NS	NS	NS	NS		2.78	97.14	NP
	07/09/13	NS	NS	NS	NS		2.65	97.27	NP
	07/19/13	NS	NS	NS	NS		2.02	97.90	NP
	10/18/13	1.3	<1	<1	<1		1.88	98.04	NP
	01/13/14	<1	<1	<1	<1		2.40	97.52	NP
	04/02/14	<1	<1	<1	<1		2.84	97.08	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.66	97.26	NP
MW-4	06/14/13	4,523	<1.0	<1.0	168	99.47	2.69	96.78	NP
	06/24/13	NS	NS	NS	NS		2.42	97.05	NP
	07/09/13	868	<1.0	<1.0	<1.0		2.28	97.19	NP
	07/19/13	NS	NS	NS	NS		1.61	97.86	NP
	10/18/13	<1	<1	<1	<1		1.46	98.01	NP
	01/13/14	<1	<1	<1	<1		2.07	97.40	NP
	04/02/14	33.1	<1	<1	<1		2.55	96.92	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.31	97.16	NP
MW-5	06/14/13	494	<1.0	1.8	15.7	99.29	2.68	96.61	NP
	06/24/13	NS	NS	NS	NS		2.39	96.90	NP
	07/09/13	535	<1.0	<1.0	<1.0		2.26	97.03	NP
	07/19/13	NS	NS	NS	NS		Inundated	Inundated	Inundated
	10/18/13	<1	<1	<1	<1		1.31	97.98	NP
	01/13/14	<1	<1	<1	<1		2.01	97.28	NP
	04/02/14	<1	<1	<1	<1		2.49	96.80	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.26	97.03	NP
MW-6	06/14/13	<1.0	<1.0	<1.0	<1.0	99.66	3.01	96.65	NP
	06/24/13	NS	NS	NS	NS		2.74	96.92	NP
	07/09/13	NS	NS	NS	NS		2.61	97.05	NP
	07/19/13	NS	NS	NS	NS		2.01	97.65	NP
	10/18/13	<1	<1	<1	<1		1.79	97.87	NP
	01/13/14	2.9	<1	<1	<1		1.33	98.33	NP
	04/02/14	258	<1	<1	<1		2.82	96.84	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.61	97.05	NP
MW-7	06/14/13	1,063	27.8	<1.0	104	99.38	2.72	96.66	NP
	06/24/13	NS	NS	NS	NS		2.43	96.95	NP
	07/09/13	2,226	100	58.9	164		2.3	97.08	NP
	07/19/13	NS	NS	NS	NS		1.76	97.62	NP
	10/18/13	108	<1	3.9	1.9		1.44	97.94	NP
	01/13/14	<1	<1	<1	<1		2.02	97.36	NP
	04/02/14	<1	<1	<1	<1		2.47	96.91	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.28	97.10	NP
MW-8	06/14/13	<1.0	<1.0	<1.0	<1.0	99.46	2.69	96.77	NP
	06/24/13	NS	NS	NS	NS		2.39	97.07	NP
	07/09/13	NS	NS	NS	NS		2.27	97.19	NP
	07/19/13	NS	NS	NS	NS		Inundated	Inundated	Inundated
	10/18/13	<1	<1	<1	<1		1.79	97.67	NP
	01/13/14	<1	<1	<1	<1		2.08	97.38	NP
	04/02/14	<1	<1	<1	<1		2.46	97.00	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.25	97.21	NP

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-9	06/14/13	<1.0	<1.0	<1.0	<1.0	99.51	3.05	96.46	NP
	06/24/13	NS	NS	NS	NS	99.03	2.25	96.78	NP
	07/09/13	NS	NS	NS	NS		2.14	96.89	NP
	07/19/13	NS	NS	NS	NS		1.18	97.85	NP
	10/18/13	<1	<1	<1	<1		1.28	97.75	NP
	01/13/14	<1	<1	<1	<1		1.82	97.69	NP
	04/02/14	<1	<1	<1	<1		2.31	96.72	NP
07/15/14	<1.0	<1.0	<1.0	<1.0		2.11	97.40	NP	
MW-10	06/14/13	<1.0	<1.0	<1.0	<1.0	100.01	3.61	96.40	NP
	06/24/13	NS	NS	NS	NS	99.44	2.7	96.74	NP
	07/09/13	NS	NS	NS	NS		2.59	96.85	NP
	07/19/13	NS	NS	NS	NS		1.89	97.55	NP
	10/18/13	<1	<1	<1	<1		1.73	97.71	NP
	01/13/14	<1	<1	<1	<1		2.29	97.72	NP
	04/02/14	<1	<1	<1	<1		2.76	96.68	NP
07/15/14	<1.0	<1.0	<1.0	<1.0		2.54	97.47	NP	
MW-11	06/14/13	<1.0	<1.0	<1.0	<1.0	100.50	4.1	96.40	NP
	06/24/13	NS	NS	NS	NS	99.98	3.23	96.75	NP
	07/09/13	NS	NS	NS	NS		3.12	96.86	NP
	07/19/13	NS	NS	NS	NS		2.48	97.50	NP
	10/18/13	<1	<1	<1	<1		2.24	97.74	NP
	01/13/14	<1	<1	<1	<1		2.82	97.68	NP
	04/02/14	<1	<1	<1	<1		3.31	96.67	NP
07/15/14	<1.0	<1.0	<1.0	<1.0		3.42	97.08	NP	
MW-12	07/09/13	<1.0	<1.0	<1.0	<1.0	99.68	2.62	97.06	NP
	07/19/13	NS	NS	NS	NS		2.14	97.54	NP
	10/18/13	<1	<1	<1	<1		1.74	97.94	NP
	01/13/14	<1	<1	<1	<1		2.32	97.36	NP
	04/02/14	<1	<1	<1	<1		2.81	96.87	NP
07/15/14	WD	WD	WD	WD		WD	WD	WD	
MW-13	07/09/13	71.1		160	2,606	99.76	2.78	96.98	NP
	07/19/13	NS	NS	NS	NS		2.28	97.48	NP
	10/18/13	131	<1	9.4	200		1.93	97.83	NP
	01/13/14	112	<1	91.7	4.3		2.51	97.25	NP
	04/02/14	75.5	1.7	47.9	125		3.07	96.69	NP
	07/15/14	71.2	<1.0	31.4	168		2.84	96.92	NP
MW-14	07/09/13	9.2		1.6	16.8	99.42	2.5	96.92	NP
	07/19/13	NS	NS	NS	NS		1.96	97.46	NP
	10/18/13	10.6	<1	<1	<1		1.63	97.79	NP
	01/13/14	1.2	<1	<1	<1		2.28	97.14	NP
	04/02/14	2	<1	<1	4		2.78	96.64	NP
	07/15/14	1.6	<1.0	<1.0	1.5		2.58	96.84	NP
MW-15	07/09/13	<1.0	<1.0	<1.0	<1.0	99.59	2.68	96.91	NP
	07/19/13	NS	NS	NS	NS		2.12	97.47	NP
	10/18/13	<1	<1	<1	<1		1.82	97.77	NP
	01/13/14	<1	<1	<1	<1		2.39	97.20	NP
	04/02/14	<1	<1	<1	<1		2.88	96.71	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.65	96.94	NP
MW-16	07/09/13	177		394	5,089	99.18	2.3	96.88	NP
	07/19/13	NS	NS	NS	NS		1.74	97.44	NP
	10/18/13	166	<1	104	405		1.41	97.77	NP
	01/13/14	249	<1	268	1733		2.02	97.16	NP
	04/02/14	149	3.1	127	852		2.49	96.69	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.29	96.89	NP
MW-17	07/09/13	851		390	9,256	99.45	2.5	96.95	NP
	07/19/13	NS	NS	NS	NS		2.02	97.43	NP
	10/18/13	961	<1	82.2	8473		1.43	98.02	NP
	01/13/14	455	<1	101	4781		2.19	97.26	NP
	04/02/14	435	4.4	69.1	5184		2.69	96.76	NP
	07/15/14	1081	<1.0	106	5741		2.46	96.99	NP
MW-18	07/09/13	<1.0	<1.0	<1.0	<1.0	98.28	1.54	96.74	NP
	07/19/13	NS	NS	NS	NS		1.02	97.26	NP
	10/18/13	<1	<1	<1	<1		0.66	97.62	NP
	01/13/14	<1	<1	<1	<1		1.15	97.13	NP
	04/02/14	<1	<1	<1	<1		1.68	96.60	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		1.49	96.79	NP
MW-19	07/09/13	<1.0	<1.0	<1.0	<1.0	98.47	1.71	96.76	NP
	07/19/13	NS	NS	NS	NS		1.1	97.37	NP

