HF Sinclair

REVIEWED
By Mike Buchanan at 4:06 pm, Nov 20, 2024

October 28, 2024

Mr. Gerry Razatos, Director (Acting)
Oil Conservation Division
New Mexico Energy, Minerals and Natural Resources Department
1220 S. Saint Francis Drive
Santa Fe, New Mexico 87505

Re: Stage 2 Abatement Plan (AP) for the Former Reverse Osmosis (RO) Reject Discharge Fields at the HF Sinclair Navajo Refining LLC (HFNSR)
Quarterly Status Report #1 – July to September 2024
Incident #nRM2022559242, GW-028

Dear Mr. Razatos:

HF Sinclair Navajo Refining LLC (HFSNR) is submitting this first quarterly status report for the Stage 2 Abatement Plan (AP) for the Former Reverse Osmosis (RO) Reject Discharge Fields (RO Fields) at the HF Sinclair Navajo Refining LLC (HFSNR) Refinery (Refinery) located in Artesia, New Mexico (**Figure 1**). The Oil Conservation Division (OCD) approved the Stage 2 AP on July 11, 2024. The former RO Fields are located within the norther portion of the active Refinery (**Figure 2**).

This quarterly status covers the period of July to September 2024.

Work Performed During July to September 2024

July 2024:

- July 19: Public notice of the Stage 2 AP was sent to the following agencies in hard copy format via certified mail: New Mexico Office of the State Engineer (OSE), New Mexico State Land Office, New Mexico Bureau of Land Management, New Mexico Office of Natural Resources Trustee, the City of Artesia, and the Eddy County Commission.
- July 22: Public notice of the Stage 2 AP was published in the Artesia Daily Press (state-wide newspaper).
- July 25: Public notice of the Stage 2 AP was published in the Artesia Daily Press (local newspaper).
- July 26: HFSNR submitted letter showing proof of public notice of the Stage 2 AP was published within 15 days of receipt of the July 11, 2024 OCD approval letter.
- July 29 and 30: HFSNR contractors performed subsurface clearance of locations for two new monitoring wells and three soil borings each within the two former RO Fields using hydro-excavation.

August 2024:

- August 1: HFSNR submitted responses required by the July 11, 2024 OCD approval of the Stage 2 AP.
- August 2: OSE sent approval of the permit to drill two wells (MW-162 and MW-163) for nonconsumptive purposes.
- August 5: HFSNR was notified by the New Mexico Gas Company (NMGC) of a planned project to install a new 6" gas pipeline that will cross the North RO field in an east-west direction. NMGC stated the planned installation project is scheduled to occur during the first quarter of 2025.
- August 12 to 15: HFSNR contractors performed the following tasks according to the Stage 2 AP:
    - Installed and developed two monitoring wells – MW-162 east of the South RO Field and MW-163 northeast of the North RO Field, at the locations shown in **Figure 3** (well completion logs are provided in **Attachment A**);
    - Collected composite soil samples from each of the two RO Fields for agronomic characteristic analyses, from the locations shown in **Figure 4**;
    - Installed one set of moisture probes in each of the two RO Fields, at locations RO-SB-N01 and RO-SB-S02 (**Figure 4**); and
    - Collected a sample from an existing well completed in the Artesian aquifer, the Mulcock well which is located west of the North RO Field, as the potential source for future irrigation water.

September 2024:

- September 9: HFSNR's contractor received the laboratory analytical reports for the soil agronomic samples. A summary table of the soil analytical data is provided in **Attachment B**.
- September 10: HFSNR sent request to OCD via email to proceed with seed bed preparation prior to determination of potential fertilizer needs.
- September 11: OCD responded to the September 10 email approving the request to proceed with seed bed preparation.
- September 13: HFSNR's contractor received the laboratory analytical report for the Mulcock well sample. A summary table of the well sample analytical data is provided in **Attachment C**.
- September 17: HFSNR's contractors surveyed the locations of the soil borings and two new monitoring wells. A copy of the surveyor's report is provided in **Attachment D**. **Figure 3** shows the locations of the new monitoring wells along with previously installed monitoring wells that are associated with the former RO fields and **Figure 4** shows the locations of the soil borings.
- September 18: HFSNR's contractor began identifying subsurface pipelines present beneath the fields to identify potential areas where tilling depths may be limited or not allowed. The

pipelines were marked and limitations were discussed with the pipeline owners, who requested positive location and determination of depths in order to determine appropriate setbacks and tilling limitations.

- September 25: Following a phone conversation with OCD regarding the field preparation schedule, HFSNR submitted a letter requesting an extension to implement the phytoremediation phase of the Stage 2 AP until the spring of 2025. The request was approved October 16, 2024. Evaluation of irrigation systems will continue in the interim.

Work Planned for October to December 2024

- Semiannual groundwater monitoring will be conducted according to the facility-wide groundwater monitoring plan, and will include collection of groundwater samples required by the Stage 2 AP.
- Evaluation of irrigation systems to be used following field preparation and planting.
- Evaluation of irrigation water needs and related update of the OSE water rights permit to allow use of the Mulcock well as a source for irrigation water.
- Confirmation of pipeline locations and depths within both the North and South RO Fields and determination of any areas where plowing and planting may not be allowed by the pipeline owners.

If you have any questions, please feel free to contact Teresa Alba at 575-746-5391 or Mike Holder at 575-308-1115.

Sincerely,

Case Hinkins
Environmental Manager
HF Sinclair Navajo Refining LLC

c: OCD: M. Buchanan
HFSNR: M. Holder, T. Alba

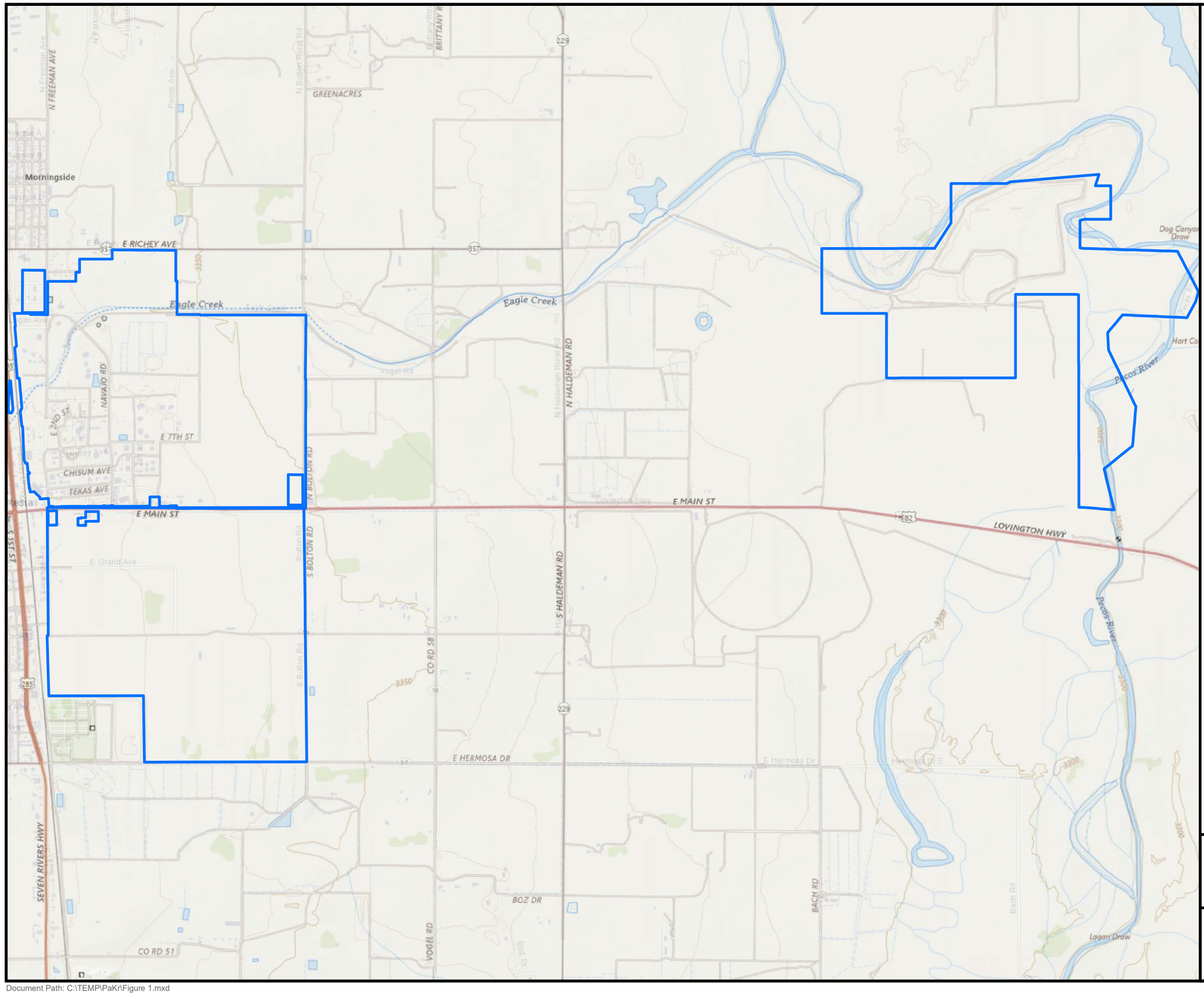
Review of the Quarterly Status Report for the ST2 AP at the Former RO Discharge Fields at the HF SInclair Navajo Refining LLC, July to September 2024.: content satisfactory
1. Proceed with plans to conduct semi-annual groundwater monitoring, facility-wide
2. Evaluate irrigation water needs and related update of the OSE water rights permit to allow Mulcock well use.
3. Confirm pipeline locations and depths within both North and South RO fields so as to prevent damage.
4. Submit the next quarterly update as scheduled in February 2025.

Figures

Attachments:

A – Well Logs
B – Summary of Soil Sample Analytical Data and Laboratory Report
C – Summary of Mulcock Well Sample Analytical Data and Laboratory Report
D – Surveyor's Report

FIGURES



Legend

Property Boundary

N
W E
S

0 1,000 2,000

Approximate Scale in Feet

Source: USGS 7.5 Minute Series, Artesia and Spring Lake, New Mexico, 2019.

