

FREMONT ENVIRONMENTAL INC.

February 7, 2019

Mr. Jacob Evans
Noble Energy
2115 117th Avenue
Greeley, CO 80634

Subject: **Remediation and Groundwater Sampling Report**
Wiedeman PM J28-2, 28-7
API # 05-123-14002 (J28-2)
Weld County, Colorado
Fremont Project No. C016-110
Facility #327010, Remediation #10028

Dear Mr. Evans:

Enclosed please find a copy of the above referenced Remediation and Groundwater Sampling Report for the Wiedeman PM J28-2, 28-7 release site in Weld County, Colorado. The enclosed report describes remedial actions to address impacted groundwater as well as the recent quarterly groundwater monitoring 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. Henahan, P.E.
Senior Consultant

Enclosure

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

REMEDIATION AND GROUNDWATER SAMPLING REPORT

NOBLE ENERGY INC.

WIEDEMAN PM J28-2, 28-7

WELD COUNTY, COLORADO

FREMONT PROJECT NO. C016-110

FACILITY #372010, REMEDIATION #10028

Prepared by:

Fremont Environmental Inc.

1759 Redwing Lane

Broomfield, CO 80020

(303) 956-8714

February 7, 2019

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REMEDICATION AND GROUNDWATER SAMPLING REPORT

NOBLE ENERGY INC.

WIEDEMAN PM J28-2, 28-7

WELD COUNTY, COLORADO

FREMONT PROJECT NO. C016-110

FACILITY #372010, REMEDIATION #10028

1.0 INTRODUCTION

The purpose of this document is to present information collected during the remediation of petroleum-impacted groundwater at the Wiedeman PM J28-2, 28-7 former water vault release location in Weld County, Colorado. A solar-powered groundwater remediation system consisting of a soil vapor extraction (SVE) bubbler unit was installed and activated at the site in June 2018. This remediation system was tied into one existing monitoring well (MW-2) to remove light non-aqueous phase liquid (LNAPL).

2.0 BACKGROUND INFORMATION

2.1 Site Location

The Wiedeman PM J28-2, 28-7 site is in Evans, Weld County, Colorado as shown on Figure 1. The site is located on cultivated land approximately 0.3 miles southeast of the intersection of West 37th St. and 65th Ave. The location is further described as the NE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 28, Township 5N, Range 66W.

2.2 Site History

The site consists of the area adjacent to and beneath the former water vault for the Wiedeman PM J28-2 natural gas well. The Wiedeman PM J28-2 well was drilled in 1988 to a total vertical depth of 7,501 feet. Soil impacts were identified adjacent to the former water vault during its removal.

A site investigation to determine the extent of soil impacts was conducted in October 2016. A total of seven soil borings were advanced utilizing a Geoprobe rig. These borings were completed as flush-mounted 1-inch diameter monitoring wells. These monitoring wells were used to delineate the extent of soil and ground water impacts at the site. The locations of the monitoring wells are illustrated on the attached figures.

An excavation to remediate the source impacts was undertaken in September 2017. Approximately 160 cubic yards of impacted soil were removed and transported to the landfill. Soil samples were collected from the excavation sidewalls and floor and analyzed for petroleum constituents. The laboratory analyses of the soil samples indicated that petroleum constituent concentrations were less than the Colorado Oil and Gas Conservation Commission's (COGCC's) Table 910-1 limits in the samples.

3.0 GROUNDWATER MONITORING AND REMEDIATION ACTIVITIES

3.1 Groundwater Level Measurements

Ground water levels were measured in the seven monitoring wells on January 21, 2019 in accordance with the Sampling Plan included in Appendix A. Two monitoring wells were dry at that time. The data are summarized in Table 1.

Water table contours inferred from the January 21, 2019 data are illustrated on Figure 3. Based on these data, ground water is inferred to flow to the east. The water table gradient was calculated at approximately 0.014 feet per foot (ft/ft) for the January 2019 data.

3.2 Groundwater Sampling and Analysis

Groundwater samples were collected from five monitoring wells on January 21, 2019 to monitor the magnitude and extent of groundwater impacts at the site. As noted above, two wells were dry at the time of sampling; further, no monitoring wells contained LNAPL.

The groundwater samples were submitted to Summit Scientific Inc. in Golden, Colorado for analyses of benzene, toluene, ethylbenzene and xylenes (BTEX) by EPA Method 8260B. The groundwater chemistry data is illustrated on Figure 4

The laboratory data indicate that the BTEX constituents were below their respective laboratory detection limits in four of the five wells for the January 2019 sampling event. Monitoring well MW-3R had a benzene concentration of 8.6 ug/L.

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

3.3 Ground Water Remediation System

As a result of groundwater impacts in monitoring well MW-2, Noble installed a solar-powered soil vapor extraction (SVE) bubbler system at this site in June 2018. The remediation system consists of one monitoring well (MW-2) that was retrofitted to accommodate SVE and bubbler tubes. The SVE system is primarily for the removal of LNAPL rather than remediation of the vadose zone.

The recent quarterly groundwater sampling event, which was conducted on January 21, 2019, as well as previous sampling events, indicates that LNAPL remediation via SVE has been effective. Due to a low water table, MW-2 was dry and unable to be sampled during the most recent sampling event. As of October 17, 2018, LNAPL was no longer present in MW-2 and had a benzene concentration 4,200 ug/L.

