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North America Division

Remediation #5350

January 3, 2012

Mr. Robert Chesson  
Department Of Natural Resources  
Oil & Gas Conservation Commission  
1120 Lincoln St., Suite 801  
Denver CO 80203-2136

RE: Groundwater Monitoring Results  
Romero Angelina 1, 2  
API 05-123-12728  
Sec. 3, T4N R65W  
Weld County, Colorado

Dear Mr. Chesson:

Please find attached the Quarterly Groundwater Monitoring Report for the Romero Angelina 1, 2. Noble Energy Inc. would like to claim business confidentiality protection for the information submitted in this letter, the supporting materials attached and all previous and subsequent correspondence related to this matter. Please contact the Noble Energy Environmental Department at (970) 785-5000 if you have any questions or require additional information.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Todd Cullum'.

Todd Cullum  
Environmental Specialist

Attachments

**FREMONT ENVIRONMENTAL INC.**

December 30, 2011

Mr. Todd Cullum  
Noble Energy Inc.  
804 Grand Ave  
Platteville, CO 80651

Subject:     **Ground Water Monitoring Report**  
Romero Angelina 1,2 SW ¼ NW ¼ Sec. 3 T4N R65W  
API # 05-123-12728  
La Salle, Colorado  
Fremont Project No. C010-009

Dear Mr. Cullum:

Enclosed please find a copy of the above referenced Ground Water Monitoring Report for the Romero Angelina site in La Salle, 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

**GROUND WATER MONITORING REPORT**

**NOBLE ENERGY INC.  
ROMERO ANGELINA 1,2  
LA SALLE, COLORADO  
FREMONT PROJECT NO. C010-009**

**Prepared by:**

**Fremont Environmental Inc.  
12061 Pennsylvania Street, Suite B-101  
Thornton, CO 80241  
(303) 956-8714**

**December 30, 2011**

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# **GROUND WATER MONITORING REPORT**

**NOBLE ENERGY INC.**

**ROMERO ANGELINA 1,2**

**LA SALLE, COLORADO**

**FREMONT PROJECT NO. C010-009**

## **1.0 INTRODUCTION**

The purpose of this document is to present ground water quality data collected subsequent to remediation efforts at the Romero Angelina 1,2 site in La Salle, Colorado. Soil impacts were identified at this facility and remediation was accomplished by extensive excavation of impacted soil in October 2010. Prior to the excavation work, a number of soil borings and monitoring wells were installed to delineate the magnitude and extent of subsurface impacts; three of the monitoring wells were initially selected for ongoing compliance monitoring. However, after one of these compliance wells became impacted, two additional monitoring wells were added to the quarterly sampling program.

## **2.0 BACKGROUND INFORMATION**

### **2.1 Site Location**

The Romero Angelina 1,2 site is located approximately 1½ miles east of La Salle, Colorado in Weld County as shown on Figure 1. The site is located in a rural and agricultural area east of County Road 43 and south of County Road 48. The location is further described as the SW ¼ of the NW ¼ of Section 3, Township 4N, Range 65W.

### **2.2 Site History**

The site is a natural gas production and oil storage facility for the Romero Angelina 1,2 wells. Historical soil impacts were observed during reconfiguration of the tanks and piping at this facility. This historically impacted soil may be attributed to releases from the concrete water pit or flow lines over the life of the facility. Ground water in the area is present at approximately three feet below the ground surface.

### **3.0 GROUND WATER MONITORING ACTIVITIES**

#### **3.1 Ground Water Level Measurements**

Ground water levels were measured in the site's six remaining monitoring wells on December 19, 2011 in accordance with the Sampling Plan included in Appendix A. The data are summarized in Table 1. Water table contours inferred from the December 19, 2011 data are illustrated on Figure 2. 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 December 2011 data.