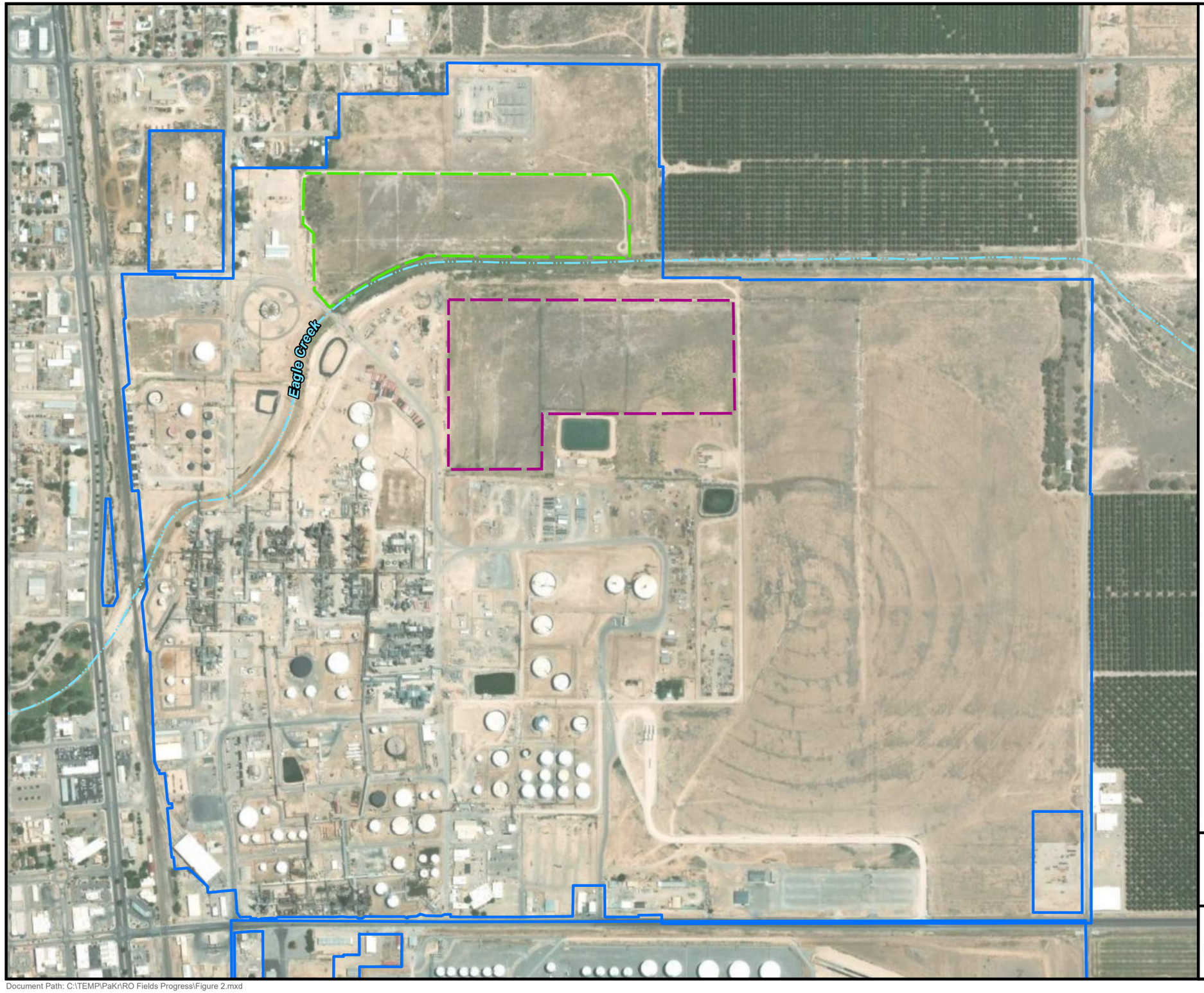
SITE LOCATION
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

HF Sinclair

Tetra Tech, Inc. Project # 212C-HN-02768

FIGURE 1

Document Path: C:\TEMP\PaKr\Figure 1.mxd



Legend

- Property Boundary
- North RO Reject Field
- South RO Reject Field
- Eagle Creek

N
W E
S

0 300 600

Approximate Scale in Feet

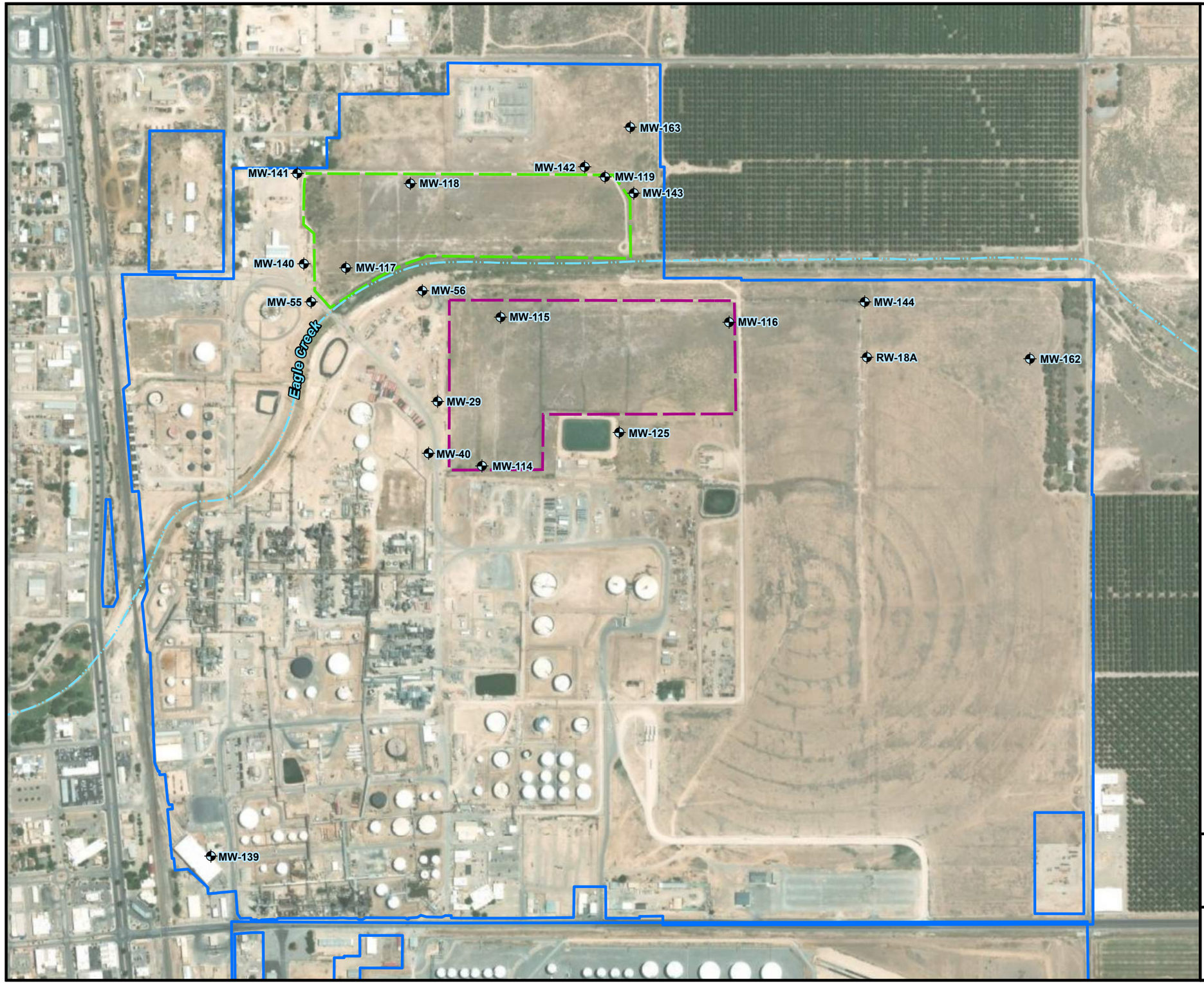
LOCATION OF FORMER RO REJECT DISCHARGE FIELDS
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

HF Sinclair

Tetra Tech, Inc. Project # 212C-HN-03079

FIGURE 2

Document Path: C:\TEMP\PaKr\RO Fields Progress\Figure 2.mxd



Legend

- Property Boundary
- North RO Reject Field
- South RO Reject Field
- Eagle Creek
- Monitoring Well

N
W E
S

0 300 600

Approximate Scale in Feet

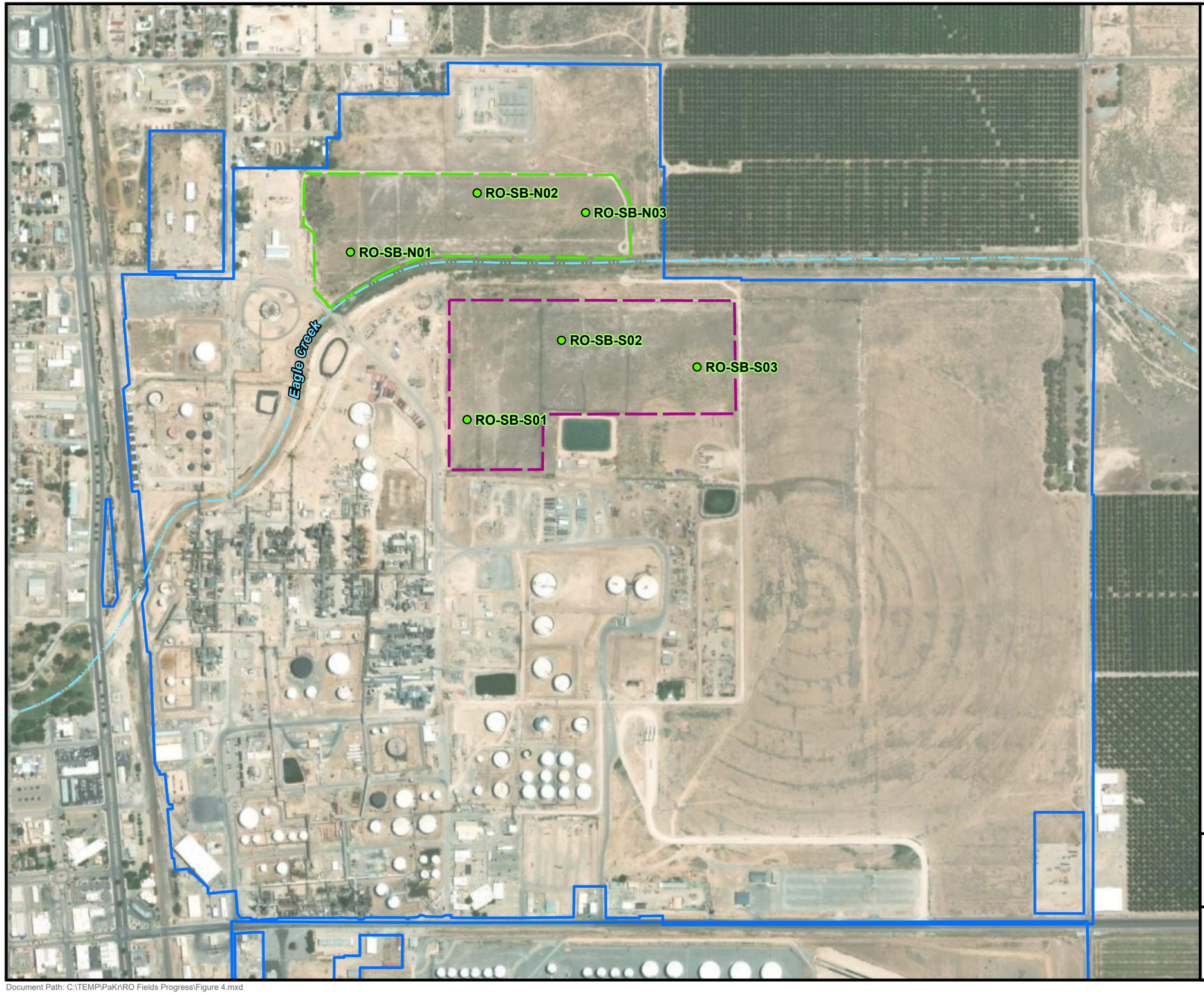
MONITORING WELLS ASSOCIATED WITH FORMER RO REJECT DISCHARGE FIELDS HF SINCLAIR NAVAJO REFINING LLC ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

