Soil Sage

Report Date: 15 Jul 2025

Project: Civitas State Land Board Sites

Purpose

Soil sampling was conducted in response to the May 2025 Corrective Action, reference Doc# 718600605, at the following location:

- 320548 - CO STATE A-61S66W 36NWSE
    - Inspection - 404219394

Soil Sampling Date: 2 Jun 2025

- **History:** Soils collected on 2 Jun 2025, shipped to Ward Laboratories 4 Jun 2025, Lab receipt 6 Jun 2025 – Lab Results received from Ward Laboratories on 11 Jul 2025. TOC samples were shipped to Pace Laboratories on 4 Jun 2025, Lab receipt 5 Jun 2025, Lab Results received on 11 Jun 2025.

Soil Analytical Summary

- 320548 – Soils are Table 915-1 **compliant.**

Summary and Recommendations

All soils are within Table 915-1 limits. The area is historically dryland crop, and hunting land. Due to the lack of irrigation and historic land use no amendments and/or fertilizers are recommended.

Reclamation Plan

Reclamation plans were developed for these sites in response to the Corrective Action submitted in January 2025. Based on the June 2025 soil results, which address the subsequent Corrective Action submitted in May 2025, the original recommendations outlined in the reclamation plan remain applicable.

Attachments

Soil Sampling Points Map

Soil Analytical Spreadsheet

Soil Analytical Reports – Ward Labs and Pace

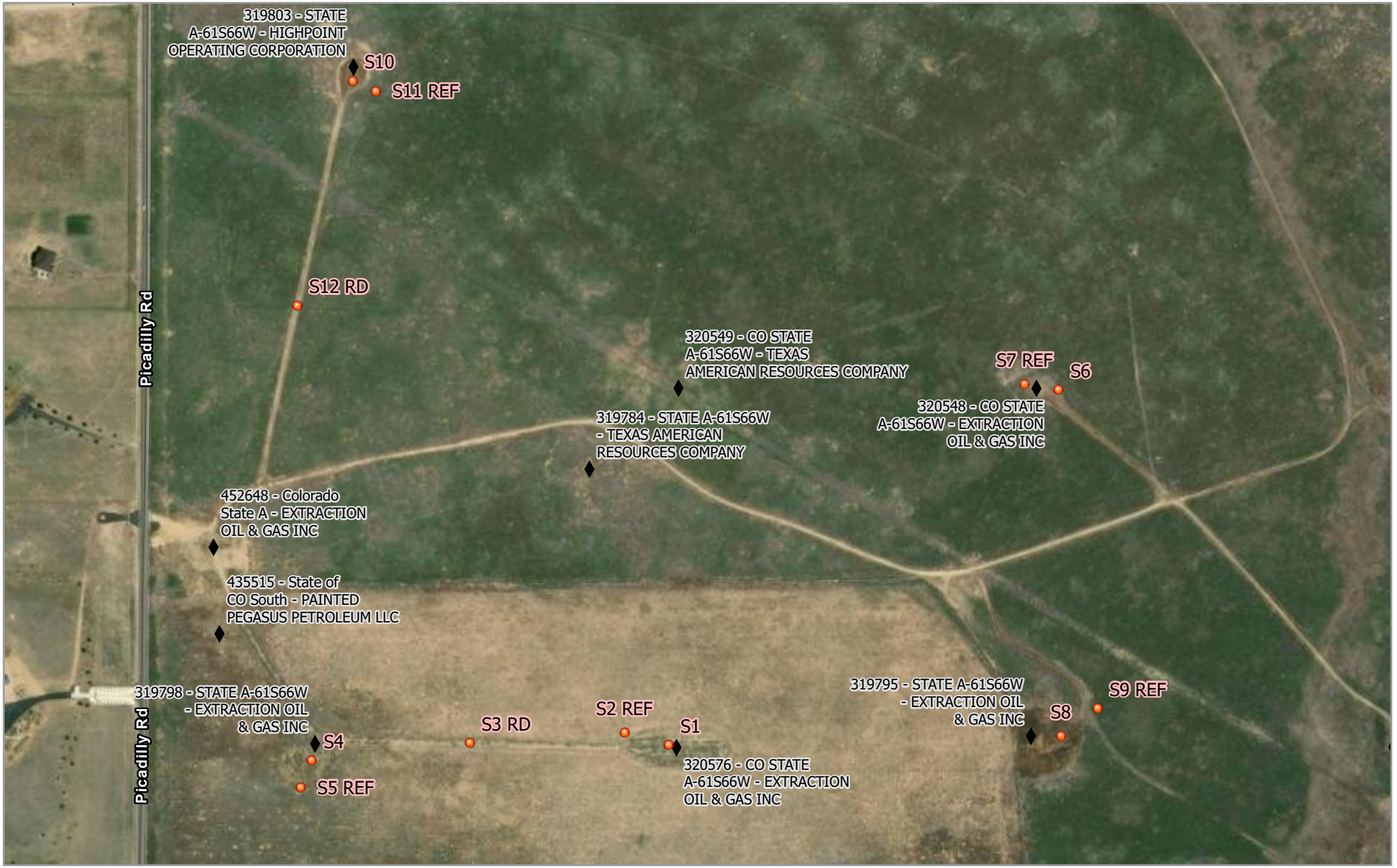
Site Photos and Observation Notes

Soil 6 – 320548 - CO STATE A-61S66W 36NWSE

Observation Notes: Resembles refence, primarily weeds, Sunflowers, Field bindweed, Russian Thistle

Soil 7 – 320548 - CO STATE A-61S66W 36NWSE – Reference

Observation Notes: Weeds present Cheatgrass



CIV - State Land Board
Map Extent - Soil Samples

Imagery: ESRI Basemap
