FREMONT ENVIRONMENTAL INC.

October 21, 2020

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

Subject: **Remediation and Groundwater Sampling Report – Second Quarter 2020 Revision #1**
Wiedeman PM J28-2, 28-7
API # 05-123-14002 (J28-2)
NWSW Sec 28, T5N, R66W
Weld County, Colorado
Fremont Project No. C016-093
Facility #327010, Remediation #10028

Dear Mr. Evans:

Enclosed please find a copy of the above referenced and revised 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. Henehan, 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 #327010, REMEDIATION #10028

Prepared by:

Fremont Environmental Inc.
1759 Redwing Lane
Broomfield, CO 80020
(303) 956-8714

October 21, 2020

TABLE OF CONTENTS

Table

Figures

Appendix

REMEDIATION AND GROUNDWATER SAMPLING REPORT

NOBLE ENERGY INC.

WIEDEMAN PM J28-2, 28-7

WELD COUNTY, COLORADO

FREMONT PROJECT NO. C016-110

FACILITY #327010, 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 has been deactivated following the removal of light non-aqueous phase liquid (LNAPL) in MW-2.

A propane-powered remediation system consisting of five air sparge (AS) wells and two passive SVE wells was installed in December 2019 to replace the previous solar-powered system and to address residual dissolved phase groundwater impacts.

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 ¼ of the SW ¼ 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.

Light nonaqueous phase liquid (LNAPL) was observed in one of the seven monitoring wells initially installed following the October 2016 site investigation. A solar-powered soil vapor extraction/bubbler system (SVE) was activated in June 2018 and tied to MW-2 to remove LNAPL from the well. The solar-powered SVE/bubbler system was effective in removing completely removing LNAPL within MW-2; however, dissolved phase constituents remained in the groundwater.

On March 25, 2019, seven additional soil borings were advanced utilizing a Geoprobe rig to define the remaining extent of impacts onsite. The soil boring logs and data from the investigation were used to establish a target area for the installation of a combined AS/passive SVE remediation system with a larger radius of influence. A monitoring well (MW-8) was also installed during this investigation to establish a point of compliance to the north. The solar-powered remediation system has since been deactivated and replaced by the combined AS/passive SVE system.

3.0 GROUNDWATER MONITORING AND REMEDIATION ACTIVITIES

3.1 Groundwater Level Measurements

Groundwater levels were measured in the eight monitoring wells on April 6, 2020. The data are summarized in Table 1.

Water table contours inferred from the April 6, 2020 data are illustrated on Figure 3. Based on these data, groundwater is inferred to flow to the north. The water table gradient was calculated at approximately 0.039 feet per foot (ft/ft) for the April 2020 data.

3.2 Groundwater Sampling and Analysis

Groundwater samples were collected from five of eight monitoring wells on April 6, 2020 to monitor the magnitude and extent of groundwater impacts at the site. Three monitoring wells were dry and none of the 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 sampled during the April 2020 event. The groundwater analytical data are summarized in Table 1. A copy of the laboratory reports, quality control data, and chain-of-custody documentation are presented in Appendix A.

3.3 Groundwater 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 was effective in removal of LNAPL and has been deactivated.

To address the dissolved phase groundwater impacts, a propane-powered remediation system consisting of five AS and 2 passive SVE wells was installed in February 2020. The AS wells are manifolded directly to the propane-powered remediation trailer. Figure 5 illustrates the layout of the remediation system.

Large variations in the water table depth are common onsite due to irrigation activities coupled with seasonal changes in the hydrologic cycle. The April 2020 data shows a slight increase in BTEX concentrations which suggests the AS has not been as effective as desired. This is caused by a low water table which has left the screened AS interval partially in the

unsaturated zone and allows air to flow within both the smear and saturated zones; this temporarily decreases the effectiveness of sparging efforts. The AS/passive SVE remediation system operates continuously for 24 hours, seven days a week.

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.

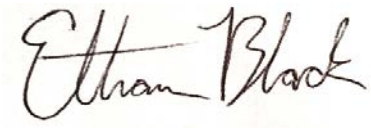
Since groundwater impacts (LNAPL and dissolved constituents) were present after the excavation was completed, a solar-powered SVE/bubbler remediation system was installed and activated in June 2018 to address LNAPL impacts. The solar-powered system has effectively removed LNAPL from MW-2/2R and has since been deactivated and replaced by a propane-powered AS/passive SVE system installed to address any remaining impacts in the saturated and smear zones.

Noble will sample the groundwater 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. No warranty is implied or intended.

This report was prepared by **FREMONT ENVIRONMENTAL INC.**



10/21/20

_____ Date_____

Ethan Black

Geologist

Reviewed by:

10/21/20

_____ Date_____

Paul V. Henehan, P.E.

Senior Consultant

TABLE

TABLE 1

SUMMARY OF GROUND WATER ELEVATION DATA AND CHEMISTRY DATA

NOBLE ENERGY INC.

WIEDEMAN PMJ 28-2, WELD COUNTY, COLORADO

FREMONT PROJECT NO. C016-110

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-1	10/12/16	<1.0	1.5	<1.0	<1.0	98.19	12.67	85.52	NP
	01/06/17	<1.0	<1.0	<1.0	<1.0		15.87	82.32	NP
	04/05/17	<1.0	<1.0	<1.0	<1.0		18.19	80.00	NP
	08/14/17	<1.0	<1.0	<1.0	<1.0		9.36	88.83	NP
	10/11/17	<1.0	<1.0	<1.0	<1.0		12.43	85.76	NP
	01/11/18	<1.0	<1.0	<1.0	<1.0		15.46	82.73	NP
	04/27/18	<1.0	<1.0	<1.0	<2.0		17.85	80.34	NP
	07/27/18	<1.0	<1.0	<1.0	<2.0		8.79	89.40	NP
	08/23/18	NS	NS	NS	NS		8.12	90.07	NP
	10/17/18	<1.0	<1.0	<1.0	<2.0		13.58	84.61	NP
	01/21/19	<1.0	<1.0	<1.0	<2.0		16.55	81.64	NP
	04/23/19	<1.0	<1.0	<1.0	<2.0		18.76	79.43	NP
	07/09/19	<1.0	<1.0	<1.0	<2.0		18.41	79.78	NP
	10/07/19	<1.0	<1.0	<1.0	<2.0		11.49	86.70	NP
	01/13/20	<1.0	<1.0	<1.0	<2.0		15.41	82.78	NP
	04/06/20	<1.0	<1.0	<1.0	<2.0		17.72	80.47	NP
MW-2	10/12/16	**20000**	**32000**	**1400**	**19000**	97.58	12.43	85.15	NP
	01/06/17	NS	NS	NS	NS		15.95	81.63	**0.34**
	04/05/17	NS	NS	NS	NS		18.42	79.16	**1.00**
	08/14/17	NS	NS	NS	NS		9.03	88.55	**0.13**
	10/11/17	NS	NS	NS	NS		12.11	98.19	**0.25**
	01/11/18	NS	NS	NS	NS		15.39	82.19	**0.24**