#### **3.2 Ground Water Sampling and Analysis**

Ground water samples were collected from six monitoring wells (MW-2, MW-3, MW-5, MW-6, MW-7 and MW-8) on December 19, 2011 to monitor the magnitude and extent of ground water impacts at the site. The ground water samples were submitted to eAnalytical Inc. in Loveland, Colorado for analyses of benzene, toluene, ethylbenzene and xylenes (BTEX) by EPA Method 8260B. The ground water chemistry data is illustrated on Figure 3.

The laboratory data indicated that the BTEX constituents were below their respective laboratory detection limits for the ground water samples collected from wells MW-3, MW-6 and MW-8 during the December 2011 sampling event. However, detectable concentrations of benzene were observed in samples collected from monitoring well MW-5 and MW-7; the benzene concentration in MW-5 was 12.4 ug/L and 6 ug/L in MW-7.

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**

Soil remediation was accomplished at the Romero Angelina 1,2 site by extensive excavation of contaminated soil in October 2010. Since that time, several monitoring wells have been utilized to monitor ground water quality at the site; most recently, these included MW-2, MW-3, MW-5, MW-6, MW-7, and MW-8.

On December 19, 2011, the ground water samples collected from monitoring wells MW-2, MW-3, MW-6 and MW-8 were below the Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 levels for BTEX. However, the ground water samples collected from MW-5 and MW-7 had benzene concentrations of 12.4 and 6 ug/L, respectively. As shown on Table 1, the benzene concentration in MW-7 has trended downward since reaching its maximum concentration of 5,540 ug/L observed during the June 2011 sampling event. The December 2011 analyses indicate a significant decrease in the benzene concentration in MW-7; in October 2011, it was 4,330 ug/L. The benzene concentration in MW-5 has fluctuated in the past with concentrations that were less than the COGCC guidance level of 5 ug/L; however, the December 2011 data indicates that the benzene level has increased to 12.4 ug/L.

Noble will continue to sample the ground water quarterly to monitor the ground water quality at this site. Wells to be sampled will include MW-3, MW-5, MW-6, MW-7 and MW-8.

#### **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 MWA

12/30/11

Date\_\_\_\_\_

\_\_\_\_\_  
Wayne Austin

Construction Supervisor

Reviewed by:



12/30/11

Date\_\_\_\_\_

\_\_\_\_\_  
Paul V. Hennehan, P.E.