The SVE well is piped directly to the solar-powered remediation trailer. Figure 5 illustrates the layout of the remediation system.

4.0 DISCUSSION

As demonstrated by soil sampling and analyses, the petroleum-impacted soil was removed from the site by excavation in September 2017. Approximately 160 cubic yards of impacted soil were removed and transported to the landfill.

Since groundwater impacts (LNAPL and dissolved constituents) were present after the excavation was completed, an SVE/bubbler remediation system was installed and activated in June 2018 to address LNAPL impacts. The remediation system will continue to operate until the LNAPL has been removed.

Noble will sample the ground water on a quarterly basis to evaluate the BTEX concentrations relative to COGCC's Table 910-1 requirements. 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.**



2/7/19

Date _____

Paul V. Henehan, P.E.

Senior Consultant

TABLES

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-3 MW-3R	08/14/17	<1.0	<1.0	<1.0	2.2	97.55	7.61	89.91	NP
	10/11/17	2.7	2.0	7.6	280		12.18	98.19	NP
	01/11/18	Dry	Dry	Dry	Dry		Dry	Dry	Dry
	04/27/18	Dry	Dry	Dry	Dry		Dry	Dry	Dry
	07/27/18	<1.0	<1.0	<1.0	<2.0		97.55	97.55	NP
	08/23/18	NS	NS	NS	NS		5.64	91.91	NP
	10/17/18	<1.0	2.7	4.9	12		13.45	84.10	NP
	01/21/19	8.6	<1.0	<1.0	390		16.65	80.90	NP
MW-4	10/12/16	<1.0	<1.0	<1.0	<1.0	96.80	12.38	84.42	NP
	01/06/17	<1.0	<1.0	<1.0	<1.0	96.80	15.62	81.18	NP
	04/05/17	Dry	Dry	Dry	Dry		Dry	Dry	Dry
	08/14/17	<1.0	<1.0	<1.0	<1.0		7.84	88.96	NP
	12/23/17	Dry	Dry	Dry	Dry		Dry	Dry	Dry
	01/11/18	<1.0	<1.0	<1.0	<1.0		15.22	81.58	NP
	04/27/18	Dry	Dry	Dry	Dry		Dry	Dry	Dry
	07/27/18	<1.0	<1.0	<1.0	<2.0		5.90	90.90	NP
	08/23/18	NS	NS	NS	NS		6.22	90.58	NP
	10/17/18	<1.0	<1.0	<1.0	<2.0		13.02	83.78	NP
	01/21/19	<1.0	<1.0	<1.0	<2.0		16.22	80.58	NP
MW-5	10/12/16	<1.0	<1.0	<1.0	2.9		95.98	11.50	84.48
	01/06/17	<1.0	<1.0	<1.0	2.8	95.98	15.24	80.74	NP
	04/05/17	Dry	Dry	Dry	Dry		Dry	Dry	Dry
	08/14/17	<1.0	<1.0	<1.0	<1.0		5.74	90.24	NP
	10/11/17	<1.0	<1.0	<1.0	<1.0		11.13	84.85	NP
	01/11/18	<1.0	<1.0	<1.0	<1.0		14.70	81.28	NP
	04/27/18	Dry	Dry	Dry	Dry		Dry	Dry	Dry
	07/27/18	<1.0	<1.0	<1.0	<2.0		4.03	91.95	NP
	08/23/18	NS	NS	NS	NS		4.72	91.26	NP
	10/17/18	<1.0	<1.0	<1.0	<2.0		12.39	83.59	NP
	01/21/19	<1.0	<1.0	<1.0	<2.0		15.77	80.21	NP