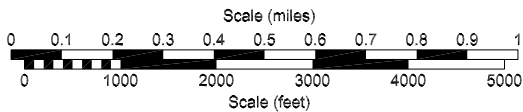
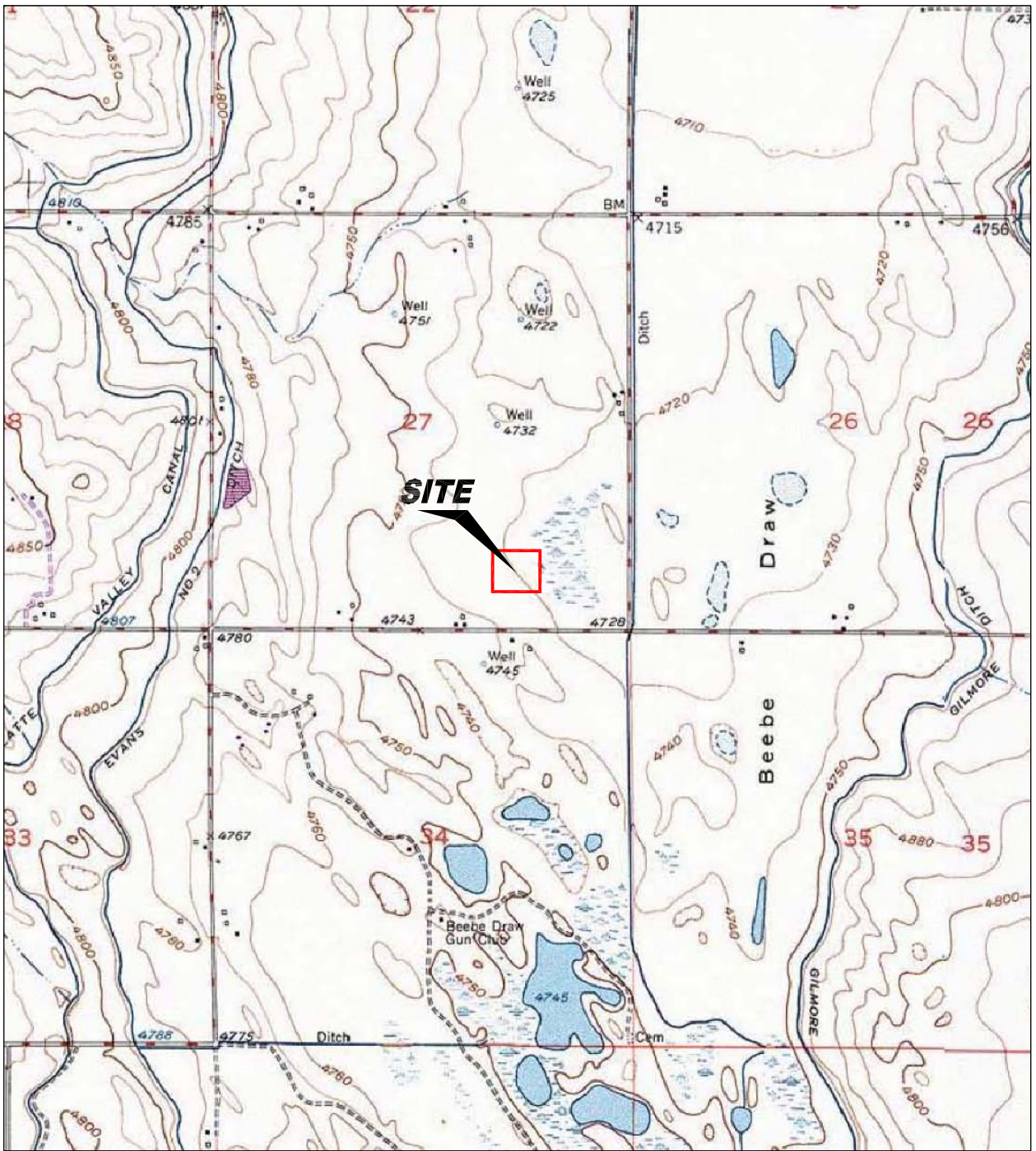
SAMPLE LOCATION	DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL BENZENE (µg/L)	TOTAL XYLENES (µg/L)	TOC ELEVATION (feet)	DEPTH TO GROUND WATER (ft)	GROUND WATER ELEVATION (ft)	FREE PRODUCT THICKNESS (ft)
MW-19	10/18/13	<1	<1	<1	<1		1.78	96.69	NP
	01/13/14	<1	<1	<1	<1		1.33	97.14	NP
	04/02/14	<1	<1	<1	<1		1.84	96.63	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		1.65	96.82	NP
MW-20	07/19/13	<1.0	<1.0	<1.0	<1.0	99.40	1.33	98.07	NP
	10/18/13	<1	<1	<1	<1		1.51	97.89	NP
	01/13/14	<1	<1	<1	<1		2.11	97.29	NP
	04/02/14	<1	<1	<1	<1		2.57	96.83	NP
	07/15/14	8.4	<1.0	<1.0	<1.0		2.32	97.08	NP
MW-21	07/19/13	<1.0	<1.0	<1.0	<1.0	99.31	1.67	97.64	NP
	10/18/13	<1	<1	<1	<1		1.51	97.80	NP
	01/13/14	<1	<1	<1	<1		2.10	97.21	NP
	04/02/14	<1	<1	<1	<1		2.56	96.75	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.33	96.98	NP
MW-22	07/19/13	<1.0	<1.0	<1.0	<1.0	99.12	2.01	97.11	NP
	10/18/13	<1	<1	<1	<1		1.73	97.39	NP
	01/13/14	<1	<1	<1	<1		2.01	97.11	NP
	04/02/14	<1	<1	<1	<1		2.49	96.63	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.30	96.82	NP
MW-23	07/19/13	<1.0	<1.0	<1.0	<1.0	98.77	1.41	97.36	NP
	10/18/13	<1	<1	<1	<1		0.98	97.79	NP
	01/13/14	<1	<1	<1	<1		1.52	97.25	NP
	04/02/14	<1	<1	<1	<1		2.01	96.76	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		1.82	96.95	NP
MW-24	07/19/13	2.4	<1.0	36.6	1,364	99.08	1.57	97.51	NP
	10/18/13	<1	<1	<1	<1		1.2	97.88	NP
	01/13/14	3.3	<1	23.7	64.4		1.74	97.34	NP
	04/02/14	1.9	<1	10.3	35.7		2.23	96.85	NP
	07/15/14	<1.0	<1.0	4.0	1.4		2.01	97.07	NP
MW-25	07/19/13	803	<1.0	473	10,322	99.36	1.96	97.40	NP
	10/18/13	435	<1	119	1572		1.49	97.87	NP
	01/13/14	47.8	<1	6.3	159		2.03	97.33	NP
	04/02/14	44.1	<1	24.3	200		2.58	96.78	NP
	07/15/14	115	<1.0	39.2	120		2.35	97.01	NP
MW-26	07/19/13	198	<1.0	344	2,547	99.30	1.88	97.42	NP
	10/18/13	109	<1	83.9	894		1.49	97.81	NP
	01/13/14	<1	<1	<1	<1		2.01	97.29	NP
	04/02/14	<1	<1	<1	<1		2.54	96.76	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		2.29	97.01	NP
MW-27	07/19/13	<1.0	<1.0	<1.0	<1.0	98.40	0.91	97.49	NP
	10/18/13	<1	<1	<1	<1		0.7	97.70	NP
	01/13/14	<1	<1	<1	<1		1.23	97.17	NP
	04/02/14	<1	<1	<1	<1		1.73	96.67	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		3.41	94.99	NP
MW-28	07/19/13	<1.0	<1.0	<1.0	<1.0	98.64	1.14	97.50	NP
	10/18/13	<1	<1	<1	<1		0.79	97.85	NP
	01/13/14	<1	<1	<1	<1		1.28	97.36	NP
	04/02/14	<1	<1	<1	<1		1.79	96.85	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		1.59	97.05	NP
MW-29	07/19/13	<1.0	<1.0	<1.0	<1.0	101.04	3.45	97.59	NP
	10/18/13	<1	<1	<1	<1		3.03	98.01	NP
	01/13/14	<1	<1	<1	<1		3.58	97.46	NP
	04/02/14	<1	<1	<1	<1		4.13	96.91	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		3.96	97.08	NP
MW-30	07/19/13	<1.0	<1.0	<1.0	<1.0	100.22	2.73	97.49	NP
	10/18/13	<1	<1	<1	<1		2.3	97.92	NP
	01/13/14	<1	<1	<1	<1		2.82	97.40	NP
	04/02/14	<1	<1	<1	<1		3.35	96.87	NP
	07/15/14	<1.0	<1.0	<1.0	<1.0		3.22	97.00	NP
Table 910-1 Limits		5	560	700	1,400				

