Appendix J

Geology/Hydrogeology Assessment

Subtask 8 – Geology/Hydrogeology Assessment

Moon Pit Site
Deschutes County, Oregon

Prepared for:
Parametrix, Inc.
150 NW Pacific Park Lane, Suite 110
Bend, Oregon 97701

February 2024
PBS Project 81087.000, Phase 0004, Task 001

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Table of Contents

Supporting Data

FIGURES

TABLES

APPENDICES

1 INTRODUCTION

PBS Engineering and Environmental Inc. (PBS) was retained by Parametrix Inc. to provide geologic consulting services for the Deschutes County Landfill Siting Project. Parametrix is contracted with the Deschutes County Solid Waste Department to assist with the selection of a new Deschutes County Landfill site.

This report and attachments provide a summary of the regional geology, and site geology, hydrogeology, and groundwater quality for the Moon Pit Site (Site; see Figures 1 and 2).

2 REGIONAL GEOLOGY

The Site is located within the High Lava Plains Physiographic Province of Central Oregon. This region is characterized by a combination of Neogene period (23 to 2.6 million years ago) basaltic lava flows, rhyolitic tuff and tuffaceous sediments, and rhyolitic dome complexes, such as Pine Mountain to the southeast of the Site. The High Lava Plains (HLP) is situated at the northern edge of the Basin and Range geologic province where a shift from northwest extension through northeast-trending faults to a system of west-northwest trending *en echelon* normal faults occurs. This system of west-northwest trending faults, known as the Brothers Fault Zone (BFZ), is believed to represent the surface expression of deep-seated right-lateral shear accommodating the termination of Basin and Range extension.[1] The BFZ is believed to have been active in the Pliocene epoch (approximately 5.3 to 2.6 million years ago) of the Neogene period within the HLP.[2] According to the USGS Quaternary Faults database[3], there are no recently active faults (i.e. Holocene; within the last 12,000 years) within 16.5 miles of the Site; however, numerous older faults associated with the BFZ have surficially impacted the HLP volcanics near the site.

The BFZ provided pathways for the mid-Miocene-age volcanism within the HLP. HLP volcanics within and to the south, southeast, east, and northeast of the Site, which are known as the Bear Creek Buttes and dated to approximately 7.5 million years, within the Miocene epoch of the Neogene period, are linked to vents in the HLP.[4] The Oregon Badlands, situated to the northwest of the Site, is a lava flow dating back approximately 80,000 years and believed to be sourced from Newberry Volcano and transported through lava tubes to an area roughly 2.75 miles northwest of the site. The Oregon Badlands basalt does not appear to be offset by the BFZ, which provides further evidence of the age of BFZ faulting.

3 SITE GEOLOGY

The Site ranges in elevation from approximately 3,580 to 3,840 feet above mean sea level. Basaltic andesite lava flows, originating from Newberry Volcano, are situated to the northwest of the Site. In the southeastern two-thirds of the Site, the surface geology consists of mid-Miocene-aged basalts that erupted from vents within the BFZ and HLP to create the Bear Creek Buttes. The rock in this portion of the Site is being quarried for crushed aggregate.

Two pre-Holocene parallel faults, trending northwest and associated with the BFZ, have been mapped near the Site. These faults indicate that the Site is situated in a graben, a fault-bounded basin that received Quaternary sediment predominantly in the northwestern portion of the Site.[5] Both adjacent fault scarps, located to the southwest and northeast, exhibit more than 20 feet of offset and are visible from the Site (see Photo 1).

[1] https://pubs.usgs.gov/of/2003/ofr-03-095/OFR_03_095_text.pdf
[2] https://www.deschutesmeridian.com/IAOS/pdf/tucker_1976.pdf
[3] https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf
[4] https://pubs.usgs.gov/wri/2002/4015/wri02-4015.pdf
[5] https://pubs.usgs.gov/imap/2455/i2455_newberry_sheet1.pdf

In the northwestern third of the Site, the surface geology comprises alluvium that is believed to have been deposited by the Dry River drainage. Gravel-rich alluvium and the underlying basalt bedrock are quarried in this portion of the Site. Dry River, which is mapped as close as approximately 950 feet to the northwest of the Site, is believed to have drained nearby ancestral Lake Millican during the Pleistocene epoch (2.58 million to 11,700 years ago) and now intermittently flows as an 88-mile-long tributary of the Crooked River.[6] Dry River is not known to flow though Dry Canyon, to the south of the Site. The northwest portion of the Site contains up to 42 feet of layered sand and gravel alluvial sediment overlying approximately 20-30 feet of basalt. This unit of basalt is underlain by approximately six feet of inter-flow sediment.

Test pits excavated in 1993, boreholes advanced in 1996, and test pits advanced in 2023 (Delve) identified the following general strata in the alluvial (northwest; approximately 135-acre) portion of the Site:

- Sand with silt topsoil – Lightweight pumiceous topsoil, loamier and more organic than underlying sediment, thickness up to about five feet.
- Gravel with sand and cobbles – Horizontally bedded, thickness about eight to ten feet.
- Sand with fine gravel – The predominant soil type in this portion of the Site; thickness up to 42 feet.
- Quaternary basalt – Believed to be a continuation of the Oregon Badlands basalt that has been capped with alluvial sediment deposited within fault-bounded basins at the northwest edge of Bear Creek Buttes.

Topsoil observations in the northwestern portion of the Site are generally consistent with the mapped Clovkamp series soil pedon.[7] The topsoil horizon was viewed at the edge of the Site; it has been removed from most of this portion of the Site.

4 HYDROGEOLOGY

No year-round surface water is present in the vicinity of the Site. Intermittent drainage may occur from the Bear Creek Buttes or along Dry River towards the depositional basin in the northwest portion of the site.

The Site is located near the eastern edge of the Upper Deschutes Basin. The regional groundwater flow direction from the Site within the basin is to the north-northwest, roughly following the Dry River drainage, which once catastrophically drained Lake Millican (formerly located in Millican Valley to the southeast of the Site), eventually reaching the Crooked River east of Redmond. A simplified model of the Upper Deschutes Basin[8] estimates the groundwater elevation at the site to be around 2,800 feet (see Figure 3).

Two water wells are located onsite, DESC 5750 ("Well A"), which was developed in 1986 and is currently not in use, and DESC 9126 ("Well B"), which was developed in 1994 and is currently used for onsite dust suppression and is additionally permitted for gravel washing. DESC 9126 is located at an elevation of approximately 3,600 feet and reports a depth to water of 852 feet, indicating a groundwater elevation of approximately 2,750 feet. The surface elevation of DESC 5750 is approximately five feet lower and reports water two feet higher than DESC 9126. The reported water levels for the wells were collected seven years apart, suggesting relatively stable groundwater conditions.

[6] https://www.usgs.gov/national-hydrography/national-hydrography-dataset
[7] https://data.deschutes.org/maps/soils-nrcs-3
[8] https://pubs.usgs.gov/wri/2002/4015/wri02-4015.pdf

5 SITE GROUNDWATER QUALITY

Well B (DESC 9126) was purged a minimum of approximately three well volumes of the last recorded water column height of the well. Groundwater was purged into a 20,000-gallon cistern, which if reaches capacity overflows into an onsite pond. The flow gauge was not functioning, so an exact purge rate was unable to be measured. However, the on-site owner's representative reported an estimate of 1,000-gallons per minute (gpm). This well was purged for approximately 22 minutes prior to sampling, with approximately 22,000 gallons purged. The purge rate was lowered to approximately 200 gpm prior to sampling through a flow-controlled spigot.

Field parameters, including temperature, pH, specific conductivity, and turbidity were measured every three minutes as the well was purged, after the minimum well volume was purged. The field parameter data are presented on the groundwater sampling field form, included as an attachment.

Groundwater samples, designated MP-B-01, were collected from Well B (DESC 9126) following purging and the stabilization of the field indicator parameters; i.e., three consecutive readings within ±3 percent (specific conductivity), ±.1 pH units (pH), ±10 percent (turbidity), and 1° Celsius (temperature) of one another. The well was sampled from a hose line near the wellhead.

The samples were collected into laboratory-supplied containers with preservatives as indicated by the laboratory method. For the analysis of dissolved concentrations of anions, cations, and metals, groundwater was field filtered for each analysis using a 0.45-micron filter and a peristaltic pump to control flow. A new, dedicated filter and disposable pump tubing were used for the filtering process. Immediately after sample collection, each sample was placed into a cooler with ice. The samples were then submitted to Pace Analytical National Center for Testing and Innovation (Pace) of Mt. Juliet, Tennessee for analysis. Due to short holding times, the samples collected for nitrate-nitrite were submitted to Edge Analytical (Edge) of Bend, Oregon for laboratory analysis. A summary of the analytical testing results for the sample collected from DESC 9126 and designated MP-B-01 is presented in Table 1. Copies of the analytical laboratory reports and chain-of-custody documentation are included as attachments.

A PBS chemist reviewed the data in accordance with the procedures specified in the U. S. Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Organic Data Review[9] and Inorganic Data Review[10] as applicable. All data were considered usable for project objectives. A data quality review of the sampling data verified the following:

- Target compounds were not detected in the method blanks, except for total organic carbon (TOC) at a concentration of 0.277 milligrams per liter (mg/L). The method blank detection was between the reporting detection limit (RDL) and the method detection limit (MDL) and flagged as an estimate with the qualifier "J." The method blank and sample detection were below the RDL and above the MDL or less than five times the practical quantitation limit (PQL) for TOC; therefore, any potential effect of results is negligible, and the data are considered valid.

- Iron detected in the sample exceeds the EPA Maximum Contaminant Level (MCL) guidance level of 0.3 milligrams per liter (mg/l). The reported concentration of iron in the sample is 0.329 mg/l.

[9] Environmental Protection Agency (EPA). (October 1999). Contract Laboratory Program National Functional Guidelines for Organic Data Review.
[10] EPA. (October 2004). Inorganic Data Review.

- The concentrations of TOC, arsenic, and zinc are flagged with the qualifier "J," meaning these concentrations are estimated values between the RDL and MDL.

No constituents were reported above the EPA MCL or the OAR 340-40 numerical groundwater quality reference levels (Table 1) except where noted above.

Table 2 provides the cation-anion balance summary for the well sampling event. The calculations are used as a quality check on the design of the sampling program or the laboratory performance. The calculations consist of the relative percent difference (PD) between the milliequivalents per liter (meq/l) concentrations of cations and anions. For analytes that were not detected, the MRL for the analyte was used in the calculation. Carbonate and ammonia were not detected above the MRL. The PD value for the sample results was +15.67 percent. Total cation concentrations (positive PD values) were greater than total anion concentrations (negative PD values). The typical acceptable range for the PD is +/- 10 percent for monitoring wells. Given the sample was collected from a water supply well rather than a well designed for groundwater monitoring the slightly higher PD is to be expected.

Please feel free to contact either of us at 541.388.9290 or via email at kyle.johnson@pbsusa.com or toby.scott@pbsusa.com with any questions or comments.

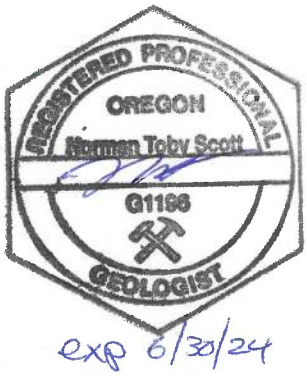
Sincerely,

2/6/2024

Kyle Johnson, RG Date
Project Geologist

2/6/2024

Toby Scott, RG Date
Senior Project Manager



exp 6/30/24

Figures

Vicinity Map

Moon Pit Site

Date: February 2024 | Project: 81087.000

Figure: 1

Site/Taxlot Boundary

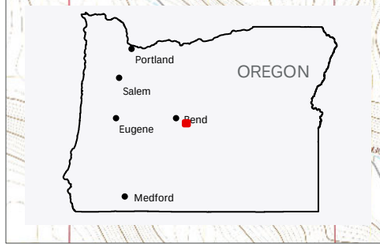
Proposed Development Area

40' Elevation Contour Interval

N

1 INCH = 3,000 FEET

0 3,000 6,000 Feet



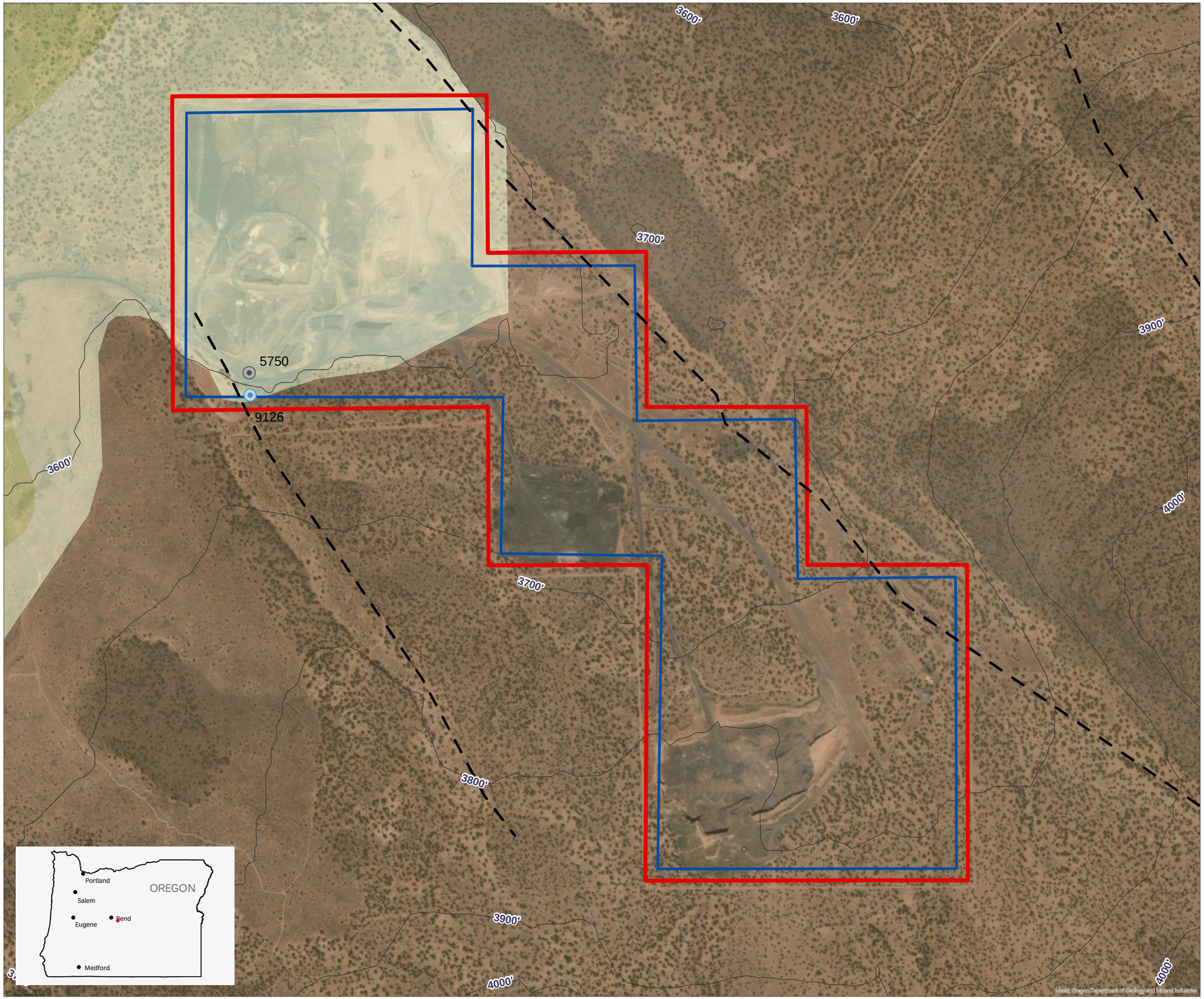
This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Surface Geologic Map

Moon Pit Site

Date: February 2024 | Project: 81087.000

Figure: 2



- Elevation Contour (100 ft interval)
- Pre-Holocene Faults (DOGAMI, 2020)
- Quaternary Surficial Deposits
- Quaternary Newberry Volcano Basalt
- Neogene High Lava Plains Basalt
- Proposed Development Area
- Site/Taxlot Boundary