HF Sinclair

Tetra Tech, Inc. Project # 212C-HN-03079

FIGURE 3

Document Path: C:\TEMP\PaKr\RO Fields Progress\Figure 3.mxd



Legend

- Property Boundary
- North RO Reject Field
- South RO Reject Field
- Eagle Creek
- Soil Boring

N
W E
S

0 300 600

Approximate Scale in Feet

SOIL BORING LOCATIONS
HF SINCLAIR NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

HF Sinclair

Tetra Tech, Inc. Project # 212C-HN-03079

FIGURE 4

Document Path: C:\TEMP\PaKr\RO Fields Progress\Figure 4.mxd

ATTACHMENT A – WELL LOGS

TETRA TECH

Boring Log MW-162

PROJECT NUMBER 212C-HN-02959
PROJECT NAME HF Sinclair - RO Stage 2
CLIENT HF Sinclair
ADDRESS 501 East Main Street, Artesia, NM
DRILLER Envirotech Drilling Services; Mario Moya and Crew

DRILLING DATES 8/12/24
TOTAL DEPTH 30 ft.
BOREHOLE DIAMETER 8 in.
CASING 0-10' bgs
SCREEN 10-30' bgs

COORDINATES 527191.92 E, 673741.66 N
COORD SYS New Mexico State Plane East NAD 83 (2011)
SURFACE ELEVATION 3342.09'
WELL TOC 3345.10'
DEPTH TO WATER (ft. bgs) 16.38; 9/17/24

SURFACE COMPLETION Stickup, locking outer shroud with concrete pad and bollards

LOGGED BY Jorge Fernandez Velo
CHECKED BY Pam Krueger

Depth (ft)	PID	Water	% Recovery	Graphic Log	Material Description	USCS	Well Diagram	Additional Observations
0					SILTY CLAY, Brown, soft, medium to high plasticity, dry	CL	concrete cement grout (0-6' bgs)	
4	0				CLAY, Brown, soft, high plasticity, dry			
6					CLAY LOAM, Light Brown, soft, high plasticity, moist		bentonite (6'-8' bgs)	Calcium carbonate nodules
8								
10	0				SILTY CLAY, Light Brown, soft, high plasticity, moist			
12								
14	0							
16		▽			SILTY CLAY, Dark Brown, very dense, high plasticity, moist			
18					CLAY LOAM, Light Brown, very dense, high plasticity, moist		fine grained sand (8'-30' bgs)	Calcium carbonate nodules
20	0				LOAM, Dark Brown, medium density, medium plasticity, moist			
22					SILTY CLAY, Dark Brown, very dense, high plasticity, moist			Calcium carbonate nodules
24	0							
26					SILTY CLAY, Brown to Light Brown, very dense, high plasticity, moist			
28					CLAY, Light Brown, very dense, high plasticity, moist			Calcium carbonate nodules
30	0				Termination Depth at: 30 ft		2 in. PVC Endcap (29.75'-30' bgs)	

Disclaimer This well log is intended for environmental purposes and should not be used separate from the original report. Produced by EQuIS Professional on 27 Sep 2024

TETRA TECH

Boring Log MW-163

PROJECT NUMBER 212C-HN-02959
PROJECT NAME HF Sinclair - RO Stage 2
CLIENT HF Sinclair
ADDRESS 501 East Main Street, Artesia, NM
DRILLER Envirotech Drilling Services; Mario Moya and Crew

DRILLING DATES 8/12/24
TOTAL DEPTH 30 ft.
BOREHOLE DIAMETER 8 in.
CASING 0-10' bgs
SCREEN 10-30' bgs

COORDINATES 524731.40 E, 675165.74 N
COORD SYS New Mexico State Plane East NAD 83 (2011)
SURFACE ELEVATION 3352.25'
WELL TOC 3355.05'
DEPTH TO WATER (ft. bgs) 17.85; 9/17/24

SURFACE COMPLETION Stickup, locking outer shroud with concrete pad and bollards

LOGGED BY Jorge Fernandez Velo
CHECKED BY Pam Krueger

Depth (ft)	PID	Water	% Recovery	Graphic Log	Material Description	USCS	Well Diagram	Additional Observations
0	4.0				CLAY LOAM, Light Brown to Brown, soft, low plasticity, dry	CL	concrete cement grout (0-6' bgs)	Calcium carbonate nodules
2	3.6							
	3.2							
	1.8				CLAY LOAM, White, soft, low plasticity, dry			
4	3.1							
	2.5							
6	2.4						bentonite (6'-8' bgs)	
	2.6				CLAY LOAM, Light Red, soft, low plasticity, moist			
8	2.0				CLAY LOAM, Light Brown, medium density, medium plasticity, moist			Calcium carbonate nodules with 1/4 and 1/2 inch rocks
	2.2				SANDY CLAY, Light Brown to Brown, medium density, low to medium plasticity, moist			
10	1.9							Calcium carbonate nodules
	2.0				CLAY LOAM, Light Brown, very dense, high plasticity, moist			
12	1.9				CLAY LOAM, Light Brown to Brown, medium density, medium plasticity, moist			
	1.3							
14	1.7							
	1.3							
16	1.5							
	1.5	▽						
18	1.4						fine grained sand (8'-30' bgs)	
	0.8							
20	1.1				CLAY, White, medium density, high plasticity, wet			
	1.4				CLAY LOAM, White, dense, high plasticity, wet			
22	1.5							
	1.4							
24	1.3				CLAY, White, dense, high plasticity, wet			
	1.2				CLAY, Light Gray, very stiff, high plasticity, wet			
26	1.2							
	1.1							
28	1.1							
	1.2							
30					Termination Depth at: 30 ft		2 in. PVC Endcap (29.75'-30' bgs)	

Disclaimer This well log is intended for environmental purposes and should not be used separate from the original report. Produced by EQuIS Professional on 27 Sep 2024

ATTACHMENT B – SUMMARY OF SOIL SAMPLE ANALYTICAL DATA AND LABORATORY REPORTS

Attachment B1 - Soil Analytical Data

Former Reverse Osmosis Reject Discharge Fields

HF Sinclair Navajo Refining LLC - Artesia, New Mexico

Sample ID:		North RO 0-1	North RO 1-2	North RO 2-4	South RO 0-1	South RO 1-2	South RO 2-4
Sample Type:		Composite	Composite	Composite	Composite	Composite	Composite
Depth (ft bgs):		0 - 1	1 - 2	2 - 4	0 - 1	1 - 2	2 - 4
Date Collected:		8/14/2024	8/14/2024	8/14/2024	8/14/2024	8/14/2024	8/14/2024
Organic Matter LOI	%	3.2	3	2.2	2.4	1.9	1.7
Mehlich Aluminum	ppm	49	16	28	162	170	21
pH	s.u.	7.6	7.5	7.6	7.7	7.7	7.7
Electrical Conductivity	dS/m	3.85	4.17	4.02	5.48	5.3	4.33
Saturation	%	55.6	62	56.1	58.7	61.6	52.6
Calcium PE	meq/L	30.8	31.4	26.8	29.1	28	25.5
Magnesium PE	meq/L	15.2	19.3	18.4	22.5	24.5	18.6
Potassium PE	meq/L	0.5	0.6	0.4	0.9	0.7	0.6
Sodium PE	meq/L	12	15	16	32	29	22
Chloride PE	meq/L	11.1	14	13.9	27	26.4	19.9
Sulfate PE	meq/L	36.3	43.4	42.1	51.6	51.1	40.9
Chloride PE	mg/kg	218	307	276	561	576	371
Sulfate PE	mg/kg	968	1370	1130	1460	1510	1030
Nitrate	ppm	105	74.6	50.2	75.7	58.8	54.3
Ammonia	ppm	12	12	10	9	8	8
CEC	meq/100g	25	21	20	26	23	21
Available Calcium	meq/100g	112	145	97.9	40	44.3	45.3
Exchangeable Calcium	meq/100g	110	143	96.4	38.3	42.6	44
Available Magnesium	meq/100g	<9.99	<9.99	<9.99	10.7	12.1	<9.99
Exchangeable Magnesium	meq/100g	8.9	7.31	8.15	9.38	10.6	7.33
Available Potassium	meq/100g	1.51	1.16	1.11	1.59	1.47	1.06
Exchangeable Potassium	meq/100g	1.48	1.13	1.08	1.54	1.43	1.03
Available Sodium	meq/100g	1.79	1.87	2.09	3.91	3.83	2.44
Exchangeable Sodium	meq/100g	1.13	0.93	1.22	2.01	2.07	1.3
DTPA Boron	ppm	0.36	0.53	0.68	0.95	0.91	1.1
DTPA Copper	ppm	1.61	1.12	1.01	2.52	2.15	1.53
DTPA Iron	ppm	8.03	8.75	8.48	12.2	11	10.7
DTPA Manganese	ppm	5.1	5.37	4.58	7.29	5.58	4.28
DTPA Zinc	ppm	2.37	2.03	1.51	5.9	2.05	1.64
Boron	ppm	0.8	0.9	1.5	1.4	1.2	1.1
Phosphorus	ppm	30	37	20	30	20	19
Chloride (total)	mg/kg	220	150	259	512	507	372

Note:

Each sample is a composite of the soil collected from the stated depth interval from 3 locations within the specific field, eg: North RO 0-1 is a composite of the soil collected from 0 to 1 ft bgs at RO-SB-N01, RO-SB-N02, and RO-SB-N03.

