

# **FREMONT ENVIRONMENTAL INC.**

August 10, 2013

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

Subject:      **Produced Water Pit Replacement Closure Report**  
                 Armstrong 2-16G5  
                 API # 05-123-18603  
                 Kersey, Colorado  
                 Fremont Project No. C013-026

Dear Mr. Evans:

Enclosed please find a copy of the above referenced Produced Water Pit Replacement Report for the Armstrong 2-16G5 site near Kersey, Colorado. The enclosed report describes the soil sampling and replacement of the existing steel water pit. 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. Henahan, P.E.  
Senior Consultant

Enclosure

**PRODUCED WATER PIT REPLACEMENT**

**NOBLE ENERGY INC.**

**ARMSTRONG 2-16G5**

**KERSEY, COLORADO**

**FREMONT PROJECT NO. C013-026**

**Prepared by:**

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

**August 10, 2013**

## **TABLE OF CONTENTS**

1.0 INTRODUCTION .....	1
2.0 BACKGROUND INFORMATION .....	1
2.1 Site Location .....	1
2.2 Site History .....	1
3.0 FIELD ACTIVITIES .....	2
4.0 REMARKS.....	3

### **Figures**

Figure 1: Site Location Map

Figure 2: Site Map

### **Appendices**

Appendix A: Laboratory Documentation

Appendix B: Photos

## **PRODUCED WATER PIT REPLACEMENT**

**NOBLE ENERGY INC.**

**ARMSTRONG 2-16G5**

**KERSEY, COLORADO**

**FREMONT PROJECT NO. C013-026**

### **1.0 INTRODUCTION**

The purpose of this document is to describe the actions taken to replace the steel, produced water pit at the Armstrong 2-16G5 well location. In addition, this report will describe the soil sampling performed to determine whether subsurface impacts were present.

### **2.0 BACKGROUND INFORMATION**

#### **2.1 Site Location**

The Armstrong 2-16G5 site is located approximately eight miles north of Kersey, Colorado in Weld County as shown on Figure 1. The site is located in a rural and agricultural area northwest of the intersection of County Road 47 and County Road 72. The location is further described as the SE  $\frac{1}{4}$  of the SE  $\frac{1}{4}$  of Section 2, Township 6N, Range 65W.

#### **2.2 Site History**

The site is a natural gas production and oil storage facility for the Armstrong 2-16G5 well as shown on Figure 2, Site Map. This well was drilled in 1995. In July 2013, it was determined that the steel produced water pit was unable to maintain its water level indicating a potential problem with the pit and/or piping. Therefore, it was scheduled for replacement.

### **3.0 FIELD ACTIVITIES**

On August 1, 2013, a crew from Ochoa Trucking Services excavated the produced water pit immediately south of the oil storage tank at the site. The steel water pit was removed and inspected for damage. No obvious indication of failure was observed. Regardless, the steel pit was replaced with a new, concrete water pit. Photos of the pit excavation are provided.

During the excavation and pit removal process, petroleum impacted soil was observed adjacent to the pit to the north and west. Upon further investigation, it was determined that one of the pipe fittings on the dump line had failed. Approximately 25 yards of impacted soil were removed from the location and disposed of as non-hazardous waste.

Since impacted soil was observed in the excavation, five soil samples were collected from the side walls and floor of the excavation rather than the typical two samples for a pit replacement with no soil impacts. Side wall samples were collected from the north, south, east and west walls. In addition, one floor sample was collected from beneath the center of the former pit location.

These soil samples were submitted to eAnalytics Laboratory, Inc. (eAnalytics) in Loveland, Colorado for the analyses of 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). In addition, the side wall sample collected from the western wall, which was the side that the dump failed on, was also analyzed for three inorganic parameters including sodium absorption ratio (SAR), electrical conductivity (EC) and pH. All soil samples were field screened with a photoionization detector (PID). The PID value for each of the soil samples was 0.0 ppm.