Imagery Date: 2024
Map Date: 14 Jul 2025
Datum: NAD_1983_UTM_Zone_13N
POC: Soil Sage

- Soil Sample Ponts
- Oil and Gas Locations

0 0.05 0.1 0.2 Miles

N

Scale: 1:7,500

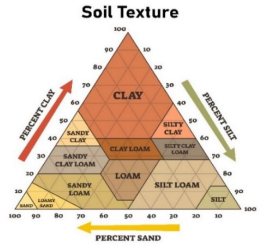
TABLE 1: Soil Report

Client	Civitas		
Operator	Extraction	**Date**	18-Nov-24
Location ID - Name	SLB	**Ward**	Soil1_20250610
Type	Locations & Reference	**Pace**	L1866620

SOIL SAGE

SOIL REPORT

	Soil Profile			Physical Properties Partical Size				
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Sand %	Silt %	Clay %	Texture Hydro	Location ID
320548								
SOIL 6.1	0	6	6	78	9	13	Sandy Loam	320548
SOIL 6.2	6	12	6	80	7	13	Sandy Loam	
SOIL 6.3	12	18	6	76	9	15	Sandy Loam	
SOIL 6.4	18	24	6	64	15	21	Sandy Clay Loam	320548
SOIL 7.1 - REF	0	6	6	78	11	11	Sandy Loam	
SOIL 7.2 - REF	6	12	6	82	7	11	Loamy Sand	
SOIL 7.3 - REF	12	18	6	76	9	15	Sandy Loam	
SOIL 7.4 - REF	18	24	6	72	5	23	Sandy Clay Loam	



	Soil Profile			Chemical Properties							Pace Analytical Laboratory WALKLEY-BLACK	Calculated	Calculated
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	pH Sat Paste	Ece (Sat Paste) mmhos/cm	CEC meq/100g	Excess Lime	Organic Matter (LOI) %	SAR	Calcium Carbonate %	TOC mg/Kg	TOC %	OM* %
320548													
SOIL 6.1	0	6	6	7.3	0.39	6	LOW	0.9	0.1	0	3880	0.39	0.67
SOIL 6.2	6	12	6	6.7	0.3	6	LOW	0.8	0.1	0	2790	0.28	0.48
SOIL 6.3	12	18	6	6.9	0.49	7.4	LOW	0.9	0.1	0	3020	0.30	0.52
SOIL 6.4	18	24	6	6.9	0.49	10.6	LOW	1.1	0.1	0	3190	0.32	0.55
SOIL 7.1 - REF	0	6	6	7.2	0.28	5.8	LOW	1.3	0.1	0	15600	1.56	2.69
SOIL 7.2 - REF	6	12	6	6.4	0.18	4.8	LOW	0.8	0.2	0	3800	0.38	0.66
SOIL 7.3 - REF	12	18	6	6	0.16	5.5	NONE	0.8	0.2	0.1	2930	0.29	0.51
SOIL 7.4 - REF	18	24	6	6.3	0.18	10.1	LOW	1.1	0.1	0	3620	0.36	0.62
ECMC Table 915-1				6-8.3	<4				<6				

