

**BETZ 30-11, 30-14**

**SECOND QUARTER 2014 GROUNDWATER MONITORING REPORT**

July 29, 2014

PREPARED ON BEHALF OF

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



PREPARED BY

Tasman Geosciences, LLC  
6899 Pecos Street, Unit C  
Denver, CO 80221



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## 1.0 INTRODUCTION

This Second Quarter 2014 Groundwater Monitoring Report (Report) presents the results of groundwater field monitoring activities performed during the second quarter 2014 at the Betz 30-11, 30-14 Tank Battery (Site). Field activities were performed by Tasman Geosciences, LLC (Tasman), on behalf of Noble Energy, Inc. (Noble), pursuant to Colorado Oil and Gas Conservation Commission (COGCC) guidance.

Field activities described in this Report were conducted to evaluate groundwater flow and quality conditions across the Site. The data collected were used to develop the analytical summary tables and maps included herein.

### 1.1 Site Background

The Site is located in the NE  $\frac{1}{4}$  of the NE  $\frac{1}{4}$  of Section 30, Township 5 North, Range 67 West, approximately 2.8 miles northwest of the town of Johnstown, in Weld County, Colorado (Figure 1). Groundwater monitoring activities are being performed in response to historic petroleum hydrocarbon impacts discovered beneath the produced water vault on November 22, 2013. In response to impacts observed, production equipment at the Site was shut in and the produced water vault was removed.

A summary of significant and/or recent environmental monitoring and remediation activities is provided below:

- On November 22, 2013 excavation activities were conducted to remove soil with petroleum hydrocarbon impacts in the vicinity of the produced water vault. The final dimensions of the excavation were 11 feet (ft.) by 12 ft. by 3.5 ft. below ground surface (bgs), as described in the Site Excavation Report dated April 9, 2014 and illustrated in Figure 2. Approximately 10 cubic yards of impacted soil were transported to the Buffalo Ridge Landfill for disposal. Clean fill was then returned to the Site.
- Four confirmation soil samples were collected and submitted for laboratory analysis for benzene, toluene, ethylbenzene, and total xylenes (collectively referred to as BTEX), naphthalene, and total petroleum hydrocarbons-gasoline range organics (TPH-GRO) using United States Environmental Protection Agency (USEPA) Method 8260 and total petroleum hydrocarbons-diesel range organics (TPH-DRO) using USEPA Method 8015. Soil sample analytical data are presented in Table 1 and illustrated in Figure 3.
- Groundwater was encountered during the excavation at a depth of approximately 3.5 ft. bgs. A laboratory sample (GW01) was collected and analyzed for BTEX using USEPA Method 8260B. The groundwater was found to have concentrations above the COGCC Table 910-1 standard for benzene and toluene. Groundwater laboratory analytical results are presented in Table 2.
- Two groundwater monitoring wells (MW-2 and MW-3) were installed at the Site on December 19, 2013 as shown in Figure 2. Soil samples from the well borings were

collected and submitted for laboratory analysis. Soil boring laboratory analytical results are presented in Table 1 and illustrated in Figure 3.

- Two additional groundwater monitoring wells (MW-1 and MW-4) were installed at the Site on January 10, 2014.
- An initial groundwater monitoring event was conducted on January 23, 2014.
- The second quarter 2014 groundwater monitoring event was conducted on April 17, 2014. Groundwater sampling procedures and results are described in subsequent sections of this Report.

## **1.2 Site Topography, Geology, and Hydrogeology**

The Site is located approximately 4,795 feet above mean sea level (amsl), and the surface topography slopes gradually to the south towards the Big Thompson River. Groundwater is encountered at approximately two to four ft. bgs and is most likely influenced by flow of the Big Thompson River.

Site investigation activities indicate that the subsurface geology immediately beneath the ground surface consists of unconsolidated, loosely bedded, alluvial sediments. The alluvium is composed of poorly sorted, medium to coarse grain sand with minor gravel.

## **2.0 GROUNDWATER MONITORING ACTIVITIES**

Second quarter groundwater monitoring activities were performed at the Site on April 17, 2014. The activities included measurement of groundwater levels and collection of groundwater samples from each of the four Site monitoring wells.

### **2.1 Groundwater Level Measurements**

Both general and significant observations from the groundwater gauging event are presented in the following sections.

#### ***General***

Groundwater levels are measured (i.e. gauged) in order to evaluate hydraulic characteristics and to provide information regarding seasonal and annual fluctuations in groundwater elevation at the Site. During the second quarter 2014 groundwater monitoring event, groundwater levels were measured at monitoring wells MW-1, MW-2, MW-3, and MW-4.