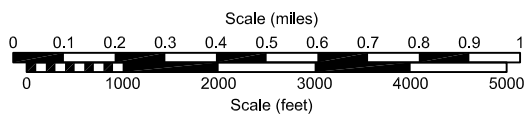
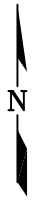
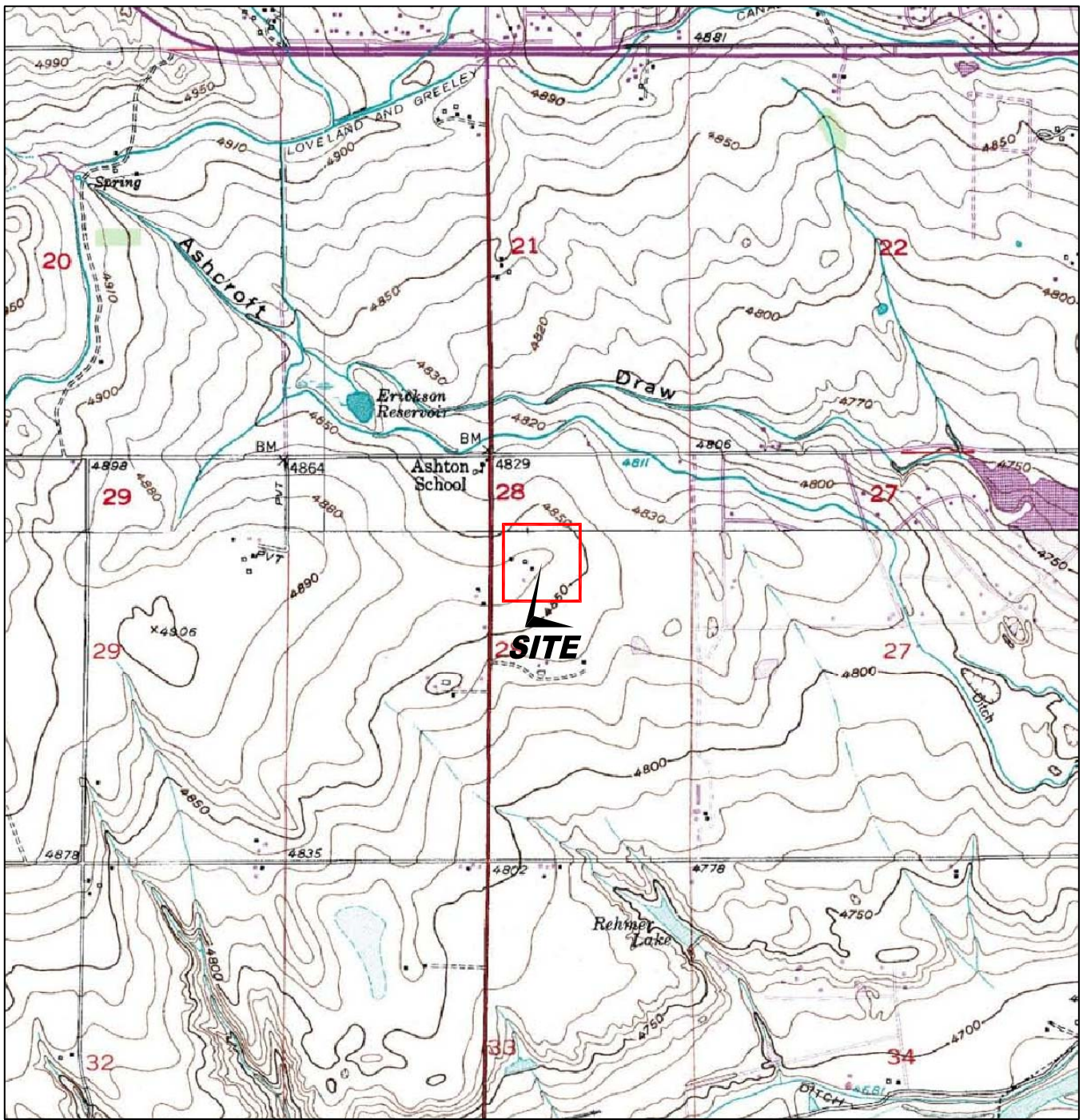
SAMPLE LOCATION	DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL BENZENE (µg/L)	TOTAL XYLENES (µg/L)	TOC ELEVATION (feet)	DEPTH TO GROUND WATER (ft)	GROUND WATER ELEVATION (ft)	FREE PRODUCT THICKNESS (ft)		
MW-6	10/12/16	<1.0	<1.0	<1.0	<1.0	100.00	14.63	85.37	NP		
	01/06/17	<1.0	<1.0	<1.0	<1.0		18.27	81.73	NP		
	04/05/17	Dry	Dry	Dry	Dry		Dry	Dry	Dry		
	08/14/17	<1.0	<1.0	<1.0	<1.0		9.23	90.77	NP		
	10/11/17	<1.0	<1.0	<1.0	<1.0		14.31	85.69	NP		
	01/11/18	<1.0	<1.0	<1.0	<1.0		18.33	81.67	NP		
	04/27/18	Dry	Dry	Dry	Dry		Dry	Dry	Dry		
	07/27/18	<1.0	<1.0	<1.0	<2.0		7.26	92.74	NP		
	08/23/18	NS	NS	NS	NS		7.58	92.42	NP		
	10/17/18	<1.0	<1.0	<1.0	<2.0		15.68	84.32	NP		
	01/21/19	Dry	Dry	Dry	Dry		Dry	Dry	Dry		
MW-7	10/12/16	<1.0	<1.0	<1.0	<1.0	97.02	11.80	85.22	NP		
	01/06/17	<1.0	<1.0	<1.0	<1.0		14.91	82.11	NP		
	04/05/17	Dry	Dry	Dry	Dry		Dry	Dry	Dry		
	08/14/17	<1.0	<1.0	<1.0	<1.0		9.55	87.47	NP		
	10/11/17	Dry	Dry	Dry	Dry		Dry	Dry	Dry		
	01/11/18	Dry	Dry	Dry	Dry		Dry	Dry	Dry		
	04/27/18	Dry	Dry	Dry	Dry		Dry	Dry	Dry		
	MW-7R	07/27/18	<1.0	<1.0	<1.0		<2.0	96.91		96.91	NP
		08/23/18	NS	NS	NS		NS		8.08	88.83	NP
		10/17/18	<1.0	<1.0	<1.0		<2.0		12.38	84.53	NP
	01/21/19	<1.0	<1.0	<1.0	<2.0		15.49	81.42	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