N

1 INCH = 800 FEET

0 800 1,600 Feet

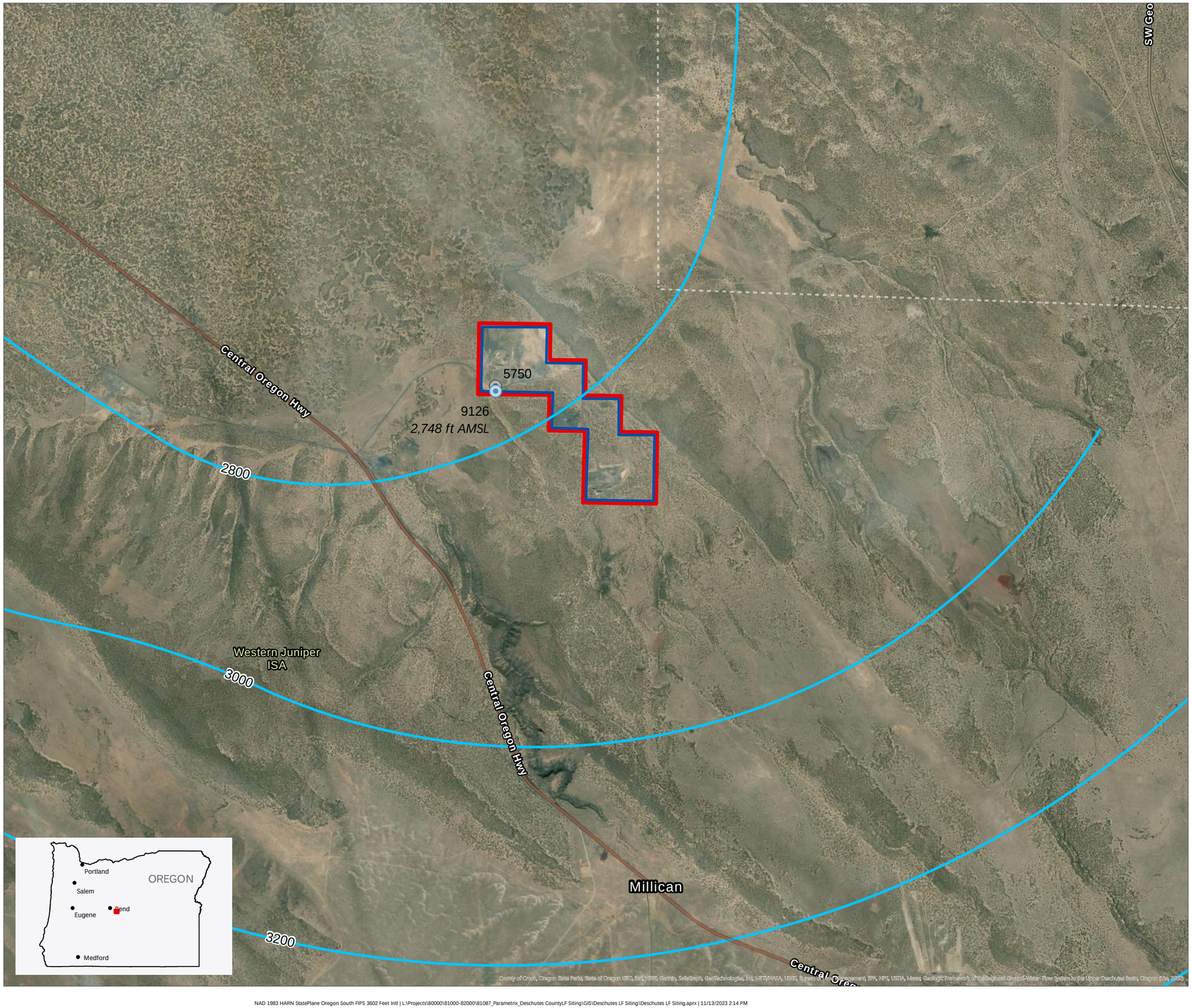
PBS

Regional Aquifer Elevation Map

Moon Pit Site

Date: February 2024 | Project: 81087.000

Figure: 3



- Onsite Active Water Well
- Onsite Inactive Water Well
- Approximate Locations of Reviewed Well Log (With Approximate Groundwater Static Elevation Above Mean Sea Level)
- Regional Aquifer Hydraulic Head Elevation Contour (200 ft Interval) (USGS, 2002)
- Proposed Development Area
- Site/Taxlot Boundary

N

1 INCH = 3,500 FEET

0 3,500 7,000 Feet

PBS

NAD 1983 HARN StatePlane Oregon South FIPS 3602 Feet Intl | L:\Projects\80000\81000-82000\81087_Parametrix_Deschutes CountyLF Siting\GIS\Deschutes LF Siting\Deschutes LF Siting.aprx | 11/13/2023 2:14 PM

Tables

Table 1
Summary of Groundwater Monitoring Data **PBS Project No. 81087.000**
Moon Pit Site, Deschutes County, Oregon **Report Date: February 2024**

	Units	EPA MCLs (2003)[1]	OAR 340-40[2]	MP-B-01 (Well B or DESC 9126)
Field Indicators (Group 1A)				
Field pH	pH Units	6.5-8.5	6.5-8.5	8.10
Field Specific Conductivity	uS/cm			265
Field Temperature	°C			21.9
Field Turbidity	NTU			131
Lab Indicators (Group 1B)				
Chemical Oxygen Demand	mg/l			< 20
Total Alkalinity (Dissolved)	mg/l			115
Hardness[3]	mg/l			74.4
Specific Conductivity	uS/cm			268
Total Dissolved Solids	mg/l	500	500	173
Total Organic Carbon	mg/l			0.277 B J
Total Suspended Solids	mg/l			< 2.5
Total Total Alkalinity	mg/l			117
Cations / Anions (Group 2A)				
Ammonia-N (Dissolved)	mg/l			< 0.25
Calcium	mg/l			12.1 (12.0)
Chloride	mg/l	250	250	6.84
Bicarbonate Alkalinity	mg/l			116
Carbonate Alkalinity[3]	mg/l			< 20
Fluoride	mg/l	4	4	0.154
Iron (Dissolved)	mg/l	0.3	0.3	**0.329**
Magnesium	mg/l			10.8 (10.7)
Manganese (Dissolved)	mg/l	0.05	0.05	0.00283 J
N-Nitrate	mg/l	10	10	0.82
N-Nitrite	mg/l			< 0.010
Potassium (Dissolved)	mg/l			4.97
Silica (Dissolved) [3]	mg/l			51.1
Silicon (Dissolved)	mg/l			23.9
Sodium (Dissolved)	mg/l			24.5
Sulfate (Dissolved)	mg/l	250	250	8.86
Total Metals (Group 2B)				
Antimony	ug/l	6		< 4
Arsenic	ug/l	10	50	1.47 J
Barium	ug/l	2000	1000	5.52
Beryllium	ug/l	4		< 2
Cadmium	ug/l	5	10	< 1
Chromium	ug/l	100	50	3.13
Cobalt	ug/l			< 2
Copper	ug/l	1000	1000	35.0
Lead	ug/l	15	50	5.03
Nickel	ug/l			< 2
Selenium	ug/l	50	10	< 2
Silver	ug/l	100	50	< 2
Thallium	ug/l	2		< 2
Vanadium	ug/l			23.3
Zinc	ug/l	5000	5000	7.29 J
Volatile Organic Compounds (Group 3)				
All Compounds	ug/l			ND

Notes:
Sample collected October 5, 2023
Bold values indicate exceedance of MCL or OAR values and are further discussed in the report.
Dissolved concentrations shown in (parentheses).
mg/l=milligrams per liter
ug/l=micrograms per liter
uS/cm=microSiemens per centimeter
°C=Degrees Celsius
NTU=nephelometric turbitity units
ND=Not Detected at or above the reported detection limit (RDL)
B = The same analyte was found in the associated laboratory blank.
J = Values with a 'J' are estimated values between the Reported Detection Limit and the Method Detection Limit.
(1) U.S. Environmental Protection Agency Maximum Contaminant Levels (MCLs) - drinking water for public water systems
(2) Oregon Administrative Rule 340-40, Tables 1 and 3 (Numberical Groundwater Quality Reference and Guidance Levels)
(3) Calculated value

Table 2
Cation/Anion Balance
Moon Pit Site, Deschutes County, Oregon

PBS Project No. 81087.000
Report Date: February 2024

Well and Sample Date	Ca^{+}		Mg^{2+}		Na^{+}		Fe^{2+}		K^{+}		Total Cations	CO_3		HCO_3^{-}		NH_3		SO_4^{2-}		Cl^{-}		Total Anions	*Percent Difference (%)*
	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	meq/l	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	meq/l	
MP-B (Well B / DESC 9126)																							
10/5/2023	**12.0**	0.600	**10.7**	0.892	**24.5**	1.065	**0.329**	0.771	**4.97**	0.127	3.456	20 U	0.667	**116**	1.902	0.25 U	0.005	**8.86**	0.185	**6.84**	0.195	2.954	*15.67*

Notes:
Bold values indicate laboratory detected concentrations above the method reporting limit.
U = not detected at the method reporting limit as shown
mg/l = milligrams per liter
meq/l = milliequivalents per liter
The method reporting limit is used for non-detect values to calculate the meq/l values.
Although non-rounded values were used in the calculations, the values displayed are rounded to three significant figures.

Appendix A
Photo Pages

Photo 1. The active well (Well B) house, as seen from the north. The hill behind the well house is a fault scarp associated with the Brothers Fault Zone.

Photo 2. The interior of the active well (Well B) house, as seen from the northeast.

Photo 3. The inactive well (Well A) house, as seen from the south.

Photo 4. Exposed alluvial sediment along the northern edge of the northwest portion of the Site. This exposure is the result of sediment quarrying.

Photo 5. The rock quarry pit in the northwest portion of the Site, as seen from the north. Exposed in this portion is approximately 30 feet of basalt overlying interflow sediment.

Photo 6. The rock quarry pit in the southeast portion of the Site, as seen from the north.

Appendix B
Groundwater Sampling Field Form

PBS	PBS Engineering and Environmental Inc. **GROUNDWATER SAMPLING FORM (YSI Pro)**	Project No: 81087.000 Project Name/ Location: Moon Pit Date: 10-5-23	
		Monitoring Well ID	MP-B-01
Initial DTW (feet bgs)	—	Sample ID (if not well ID)	MP-B-01
Screen Interval (feet bgs)	—	Sample Time	1034
Well depth (feet bgs)	1143'	QC Sample type: _____	☒ Not collected ID_____ Time_____
Depth of pump/tubing inlet (feet bgs)	—		
Sampling method (describe pump or sampler)	~~Spigot~~ hose line	Field Personnel	HB
Purge Rate (L/min)	~1000/min	Weather Conditions	60s/70s, sunny

WELL PURGING INFORMATION

Time ☐ elapsed ☐ actual	DTW (feet)	Temp. (°C)	Dissolved oxygen (mg/L)	Specific conductivity ☐ mS/cm ☒ µS/cm	pH	ORP (mV)	Turbidity ~~(NTU)~~ ppm	Observations	Volume purged ☐ ltr ☒ gal
EPA stabilization goals:	**<0.32' drawdown**	**N/A**	**±10%**	**±3%**	**±0.1**	**±10mV**	**±10%**		
1026	—	20.9	—	263	8.06	—	131		>1000
1029	—	21.7	—	266	8.13	—	132		↓
1032	—	21.9	—	265	8.10	—	131		↓
								Total Volume Purged	

FIELD OBSERVATIONS / NOTES (such as well head condition, groundwater color, sediment load, recovery, sheen, odor, equipment)

Gage on line that goes to 20k tank
Well turned on @ ~1012. Needs to run a while before H_2O comes to surface.
H_2O up @ 1017. ~~stopped purging at this rate @ 1028~~ Can't slow down water pressure much, changed rate out of ground to ~200 gal/min upon sampling
37lb of pressure in 8" pipe
Running for 22min before sample collected

Signature of Field Personnel: HB

Appendix C
Laboratory Analytical Reports

ANALYTICAL REPORT

October 19, 2023

PBS Engineering & Env.- POR

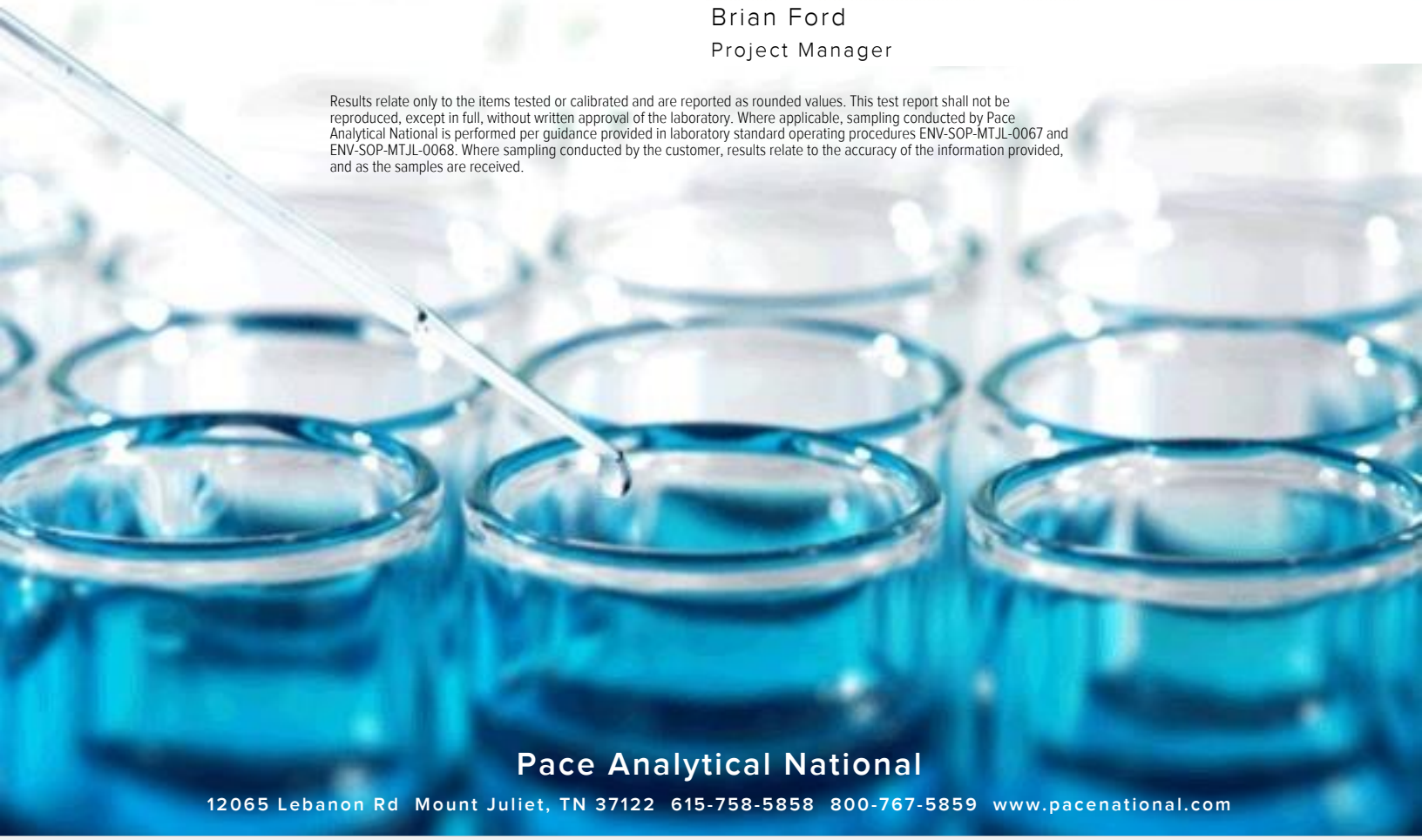
Sample Delivery Group:	L1663867
Samples Received:	10/06/2023
Project Number:	81087.000
Description:	Moon Pit

Report To: Holly Burnett
390 NE Emerson Ave
Suite 201
Bend, OR 97701

Entire Report Reviewed By:

Brian Ford
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 www.pacenational.com

TABLE OF CONTENTS

MP-B-01 L1663867-01 GW

Collected by: Holly Burnett | Collected date/time: 10/05/23 10:34 | Received date/time: 10/06/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2146837	1	10/17/23 13:07	10/17/23 13:07	DJS	Mt. Juliet, TN
Calculated Results	WG2146862	1	10/12/23 20:54	10/12/23 20:54	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG2149548	1	10/11/23 18:54	10/12/23 12:22	MMF	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 D-2011	WG2149502	1	10/11/23 16:39	10/12/23 19:37	JAC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG2147880	1	10/11/23 11:06	10/11/23 11:06	BJM	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG2148178	1	10/10/23 07:59	10/10/23 12:57	JGM	Mt. Juliet, TN
Wet Chemistry by Method 9050A	WG2144468	1	10/12/23 10:59	10/12/23 10:59	BJM	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG2149939	1	10/12/23 21:07	10/12/23 21:07	ASH	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2146837	1	10/11/23 10:39	10/14/23 11:43	DJS	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2146837	1	10/11/23 10:39	10/16/23 21:59	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2146837	1	10/11/23 10:39	10/17/23 13:07	DJS	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2146862	1	10/11/23 08:31	10/14/23 12:47	ZSA	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2146872	1	10/09/23 03:48	10/12/23 00:23	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG2147771	1	10/09/23 15:19	10/09/23 15:19	JCP	Mt. Juliet, TN

MP-B-01 FF L1663867-02 GW

Collected by: Holly Burnett | Collected date/time: 10/05/23 10:34 | Received date/time: 10/06/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 2320 B-2011	WG2149208	1	10/12/23 10:20	10/12/23 10:20	BJM	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG2148273	1	10/10/23 16:49	10/10/23 16:49	BMD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2149890	1	10/13/23 22:33	10/13/23 22:33	HMM	Mt. Juliet, TN

MP-B-01 FF L1663867-03 WW

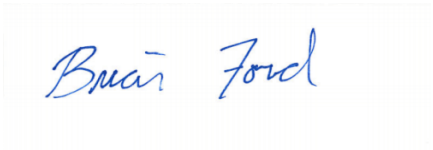
Collected by: Holly Burnett | Collected date/time: 10/05/23 10:34 | Received date/time: 10/06/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG2153460	1	10/19/23 08:14	10/19/23 08:14	ASM	Mt. Juliet, TN

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

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.