Definitions:

%	percent
CEC	Cation Exchange Capacity
dS/m	decisiemens per meter (millimho per centimeter)
DTPA	Diethylenetriaminepentaacetic acid
ft bgs	feet below ground surface
LOI	lost on ignition
meq/100 g	milliequivalents per 100 grams
meq/L	milliequivalents per Liter
mg/kg	milligram per kilogram
PE	Saturated Paste Extract
ppm	part per million
s.u.	standard units

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Date: 9/9/2024

CLIENT: Pace Wyoming
Project: HFSNR RO Fields - Phase 1
Lab Order: S2408306

CASE NARRATIVE

Report ID: S2408306001

Entire Report Reviewed by: Crystal Herman

Crystal Herman, Mining Supervisor

Samples North RO 0-1, North RO 1-2, North RO 2-4, South RO 0-1, South RO 1-2 and South RO 2-4 were received on August 16, 2024.

Samples were analyzed using the methods outlined in the following references:

U.S.E.P.A. 600/2-78-054 "Field and Laboratory Methods Applicable to Overburden and Mining Soils", 1978
American Society of Agronomy, Number 9, Part 2, 1982
USDA Handbook 60 "Diagnosis and Improvement of Saline and Alkali Soils", 1969
Wyoming Department of Environmental Quality, Land Quality Division, Guideline No. 1, 1984
New Mexico Overburden and Soils Inventory and Handling Guideline, March 1987
State of Utah, Division of Oil, Gas, and Mining: Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining, April 1988
Montana Department of State Lands, Reclamation Division: Soil, Overburden, and Regraded Spoil Guidelines, August 1998
State of Nevada Modified Sobek Procedure
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition

All Quality Control parameters met the acceptance criteria defined by EPA and Pace Analytical (Formerly Inter-Mountain Laboratories) except as indicated in this case narrative.

Qualifiers by sample

2022 QC - DTPA Metals by ICP/Boron - Spike Recovery outside accepted recovery limits
Plano QC - DTPA Metals by ICP/Iron - Spike Recovery outside accepted recovery limits
QC SOIL LCS - Nitrogen - Soil/Nitrogen-Nitrate - Spike Recovery outside accepted recovery limits
S2408306-006 - Saturated Paste Anions/Chloride - Report limit raised due to dilution
S2408306-006 - Saturated Paste Anions/Sulfate - Report limit raised due to dilution

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Date: 9/9/2024

Definitions

RL	Reporting Limit

Qualifiers

*	Value exceeds Maximum Contaminant Level
A	Check MSA specifications
B	Analyte detected in the associated Method Blank
C	Calculated Value
D	Report limit raised due to dilution
E	Value above quantitation range
G	Analyzed at Pace Gillette, WY laboratory
H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits
L	Analyzed by another laboratory
M	Value exceeds Monthly Ave or MCL or is less than LCL
N	Sample analyzed outside of compliance requirements
ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions
P	Sample preserved in lab at time of receipt
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
U	Analyte below method detection limit
X	Matrix Effect

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Soil Analysis Report

Pace Wyoming

Sheridan, WY 82801

Report ID: S2408306001

Project: HFSNR RO Fields - Phase 1

Date Received: 8/16/2024

Date Reported: 9/9/2024

Work Order: S2408306

Lab ID	Sample ID	Organic Matter LOI %	Mehlich Aluminum ppm	pH s.u.	Electrical Conductivity dS/m	Saturation %	Calcium PE meq/L	Magnesium PE meq/L	Potassium PE meq/L	Sodium PE meq/L
S2408306-001	North RO 0-1	3.2	49	7.6	3.85	55.6	30.8	15.2	0.5	12
S2408306-002	North RO 1-2	3.0	16	7.5	4.17	62.0	31.4	19.3	0.6	15
S2408306-003	North RO 2-4	2.2	28	7.6	4.02	56.1	26.8	18.4	0.4	16
S2408306-004	South RO 0-1	2.4	162	7.7	5.48	58.7	29.1	22.5	0.9	32
S2408306-005	South RO 1-2	1.9	170	7.7	5.30	61.6	28.0	24.5	0.7	29
S2408306-006	South RO 2-4	1.7	21	7.7	4.33	52.6	25.5	18.6	0.6	22

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, TOC=Total Organic Carbon

Reviewed by: Crystal Herman

Crystal Herman, Mining Supervisor

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Soil Analysis Report

Pace Wyoming

Sheridan, WY 82801

Report ID: S2408306001

Project: HFSNR RO Fields - Phase 1

Date Reported: 9/9/2024

Date Received: 8/16/2024

Work Order: S2408306

Lab ID	Sample ID	Chloride PE meq/L	Sulfate PE meq/L	Chloride PE mg/kg	Sulfate PE mg/kg	Nitrate ppm	Ammonia ppm
S2408306-001	North RO 0-1	11.1	36.3	218	968	106	12
S2408306-002	North RO 1-2	14.0	43.4	307	1370	75.1	12
S2408306-003	North RO 2-4	13.9	42.1	276	1130	50.7	10
S2408306-004	South RO 0-1	27.0	51.6	561	1460	76.2	9
S2408306-005	South RO 1-2	26.4	51.1	576	1510	59.2	8
S2408306-006	South RO 2-4	19.9	40.9	371	1030	54.8	8

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, TOC=Total Organic Carbon

Reviewed by: Crystal Herman

Crystal Herman, Mining Supervisor

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Soil Analysis Report

Pace Wyoming

Sheridan, WY 82801

Report ID: S2408306001

Project: HFSNR RO Fields - Phase 1

Date Reported: 9/9/2024

Date Received: 8/16/2024

Work Order: S2408306

Lab ID	Sample ID	CEC	Available Calcium	Exchangeable Calcium	Available Magnesium	Exchangeable Magnesium	Available Potassium	Exchangeable Potassium	Available Sodium	Exchangeable Sodium
		meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g
S2408306-001	North RO 0-1	25	112	110	<9.99	8.90	1.51	1.48	1.79	1.13
S2408306-002	North RO 1-2	21	145	143	<9.99	7.31	1.16	1.13	1.87	0.93
S2408306-003	North RO 2-4	20	97.9	96.4	<9.99	8.15	1.11	1.08	2.09	1.22
S2408306-004	South RO 0-1	26	40.0	38.3	10.7	9.38	1.59	1.54	3.91	2.01
S2408306-005	South RO 1-2	23	44.3	42.6	12.1	10.6	1.47	1.43	3.83	2.07
S2408306-006	South RO 2-4	21	45.3	44.0	<9.99	7.33	1.06	1.03	2.44	1.30

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, TOC=Total Organic Carbon

Reviewed by: Crystal Herman

Crystal Herman, Mining Supervisor

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Soil Analysis Report

Pace Wyoming

Sheridan, WY 82801

Report ID: S2408306001

Project: HFSNR RO Fields - Phase 1

Date Received: 8/16/2024

Date Reported: 9/9/2024

Work Order: S2408306

Lab ID	Sample ID	DTPA Boron ppm	DTPA Copper ppm	DTPA Iron ppm	DTPA Manganese ppm	DTPA Zinc ppm	Boron ppm	Phosphorus ppm
S2408306-001	North RO 0-1	0.36	1.61	8.03	5.10	2.37	0.8	30
S2408306-002	North RO 1-2	0.53	1.12	8.75	5.37	2.03	0.9	37
S2408306-003	North RO 2-4	0.68	1.01	8.48	4.58	1.51	1.5	20
S2408306-004	South RO 0-1	0.95	2.52	12.2	7.29	5.90	1.4	30
S2408306-005	South RO 1-2	0.91	2.15	11.0	5.58	2.05	1.2	20
S2408306-006	South RO 2-4	1.10	1.53	10.7	4.28	1.64	1.1	19

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, TOC=Total Organic Carbon

Reviewed by: Crystal Herman

Crystal Herman, Mining Supervisor

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

ANALYTICAL QC SUMMARY REPORT

CLIENT: Pace Wyoming **Date:** 9/9/2024
Work Order: S2408306 **Report ID:** S2408306001
Project: HFSNR RO Fields - Phase 1

Available Metals - meq Sample Type **MBLK** Units: meq/100g

AVA BLK (08/19/24 21:39) RunNo: 223537

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Available Calcium	ND	35.8					
Available Magnesium	ND	9.99					
Available Potassium	ND	0.42					
Available Sodium	ND	1.54					

Available Metals - meq Sample Type **LCS** Units: meq/100g

AVA 2022 QC (08/19/24 21:37) RunNo: 223537

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Available Calcium	45.4	35.8	42		108	75 - 125	
Available Magnesium	ND	9.99	5.44		91.6	75 - 125	
Available Potassium	0.89	0.42	0.94		94.6	75 - 125	
Available Sodium	3.94	1.54	4.05		97.2	70 - 130	

Available Metals - meq Sample Type **DUP** Units: meq/100g

S2408306-006AD (08/19/24 21:35) RunNo: 223537

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Available Calcium	44.3	35.8	45.3	2.28		20	
Available Magnesium	ND	9.99	ND			20	
Available Potassium	1.02	0.42	1.06	3.71		20	
Available Sodium	2.29	1.54	2.44	6.40		20	

Calcium Chloride Boron/Selenium Sample Type **MBLK** Units: ppm

CACL BLK (08/19/24 20:51) RunNo: 223535

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Boron	ND	0.1					

Calcium Chloride Boron/Selenium Sample Type **LCS** Units: ppm

CACL QC (08/19/24 20:48) RunNo: 223535

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Boron	3.7	0.1	3.18		117	50 - 150	

Calcium Chloride Boron/Selenium Sample Type **DUP** Units: ppm

S2408306-006AD (08/19/24 20:46) RunNo: 223535

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Boron	1.2	0.1	1.1	5.72		62.9	

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ANALYTICAL QC SUMMARY REPORT

CLIENT: Pace Wyoming **Date:** 9/9/2024
Work Order: S2408306 **Report ID:** S2408306001
Project: HFSNR RO Fields - Phase 1

Cation Exchange Capacity Sample Type **MBLK** Units: meq/100g

CEC BLK (08/22/24 17:00)	RunNo: 223678						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Cation Exchange Capacity	ND	2					

Cation Exchange Capacity Sample Type **LCS** Units: meq/100g

PLANO QC (08/22/24 16:53)	RunNo: 223678						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Cation Exchange Capacity	20	2	21.2		92.8	70 - 130	

Cation Exchange Capacity Sample Type **DUP** Units: meq/100g

S2408306-001AD (08/22/24 16:20)	RunNo: 223678						
Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Cation Exchange Capacity	25	2	25	2.72		20	