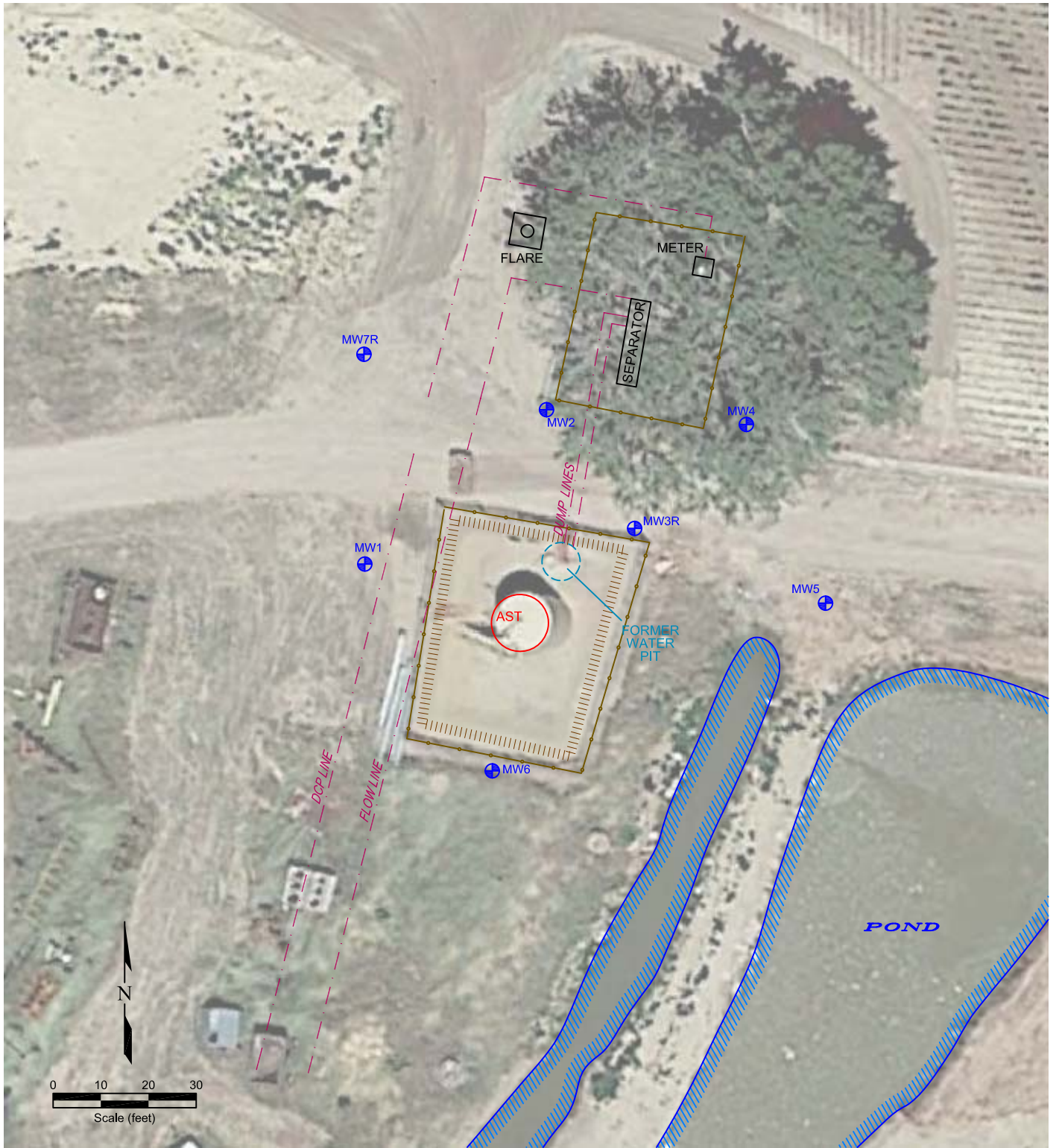
USGS 7.5 MINUTE SERIES (TOPOGRAPHIC)

Figure 1
SITE LOCATION MAP







Noble Wiedeman PM J28-2, 28-7
NE SW Section 28, T5N, R66W
Weld County, Colorado

Project No. C016-110	Prepared by	Drawn by JMA
Date 2/5/19	Reviewed by	Filename 16110T