Brian Ford
Project Manager

Calculated Results

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Silica,Dissolved	51100		59.7	428	1	10/17/2023 13:07	WG2146837

Calculated Results

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Hardness (calculated) as CaCO3	74400		198	2500	1	10/12/2023 20:54	WG2146862

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Dissolved Solids	173000		10000	1	10/12/2023 12:22	WG2149548

Gravimetric Analysis by Method 2540 D-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Suspended Solids	ND		2500	1	10/12/2023 19:37	WG2149502

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Alkalinity	115000		8450	20000	1	10/11/2023 11:06	WG2147880

Sample Narrative:

L1663867-01 WG2147880: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
COD	U		11700	20000	1	10/10/2023 12:57	WG2148178

Wet Chemistry by Method 9050A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	umhos/cm		umhos/cm		date / time	
Specific Conductance	268		10.0	1	10/12/2023 10:59	WG2144468

Sample Narrative:

L1663867-01 WG2144468: at 25C

Wet Chemistry by Method 9060A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
TOC (Total Organic Carbon)	277	B J	102	1000	1	10/12/2023 21:07	WG2149939

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Calcium	12100		79.3	1000	1	10/14/2023 12:47	WG2146862
Calcium,Dissolved	12000		79.3	1000	1	10/14/2023 11:43	WG2146837
Iron,Dissolved	329		18.0	100	1	10/14/2023 11:43	WG2146837
Magnesium	10800		85.3	1000	1	10/14/2023 12:47	WG2146862
Magnesium,Dissolved	10700		85.3	1000	1	10/16/2023 21:59	WG2146837

Metals (ICP) by Method 6010D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Manganese,Dissolved	2.83	J	0.934	10.0	1	10/14/2023 11:43	WG2146837
Potassium,Dissolved	4970		261	2000	1	10/14/2023 11:43	WG2146837
Silicon,Dissolved	23900		27.9	200	1	10/17/2023 13:07	WG2146837
Sodium,Dissolved	24500		504	3000	1	10/14/2023 11:43	WG2146837

Metals (ICPMS) by Method 6020B

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Antimony	U		1.03	4.00	1	10/12/2023 00:23	WG2146872
Arsenic	1.47	J	0.180	2.00	1	10/12/2023 00:23	WG2146872
Barium	5.52		0.381	2.00	1	10/12/2023 00:23	WG2146872
Beryllium	U		0.190	2.00	1	10/12/2023 00:23	WG2146872
Cadmium	U		0.150	1.00	1	10/12/2023 00:23	WG2146872
Chromium	3.13		1.24	2.00	1	10/12/2023 00:23	WG2146872
Copper	35.0		1.51	5.00	1	10/12/2023 00:23	WG2146872
Cobalt	U		0.0596	2.00	1	10/12/2023 00:23	WG2146872
Lead	5.03		0.849	2.00	1	10/12/2023 00:23	WG2146872
Nickel	U		0.816	2.00	1	10/12/2023 00:23	WG2146872
Selenium	U		0.300	2.00	1	10/12/2023 00:23	WG2146872
Silver	U		0.0700	2.00	1	10/12/2023 00:23	WG2146872
Thallium	U		0.121	2.00	1	10/12/2023 00:23	WG2146872
Vanadium	23.3		0.664	5.00	1	10/12/2023 00:23	WG2146872
Zinc	7.29	J	3.02	25.0	1	10/12/2023 00:23	WG2146872

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result ug/l	Qualifier	MDL ug/l	RDL ug/l	Dilution	Analysis date / time	Batch
Acetone	U		11.3	50.0	1	10/09/2023 15:19	WG2147771
Acrolein	U		2.54	50.0	1	10/09/2023 15:19	WG2147771
Acrylonitrile	U		0.671	10.0	1	10/09/2023 15:19	WG2147771
Benzene	U		0.0941	1.00	1	10/09/2023 15:19	WG2147771
Bromobenzene	U		0.118	1.00	1	10/09/2023 15:19	WG2147771
Bromodichloromethane	U		0.136	1.00	1	10/09/2023 15:19	WG2147771
Bromoform	U		0.129	1.00	1	10/09/2023 15:19	WG2147771
Bromomethane	U		0.605	5.00	1	10/09/2023 15:19	WG2147771
n-Butylbenzene	U		0.157	1.00	1	10/09/2023 15:19	WG2147771
sec-Butylbenzene	U		0.125	1.00	1	10/09/2023 15:19	WG2147771
tert-Butylbenzene	U		0.127	1.00	1	10/09/2023 15:19	WG2147771
Carbon tetrachloride	U		0.128	1.00	1	10/09/2023 15:19	WG2147771
Chlorobenzene	U		0.116	1.00	1	10/09/2023 15:19	WG2147771
Chlorodibromomethane	U		0.140	1.00	1	10/09/2023 15:19	WG2147771
Chloroethane	U		0.192	5.00	1	10/09/2023 15:19	WG2147771
Chloroform	U		0.111	5.00	1	10/09/2023 15:19	WG2147771
Chloromethane	U		0.960	2.50	1	10/09/2023 15:19	WG2147771
2-Chlorotoluene	U		0.106	1.00	1	10/09/2023 15:19	WG2147771
4-Chlorotoluene	U		0.114	1.00	1	10/09/2023 15:19	WG2147771
1,2-Dibromo-3-Chloropropane	U		0.276	5.00	1	10/09/2023 15:19	WG2147771
1,2-Dibromoethane	U		0.126	1.00	1	10/09/2023 15:19	WG2147771
Dibromomethane	U		0.122	1.00	1	10/09/2023 15:19	WG2147771
1,2-Dichlorobenzene	U		0.107	1.00	1	10/09/2023 15:19	WG2147771
1,3-Dichlorobenzene	U		0.110	1.00	1	10/09/2023 15:19	WG2147771
1,4-Dichlorobenzene	U		0.120	1.00	1	10/09/2023 15:19	WG2147771
Dichlorodifluoromethane	U		0.374	5.00	1	10/09/2023 15:19	WG2147771
1,1-Dichloroethane	U		0.100	1.00	1	10/09/2023 15:19	WG2147771
1,2-Dichloroethane	U		0.0819	1.00	1	10/09/2023 15:19	WG2147771

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
1,1-Dichloroethene	U		0.188	1.00	1	10/09/2023 15:19	WG2147771
cis-1,2-Dichloroethene	U		0.126	1.00	1	10/09/2023 15:19	WG2147771
trans-1,2-Dichloroethene	U		0.149	1.00	1	10/09/2023 15:19	WG2147771
1,2-Dichloropropane	U		0.149	1.00	1	10/09/2023 15:19	WG2147771
1,1-Dichloropropene	U		0.142	1.00	1	10/09/2023 15:19	WG2147771
1,3-Dichloropropane	U		0.110	1.00	1	10/09/2023 15:19	WG2147771
cis-1,3-Dichloropropene	U		0.111	1.00	1	10/09/2023 15:19	WG2147771
trans-1,3-Dichloropropene	U		0.118	1.00	1	10/09/2023 15:19	WG2147771
2,2-Dichloropropane	U		0.161	1.00	1	10/09/2023 15:19	WG2147771
Di-isopropyl ether	U		0.105	1.00	1	10/09/2023 15:19	WG2147771
Ethylbenzene	U		0.137	1.00	1	10/09/2023 15:19	WG2147771
Hexachloro-1,3-butadiene	U		0.337	1.00	1	10/09/2023 15:19	WG2147771
Isopropylbenzene	U		0.105	1.00	1	10/09/2023 15:19	WG2147771
p-Isopropyltoluene	U		0.120	1.00	1	10/09/2023 15:19	WG2147771
2-Butanone (MEK)	U		1.19	10.0	1	10/09/2023 15:19	WG2147771
Methylene Chloride	U		0.430	5.00	1	10/09/2023 15:19	WG2147771
4-Methyl-2-pentanone (MIBK)	U		0.478	10.0	1	10/09/2023 15:19	WG2147771
Methyl tert-butyl ether	U		0.101	1.00	1	10/09/2023 15:19	WG2147771
Naphthalene	U	C3	1.00	5.00	1	10/09/2023 15:19	WG2147771
n-Propylbenzene	U		0.0993	1.00	1	10/09/2023 15:19	WG2147771
Styrene	U		0.118	1.00	1	10/09/2023 15:19	WG2147771
1,1,1,2-Tetrachloroethane	U		0.147	1.00	1	10/09/2023 15:19	WG2147771
1,1,2,2-Tetrachloroethane	U		0.133	1.00	1	10/09/2023 15:19	WG2147771
1,1,2-Trichlorotrifluoroethane	U		0.180	1.00	1	10/09/2023 15:19	WG2147771
Tetrachloroethene	U		0.300	1.00	1	10/09/2023 15:19	WG2147771
Toluene	U		0.278	1.00	1	10/09/2023 15:19	WG2147771
1,2,3-Trichlorobenzene	U		0.230	1.00	1	10/09/2023 15:19	WG2147771
1,2,4-Trichlorobenzene	U		0.481	1.00	1	10/09/2023 15:19	WG2147771
1,1,1-Trichloroethane	U		0.149	1.00	1	10/09/2023 15:19	WG2147771
1,1,2-Trichloroethane	U		0.158	1.00	1	10/09/2023 15:19	WG2147771
Trichloroethene	U		0.190	1.00	1	10/09/2023 15:19	WG2147771
Trichlorofluoromethane	U		0.160	5.00	1	10/09/2023 15:19	WG2147771
1,2,3-Trichloropropane	U		0.237	2.50	1	10/09/2023 15:19	WG2147771
1,2,4-Trimethylbenzene	U		0.322	1.00	1	10/09/2023 15:19	WG2147771
1,2,3-Trimethylbenzene	U		0.104	1.00	1	10/09/2023 15:19	WG2147771
1,3,5-Trimethylbenzene	U		0.104	1.00	1	10/09/2023 15:19	WG2147771
Vinyl chloride	U		0.234	1.00	1	10/09/2023 15:19	WG2147771
Xylenes, Total	U		0.174	3.00	1	10/09/2023 15:19	WG2147771
(S) Toluene-d8	*109*			*80.0-120*		*10/09/2023 15:19*	WG2147771
(S) 4-Bromofluorobenzene	*99.1*			*77.0-126*		*10/09/2023 15:19*	WG2147771
(S) 1,2-Dichloroethane-d4	*113*			*70.0-130*		*10/09/2023 15:19*	WG2147771

Volatile Organic Compounds (GC/MS) by Method 8260D - TENTATIVELY IDENTIFIED COMPOUNDS

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch	CAS #	RT
	ug/l		ug/l	ug/l		date / time			

Number of TICs found: 0

Tentatively Identified compounds (TIC) refers to substances not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search routine of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist. Quantitation is accomplished by relative peak area of the TIC compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is 10% or more of that of the nearest internal standard.

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Alkalinity	117000		8450	20000	1	10/12/2023 10:20	WG2149208
Alkalinity,Bicarbonate	116000		8450	20000	1	10/12/2023 10:20	WG2149208
Alkalinity,Carbonate	U		8450	20000	1	10/12/2023 10:20	WG2149208

Sample Narrative:

L1663867-02 WG2149208: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Ammonia Nitrogen	U		117	250	1	10/10/2023 16:49	WG2148273

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Chloride	6840		379	1000	1	10/13/2023 22:33	WG2149890
Fluoride	154		64.0	150	1	10/13/2023 22:33	WG2149890

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Sulfate	8860		594	5000	1	10/19/2023 08:14	WG2153460

Method Blank (MB)

(MB) R3986737-1 10/12/23 12:22

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Dissolved Solids	U		10000	10000

L1663610-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1663610-04 10/12/23 12:22 • (DUP) R3986737-3 10/12/23 12:22

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	331000	346000	1	4.43		5

L1663622-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663622-01 10/12/23 12:22 • (DUP) R3986737-4 10/12/23 12:22

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	507000	508000	1	0.197		5

Laboratory Control Sample (LCS)

(LCS) R3986737-2 10/12/23 12:22

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Dissolved Solids	8800000	8090000	91.9	77.3-123	

Method Blank (MB)

(MB) R3985873-1 10/12/23 19:37

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Suspended Solids	U		2500	2500

L1664102-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1664102-02 10/12/23 19:37 • (DUP) R3985873-3 10/12/23 19:37

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Suspended Solids	580000	608000	1	4.71		5

L1664162-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1664162-01 10/12/23 19:37 • (DUP) R3985873-4 10/12/23 19:37

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Suspended Solids	70800	70800	1	0.000		5

Laboratory Control Sample (LCS)

(LCS) R3985873-2 10/12/23 19:37

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Suspended Solids	773000	756000	97.8	85.7-114	

Method Blank (MB)

(MB) R3984786-2 10/11/23 09:52

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alkalinity	U		8450	20000

Sample Narrative:

BLANK: Endpoint pH 4.5

L1662902-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1662902-01 10/11/23 10:20 • (DUP) R3984786-3 10/11/23 10:24

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	82100	83300	1	1.44		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

L1663868-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663868-01 10/11/23 11:59 • (DUP) R3984786-4 10/11/23 12:05

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	126000	125000	1	0.867		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3984786-1 10/11/23 09:45

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100000	103000	103	90.0-110	

Sample Narrative:

LCS: Endpoint pH 4.5

Method Blank (MB)

(MB) R3985483-2 10/12/23 09:57

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alkalinity	U		8450	20000
Alkalinity,Bicarbonate	U		8450	20000
Alkalinity,Carbonate	U		8450	20000

Sample Narrative:

BLANK: Endpoint pH 4.5

L1664538-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1664538-01 10/12/23 10:08 • (DUP) R3985483-4 10/12/23 10:14

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	499000	496000	1	0.560		20
Alkalinity,Bicarbonate	499000	496000	1	0.560		20
Alkalinity,Carbonate	U	U	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

L1664538-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1664538-04 10/12/23 12:20 • (DUP) R3985483-6 10/12/23 12:27

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	215000	215000	1	0.110		20
Alkalinity,Bicarbonate	212000	211000	1	0.167		20
Alkalinity,Carbonate	U	U	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3985483-1 10/12/23 09:49

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100000	101000	101	90.0-110	

Sample Narrative:

LCS: Endpoint pH 4.5

Method Blank (MB)

(MB) R3988356-1 10/18/23 20:02

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

Laboratory Control Sample (LCS)

(LCS) R3988356-2 10/18/23 20:19

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	41100	103	90.0-110	

Method Blank (MB)

(MB) R3984456-1 10/10/23 16:37

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Ammonia Nitrogen	U		117	250

L1663566-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663566-01 10/10/23 16:45 • (DUP) R3984456-5 10/10/23 16:46

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Ammonia Nitrogen	U	U	1	0.000		10

L1664103-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1664103-04 10/10/23 17:03 • (DUP) R3984456-8 10/10/23 17:04

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Ammonia Nitrogen	3470	3400	1	2.04		10

Laboratory Control Sample (LCS)