Bold face values exceed the COGCC limits

NP - No Free Product

NS - Not Sampled

FIGURES



USGS 7.5 MINUTE SERIES (TOPOGRAPHIC)

Figure 1
SITE LOCATION MAP

Noble Lipsack R G27-15
SW SE Section 27, T4N, R65W
Weld County, Colorado

Project No.
C013-009

Prepared by

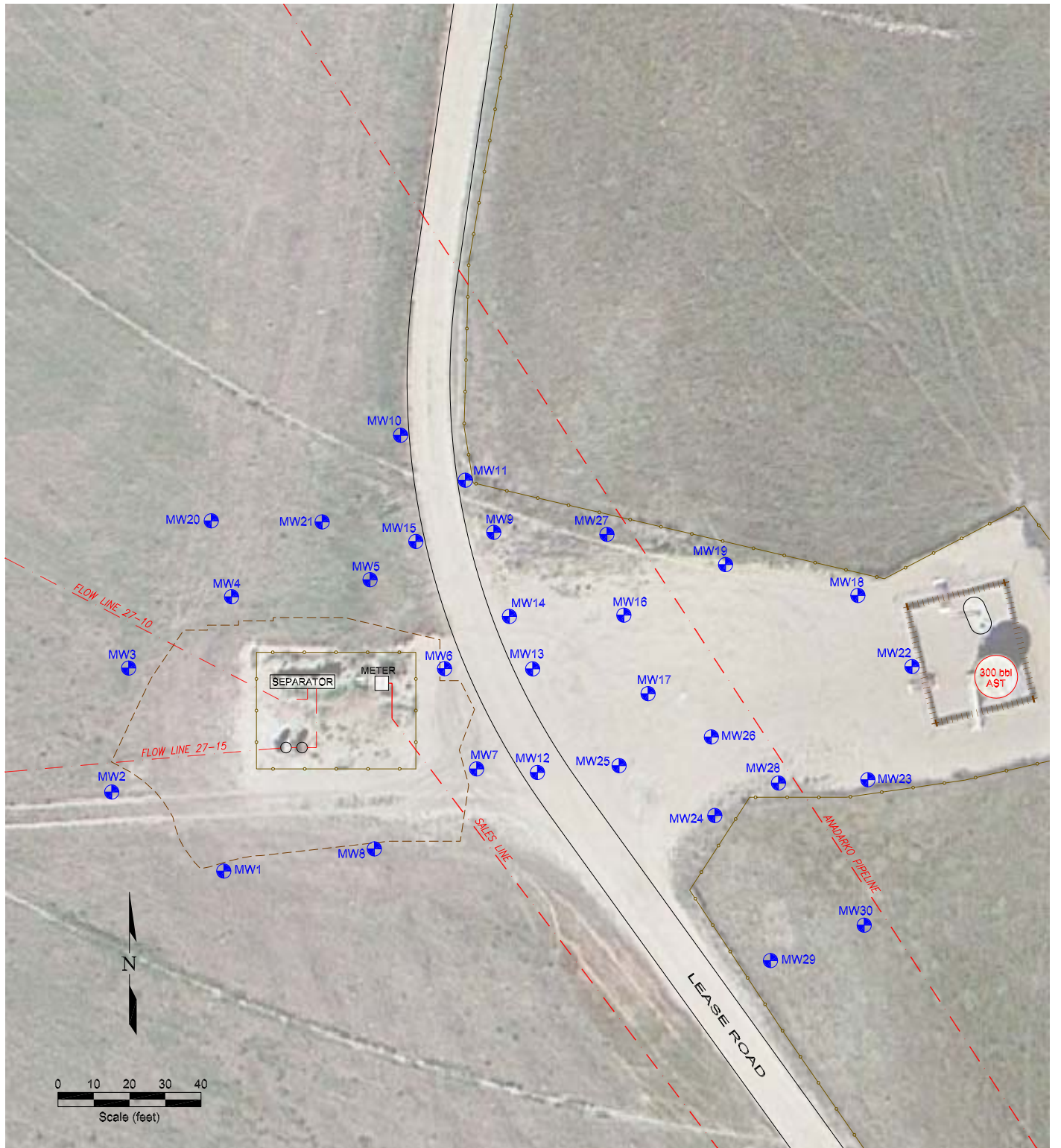
Drawn by
JMA

Date
5/21/13

Reviewed by

Filename
13009T





LEGEND




-  MONITORING WELL
-  FENCE LINE
-  PIPELINE
-  CONTAINMENT BERM
-  ABOVE GROUND STORAGE TANK

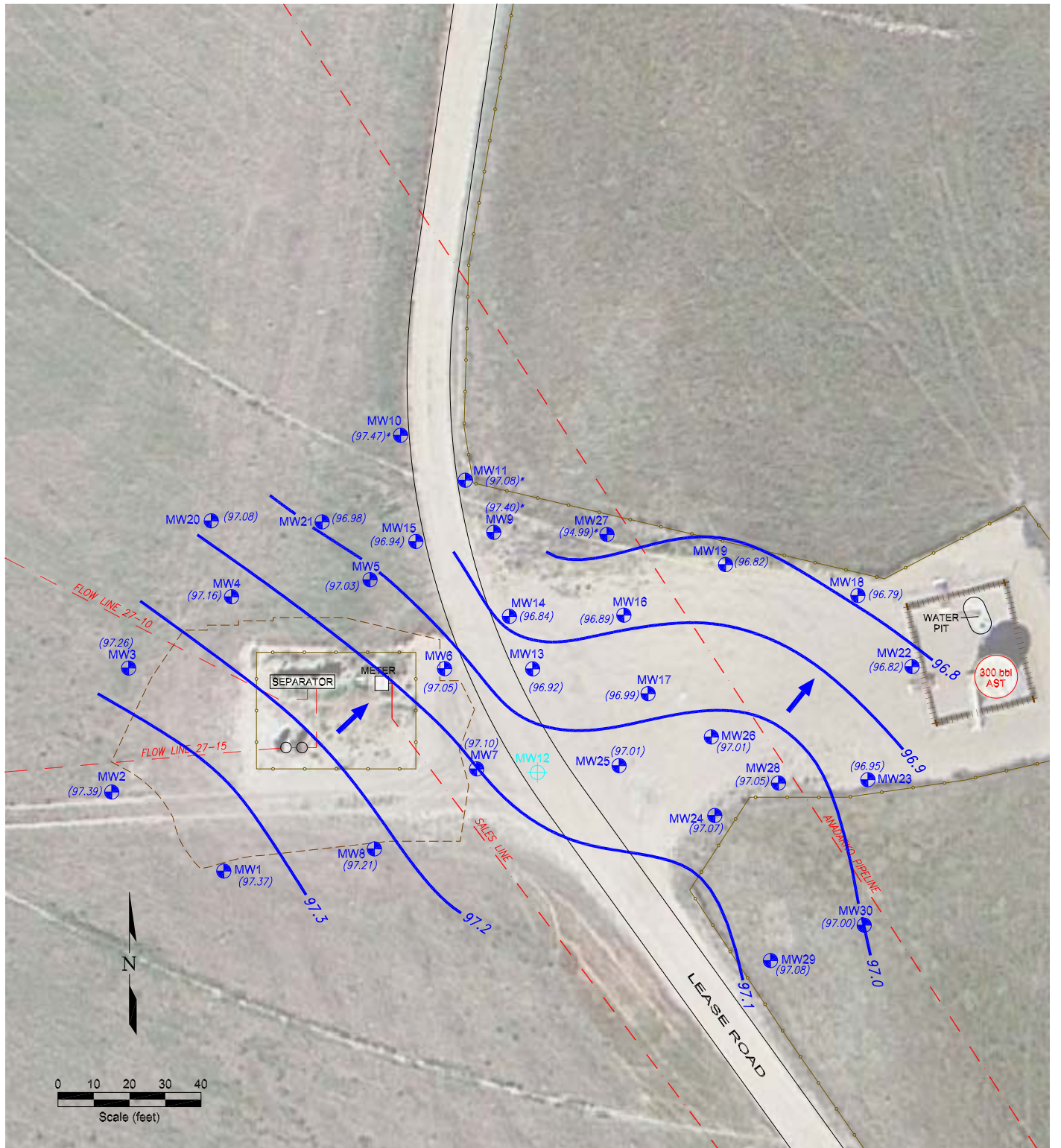
Figure 2

SITE MAP

Noble Libsack R G27-15
 SW SE Section 27, T4N, R65W
 Weld County, Colorado

Project No. C013-009	Prepared by	Drawn by JMA
Date 7/24/13	Reviewed by	Filename 13009R





