



December 27, 2022

Mr. Jason Davidson, PG
Sr. Environmental Specialist
PDC Energy
4000 Burlington Avenue
Evans, Colorado 80620

RE: Site Investigation – Soil Delineation
Flessner 9
Washington County, CO
COGCC Remediation Project No. 8430

Dear Mr. Davidson:

On October 4, 2022, 2DOT Consulting, LLC (2DOT) completed a total of 16 soil borings at the Flessner 9 oil and gas facility, located in the southwest quarter of the southeast quarter of Section 19, Township 1 South Range 56 West in Washington County, Colorado. The purpose of the soil borings was to delineate the extent of impact related to the historic use produced water skim pits. Previous investigations identified an impacted area of approximately 6.5 acres that included the location of the former skim pits. During those investigations soil samples identified concentrations above the Colorado Oil and Gas Commission (COGCC) Table 915-1 Cleanup Concentrations for Sodium Adsorption Ratio (SAR) and Electrical Conductivity (EC). Hydrocarbons were not detected. In March of 2020, a soil remediation plan was implemented that included ripping the upper 18-inches of soil, adding 2 tons per acre of corn stalks, 16 tons per acre of gypsum, 2 tons per acre of elemental sulfur and 100 pounds per acre of nitrogen.

Delineation Soil Boring Summary

The soil borings were completed using a Geoprobe direct push sampling method to a maximum depth of 10 feet below ground surface. Samples collected from the 16 soil borings were analyzed for:

- Electrical Conductivity (EC)
- Sodium Adsorption Ratio (SAR)
- pH
- Boron

Four of the borings (BG-1 through BG-4) were completed in areas outside of the original impacted area to demonstrate background soil conditions. Ten soil boring were completed within the impacted area. Soil samples were collected and analyzed from all 14 boring from depths of 0.5 feet, 1.5 feet, 3.0 feet, 5.0 feet and 10.0 feet.

Two soil borings (SB-11 and SB-12) were drilled at the location of previous compliance sample locations to a depth of 3 feet below ground surface and samples from those borings were collected at depths of 0.5 feet, 1.5 feet and 3.0 feet and analyzed for the same parameters as the other samples. Soils were consistent across the entire site. Soil types encountered in each of the 16 soil borings were described from 0 to 1 foot below grade as consisting of brown clayey silts with some organic matter.



From 1 to 10 feet below grade the soils typically consisted of a light tan dry, compacted clayey silt. No groundwater was encountered in any of the borings. Typical hydraulic conductivity for this soil type ranges from 1.6×10^{-9} to 1.64×10^{-7} feet per second. Soil boring locations are illustrated on **Figure 1** and soil boring logs are included in the **Attachments**.

Analytical Results Summary

Analytical results for the 56 soil samples from the 12 soil borings in the impacted area between 0.5 and 10 feet ranged from:

EC	0.29 to 7.95 mmhos/cm	Median 2.25	Average 2.77	12 exceedances
SAR	1.3 to 45.4	Median 13.60	Average 15.65	42 exceedances
pH	6.26 to 8.86	Median 7.73	Average 7.73	1 exceedance
Boron	not detected to 4.05 mg/l	Median 1.05	Average 1.32	14 exceedances

Analytical results for the 36 samples collected from the 12 soil borings in the impacted area between 0.5 and 3 feet ranged from:

EC	0.29 to 6.87 mmhos/cm	Median 2.38	Average 2.80	7 exceedances
SAR	1.3 to 33.8	Median 15.0	Average 16.0	28 exceedances
pH	6.26 to 8.25	Median 7.78	Average 7.75	0 exceedances
Boron	not detected to 4.05 mg/l	Median 1.69	Average 1.65	12 exceedances

Analytical results from the 20 background soil samples from the 4 background soil borings collected between 0.5 and 10 feet below ground level ranged from:

EC	0.12 to 7.12 mmhos/cm	Median 0.48	Average 1.85	4 exceedances
SAR	0.26 to 10.9	Median 2.44	Average 3.77	5 exceedances
pH	7.47 to 8.49	Median 7.92	Average 7.97	4 exceedances
Boron	0.08 to 0.98 mg/l	Median 0.26	Average 0.36	0 exceedances

Analytical results are summarized in the attached **Table 1** and illustrated on **Figure 1**. Analytical results are available upon request.