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-2	04/27/18	NS	NS	NS	NS	97.58	18.82	78.76	**1.66**
	07/27/18	**1900**	41	27	**81000**		8.05	89.53	NP
	08/23/18	NS	NS	NS	NS		7.61	89.97	NP
	10/17/18	**4200**	**4800**	150	**26000**		13.06	84.52	NP
	01/21/19	DRY	DRY	DRY	DRY		DRY	DRY	DRY
MW-2R	04/23/19	IW	IW	IW	IW	97.99	18.97	79.02	IW
	07/09/19	**1200**	**1700**	20	**5200**		17.59	80.40	NP
	10/07/19	**300**	**270**	36	**2700**		11.48	86.51	NP
	01/13/20	**5000**	**9000**	630	**8400**		15.62	82.37	NP
	04/06/20	**5800**	**1500**	10	**7100**		17.65	80.34	NP
MW-3	10/12/16	**260**	**640**	150	**2600**	97.52	12.53	84.99	NP
	01/06/17	**1400**	**1900**	310	**6700**		15.99	81.53	NP
	04/05/17	Dry	Dry	Dry	Dry		Dry	Dry	Dry
	08/14/17	<1.0	<1.0	<1.0	2.2		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
MW-3R	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
	10/07/19	<1.0	<1.0	<1.0	<2.0		10.91	86.64	NP
	01/13/20	<1.0	<1.0	<1.0	<2.0		15.43	82.12	NP
	04/06/20	1.3	<1.0	<1.0	35		17.29	80.26	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

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-4	04/05/17	Dry	Dry	Dry	Dry	96.80	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
	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
	10/07/19	<1.0	<1.0	<1.0	<2.0		10.55	86.25	NP
	01/13/20	<1.0	<1.0	<1.0	<2.0		14.98	81.82	NP
	04/06/20	<1.0	<1.0	<1.0	<2.0		16.83	79.97	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
	10/07/19	<1.0	<1.0	<1.0	<2.0		9.79	86.19	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-5	01/13/20	<1.0	<1.0	<1.0	<2.0	95.98	14.47	81.51	NP
	04/06/20	NS	NS	NS	NS		16.32	79.66	NP
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
	10/07/19	<1.0	<1.0	<1.0	<2.0		13.08	86.92	NP
	01/13/20	<1.0	<1.0	<1.0	<2.0		17.73	82.27	NP
	04/06/20	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
	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

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-7R	01/21/19	<1.0	<1.0	<1.0	<2.0	96.91	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
	10/07/19	<1.0	<1.0	<1.0	<2.0		11.57	85.34	NP
	01/13/20	<1.0	<1.0	<1.0	<2.0		14.29	82.62	NP
	04/06/20	<1.0	<1.0	<1.0	<2.0		18.31	78.60	NP
MW-8	04/23/19	Dry	Dry	Dry	Dry	99.30	Dry	Dry	Dry
	07/09/19	Dry	Dry	Dry	Dry		Dry	Dry	Dry
	10/07/19	3.3	<1.0	<1.0	<2.0		12.98	86.32	NP
	01/13/20	<1.0	<1.0	<1.0	<2.0		16.75	82.55	NP
	04/06/20	Dry	Dry	Dry	Dry		Dry	Dry	Dry
Table 910-1 Limits		5	560	700	1,400				

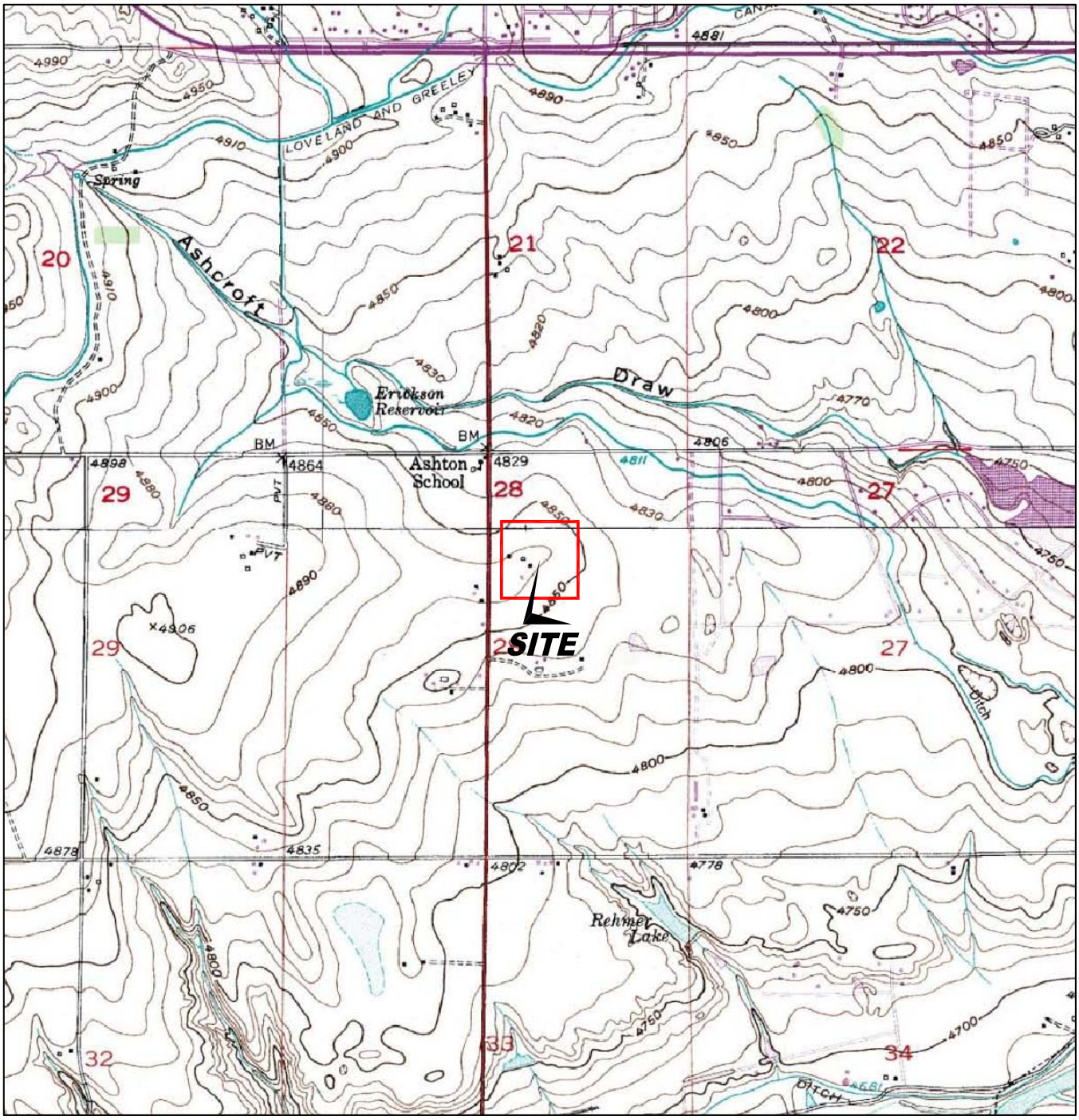
Bold face values exceed the COGCC limits