Groundwater levels are measured on the north side of the well casing to the nearest 0.01-foot using an oil-water interface probe (IP). Groundwater level data were subsequently converted to elevations (feet amsl) by subtracting the measured groundwater depth-to-water (DTW) level from the well's top-of-casing (TOC) elevation survey datum.

### Significant Observations

The groundwater table was encountered at approximately 2 ft. bgs and slopes to the south with a gradient of approximately 0.003 ft./ft., as measured between monitoring wells MW-4 and MW-2.

No measurable light non-aqueous phase liquid (LNAPL) was detected in groundwater monitoring wells during the second quarter 2014 groundwater monitoring event.

## **2.2 Groundwater Sampling**

This section summarizes the groundwater sampling activities that were performed and the protocols followed during the second quarter 2014 groundwater monitoring event.

### **2.2.1 Groundwater Sampling Points**

On April 17, 2014, Site groundwater monitoring wells MW-1, MW-2, MW-3, and MW-4 were sampled as part of the second quarter groundwater monitoring event. The Site monitoring locations are illustrated in Figure 2.

### **2.2.2 Groundwater Purging and Sampling Activities**

This section summarizes both general and significant observations from the groundwater purging and sampling activities.

#### General

Prior to collecting groundwater samples, groundwater levels were measured at each of the Site monitoring wells, as previously described. The presence of product was also evaluated using an IP. Subsequently, a minimum of three well casing volumes of groundwater (calculated from total well depth and groundwater level measurements) were purged from the subject well prior to collecting a groundwater sample.

Groundwater monitoring wells were sampled using individual, disposable, polyethylene bailers to limit the potential for cross-contamination between sampling points. Clean sample containers (40-milliliter [ml] volatile organic analysis [VOA] vials) supplied by the analytical laboratory were used to contain liquid for subsequent analyses.

VOA vials were overfilled and capped to reduce the potential for any headspace and to prevent the loss of volatile analytes, and subsequently inverted and gently tapped to dislodge any air bubbles that may have formed around the cap or sides. Sample bottles were then labeled with the corresponding date, time, and well identification, and subsequently placed in an ice-filled cooler and maintained at approximately 4 degrees Celsius (°C) for transportation.

The groundwater samples were packed as designated by the analytical laboratory and transferred for analysis under chain-of-custody procedures to Summit Scientific in Golden, CO. The groundwater samples were submitted for analysis of BTEX using USEPA Method 8260B.

### Significant Observations

- No hydrocarbon sheen was observed in any of the four groundwater monitoring locations.
- No hydrocarbon odors were detected in purge water collected from any of the four groundwater monitoring locations.

## **3.0 GROUNDWATER MONITORING RESULTS AND EVALUATION**

Groundwater monitoring results are presented in the following sections.

### **3.1 Groundwater Monitoring Results**

During the second quarter 2014 groundwater monitoring event, groundwater elevations ranged from 4792.09 ft. amsl at MW-4 to 4791.89 ft. amsl at MW-2. The average groundwater table elevation decreased by an average of 0.21 ft. in the four Site monitoring wells since the initial groundwater monitoring event on January 23, 2014.

Groundwater elevation data are presented in Table 3 and groundwater potentiometric surface contours are illustrated in Figure 4. As illustrated, measured groundwater elevations from the four monitoring wells indicate a groundwater gradient to the south.

Groundwater analytical results for the second quarter 2014 groundwater monitoring event are summarized below, presented in Table 2, and illustrated in Figure 5. To evaluate Site conditions, groundwater analytical results are compared to the COGCC Table 910-1 standards for BTEX in groundwater. The laboratory analytical data reports are provided in Attachment A.

- Benzene was not detected above the COGCC Table 910-1 standard of 5 micrograms per liter ( $\mu\text{g/L}$ ) in any of the 4 monitoring wells sampled.
- Toluene was not detected above the COGCC Table 910-1 standard of 560  $\mu\text{g/L}$  in any of the 4 monitoring wells sampled.
- Ethylbenzene was not detected above the COGCC Table 910-1 standard of 700  $\mu\text{g/L}$  in any of the 4 monitoring wells sampled.
- Total xylenes were not detected above the COGCC Table 910-1 standard of 1400  $\mu\text{g/L}$  in any of the 4 monitoring wells sampled.

### **3.2 Hydrocarbon Concentration Trends**

#### Hydrocarbon Trends

Samples collected during the second quarter 2014 exhibited concentrations of BTEX below laboratory reporting limits and below COGCC Table 910-1 standards for all four Site monitoring

wells sampled. As shown in Table 3, there has been no change in hydrocarbon levels at the Site since the initial groundwater monitoring event.