DTPA Metals by ICP Sample Type **MBLK** Units: ppm

DTPA BLK (08/19/24 22:53)	RunNo: 223541						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Boron	ND	0.44					
Copper	ND	0.44					
Iron	ND	1.76					
Manganese	ND	0.44					
Zinc	ND	0.44					

DTPA Metals by ICP Sample Type **LCS** Units: ppm

2022 QC (08/19/24 22:48)	RunNo: 223541						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Boron	3.18	0.44	5.11		62.2	80 - 120	S

PLANO QC (08/19/24 22:50)	RunNo: 223541						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Copper	2.37	0.44	2.14		111	80 - 120	
Iron	131	1.76	171		76.5	80 - 120	S
Manganese	335	0.44	351		95.4	80 - 120	
Zinc	8.09	0.44	7.24		112	80 - 120	

DTPA Metals by ICP Sample Type **DUP** Units: ppm

S2408306-006AD (08/19/24 22:46)	RunNo: 223541						
Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Boron	0.93	0.05	1.10	17.3		0	
Copper	1.57	0.05	1.53	2.34		20	
Iron	10.2	0.05	10.7	4.87		20	
Manganese	4.13	0.05	4.28	3.45		20	
Zinc	1.64	0.05	1.64	0.0489		20	

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1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

ANALYTICAL QC SUMMARY REPORT

CLIENT: Pace Wyoming
Work Order: S2408306
Project: HFSNR RO Fields - Phase 1

Date: 9/9/2024
Report ID: S2408306001

Electrical Conductivity - Soil Sample Type **LCS** Units: dS/m

CONTROL (08/21/24 10:19) RunNo: 223613

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Electrical Conductivity	0.55	0.01	0.67		82.1	80 - 120	

Electrical Conductivity - Soil Sample Type **DUP** Units: dS/m

S2408306-006A (08/21/24 10:16) RunNo: 223613

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Electrical Conductivity	4.64	0.01	4.33	6.93		20	

Nitrogen - Soil Sample Type **MBLK** Units: ppm

SOIL BLANK (08/29/24 11:20) RunNo: 223864

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Nitrogen-Nitrate	0.5	0.1					

NH3_SOILS_MBLK (08/29/24 13:58) RunNo: 223885

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Nitrogen-Ammonia	12	1					

Nitrogen - Soil Sample Type **LCS** Units: ppm

QC SOIL LCS (08/29/24 11:18) RunNo: 223864

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Nitrogen-Nitrate	13.0	0.1	7.5		173	70 - 130	S

NH3_SOILS_LCS (08/29/24 14:39) RunNo: 223885

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Nitrogen-Ammonia	83	1	69.3		119	70 - 130	

Nitrogen - Soil Sample Type **DUP** Units: ppm

S2408306-006AD (08/29/24 11:31) RunNo: 223864

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Nitrogen-Nitrate	54.4	0.1	54.3	0.258		20	

S2408306-006ADUP (08/29/24 14:11) RunNo: 223885

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Nitrogen-Ammonia	8	1	8	3.97		20	

Pace Analytical
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ANALYTICAL QC SUMMARY REPORT

CLIENT: Pace Wyoming **Date:** 9/9/2024
Work Order: S2408306 **Report ID:** S2408306001
Project: HFSNR RO Fields - Phase 1

ICP Metals - Mehlich Extraction Sample Type **MBLK** Units: ppm

MEILICH BLK (08/19/24 22:21)	RunNo: 223538						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Aluminum	ND	12.4					

ICP Metals - Mehlich Extraction Sample Type **LCS** Units: ppm

LCS CH (08/19/24 22:06)	RunNo: 223538						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Aluminum	653	1	793		82.3	80 - 120	

LCS CH (08/19/24 22:08)	RunNo: 223538						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Aluminum	651	1	793		82.1	80 - 120	

LCS CH (08/19/24 22:10)	RunNo: 223538						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Aluminum	641	1	793		80.9	80 - 120	

MEILICH QC (08/19/24 22:19)	RunNo: 223538						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Aluminum	690	12.4	793		87.0	80 - 120	

ICP Metals - Mehlich Extraction Sample Type **DUP** Units: ppm

S2408306-006AD (08/19/24 22:04)	RunNo: 223538						
Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Aluminum	30.6	12.4	20.6	39.0		0	

Sodium Bicarbonate Phosphorus Sample Type **LCS** Units: ppm

CONTROL (08/20/24 12:39)	RunNo: 223567						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Phosphorus	62	2	51.5		120	75 - 125	

Sodium Bicarbonate Phosphorus Sample Type **DUP** Units: ppm

S2408306-006A (08/20/24 12:38)	RunNo: 223567						
Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Phosphorus	17	2	19	13.2		20	

Organic Matter by Loss on Ignition Sample Type **LCS** Units: %

CONTROL (08/19/24 11:35)	RunNo: 223755						
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Organic Matter	2.4	0.1	3.11		76.4	75 - 125	

Organic Matter by Loss on Ignition Sample Type **DUP** Units: %

S2408306-006A (08/19/24 11:34)	RunNo: 223755						
Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Organic Matter	1.6	0.1	1.7	8.47		20	

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ANALYTICAL QC SUMMARY REPORT

CLIENT: Pace Wyoming **Date:** 9/9/2024
Work Order: S2408306 **Report ID:** S2408306001
Project: HFSNR RO Fields - Phase 1

pH-Soil Sample Type **LCS** Units: s.u.

CONTROL (08/21/24 11:35) RunNo: 223613

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
pH	6.3	0.1	6.7		93.9	90 - 110	

CONTROL (08/26/24 07:43) RunNo: 223754

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
pH	6.3	0.1	6.7		93.4	90 - 110	

pH-Soil Sample Type **DUP** Units: s.u.

S2408306-006A (08/21/24 11:32) RunNo: 223613

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
pH	7.7	0.1	7.7	0.388		20	

Saturated Paste Cations by EPA 200.7 Sample Type **MBLK** Units: meq/L

SAR BLK (08/22/24 15:07) RunNo: 223676

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Calcium	ND	0.11					
Magnesium	ND	0.2					
Potassium	ND	0.3					
Sodium	ND	1					

Saturated Paste Cations by EPA 200.7 Sample Type **LCS** Units: meq/L

SAR QC (08/22/24 15:04) RunNo: 223676

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Calcium	3.03	0.11	4.24		71.5	60 - 140	
Magnesium	2.0	0.2	2.61		77.1	60 - 140	
Potassium	0.5	0.3	0.56		90.6	70 - 130	
Sodium	ND	1	0.24		120	60 - 140	

Saturated Paste Cations by EPA 200.7 Sample Type **DUP** Units: meq/L

S2408306-006AD (08/22/24 15:02) RunNo: 223676

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Calcium	27.9	0.11	25.5	8.91		20	
Magnesium	20.2	0.2	18.6	8.49		20	
Potassium	0.6	0.3	0.6	7.76		20	
Sodium	24	1	22	8.21		20	

Saturated Paste Anions Sample Type **MBLK** Units: meq/L

SOIL BLANK (08/26/24 18:53) RunNo: 223895

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Chloride	ND	0.01					
Sulfate	ND	0.01					

Saturated Paste Anions Sample Type **DUP** Units: meq/L

S2408306-006AD (08/26/24 20:02) RunNo: 223895

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Chloride	21.2	2.02	19.9	6.42		20	D
Sulfate	41.7	2.02	40.9	1.93		20	D

Pace Analytical
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

ANALYTICAL QC SUMMARY REPORT

CLIENT: Pace Wyoming **Date:** 9/9/2024
Work Order: S2408306 **Report ID:** S2408306001
Project: HFSNR RO Fields - Phase 1

Saturated Paste Anions (ppm) Sample Type **MBLK** Units: ppm

SOIL BLANK (08/26/24 18:53) RunNo: 223895

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Chloride	ND	1					
Sulfate	ND	1					

Saturated Paste Anions (ppm) Sample Type **LCS** Units: ppm

SOIL QC (08/26/24 19:02) RunNo: 223895

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Chloride	9	1	7.11		120	50 - 150	
Sulfate	36	1	30.7		118	80 - 120	

Saturated Paste Anions (ppm) Sample Type **DUP** Units: mg/kg

S2408306-006AD (08/26/24 20:02) RunNo: 223895

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Chloride	385	8.69	371	3.53		20	D
Sulfate	1020	12.1	1030	0.972		20	D

Saturation Percent Sample Type **LCS** Units: %

CONTROL (08/21/24 08:32) RunNo: 223754

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Saturation Percent	54.7	0.1	54.2		101	80 - 120	

Saturation Percent Sample Type **DUP** Units: %

S2408306-006A (08/21/24 08:31) RunNo: 223754

Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
Saturation Percent	51.1	0.1	52.6	2.84		20	

Pace® Location Requested (City/State):
1673 Terra Avenue
Sheridan WY 82801
307-672-8945

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here

Scan QR Code for instructions

Company Name:	Tetra Tech	Contact/Report To:	Pam Krueger
Street Address:	1500 CityWest Blvd Houston, TX 77042	Phone #:	713-249-8548
		E-Mail:	pam.krueger@tetratech.com
		Cc E-Mail:	jorge.fernandezvelo@tetratech.com
Customer Project #:	212C-HN-02959, Task 100		
Project Name:	HFSNR RO Fields - Phase 1	Invoice To:	
		Invoice E-Mail:	
Site Collection Info/Facility ID (as applicable):	HFSNR Artesia Refinery, RO Fields	Purchase Order # (if applicable):	
		Quote #:	4093

Time Zone Collected: [ ] AK [ ] PT [X] MT [ ] CT [ ] ET

County / State origin of sample(s): Eddy County, NM

Data Deliverables: [X] Level II [ ] Level III [ ] Level IV [ ] EQUIS [ ] Other _____

Regulatory Program (DW, RCRA, etc.) as applicable: Reportable [ ] Yes [ ] No

Rush (Pre-approval required): [x] 5 Day [ ] 1 Day [ ] 2 Day [ ] 3 Day [ ] Other _____

DW PWSID # or WW Permit # as applicable:

Date Results Requested:

Field Filtered (if applicable): [ ] Yes [ ] No

Analysis:

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Waste Water (WW), Product (P), Soil/Solid (SS), Oil (OL), Wipe (WP), Tissue (TS), Bioassay (B), Vapor (V), Surface Water (SW),Sediment (SED), Sludge (SL), Caulk (CK), Leachate (LL), Biosolid (BS), Other (OT)