Senior Consultant

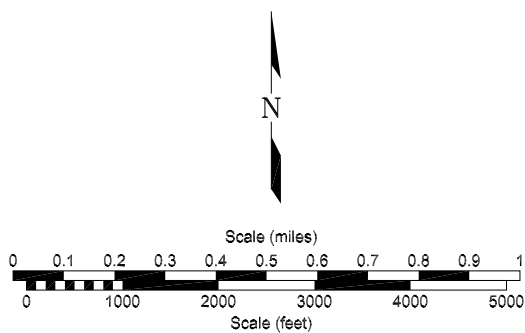
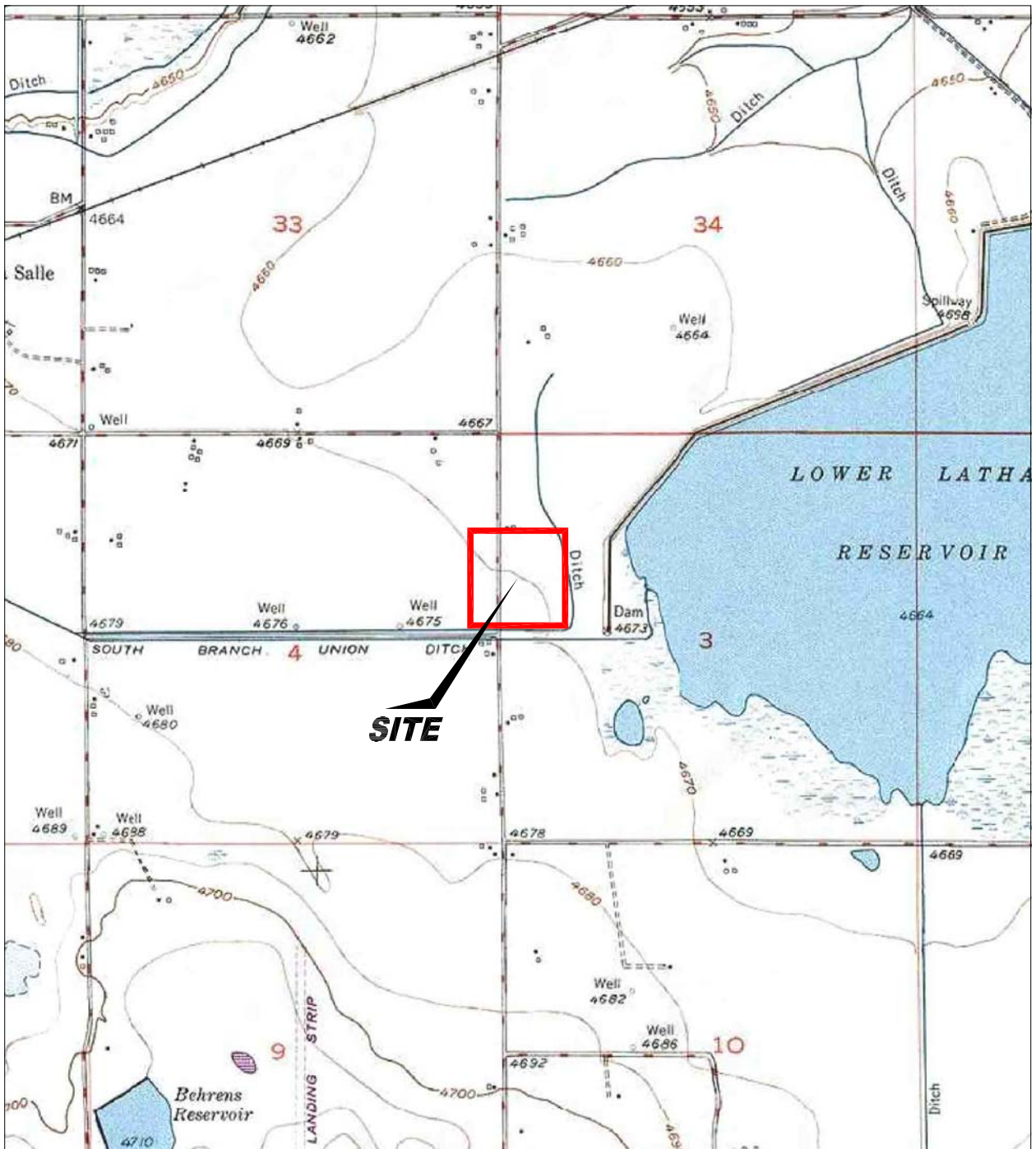


## TABLE

TABLE 1  
SUMMARY OF GROUND WATER ELEVATION DATA AND CHEMISTRY DATA  
NOBLE ENERGY INC.  
ROMERO ANGELINO 1,2, LA SALLE, COLORADO  
FREMONT PROJECT NO. C010-009