LEGEND

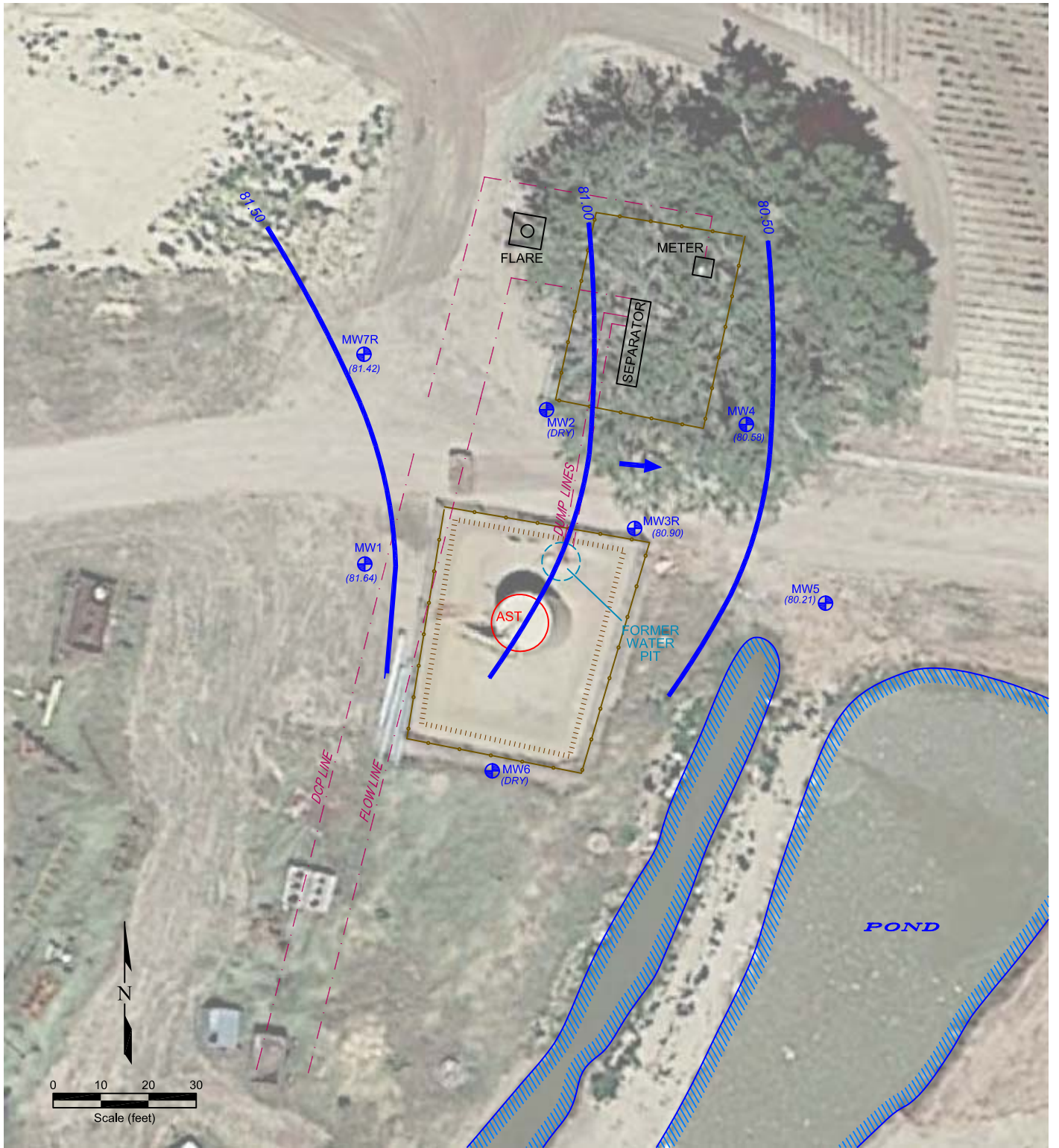
-  MONITORING WELL
-  FENCE LINE
-  CONTAINMENT BERM
-  PIPELINE
-  ABOVE GROUND STORAGE TANK
-  FORMER FACILITY

**Figure 2
SITE MAP**

Noble Wiedeman PM J28-2, 28-7
NE SW Section 28, T5N, R66W
Weld County, Colorado

Project No. C016-110	Prepared by	Drawn by JMA
Date 2/5/19	Reviewed by EB	Filename 16110Q





LEGEND











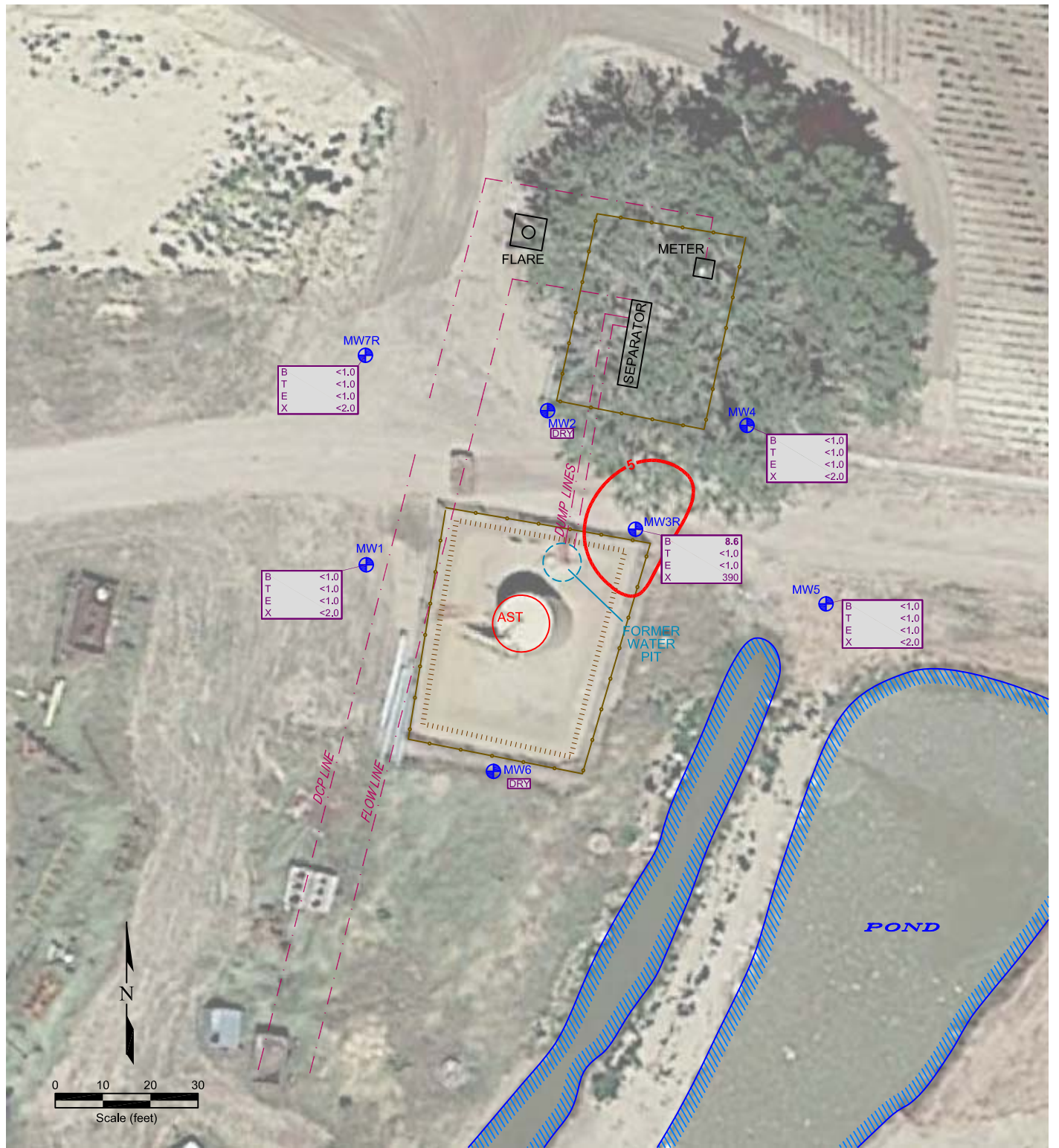
-  MONITORING WELL
-  FENCE LINE
-  CONTAINMENT BERM
-  PIPELINE
-  ABOVE GROUND STORAGE TANK
-  FORMER FACILITY
-  NOT USED FOR CONTOURING
-  GROUND WATER ELEVATION (ft above arbitrary datum)
-  WATER TABLE CONTOUR
-  GROUND WATER FLOW DIRECTION

