

FREMONT ENVIRONMENTAL INC.

August 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

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

August 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 eight monitoring wells on July 9, 2019 in accordance with the Sampling Plan included in Appendix A. One monitoring well was dry at that time. The data are summarized in Table 1.

Water table contours inferred from the July 9, 2019 data are illustrated on Figure 3. Based on these data, ground water is inferred to flow to the northwest. The water table gradient was calculated at approximately 0.180 feet per foot (ft/ft) for the July 2019 data.

3.2 Groundwater Sampling and Analysis

Groundwater samples were collected from seven monitoring wells on July 9, 2019 to monitor the magnitude and extent of groundwater impacts at the site. As noted above, one well was 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 six of the seven wells sampled during the July 2019 sampling event. Monitoring well MW-2 exceeded the COGCC Table 910-1 limits for benzene, toluene and xylenes. The benzene concentration was 1,200 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 SVE well is piped directly to the solar-powered remediation trailer. Figure 5 illustrates the layout of the remediation system.

The recent quarterly groundwater sampling event, which was conducted on July 9, 2019, as well as previous sampling events, indicates that LNAPL remediation via SVE remains effective. Due to an influx of sedimentation, MW-2 was abandoned and replaced with MW-2R in April 2019. MW-8 was also added to establish a point of compliance to the north of the site. As of July 9, 2019, LNAPL was not present in MW-2R but concentrations of benzene, toluene and xylene in the monitoring well were above the COGCC Table 910-1 limits.

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.**



8/7/19

Date _____

Paul V. Henehan, P.E.

Senior Consultant

TABLE

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
	04/23/19	Dry	Dry	Dry	Dry			Dry	Dry	Dry
	07/09/19	<1.0	<1.0	<1.0	<2.0			9.37	88.18	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		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	96.80	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	
	04/23/19	Dry	Dry	Dry	Dry		Dry	Dry	Dry	
	07/09/19	<1.0	<1.0	<1.0	<1.0		13.40	83.40	NP	
MW-5	10/12/16	<1.0	<1.0	<1.0	2.9	95.98	11.50	84.48	NP	
	01/06/17	<1.0	<1.0	<1.0	2.8		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	
	04/23/19	Dry	Dry	Dry	Dry		Dry	Dry	Dry	
	07/09/19	<1.0	<1.0	<1.0	<2.0		5.20	90.78	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	
	04/23/19	Dry	Dry	Dry	Dry		Dry	Dry	Dry	
	07/09/19	<1.0	<1.0	<1.0	<2.0		12.00	88.00	NP	
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	
	04/23/19	<1.0	<1.0	<1.0	<2.0		17.72	79.19	NP	
	07/09/19	<1.0	<1.0	<1.0	<2.0		18.13	78.78	NP	
MW-8	04/23/19	Dry	Dry	Dry	Dry		Dry	Dry	Dry	
	07/09/19	Dry	Dry	Dry	Dry		Dry	Dry	Dry	
Table 910-1 Limits		5	560	700	1,400					