*Estimate organic matter content from TOC

	Soil Profile			Extraction Method KCL	M3	NH4OAc Potassium	
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Nitrate-N ppm	Phosphorus P ppm	K ppm	Nitrate - N Lbs/A
320548							
SOIL 6.1	0	6	6	5.4	65	409	10
SOIL 6.2	6	12	6	6	50	318	11
SOIL 6.3	12	18	6	7.8	70	314	14
SOIL 6.4	18	24	6	11	73	331	20
SOIL 7.1 - REF	0	6	6	3.3	49	333	6
SOIL 7.2 - REF	6	12	6	1.3	47	384	2
SOIL 7.3 - REF	12	18	6	1.5	57	320	3
SOIL 7.4 - REF	18	24	6	2.5	51	301	5

	Soil Profile			Plant Available NH4OAc Calcium	NH4OAc Magnesium	NH4OAc Sodium	Hot Water	Ca-NO3	M3 Sulfate	AB-DTPA Copper	Iron	Manganese	Zinc	Sat Paste Chloride	Calcium	Magnesium	Sodium	Sulfate
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Ca ppm	Mg ppm	Na ppm	Boron B ppm	Chloride Cl ppm	S ppm	Cu ppm	Fe ppm	Mn ppm	Zn ppm	Cl ppm	Ca ppm	Mg ppm	Na ppm	S ppm
320548																		
SOIL 6.1	0	6	6	789	120	8	0.24	3.1	5.3	0.44	6.4	1.9	0.4	5	25	6	2	2.7
SOIL 6.2	6	12	6	816	124	7	0.21	2.4	4.5	0.36	4.8	1.8	0.16	4	22	6	2	3.9
SOIL 6.3	12	18	6	1086	140	9	0.29	2.8	5.2	0.35	4.5	1.2	0.12	33	47	9	2	4.7
SOIL 6.4	18	24	6	1566	219	12	0.57	6.7	6.7	0.33	6.4	0.9	0.31	17	56	11	4	4.7

SOIL 7.1 - REF	0	6	6	773	128	11	0.24	3.9	5.3	0.32	8.5	2.5	1.11	6	20	6	1	2.8
SOIL 7.2 - REF	6	12	6	594	97	12	0.18	4.9	5.1	0.48	13.7	2.7	0.28	5	7	2	3	3.7
SOIL 7.3 - REF	12	18	6	726	119	9	0.16	4.1	4.4	0.47	15	2.1	0.22	2	8	3	3	2
SOIL 7.4 - REF	18	24	6	1383	285	9	0.28	4.4	4.3	0.37	13.4	1.5	0.26	5	17	5	3	3.6

ECMC Table 915-1 2

SOIL REPORT

Terms Defined

pH	A measure of the acidity or basicity (alkalinity) of a soil. pH is defined as the negative logarithm (base 10) of the activity of hydronium ion in a solution
ECe	The Electrical Conductivity of a saturated soil Extract that measures salinity
Alkalinity	Alkalinity indicates a solution's power to react with acid and buffer its pH - the power to keep its pH from changing. The higher the Alkanility, the higher the buffering capacity against pH change.
CEC - Cation Exchange Capacity	The measure of how many cations can be retained on soil particle surfaces.
CEC Ranges	
Range 11-50	High Clay, more lime to correct a given pH, greater capacity to hold nutrients, physical effects of high clay content, high water-holding capacity
Range 1-10	High Sand, Nitrogen and potassium leaching, less lime to correct a given pH, physical effects of high sand content, low water-holding capacity

Optimal pH range for plant growth
6.0 -7.0

Typical Soil Concentrations sufficient for plant growth

Element	Symbol	mg/kg ppm	percent	Relative number of atoms	Notes
Nitrogen	N	15,000	1.5	1,000,000	
Potassium	K	10,000	1	250,000	
Calcium	Ca	5,000	0.5	125,000	Root Formation
Magnesium	Mg	2,000	0.2	80,000	Chlorophyll Formation
Phosphorus	P	2,000	0.2	60,000	
Sulfur	S	1,000	0.1	30,000	Proteins & NPK Uptake
Chlorine	Cl	100	--	3,000	
Iron	Fe	100	--	2,000	Chlorophyll catalyst
Boron	B	20	--	2,000	Absorption Calcium
Manganese	Mn	50	--	1,000	
Zinc	Zn	20	--	300	
Copper	Cu	6	--	100	Photosynthesis & Respiration - correlated with %OM
Molybdenum	Mo	0.1	--	1	Fixation of Organic Nitrogen
Nickel	Ni	0.1	--	1	

Source: E.Epstein, 1965

Reference Key
Low
Medium
High

Optimal
Neutral
No Reference

Analytical Error