(LCS) R3984456-2 10/10/23 16:39

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Ammonia Nitrogen	7500	7360	98.1	90.0-110	

L1663510-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663510-01 10/10/23 16:40 • (MS) R3984456-3 10/10/23 16:42 • (MSD) R3984456-4 10/10/23 16:43

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Ammonia Nitrogen	5000	U	4990	4950	99.8	99.1	1	90.0-110			0.784	10

L1664103-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L1664103-03 10/10/23 17:00 • (MS) R3984456-7 10/10/23 17:01

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	ug/l	ug/l	ug/l	%		%	
Ammonia Nitrogen	5000	3900	8310	88.1	1	90.0-110	J6

L1664103-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L1664103-03 10/10/23 17:00 • (MS) R3984456-7 10/10/23 17:01

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier

Sample Narrative:

MS: Spike failed due to matrix

Method Blank (MB)

(MB) R3984221-1 10/10/23 12:50

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
COD	U		11700	20000

L1663353-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663353-01 10/10/23 12:52 • (DUP) R3984221-3 10/10/23 12:53

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	62400	58400	1	6.48		20

L1663868-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663868-01 10/10/23 12:58 • (DUP) R3984221-6 10/10/23 12:58

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	U	U	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3984221-2 10/10/23 12:50

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
COD	500000	521000	104	90.0-110	

L1663610-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663610-06 10/10/23 12:56 • (MS) R3984221-4 10/10/23 12:56 • (MSD) R3984221-5 10/10/23 12:56

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
COD	500000	29600	520000	538000	98.0	102	1	90.0-110			3.52	20

Method Blank (MB)

(MB) R3985322-1 10/12/23 10:59

Analyte	MB Result umhos/cm	MB Qualifier	MB MDL umhos/cm	MB RDL umhos/cm
Specific Conductance	U		10.0	10.0

Sample Narrative:
BLANK: at 25C

L1663302-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663302-01 10/12/23 10:59 • (DUP) R3985322-3 10/12/23 10:59

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	43300	43300	1	0.000		20

Sample Narrative:
OS: at 25C
DUP: at 25C

L1664194-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1664194-01 10/12/23 10:59 • (DUP) R3985322-4 10/12/23 10:59

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	200	204	1	1.83		20

Sample Narrative:
OS: at 25C
DUP: at 25C

Laboratory Control Sample (LCS)

(LCS) R3985322-2 10/12/23 10:59

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	732	754	103	85.0-115	

Sample Narrative:
LCS: at 25C

Method Blank (MB)

(MB) R3986690-1 10/13/23 09:10

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Chloride	U		379	1000
Fluoride	U		64.0	150

L1664045-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1664045-01 10/13/23 22:47 • (DUP) R3986690-3 10/13/23 23:00

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	17200	16900	1	1.54		15
Fluoride		U	1	0.000		15

L1664052-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1664052-03 10/14/23 03:21 • (DUP) R3986690-6 10/14/23 03:35

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	10600	10500	1	0.929		15
Fluoride	U	U	1	0.000		15

Laboratory Control Sample (LCS)

(LCS) R3986690-2 10/13/23 09:23

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40000	39400	98.6	80.0-120	
Fluoride	8000	7740	96.8	80.0-120	

L1664045-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1664045-01 10/13/23 22:47 • (MS) R3986690-4 10/13/23 23:14 • (MSD) R3986690-5 10/13/23 23:55

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	40000	17200	54800	54900	94.0	94.1	1	80.0-120			0.0781	15
Fluoride	8000		8160	8200	102	102	1	80.0-120			0.438	15

L1664052-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L1664052-03 10/14/23 03:21 • (MS) R3986690-7 10/14/23 03:48

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	40000	10600	49400	97.0	1	80.0-120	
Fluoride	8000	U	8130	102	1	80.0-120	

Method Blank (MB)

(MB) R3985771-2 10/12/23 12:09

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
TOC (Total Organic Carbon)	121	J	102	1000

L1663633-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1663633-05 10/12/23 13:06 • (DUP) R3985771-3 10/12/23 13:32

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	14200	14400	1	1.40		20

L1663702-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1663702-06 10/12/23 16:25 • (DUP) R3985771-6 10/12/23 16:39

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	2290	2260	1	1.54		20

Laboratory Control Sample (LCS)

(LCS) R3985771-1 10/12/23 11:57

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TOC (Total Organic Carbon)	25000	25900	103	85.0-115	

L1663702-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663702-05 10/12/23 14:45 • (MS) R3985771-4 10/12/23 15:09 • (MSD) R3985771-5 10/12/23 15:34

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	25000	1630	27600	27300	104	103	1	80.0-120			0.838	20

L1663702-18 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663702-18 10/12/23 19:10 • (MS) R3985771-7 10/12/23 19:33 • (MSD) R3985771-8 10/12/23 20:01

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	25000	2020	27900	27700	104	103	1	80.0-120			0.683	20

Method Blank (MB)

(MB) R3986340-1 10/14/23 11:03

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Calcium,Dissolved	U		79.3	1000
Iron,Dissolved	U		18.0	100
Manganese,Dissolved	U		0.934	10.0
Potassium,Dissolved	288	J	261	2000
Silicon,Dissolved	U		27.9	200
Sodium,Dissolved	U		504	3000

Method Blank (MB)

(MB) R3986916-1 10/16/23 21:42

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Magnesium,Dissolved	U		85.3	1000

Method Blank (MB)

(MB) R3987220-1 10/17/23 12:51

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Silicon,Dissolved	U		27.9	200

Laboratory Control Sample (LCS)

(LCS) R3986340-2 10/14/23 11:06

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Calcium,Dissolved	10000	10000	100	80.0-120	
Iron,Dissolved	10000	9830	98.3	80.0-120	
Manganese,Dissolved	1000	1010	101	80.0-120	
Potassium,Dissolved	10000	10100	101	80.0-120	
Silicon,Dissolved	1000	1010	101	80.0-120	
Sodium,Dissolved	10000	10200	102	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3986916-2 10/16/23 21:45

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Magnesium,Dissolved	10000	9640	96.4	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3987220-2 10/17/23 12:53

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Silicon,Dissolved	1000	941	94.1	80.0-120	

L1663868-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663868-01 10/14/23 11:08 • (MS) R3986340-4 10/14/23 11:37 • (MSD) R3986340-5 10/14/23 11:40

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Calcium,Dissolved	10000	13700	24600	24500	109	108	1	75.0-125			0.413	20
Iron,Dissolved	10000	21.6	10000	9920	99.8	99.0	1	75.0-125			0.800	20
Manganese,Dissolved	1000	U	1010	1000	101	100	1	75.0-125			0.773	20
Potassium,Dissolved	10000	4990	14800	14800	98.3	97.8	1	75.0-125			0.305	20
Sodium,Dissolved	10000	29900	39100	39200	92.1	93.1	1	75.0-125			0.268	20

L1663868-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663868-01 10/16/23 21:48 • (MS) R3986916-4 10/16/23 21:53 • (MSD) R3986916-5 10/16/23 21:56

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Magnesium,Dissolved	10000	6770	16200	16100	94.0	93.2	1	75.0-125			0.503	20

L1663868-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663868-01 10/17/23 12:56 • (MS) R3987220-4 10/17/23 13:02 • (MSD) R3987220-5 10/17/23 13:05

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Silicon,Dissolved	1000	22400	23400	23300	97.4	84.9	1	75.0-125	E	E	0.537	20

Method Blank (MB)

(MB) R3985686-1 10/12/23 20:10

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Calcium	U		79.3	1000
Magnesium	U		85.3	1000

Laboratory Control Sample (LCS)

(LCS) R3985686-2 10/12/23 20:12

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Calcium	10000	10200	102	80.0-120	
Magnesium	10000	9760	97.6	80.0-120	

L1663800-15 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663800-15 10/12/23 20:15 • (MS) R3985686-4 10/12/23 20:20 • (MSD) R3985686-5 10/12/23 20:23

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Calcium	10000	27700	36600	36500	88.4	87.8	1	75.0-125			0.165	20
Magnesium	10000	13800	22500	22600	86.5	87.4	1	75.0-125			0.416	20

Method Blank (MB)

(MB) R3985095-1 10/11/23 22:42

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Antimony	U		1.03	4.00
Arsenic	U		0.180	2.00
Barium	U		0.381	2.00
Beryllium	U		0.190	2.00
Cadmium	U		0.150	1.00
Chromium	U		1.24	2.00
Copper	U		1.51	5.00
Cobalt	U		0.0596	2.00
Lead	U		0.849	2.00
Nickel	U		0.816	2.00
Selenium	U		0.300	2.00
Silver	U		0.0700	2.00
Thallium	U		0.121	2.00
Vanadium	U		0.664	5.00
Zinc	U		3.02	25.0

Laboratory Control Sample (LCS)

(LCS) R3985095-2 10/11/23 22:45

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony	50.0	54.9	110	80.0-120	
Arsenic	50.0	54.5	109	80.0-120	
Barium	50.0	54.3	109	80.0-120	
Beryllium	50.0	55.2	110	80.0-120	
Cadmium	50.0	54.5	109	80.0-120	
Chromium	50.0	56.1	112	80.0-120	
Copper	50.0	50.9	102	80.0-120	
Cobalt	50.0	55.1	110	80.0-120	
Lead	50.0	54.8	110	80.0-120	
Nickel	50.0	54.4	109	80.0-120	
Selenium	50.0	57.9	116	80.0-120	
Silver	50.0	58.5	117	80.0-120	
Thallium	50.0	53.8	108	80.0-120	
Vanadium	50.0	55.3	111	80.0-120	
Zinc	50.0	53.4	107	80.0-120	

L1663702-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663702-01 10/11/23 22:48 • (MS) R3985095-4 10/11/23 22:55 • (MSD) R3985095-5 10/11/23 22:58

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	50.0	U	53.3	53.2	107	106	1	75.0-125			0.107	20
Arsenic	50.0	U	51.3	53.0	103	106	1	75.0-125			3.28	20
Barium	50.0		71.9	73.5	106	110	1	75.0-125			2.29	20
Beryllium	50.0	U	54.0	53.7	108	107	1	75.0-125			0.646	20
Cadmium	50.0	0.168	55.0	54.3	110	108	1	75.0-125			1.28	20
Chromium	50.0	2.16	54.3	746	104	1490	1	75.0-125		J3 J5	173	20
Copper	50.0	U	50.0	67.6	100	135	1	75.0-125		J3 J5	30.0	20
Cobalt	50.0	0.0862	51.5	57.2	103	114	1	75.0-125			10.4	20
Lead	50.0		53.3	53.8	107	108	1	75.0-125			0.955	20
Nickel	50.0	0.939	53.2	373	104	743	1	75.0-125		J3 J5	150	20
Selenium	50.0		58.9	56.6	118	113	1	75.0-125			4.12	20
Silver	50.0		57.4	56.9	115	114	1	75.0-125			0.730	20
Thallium	50.0	0.165	51.7	52.3	103	104	1	75.0-125			1.25	20
Vanadium	50.0	U	51.9	57.0	104	114	1	75.0-125			9.23	20
Zinc	50.0	3.31	53.2	53.4	99.8	100	1	75.0-125			0.396	20

Method Blank (MB)

(MB) R3985563-3 10/09/23 10:35

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Acrolein	U		2.54	50.0
Acrylonitrile	U		0.671	10.0
Benzene	U		0.0941	1.00
Bromobenzene	U		0.118	1.00
Bromodichloromethane	U		0.136	1.00
Bromoform	U		0.129	1.00
Bromomethane	U		0.605	5.00
n-Butylbenzene	U		0.157	1.00
sec-Butylbenzene	U		0.125	1.00
tert-Butylbenzene	U		0.127	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chlorodibromomethane	U		0.140	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
Chloromethane	U		0.960	2.50
2-Chlorotoluene	U		0.106	1.00
4-Chlorotoluene	U		0.114	1.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dibromoethane	U		0.126	1.00
Dibromomethane	U		0.122	1.00
1,2-Dichlorobenzene	U		0.107	1.00
1,3-Dichlorobenzene	U		0.110	1.00
1,4-Dichlorobenzene	U		0.120	1.00
Dichlorodifluoromethane	U		0.374	5.00
1,1-Dichloroethane	U		0.100	1.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
cis-1,2-Dichloroethene	U		0.126	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
1,1-Dichloropropene	U		0.142	1.00
1,3-Dichloropropane	U		0.110	1.00
cis-1,3-Dichloropropene	U		0.111	1.00
trans-1,3-Dichloropropene	U		0.118	1.00
2,2-Dichloropropane	U		0.161	1.00
Di-isopropyl ether	U		0.105	1.00
Ethylbenzene	U		0.137	1.00
Hexachloro-1,3-butadiene	U		0.337	1.00

Method Blank (MB)

(MB) R3985563-3 10/09/23 10:35

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Isopropylbenzene	U		0.105	1.00
p-Isopropyltoluene	U		0.120	1.00
2-Butanone (MEK)	U		1.19	10.0
Methylene Chloride	U		0.430	5.00
4-Methyl-2-pentanone (MIBK)	U		0.478	10.0
Methyl tert-butyl ether	U		0.101	1.00
Naphthalene	U		1.00	5.00
n-Propylbenzene	U		0.0993	1.00
Styrene	U		0.118	1.00
1,1,1,2-Tetrachloroethane	U		0.147	1.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
1,1,2-Trichlorotrifluoroethane	U		0.180	1.00
Tetrachloroethene	U		0.300	1.00
Toluene	U		0.278	1.00
1,2,3-Trichlorobenzene	U		0.230	1.00
1,2,4-Trichlorobenzene	U		0.481	1.00
1,1,1-Trichloroethane	U		0.149	1.00
1,1,2-Trichloroethane	U		0.158	1.00
Trichloroethene	U		0.190	1.00
Trichlorofluoromethane	U		0.160	5.00
1,2,3-Trichloropropane	U		0.237	2.50
1,2,4-Trimethylbenzene	U		0.322	1.00
1,2,3-Trimethylbenzene	U		0.104	1.00
1,3,5-Trimethylbenzene	U		0.104	1.00
Vinyl chloride	U		0.234	1.00
Xylenes, Total	U		0.174	3.00
(S) Toluene-d8	*110*			*80.0-120*
(S) 4-Bromofluorobenzene	*99.6*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*112*			*70.0-130*

Method Blank (MB) - TENTATIVELY IDENTIFIED COMPOUNDS

(MB) R3985563-3 10/09/23 10:35

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l	CAS #

Number of TICs found: 0

Tentatively Identified compounds (TIC) refers to substances not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search routine of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist. Quantitation is accomplished by relative peak area of the TIC compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is 10% or more of that of the nearest internal standard.