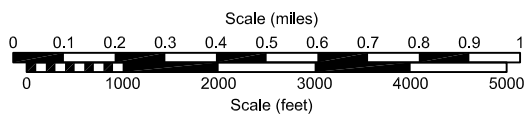
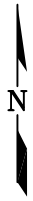
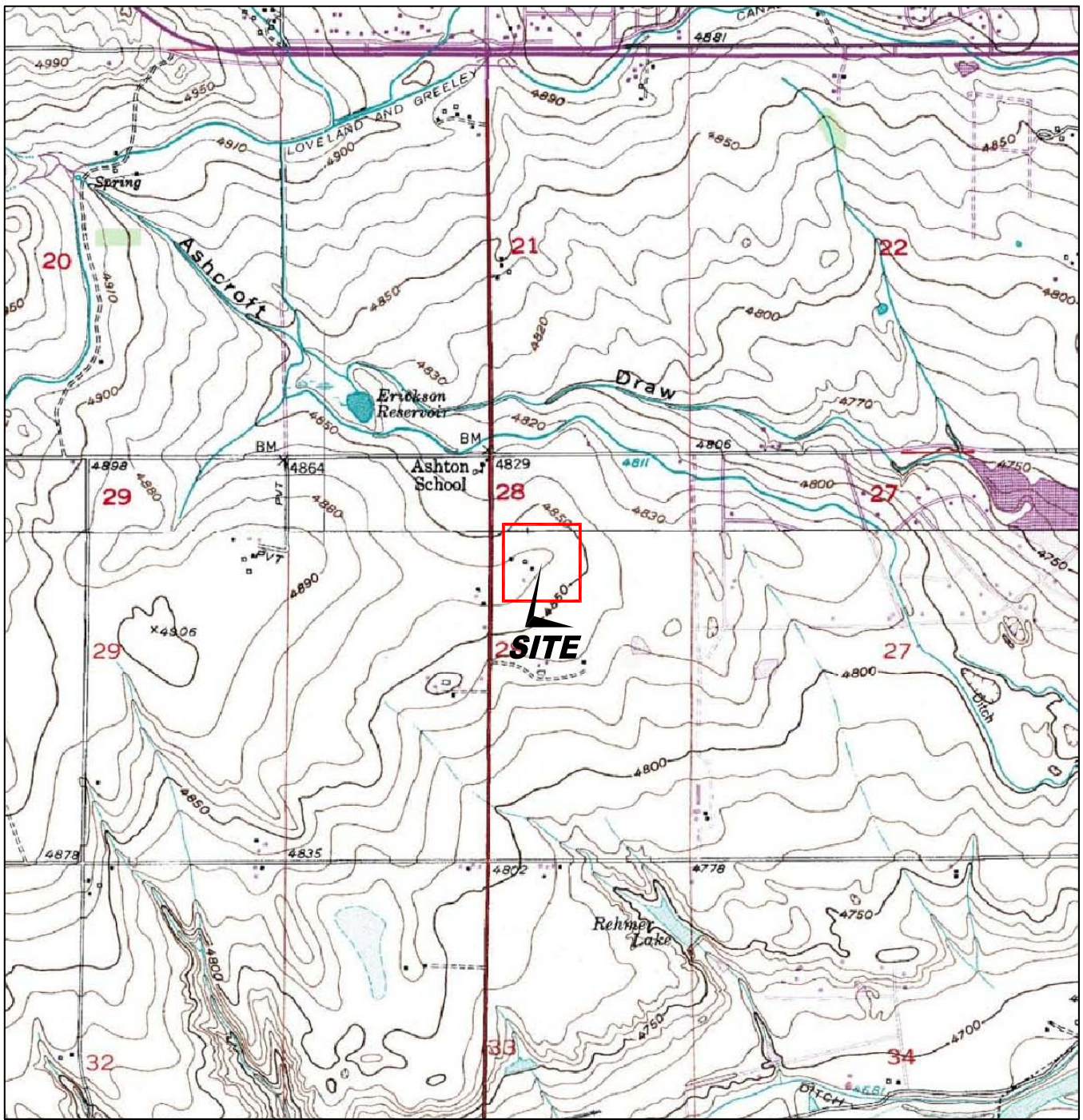
Bold face values exceed the COGCC limits