## **4.0 CONCLUSIONS AND RECOMMENDATIONS**

This section of the Report presents conclusions from the findings of the second quarter activities as well as recommendations for future activities.

### **4.1 Conclusions**

Laboratory analytical data indicate that dissolved-phase petroleum hydrocarbon concentrations are not present above laboratory reporting limits in any of the Site groundwater monitoring well locations.

### **4.2 Recommendations**

Ongoing quarterly monitoring activities, including groundwater gauging and sampling, will provide for continued assessment of Site conditions and analysis of Site hydrocarbon concentration trends.

## **5.0 UPCOMING SITE ACTIVITIES**

Upcoming Site activities anticipated for the next quarterly monitoring period include the following items:

- Conduct the third quarter 2014 groundwater monitoring and sampling event in July 2014.

# **TABLES**

**TABLE 1**  
**SUMMARY OF SOIL ANALYTICAL RESULTS**  
**NOBLE ENERGY, INC. - BETZ 30-11, 30-14**

Date	Soil Sample ID	Laboratory Results	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Total Xylenes mg/kg	TPH-GRO mg/kg	TPH-DRO mg/kg	Naphthalene mg/kg
		COGCC Standard	0.17	85	100	175	500		23
11/22/13	SS01@3'	Result =	<0.0020	<0.0050	<0.0050	<0.010	<0.50	<50	<0.010
12/19/13	MW-2@1-3'	Result =	<0.0020	<0.0050	<0.0050	<0.010	<0.50	<50	<0.010
12/19/13	MW-3@1-3'	Result =	<0.0020	<0.0050	<0.0050	<0.010	<0.50	<50	<0.010
2/17/14	SS05@3'	Result =	<0.01	<0.01	<0.01	<0.01	<50	<50	<0.01
2/17/14	SS06@3'	Result =	<0.01	<0.01	<0.01	<0.01	<50	<50	<0.01
2/17/14	SS07@3'	Result =	<0.01	<0.01	<0.01	<0.01	<50	<50	<0.01

Date	Soil Sample ID	Laboratory Results	EC	pH	SAR
		COGCC Standard	4 or 2x BG.	6-9	<12
11/22/13	SS01@3'	Result =	2.63	7.81	1.91

COGCC = Colorado Oil and Gas Conservation Commission

mg/kg = Milligrams per kilogram

< = Analytical result is less than the indicated laboratory reporting limit

EC = specific conductance

BG = background

SAR = sodium adsorption ratio

Soil standards referenced from COGCC Table 910-1

Highlighted results exceed the COGCC Table 910-1 standard

**TABLE 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS**  
**NOBLE ENERGY, INC. - BETZ 30-11, 30-14**

Date	Monitoring Well ID	Laboratory Results	Benzene $\mu\text{g/l}$	Toluene $\mu\text{g/l}$	Ethylbenzene $\mu\text{g/l}$	Total Xylenes $\mu\text{g/l}$
		COGCC Standard	5	560	700	1,400
11/22/13	GW01	Result =	350	590	120	840
1/23/14	MW-1	Result =	<1.0	<1.0	<1.0	<1.0
4/17/14	MW-1	Result =	<1.0	<1.0	<1.0	<1.0
1/23/14	MW-2	Result =	<1.0	<1.0	<1.0	<1.0
4/17/14	MW-2	Result =	<1.0	<1.0	<1.0	<1.0
1/23/14	MW-3	Result =	<1.0	<1.0	<1.0	<1.0
4/17/14	MW-3	Result =	<1.0	<1.0	<1.0	<1.0
1/23/14	MW-4	Result =	<1.0	<1.0	<1.0	<1.0
4/17/14	MW-4	Result =	<1.0	<1.0	<1.0	<1.0

COGCC = Colorado Oil and Gas Conservation Commission

$\mu\text{g/l}$  = micrograms per liter

<= Analytical result is less than the indicated laboratory reporting limit

Groundwater standards referenced from COGCC Table 910-1

 Highlighted results exceed the COGCC Table 910-1 standard

**TABLE 3**  
**SUMMARY OF GROUNDWATER ELEVATION DATA**  
**NOBLE ENERGY, INC. - BETZ 30-11, 30-14**

Date	Monitoring Well ID	Surveyed Well Elevation (ft. AMSL)	Total Depth (ft. BTOC)	Depth to Water (ft. BTOC)	Depth to LNAPL (ft. BTOC)	LNAPL Thickness (ft.)	Corrected GW Elevation (ft. AMSL)
1/23/14	MW-1	4797.84	7.94	5.58	ND	ND	4792.26
4/17/14	MW-1		7.94	5.81	ND	ND	4792.03
1/23/14	MW-2	4794.00	9.78	1.92	ND	ND	4792.08
4/17/14	MW-2		9.40	2.11	ND	ND	4791.89
1/23/14	MW-3	4794.24	9.54	2.12	ND	ND	4792.12
4/17/14	MW-3		9.41	2.31	ND	ND	4791.93
1/23/14	MW-4	4798.62	7.82	6.30	ND	ND	4792.32
4/17/14	MW-4		7.84	6.53	ND	ND	4792.09