LEGEND











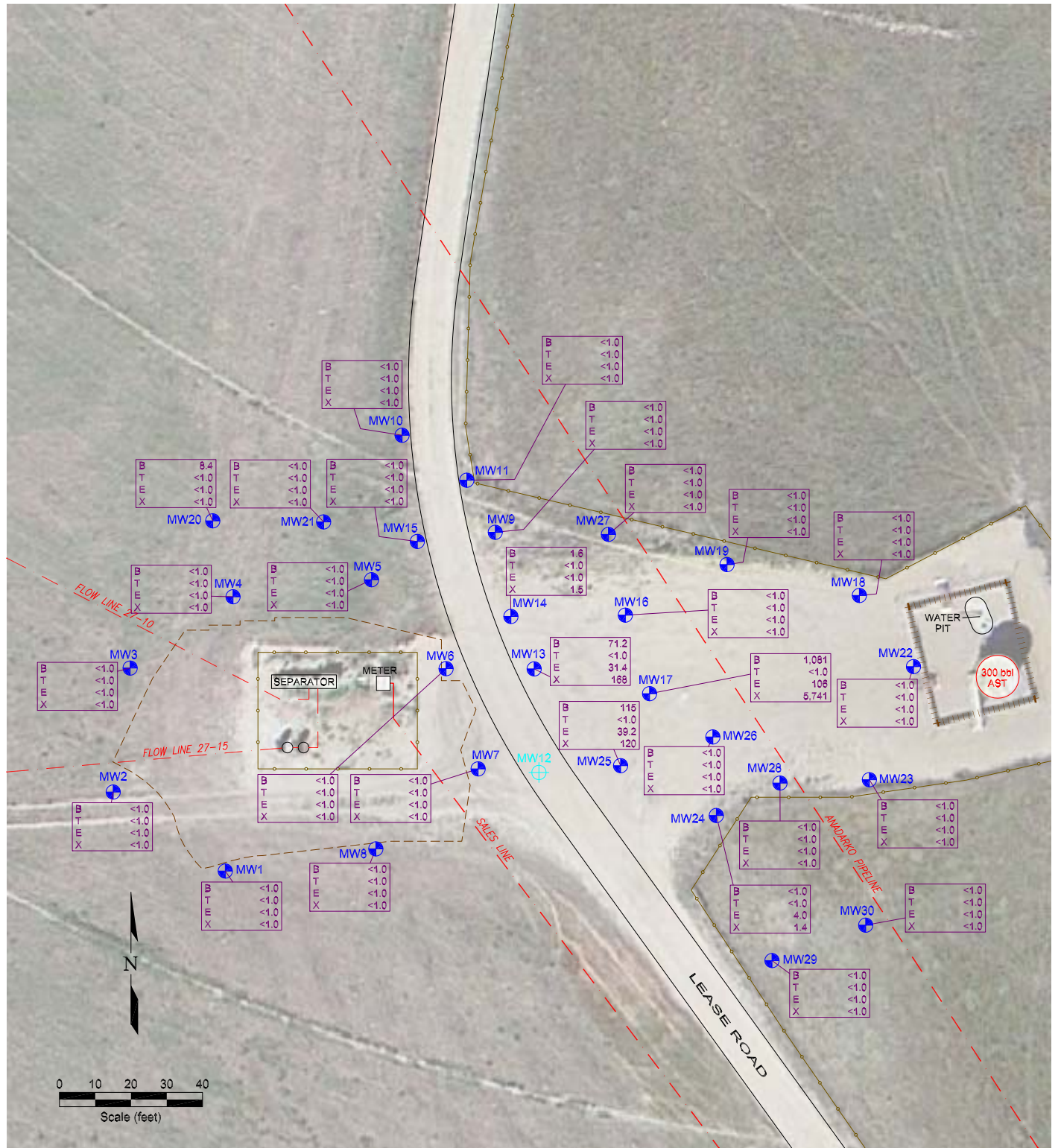
-  MONITORING WELL
-  DESTROYED MONITORING WELL
-  FENCE LINE
-  PIPELINE
-  CONTAINMENT BERM
-  ABOVE GROUND STORAGE TANK
-  GROUND WATER ELEVATION (ft above arbitrary datum)
-  WATER TABLE CONTOUR
-  GROUND WATER FLOW DIRECTION
-  NOT USED FOR CONTOURING

Figure 3
INFERRED GROUNDWATER CONTOUR
JULY 15, 2014

Noble Libsack R G27-15
 SW SE Section 27, T4N, R65W
 Weld County, Colorado