NP - No Free Product

NS - Not Sampled

IW - Insufficient Water

FIGURES



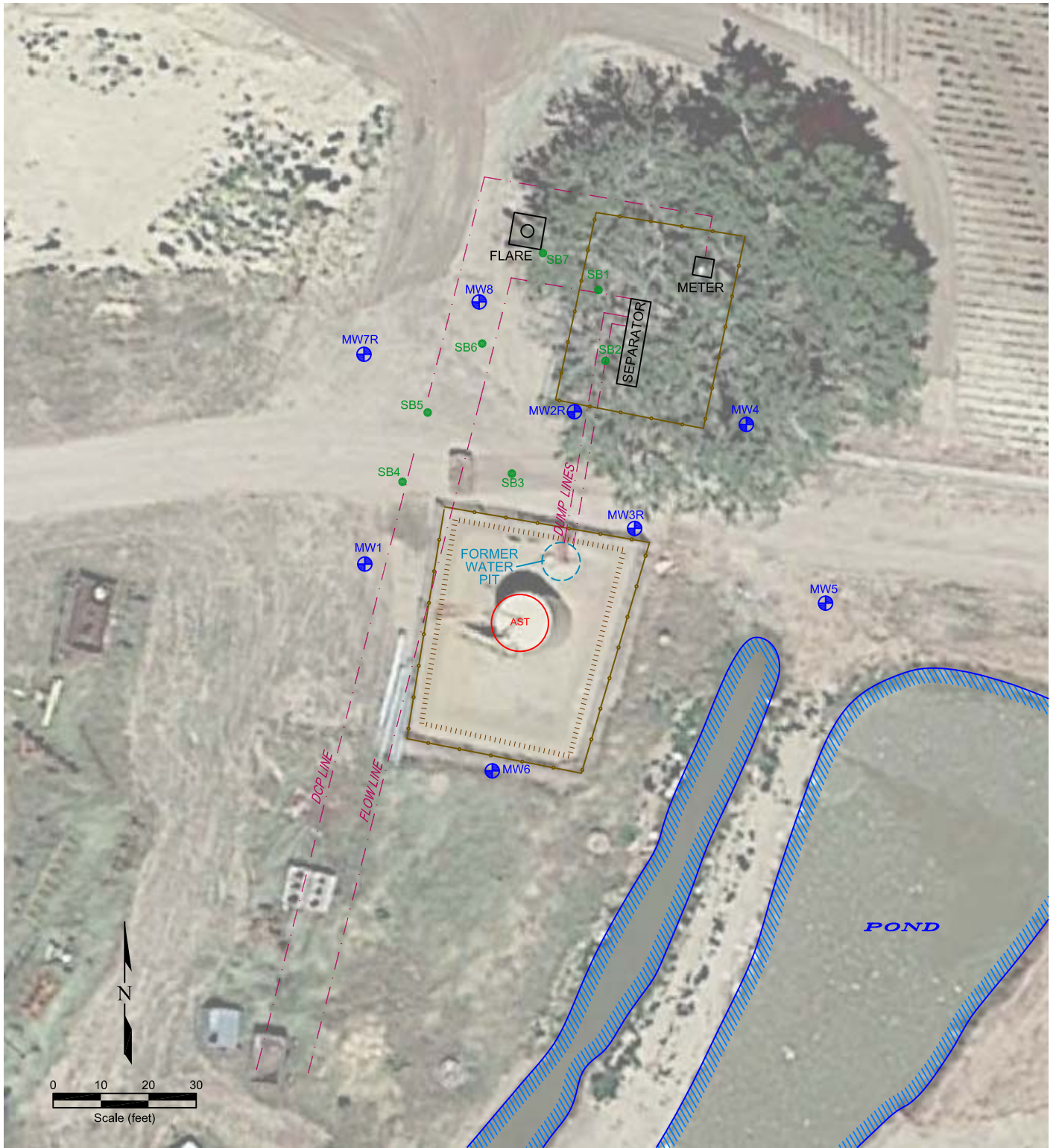
USGS 7.5 MINUTE SERIES (TOPOGRAPHIC)

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 7/18/19	Reviewed by EB	Filename 16110T