ft. = Feet

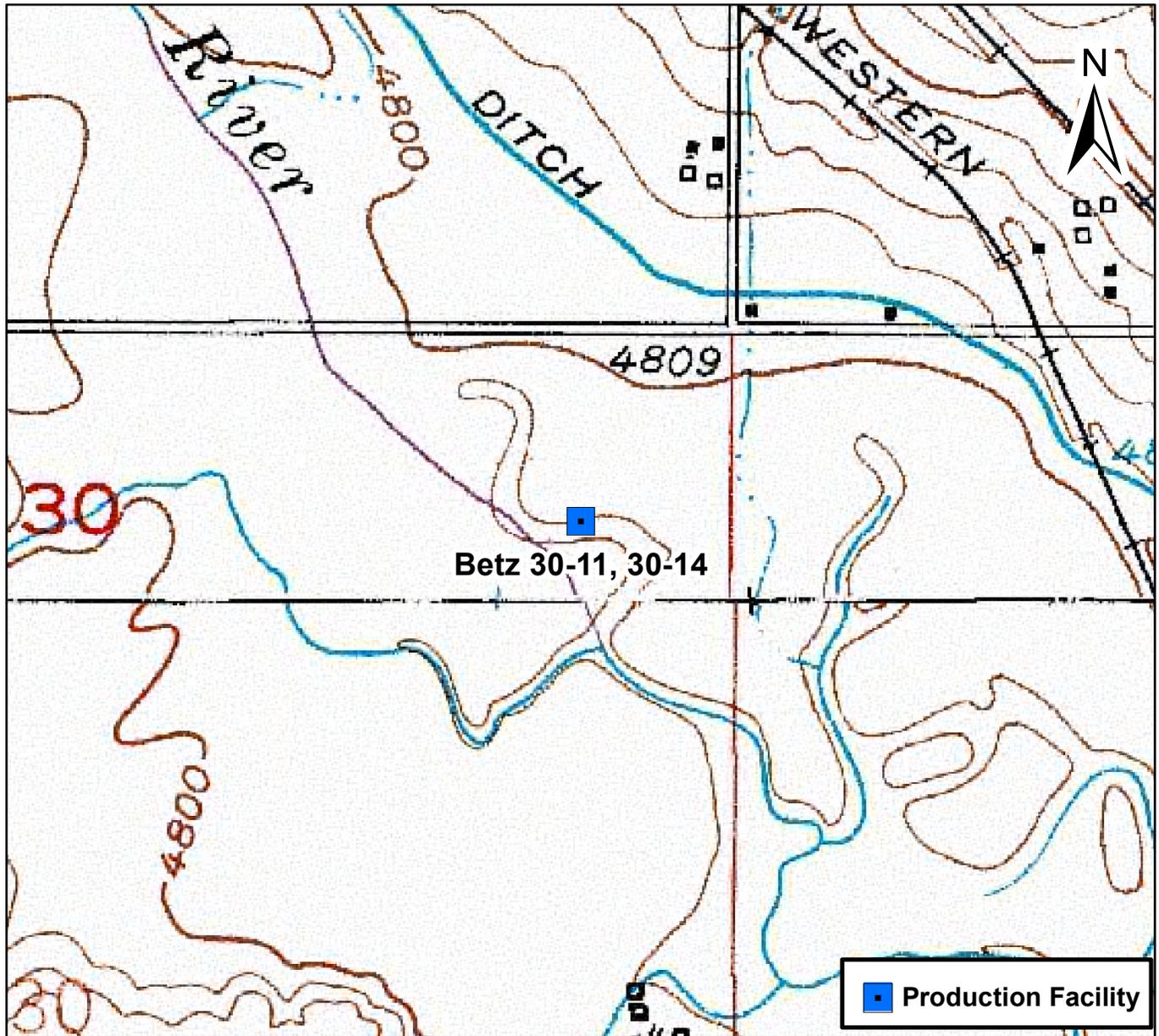
AMSL = Above mean sea level

BTOC = Below top of casing

LNAPL = Light non-aqueous phase liquid

ND = No LNAPL detected

## **FIGURES**



### Figure 1

Site Location Map  
 Betz 30-11, 30-14  
 NENE S30 T5N R67W  
 Weld County, Colorado