SAMPLE LOCATION	DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL BENZENE (µg/L)	XYLENES (µg/L)	TOC ELEVATION (feet)	DEPTH TO GROUND WATER (ft)	GROUND WATER ELEVATION (ft)	FREE PRODUCT THICKNESS (ft)
MW-1	9/1/2010	<b>9430</b>	<b>2010</b>	532	<b>7610</b>	99.33	3.74	95.59	0
	6/20/2011	WD	WD	WD	WD	WD	WD	WD	WD
MW-2	9/1/2010	<1.0	<1.0	<1.0	5.43	99.13	3.62	95.51	0
	6/20/2011	NS	NS	NS	NS		4.27	94.86	0
	9/23/2011	NS	NS	NS	NS		3.21	95.92	0
	12/19/2011	<1.0	<1.0	<1.0	<1.0		3.87	95.26	0
MW-3	9/1/2010	<1.0	<1.0	<1.0	<2.0	100.00	3.62	96.38	0
	12/27/2010	<1.0	<1.0	<1.0	<1.0		4.96	95.04	0
	3/9/2011	<1.0	<1.0	<1.0	<3.0		5.54	94.46	0
	6/20/2011	<1.0	<1.0	<1.0	<3.0		4.54	95.46	0
	9/23/2011	<1.0	<1.0	<1.0	<3.0		3.71	96.29	0
	12/19/2011	<1.0	<1.0	<1.0	<1.0		4.23	95.77	0
MW-4	9/1/2010	<b>10.4</b>	<10	<b>998</b>	276	99.38	3.55	95.83	0
	6/20/2011	WD	WD	WD	WD	WD	WD	WD	WD
MW-5	9/1/2010	4.98	<10	<10	2.41	97.03	1.74	95.29	0
	6/20/2011	<1.0	<1.0	<1.0	<3.0		2.44	94.59	0
	7/27/2011	<1.0	<1.0	<1.0	<3.0		2.19	94.84	0
	9/23/2011	2.3	<1.0	<1.0	<3.0		1.25	95.78	0
	12/19/2011	<b>12.4</b>	13.8	<1.0	<1.0		2.01	95.02	0
MW-6	9/1/2010	<1.0	<1.0	<1.0	2.69	97.17	1.89	95.28	0
	6/20/2011	<b>20.9</b>	<1.0	<1.0	<3.0		2.56	94.61	0
	7/27/2011	<1.0	<1.0	<1.0	<3.0		2.29	94.88	0
	9/23/2011	<1.0	<1.0	<1.0	<3.0		1.39	95.78	0
	12/19/2011	<1.0	<1.0	<1.0	<1.0		2.12	95.05	0
MW-7	9/1/2010	<1.0	<1.0	<1.0	<2.0	97.18	1.71	95.47	0
	12/27/2010	<1.0	<1.0	<1.0	<1.0		2.79	94.39	0
	3/9/2011	<b>367</b>	<1.0	4.5	21.7		3.22	93.96	0
	3/24/2011	<b>528</b>	<1.0	16.6	67.7		NM	NM	0
	6/20/2011	<b>5540</b>	1.9	216	98.4		2.43	94.75	0
	7/27/2011	<b>4830</b>	1.2	279	91.1		2.18	95.00	0
	9/23/2011	<b>4330</b>	<1.0	248	5		1.32	95.86	0
	12/19/2011	<b>6</b>	<1.0	<1.0	<1.0		2.01	95.17	0
MW-8	9/1/2010	<1.0	<1.0	<1.0	<2.0	97.00	1.58	95.42	0
	12/27/2010	<1.0	<1.0	<1.0	<1.0		2.60	94.40	0
	3/9/2011	<1.0	<1.0	<1.0	<3.0		3.49	93.51	0
	6/20/2011	<1.0	<1.0	<1.0	<3.0		2.27	94.73	0
	7/27/2011	<1.0	<1.0	<1.0	<3.0		1.99	95.01	0
	9/23/2011	<1.0	<1.0	<1.0	<3.0		1.16	95.84	0
	12/19/2011	<1.0	<1.0	<1.0	<1.0		1.82	95.18	0
MW-9	9/1/2010	<b>891</b>	<10	546	<b>6570</b>	99.81	3.81	96.00	0
	6/20/2011	WD	WD	WD	WD	WD	WD	WD	WD
COGCC Table 910-1 Limits		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>				

## **FIGURES**



USGS 7.5 MINUTE SERIES (TOPOGRAPHIC)