The laboratory data indicated that the BTEX, TPH-GRO, TPH-DRO and naphthalene constituents were below their respective laboratory detection limits for all soil samples. In addition, the SAR and EC were lower than the Colorado Oil and Gas Commission's (COGCC's) Table 910-1 limits. The pH was within an acceptable range. A copy of the laboratory reports, quality control data, and chain-of-custody documentation are presented in Appendix A.

The steel pit was replaced by a new concrete pit at this same location and the facility was placed back in operation. Fremont personnel did not oversee that portion of the project.

#### **4.0 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.**



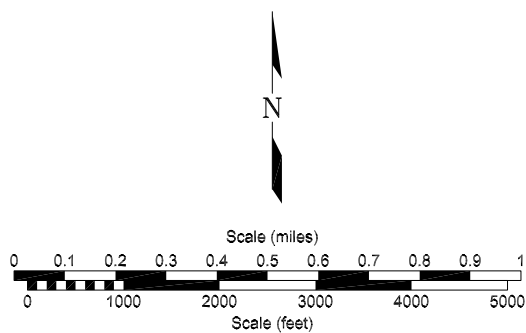
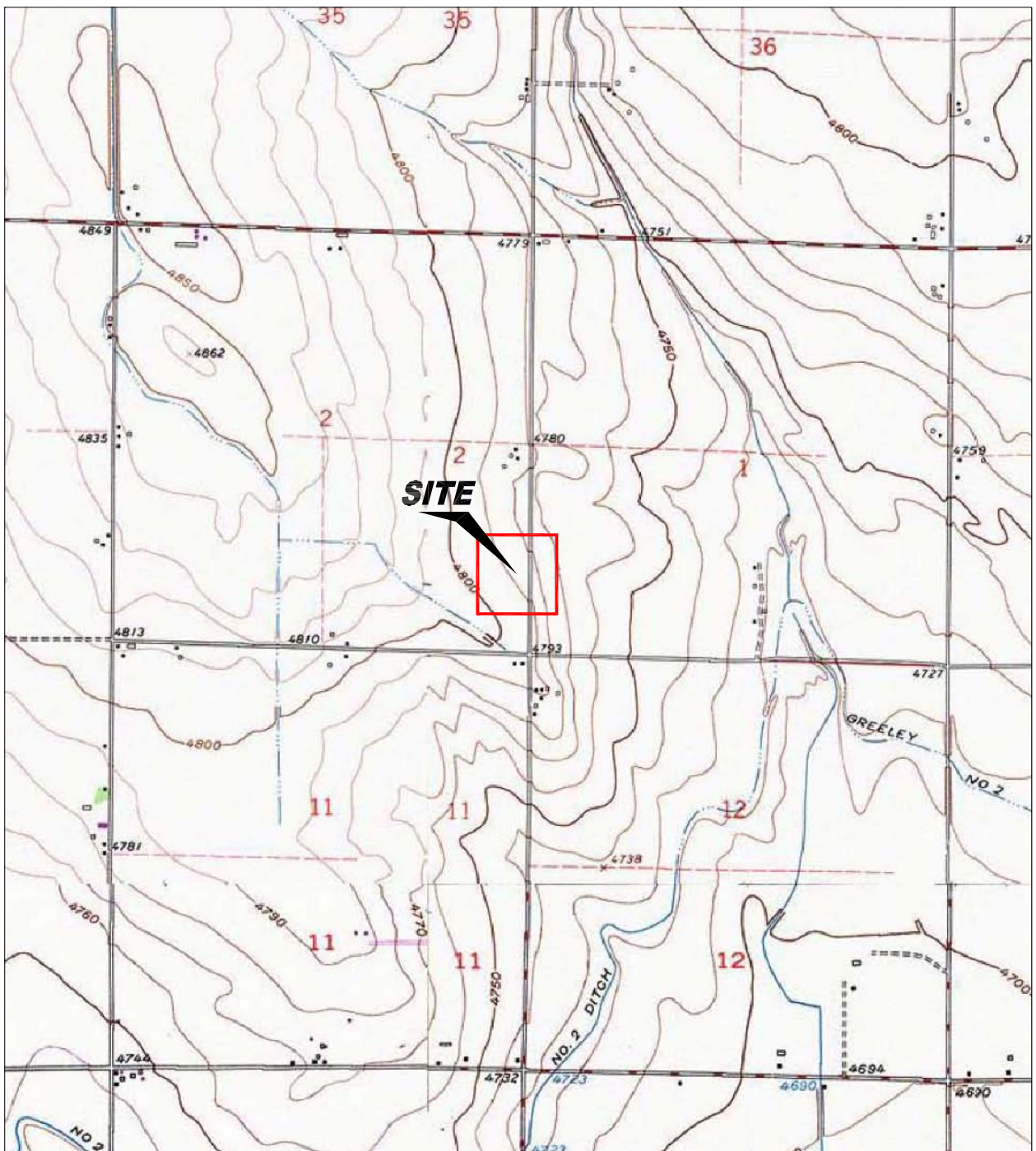
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Paul V. Henahan, P.E.