LEGEND

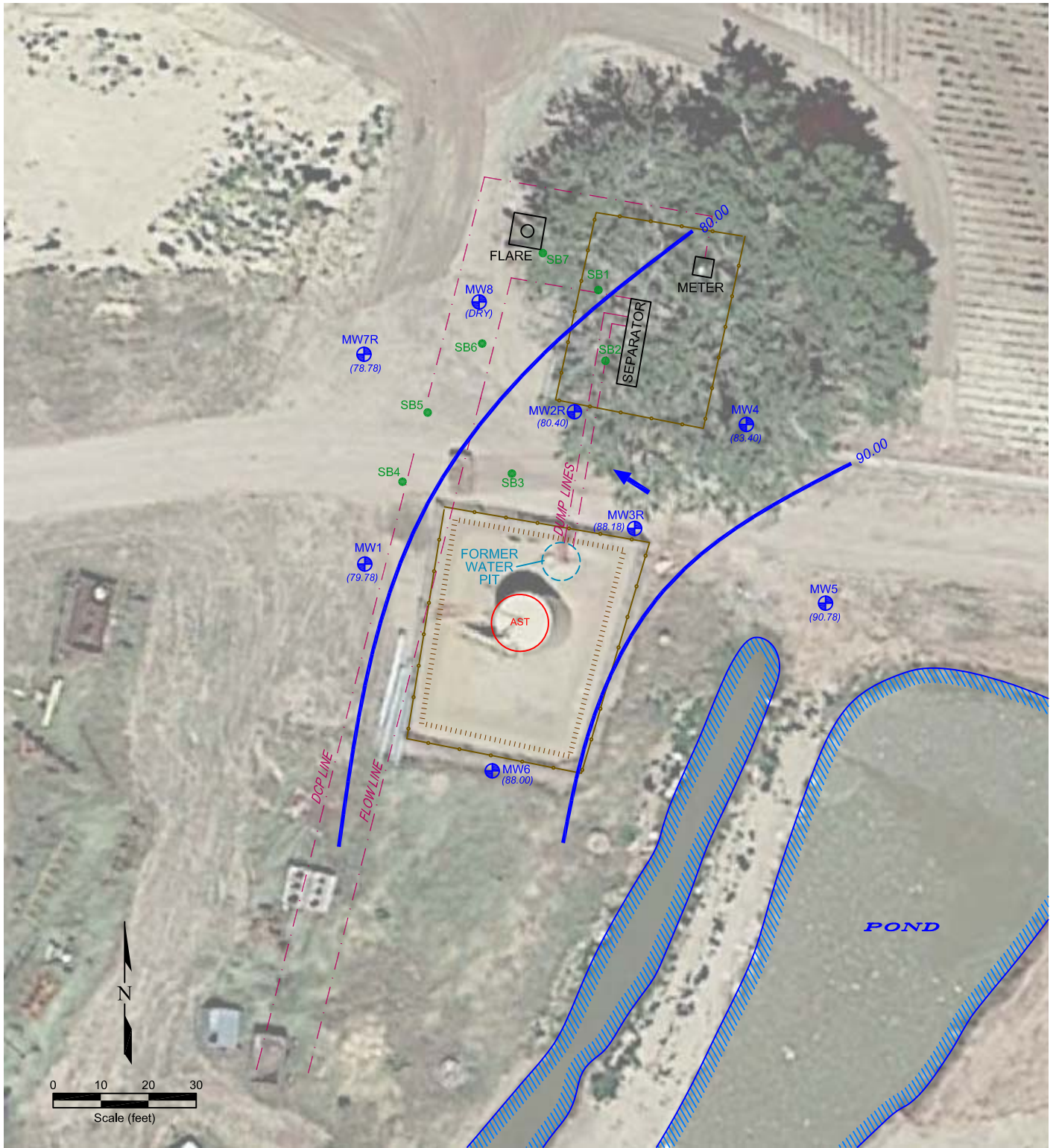
	SOIL BORING		ABOVE GROUND STORAGE TANK
	MONITORING WELL		FORMER FACILITY
	FENCE LINE		
	CONTAINMENT BERM		
	PIPELINE		