Data Review

Background Soil Sample Results

The results of the laboratory analyses in background soil samples outside of the impacted area were compared to the Table 915-1 Cleanup Concentrations. Elevated levels of EC were detected in 3 of the 4 soil borings at depths that ranged from 5 to 10 feet below ground level. Elevated levels of SAR were detected in 3 of the 4 borings from 5 to 10 feet below ground level with only one sample above the cleanup concentrations at 3 feet below ground level. Elevated pH concentrations were identified in 3 of the 4 background soil borings at depths from 1.5 to 5 feet below ground level with the greatest pH concentration in all the samples analyzed at 0.19 units above the target concentration of 8.3. No boron levels were detected above the Table 915-1 Cleanup Concentration.



Three background soil samples exceeded the Table 915-1 Cleanup Concentration at depths of 0.5 to 3 feet below ground level. The remaining samples that exceeded the cleanup concentrations were found from 5 to 10 feet below ground level.

Impacted Area Soil Sampling Results

Only three of the of the 20 background samples analyzed detected concentrations that exceeded the Table 915-1 criteria in the depths of between 0.5 and 3 feet below grade. The results of the background soil samples indicated that half of the samples collected identified elevated levels of the parameters analyzed at depths below 3 feet.

Soil sample results from the impacted area within the 0.5 to 3 foot depths show elevated SAR levels throughout. EC sample results in the 0.5 to 3 foot depths show elevated levels in 6 of the 12 soil borings located near the center and eastern end of the impacted area. Boron sample results in the 0.5 to 3 foot depths show elevated levels in 8 of the 12 soil borings with only three samples that were in the 3 to 4 mg/l range. The boron samples results were at or near the cleanup concentration. None of the soil samples collected in the 0.5 to 3 foot depths showed elevated concentrations of pH.

Groundwater was not encountered during this site investigation. A review of Colorado Division of Water Resources GIS Maps was conducted to identify depth to groundwater at the Site. The nearest well is located approximately 1.3 miles to the west. The well has a total depth of 51 feet and is designated as a stock well. All other wells in the vicinity are greater than 1.5 miles from the impacted area. Based on the research of available data the depth to groundwater is expected to be encountered between 40 and 50 feet below grade. Domestic use wells within the township range from depths of 90 to 165 feet below grade.

Recommendations

Photographic evidence suggests that the remediation activities completed in March of 2022 had a positive outcome on the ability of the impacted area to support plant growth. These activities included deep ripping of the soils and adding physical amendments to improve infiltration; and adding chemical amendments to reduce EC and SAR levels. Photos taken at the site in September 2022 are included in the **Attachments** for reference. The site is situated within an area designated as non-irrigated agricultural land use and does not receive supplemental irrigation water other than naturally occurring. The US Drought Monitor for the State of Colorado indicates that the portion of Washington County in which the site is located is designated as a D2 (Severe Drought) area as shown in **Figure 2**. While the map statistics do show that over the past 11 months the percentage of the state designated as D2 has decreased, the area of Washington County where the site is located, still shows a below average amount of precipitation.

The remediation measures taken in 2020 require time and water to reduce the elevated concentrations of SAR and EC. Due to the drought conditions, the remediated area has not received enough precipitation to drive expected reactions. In addition, soil encountered at the site has sufficiently low hydraulic conductivity to suggest little to no vertical migration and depth to groundwater is expected to be encountered between 40 and 50 feet below grade. As such, the remediation options will focus on the upper 3 feet within the impacted area.



PDC is proposing to allow the existing remediation in the impacted area to continue with the following modifications:

- Continue to monitor soil conditions within the 0.5 to 3 foot depths from four monitoring points within the impacted area. Soil samples will be analyzed for SAR, EC, and Boron. Elevated pH was not detected within that zone and will not be analyzed for future compliance monitoring.
- Samples will be collected twice per year, once before planting and once after harvest. Sample results will be submitted to the COGCC via Form 27.
- Deep ripping of the soils will be conducted twice per year. Once before planting and once in the fall following planting to allow for increased penetration of precipitation.
- Compliance samples will be evaluated on an annual basis to monitor the progress of the remediation and, if necessary, the remediation work plan may be revised.

Should you have any questions or require additional information, please feel free to contact me.