Laboratory Control Sample (LCS)

(LCS) R3985563-1 10/09/23 09:34

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	25.0	29.2	117	19.0-160	
Acrolein	25.0	26.5	106	10.0-160	
Acrylonitrile	25.0	29.1	116	55.0-149	
Benzene	5.00	5.66	113	70.0-123	
Bromobenzene	5.00	5.38	108	73.0-121	
Bromodichloromethane	5.00	5.39	108	75.0-120	
Bromoform	5.00	4.94	98.8	68.0-132	
Bromomethane	5.00	5.47	109	10.0-160	
n-Butylbenzene	5.00	5.15	103	73.0-125	
sec-Butylbenzene	5.00	5.63	113	75.0-125	
tert-Butylbenzene	5.00	5.62	112	76.0-124	
Carbon tetrachloride	5.00	5.82	116	68.0-126	
Chlorobenzene	5.00	5.48	110	80.0-121	
Chlorodibromomethane	5.00	5.15	103	77.0-125	
Chloroethane	5.00	5.81	116	47.0-150	
Chloroform	5.00	5.45	109	73.0-120	
Chloromethane	5.00	6.41	128	41.0-142	
2-Chlorotoluene	5.00	5.56	111	76.0-123	
4-Chlorotoluene	5.00	5.42	108	75.0-122	
1,2-Dibromo-3-Chloropropane	5.00	4.57	91.4	58.0-134	
1,2-Dibromoethane	5.00	5.56	111	80.0-122	
Dibromomethane	5.00	5.49	110	80.0-120	
1,2-Dichlorobenzene	5.00	5.34	107	79.0-121	
1,3-Dichlorobenzene	5.00	5.55	111	79.0-120	
1,4-Dichlorobenzene	5.00	5.25	105	79.0-120	
Dichlorodifluoromethane	5.00	5.98	120	51.0-149	
1,1-Dichloroethane	5.00	5.74	115	70.0-126	
1,2-Dichloroethane	5.00	5.53	111	70.0-128	
1,1-Dichloroethene	5.00	5.66	113	71.0-124	
cis-1,2-Dichloroethene	5.00	5.88	118	73.0-120	
trans-1,2-Dichloroethene	5.00	5.73	115	73.0-120	
1,2-Dichloropropane	5.00	5.62	112	77.0-125	
1,1-Dichloropropene	5.00	5.59	112	74.0-126	
1,3-Dichloropropane	5.00	5.61	112	80.0-120	
cis-1,3-Dichloropropene	5.00	5.35	107	80.0-123	
trans-1,3-Dichloropropene	5.00	5.18	104	78.0-124	
2,2-Dichloropropane	5.00	5.97	119	58.0-130	
Di-isopropyl ether	5.00	5.52	110	58.0-138	
Ethylbenzene	5.00	5.19	104	79.0-123	
Hexachloro-1,3-butadiene	5.00	5.71	114	54.0-138	

Laboratory Control Sample (LCS)

(LCS) R3985563-1 10/09/23 09:34

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Isopropylbenzene	5.00	5.45	109	76.0-127	
p-Isopropyltoluene	5.00	5.75	115	76.0-125	
2-Butanone (MEK)	25.0	25.7	103	44.0-160	
Methylene Chloride	5.00	5.64	113	67.0-120	
4-Methyl-2-pentanone (MIBK)	25.0	27.7	111	68.0-142	
Methyl tert-butyl ether	5.00	5.38	108	68.0-125	
Naphthalene	5.00	3.11	62.2	54.0-135	
n-Propylbenzene	5.00	5.41	108	77.0-124	
Styrene	5.00	5.04	101	73.0-130	
1,1,1,2-Tetrachloroethane	5.00	5.35	107	75.0-125	
1,1,2,2-Tetrachloroethane	5.00	5.17	103	65.0-130	
1,1,2-Trichlorotrifluoroethane	5.00	5.45	109	69.0-132	
Tetrachloroethene	5.00	5.73	115	72.0-132	
Toluene	5.00	5.56	111	79.0-120	
1,2,3-Trichlorobenzene	5.00	4.65	93.0	50.0-138	
1,2,4-Trichlorobenzene	5.00	4.61	92.2	57.0-137	
1,1,1-Trichloroethane	5.00	5.57	111	73.0-124	
1,1,2-Trichloroethane	5.00	5.28	106	80.0-120	
Trichloroethene	5.00	5.77	115	78.0-124	
Trichlorofluoromethane	5.00	6.48	130	59.0-147	
1,2,3-Trichloropropane	5.00	5.91	118	73.0-130	
1,2,4-Trimethylbenzene	5.00	5.51	110	76.0-121	
1,2,3-Trimethylbenzene	5.00	5.52	110	77.0-120	
1,3,5-Trimethylbenzene	5.00	5.39	108	76.0-122	
Vinyl chloride	5.00	6.03	121	67.0-131	
Xylenes, Total	15.0	16.3	109	79.0-123	
(S) Toluene-d8			*108*	*80.0-120*	
(S) 4-Bromofluorobenzene			*102*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*111*	*70.0-130*	

GLOSSARY OF TERMS

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.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RT	Retention Time.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
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
B	The same analyte is found in the associated blank.
C3	The reported concentration is an estimate. The continuing calibration standard associated with this data responded low. Method sensitivity check is acceptable.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

ACCREDITATIONS & LOCATIONS

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:
PBS Engineering & Env.- POR

390 NE Emerson Ave
Suite 201
Bend. OR 97701

Billing Information:
Accounts Payable
4412 S Corbett Ave
Portland, OR 97239

Pres Chk

Report to:
Holly Burnett

Email To: **Holly.Burnett@pbsusa.com**
toby.scott@pbsusa.com

Project Description: Moon Pit

City/State Collected: Bend, OR

Please Circle: (PT) MT CT ET

Phone: 541-388-9290

Client Project # 81087.000

Lab Project # **PBSENGPOR-MOONPIT**

Collected by (print): Holly Burnett

Site/Facility ID #

P.O. #

Collected by (signature): HBurnett

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

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	COD 250mlHDPE-H2SO4	FF Alk(tot,bi,ca) 125mlHDPE-NoPres	FF Ammonia 250mlHDPE-H2SO4	FF Cl,F,SO4 125mlHDPE-NoPres	FF Diss Metals** 250mlHDPE HNO3	Spec Con,Tot Alk 250mlHDPE-NoPres	TDS,TSS 1L-HDPE NoPres	TOC 250mlAmb-HCl	Total Metals* 250mlHDPE-HNO3	VOCs+TICs 8260TIC 40mlAmb-HCl	Remarks	Sample # (lab only)
									L2		L2				L2			
MP-B-01	G	GW		10-5-23	1034	14	X	X	X	X	X	X	X	X	X	X		-01

Chain of Custody Page 1 of 1

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 # 166387
F051

Acctnum: **PBSENGPOR**
Template: **T239069**
Prelogin: **P1028670**
PM: **110 - Brian Ford**
PB:
Shipped Via:

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

Remarks:*Total Metals=Ag,As,Ba,Be,Cd,Co,Cr,Cu,Ni,Pb,Sb,Se,Tl,V,Zn 6020;Ca,Mg 6010;Hard.
****FF Diss Metals=Ca,Fe,K,Mg,Mn,Na,Si,SILICA 6010.**

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 6841 8340 9522

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:		N
Preservation Correct/Checked:		Y N
RAD Screen <0.5 mR/hr:		Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: (Yes) / No HCL / MeoH TBR	Hold:
HBurnett	10-5-23	1500			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received: CCAB .5+0=5.0	If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 10/6/23 Time: 9:00	Condition: NCF / (OK)

Burlington, WA *Corporate Laboratory (a)*
1620 S Walnut St - Burlington, WA 98233 - **800.755.9295** • 360.757.1400

Bellingham, WA *Microbiology (b)*
805 Orchard Dr Ste 4 - Bellingham, WA 98225 - 360.715.1212

Portland, OR *Microbiology/Chemistry (c)*
9725 SW Commerce Cr Ste A2 - Wilsonville, OR 97070 - 503.682.7802

Corvallis, OR *Microbiology/Chemistry (d)*
1100 NE Circle Blvd, Ste 130 - Corvallis, OR 97330 - 541.753.4946

Bend, OR *Microbiology (e)*
20332 Empire Blvd Ste 4 - Bend, OR 97701 - 541.639.8425

Data Report

Client Name: PBS Engineering and Environmental
390 NE Emerson Ave
STE 201
Bend, OR 97701

Reference Number: **23-30754**
Project: Moon Pit

Report Date: 10/12/23

Date Received: 10/5/23
Approved by: pap
Authorized by:

Michelle R Angland
Lab Manager, Bend

Sample Description: MP-B-01 Moon Pit — Matrix W — Sample Date: 10/5/23 10:34 am
Lab Number: 61152 — Sample Comment: — Collected By: HB

CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment
14797-65-0	**NITRITE-N**	ND	0.010	0.006	**mg/L**	1.0	SM4500-NO3 F	c	10/6/23	PDK	cno3_231006	
14797-55-8	**NITRATE-N**	0.82	0.005	0.0035	**mg/L**	1.0	SM4500-NO3 F	c	10/6/23	PDK	cno3_231006	

Notes:
ND = Not detected above the listed practical quantitation limit (PQL) or not above the Method Detection Limit (MDL), if requested.
PQL = Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions.
D.F. - Dilution Factor

If you have any questions concerning this report contact us at the above phone number.

Subtask 8 – Geology/Hydrogeology Assessment

Roth East Site
Deschutes County, Oregon

Prepared for:
Parametrix, Inc.
150 NW Pacific Park Lane, Suite 110
Bend, Oregon 97701

February 2024
PBS Project 81087.000, Phase 0004, Task 002

390 NE EMERSON AVENUE
SUITE 201
BEND, OR 97701
541.388.9290 MAIN
866.727.0140 FAX
PBSUSA.COM

Table of Contents

Supporting Data

FIGURES

TABLES

APPENDICES

1 INTRODUCTION

PBS Engineering and Environmental Inc. (PBS) was retained by Parametrix Inc. to provide geologic consulting services for the Deschutes County Landfill Siting Project. Parametrix is contracted with the Deschutes County Solid Waste Department to assist with the selection of a new Deschutes County Landfill site.

This report and attachments provide a summary of the regional geology, site geology, site hydrogeology, and site groundwater quality for the Roth East Site (Site; see Figures 1 and 2).

2 REGIONAL GEOLOGY

The Site is located within the High Lava Plains Physiographic Province of Central Oregon. This region is characterized by a combination of Neogene period (23 to 2.6 million years ago) basaltic lava flows, rhyolitic tuff and tuffaceous sediments, and rhyolitic dome complexes, such as Pine Mountain to the southeast of the Site. The High Lava Plains (HLP) is situated at the northern edge of the Basin and Range geologic province where a shift from northwest extension through northeast-trending faults to a system of west-northwest trending *en echelon* normal faults occurs. This system of west-northwest trending faults, known as the Brothers Fault Zone (BFZ), is believed to represent the surface expression of deep-seated right-lateral shear accommodating the termination of Basin and Range extension.[1] The BFZ is believed to have been active in the Pliocene epoch (approximately 5.3 to 2.6 million years ago) of the Neogene period within the HLP.[2] According to the USGS Quaternary Faults database[3], there are no recently active faults (i.e. Holocene; within the last 12,000 years) within 16.5 miles of the Site; however, numerous older faults associated with the BFZ have surficially impacted the HLP volcanics near the site.

The BFZ provided pathways for the mid-Miocene-age volcanism within the HLP. HLP volcanics within and to the south, southeast, east, and northeast of the Site, which are known as the Bear Creek Buttes and dated to approximately 7.5 million years, within the Miocene epoch of the Neogene period, are linked to vents in the HLP.[4] The Oregon Badlands, situated to the northwest of the Site, is a lava flow dating back approximately 80,000 years and believed to be sourced from Newberry Volcano and transported through lava tubes to an area roughly 2.75 miles northwest of the site. The Oregon Badlands basalt does not appear to be offset by the BFZ, which provides further evidence of the age of BFZ faulting.

3 SITE GEOLOGY

The proposed development area of the Site is located at elevations ranging from approximately 4,450 to 4,600 feet above mean sea level and lies atop alluvial deposits along the northern flank of Pine Mountain and directly downslope from small buttes mapped as Pliocene lava flows that have been uplifted by faults[5] (see Figure 2). These buttes reach a maximum elevation of 5,550 feet, but the buttes directly upslope of the proposed development area reach 5,112 feet elevation. The alluvial deposits at the Site may originate from Pine Mountain, the uplifted Pliocene flows, Newberry Volcano, which produced lava flows reaching the southern edge of Pine Mountain and Millican Valley as recently as 7,700 years ago.[6] Alluvial deposits at the Site may include talus, slope wash, fanglomerate, and windblown deposits.

[1] https://pubs.usgs.gov/of/2003/ofr-03-095/OFR_03_095_text.pdf
[2] https://www.deschutesmeridian.com/IAOS/pdf/tucker_1976.pdf
[3] https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf
[4] https://pubs.usgs.gov/wri/2002/4015/wri02-4015.pdf
[5] https://ngmdb.usgs.gov/Prodesc/proddesc_1708.htm
[6] https://pubs.usgs.gov/fs/2011/3145/fs2011-3145.pdf

Published geological interpretations align with surface observations made onsite in October 2023 and the unconsolidated stratigraphy revealed during a geotechnical investigation conducted at the site in September 2023 (Delve Underground, 2023). A geophysical study carried out by Siemens and Associates in 2023 estimated at least 300 feet of unconsolidated alluvial deposits overlying bedrock beneath the proposed development area. Moreover, sediment thickness within areas of the Millican Valley is reported to exceed 445 feet.[7] During the geotechnical investigation, which was conducted to verify observations made during the geophysical survey, three boreholes (B-1, B-2, and B-3) were advanced to depths of 100 to 150 feet in the northern and central portions of the proposed development area (Figure 2). The subsurface strata encountered generally consisted of subrounded basalt and tuff gravel mixed with varying proportions of silt and sand in 6- to 12-inch layers typical of alluvial deposits. Groundwater or saturated strata was not encountered in the three investigated borings. Bedrock was not encountered during the investigation, but according to nearby well logs is likely to be basalt associated with the HLP. The Site's surface soil includes a notable quantity of pebbles and cobbles, which gradually diminishes in size and quantity downslope towards the lacustrine Millican Valley floor to the northwest.

4 HYDROGEOLOGY

The Site is located near the far eastern edge of the Upper Deschutes Basin. The regional groundwater flow direction from the Millican Valley is to the north-northwest, roughly following topography and the path of Dry River, which once catastrophically drained Lake Millican to the northwest, eventually reaching the Crooked River east of Redmond. A simplified model of the Upper Deschutes Basin[8] estimates the regional groundwater elevation at the proposed development area to be approximately 3,800 feet above mean level (see Figure 3). This model uses the recorded static water levels from the installation of select nearby water wells to create an approximate groundwater surface.

A well located near the southwestern corner of the Site (DESC 194; a.k.a., the Powell Well or Deep Well) and situated approximately 1.1 miles from the proposed development area at an elevation of roughly 4,800 feet (600 feet above the Millican Valley floor), reports a depth to water of 970 feet (measured during installation in 1990), indicating a groundwater elevation of approximately 3,830 feet. The geophysical investigation conducted by Siemens and Associates indicates that first bedrock is located at a depth of greater than 300 feet below the surface of the proposed development area, corresponding to an approximate elevation range of 4,150 to 4,300 feet.

Water wells within the presumed footprint of prehistoric Lake Millican (below an elevation of approximately 4,300 feet) have reportedly encountered a saturated zone near the bottom of the approximately 450-feet-thick sedimentary sequence, with yields of less than 20 gal/min.[9] This was confirmed by review of the DESC 1603 and DESC 1371 well logs (summarized in the table below), which are located approximately 2.7 miles and 1.9 miles northwest of the proposed development area, respectively. This suggests that the bedrock underlying alluvial sediment within the Lake Millican footprint may separate a shallow water bearing zone from the deeper regional aquifer. Well logs of water wells to the east and northeast of the proposed development area report screened intervals generally consistent with the expected regional aquifer elevation, based on the simplified model, rather than being evident of a shallow water bearing zone. This observation was confirmed by reviewing eight water well logs from wells advanced between elevations of approximately 4,300 and 4500 feet. The approximate location of reviewed wells is based on the Oregon Water Resources Department's (OWRD) water well report location descriptions and have not been field verified (See Figure 3).

[7] https://pubs.usgs.gov/wri/2002/4015/wri02-4015.pdf
[8] https://pubs.usgs.gov/wri/2002/4015/wri02-4015.pdf
[9] https://pubs.usgs.gov/wri/2002/4015/wri02-4015.pdf

The field verified on site Powell Well (DESC 194), appears to be correlated with the regional aquifer and has a reported estimated yield of 50 gal/min based on a well test conducted at time of well completion. See table below for a summary of reviewed well logs.

Well ID	Owner Name	Completion Date	First Water	Static Water	Screened Interval	Reported Yield (gpm)	Potential Confining Layers Above Groundwater?	Interpreted Bedrock Depth
DESC 194	Lloyd Powell	8/6/1990	970	970	Open hole to 995	50	Yes	Near surface
DESC 1371	Panelope A Behre	6/10/1992	398	398	Open hole to 425	10	Yes	Not encountered
DESC 1603	Earl Conyers	12/16/1992	371	352	330-347	12	Yes	397
DESC 6477	Jack Vogt	9/1/1972	NR	485	Open hole to 498	3	Unknown	Unknown
DESC 6478/50803	Hershel Haley	11/15/1969	NR	NR	No water	No water	No water	235
DESC 6479/50804	Hershel Haley	11/19/1969	NR	450	Open hole to 655	12	Yes	275
DESC 52142	Larry Waugman	1/16/1999	465	435	425-505	20	Yes	505
DESC 54733	Pieratt Bros, Inc	2/28/2002	495	495	505-545	15	Unknown	Not encountered
DESC 58094	Doug McGee	6/27/2007	499	480	524-544	15	Yes	Not encountered
DESC 58210	Bill Grafton	9/7/2007	476	423	505-525 545-565	35	Yes	Not encountered
DESC 62152	Mark&Ann Mallot	7/9/2020	460	480	570-590	10	Yes	Not encountered

Notes:
All information based on information provided in OWRD water well logs
Measurements in feet below ground surface
gpm - gallons per minute
NR: Not Reported

5 SITE GROUNDWATER QUALITY

The Powell Well (DESC 194) was purged a minimum of approximately three well volumes of the last recorded water column height of the well (20 feet). Groundwater was purged at a hose connection for approximately 15 minutes, at a flow rate of approximately 19 liters (5 gallons) per minute. Groundwater purged from this well was discharged onto the ground surface, and over 80 gallons of water was purged from this well prior to sampling.