Specify Container Size **

Identify Container Preservative Type***

Analysis Requested

Customer Sample ID	Matrix *	Comp / Grab	Composite Start Date	Composite Start Time	Collected or Composite End Date	Collected or Composite End Time	# Cont.	Res. Chlorine Results	Res. Chlorine Units	Organic Matter (SSSA part3 p1004) pH (USDA 60-21a)	CEC (EPA 9081)	Nitrate (ASA9 33-2) Extractable P (ASA9 73-4 4)	Extractable/Available K, Ca, Mg, Na (USDA 60-18/200 7)	DPTA Zn, Mn, Fe, Co, B (ASA 19 3 3) Al (SSSA 5 part 3)	NH4+ (ASA 9 33-2) Paste Ca, Mg, Na SAR (USDA-2/200 7)	Paste SO4 (USDA 60-2/EPA 300) Paste Cl (USDA 60-2/EPA 300)	Paste B (CaCl extraction)	Paste EC (USDA 60-4)	Sat Paste Extraction (ASA9 62-1 3 2 1/USDA 60 2)	Sample Comment	Preservation non-conformance identified for sample:
North RO 0 1	SS	Comp	8-14-24	800	8-14-24	850				X	X	X	X	X	X	X	X	X	X		
North RO 1-2				900		930															
North RO 2-4				1000		1030															
South RO 0 1				1100		1130															
South RO 1-2				1200		1230															
South RO 2-4				1300		1330															

**Container Size: (1) 1L, (2) 500mL, (3) 250mL, (4) 125mL, (5) 100mL, (6) 40mL vial, (7) EnCore, (8) TerraCore, (9) 90mL, (10) Other

*** Preservative Types: (1) None, (2) HNO3, (3) H2SO4, (4) HCl, (5) NaOH, (6) Zn Acetate, (7) NaHSO4, (8) Sod. Thiosulfate, (9) Ascorbic Acid, (10) MeOH, (11) Other

Lab Use Only
Proj. Mgr:
AcctNum / Client ID:
Table #:
Profile / Template:
Prelog / Bottle Ord. ID:

Additional Instructions from Pace®:

Collected By:
(Printed Name)
Signature:

Customer Remarks / Special Conditions / Possible Hazards:

# Coolers:	Thermometer ID:	Correction Factor (°C):	Obs. Temp. (°C)	Corrected Temp. (°C)	On Ice:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Tracking Number:
Jorge Fernandez V	8-14-24 2020	Daniel Stapp PACE	8/16/24 0957	
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Delivered by: [ ] In- Person [ ] Courier
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	[ ] FedEX [ ] UPS [ ] Other
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Page: of

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace® Terms and Conditions found at https://www.pacelabs.com/resource-library/resource/pace-terms-and-conditions/

ENV-FRM-CORQ-0019_v02_110123 ©

ANALYTICAL REPORT

August 26, 2024

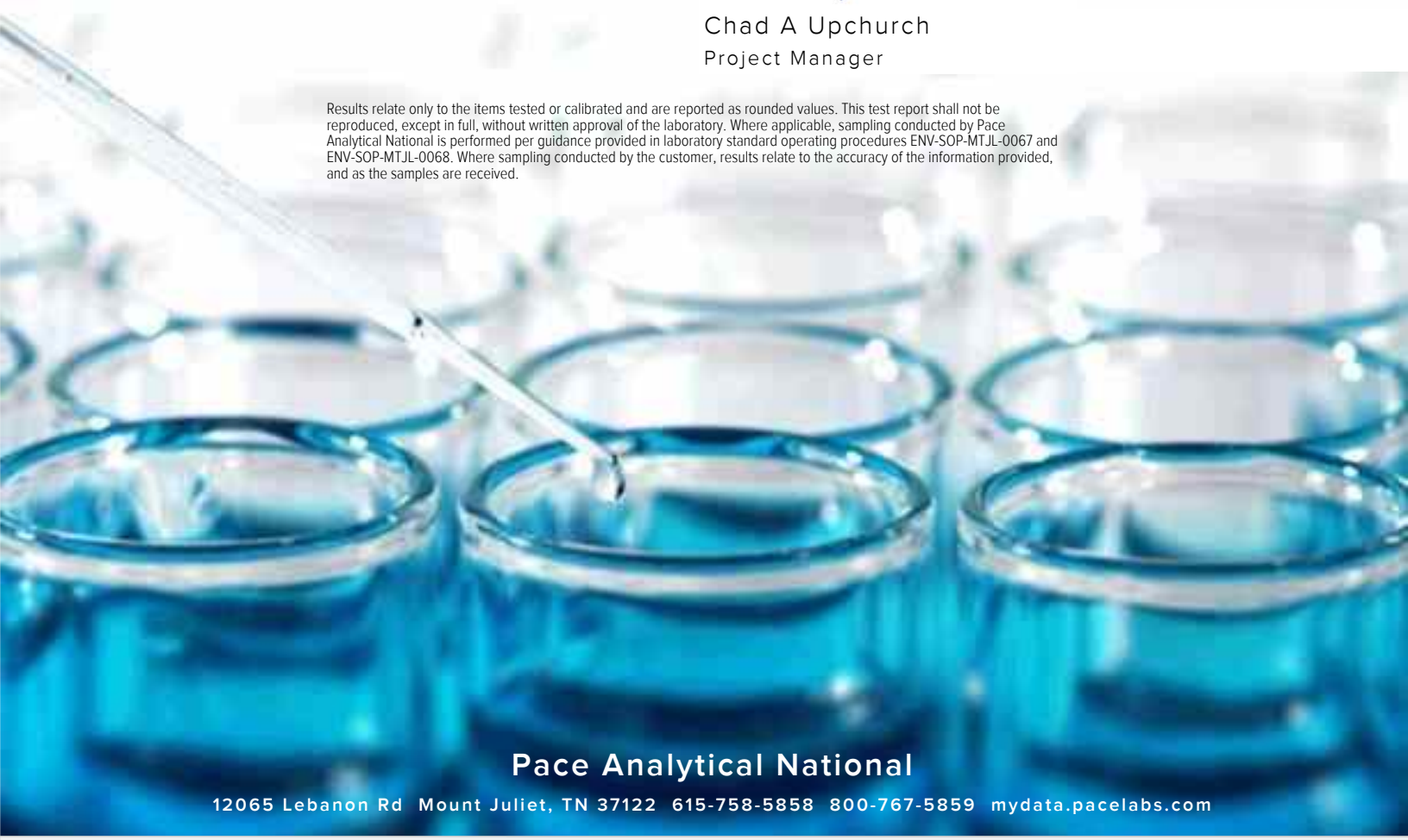
Tetra Tech EMI - Houston, TX

Sample Delivery Group:	L1768949
Samples Received:	08/17/2024
Project Number:	212C-HN-02959
Description:	

Report To: Pam Krueger
1500 CityWest Boulevard
Suite 1000
Houston, TX 77042

Entire Report Reviewed By:

Chad A Upchurch
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

TABLE OF CONTENTS

SAMPLE SUMMARY

NORTH RO 0-1 L1768949-01 Solid

			Collected by	Collected date/time	Received date/time	
				08/14/24 08:00	08/17/24 09:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG2347769	1	08/21/24 17:00	08/21/24 17:17	KDW	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2349281	1	08/24/24 00:06	08/24/24 03:12	JDG	Mt. Juliet, TN

NORTH RO 1-2 L1768949-02 Solid

			Collected by	Collected date/time	Received date/time	
				08/14/24 09:00	08/17/24 09:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG2347771	1	08/22/24 09:45	08/22/24 09:52	CMB	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2349281	1	08/24/24 00:06	08/24/24 04:24	JDG	Mt. Juliet, TN

NORTH RO 2-4 L1768949-03 Solid

			Collected by	Collected date/time	Received date/time	
				08/14/24 10:00	08/17/24 09:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG2347771	1	08/22/24 09:45	08/22/24 09:52	CMB	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2349281	1	08/24/24 00:06	08/24/24 04:42	JDG	Mt. Juliet, TN

SOUTH RO 0-1 L1768949-04 Solid

			Collected by	Collected date/time	Received date/time	
				08/14/24 11:00	08/17/24 09:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG2347771	1	08/22/24 09:45	08/22/24 09:52	CMB	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2349281	1	08/24/24 00:06	08/24/24 05:00	JDG	Mt. Juliet, TN

SOUTH RO 1-2 L1768949-05 Solid

			Collected by	Collected date/time	Received date/time	
				08/14/24 12:00	08/17/24 09:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG2347771	1	08/22/24 09:45	08/22/24 09:52	CMB	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2349281	1	08/24/24 00:06	08/24/24 05:18	JDG	Mt. Juliet, TN

SOUTH RO 2-4 L1768949-06 Solid

			Collected by	Collected date/time	Received date/time	
				08/14/24 13:00	08/17/24 09:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG2347771	1	08/22/24 09:45	08/22/24 09:52	CMB	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2349281	1	08/24/24 00:06	08/24/24 05:36	JDG	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chad A Upchurch
Project Manager

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	94.8		1	08/21/2024 17:17	WG2347769

Wet Chemistry by Method 9056A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	220		9.70	21.1	1	08/24/2024 03:12	WG2349281

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	71.6		1	08/22/2024 09:52	WG2347771

Wet Chemistry by Method 9056A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	150		12.8	27.9	1	08/24/2024 04:24	WG2349281

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	90.9		1	08/22/2024 09:52	WG2347771

Wet Chemistry by Method 9056A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	259		10.1	22.0	1	08/24/2024 04:42	WG2349281

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	93.1		1	08/22/2024 09:52	WG2347771

Wet Chemistry by Method 9056A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	512		9.88	21.5	1	08/24/2024 05:00	WG2349281

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	91.8		1	08/22/2024 09:52	WG2347771

Wet Chemistry by Method 9056A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	507		10.0	21.8	1	08/24/2024 05:18	WG2349281

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	91.4		1	08/22/2024 09:52	WG2347771

Wet Chemistry by Method 9056A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	372		10.1	21.9	1	08/24/2024 05:36	WG2349281

Method Blank (MB)

(MB) R4110038-1 08/21/24 17:17

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1768949-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1768949-01 08/21/24 17:17 • (DUP) R4110038-3 08/21/24 17:17

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	94.8	94.6	1	0.243		10

Laboratory Control Sample (LCS)

(LCS) R4110038-2 08/21/24 17:17

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	90.0-110	

Method Blank (MB)

(MB) R4110621-1 08/22/24 09:52

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1768949-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1768949-03 08/22/24 09:52 • (DUP) R4110621-3 08/22/24 09:52

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	90.9	90.4	1	0.598		10

Laboratory Control Sample (LCS)

(LCS) R4110621-2 08/22/24 09:52

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	90.0-110	

Method Blank (MB)