Project No. C013-009	Prepared by	Drawn by JMA
Date 8/1/14	Reviewed by	Filename 13009R





LEGEND

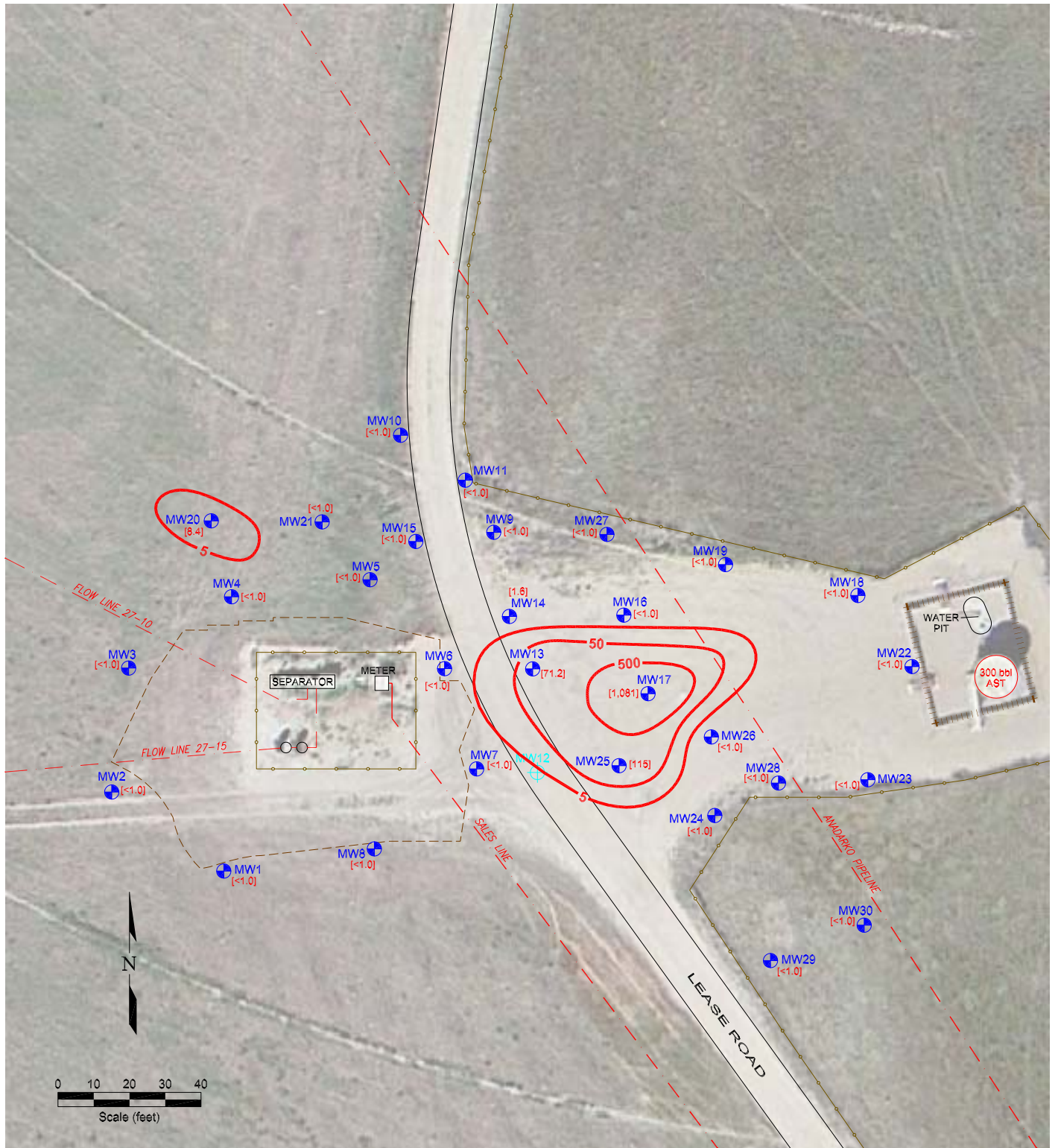
- MONITORING WELL
 - DESTROYED MONITORING WELL
 - FENCE LINE
 - PIPELINE
 - CONTAINMENT BERM
 - ABOVE GROUND STORAGE TANK
- | | | |
|---|------|----------------------|
| B | <1.0 | BENZENE (ug/L) |
| T | <1.0 | TOLUENE (ug/L) |
| E | <1.0 | ETHYLBENZENE (ug/L) |
| X | <1.0 | TOTAL XYLENES (ug/L) |