Sincerely,

Mark Keyes
EHS Project Manager

Enclosures:

Figures
Tables
Attachments

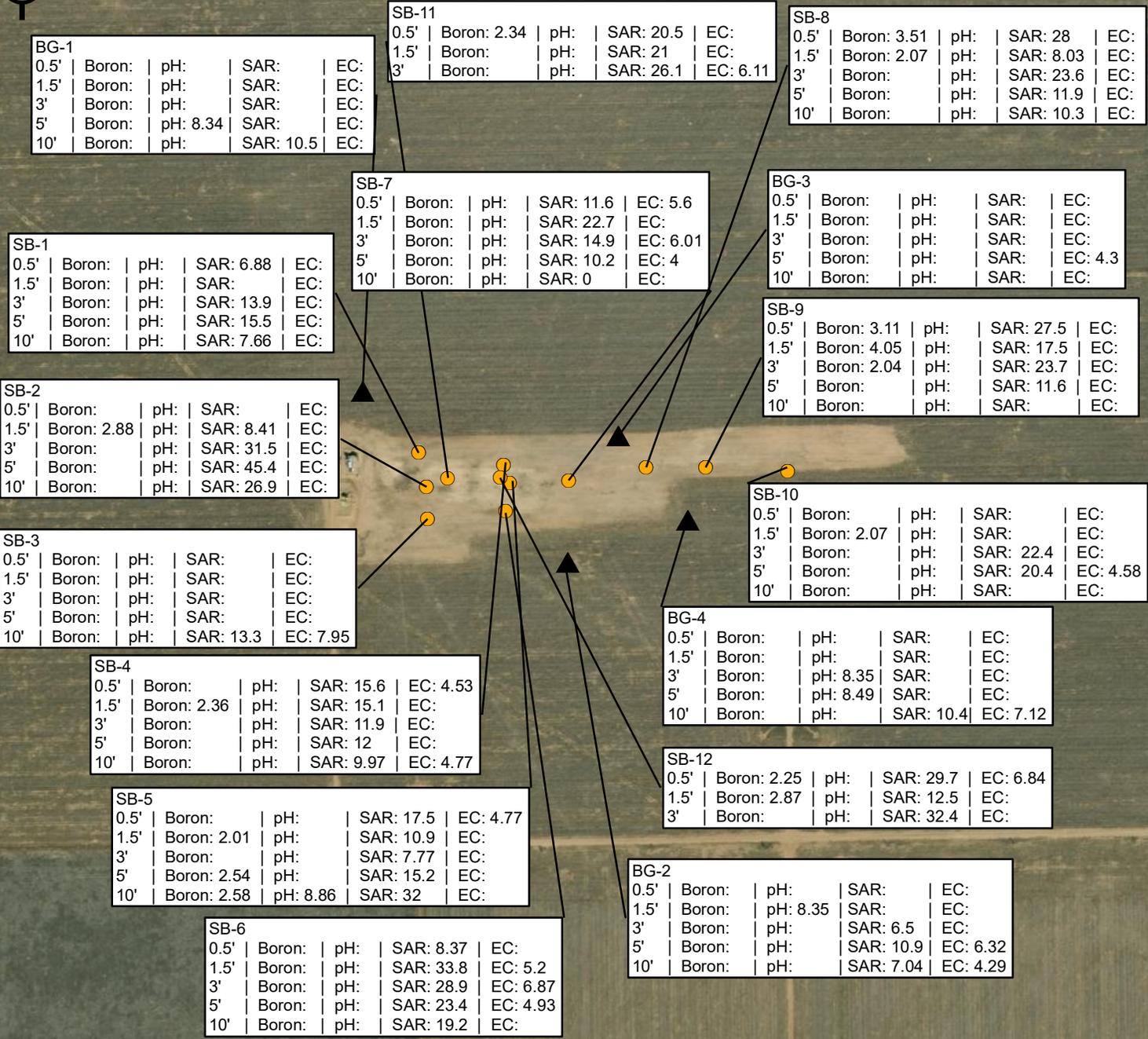
Figures

(3301-40) Flessner 9 Pad

SECTION 19, TOWNSHIP 1S, RANGE 56W, 6TH P.M. WASHINGTON CO



Map Location: T:\CLIENTS\PDC_3300\3301 Projects\3301-40 Flessner 9.2_Deliverables\Flessner 9 Project Area Map_221004.mxd



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Type

- Background Soil Sample
- Soil Sample

SAMPLE ID
 Depth (in Feet) | Boron (mg/L) | pH | SAR (Sodium Adsorption Ratio) | EC (Specific Conductance (mmhos/cm))

*Only results above the Colorado Oil & Gas Conservation Commission (COGCC)
 Table 915 Cleanup Concentrations are shown.