Figure 3
INFERRED GROUNDWATER CONTOUR MAP
 January 21, 2019

Noble Wiedeman PM J28-2, 28-7
 NE SW Section 28, T5N, R66W
 Weld County, Colorado

Project No. C016-110	Prepared by	Drawn by JMA
Date 2/7/19	Reviewed by EB	Filename 16110Q



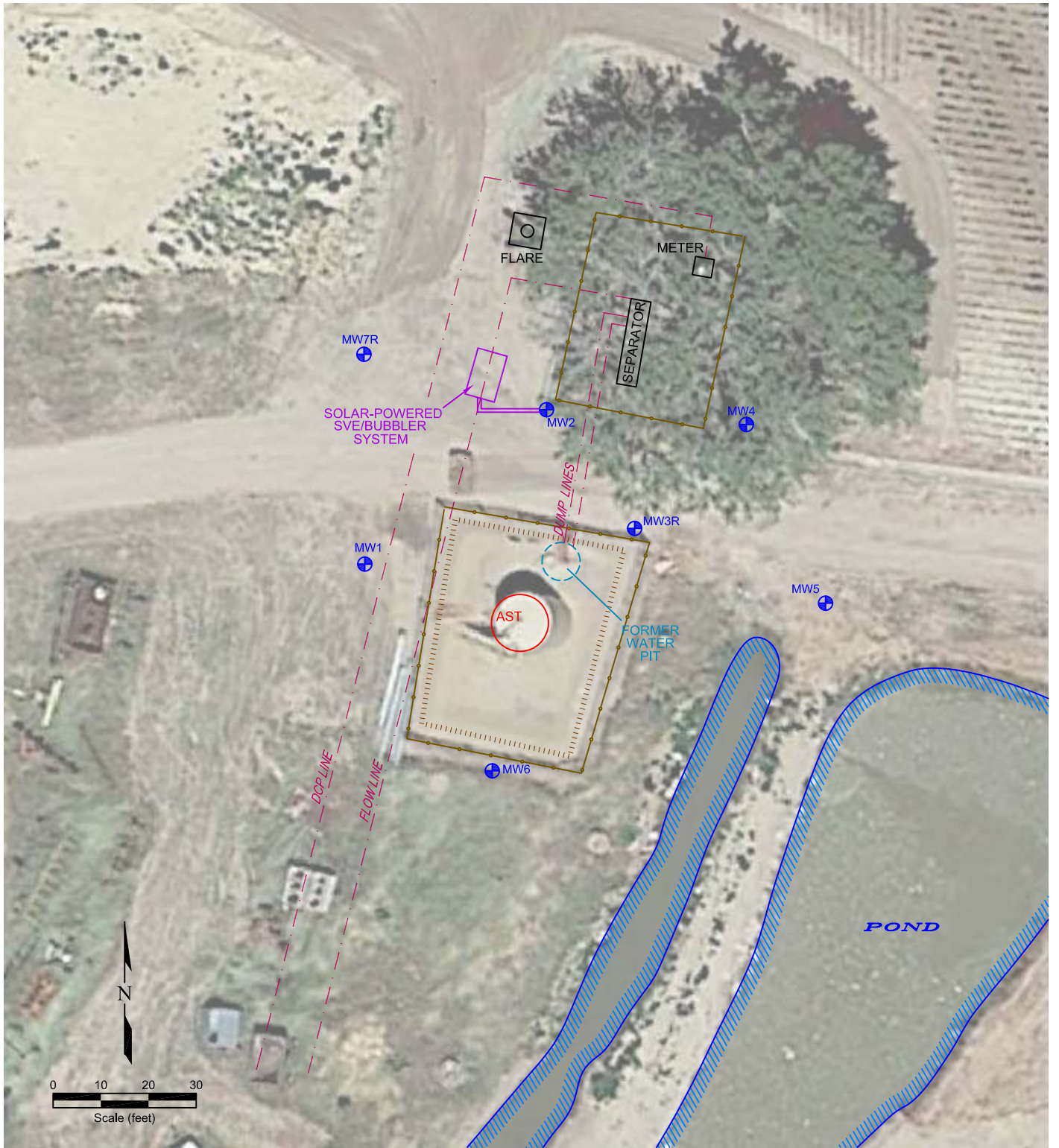


LEGEND

- MONITORING WELL
 - FENCE LINE
 - CONTAINMENT BERM
 - PIPELINE
 - ABOVE GROUND STORAGE TANK
 - FORMER FACILITY
- | | | |
|---|------|----------------------|
| B | <1.0 | BENZENE (ug/L) |
| T | <1.0 | TOLUENE (ug/L) |
| E | <1.0 | ETHYLBENZENE (ug/L) |
| X | <2.0 | TOTAL XYLENES (ug/L) |
- NOT SAMPLED
- BENZENE ISOCONCENTRATION (ug/L)
Base in part on historical data
Dashed where inferred

Figure 4
**GROUND WATER CHEMISTRY &
 BENZENE ISOCONCENTRATION MAP**
 January 21, 2019
 Noble Wiedeman PM J28-2, 28-7
 NE SW Section 28, T5N, R66W
 Weld County, Colorado

Project No. C016-110	Prepared by JMA	Drawn by JMA	
Date 2/7/19	Reviewed by EB	Filename 16110Q	



LEGEND

- | | | | |
|--|------------------|--|---------------------------|
| | MONITORING WELL | | ABOVE GROUND STORAGE TANK |
| | FENCE LINE | | FORMER FACILITY |
| | CONTAINMENT BERM | | |
| | PIPELINE | | |
| | SYSTEM TRENCH | | |

Figure 5

AS BUILT REMEDIATION SYSTEM LAYOUT

Noble Wiedeman PM J28-2, 28-7
 NE SW Section 28, T5N, R66W
 Weld County, Colorado

Project No. C016-110	Prepared by	Drawn by JMA
Date 2/7/19	Reviewed by EB	Filename 16110Q



APPENDIX A

LABORATORY DOCUMENTATION

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

January 30, 2019

Paul Henehan
Fremont Environmental
PO Box 1289
Wellington, CO 80549

RE: Noble - Wiedeman PM J28-2, 28-7

Enclosed are the results of analyses for samples received by Summit Scientific on 01/23/19 16:41. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'Paul Shrewsbury', written in a cursive style.

Paul Shrewsbury For Ben Shrewsbury
Laboratory Manager



Fremont Environmental
PO Box 1289
Wellington CO, 80549

Project: Noble - Wiedeman PM J28-2, 28-7

Project Number: [none]
Project Manager: Paul Henehan

Reported:
01/30/19 07:51

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	1901292-01	Water	01/21/19 00:00	01/23/19 16:41
MW-3	1901292-02	Water	01/21/19 00:00	01/23/19 16:41
MW-4	1901292-03	Water	01/21/19 00:00	01/23/19 16:41
MW-5	1901292-04	Water	01/21/19 00:00	01/23/19 16:41
MW-7	1901292-05	Water	01/21/19 00:00	01/23/19 16:41