(MB) R4111724-1 08/24/24 02:37

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	U		9.20	20.0

L1768949-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1768949-01 08/24/24 03:12 • (DUP) R4111724-3 08/24/24 03:30

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	220	230	1	4.49		15

L1769308-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1769308-01 08/24/24 07:41 • (DUP) R4111724-6 08/24/24 07:59

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	22.7	25.7	1	12.7		15

Laboratory Control Sample (LCS)

(LCS) R4111724-2 08/24/24 02:54

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	200	198	98.9	80.0-120	

L1768949-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1768949-01 08/24/24 03:12 • (MS) R4111724-4 08/24/24 03:48 • (MSD) R4111724-5 08/24/24 04:06

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	211	220	448	449	108	108	1	80.0-120			0.231	15

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MDL (dry)	Method Detection Limit.
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Tetra Tech EMI - Houston, TX

1500 CityWest Boulevard
Suite 1000
Houston. TX 77042

Billing Information:
Accounts Payable
901 West Wall
Suite 100
Midland, TX 79701

Pres Chk

Report to: **Pam Krueger**

Email To: PAM.KRUEGER@tetratech.com;MIKE.JOHNSON

Project Description: 212C -HN-02959

City/State Collected: Artesia NM

Please Circle: PT MT CT ET

Phone: **832-251-5160**

Client Project #

Lab Project # **TETRAHTX-NAVAJO**

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):
Immediately Packed on Ice N ___ Y *

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day * 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CHLORIDE 4ozClr-NoPres	Remarks	Sample # (lab only)
North RO 0-1	comp	SS	0-1ft	8-14-24	900	1	X		-01
North RO 1-2		SS	1-2ft		900	1	X		-02
North RO 2-4		SS	2-4ft		1000	1	X		-03
South RO 0-1		SS	0-1ft		1100	1	X		-04
South RO 1-2		SS	1-2ft		1200	1	X		-05
South RO 2-4		SS	2-4ft		1300	1	X		-06
		SS				1	X		
		SS				1	X		
		SS				1	X		
		SS				1	X		

Chain of Custody

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # 176894

F020

Acctnum: **TETRAHTX**
Template: **T257841**
Prelogin: **P1093406**
PM: **3564 - Chad A Upchurch**
PB: MV 8/5/24
Shipped Via: **FedEX Ground**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 4041 0473 5708

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Jessica Fernandez	8-14-24	2000	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)
			Charles Stevenson

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: ED A9°C Bottles Received:
0.4+0.3=0.7 6

Date: 8-17-24 Time: 9:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

ATTACHMENT C – SUMMARY OF MULCOCK WELL SAMPLE ANALYTICAL DATA AND LABORATORY REPORT

Attachment C1 - Mulcock Well Analytical Data

Former Reverse Osmosis Reject Discharge Fields
HF Sinclair Navajo Refining LLC - Artesia, New Mexico

		Mulcock Well 8/15/2024	
Analyte (mg/L)	**Standard**	**Result**	
Alkalinity,Bicarbonate	--	188	
Alkalinity,Carbonate	--	<8.45	
Total Dissolved Solids	1,000	899	
Dissolved Metals			
Boron,Dissolved	5	0.0523	
Calcium,Dissolved	--	172	
Copper,Dissolved	1	0.00244	J
Iron,Dissolved	1	<0.0281	
Magnesium,Dissolved	--	54.2	
Manganese,Dissolved	0.2	<0.000704	
Potassium,Dissolved	--	1.28	J
Sodium,Dissolved	--	18.5	
Zinc,Dissolved	10	<0.00302	
Water Quality Parameters			
Chloride	250	14.8	
Fluoride	1.6	1.03	
Nitrate as (N)	10	0.795	
Sulfate	600	379	

Notes and Abbreviations:

< x = result not detected with a method detection limit of x
J = reported value is an estimate
mg/L = milligrams per Liter
N = Nitrogen
Standard = Water Quality Control Commission Standard

Pace Analytical®

ANALYTICAL REPORT

September 13, 2024

Tetra Tech EMI - Houston, TX

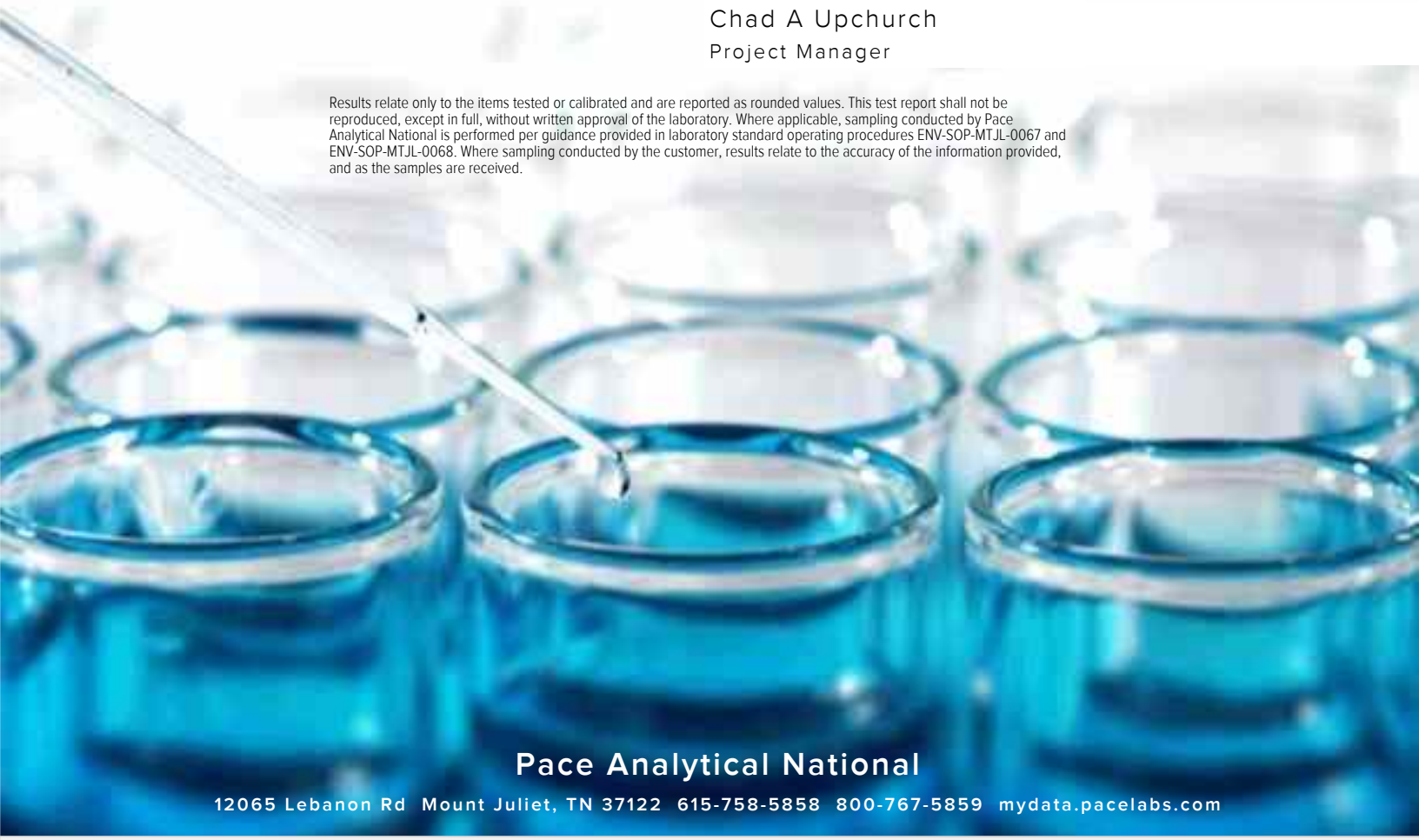
Sample Delivery Group:	L1768164
Samples Received:	08/16/2024
Project Number:	
Description:	Navajo - Water Sampling

Report To: Pam Krueger
1500 CityWest Boulevard
Suite 1000
Houston, TX 77042

Entire Report Reviewed By:

Chad A Upchurch
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 mydata.pacelabs.com

TABLE OF CONTENTS

SAMPLE SUMMARY

MULCOOK L1768164-01 GW

	Collected by	Collected date/time	Received date/time
		08/15/24 07:20	08/16/24 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2345053	1	08/17/24 10:11	08/19/24 13:24	JAC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG2346097	1	08/20/24 10:37	08/20/24 10:37	BJM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2344367	1	08/16/24 19:53	08/16/24 19:53	JDG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2347384	10	08/21/24 22:04	08/21/24 22:04	DLH	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2359544	1	09/12/24 13:32	09/12/24 16:20	JPD	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chad A Upchurch
Project Manager

Sample Delivery Group (SDG) Narrative

Analysis was filtered in the laboratory.

Lab Sample ID	Project Sample ID	Method
L1768164-01	MULCOOK	6020
R4119202-3		6020
R4119202-7		6020

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Dissolved Solids	899		13.3	1	08/19/2024 13:24	WG2345053

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Alkalinity,Bicarbonate	188		8.45	20.0	1	08/20/2024 10:37	WG2346097
Alkalinity,Carbonate	U		8.45	20.0	1	08/20/2024 10:37	WG2346097

Sample Narrative:

L1768164-01 WG2346097: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	14.8		0.547	1.00	1	08/16/2024 19:53	WG2344367
Fluoride	1.03		0.0761	0.150	1	08/16/2024 19:53	WG2344367
Nitrate as (N)	0.795		0.0884	0.100	1	08/16/2024 19:53	WG2344367
Sulfate	379		6.37	50.0	10	08/21/2024 22:04	WG2347384

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Boron,Dissolved	0.0523		0.00963	0.0300	1	09/12/2024 16:20	WG2359544
Calcium,Dissolved	172		0.0936	1.00	1	09/12/2024 16:20	WG2359544
Copper,Dissolved	0.00244	J	0.00151	0.00500	1	09/12/2024 16:20	WG2359544
Iron,Dissolved	U		0.0281	0.100	1	09/12/2024 16:20	WG2359544
Magnesium,Dissolved	54.2		0.0735	1.00	1	09/12/2024 16:20	WG2359544
Manganese,Dissolved	U		0.000704	0.00500	1	09/12/2024 16:20	WG2359544
Potassium,Dissolved	1.28	J	0.108	2.00	1	09/12/2024 16:20	WG2359544
Sodium,Dissolved	18.5		0.376	2.00	1	09/12/2024 16:20	WG2359544
Zinc,Dissolved	U		0.00302	0.0250	1	09/12/2024 16:20	WG2359544

Method Blank (MB)

(MB) R4109460-1 08/19/24 13:24

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Dissolved Solids	U		10.0	10.0