Field parameters, including temperature, pH, specific conductivity, and turbidity were measured every three minutes as the well was purged. The field parameter data are presented on the groundwater sampling field form, included as an attachment.

Groundwater samples were collected from the Powell Well (DESC 194) following purging and the stabilization of the field indicator parameters, i.e., three consecutive readings within ±3 percent (specific conductivity), ±.1 pH units (pH), ±10 percent (turbidity), and 1° Celsius (temperature) of one another. The well was sampled using clean dedicated tubing connected to the spigot near the wellhead.
The samples were collected into laboratory-supplied containers with preservatives as indicated by the laboratory method. For the analysis of dissolved concentrations of anions, cations, and metals, groundwater was field filtered for each analysis using a 0.45-micron filter and a peristaltic pump to control flow. A new, dedicated filter and disposable pump tubing were used for the filtering process. Immediately after sample collection, each sample was placed into a cooler with ice. The samples were then submitted to Pace Analytical National Center for Testing and Innovation (Pace) of Mt. Juliet, Tennessee for analysis. Due to short holding times, the samples collected for nitrate-nitrite were submitted to Edge Analytical (Edge) of Bend, Oregon for

laboratory analysis. A summary of the analytical testing results for the sampling events is presented in Table 1. Copies of the analytical laboratory reports and chain-of-custody documentation are included as attachments.

A PBS chemist reviewed the data in accordance with the procedures specified in the U. S. Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Organic Data Review[10] and Inorganic Data Review[11] as applicable. A data quality review of the sampling data verified the following:

- No constituents were reported above the EPA Maximum Contaminant Level (MCL) or the OAR 340-40 numerical groundwater quality reference levels (Table 1).
- The concentrations of dissolved iron, sulfate, and arsenic are flagged with the qualifier "J," meaning these are estimated values between the reporting detection limit (RDL) and method detection limit (MDL).

All data was considered usable for project objectives.

Table 2 provides the cation-anion balance summary for the well sampling event. The calculations are used as a quality check on the design of the sampling program or the laboratory performance. The calculations consist of the percent difference (PD) between the milliequivalents per liter (meq/l) concentrations of cations and anions. For analytes that were not detected, the MRL for the analyte was used in the calculation. Carbonate and ammonia were not detected above the MRL. The PD value for the sample results was +16.15 percent. Total cation concentrations (positive PD values) were greater than total anion concentrations (negative PD values). The typical acceptable range for the PD is +/- 10 percent for wells constructed for groundwater monitoring (i.e. monitoring wells). Given the samples were collected from a water supply well rather than a well designed for groundwater monitoring the slightly higher PD is to be expected.

Please feel free to contact either of us at 541.388.9290 or via email at kyle.johnson@pbsusa.com or toby.scott@pbsusa.com with any questions or comments.

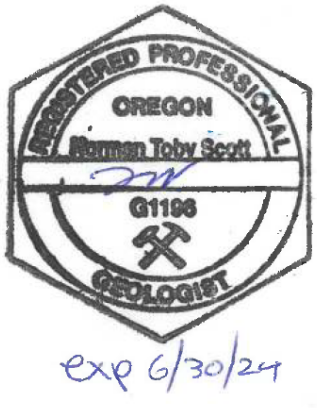
Sincerely,

2/6/2024

Kyle Johnson, RG Date
Project Geologist

2/6/2024

Toby Scott, RG Date
Senior Project Manager



exp 6/30/24

[10] Environmental Protection Agency (EPA). (October 1999). Contract Laboratory Program National Functional Guidelines for Organic Data Review.
[11] EPA. (October 2004). Inorganic Data Review.

Figures

Vicinity Map

Roth East Site

Date: February 2024 | Project: 81087.000

Figure: 1

Site/Taxlot Boundary

Proposed Development Area

20 Meter (approx. 65') Elevation Contour Interval

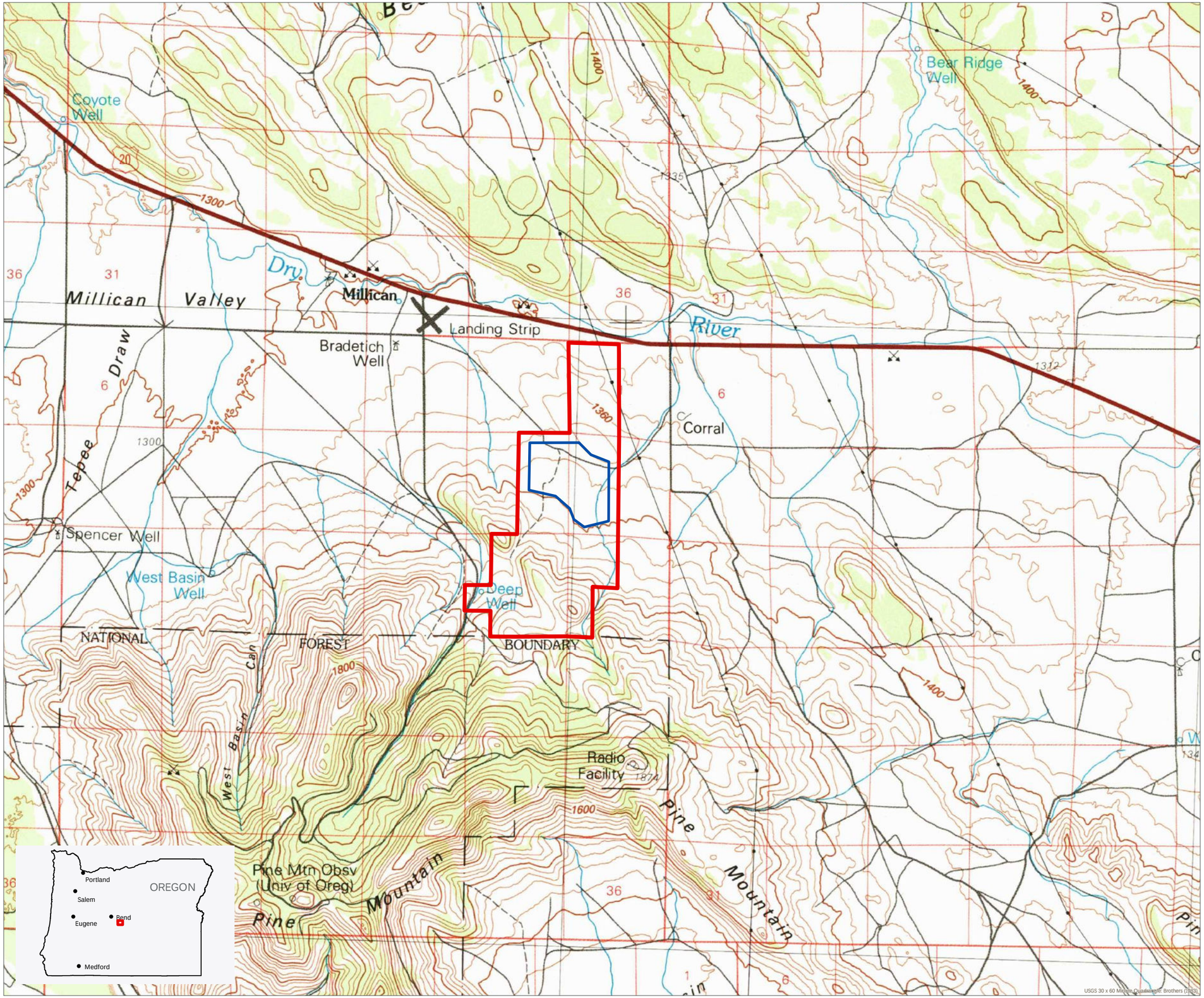
N

1 INCH = 5,000 FEET

0 5,000 10,000 Feet

PBS

This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

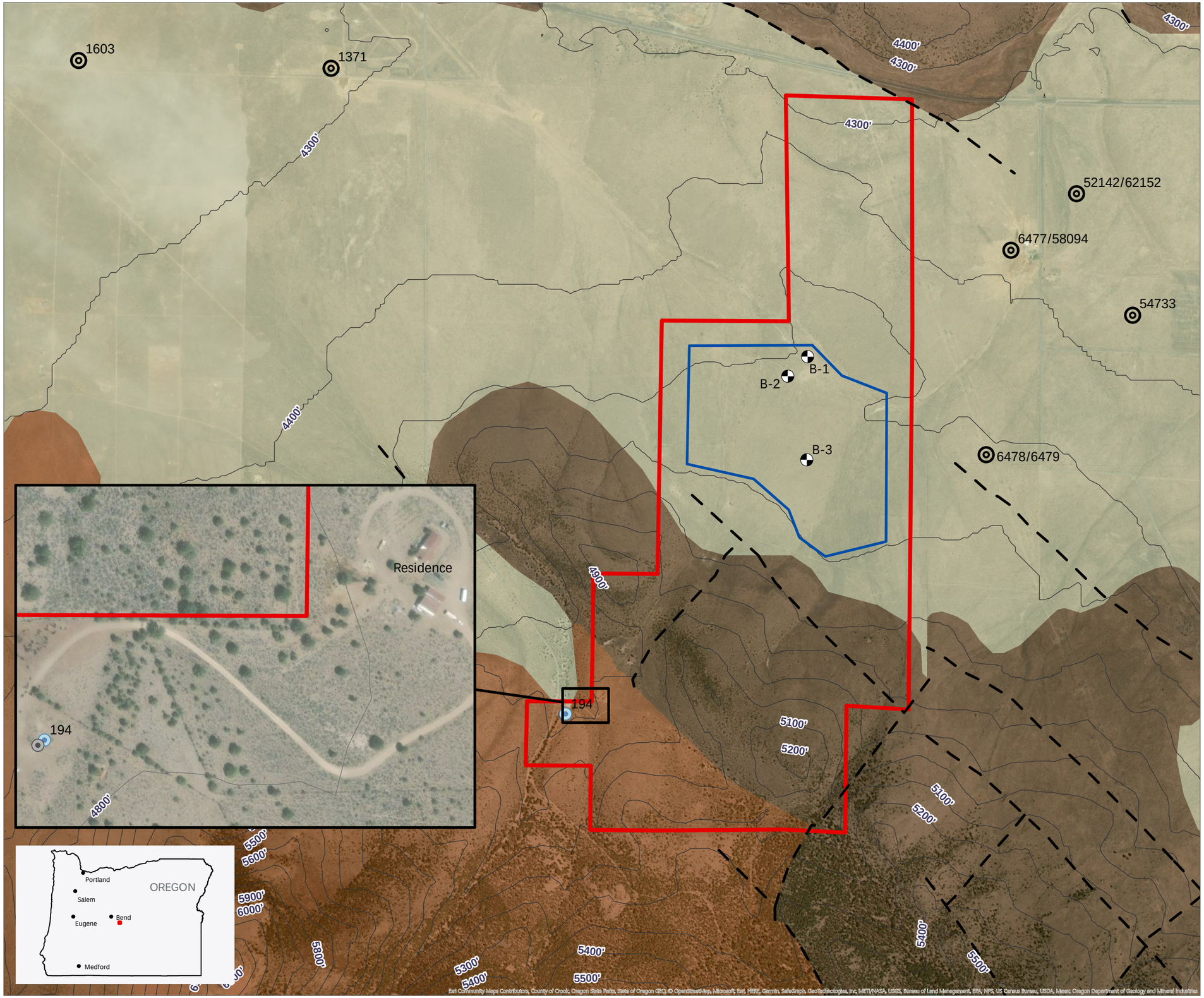


Surface Geologic Map

Roth East Site

Date: February 2024 | Project: 81087.000

Figure: 2



- Onsite Active Water Well
- Onsite Inactive Water Well
- Approximate Locations of Reviewed Well Log
- Elevation Contour (100 ft interval)
- Pre-Holocene Faults (DOGAMI, 2020)
- Quaternary Surficial Deposits
- Neogene Silicic Vent Deposits
- Neogene High Lava Plains Basalt
- Proposed Development Area
- Site/Taxlot Boundary

N

1 INCH = 2,000 FEET

0 2,000 4,000 Feet

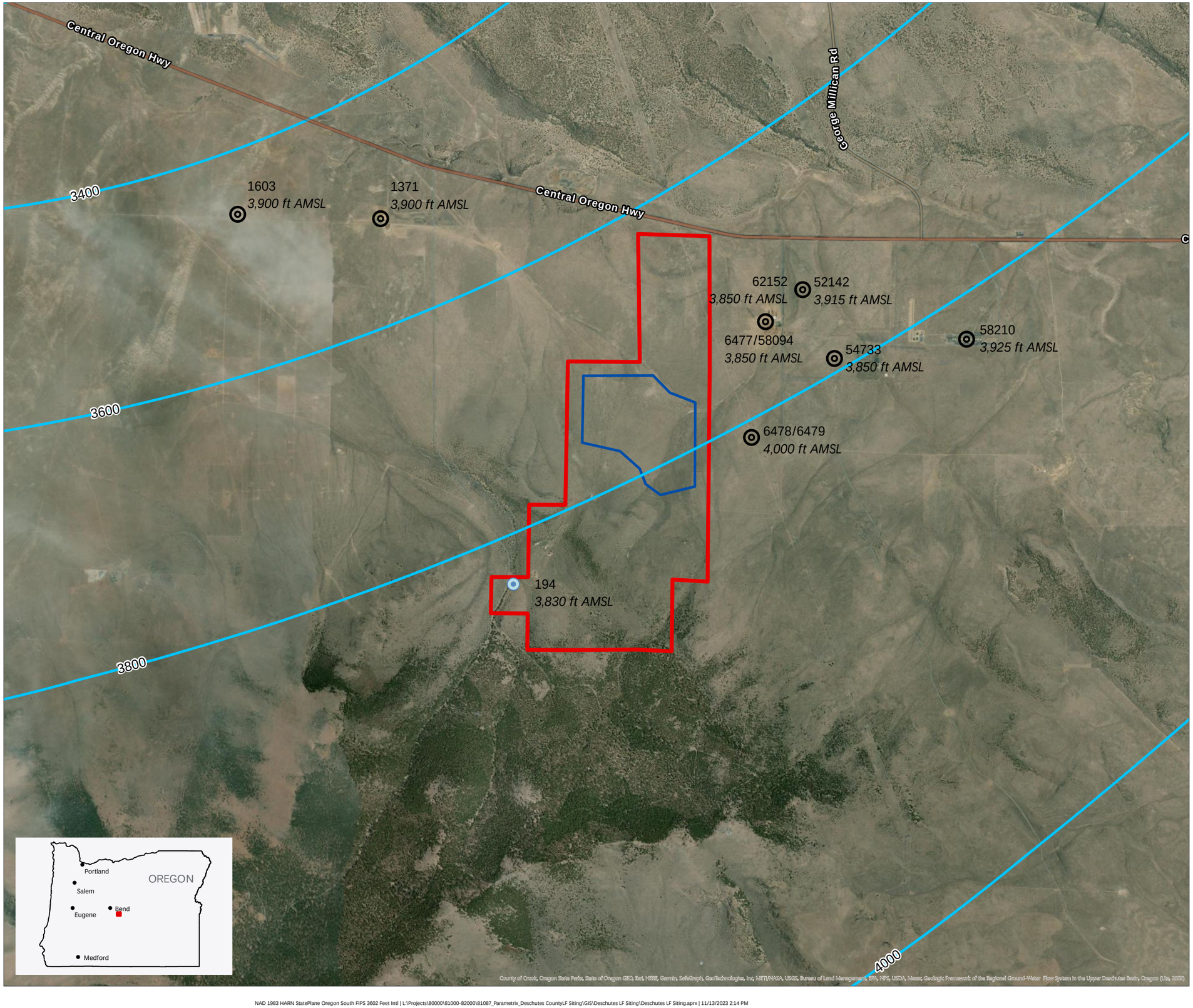
PBS

Regional Aquifer Elevation Map

Roth East Site

Date: February 2024 | Project: 81087.000

Figure: 3



- Onsite Active Water Well
- Onsite Inactive Water Well
- Approximate Locations of Reviewed Well Log (With Approximate Groundwater Static Elevation Above Mean Sea Level)
- Regional Aquifer Hydraulic Head Elevation Contour (200 ft Interval) (USGS, 2002)
- Proposed Development Area
- Site/Taxlot Boundary