**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 7/18/19	Reviewed by PH	Filename 16110Q





LEGEND











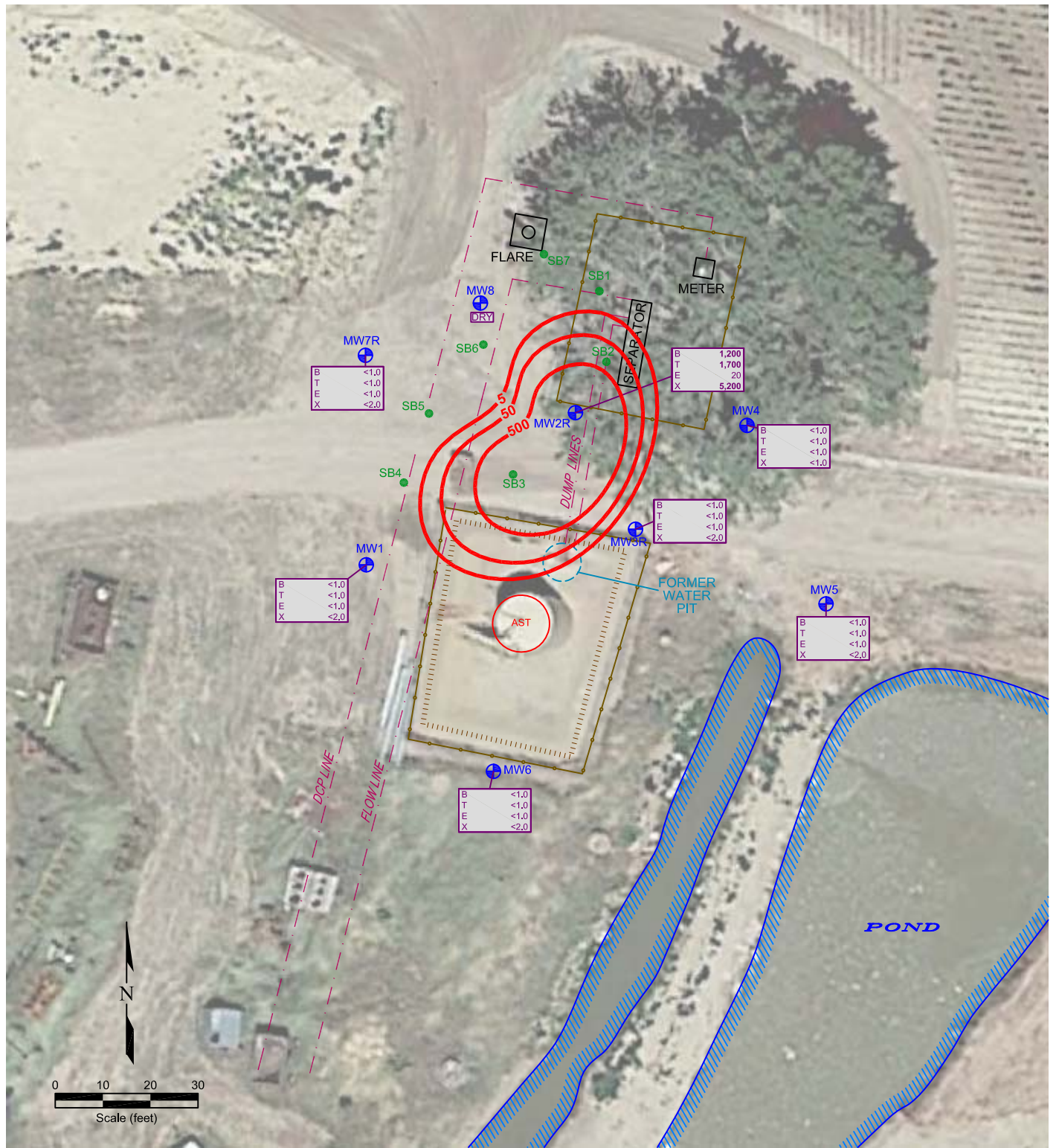
-  SOIL BORING
-  MONITORING WELL
-  FENCE LINE
-  CONTAINMENT BERM
-  PIPELINE
-  ABOVE GROUND STORAGE TANK
-  FORMER FACILITY
-  GROUND WATER ELEVATION (ft above arbitrary datum)
-  WATER TABLE CONTOUR
-  GROUND WATER FLOW DIRECTION

Figure 3
INFERRED GROUNDWATER CONTOUR MAP
 July 9, 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 7/18/19	Reviewed by PH	Filename 16110Q