Figure 1  
SITE LOCATION MAP

Noble Energy  
Romero Angelino 1,2  
La Salle, Colorado

Project No.  
C010-009

Prepared by

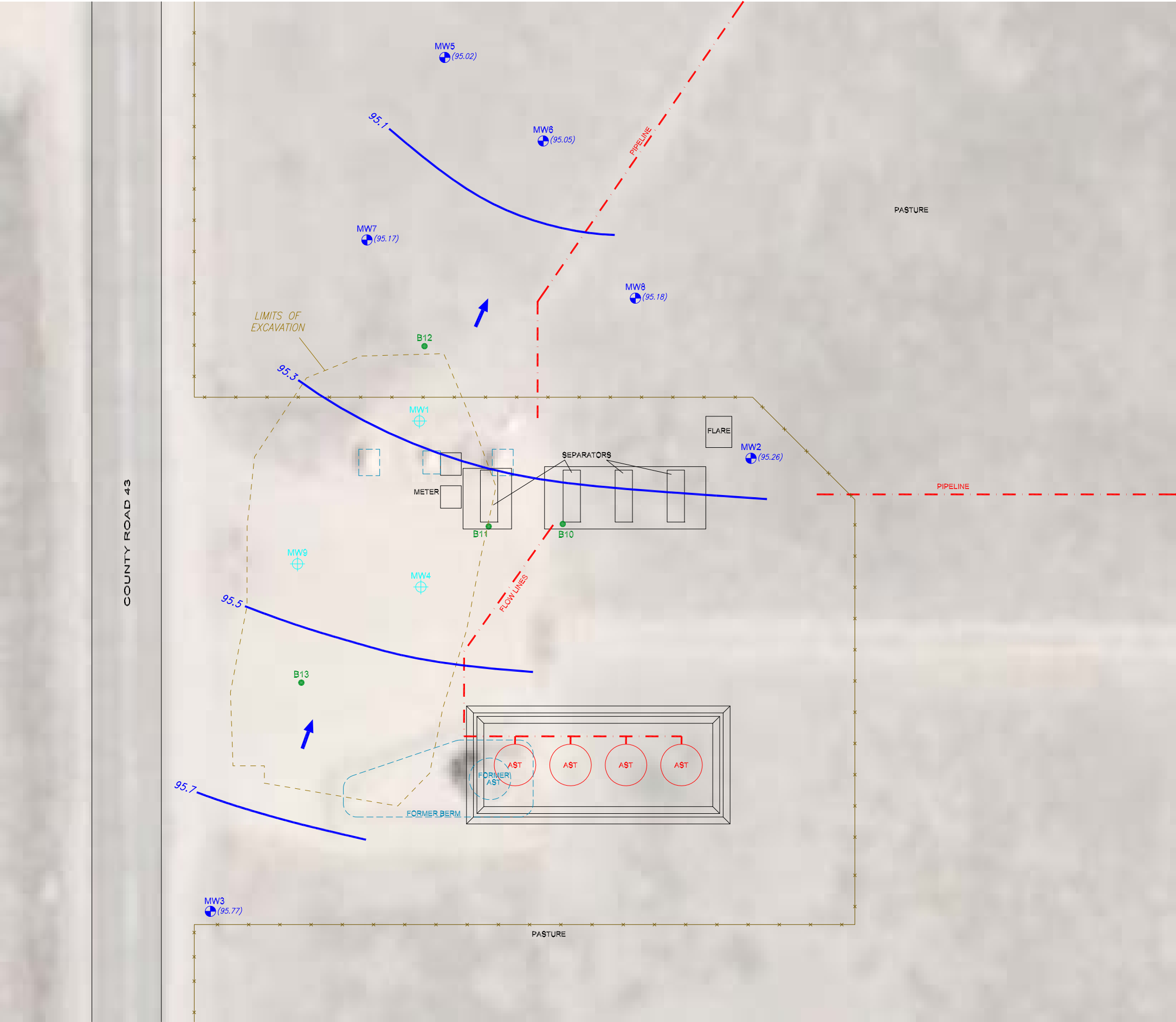
Drawn by  
JMA

Date  
9/15/10

Reviewed by

Filename  
10009T





**LEGEND**

MONITORING WELL

DESTROYED MONITORING WELL

SOIL BORING

FENCE LINE

PIPELINE

ABOVE GROUND STORAGE TANK

FORMER FACILITY

GROUND WATER ELEVATION (ft above arbitrary datum)