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Summit Scientific

S₂

1901292

4653 Table Mountain Drive ♦ Golden, Colorado 80403
303-277-9310 ♦ 303-374-5933 (f)

Page 1 of 1

Client: Fremont Environmental

Project Manager: Paul Henehan

Address: P.O Box 1289

E-Mail: paulh@fremontenv.com, ethanb@fremontenv.com

City/State/Zip: Wellington, CO 80549

Bill to: Jacob


Phone: 303-956-8714

Project Name: Noble - Wiedeman PM J 28-2, 7

Sampler Name: Black

Project Number:

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix				Analysis Requested						Special Instructions	
					HCl	HNO ₃	None	Other	Water	Soil	Air-Canister #	Other	BTEX	Naphthalene	GRO	DRO	SAR	EC		pH
1	MW-1	1/21/19		2			X		X					X						
2	MW-3																			
3	MW-4																			
4	MW-5																			
5	MW-7																			
6																				
7																				
8																				
9																				
10																				

Relinquished by: <u>Ethan Black</u>	Date/Time: <u>1/23/19</u> ¹⁶⁴¹	Received by: 	Date/Time: <u>1-23-19</u> <u>1641</u>	Turn Around Time (Check) Same Day _____ 72 hours 24 hours _____ Standard <input checked="" type="checkbox"/> 48 hours _____ Sample Integrity: Temperature Upon Receipt: <u>14.1</u> Samples Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Notes:
Relinquished by:	Date/Time:	Received by:	Date/Time:		
Relinquished by:	Date/Time:	Received by:	Date/Time:		

Sample Receipt Checklist

S2 Work Order 1901292

Client: Fremont Environmental Client Project ID: Noble - Wiedeman PM J28-2, 7

Shipped Via: H.D./P.U./FedEx/UPS/USPS/Other H-D. Airbill #: _____

Matrix (check all that apply): Air Soil/Solid Water Other: _____
(Describe)

Temp (°C)	<u>14.1</u>
-----------	-------------

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C ⁽¹⁾ ? NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If custody seals are present, are they intact ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Are samples with holding times due within 48 hours sample due within 48 hours present?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ? Record the pH in Comments.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If dissolved metals are requested, were samples field filtered?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Additional Comments (if any):				

⁽¹⁾ If NO, then contact the client before proceeding with analysis and note in case narrative.