Drawn By: DBA  
 Date: 12/16/2013





Map data: Google, ESRI

PROJECT NO:  
 DRAWN BY: ATF  
 DATE: 3/05/2014



6899 Pecos St., Unit C  
 Denver, CO 80221

**Facility**  
 Noble Energy  
 Betz 30-11, 30-14  
 Weld County, CO

**LEGEND:**

-  Groundwater Monitoring Location
-  Earthen Berm
-  Excavation Extent (Surveyed Via Trimble Unit)
-  Oil Tank



Site Map  
 Figure 2



Map data: Google, ESRI

PROJECT NO:  
 DRAWN BY: ATF  
 DATE: 7/24/2014

**TASMAN** GEOSCIENCES  
 6899 Pecos St., Unit C  
 Denver, CO 80221

**Facility**  
 Noble Energy  
 Betz 30-11, 30-14  
 Weld County, CO

**LEGEND:**

- Excavation Soil Sample Location
- Borehole Sample Location
- Excavation Extent (Surveyed Via Timble Unit)

- Earthen Berm
- Oil Tank

0 ft. 53 ft. 106 ft.

Soil Analytical Sample Locations Map  
 Figure 3



PROJECT NO:  
 DRAWN BY: ATF  
 DATE: 5/12/2014

**TASMAN** GEOSCIENCES  
 6899 Pecos St., Unit C  
 Denver, CO 80221

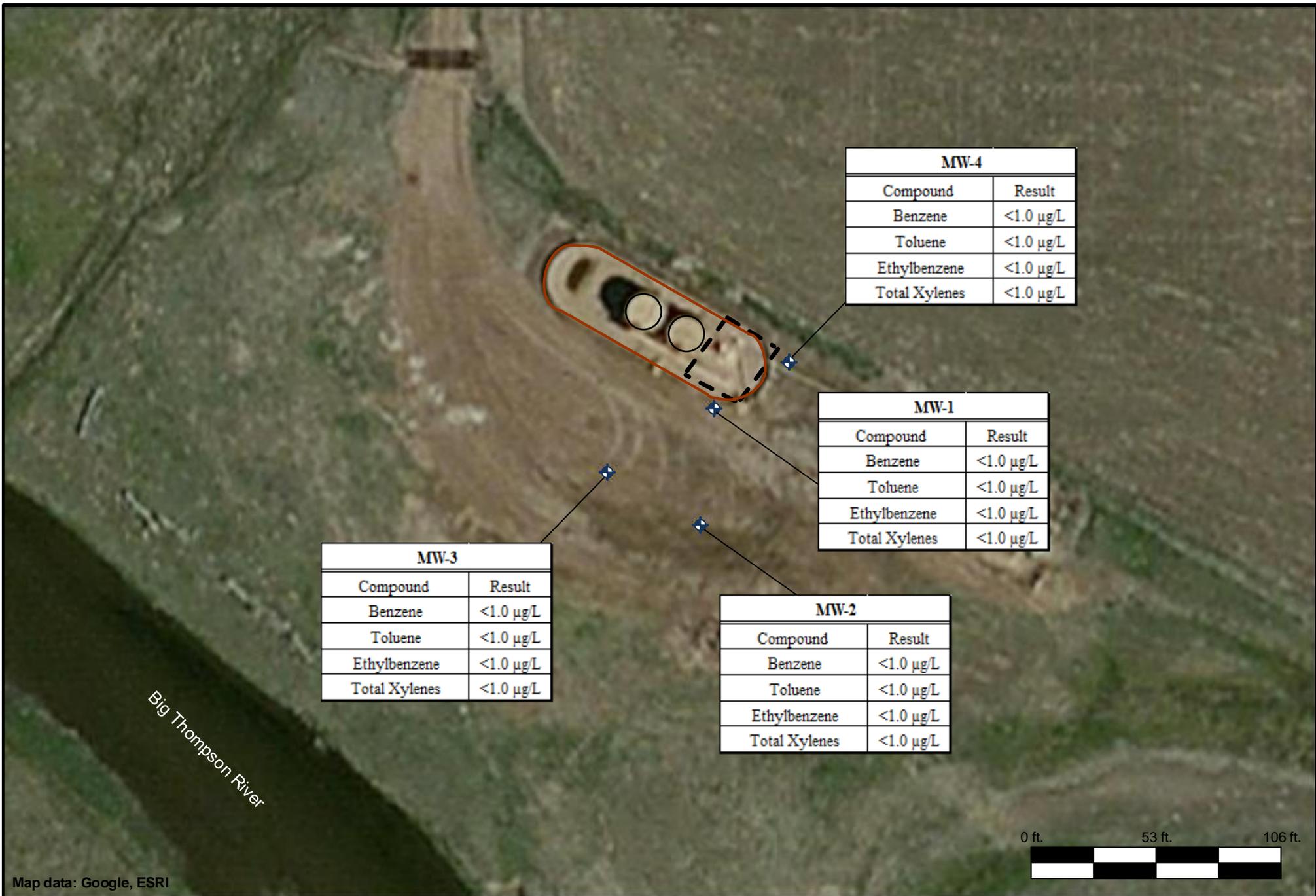
**Facility**  
 Noble Energy  
 Betz 30-11, 30-14  
 Weld County, CO