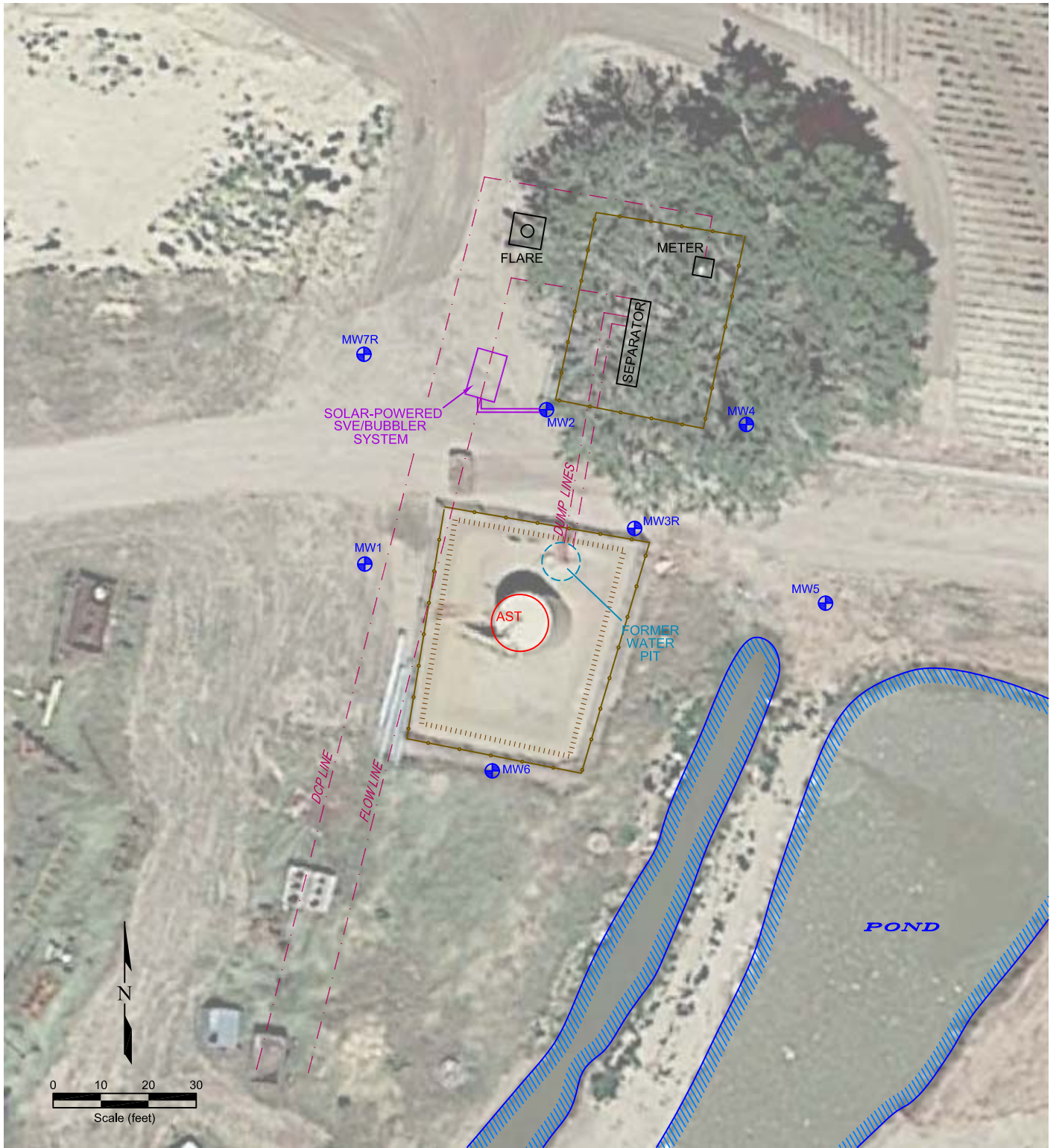


LEGEND

	SOIL BORING		ABOVE GROUND STORAGE TANK
	MONITORING WELL		FORMER FACILITY
	FENCE LINE		
	CONTAINMENT BERM		
	PIPELINE		
	BENZENE (ug/L) TOLUENE (ug/L) ETHYLBENZENE (ug/L) TOTAL XYLENES (ug/L)		
	INSUFFICIENT WATER SAMPLE		
	BENZENE ISOCONCENTRATION (ug/L) Base in part on historical data Dashed where inferred		

Figure 4
GROUND WATER CHEMISTRY MAP
BENZENE ISOCONCENTRATION MAP
 July 9, 2019
 Noble Wiedeman PM J28-2, 28-7
 NE SW Section 28, T5N, R66W
 Weld County, Colorado

Project No. C016-110	Prepared by PH	Drawn by JMA	
Date 7/18/19	Reviewed by PH	Filename 16110Q	



LEGEND








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

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

July 16, 2019

Paul Henehan

Fremont Environmental

PO Box 1289

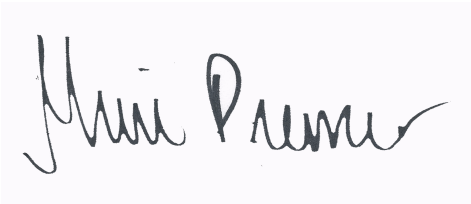
Wellington, CO 80549

RE: Noble - Wiedeman PMJ 28-2,7

Work Order # 1907087

Enclosed are the results of analyses for samples received by Summit Scientific on 07/09/19 14:50. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Muri Premer". The signature is written in a cursive style with a large initial "M" and a long, sweeping underline.