UR
Custodian Printed Name or Initials

[Signature]
Signature of Custodian

1.23.19 1650
Date/Time



Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PM J28-2, 28-7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 01/30/19 07:51

MW-1
1901292-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/21/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1901298	01/24/19	01/27/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **01/21/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		121 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		101 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.7 %		21-167		"	"	"	"	

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PM J28-2, 28-7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 01/30/19 07:51

MW-3
1901292-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/21/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	8.6	1.0		ug/l	1	1901298	01/24/19	01/27/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	390	2.0		"	"	"	"	"	"	

Date Sampled: **01/21/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		116 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		97.0 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		111 %		21-167		"	"	"	"	

Summit Scientific

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Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PM J28-2, 28-7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 01/30/19 07:51

MW-4
1901292-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/21/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1901298	01/24/19	01/27/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **01/21/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		110 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		93.8 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.6 %		21-167		"	"	"	"	

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 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PM J28-2, 28-7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 01/30/19 07:51

MW-5
1901292-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/21/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1901298	01/24/19	01/28/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **01/21/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		114 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		97.7 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		102 %		21-167		"	"	"	"	

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Project: Noble - Wiedeman PM J28-2, 28-7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 01/30/19 07:51

MW-7
1901292-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/21/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1901298	01/24/19	01/28/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **01/21/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		127 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		103 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.8 %		21-167		"	"	"	"	

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Project: Noble - Wiedeman PM J28-2, 28-7

Project Number: [none]
Project Manager: Paul Henehan

Reported:
01/30/19 07:51

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 1901298 - EPA 5030 Water MS

Blank (1901298-BLK1)

Prepared: 01/24/19 Analyzed: 01/25/19

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	16.0		"	13.3		120	23-173			
Surrogate: Toluene-d8	13.1		"	13.3		98.0	20-170			
Surrogate: 4-Bromofluorobenzene	15.5		"	13.3		116	21-167			

LCS (1901298-BS1)

Prepared: 01/24/19 Analyzed: 01/25/19

Benzene	26.2	1.0	ug/l	33.3		78.5	70-130			
Toluene	32.8	1.0	"	33.3		98.5	70-130			
Ethylbenzene	35.2	1.0	"	33.3		106	70-130			
m,p-Xylene	62.4	2.0	"	66.7		93.6	70-130			
o-Xylene	34.9	1.0	"	33.3		105	70-130			
Surrogate: 1,2-Dichloroethane-d4	14.8		"	13.3		111	23-173			
Surrogate: Toluene-d8	13.1		"	13.3		98.3	20-170			
Surrogate: 4-Bromofluorobenzene	15.1		"	13.3		113	21-167			

Matrix Spike (1901298-MS1)

Source: 1901287-01

Prepared: 01/24/19 Analyzed: 01/25/19

Benzene	25.8	1.0	ug/l	33.3	ND	77.5	70-130			
Toluene	32.8	1.0	"	33.3	ND	98.3	70-130			
Ethylbenzene	33.6	1.0	"	33.3	ND	101	70-130			
m,p-Xylene	58.1	2.0	"	66.7	ND	87.2	70-130			
o-Xylene	33.1	1.0	"	33.3	ND	99.4	70-130			
Surrogate: 1,2-Dichloroethane-d4	15.6		"	13.3		117	23-173			
Surrogate: Toluene-d8	12.6		"	13.3		94.9	20-170			
Surrogate: 4-Bromofluorobenzene	13.6		"	13.3		102	21-167			

Summit Scientific

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Project: Noble - Wiedeman PM J28-2, 28-7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 01/30/19 07:51

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 1901298 - EPA 5030 Water MS

Matrix Spike Dup (1901298-MSD1)	Source: 1901287-01			Prepared: 01/24/19 Analyzed: 01/25/19						
Benzene	29.9	1.0	ug/l	33.3	ND	89.6	70-130	14.5	30	
Toluene	37.4	1.0	"	33.3	ND	112	70-130	13.1	30	
Ethylbenzene	37.5	1.0	"	33.3	ND	112	70-130	10.9	30	
m,p-Xylene	67.1	2.0	"	66.7	ND	101	70-130	14.4	30	
o-Xylene	36.6	1.0	"	33.3	ND	110	70-130	9.92	30	
Surrogate: 1,2-Dichloroethane-d4	16.6		"	13.3		124	23-173			
Surrogate: Toluene-d8	14.1		"	13.3		106	20-170			
Surrogate: 4-Bromofluorobenzene	13.9		"	13.3		105	21-167			

Summit Scientific

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Fremont Environmental
PO Box 1289
Wellington CO, 80549

Project: Noble - Wiedeman PM J28-2, 28-7

Project Number: [none]
Project Manager: Paul Henehan

Reported:
01/30/19 07:51

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