NP - No Free Product

NS - Not Sampled

IW - Insufficient Water

FIGURES



N

Scale (miles)

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

0 1000 2000 3000 4000 5000

Scale (feet)

USGS 7.5 MINUTE SERIES (TOPOGRAPHIC)

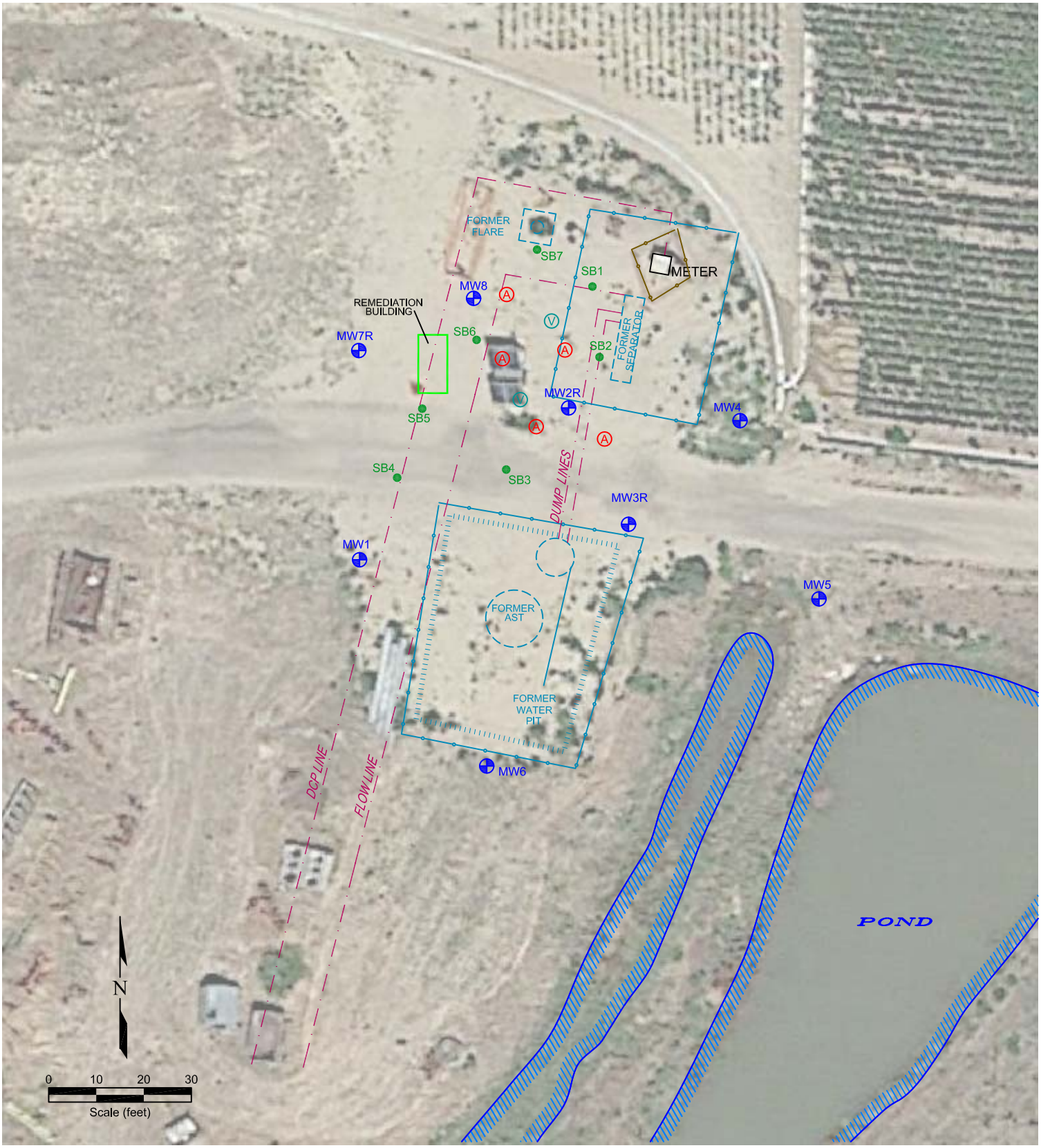
Figure 1

SITE LOCATION MAP

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

Project No.	Prepared by	Drawn by
C016-110		**TA**
Date	Reviewed by	Filename
4/27/20	**EB**	**16110T**