Muri Premer For Ben Shrewsbury

Laboratory Manager



Fremont Environmental
PO Box 1289
Wellington CO, 80549

Project: Noble - Wiedeman PMJ 28-2,7

Project Number: [none]
Project Manager: Paul Henehan

Reported:
07/16/19 10:30

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	1907087-01	Water	07/09/19 00:00	07/09/19 14:50
MW-2R	1907087-02	Water	07/09/19 00:00	07/09/19 14:50
MW-3	1907087-03	Water	07/09/19 00:00	07/09/19 14:50
MW-4	1907087-04	Water	07/09/19 00:00	07/09/19 14:50
MW-5	1907087-05	Water	07/09/19 00:00	07/09/19 14:50
MW-6	1907087-06	Water	07/09/19 00:00	07/09/19 14:50
MW-7	1907087-07	Water	07/09/19 00:00	07/09/19 14:50

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

1907087

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: Wiedeman PMJ 28-2,7

Sampler Name: Black

Project Number:

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix			Analysis Requested						Special Instructions			
					HCl	HNO3	None	Other	Water	Soil	Air-Canister #	Other	BTEX	Naphthalene	GRO	DRO	SAR		EC	pH	
1	MW-1	7/9/19		2			X		X					X							
2	MW-2R																				
3	MW-3																				
4	MW-4																				
5	MW-5																				
6	MW-6																				
7	MW-7																				
8																					
9																					
10																					

Relinquished by: <u>Ethan Black</u>	Date/Time: <u>7/9/19 1450</u>	Received by: <u>[Signature]</u>	Date/Time: <u>07/09/19 1450</u>	Turn Around Time (Check) Same Day _____ 72 hours _____ 24 hours _____ Standard <u>X</u> 48 hours _____ Sample Integrity: Temperature Upon Receipt: <u>S.7</u> Samples Intact: <u>Yes</u> No	Notes: Bottle label MW-2 = COC MW-2R. Noticed after packing samples. Sorry for confusion. EB
Relinquished by:	Date/Time:	Received by:	Date/Time:		
Relinquished by:	Date/Time:	Received by:	Date/Time:		

Sample Receipt Checklist

S2 Work Order 1907087

Client: FREMONT ENVIRONMENTAL Client Project ID: WIEDERMAN PMJ 28-2,7

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

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

Temp (°C)	<u>5.7</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.	<u>X</u>			
Were all samples received intact ⁽¹⁾ ?	<u>X</u>			
Was adequate sample volume provided ⁽¹⁾ ?	<u>X</u>			
If custody seals are present, are they intact ⁽¹⁾ ?			<u>X</u>	
Are samples with holding times due within 48 hours sample due within 48 hours present?		<u>X</u>		
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	<u>X</u>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<u>X</u>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<u>X</u>			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	<u>X</u>			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		<u>X</u>		
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect			<u>X</u>	
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ? Record the pH in Comments.			<u>X</u>	
If dissolved metals are requested, were samples field filtered?			<u>X</u>	

Additional Comments (if any):

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

RE
Custodian Printed Name or Initials

[Signature]
Signature of Custodian

07/09/19
Date/Time 1500



Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PMJ 28-2,7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 07/16/19 10:30

MW-1
1907087-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1907126	07/10/19	07/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		90.8 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		95.3 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		93.3 %		21-167		"	"	"	"	

Summit Scientific

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Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PMJ 28-2,7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 07/16/19 10:30

MW-2R
1907087-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	1200	10		ug/l	10	1907126	07/10/19	07/11/19	EPA 8260B	
Toluene	1700	10		"	"	"	"	"	"	
Ethylbenzene	20	10		"	"	"	"	"	"	
Xylenes (total)	5200	20		"	"	"	"	"	"	

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		90.6 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		91.6 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		112 %		21-167		"	"	"	"	

Summit Scientific

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Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PMJ 28-2,7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 07/16/19 10:30

MW-3
1907087-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1907126	07/10/19	07/11/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		92.5 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		94.4 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.3 %	21-167		"	"	"	"	

Summit Scientific

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Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PMJ 28-2,7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 07/16/19 10:30