PREPARED BY:

7674 Grandview Ave., Ste. 210
 Arvada, CO 80002

0 320 640

Feet

SOURCES:
 Project Features, 2DOT 2020
 and PDC 2020.

PREPARED FOR:

Projection: Nad83 UTM 13N Date: 6/23/2020
 Drafted By: SM Reviewed By: SR

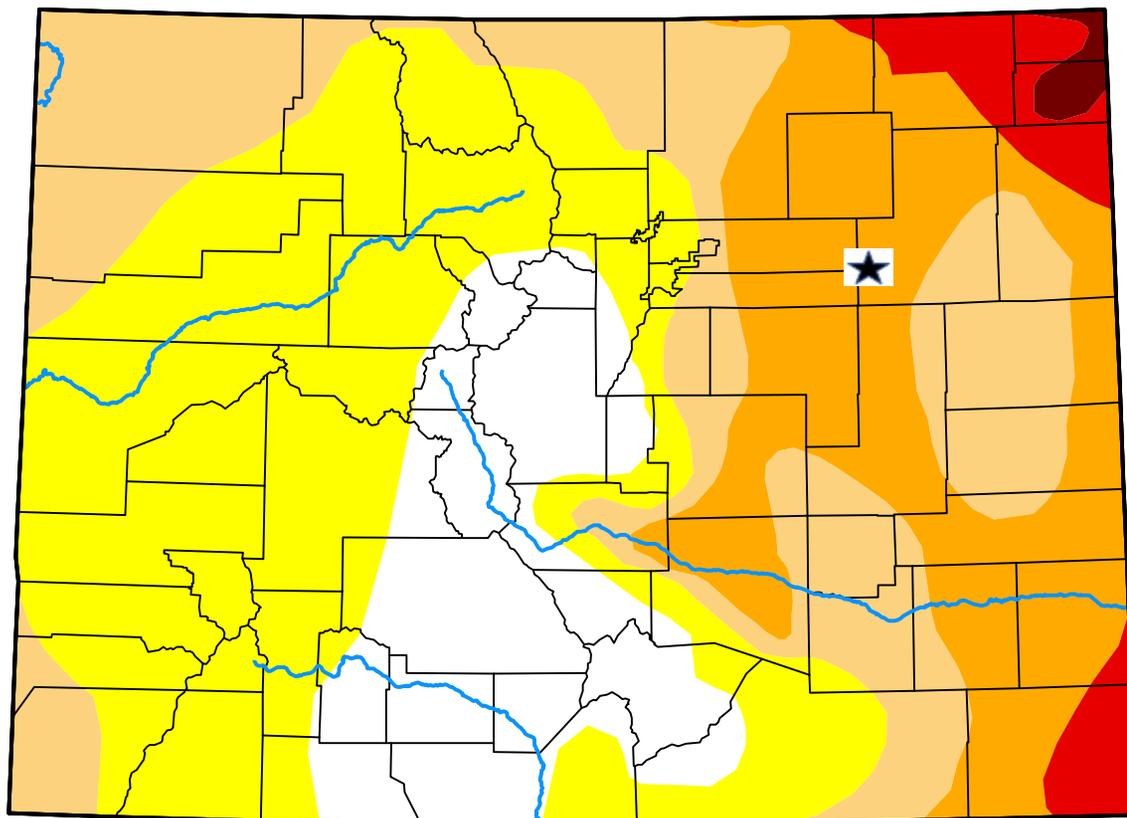
**Soil Boring Locations
 and Cleanup
 Concentration Results**