Figure 4
GROUND WATER CHEMISTRY MAP
JULY 15, 2014

Noble Libsack R G27-15
 SW SE Section 27, T4N, R65W
 Weld County, Colorado

Project No. C013-009	Prepared by	Drawn by JMA
Date 7/31/14	Reviewed by	Filename 13009R





LEGEND

- MONITORING WELL
- DESTROYED MONITORING WELL
- FENCE LINE
- PIPELINE
- CONTAINMENT BERM
- ABOVE GROUND STORAGE TANK
- BENZENE CONCENTRATION (ug/L)
- BENZENE ISOCONCENTRATION (ug/L)

Figure 5
BENZENE ISOCONCENTRATION MAP
 JULY 15, 2014

Noble Libsack R G27-15
 SW SE Section 27, T4N, R65W
 Weld County, Colorado

Project No. C013-009	Prepared by	Drawn by JMA
Date 7/31/14	Reviewed by	Filename 13009R



APPENDIX A

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'. 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 B

LABORATORY DOCUMENTATION

Test Report

eANALYTICS LABORATORY

July 17, 2014

Client: Fremont Environmental / Noble Energy
Project: Libsack RG27-15
Lab ID: 1777
Date Samples Received: 7/15/2014
Number of Samples: 29
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

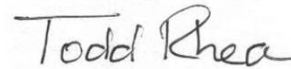
The quality control procedures associated with the requested analyses were satisfactorily passed before the samples were run.

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

Sincerely,



Christopher Dieken
Quality Assurance Manager



Todd Rhea
Laboratory Manager

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: CO13-009 Libsack RG27-15													
Project Manager: Paul Henehan													
Sampler: Mark T 7-17-14 Todd R.													
Phone/Email: 303-956-8714													
Address: P.O. Box 1289 Wellington CO 80549													
Lab ID	Sample Name	Sampling Date/Time											
1	mwl	7/15	AM/PM	200	X								
2			AM/PM										
3			AM/PM										
4			AM/PM										
5			AM/PM										
6			AM/PM										
7			AM/PM										
8			AM/PM										
9			AM/PM										
10			AM/PM										
11			AM/PM										
12			AM/PM										
13			AM/PM										
14			AM/PM										
15			AM/PM										
16			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: **7/15**
 Company: FREMONT ENVIRONMENTAL Time: **1:50** AM/PM

Received by: _____ Date: _____
 Company: _____ Time: _____ AM/PM

Relinquished by: _____ Date: _____
 Company: _____ Time: _____ AM/PM

Received by: *[Signature]* Date: **7/15/14**
 Company: eANALYTICS Time: **5:00** AM/PM

WO # **1777**

eANALYTICS: Environmental testing made Easy

Page **1** of **2**

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: CO13009 Libsack RQ27-15															
Project Manager: Paul Henchan															
Sampler: Mark T															
Phone/Email: 303-956-8714															
Address: P.O. Box 1289 Wellington CO 80549															
Lab ID	Sample Name	Sampling Date/Time													
16	MW 17	7/15	AM/PM	2W	X										
17	18		AM/PM												
18	19		AM/PM												
19	20		AM/PM												
20	21		AM/PM												
21	22		AM/PM												
22	23		AM/PM												
23	24		AM/PM												
24	25		AM/PM												
25	26		AM/PM												
26	27		AM/PM												
27	28		AM/PM												
28	29		AM/PM												
29	30		AM/PM												
Comments:															
Turnaround Time (Business Days) <small>TAT begins when sample is received by eANALYTICS</small> <input checked="" type="radio"/> Normal (5-10 Days) <input type="radio"/> 3 Day (1.25x) <input type="radio"/> 2 Day (1.5x) <input type="radio"/> 1 Day (2x) <input type="radio"/> Next Bus Morning (Noble Pricing)						Record of Custody Relinquished by: <i>Mark T</i> Date: 7/15 Company: FREMONT ENVIRONMENTAL Time: 1500 AM/PM Received by: _____ Date: _____ Company: _____ Time: _____ AM/PM Relinquished by: _____ Date: _____ Company: _____ Time: _____ Received by: <i>Teed</i> Date: 7/15/14 Company: eANALYTICS Time: 1500 AM/PM									
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															