FREMONT ENVIRONMENTAL



LEGEND

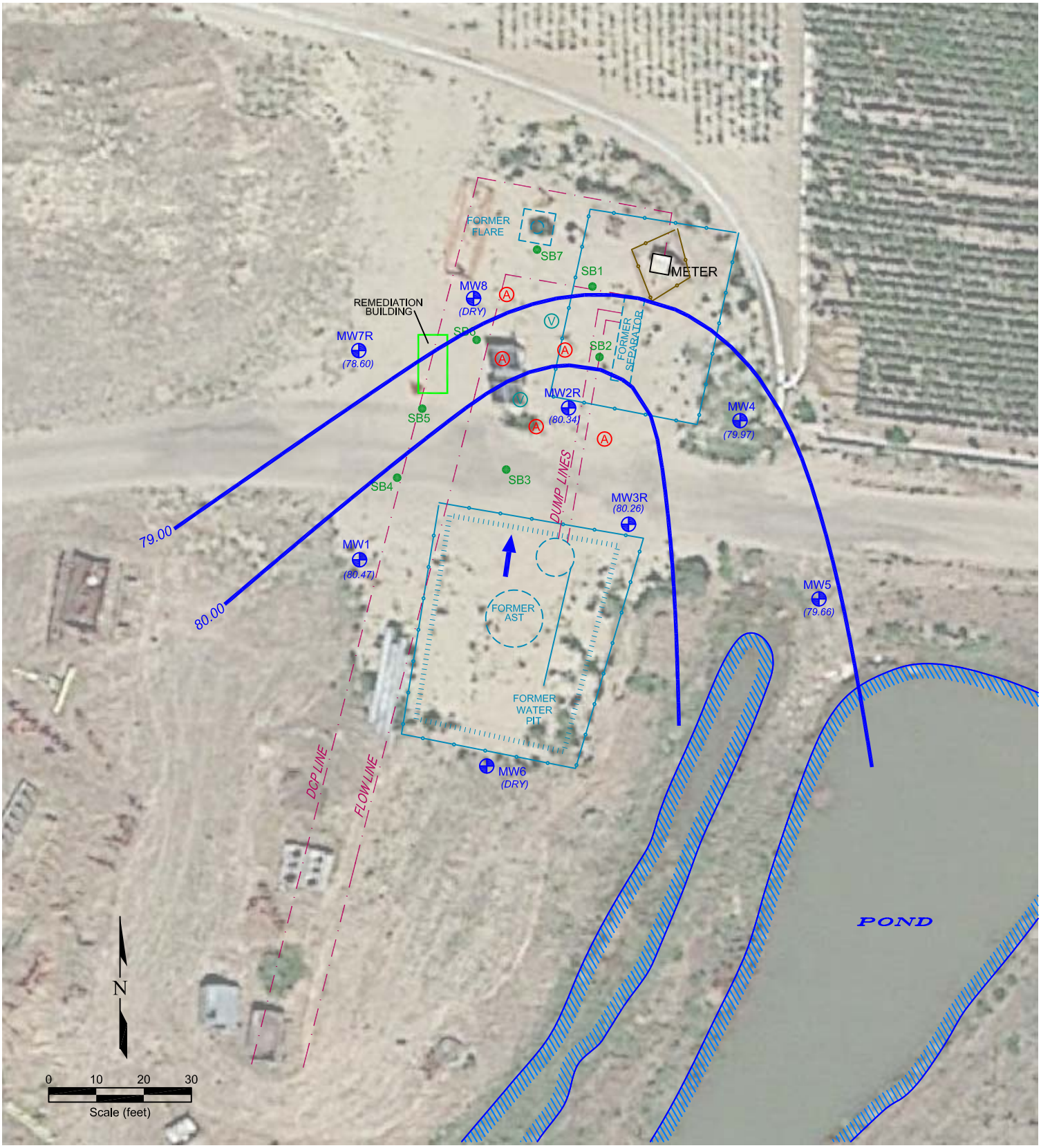
- SOIL BORING
- MONITORING WELL
- AIR SPARGE WELL
- PASSIVE SOIL VAPOR EXTRACTION WELL
- ABOVE GROUND STORAGE TANK
- FORMER — FORMER FACILITY
- BUILDING — BUILDING
- FENCE LINE
- CONTAINMENT BERM
- PIPELINE

Figure 2
SITE MAP

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

Project No.	Prepared by	Drawn by
C016-110		**TA**
Date	Reviewed by	Filename
4/27/20	**EB**	**16110Q**

FREMONT ENVIRONMENTAL



LEGEND

- SOIL BORING
- MONITORING WELL
- AIR SPARGE WELL
- PASSIVE SOIL VAPOR EXTRACTION WELL
- ABOVE GROUND STORAGE TANK
- FORMER — FORMER FACILITY
- BUILDING — BUILDING
- FENCE LINE
- CONTAINMENT BERM
- PIPELINE
- (DRY) — INEFFICIENT WATER SUPPLY
- (82.78) — GROUND WATER ELEVATION (ft above arbitrary datum)
- 85.50 — WATER TABLE CONTOUR
- GROUND WATER FLOW DIRECTION

Figure 3

INFERRED GROUNDWATER CONTOUR MAP

April 6, 2020

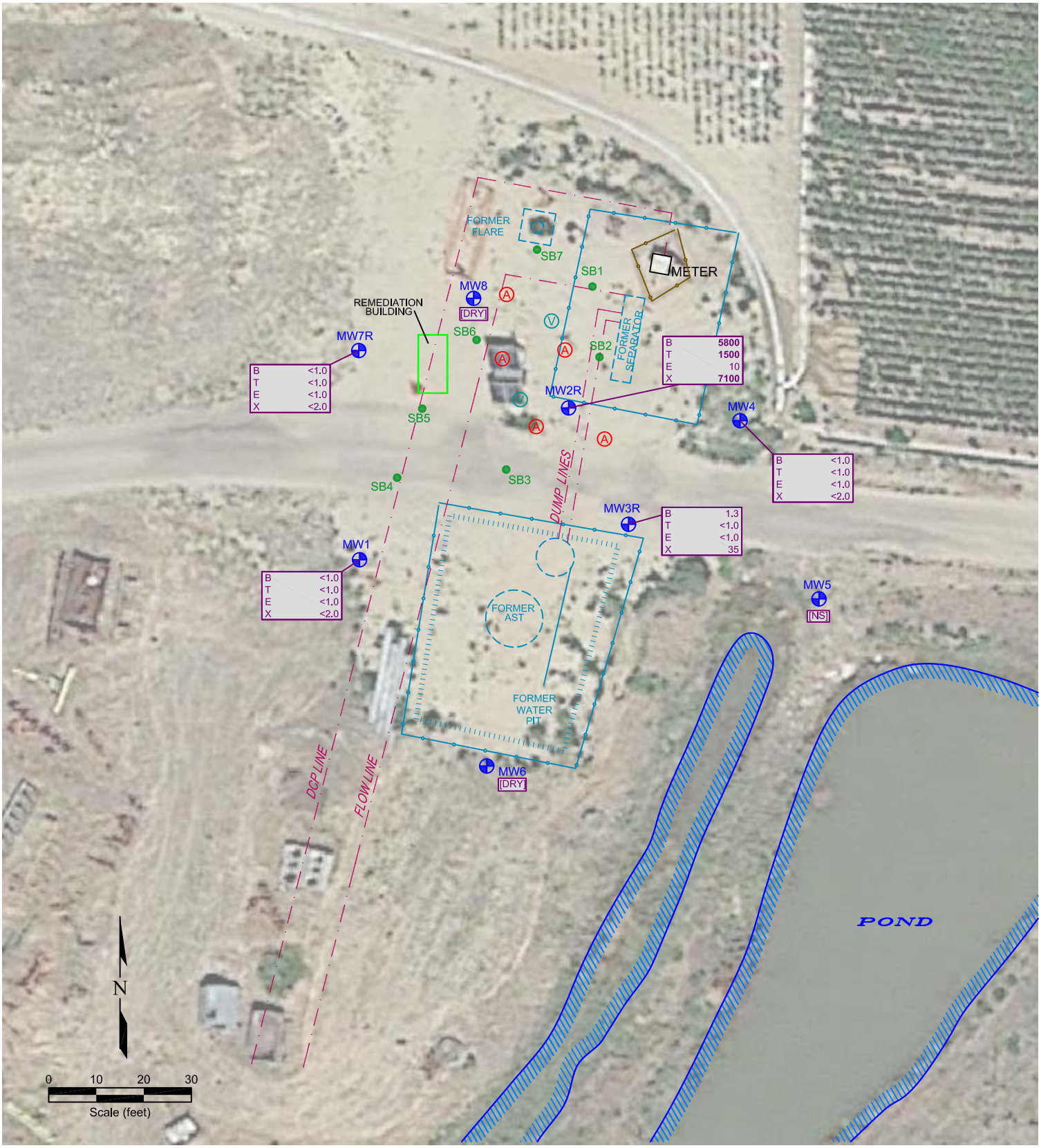
Noble Wiedeman PM J28-2, 28-7

NE SW Section 28, T5N, R66W

Weld County, Colorado

Project No.	Prepared by	Drawn by
C016-110		**TA**
Date	**Reviewed by**	**Filename**
4/27/20	**EB**	**16110Q**