N

1 INCH = 3,500 FEET

0 3,500 7,000 Feet

PBS

This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Tables

Table 1
Summary of Groundwater Monitoring Data **PBS Project No. 81087.000**
Roth East Site, Deschutes County, Oregon **Report Date: February 2024**

	Units	EPA MCLs (2003)[1]	OAR 340-40[2]	RE-Powell-01 (Powell / Deep Well)
Field Indicators (Group 1A)				
Field pH	pH Units	6.5-8.5	6.5-8.5	8.35
Field Specific Conductivity	uS/cm			255
Field Temperature	°C			18.1
Field Turbidity	NTU			128
Lab Indicators (Group 1B)				
Chemical Oxygen Demand	mg/l			< 20
Total Alkalinity (Dissolved)	mg/l			126
Hardness [3]	mg/l			62.5
Specific Conductivity	uS/cm			265
Total Dissolved Solids	mg/l	500	500	178
Total Organic Carbon	mg/l			< 1
Total Suspended Solids	mg/l			< 2.5
Total Total Alkalinity	mg/l			126
Cations / Anions (Group 2A)				
Ammonia-N (Dissolved)	mg/l			< 0.25
Calcium	mg/l			13.8 (13.7)
Chloride	mg/l	250	250	5.4
Bicarbonate Alkalinity	mg/l			124
Carbonate Alkalinity[3]	mg/l			< 20
Fluoride	mg/l	4	4	0.158
Iron (Dissolved)	mg/l	0.3	0.3	0.0216 J
Magnesium	mg/l			6.91 (6.77)
Manganese (Dissolved)	mg/l	0.05	0.05	< 0.01
N-Nitrate	mg/l	10	10	0.39
N-Nitrite	mg/l			< 0.010
Potassium (Dissolved)	mg/l			4.99
Silica (Dissolved) [3]	mg/l			47.9
Silicon (Dissolved)	mg/l			22.4
Sodium (Dissolved)	mg/l			29.9
Sulfate	mg/l	250	250	3.77 J
Total Metals (Group 2B)				
Antimony	ug/l	6		< 4
Arsenic	ug/l	10	50	1.93 J
Barium	ug/l	2000	1000	3.66
Beryllium	ug/l	4		< 2
Cadmium	ug/l	5	10	< 1
Chromium	ug/l	100	50	2.22
Cobalt	ug/l			< 2
Copper	ug/l	1000	1000	12.3
Lead	ug/l	15	50	4.17
Nickel	ug/l			< 2
Selenium	ug/l	50	10	< 2
Silver	ug/l	100	50	< 2
Thallium	ug/l	2		< 2
Vanadium	ug/l			33.5
Zinc	ug/l	5000	5000	86.9
Volatile Organic Compounds (Group 3)				
All Compounds	ug/l			ND

Notes:
Sample collected October 5, 2023
Bold values indicate exceedance of MCL or OAR values and are further discussed in the report.
Dissolved concentrations shown in (parentheses).
mg/l=milligrams per liter
ug/l=micrograms per liter
uS/cm=microSiemens per centimeter
°C=Degrees Celsius
NTU=nephelometric turbitity units
ND=Not Detected at or above the reported detection limit (RDL)
J = Values with a 'J' are estimated values between the Reported Detection Limit and the Method Detection Limit.
(1) U.S. Environmental Protection Agency Maximum Contaminant Levels (MCLs) drinking water for public water systems
(2) Oregon Administrative Rule 340-40, Tables 1 and 3 (Numberical Groundwater Quality Reference and Guidance Levels)
(3) Calculated value

Table 2
Cation/Anion Balance
Roth East Site, Deschutes County, Oregon

PBS Project No. 81087.000
Report Date: February 2024

Well and Sample Date	Ca^{+}		Mg^{2+}		Na^{+}		Fe^{2+}		K^{+}		Total Cations	CO_3		HCO_3^{-}		NH_3		SO_4^{2-}		Cl^{-}		Total Anions	*Percent Difference (%)*
	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	meq/l	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	mg/l	meq/l	meq/l	
RE-Powell/ Deep Well (DESC194)																							
10/5/2023	**13.8**	0.690	**6.77**	0.564	**29.9**	1.300	**21.6**	0.771	**4.99**	0.128	3.454	20 U	0.667	**124**	2.033	0.25 U	0.005	**3.77**	0.079	**5.40**	0.154	2.937	*16.15*

Notes:
Bold values indicate laboratory detected concentrations above the method reporting limit.
U = not detected at the method reporting limit as shown
mg/l = milligrams per liter
meq/l = milliequivalents per liter
The method reporting limit is used for non-detect values to calculate the meq/l values.
Although non-rounded values were used in the calculations, the values displayed are rounded to three significant figures.

Appendix A
Photo Pages

Photo 1. The active water well location (Powell or Deep well) as seen from the south. Vault is shown by arrow.

Photo 2. The interior of the water well vault, as seen from the north. The well is shown by arrow.

Photo 3. The proposed development area of the Site, as seen from near the northwest corner, looking southeast.

Photo 4. Millican Valley as seen from the proposed development area access road, looking northwest.

Appendix B
Groundwater Sampling Field Form

PBS	PBS Engineering and Environmental Inc. **GROUNDWATER SAMPLING FORM (YSI Pro)**	Project No: 81087.000 Project Name/ Location: Roth East Date: 10-5-23	
		Monitoring Well ID	RE-Powell-01
Initial DTW (feet bgs)	—	Sample ID (if not well ID)	RE-Powell-01
Screen Interval (feet bgs)	—	Sample Time	838
Well depth (feet bgs)	—	QC Sample type: _____	☒ Not collected ID_____ Time_____
Depth of pump/tubing inlet (feet bgs)	—		
Sampling method (describe pump or sampler)	spigot	Field Personnel	HB
Purge Rate (L/min)	5 gal / 1 min	Weather Conditions	50s, sunny

WELL PURGING INFORMATION

Time ☐ elapsed ☒ actual	DTW (feet)	Temp. (°C)	Dissolved oxygen (mg/L)	Specific conductivity ☐ mS/cm ☒ µS/cm	pH	ORP (mV)	Turbidity (NTU) ppm	Observations	Volume purged ☐ ltr ☒ gal
EPA stabilization goals:	<0.32' drawdown	N/A	±10%	±3%	±0.1	±10mV	±10%		
830	—	16.2	—	263	8.32	—	132		75
833	—	17.6	—	254	8.34	—	125		78
836	—	18.1	—	255	8.35	—	128		81
								Total Volume Purged	> 81

FIELD OBSERVATIONS / NOTES (such as well head condition, groundwater color, sediment load, recovery, sheen, odor, equipment)

Hose
Start @ 815. Purge rate 5 gal / 1 min. 15 min

Signature of Field Personnel: HB

Appendix C
Laboratory Analytical Reports

ANALYTICAL REPORT

October 19, 2023

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

PBS Engineering & Env.- POR

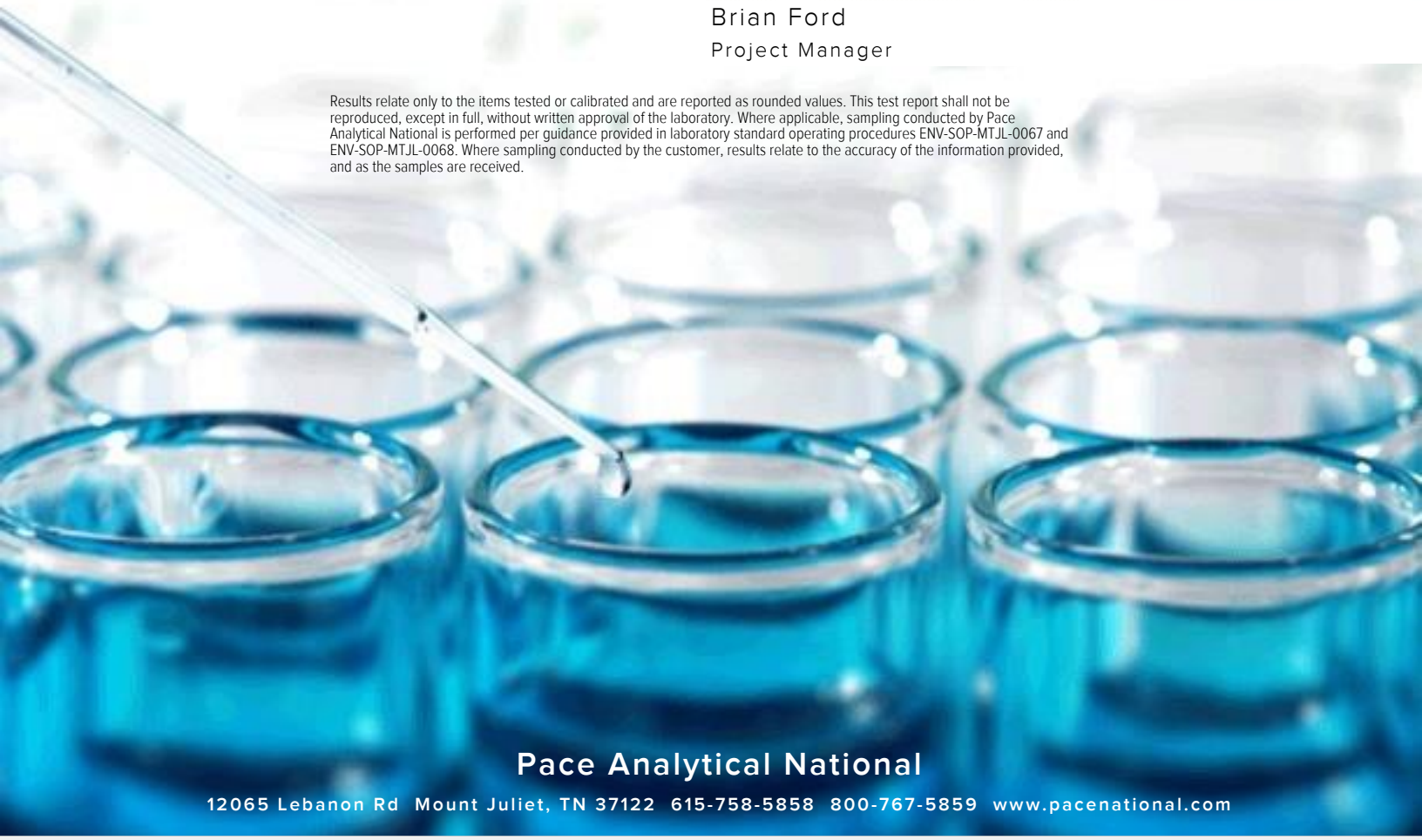
Sample Delivery Group:	L1663868
Samples Received:	10/06/2023
Project Number:	81087.000
Description:	Roth East

Report To: Holly Burnett
390 NE Emerson Ave
Suite 201
Bend, OR 97701

Entire Report Reviewed By:

Brian Ford
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 www.pacenational.com

TABLE OF CONTENTS

RE-POWELL-01 L1663868-01 GW

Collected by: Holly Burnett | Collected date/time: 10/05/23 08:38 | Received date/time: 10/06/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2146837	1	10/17/23 12:56	10/17/23 12:56	DJS	Mt. Juliet, TN
Calculated Results	WG2146862	1	10/12/23 20:57	10/12/23 20:57	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG2149548	1	10/11/23 18:54	10/12/23 12:22	MMF	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 D-2011	WG2149502	1	10/11/23 16:39	10/12/23 19:37	JAC	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG2147880	1	10/11/23 11:59	10/11/23 11:59	BJM	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG2148178	1	10/10/23 07:59	10/10/23 12:58	JGM	Mt. Juliet, TN
Wet Chemistry by Method 9050A	WG2144468	1	10/12/23 10:59	10/12/23 10:59	BJM	Mt. Juliet, TN
Wet Chemistry by Method 9060A	WG2149942	1	10/12/23 16:33	10/12/23 16:33	ASH	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2146837	1	10/11/23 10:39	10/14/23 11:08	DJS	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2146837	1	10/11/23 10:39	10/16/23 21:48	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2146837	1	10/11/23 10:39	10/17/23 12:56	DJS	Mt. Juliet, TN
Metals (ICP) by Method 6010D	WG2146862	1	10/11/23 08:31	10/14/23 12:50	ZSA	Mt. Juliet, TN
Metals (ICPMS) by Method 6020B	WG2146872	1	10/09/23 03:48	10/12/23 00:26	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260D	WG2147771	1	10/09/23 15:40	10/09/23 15:40	JCP	Mt. Juliet, TN

RE-POWELL-01 FF L1663868-02 GW

Collected by: Holly Burnett | Collected date/time: 10/05/23 08:38 | Received date/time: 10/06/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 2320 B-2011	WG2149208	1	10/12/23 10:28	10/12/23 10:28	BJM	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG2148273	1	10/10/23 16:51	10/10/23 16:51	BMD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2148972	1	10/12/23 19:29	10/12/23 19:29	HMM	Mt. Juliet, TN

RE-POWELL-01 FF L1663868-03 WW

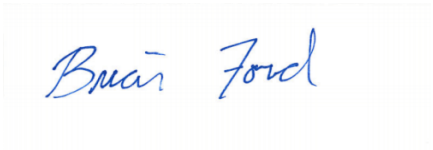
Collected by: Holly Burnett | Collected date/time: 10/05/23 08:38 | Received date/time: 10/06/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG2153460	1	10/19/23 08:31	10/19/23 08:31	ASM	Mt. Juliet, TN

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

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.



Brian Ford
Project Manager

Calculated Results

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Silica,Dissolved	47900		59.7	428	1	10/17/2023 12:56	WG2146837

Calculated Results

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Hardness (calculated) as CaCO3	62500		198	2500	1	10/12/2023 20:57	WG2146862

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Dissolved Solids	178000		10000	1	10/12/2023 12:22	WG2149548

Gravimetric Analysis by Method 2540 D-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
Suspended Solids	ND		2500	1	10/12/2023 19:37	WG2149502

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Alkalinity	126000		8450	20000	1	10/11/2023 11:59	WG2147880

Sample Narrative:

L1663868-01 WG2147880: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
COD	U		11700	20000	1	10/10/2023 12:58	WG2148178

Wet Chemistry by Method 9050A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	umhos/cm		umhos/cm		date / time	
Specific Conductance	265		10.0	1	10/12/2023 10:59	WG2144468

Sample Narrative:

L1663868-01 WG2144468: at 25C

Wet Chemistry by Method 9060A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
TOC (Total Organic Carbon)	U		102	1000	1	10/12/2023 16:33	WG2149942

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Calcium	13800		79.3	1000	1	10/14/2023 12:50	WG2146862
Calcium,Dissolved	13700		79.3	1000	1	10/14/2023 11:08	WG2146837
Iron,Dissolved	21.6	J	18.0	100	1	10/14/2023 11:08	WG2146837
Magnesium	6910		85.3	1000	1	10/14/2023 12:50	WG2146862
Magnesium,Dissolved	6770		85.3	1000	1	10/16/2023 21:48	WG2146837

Metals (ICP) by Method 6010D

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Manganese,Dissolved	U		0.934	10.0	1	10/14/2023 11:08	WG2146837
Potassium,Dissolved	4990		261	2000	1	10/14/2023 11:08	WG2146837
Silicon,Dissolved	22400		27.9	200	1	10/17/2023 12:56	WG2146837
Sodium,Dissolved	29900		504	3000	1	10/14/2023 11:08	WG2146837

Metals (ICPMS) by Method 6020B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Antimony	U		1.03	4.00	1	10/12/2023 00:26	WG2146872
Arsenic	1.93	J	0.180	2.00	1	10/12/2023 00:26	WG2146872
Barium	3.66		0.381	2.00	1	10/12/2023 00:26	WG2146872
Beryllium	U		0.190	2.00	1	10/12/2023 00:26	WG2146872
Cadmium	U		0.150	1.00	1	10/12/2023 00:26	WG2146872
Chromium	2.22		1.24	2.00	1	10/12/2023 00:26	WG2146872
Copper	12.3		1.51	5.00	1	10/12/2023 00:26	WG2146872
Cobalt	U		0.0596	2.00	1	10/12/2023 00:26	WG2146872
Lead	4.17		0.849	2.00	1	10/12/2023 00:26	WG2146872
Nickel	U		0.816	2.00	1	10/12/2023 00:26	WG2146872
Selenium	U		0.300	2.00	1	10/12/2023 00:26	WG2146872
Silver	U		0.0700	2.00	1	10/12/2023 00:26	WG2146872
Thallium	U		0.121	2.00	1	10/12/2023 00:26	WG2146872
Vanadium	33.5		0.664	5.00	1	10/12/2023 00:26	WG2146872
Zinc	86.9		3.02	25.0	1	10/12/2023 00:26	WG2146872