U.S. Drought Monitor Colorado

November 29, 2022
(Released Thursday, Dec. 1, 2022)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	16.25	83.75	47.20	23.68	4.34	0.57
Last Week <i>11-22-2022</i>	16.27	83.73	49.35	25.20	4.34	0.57
3 Months Ago <i>08-30-2022</i>	13.14	86.86	46.41	16.96	4.17	0.59
Start of Calendar Year <i>01-04-2022</i>	0.00	100.00	95.49	67.08	22.25	0.00
Start of Water Year <i>09-27-2022</i>	15.46	84.54	45.65	15.47	3.73	0.57
One Year Ago <i>11-30-2021</i>	0.00	100.00	95.45	52.30	14.34	0.00



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

David Simeral
Western Regional Climate Center



Tables

Table 1
Flessner 9 Delineation Soil Boring Results

SAR

Depth	SB1	SB2	SB3	SB4	SB5	SB6	SB7	SB8	SB9	SB10	SB11	SB12
0.5	6.88	3.33	1.3	15.6	17.5	8.37	11.6	28	27.5	2.19	20.5	29.7
1.5	4.39	8.41	4.61	15.1	10.9	33.8	22.7	8.03	17.5	4.45	21	12.5
3	13.9	31.5	3.81	11.9	7.77	28.9	14.9	23.6	23.7	22.2	26.1	32.4
5	15.5	45.4	5.42	12	15.2	23.4	10.2	11.9	11.6	20.4	NS	NS
10	7.66	26.9	13.3	9.97	32	19.2	5.42	10.3	1.92	2.03	NS	NS

SAR Table 915 Criteria <6

Range:	1.3	45.4	Avg:	15.6475	Median:	13.6
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EC mmhos/cm

Depth	SB1	SB2	SB3	SB4	SB5	SB6	SB7	SB8	SB9	SB10	SB11	SB12
0.5	3.28	1.55	3.26	4.53	4.77	3.92	5.6	3.99	2.64	2.09	1.37	6.84
1.5	0.29	0.91	0.71	1.2	1.07	5.2	3.21	1.77	1.32	1.31	2.33	2.16
3	1.29	2.42	0.42	1.22	0.87	6.87	6.01	2.83	1.73	2.72	6.18	2.79
5	2.81	3.9	0.66	2.14	1.65	4.93	4	1.3	0.92	4.58	NS	NS
10	1.7	2.74	7.95	4.77	1.12	1.89	1.03	1.51	3.44	1.26	NS	NS

EC Table 915 Criteria <4 mmhos/cm

Range:	0.29	7.95	Avg:	2.767321	Median:	2.245
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Boron mg/l

Depth	SB1	SB2	SB3	SB4	SB5	SB6	SB7	SB8	SB9	SB10	SB11	SB12
0.5	0.832	0.134	ND	1.71	1.67	1.27	1.75	3.51	3.11	0.92	2.34	2.25
1.5	1.93	2.88	0.26	2.36	2.01	1.28	0.269	2.07	4.05	2.07	1.6	2.87
3	0.675	0.937	ND	0.81	1.74	1.05	0.353	1.49	2.04	0.777	1.04	1.92
5	0.392	0.611	ND	0.317	2.54	0.833	0.677	1.12	0.661	0.655	NS	NS
10	0.5	0.394	0.656	0.35	2.58	1.11	0.33	0.16	0.204	0.0728	NS	NS

Boron Table 915 Criteria 2mg/l

Range:	0.0728	4.05	Avg:	1.323392	Median:	1.05
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pH

Depth	SB1	SB2	SB3	SB4	SB5	SB6	SB7	SB8	SB9	SB10	SB11	SB12
0.5	7.58	7.41	7.18	7.59	7.62	7.73	7.55	8.07	8.13	6.26	7.81	7.63
1.5	7.68	8.02	7.74	7.64	8.12	7.93	7.59	8.14	8.05	7.22	8.1	7.7
3	7.91	8.25	7.98	7.55	8.2	7.68	7.45	7.82	8.05	7.85	7.86	8
5	7.68	8.03	7.89	6.93	8.11	7.73	7.48	7.67	8.04	7.73	NS	NS
10	7.42	7.73	7.32	7.28	8.86	7.71	7.88	7.5	7.33	7.74	NS	NS

pH Table 915 Criteria 6-8.3

Range:	6.26	8.86	Avg:	7.734821	Median:	7.73
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BACKGROUND SAMPLE RESULTS

SAR

Depth	BG1	BG2	BG3	BG4
0.5	1.85	2.15	0.299	0.319
1.5	0.989	1.02	1.11	0.258
3	0.505	6.54	3.81	0.969
5	3.51	10.9	5.33	5.19
10	10.5	7.04	2.73	10.4