MW-4
1907087-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1907126	07/10/19	07/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		89.7 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		92.9 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.9 %		21-167		"	"	"	"	

Summit Scientific

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Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PMJ 28-2,7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 07/16/19 10:30

MW-5
1907087-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1907126	07/10/19	07/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		93.1 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		96.2 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		93.7 %		21-167		"	"	"	"	

Summit Scientific

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Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PMJ 28-2,7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 07/16/19 10:30

MW-6
1907087-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1907126	07/10/19	07/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		92.9 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		94.1 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.8 %		21-167		"	"	"	"	

Summit Scientific

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Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PMJ 28-2,7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 07/16/19 10:30

MW-7
1907087-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1907126	07/10/19	07/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **07/09/19 00:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		94.6 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		94.8 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		93.5 %		21-167		"	"	"	"	

Summit Scientific

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Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PMJ 28-2,7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 07/16/19 10:30

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 1907126 - EPA 5030 Water MS

Blank (1907126-BLK1)

Prepared: 07/10/19 Analyzed: 07/11/19

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	11.1		"	13.3		83.4	23-173			
Surrogate: Toluene-d8	12.6		"	13.3		94.3	20-170			
Surrogate: 4-Bromofluorobenzene	13.2		"	13.3		99.3	21-167			

LCS (1907126-BS1)

Prepared: 07/10/19 Analyzed: 07/11/19

Benzene	26.2	1.0	ug/l	33.3		78.8	51-132			
Toluene	29.2	1.0	"	33.3		87.6	51-138			
Ethylbenzene	31.0	1.0	"	33.3		93.1	58-146			
m,p-Xylene	61.6	2.0	"	66.7		92.4	57-144			
o-Xylene	29.6	1.0	"	33.3		88.7	53-146			
Surrogate: 1,2-Dichloroethane-d4	12.5		"	13.3		93.6	23-173			
Surrogate: Toluene-d8	12.9		"	13.3		96.5	20-170			
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3		95.8	21-167			

Matrix Spike (1907126-MS1)

Source: 1907092-01

Prepared: 07/10/19 Analyzed: 07/11/19

Benzene	32.8	1.0	ug/l	33.3	6.63	78.5	34-141			
Toluene	31.5	1.0	"	33.3	1.54	89.8	27-151			
Ethylbenzene	65.3	1.0	"	33.3	34.8	91.7	29-160			
m,p-Xylene	127	2.0	"	66.7	66.3	91.0	20-166			
o-Xylene	120	1.0	"	33.3	91.5	84.6	33-159			
Surrogate: 1,2-Dichloroethane-d4	13.1		"	13.3		98.0	23-173			
Surrogate: Toluene-d8	12.8		"	13.3		96.2	20-170			
Surrogate: 4-Bromofluorobenzene	13.9		"	13.3		104	21-167			

Summit Scientific

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Fremont Environmental
 PO Box 1289
 Wellington CO, 80549

Project: Noble - Wiedeman PMJ 28-2,7

Project Number: [none]
 Project Manager: Paul Henehan

Reported:
 07/16/19 10:30

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

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

Batch 1907126 - EPA 5030 Water MS

Matrix Spike Dup (1907126-MSD1)	Source: 1907092-01			Prepared: 07/10/19 Analyzed: 07/11/19					
Benzene	32.2	1.0	ug/l	33.3	6.63	76.8	34-141	1.72	30
Toluene	31.3	1.0	"	33.3	1.54	89.4	27-151	0.446	30
Ethylbenzene	61.8	1.0	"	33.3	34.8	81.1	29-160	5.55	30
m,p-Xylene	121	2.0	"	66.7	66.3	81.9	20-166	4.90	30
o-Xylene	111	1.0	"	33.3	91.5	58.4	33-159	7.58	30
Surrogate: 1,2-Dichloroethane-d4	13.2		"	13.3		98.6	23-173		
Surrogate: Toluene-d8	12.7		"	13.3		95.6	20-170		
Surrogate: 4-Bromofluorobenzene	13.9		"	13.3		104	21-167		

Summit Scientific

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Fremont Environmental
PO Box 1289
Wellington CO, 80549

Project: Noble - Wiedeman PMJ 28-2,7

Project Number: [none]
Project Manager: Paul Henehan

Reported:
07/16/19 10:30

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