L1768010-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1768010-01 08/19/24 13:24 • (DUP) R4109460-3 08/19/24 13:24

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	638	636	1	0.314		10

L1768179-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1768179-02 08/19/24 13:24 • (DUP) R4109460-4 08/19/24 13:24

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	124	127	1	2.39		10

Laboratory Control Sample (LCS)

(LCS) R4109460-2 08/19/24 13:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800	8660	98.4	85.0-115	

Method Blank (MB)

(MB) R4109274-2 08/20/24 10:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity,Bicarbonate	U		8.45	20.0
Alkalinity,Carbonate	U		8.45	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1768164-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1768164-01 08/20/24 10:37 • (DUP) R4109274-4 08/20/24 10:42

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity,Bicarbonate	188	188	1	0.221		20
Alkalinity,Carbonate	U	U	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

Method Blank (MB)

(MB) R4109427-1 08/16/24 12:44

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.547	1.00
Fluoride	U		0.0761	0.150
Nitrate as (N)	U		0.0884	0.100

L1767987-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1767987-01 08/16/24 13:32 • (DUP) R4109427-3 08/16/24 13:48

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Fluoride	4.78	4.76	1	0.386		15
Nitrate as (N)	13.4	13.3	1	0.684		15

L1768215-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1768215-05 08/16/24 18:18 • (DUP) R4109427-5 08/16/24 18:34

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Fluoride	0.375	0.371	1	1.07		15
Nitrate as (N)	U	U	1	0.000		15

L1768215-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1768215-05 08/16/24 19:22 • (DUP) R4109427-8 08/16/24 19:38

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	238	239	5	0.295		15

Laboratory Control Sample (LCS)

(LCS) R4109427-2 08/16/24 13:00

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.6	99.1	80.0-120	
Fluoride	8.00	8.26	103	80.0-120	
Nitrate as (N)	8.00	7.85	98.1	80.0-120	

L1767987-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1767987-01 08/16/24 13:32 • (MS) R4109427-4 08/16/24 14:04

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Fluoride	8.00	4.78	12.2	92.3	1	80.0-120	
Nitrate as (N)	8.00	13.4	19.0	70.1	1	80.0-120	J6

L1768215-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1768215-05 08/16/24 18:18 • (MS) R4109427-6 08/16/24 18:50 • (MSD) R4109427-7 08/16/24 19:06

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Fluoride	8.00	0.375	7.85	8.42	93.5	101	1	80.0-120			6.91	15
Nitrate as (N)	8.00	U	7.15	7.79	89.4	97.3	1	80.0-120			8.50	15

Method Blank (MB)

(MB) R4110208-1 08/21/24 21:24

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Sulfate	U		0.637	5.00

Laboratory Control Sample (LCS)

(LCS) R4110208-2 08/21/24 21:37

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	37.6	94.0	80.0-120	

Method Blank (MB)

(MB) R4119202-1 09/12/24 16:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	U		0.00963	0.0300
Calcium,Dissolved	U		0.0936	1.00
Copper,Dissolved	U		0.00151	0.00500
Iron,Dissolved	U		0.0281	0.100
Magnesium,Dissolved	U		0.0735	1.00
Manganese,Dissolved	U		0.000704	0.00500
Potassium,Dissolved	U		0.108	2.00
Sodium,Dissolved	U		0.376	2.00
Zinc,Dissolved	U		0.00302	0.0250

Laboratory Control Sample (LCS)

(LCS) R4119202-2 09/12/24 16:13

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Boron,Dissolved	0.0500	0.0550	110	80.0-120	
Calcium,Dissolved	5.00	4.87	97.5	80.0-120	
Copper,Dissolved	0.0500	0.0494	98.7	80.0-120	
Iron,Dissolved	1.00	0.992	99.2	80.0-120	
Magnesium,Dissolved	5.00	4.91	98.3	80.0-120	
Manganese,Dissolved	0.0500	0.0498	99.5	80.0-120	
Potassium,Dissolved	5.00	4.96	99.2	80.0-120	
Sodium,Dissolved	5.00	5.00	100	80.0-120	
Zinc,Dissolved	0.0500	0.0473	94.6	80.0-120	

L1768164-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1768164-01 09/12/24 16:20 • (MS) R4119202-4 09/12/24 16:23 • (MSD) R4119202-5 09/12/24 16:26

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	0.0500	0.0523	0.0993	0.101	94.1	97.8	1	75.0-125			1.87	20
Calcium,Dissolved	5.00	172	177	177	102	95.2	1	75.0-125			0.202	20
Copper,Dissolved	0.0500	0.00244	0.0502	0.0501	95.5	95.4	1	75.0-125			0.129	20
Iron,Dissolved	1.00	U	0.966	0.972	96.6	97.2	1	75.0-125			0.571	20
Magnesium,Dissolved	5.00	54.2	58.2	58.6	79.9	87.4	1	75.0-125			0.647	20
Manganese,Dissolved	0.0500	U	0.0483	0.0491	96.6	98.1	1	75.0-125			1.55	20
Potassium,Dissolved	5.00	1.28	6.14	6.11	97.2	96.7	1	75.0-125			0.369	20
Sodium,Dissolved	5.00	18.5	22.5	22.0	80.5	69.8	1	75.0-125		J6	2.40	20
Zinc,Dissolved	0.0500	U	0.0536	0.0542	107	108	1	75.0-125			1.02	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:

Tetra Tech EMI - Houston, TX

1500 CityWest Boulevard
Suite 1000
Houston. TX 77042

Billing Information:

Accounts Payable
901 West Wall
Suite 100
Midland, TX 79701

Pres Chk

Report to: **Pam Krueger**

Email To: **PAM.KRUEGER@tetratech.com;**

Project Description: **Navajo - Water Sampling**

City/State Collected:

Please Circle: PT MT CT ET

Phone: **832-251-5160**

Client Project #

Lab Project # **TETRAHTX-NAVAJO**

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N____ Y__X__

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day __X__ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	** NITRATE ** 125mlHDPE-NoPres	ALKBI, ALKCA 500mlHDPE-NoPres	CHLORIDE, FLUORIDE 125mlHDPE-NoPres	DISS METALS 250mlHDPE-NoPres	SULFATE 125mlHDPE-NoPres	TDS 1L-HDPE NoPres					Remarks	Sample # (lab only)
Mulcook	Grab	GW		8-15-24	720	5	X	X	X	X	X	X						-01
		GW				DG 8.16.24												

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: ** NITRATE = SHORT HOLD (48hr) **

**** DISS METALS = B, Ca, Cu, Fe, Mg, Mn, K, Na, Zn**

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 410291855230

Trip Blank Received: Yes (X) No
— HCL / MeoH TBR

Temp: MS18 °C 1.6 to 3 - 1.9

Bottles Received: 5

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Jaya L Fernandez V	8-15-24	750	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Deyanth

Date: 8.16.24 Time: 0900

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y / N
COC Signed/Accurate:		Y / N
Bottles arrive intact:		Y / N
Correct bottles used:		Y / N
Sufficient volume sent:		Y / N
If Applicable		
VOA Zero Headspace:		Y / N
Preservation Correct/Checked:		Y / N
RAD Screen <0.5 mR/hr:		Y / N

Chain of Custody

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1508164

D149

Acctnum: **TETRAHTX**

Template: **T258133**

Prelogin: **P1094430**

PM: **3564 - Chad A Upchurch**

PB:

Shipped Via: **FedEX Standard**

ATTACHMENT D – SURVEYOR'S REPORT

Atkins ENGINEERING ASSOCIATES INC.
2904 W 2nd St.
Roswell, NM 88201
voice: 575.624.2420
fax: 575.624.2421
www.atkinseng.com

09/17/2024

Pam Krueger
Sr. Project Manager
Tetra Tech
1500 CityWest Boulevard, Ste 1000
Houston, TX 77042

Emailed to: PAM.KRUEGER@tetratech.com on date of letter

Atkins Engineering Associates (AEA) has completed the monitor well survey at the Navajo Refinery, Artesia, NM. The following table summarizes the coordinates and elevation data for the monitor wells, top-of-casing (TOC) north side and soil boring locations.

Description	Northing (USft)	Easting (USft)	Latitude (DD)	Longitude (DD)	Elevation TOC (USft)	Elevation Adjacent Ground (USft)
MW-162	673741.66	527191.92	32.85213114	-104.3793971	3345.10	3342.09
MW-163	675165.74	524731.40	32.85604221	-104.3874119	3355.05	3352.25
RO-SB-N01	674395.52	523009.41	32.85392261	-104.3930182	3359.70	--
RO-SB-N02	674757.99	523789.08	32.85492009	-104.3904799	3355.59	--
RO-SB-N03	674637.79	524456.14	32.85459068	-104.3883074	3353.24	--
RO-SB-S01	673365.11	523727.06	32.85109149	-104.3906794	3358.16	--
RO-SB-S02	673853.75	524308.80	32.85243543	-104.3887859	3355.19	--
RO-SB-S03	673689.42	525143.53	32.85198492	-104.3860674	3352.68	--
NGS BM G416	672382.10	521658.48	32.84838629	-104.3974135	3368.79	--

Horizontal coordinates are in US Survey Feet NAD 83 (2011) (EPOCH:2010.0000) New Mexico State Plane East Grid Coordinates, scaled to ground with a combined scale factor 1.0002483716731701648.

Orthometric Heights (Elevations) established using RTK GPS observations tied to NGS Benchmark "G-416" with a published Orthometric Height of 3368.79 feet NAVD88.

If you have any questions, please contact me at (575) 624-2420 or ryan@atkinseng.com

Ryan C. Cortez, PS 22761

9/17/2024
Date (Signed)

RYAN C CORTEZ NEW MEXICO 22761 PROFESSIONAL SURVEYOR 9/17/2024

Sante Fe Main Office
Phone: (505) 476-3441

General Information
Phone: (505) 629-6116

Online Phone Directory
https://www.emnrd.nm.gov/ocd/contact-us

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Operator:	OGRID:
HF Sinclair Navajo Refining LLC ATTN: GENERAL COUNSEL Dallas, TX 75201	15694
	Action Number: 396321
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
michael.buchanan	Review of the Quarterly Status Report for the ST2 AP at the Former RO Discharge Fields at the HF SInclair Navajo Refining LLC, July to September 2024.: content satisfactory 1. Proceed with plans to conduct semi-annual groundwater monitoring, facility-wide 2. Evaluate irrigation water needs and related update of the OSE water rights permit to allow Mulcock well use. 3. Confirm pipeline locations and depths within both North and South RO fields so as to prevent damage. 4. Submit the next quarterly update as scheduled in February 2025.	11/20/2024