FREMONT ENVIRONMENTAL



LEGEND

- SOIL BORING
- MONITORING WELL
- AIR SPARGE WELL
- PASSIVE SOIL VAPOR EXTRACTION WELL
- ABOVE GROUND STORAGE TANK
- FORMER — FORMER FACILITY
- BUILDING — BUILDING
- FENCE LINE
- CONTAINMENT BERM
- PIPELINE

[NS] NOT SAMPLED

[DRY] INEFFICIENT WATER SUPPLY

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)

Figure 4

GROUND WATER CHEMISTRY MAP

April 6, 2020

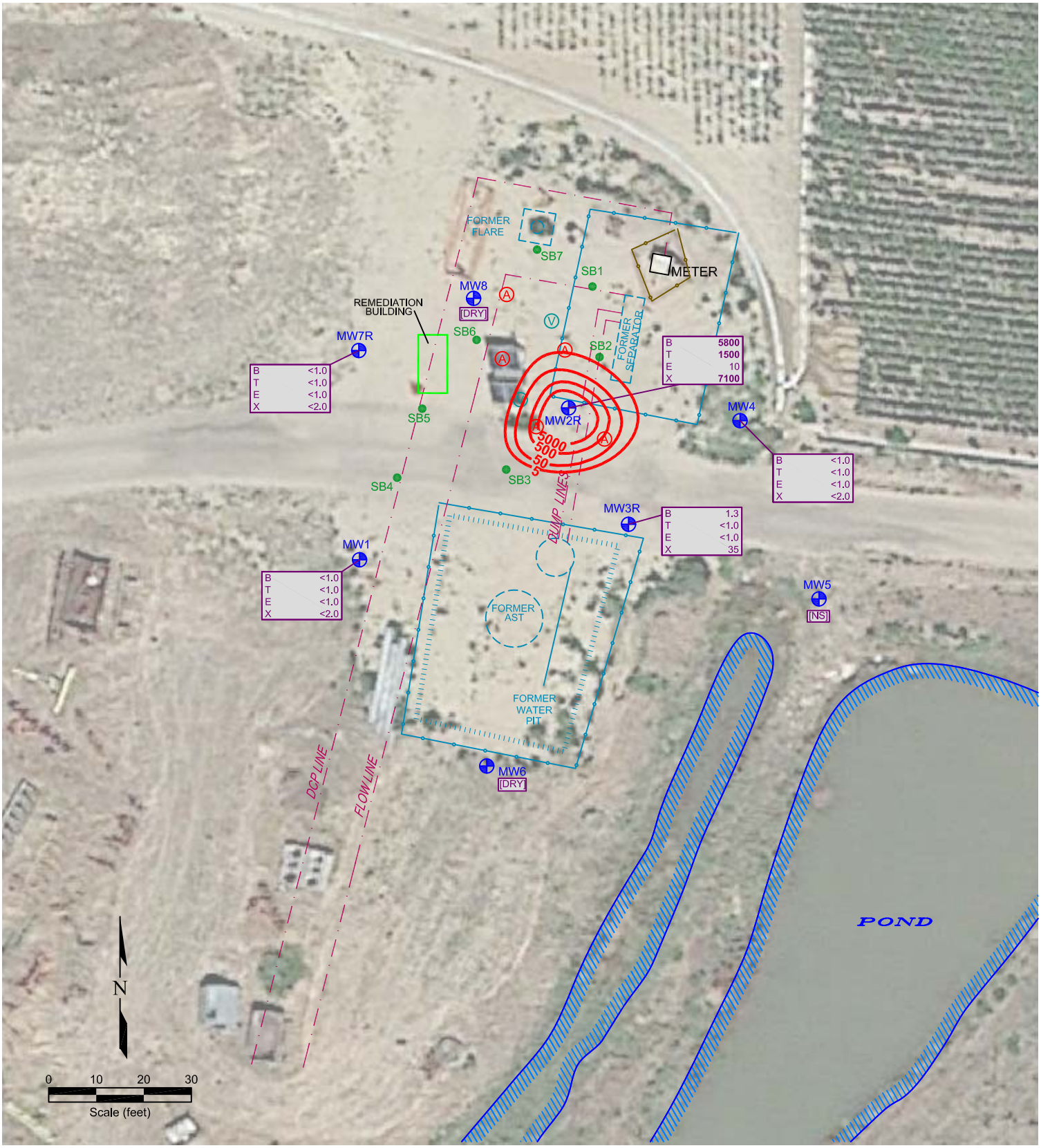
Noble Wiedeman PM J28-2, 28-7

NE SW Section 28, T5N, R66W

Weld County, Colorado

Project No.	Prepared by	Drawn by
C016-110		**TA**
Date	Reviewed by	Filename
4/27/20	**EB**	**16110Q**

FREMONT ENVIRONMENTAL



LEGEND

- SOIL BORING
- MONITORING WELL
- AIR SPARGE WELL
- PASSIVE SOIL VAPOR EXTRACTION WELL
- ABOVE GROUND STORAGE TANK
- FORMER — FORMER FACILITY
- BUILDING — BUILDING
- FENCE LINE
- CONTAINMENT BERM
- PIPELINE
- B <1.0 / T <1.0 / E <1.0 / X <2.0 — BENZENE (ug/L) / TOLUENE (ug/L) / ETHYLBENZENE (ug/L) / TOTAL XYLENES (ug/L)
- [NS] — NOT SAMPLED
- [DRY] — INEFFICIENT WATER SUPPLY
- 5 — BENZENE ISOCONCENTRATION (ug/L) Dashed where inferred - Base in part on historical data