NOT MEASURED

WATER TABLE CONTOUR

GROUND WATER FLOW DIRECTION

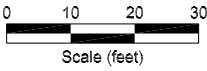


Figure 2

INFERRED GROUNDWATER CONTOUR

DECEMBER 19, 2011

Noble Energy

Romero Angelino 1,2

La Salle, Colorado

Project No. C010-009	Prepared by JMA	Drawn by JMA	
Date 12/30/11	Reviewed by	Filename 10009Q	



**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 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 – 8260B
Total Petroleum Hydrocarbons - Gasoline Range Organics (TPH-GRO)	EPA Method – 8015 Modified
Total Petroleum Hydrocarbons - Diesel Range Organics (TPH-DRO)	EPA Method – 8015 Modified

## **APPENDIX B**

### **LABORATORY DOCUMENTATION**

# Certificate of Analysis

## Sample Information

Client: Fremont Environmental  
1630 S. College #B2  
Fort Collins CO 80525

Project: Noble/Romero/C010-009  
Methods: EPA8260C (Volatile Organics)

Date Received: 12/19/11

## Water Sample Analysis

Sample Name	Benzene µg/L	Ethyl- benzene µg/L	Toluene µg/L	Total Xylenes µg/L	GRO mg/L	Date Sampled	Date Analyzed	Lab ID
MW-3	< 1	< 1	< 1	< 1	< 0.5	12/19/11	12/19/11	2237-01
MW-2	< 1	< 1	< 1	< 1	< 0.5	12/19/11	12/19/11	2237-02
MW-8	< 1	< 1	< 1	< 1	< 0.5	12/19/11	12/19/11	2237-03
MW-7	6.0	< 1	< 1	< 1	< 0.5	12/19/11	12/19/11	2237-04
MW-5	12.4	13.8	< 1	< 1	< 0.5	12/19/11	12/19/11	2237-05
MW-6	< 1	< 1	< 1	< 1	< 0.5	12/19/11	12/19/11	2237-06

*Todd Rhea*

Laboratory Manager - eAnalytics Laboratory

eAnalytics Laboratory: 1767 Rocky Mountain Avenue Loveland CO 80538 (970) 667-6975  
The results contained within this report relate only to the items analyzed

Phone: (970) 667-6975

Fax: (970) 669-0941

[www.eAnalyticsLab.com](http://www.eAnalyticsLab.com)

## ANALYSIS INFORMATION

(\*New Clients please fill out completely)

(Select analysis by checking box on corresponding margin line)

Address:

[illegible]

Comments:

TAT begins when sample is received by eANALYTICS

- ☒ Normal (5-10 Days)  
☐ 3 Day (1.25x)  
☐ 2 Day (1.5x)  
☐ 1 Day (2x)  
☐ Same Day (3x)

Rush analysis requires an extra charge.  
If possible please inform eANALYTICS in  
advance for rush analysis.

Colorado OPS Project :	Yes / No
------------------------	----------

**Samples Received Intact:**

Received Within Temperature Range (2-6°C)

**Sample Preservative:**

Ice	Acid
None	Other

Relinquished by: Wayne Austin

Company: *Fremont*

Received by:

Company

Relinquished by:

Company

Received by:

Company:

Date: 12/19

Time 2.5

Date: \_\_\_\_\_

Three

Date: \_\_\_\_\_

Time

Date: 12/19/11

Time 2:00

WO # 2237

**eANALYTICS: Environmental testing made Easy**

Page 1 of 1