WO # 1777

eANALYTICS: Environmental testing made Easy

Page 2 of 2

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538



Client: Fremont Environmental / Noble Energy Lab ID: 1777
 Project: Libsack RG27-15
 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
MW1	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/15/14	1777 1
MW2	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/15/14	1777 2
MW3	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/15/14	1777 3
MW4	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/15/14	1777 4
MW5	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/15/14	1777 5
MW6	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/15/14	1777 6
MW7	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/15/14	1777 7
MW8	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/15/14	1777 8
MW9	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/15/14	1777 9
MW10	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/15/14	1777 10
MW11	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/15/14	1777 11
MW13	71.2	< 1.0	31.4	168	07/15/14	07/15/14	1777 12
MW14	1.6	< 1.0	< 1.0	1.5	07/15/14	07/15/14	1777 13
MW15	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 14
MW16	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 15
MW17	1081	< 1.0	106	5741	07/15/14	07/16/14	1777 16
MW18	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 17
MW19	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 18
MW20	8.4	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 19
MW21	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 20

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538

eANALYTICS
LABORATORY

Client: Fremont Environmental / Noble Energy Lab ID: 1777
 Project: Libsack RG27-15
 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
MW22	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 21
MW23	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 22
MW24	< 1.0	< 1.0	4.0	1.4	07/15/14	07/16/14	1777 23
MW25	115	< 1.0	39.2	120	07/15/14	07/16/14	1777 24
MW26	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 25
MW27	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 26
MW28	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 27
MW29	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 28
MW30	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	07/16/14	1777 29

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538



Client: Fremont Environmental / Noble Energy

Lab ID: 1777

Project: Libsack RG27-15

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
MW1	89	101	86	95	07/15/14	07/15/14	1777 1
MW2	86	98	99	93	07/15/14	07/15/14	1777 2
MW3	106	102	94	105	07/15/14	07/15/14	1777 3
MW4	100	98	104	107	07/15/14	07/15/14	1777 4
MW5	103	109	97	98	07/15/14	07/15/14	1777 5
MW6	97	105	101	101	07/15/14	07/15/14	1777 6
MW7	89	102	86	103	07/15/14	07/15/14	1777 7
MW8	98	86	89	106	07/15/14	07/15/14	1777 8
MW9	106	91	104	106	07/15/14	07/15/14	1777 9
MW10	96	108	97	109	07/15/14	07/15/14	1777 10
MW11	98	102	102	86	07/15/14	07/15/14	1777 11
MW13	91	94	92	105	07/15/14	07/15/14	1777 12
MW14	96	87	109	104	07/15/14	07/15/14	1777 13
MW15	106	107	106	91	07/15/14	07/16/14	1777 14
MW16	104	105	109	100	07/15/14	07/16/14	1777 15
MW17	103	104	98	87	07/15/14	07/16/14	1777 16
MW18	97	86	94	97	07/15/14	07/16/14	1777 17
MW19	93	102	93	95	07/15/14	07/16/14	1777 18
MW20	106	96	107	100	07/15/14	07/16/14	1777 19
MW21	101	96	93	89	07/15/14	07/16/14	1777 20



Client: Fremont Environmental / Noble Energy Lab ID: 1777
 Project: Libsack RG27-15 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
MW22	93	97	100	94	07/15/14	07/16/14	1777 21
MW23	92	99	92	100	07/15/14	07/16/14	1777 22
MW24	94	97	99	101	07/15/14	07/16/14	1777 23
MW25	94	99	93	97	07/15/14	07/16/14	1777 24
MW26	97	95	104	104	07/15/14	07/16/14	1777 25
MW27	96	97	897	94	07/15/14	07/16/14	1777 26
MW28	94	101	100	96	07/15/14	07/16/14	1777 27
MW29	95	98	98	99	07/15/14	07/16/14	1777 28
MW30	92	93	92	95	07/15/14	07/16/14	1777 29

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538



Client: Fremont Environmental / Noble Energy Lab ID: 1777
 Project: Libsack RG27-15
 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%)	94	92	98	91	07/15/14	LCS 1777 1
Method Blank	< 1.0	< 1.0	< 1.0	< 1.0	07/15/14	MB 1777 1
	ug/L	ug/L	ug/L	ug/L		

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538

eANALYTICS
LABORATORY

Client: Fremont Environmental / Noble Energy Lab ID: 1777
 Project: Libsack RG27-15
 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	95	97	103	07/16/14	LCS 1777 2
Method Blank	< 1.0	< 1.0	< 1.0	< 1.0	07/16/14	MB 1777 2
	ug/L	ug/L	ug/L	ug/L		

eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538

APPENDIX C

REMINGTON TECHNOLOGIES INC. REPORT



Remington

PROBLEM SOLVED

Soil and Groundwater Remediation
8100 Arkins Court
Loveland, CO 80538
(970) 278-1646

Paul Henehan
Fremont Environmental
12061 Pennsylvania Street
Suite B-101
Thornton, CO 80241

May 14, 2014

Re: Remedial Injection Report
Noble Libsack R G27-15
Weld County, Colorado

Dear Mr. Henehan,

Remington Technologies, LLC (Remington) personnel and equipment mobilized to Noble Energy Tank Battery Libsack R G27-15 in Weld County, Colorado on May 6, 2014 and were on site at 0800 hours. Upon arrival, Remington personnel reviewed health and safety plans (HASP), job safety analyses (JSAs), and discussed the scope of work with Mike Gerstner of Fremont Environmental.

Injection Scope of Work:

Advanced and utilized 14 temporary injection points to deliver 1,200 gallons of 12% COGAC™ solution. Figure 1-B illustrates the injection point layout. Each injection point required one injection interval. Details can be seen in the table below.

Injection Event:

After the site walk-through and the equipment set-up was completed, each temporary injection point was advanced to total depth with a 7822DT Geoprobe® using Remington Technologies auger/packer system.

During the scheduled work, which began May 6, 2014 and ended May 6, 2014, Remington completed the scope of work (SOW) by injecting 14 COGAC™ injection points. All 14 temporary injection points were injected with a total of 1,200 gallons of 12% COGAC™ solution. No deviations from the SOW were necessary to complete this event. Details regarding daily injection parameters for each injection point including total times, volumes, injection depths, flow rates, and pressures can be reviewed in Table 1.

Borehole Abandonment:

After the injections, each borehole was abandoned by placing bentonite from the bottom of the excavation point to approximately 1.5-feet bgs. Clean sand was placed from 1.5 feet to 0.5 feet bgs. Native, asphalt, or concrete material was placed in the remaining portion of the borehole up to ground surface.

Waste Disposal:

During this event no drums were required, therefore no further action or manifest was required by Remington Technologies or Fremont Environmental.

Summary:

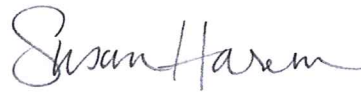
In summary, the SOW was completed by injecting 1,200 gallons of solution which included 1,200 pounds of COGAC™ to inject 14 temporary injection points. After injections were completed, Remington personnel returned May 7, 2014 to spread rock and complete site clean-up.