Figure 5

GROUND WATER CHEMISTRY WITH BENZENE ISO-CONCENTRATION MAP

April 6, 2020

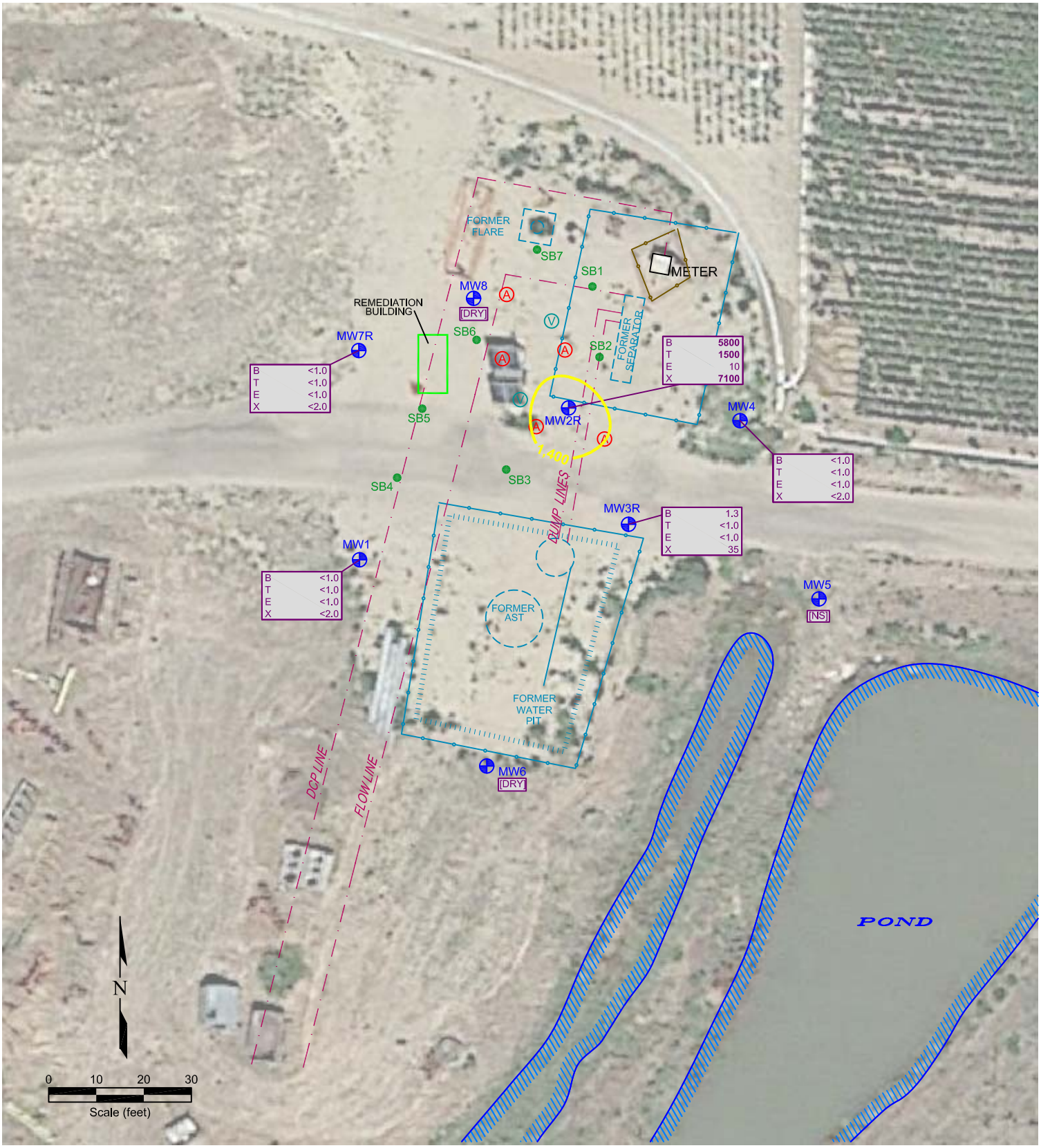
Noble Wiedeman PM J28-2, 28-7

NE SW Section 28, T5N, R66W

Weld County, Colorado

Project No.	Prepared by	Drawn by
C016-110		TA
Date	Reviewed by	Filename
4/27/20	EB	16110Q

FREMONT ENVIRONMENTAL



LEGEND

- SOIL BORING
- MONITORING WELL
- AIR SPARGE WELL
- PASSIVE SOIL VAPOR EXTRACTION WELL
- ABOVE GROUND STORAGE TANK
- FORMER — FORMER FACILITY
- BUILDING — BUILDING
- FENCE LINE
- CONTAINMENT BERM
- PIPELINE

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)