**LEGEND:**

- Groundwater Monitoring Location
- Earthen Berm
- Flow Direction
- Excavation Extent (Surveyed Via Trimble Unit)

- Groundwater Contour (Dashed where inferred)
- Earthen Berm
- Oil Tank

Groundwater Potentiometric Surface Contour Map  
 (April 17, 2014)  
 Figure 4



MW-4	
Compound	Result
Benzene	<1.0 µg/L
Toluene	<1.0 µg/L
Ethylbenzene	<1.0 µg/L
Total Xylenes	<1.0 µg/L

MW-1	
Compound	Result
Benzene	<1.0 µg/L
Toluene	<1.0 µg/L
Ethylbenzene	<1.0 µg/L
Total Xylenes	<1.0 µg/L

MW-3	
Compound	Result
Benzene	<1.0 µg/L
Toluene	<1.0 µg/L
Ethylbenzene	<1.0 µg/L
Total Xylenes	<1.0 µg/L

MW-2	
Compound	Result
Benzene	<1.0 µg/L
Toluene	<1.0 µg/L
Ethylbenzene	<1.0 µg/L
Total Xylenes	<1.0 µg/L

Map data: Google, ESRI

PROJECT NO:  
DRAWN BY: ATF  
DATE: 5/12/2014



**Facility**  
Noble Energy  
Betz 30-11, 30-14  
Weld County, CO

**LEGEND:**

- Earthen Berm
- Groundwater Monitoring Location
- Excavation Extent (Surveyed Via Trimble Unit)
- Oil Tank



Groundwater Analytical  
Results Map  
(April 17, 2014)  
Figure 5

# **ATTACHMENT A**

## **LABORATORY ANALYTICAL DATA REPORTS**

# Summit Scientific

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741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

April 21, 2014

Daniel Wade  
Noble Energy  
804 Grand Avenue  
Platteville, CO 80651  
RE: Betz 30-11, 30-14

Enclosed are the results of analyses for samples received by Summit Scientific on 04/18/14 10:40. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to be 'BS', with a long, sweeping horizontal line extending to the right.

Ben Shrewsbury  
President / Laboratory Manager



Noble Energy  
804 Grand Avenue  
Platteville CO, 80651

Project: Betz 30-11, 30-14

Project Number: [none]  
Project Manager: Daniel Wade

**Reported:**  
04/21/14 16:36

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW01	1404131-01	Water	04/17/14 14:20	04/18/14 10:40
MW02	1404131-02	Water	04/17/14 14:40	04/18/14 10:40
MW03	1404131-03	Water	04/17/14 14:30	04/18/14 10:40
MW04	1404131-04	Water	04/17/14 14:10	04/18/14 10:40

Summit Scientific

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Noble Energy  
804 Grand Avenue  
Platteville CO, 80651

Project: Betz 30-11, 30-14

Project Number: [none]  
Project Manager: Daniel Wade

Reported:  
04/21/14 16:36

Summit Scientific  
1404131

S:

741 Corporate Circle, Suite 188 • Golden, Colorado 80401  
303-277-9310 • 303-374-9333

Client: Tucson Geosciences / Noble  
Address: 6899 Pecos Street  
City/State/Zip: Denver, CO 80221  
Phone: 303-487-1228  
Project Manager: Dan Wade  
E-Mail:  
Project Name: Betz 30-11, 30-14  
Sampler Name: Brad Macdonald  
Project Number:

Page 1 of 1

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix				Analysis Requested				Special Instructions	
					HCl	HNO3	None	Other (Specify)	Groundwater	Soil	Air-Canister #	Other (Specify)	8260 GBTEXN	8016 DRO	8260 BTEX			
1	MWD1	4/17/14	1420	3		X	X	X	X					X	X			
2	MWD2	4/17/14	1440	3		X	X	X	X					X	X			
3	MWD3	4/17/14	1430	3		X	X	X	X					X	X			
4	MWD4	4/17/14	1410	3		X	X	X	X					X	X			
5																		
6																		
7																		
8																		
9																		
10																		