SAR Table 915 Criteria <6

Range:	0.258	10.9
Avg:	3.77095	
Median:	2.44	

EC mmhos/cm

Depth	BG1	BG2	BG3	BG4
0.5	0.272	0.478	0.438	0.267
1.5	0.168	0.485	0.408	0.19
3	0.12	3.65	0.612	0.213
5	0.485	6.32	4.3	0.423
10	3.73	4.29	3.11	7.12

EC Table 915 Criteria <4 mmhos/cm

Range:	0.12	7.12
Avg:	1.85395	
Median:	2.44	

Boron mg/l

Depth	BG1	BG2	BG3	BG4
0.5	0.181	0.276	0.232	0.26
1.5	0.076	0.259	0.428	0.141
3	0.076	0.863	0.56	0.146
5	0.11	0.979	0.506	0.318
10	0.164	0.466	0.26	0.88

Boron Table 915 Criteria 2mg/l

Range:	0.076	0.979
Avg:	0.35905	
Median:	2.44	

pH

Depth	BG1	BG2	BG3	BG4
0.5	8.29	8.11	7.47	7.55
1.5	8.14	8.35	7.76	8.18
3	8.23	7.83	7.97	8.35
5	8.34	7.85	7.59	8.49
10	7.87	7.85	7.51	7.62

pH Table 915 Criteria 6-8.3

Range:	7.47	8.49
Avg:	7.9675	
Median:	2.44	

* Shaded cells indicate results above Table 915 Criteria

Attachments

Soil Boring Logs



Project:	Flessner 9	Boring Number:	SB-1
Location:	Woodrow CO	Start Time:	9:15 AM
Proj. No.	PDC-3301-40	Sheet 1 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
EOB	1	D			ML		light brown/tan dry clayey silt with organics	
	2	D					light brown/tan dry clayey silt	
	3	D						
	4							
	5	D						
	6							
	7							
	8							
	9							
	10	D					EOB	
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	SB-2
Location:	Woodrow CO	Start Time:	9:25 AM
Proj. No.	PDC-3301-40	Sheet 2 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
EOB	1	D			ML		light brown/tan dry clayey silt with organics	
	2	D					light brown/tan dry clayey silt	
	3	D					EOB	
	4							
	5	D						
	6							
	7							
	8							
	9							
	10	D						
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	SB-3
Location:	Woodrow CO	Start Time:	9:33 AM
Proj. No.	PDC-3301-40	Sheet 3 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
EOB	1	D			ML		light brown/tan dry clayey silt with organics	
	2	D					light brown/tan dry clayey silt	
	3	D						
	4							
	5	D						
	6							
	7							
	8							
	9							
	10	D					EOB	
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	SB-4
Location:	Woodrow CO	Start Time:	10:06 AM
Proj. No.	PDC-3301-40	Sheet 4 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
	1	D			ML		dark brown dry clayey silt	
	2	D						
	3	D						
	4							
	5	D						
	6							
	7						light brown dry clayey silt	
	8							
	9							
EOB	10	D						EOB
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	SB-5
Location:	Woodrow CO	Start Time:	9:54 AM
Proj. No.	PDC-3301-40	Sheet 5 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
EOB	1	D			ML		brown dry clayey silt with organics	
	2	D					brown dry clayey silt	
	3	D						
	4							
	5	D						
	6							
	7							
	8							
	9							
	10	D					EOB	
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	SB-6
Location:	Woodrow CO	Start Time:	9:40 AM
Proj. No.	PDC-3301-40	Sheet 6 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
	1	D			ML		light brown/tan dry clayey silt with organics	
	2	D					light brown/tan dry clayey silt	
	3	D						
	4							
	5	D						
	6							
	7							
	8							
	9							
EOB	10	D						EOB
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	SB-7
Location:	Woodrow CO	Start Time:	10:30 AM
Proj. No.	PDC-3301-40	Sheet 7 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests		
EOB	1	D			ML		dark brown dry clayey silt			
	2	D					light brown/tan dry clayey silt			
	3	D								
	4									
	5	D								
	6									
	7									
	8									brown dry clayey silt
	9									
	10	D								EOB
	11									
	12									
	13									
	14									
	15									
	16									
	17									
	18									
	19									
	20									