[NS] NOT SAMPLED

[DRY] INEFFICIENT WATER SUPPLY

1,400 XYLENES ISOCONCENTRATION (ug/L)
Dashed where inferred

Figure 6

GROUND WATER CHEMISTRY WITH XYLENES ISO-CONCENTRATION MAP

April 6, 2020

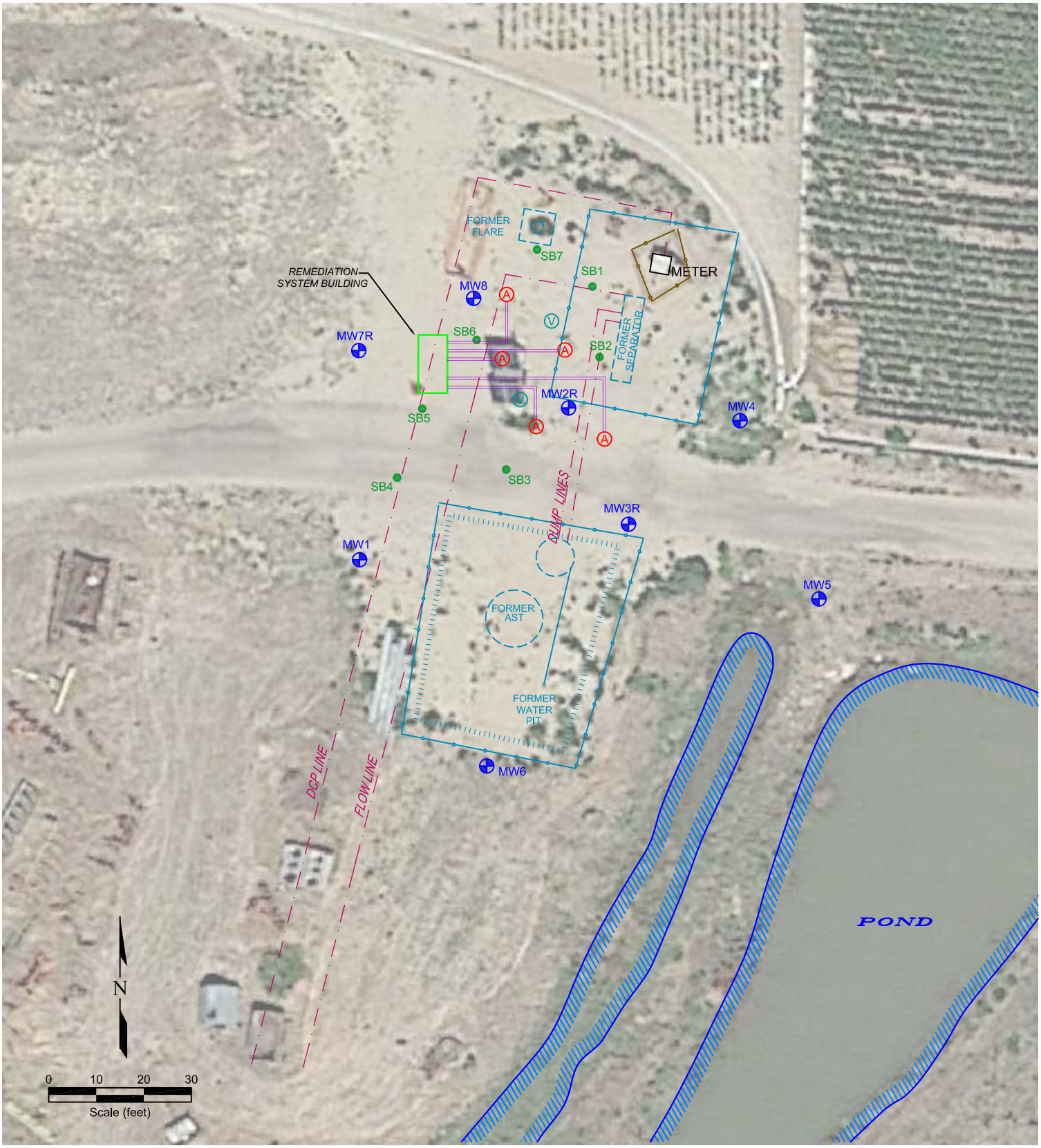
Noble Wiedeman PM J28-2, 28-7

NE SW Section 28, T5N, R66W

Weld County, Colorado

Project No.	Prepared by	Drawn by
C016-110		TA
Date	Reviewed by	Filename
4/27/20	EB	16110Q

FREMONT ENVIRONMENTAL



LEGEND

- SOIL BORING
- MONITORING WELL
- AIR SPARGE WELL
- PASSIVE SOIL VAPOR EXTRACTION WELL
- ABOVE GROUND STORAGE TANK
- FORMER — FORMER FACILITY
- BUILDING — BUILDING
- FENCE LINE
- CONTAINMENT BERM
- PIPELINE
- SYSTEM TRENCH

Figure 7

AS-BUILT REMEDIATION SYSTEM

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

Project No.	Prepared by	Drawn by
C016-110		**TA**
Date	Reviewed by	Filename
4/29/20	**EB**	**16110Q**

FREMONT ENVIRONMENTAL

APPENDIX A

LABORATORY DOCUMENTATION

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

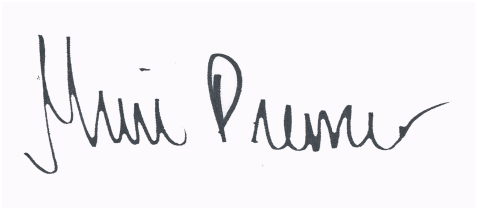
April 20, 2020

Paul Henehan
Fremont Environmental
PO Box 1289
Wellington, CO 80549

RE: Noble - Wiedeman PM J28 2
Work Order #2004168

Enclosed are the results of analyses for samples received by Summit Scientific on 04/10/20 16:30. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Muri Premer For Paul Shrewsbury
President

S2

Fremont Environmental PO Box 1289 Wellington CO, 80549	Project: Noble - Wiedeman PM J28 2 Project Number: [none] Project Manager: Paul Henehan	**Reported:** 04/20/20 10:44

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	2004168-01	Water	04/06/20 00:00	04/10/20 16:30
MW-2R	2004168-02	Water	04/06/20 00:00	04/10/20 16:30
MW-3	2004168-03	Water	04/06/20 00:00	04/10/20 16:30
MW-4	2004168-04	Water	04/06/20 00:00	04/10/20 16:30
MW-7	2004168-05	Water	04/06/20 00:00	04/10/20 16:30

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.

2004168

Summit Scientific

S2

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 PMJ 28-2
Sampler Name: Black | Project Number:

					Preservative				Matrix				Analysis Requested								Special Instructions
ID	Sample Description	Date Sampled	Time Sampled	# of containers	HCl	HNO3	None	Other ___	Water	Soil	Air-Canister #	Other ___	BTEX	Naphthalene	GRO	DRO	SAR	EC	pH		
1	MW-1	4/6/20		2		X	X		X				X								
2	MW-2R	"		"		"	"		"				"								
3	MW-3	"		"		"	"		"				"								
4	MW-4	"		"		"	"		"				"								
5	MW-7	"		"		"	"		"				"								
6	MW-8	"		"		"	"		"				"								
7																					
8																					
9																					
10																					

Relinquished by:	Date/Time:	Received by:	Date/Time:
Ethan Black	4/10/20 1630	[signature]	04/10/2020 1630
Relinquished by:	Date/Time:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Received by:	Date/Time:

Turn Around Time (Check)
Same Day ___ 72 hours ___
24 hours ___ Standard X
48 hours ___

Sample Integrity:
Temperature Upon Receipt: 4.3
Samples Intact: (Yes) No

Notes:

Sample Receipt Checklist

S2 Work Order 2004168

Client: FREMONT ENVIRONMENTAL Client Project ID: NOBLE - WIEDEMAN PMJ 28-2

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

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

Temp (°C)	4.3

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

[1] **If NO, then contact the client before proceeding with analysis and note in case narrative.**

RZ		4/10/20
Custodian Printed Name or Initials	**Signature of Custodian**	**Date/Time**

S2

Fremont Environmental PO Box 1289 Wellington CO, 80549	Project: Noble - Wiedeman PM J28 2 Project Number: [none] Project Manager: Paul Henehan	**Reported:** 04/20/20 10:44

MW-1

2004168-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/06/20 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	2004201	04/16/20	04/17/20	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/06/20 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		*88.1 %*	*23-173*		"	"	"	"	
Surrogate: Toluene-d8		*99.6 %*	*20-170*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*99.2 %*	*21-167*		"	"	"	"	

S2

Fremont Environmental PO Box 1289 Wellington CO, 80549	Project: Noble - Wiedeman PM J28 2 Project Number: [none] Project Manager: Paul Henehan	**Reported:** 04/20/20 10:44

MW-2R

2004168-02 (Water)