Senior Consultant

8/10/13  
Date \_\_\_\_\_

## **FIGURES**



USGS 7.5 MINUTE SERIES (TOPOGRAPHIC)

Figure 1  
SITE LOCATION MAP

Noble - Armstrong 2-16G5  
SE SE Section 2, T6N, R65 W  
Weld County, Colorado

Project No.  
C013-026

Prepared by

Drawn by  
JMA

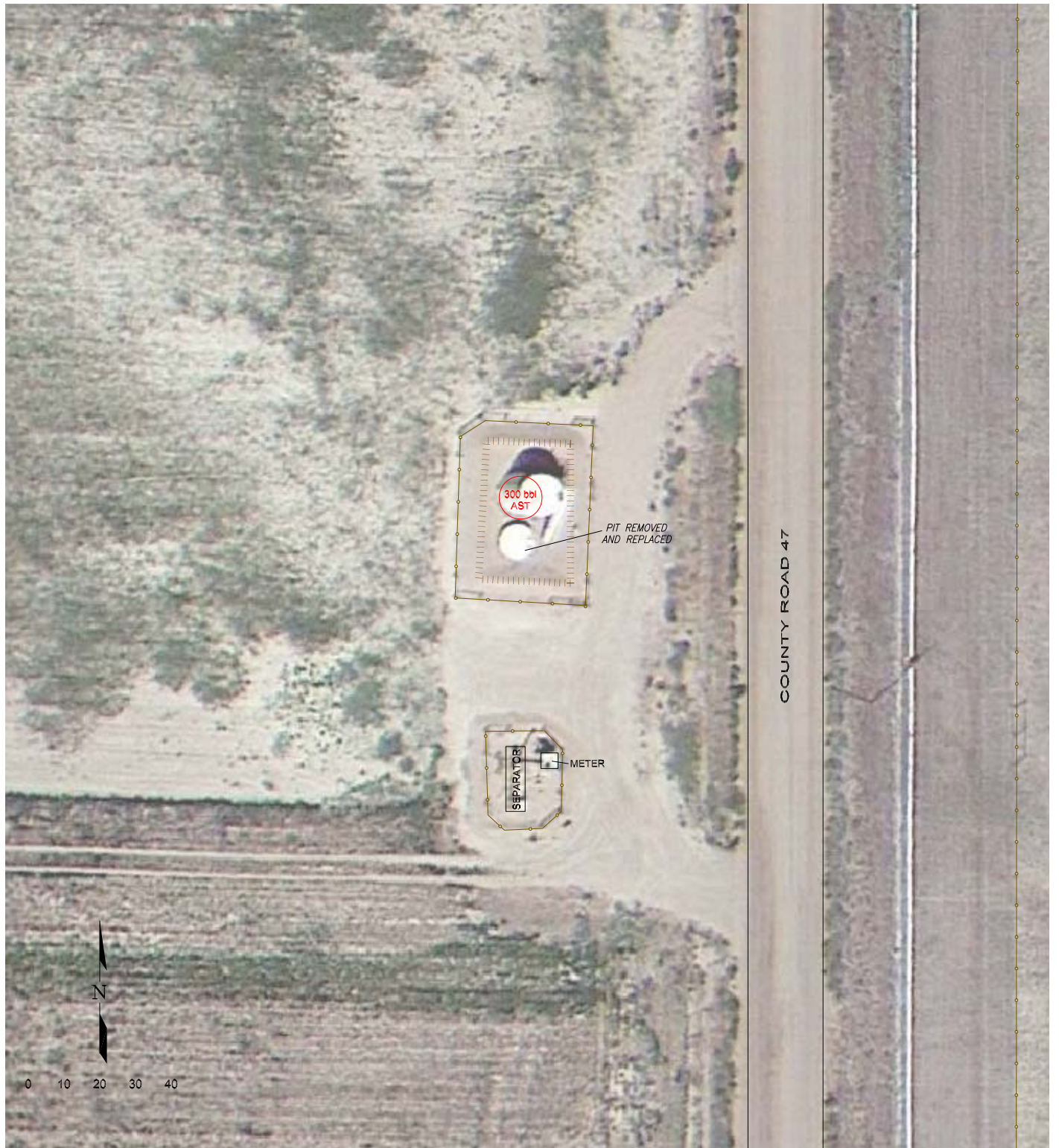
Date  
8/6/13

Reviewed by

Filename  
13026T








#### LEGEND

-  FENCE LINE
-  BERM
-  ABOVE GROUND STORAGE TANK

Figure 2

#### SITE MAP

**Noble - Armstrong 2-16G5**  
SE SE Section 2, T6N, R65 W  
Weld County, Colorado

Project No. C013-026	Prepared by	Drawn by JMA	
Date 8/6/13	Reviewed by	Filename 13026Q	

**APPENDIX A**

**LABORATORY DOCUMENTATION**

# Certificate of Analysis



August 2, 2013

Client: Fremont Environmental  
PO Box 1289  
Wellington CO 80549

Project: Armstrong 2-16G5

Lab ID: 080102

Date Received: 08/01/13

Number of Samples Received: 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

Analysis	EPA Method	Lab ID on COC
BTEX / Nap	8260C	1 - 5
TPH - GRO/DRO	8260C/8015C	1 - 5
pH	9045D	4
Sodium Adsorption Ratio	U.S. Dept of Ag Handbook 60 Method 20B	4
Electrical Conductivity	U.S. Dept of Ag Handbook 60 Method 3	4

All quality control analyses associated with the requested analyses were satisfactorily passed before the samples were run. If you have any questions please give us a call, we are happy to help.

Thank you for allowing eAnalytics Laboratory to provide laboratory services for you, we truly appreciate your business.

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



A2LA & Department of Defense (DoD) Certified

**e**ANALYTICS  
LABORATORY

August 2, 2013

[illegible]

WO# 080102 eANALYTICS: Environmental testing made Easy Page 1 of 1





**e**ANALYTICS  
LABORATORY

**August 2, 2013**

EPA Method: 8260C	BTEX / Nap
8260C/8015C	TPH - GRO/DRO

[illegible]

**e**ANALYTICS  
LABORATORY

**August 2, 2013**

Project: Armstrong 2-16G5

Lab ID: 080102

EPA Method: 8260C

[illegible]





**APPENDIX B**

**PHOTOS**



**Looking northwest at pit excavation after most of the impacted soil was removed.**



**Steel water pit after removal. No indication of failure was observed.**