Relinquished by: <i>[Signature]</i>	Date/Time: 4/15/14	Received by: <i>[Signature]</i>	Date/Time: 4/17/14 11:50	Turn Around Time (Check):	72 hours	Standard	X	Notes:
Relinquished by:	Date/Time:	Received by:	Date/Time:	Sample Integrity:	Temperature Upon Receipt:	Infect:	Yes No	
Relinquished by:	Date/Time:	Received by:	Date/Time:					

www.s2scientific.com



Noble Energy  
804 Grand Avenue  
Platteville CO, 80651

Project: Betz 30-11, 30-14

Project Number: [none]  
Project Manager: Daniel Wade

**Reported:**  
04/21/14 16:36

**MW01**  
**1404131-01 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/14 14:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1404134	04/19/14	04/19/14	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **04/17/14 14:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		108 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		98.9 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		105 %	45-146		"	"	"	"	

Summit Scientific

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Noble Energy  
804 Grand Avenue  
Platteville CO, 80651

Project: Betz 30-11, 30-14

Project Number: [none]  
Project Manager: Daniel Wade

**Reported:**  
04/21/14 16:36

**MW02**  
**1404131-02 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/14 14:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1404134	04/19/14	04/19/14	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **04/17/14 14:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		109 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		98.3 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		104 %	45-146		"	"	"	"	

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Noble Energy  
804 Grand Avenue  
Platteville CO, 80651

Project: Betz 30-11, 30-14

Project Number: [none]  
Project Manager: Daniel Wade

**Reported:**  
04/21/14 16:36

**MW03**  
**1404131-03 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/14 14:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1404134	04/19/14	04/19/14	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **04/17/14 14:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		<i>110 %</i>	<i>37-154</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: Toluene-d8</i>		<i>98.8 %</i>	<i>45-149</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	
<i>Surrogate: 4-Bromofluorobenzene</i>		<i>105 %</i>	<i>45-146</i>		<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	

Summit Scientific

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Noble Energy  
804 Grand Avenue  
Platteville CO, 80651

Project: Betz 30-11, 30-14

Project Number: [none]  
Project Manager: Daniel Wade

**Reported:**  
04/21/14 16:36

**MW04**  
**1404131-04 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/14 14:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1404134	04/19/14	04/19/14	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **04/17/14 14:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		108 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		97.7 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		106 %	45-146		"	"	"	"	

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Noble Energy  
804 Grand Avenue  
Platteville CO, 80651

Project: Betz 30-11, 30-14

Project Number: [none]  
Project Manager: Daniel Wade

Reported:  
04/21/14 16:36

### Volatile Organic Compounds by EPA Method 8260B - Quality Control

#### Summit Scientific

Analyte	Reporting			Spike	Source	%REC		RPD		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

#### Batch 1404134 - EPA 5030 Water MS

##### Blank (1404134-BLK1)

Prepared & Analyzed: 04/18/14

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	14.1		"	13.2		106	37-154			
Surrogate: Toluene-d8	13.2		"	13.3		99.4	45-149			
Surrogate: 4-Bromofluorobenzene	14.1		"	13.3		106	45-146			

##### LCS (1404134-BS1)

Prepared & Analyzed: 04/18/14

Benzene	28.6	1.0	ug/l	33.2		85.9	51-132			
Toluene	31.9	1.0	"	33.3		95.8	51-138			
Ethylbenzene	32.6	1.0	"	33.1		98.5	58-146			
m,p-Xylene	69.4	2.0	"	66.7		104	57-144			
o-Xylene	33.8	1.0	"	32.9		103	53-146			
Surrogate: 1,2-Dichloroethane-d4	14.1		"	13.2		107	37-154			
Surrogate: Toluene-d8	13.2		"	13.3		99.2	45-149			
Surrogate: 4-Bromofluorobenzene	13.8		"	13.3		104	45-146			

##### LCS (1404134-BS2)

Prepared & Analyzed: 04/18/14

Benzene	28.7	1.0	ug/l	33.2		86.3	51-132			
Toluene	32.0	1.0	"	33.3		96.1	51-138			
Ethylbenzene	32.7	1.0	"	33.1		98.9	58-146			
m,p-Xylene	69.9	2.0	"	66.7		105	57-144			
o-Xylene	34.4	1.0	"	32.9		104	53-146			
Surrogate: 1,2-Dichloroethane-d4	13.8		"	13.2		105	37-154			
Surrogate: Toluene-d8	13.3		"	13.3		99.5	45-149			
Surrogate: 4-Bromofluorobenzene	13.7		"	13.3		103	45-146			