If you have any questions or comments, please contact us at any time.

Sincerely,




Grant Drennan
Vice President of Operations
Gdrennan@RemingtonTech.Net



Susan Harem
Office Manager
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Table 1

 Remington PROBLEM SOLVED		DAILY INJECTION FIELD LOG SHEET						
Client/Project:	Fremont / Libsack Tank Battery			Client Representative:	Mike Gerstner			
Technicians:	Michael Boyle, Justin Enger, & Clint Schmal			Time of Arrival:	0800			
Site Address:	0.3 mi. west & 0.2 mi. north of WCR 40 & WCR 45, Weld County, Colorado							
Injection Scope of work:		14 Temporary Injection Points / 1,200 Gallons						
Boring ID No.	Date	Start Time	End Time	Total Time	Injection Interval	Break Through / Average PSI	Average Flow Rate (gpm)	Total Injected @ interval
IP-1	5/6/14	9:54	10:09	15	3'-5'	0	6.67	100
IP-1	5/6/14	10:32	10:37	5	3'-5'	0	10.00	50
IP-2	5/6/14	10:10	10:15	5	3'-5'	10	16.00	80
IP-3	5/6/14	10:27	10:32	5	3'-5'	10	6.00	30
IP-4	5/6/14	10:45	10:47	2	4'-7'	10	5.00	10
IP-5	5/6/14	11:15	11:16	1	4'-7'	0	5.00	5
IP-6	5/6/14	11:16	11:31	15	4'-7'	0	6.67	100
IP-7	5/6/14	11:33	11:43	10	4'-7'	0	5.00	50
IP-8	5/6/14	11:59	12:10	11	4'-7'	10	6.82	75
IP-9	5/6/14	13:15	13:22	7	4'-7'	5	5.71	40
IP-10	5/6/14	13:25	13:51	26	4'-7'	10	6.92	180
IP-10	5/6/14	14:45	14:50	5	4'-7'	10	12.00	60
IP-11	5/6/14	13:51	14:03	12	4'-7'	10	15.00	180
IP-11	5/6/14	14:50	15:12	22	4'-7'	0	6.82	150
IP-12	5/6/14	14:28	14:35	7	4'-7'	0	5.71	40
IP-13	5/6/14	14:36	14:40	4	4'-7'	0	8.75	35
IP-14	5/6/14	14:40	14:42	2	4'-7'	0	7.50	15
Daily Injection Summary / Average		Injection Time (min.)		154		4.4	7.97	1200
Injection Notes:		Surfacing occurred at all injection locations						

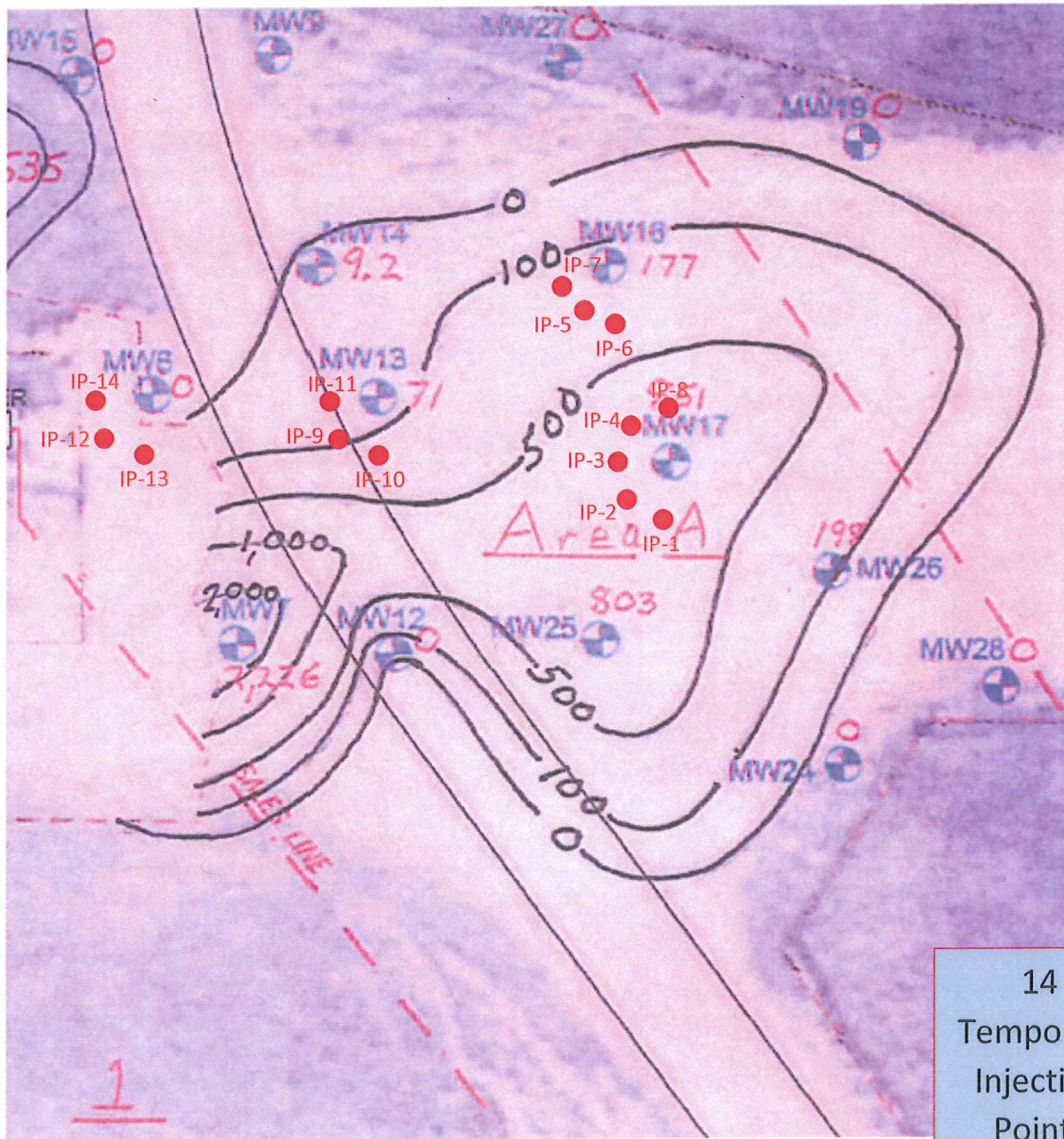


FIGURE 1-B (Reference Only)
 Injection Point Layout
 Noble Libsack R G-27-15
 Weld County, Colorado
 14 Temporary Injection Points

● Temporary injection point



Note: The figure was provided by Fremont Environmental and edited by Remington Technologies. Locations are approximate.