Project:	Flessner 9	Boring Number:	SB-8
Location:	Woodrow CO	Start Time:	10:51 AM
Proj. No.	PDC-3301-40	Sheet 8 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
	1	D			ML		dark brown dry clayey silt with organics	
	2	D					light brown/tan dry clayey silt	
	3	D						
	4							
	5	D						
	6							
	7							
	8							
	9							
EOB	10	D					EOB	
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	SB-9
Location:	Woodrow CO	Start Time:	11:03 AM
Proj. No.	PDC-3301-40	Sheet 9 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests	
EOB	1	D			ML		light brown/tan dry clayey silt with organics		
	2	D					light brown/tan dry clayey silt		
	3	D							
	4								
	5	D							
	6								
	7								
	8								
	9								
	10	D							EOB
	11								
	12								
	13								
	14								
	15								
	16								
	17								
	18								
	19								
	20								



Project:	Flessner 9	Boring Number:	SB-10
Location:	Woodrow CO	Start Time:	11:13 AM
Proj. No.	PDC-3301-40	Sheet 10 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
	1	D			ML		dark brown dry clayey silt with organics	
	2	D						
	3	D					light brown/tan dry clayey silt	
	4							
	5	D						
	6							
	7							
	8							
	9							
EOB	10	D					EOB	
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	SB-11
Location:	Woodrow CO	Start Time:	11:46 AM
Proj. No.	PDC-3301-40	Sheet 11 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
EOB	1	D			ML		light brown dry clayey silt	
	2	D			CL		dark brown dry silty clay	
	3	D						
	4							
	5	D					EOB	
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	SB-12
Location:	Woodrow CO	Start Time:	11:50 AM
Proj. No.	PDC-3301-40	Sheet 12 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
EOB	1	D			CL		dark brown dry silty clay	
	2	D						
	3	D						
	4							
	5	D						EOB
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	BG-1
Location:	Woodrow CO	Start Time:	9:10 AM
Proj. No.	PDC-3301-40	Sheet 13 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
EOB	1	D			ML		dark brown dry clayey silt with organics	
	2	D					brown dry clayey silt	
	3	D					EOB	
	4							
	5	D						
	6							
	7							
	8							
	9							
	10	D						
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	BG-2
Location:	Woodrow CO	Start Time:	11:33 AM
Proj. No.	PDC-3301-40	Sheet 14 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
	1	D			ML		dark brown dry clayey silt	
	2	D					brown dry clayey silt	
	3	D						
	4							
	5	D						
	6							
	7							
	8							
	9							
EOB	10	D						EOB
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	BG-3
Location:	Woodrow CO	Start Time:	10:41 AM
Proj. No.	PDC-3301-40	Sheet 15 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
	1	D			ML		dark brown dry clayey silt with organics	
	2	D						
	3	D					brown dry clayey silt	
	4							
	5	D						
	6							
	7							
	8							
	9							
EOB	10	D					EOB	
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							



Project:	Flessner 9	Boring Number:	BG-4
Location:	Woodrow CO	Start Time:	11:20 AM
Proj. No.	PDC-3301-40	Sheet 16 of	16

Date:	10/4/2022	Logged by:	Mary Strecker
Drilling Method	Direct Push	Drilling Contractor:	Terracon
Drill Rig Type	Geoprobe	Sampling Method(s)	Discrete
Depth to GW	NA	Total Depth Drilled	10'
Backfill used	Bentonite/Cuttings	Well Set (Y/N)	N

Elevation	Depth (ft)	Sample Type	Sample No.	Blows/ft	USCS Symbol	Graphic Log	Material Description	Remarks and Other Tests
	1	D			ML		dark brown dry clayey silt	
	2	D					light brown/tan dry clayey silt	
	3	D						
	4							
	5	D						
	6							
	7							
	8							
	9							
EOB	10	D					EOB	
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

Site Photographs
September 15, 2022

Photo 1 – Facing Northeast. The exposed ground is the eastern edge of the Flessner 9 tank battery. Barley and weeds are visible in the photo along the line of the impacted area.



Photo 2 – Due East



Photo 3 - Southeast



Photo 4 – Facing east approximately 100 feet east of the east edge of the working surface of the Flessner 9 tank battery.