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**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source	%REC		RPD		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

**Batch 1404134 - EPA 5030 Water MS**

<b>Matrix Spike (1404134-MS1)</b>		<b>Source: 1404129-01</b>			<b>Prepared &amp; Analyzed: 04/18/14</b>						
Benzene	29.2	1.0	ug/l	33.2	ND	88.0	34-141				
Toluene	32.0	1.0	"	33.3	ND	95.9	27-151				
Ethylbenzene	33.4	1.0	"	33.1	ND	101	29-160				
m,p-Xylene	71.1	2.0	"	66.7	ND	107	20-166				
o-Xylene	34.7	1.0	"	32.9	ND	105	33-159				
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>14.4</i>		<i>"</i>	<i>13.2</i>		<i>109</i>	<i>37-154</i>				
<i>Surrogate: Toluene-d8</i>	<i>13.2</i>		<i>"</i>	<i>13.3</i>		<i>99.3</i>	<i>45-149</i>				
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.7</i>		<i>"</i>	<i>13.3</i>		<i>103</i>	<i>45-146</i>				

<b>Matrix Spike (1404134-MS2)</b>		<b>Source: 1404129-02</b>			<b>Prepared &amp; Analyzed: 04/18/14</b>						
Benzene	28.6	1.0	ug/l	33.2	ND	86.0	34-141				
Toluene	31.3	1.0	"	33.3	ND	93.9	27-151				
Ethylbenzene	32.6	1.0	"	33.1	ND	98.6	29-160				
m,p-Xylene	69.0	2.0	"	66.7	ND	103	20-166				
o-Xylene	34.4	1.0	"	32.9	ND	104	33-159				
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>14.7</i>		<i>"</i>	<i>13.2</i>		<i>111</i>	<i>37-154</i>				
<i>Surrogate: Toluene-d8</i>	<i>13.1</i>		<i>"</i>	<i>13.3</i>		<i>98.2</i>	<i>45-149</i>				
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.5</i>		<i>"</i>	<i>13.3</i>		<i>101</i>	<i>45-146</i>				

<b>Matrix Spike Dup (1404134-MSD1)</b>		<b>Source: 1404129-01</b>			<b>Prepared &amp; Analyzed: 04/18/14</b>						
Benzene	28.6	1.0	ug/l	33.2	ND	86.1	34-141	2.18	32		
Toluene	31.4	1.0	"	33.3	ND	94.1	27-151	1.89	25		
Ethylbenzene	33.2	1.0	"	33.1	ND	100	29-160	0.691	50		
m,p-Xylene	70.3	2.0	"	66.7	ND	106	20-166	1.10	36		
o-Xylene	34.9	1.0	"	32.9	ND	106	33-159	0.431	26		
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>15.0</i>		<i>"</i>	<i>13.2</i>		<i>113</i>	<i>37-154</i>				
<i>Surrogate: Toluene-d8</i>	<i>13.0</i>		<i>"</i>	<i>13.3</i>		<i>97.7</i>	<i>45-149</i>				
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.6</i>		<i>"</i>	<i>13.3</i>		<i>102</i>	<i>45-146</i>				

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**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source	%REC		RPD		Notes
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	

**Batch 1404134 - EPA 5030 Water MS**

<b>Matrix Spike Dup (1404134-MSD2)</b>	<b>Source: 1404129-02</b>			<b>Prepared &amp; Analyzed: 04/19/14</b>						
Benzene	29.4	1.0	ug/l	33.2	ND	88.5	34-141	2.83	32	
Toluene	32.6	1.0	"	33.3	ND	97.7	27-151	3.95	25	
Ethylbenzene	34.0	1.0	"	33.1	ND	103	29-160	4.17	50	
m,p-Xylene	71.5	2.0	"	66.7	ND	107	20-166	3.57	36	
o-Xylene	35.4	1.0	"	32.9	ND	108	33-159	3.07	26	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>15.1</i>		<i>"</i>	<i>13.2</i>		<i>114</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>13.1</i>		<i>"</i>	<i>13.3</i>		<i>98.4</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.8</i>		<i>"</i>	<i>13.3</i>		<i>103</i>	<i>45-146</i>			

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### Notes and Definitions

DET Analyte DETECTED  
ND Analyte NOT DETECTED at or above the reporting limit  
NR Not Reported  
dry Sample results reported on a dry weight basis  
RPD Relative Percent Difference

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