Summit Scientific

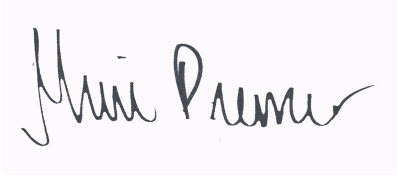
Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/06/20 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	**5800**	100	ug/l	100	2004201	04/16/20	04/17/20	EPA 8260B	
Toluene	**1500**	100	"	"	"	"	"	"	
Ethylbenzene	**10**	1.0	"	1	"	"	"	"	
Xylenes (total)	**7100**	200	"	100	"	"	"	"	

Date Sampled: **04/06/20 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		*80.6 %*	*23-173*		"	"	"	"	
Surrogate: Toluene-d8		*99.8 %*	*20-170*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*101 %*	*21-167*		"	"	"	"	



S2

Fremont Environmental PO Box 1289 Wellington CO, 80549	Project: Noble - Wiedeman PM J28 2 Project Number: [none] Project Manager: Paul Henehan	**Reported:** 04/20/20 10:44

MW-3

2004168-03 (Water)

Summit Scientific

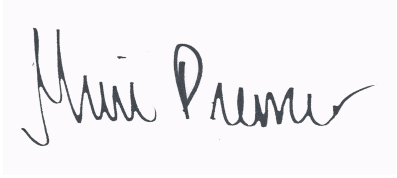
Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/06/20 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	**1.3**	1.0	ug/l	1	2004201	04/16/20	04/17/20	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	**35**	2.0	"	"	"	"	"	"	

Date Sampled: **04/06/20 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		*86.1 %*	*23-173*		"	"	"	"	
Surrogate: Toluene-d8		*101 %*	*20-170*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*109 %*	*21-167*		"	"	"	"	



S2

Fremont Environmental PO Box 1289 Wellington CO, 80549	Project: Noble - Wiedeman PM J28 2 Project Number: [none] Project Manager: Paul Henehan	**Reported:** 04/20/20 10:44

MW-4

2004168-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/06/20 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	2004201	04/16/20	04/17/20	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/06/20 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		*89.6 %*	*23-173*		"	"	"	"	
Surrogate: Toluene-d8		*98.5 %*	*20-170*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*103 %*	*21-167*		"	"	"	"	

S2

Fremont Environmental PO Box 1289 Wellington CO, 80549	Project: Noble - Wiedeman PM J28 2 Project Number: [none] Project Manager: Paul Henehan	**Reported:** 04/20/20 10:44

MW-7

2004168-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/06/20 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	2004201	04/16/20	04/17/20	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/06/20 00:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		*89.4 %*	*23-173*		"	"	"	"	
Surrogate: Toluene-d8		*101 %*	*20-170*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*100 %*	*21-167*		"	"	"	"	

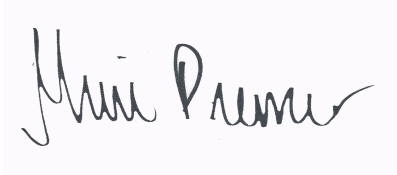
S2

Fremont Environmental PO Box 1289 Wellington CO, 80549	Project: Noble - Wiedeman PM J28 2 Project Number: [none] Project Manager: Paul Henehan	**Reported:** 04/20/20 10:44

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2004201 - EPA 5030 Water MS										
Blank (2004201-BLK1)				Prepared: 04/16/20 Analyzed: 04/17/20						
Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	*11.5*		*"*	*13.3*		*86.3*	*23-173*			
Surrogate: Toluene-d8	*13.3*		*"*	*13.3*		*99.8*	*20-170*			
Surrogate: 4-Bromofluorobenzene	*13.6*		*"*	*13.3*		*102*	*21-167*			
LCS (2004201-BS1)				Prepared: 04/16/20 Analyzed: 04/17/20						
Benzene	26.6	1.0	ug/l	33.3		79.9	51-132			
Toluene	30.2	1.0	"	33.3		90.8	51-138			
Ethylbenzene	27.0	1.0	"	33.3		81.0	58-146			
m,p-Xylene	56.0	2.0	"	66.7		84.1	57-144			
o-Xylene	27.3	1.0	"	33.3		82.0	53-146			
Surrogate: 1,2-Dichloroethane-d4	*11.2*		*"*	*13.3*		*84.4*	*23-173*			
Surrogate: Toluene-d8	*13.4*		*"*	*13.3*		*101*	*20-170*			
Surrogate: 4-Bromofluorobenzene	*13.6*		*"*	*13.3*		*102*	*21-167*			
Matrix Spike (2004201-MS1)		**Source: 2004165-01**		Prepared: 04/16/20 Analyzed: 04/17/20						
Benzene	27.1	1.0	ug/l	33.3	ND	81.3	34-141			
Toluene	30.2	1.0	"	33.3	ND	90.5	27-151			
Ethylbenzene	27.7	1.0	"	33.3	ND	83.1	29-160			
m,p-Xylene	57.5	2.0	"	66.7	ND	86.2	20-166			
o-Xylene	28.2	1.0	"	33.3	ND	84.6	33-159			
Surrogate: 1,2-Dichloroethane-d4	*11.6*		*"*	*13.3*		*87.0*	*23-173*			
Surrogate: Toluene-d8	*13.5*		*"*	*13.3*		*101*	*20-170*			
Surrogate: 4-Bromofluorobenzene	*14.2*		*"*	*13.3*		*106*	*21-167*			



S2

Fremont Environmental PO Box 1289 Wellington CO, 80549	Project: Noble - Wiedeman PM J28 2 Project Number: [none] Project Manager: Paul Henehan	**Reported:** 04/20/20 10:44

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2004201 - EPA 5030 Water MS										
Matrix Spike Dup (2004201-MSD1)	**Source: 2004165-01**			Prepared: 04/16/20 Analyzed: 04/17/20						
Benzene	26.7	1.0	ug/l	33.3	ND	80.1	34-141	1.49	30	
Toluene	30.2	1.0	"	33.3	ND	90.5	27-151	0.0995	30	
Ethylbenzene	27.8	1.0	"	33.3	ND	83.5	29-160	0.468	30	
m,p-Xylene	57.8	2.0	"	66.7	ND	86.7	20-166	0.520	30	
o-Xylene	27.9	1.0	"	33.3	ND	83.6	33-159	1.14	30	
Surrogate: 1,2-Dichloroethane-d4	*12.0*		*"*	*13.3*		*90.3*	*23-173*			
Surrogate: Toluene-d8	*13.4*		*"*	*13.3*		*101*	*20-170*			
Surrogate: 4-Bromofluorobenzene	*14.2*		*"*	*13.3*		*107*	*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 Project Number: [none] Project Manager: Paul Henehan	**Reported:** 04/20/20 10:44

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