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Acetone	U		11.3	50.0	1	10/09/2023 15:40	WG2147771
Acrolein	U		2.54	50.0	1	10/09/2023 15:40	WG2147771
Acrylonitrile	U		0.671	10.0	1	10/09/2023 15:40	WG2147771
Benzene	U		0.0941	1.00	1	10/09/2023 15:40	WG2147771
Bromobenzene	U		0.118	1.00	1	10/09/2023 15:40	WG2147771
Bromodichloromethane	U		0.136	1.00	1	10/09/2023 15:40	WG2147771
Bromoform	U		0.129	1.00	1	10/09/2023 15:40	WG2147771
Bromomethane	U		0.605	5.00	1	10/09/2023 15:40	WG2147771
n-Butylbenzene	U		0.157	1.00	1	10/09/2023 15:40	WG2147771
sec-Butylbenzene	U		0.125	1.00	1	10/09/2023 15:40	WG2147771
tert-Butylbenzene	U		0.127	1.00	1	10/09/2023 15:40	WG2147771
Carbon tetrachloride	U		0.128	1.00	1	10/09/2023 15:40	WG2147771
Chlorobenzene	U		0.116	1.00	1	10/09/2023 15:40	WG2147771
Chlorodibromomethane	U		0.140	1.00	1	10/09/2023 15:40	WG2147771
Chloroethane	U		0.192	5.00	1	10/09/2023 15:40	WG2147771
Chloroform	U		0.111	5.00	1	10/09/2023 15:40	WG2147771
Chloromethane	U		0.960	2.50	1	10/09/2023 15:40	WG2147771
2-Chlorotoluene	U		0.106	1.00	1	10/09/2023 15:40	WG2147771
4-Chlorotoluene	U		0.114	1.00	1	10/09/2023 15:40	WG2147771
1,2-Dibromo-3-Chloropropane	U		0.276	5.00	1	10/09/2023 15:40	WG2147771
1,2-Dibromoethane	U		0.126	1.00	1	10/09/2023 15:40	WG2147771
Dibromomethane	U		0.122	1.00	1	10/09/2023 15:40	WG2147771
1,2-Dichlorobenzene	U		0.107	1.00	1	10/09/2023 15:40	WG2147771
1,3-Dichlorobenzene	U		0.110	1.00	1	10/09/2023 15:40	WG2147771
1,4-Dichlorobenzene	U		0.120	1.00	1	10/09/2023 15:40	WG2147771
Dichlorodifluoromethane	U		0.374	5.00	1	10/09/2023 15:40	WG2147771
1,1-Dichloroethane	U		0.100	1.00	1	10/09/2023 15:40	WG2147771
1,2-Dichloroethane	U		0.0819	1.00	1	10/09/2023 15:40	WG2147771

Volatile Organic Compounds (GC/MS) by Method 8260D

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
1,1-Dichloroethene	U		0.188	1.00	1	10/09/2023 15:40	WG2147771
cis-1,2-Dichloroethene	U		0.126	1.00	1	10/09/2023 15:40	WG2147771
trans-1,2-Dichloroethene	U		0.149	1.00	1	10/09/2023 15:40	WG2147771
1,2-Dichloropropane	U		0.149	1.00	1	10/09/2023 15:40	WG2147771
1,1-Dichloropropene	U		0.142	1.00	1	10/09/2023 15:40	WG2147771
1,3-Dichloropropane	U		0.110	1.00	1	10/09/2023 15:40	WG2147771
cis-1,3-Dichloropropene	U		0.111	1.00	1	10/09/2023 15:40	WG2147771
trans-1,3-Dichloropropene	U		0.118	1.00	1	10/09/2023 15:40	WG2147771
2,2-Dichloropropane	U		0.161	1.00	1	10/09/2023 15:40	WG2147771
Di-isopropyl ether	U		0.105	1.00	1	10/09/2023 15:40	WG2147771
Ethylbenzene	U		0.137	1.00	1	10/09/2023 15:40	WG2147771
Hexachloro-1,3-butadiene	U		0.337	1.00	1	10/09/2023 15:40	WG2147771
Isopropylbenzene	U		0.105	1.00	1	10/09/2023 15:40	WG2147771
p-Isopropyltoluene	U		0.120	1.00	1	10/09/2023 15:40	WG2147771
2-Butanone (MEK)	U		1.19	10.0	1	10/09/2023 15:40	WG2147771
Methylene Chloride	U		0.430	5.00	1	10/09/2023 15:40	WG2147771
4-Methyl-2-pentanone (MIBK)	U		0.478	10.0	1	10/09/2023 15:40	WG2147771
Methyl tert-butyl ether	U		0.101	1.00	1	10/09/2023 15:40	WG2147771
Naphthalene	U	C3	1.00	5.00	1	10/09/2023 15:40	WG2147771
n-Propylbenzene	U		0.0993	1.00	1	10/09/2023 15:40	WG2147771
Styrene	U		0.118	1.00	1	10/09/2023 15:40	WG2147771
1,1,1,2-Tetrachloroethane	U		0.147	1.00	1	10/09/2023 15:40	WG2147771
1,1,2,2-Tetrachloroethane	U		0.133	1.00	1	10/09/2023 15:40	WG2147771
1,1,2-Trichlorotrifluoroethane	U		0.180	1.00	1	10/09/2023 15:40	WG2147771
Tetrachloroethene	U		0.300	1.00	1	10/09/2023 15:40	WG2147771
Toluene	U		0.278	1.00	1	10/09/2023 15:40	WG2147771
1,2,3-Trichlorobenzene	U		0.230	1.00	1	10/09/2023 15:40	WG2147771
1,2,4-Trichlorobenzene	U		0.481	1.00	1	10/09/2023 15:40	WG2147771
1,1,1-Trichloroethane	U		0.149	1.00	1	10/09/2023 15:40	WG2147771
1,1,2-Trichloroethane	U		0.158	1.00	1	10/09/2023 15:40	WG2147771
Trichloroethene	U		0.190	1.00	1	10/09/2023 15:40	WG2147771
Trichlorofluoromethane	U		0.160	5.00	1	10/09/2023 15:40	WG2147771
1,2,3-Trichloropropane	U		0.237	2.50	1	10/09/2023 15:40	WG2147771
1,2,4-Trimethylbenzene	U		0.322	1.00	1	10/09/2023 15:40	WG2147771
1,2,3-Trimethylbenzene	U		0.104	1.00	1	10/09/2023 15:40	WG2147771
1,3,5-Trimethylbenzene	U		0.104	1.00	1	10/09/2023 15:40	WG2147771
Vinyl chloride	U		0.234	1.00	1	10/09/2023 15:40	WG2147771
Xylenes, Total	U		0.174	3.00	1	10/09/2023 15:40	WG2147771
(S) Toluene-d8	*110*			*80.0-120*		*10/09/2023 15:40*	WG2147771
(S) 4-Bromofluorobenzene	*99.9*			*77.0-126*		*10/09/2023 15:40*	WG2147771
(S) 1,2-Dichloroethane-d4	*115*			*70.0-130*		*10/09/2023 15:40*	WG2147771

Volatile Organic Compounds (GC/MS) by Method 8260D - TENTATIVELY IDENTIFIED COMPOUNDS

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch	CAS #	RT
	ug/l		ug/l	ug/l		date / time			

Number of TICs found: 0

Tentatively Identified compounds (TIC) refers to substances not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search routine of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist. Quantitation is accomplished by relative peak area of the TIC compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is 10% or more of that of the nearest internal standard.

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

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Alkalinity	126000		8450	20000	1	10/12/2023 10:28	WG2149208
Alkalinity,Bicarbonate	124000		8450	20000	1	10/12/2023 10:28	WG2149208
Alkalinity,Carbonate	U		8450	20000	1	10/12/2023 10:28	WG2149208

Sample Narrative:

L1663868-02 WG2149208: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Ammonia Nitrogen	U		117	250	1	10/10/2023 16:51	WG2148273

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Chloride	5400		379	1000	1	10/12/2023 19:29	WG2148972
Fluoride	158		64.0	150	1	10/12/2023 19:29	WG2148972

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Sulfate	3770	J	594	5000	1	10/19/2023 08:31	WG2153460

Method Blank (MB)

(MB) R3986737-1 10/12/23 12:22

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Dissolved Solids	U		10000	10000

L1663610-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1663610-04 10/12/23 12:22 • (DUP) R3986737-3 10/12/23 12:22

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Dissolved Solids	331000	346000	1	4.43		5

L1663622-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663622-01 10/12/23 12:22 • (DUP) R3986737-4 10/12/23 12:22

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Dissolved Solids	507000	508000	1	0.197		5

Laboratory Control Sample (LCS)

(LCS) R3986737-2 10/12/23 12:22

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Dissolved Solids	8800000	8090000	91.9	77.3-123	

Method Blank (MB)

(MB) R3985873-1 10/12/23 19:37

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Suspended Solids	U		2500	2500

L1664102-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1664102-02 10/12/23 19:37 • (DUP) R3985873-3 10/12/23 19:37

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Suspended Solids	580000	608000	1	4.71		5

L1664162-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1664162-01 10/12/23 19:37 • (DUP) R3985873-4 10/12/23 19:37

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Suspended Solids	70800	70800	1	0.000		5

Laboratory Control Sample (LCS)

(LCS) R3985873-2 10/12/23 19:37

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Suspended Solids	773000	756000	97.8	85.7-114	

Method Blank (MB)

(MB) R3984786-2 10/11/23 09:52

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alkalinity	U		8450	20000

Sample Narrative:

BLANK: Endpoint pH 4.5

L1662902-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1662902-01 10/11/23 10:20 • (DUP) R3984786-3 10/11/23 10:24

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	82100	83300	1	1.44		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

L1663868-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663868-01 10/11/23 11:59 • (DUP) R3984786-4 10/11/23 12:05

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	126000	125000	1	0.867		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3984786-1 10/11/23 09:45

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100000	103000	103	90.0-110	

Sample Narrative:

LCS: Endpoint pH 4.5

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

Method Blank (MB)

(MB) R3985483-2 10/12/23 09:57

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alkalinity	U		8450	20000
Alkalinity,Bicarbonate	U		8450	20000
Alkalinity,Carbonate	U		8450	20000

Sample Narrative:

BLANK: Endpoint pH 4.5

L1664538-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1664538-01 10/12/23 10:08 • (DUP) R3985483-4 10/12/23 10:14

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	499000	496000	1	0.560		20
Alkalinity,Bicarbonate	499000	496000	1	0.560		20
Alkalinity,Carbonate	U	U	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

L1664538-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1664538-04 10/12/23 12:20 • (DUP) R3985483-6 10/12/23 12:27

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	215000	215000	1	0.110		20
Alkalinity,Bicarbonate	212000	211000	1	0.167		20
Alkalinity,Carbonate	U	U	1	0.000		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3985483-1 10/12/23 09:49

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100000	101000	101	90.0-110	

Sample Narrative:

LCS: Endpoint pH 4.5

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

Method Blank (MB)

(MB) R3988356-1 10/18/23 20:02

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Sulfate	U		594	5000

Laboratory Control Sample (LCS)

(LCS) R3988356-2 10/18/23 20:19

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40000	41100	103	90.0-110	

Method Blank (MB)

(MB) R3984456-1 10/10/23 16:37

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Ammonia Nitrogen	U		117	250

L1663566-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663566-01 10/10/23 16:45 • (DUP) R3984456-5 10/10/23 16:46

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Ammonia Nitrogen	U	U	1	0.000		10

L1664103-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1664103-04 10/10/23 17:03 • (DUP) R3984456-8 10/10/23 17:04

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Ammonia Nitrogen	3470	3400	1	2.04		10

Laboratory Control Sample (LCS)

(LCS) R3984456-2 10/10/23 16:39

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Ammonia Nitrogen	7500	7360	98.1	90.0-110	

L1663510-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663510-01 10/10/23 16:40 • (MS) R3984456-3 10/10/23 16:42 • (MSD) R3984456-4 10/10/23 16:43

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Ammonia Nitrogen	5000	U	4990	4950	99.8	99.1	1	90.0-110			0.784	10

L1664103-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L1664103-03 10/10/23 17:00 • (MS) R3984456-7 10/10/23 17:01

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	ug/l	ug/l	ug/l	%		%	
Ammonia Nitrogen	5000	3900	8310	88.1	1	90.0-110	J6

L1664103-03 Original Sample (OS) • Matrix Spike (MS)

(OS) L1664103-03 10/10/23 17:00 • (MS) R3984456-7 10/10/23 17:01

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier

Sample Narrative:

MS: Spike failed due to matrix

Method Blank (MB)

(MB) R3984221-1 10/10/23 12:50

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
COD	U		11700	20000

L1663353-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663353-01 10/10/23 12:52 • (DUP) R3984221-3 10/10/23 12:53

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	62400	58400	1	6.48		20

L1663868-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663868-01 10/10/23 12:58 • (DUP) R3984221-6 10/10/23 12:58

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	U	U	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3984221-2 10/10/23 12:50

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
COD	500000	521000	104	90.0-110	

L1663610-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663610-06 10/10/23 12:56 • (MS) R3984221-4 10/10/23 12:56 • (MSD) R3984221-5 10/10/23 12:56

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
COD	500000	29600	520000	538000	98.0	102	1	90.0-110			3.52	20

Method Blank (MB)

(MB) R3985322-1 10/12/23 10:59

Analyte	MB Result umhos/cm	MB Qualifier	MB MDL umhos/cm	MB RDL umhos/cm
Specific Conductance	U		10.0	10.0

Sample Narrative:
BLANK: at 25C

L1663302-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1663302-01 10/12/23 10:59 • (DUP) R3985322-3 10/12/23 10:59

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	43300	43300	1	0.000		20

Sample Narrative:
OS: at 25C
DUP: at 25C

L1664194-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1664194-01 10/12/23 10:59 • (DUP) R3985322-4 10/12/23 10:59

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	200	204	1	1.83		20

Sample Narrative:
OS: at 25C
DUP: at 25C

Laboratory Control Sample (LCS)

(LCS) R3985322-2 10/12/23 10:59

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	732	754	103	85.0-115	

Sample Narrative:
LCS: at 25C

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

Method Blank (MB)

(MB) R3986631-1 10/12/23 09:29

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Chloride	U		379	1000
Fluoride	U		64.0	150

L1662489-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1662489-01 10/12/23 13:33 • (DUP) R3986631-3 10/12/23 13:46

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Chloride	41300	40600	1	1.69		15
Fluoride	U	U	1	0.000		15

L1663868-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1663868-02 10/12/23 19:29 • (DUP) R3986631-6 10/12/23 19:43

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Chloride	5400	5260	1	2.65		15
Fluoride	158	158	1	0.000		15

Laboratory Control Sample (LCS)

(LCS) R3986631-2 10/12/23 09:43

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Chloride	40000	39600	99.1	80.0-120	
Fluoride	8000	7740	96.8	80.0-120	

L1662489-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1662489-01 10/12/23 13:33 • (MS) R3986631-4 10/12/23 14:00 • (MSD) R3986631-5 10/12/23 14:14

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Chloride	40000	41300	54500	55300	33.0	35.2	1	80.0-120	J6	J6	1.59	15
Fluoride	8000	U	8890	9050	111	113	1	80.0-120			1.80	15

L1663868-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1663868-02 10/12/23 19:29 • (MS) R3986631-7 10/12/23 20:24

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	40000	5400	44100	96.7	1	80.0-120	
Fluoride	8000	158	8030	98.4	1	80.0-120	

Method Blank (MB)

(MB) R3985998-2 10/12/23 12:27

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
TOC (Total Organic Carbon)	U		102	1000

L1664045-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1664045-05 10/12/23 18:55 • (DUP) R3985998-5 10/12/23 19:14

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
TOC (Total Organic Carbon)	1090	1180	1	7.67		20

L1664045-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1664045-08 10/12/23 20:34 • (DUP) R3985998-6 10/12/23 20:54

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
TOC (Total Organic Carbon)	720	652	1	9.90	J	20

Laboratory Control Sample (LCS)

(LCS) R3985998-1 10/12/23 12:07

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
TOC (Total Organic Carbon)	25000	24600	98.4	85.0-115	

L1663868-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663868-01 10/12/23 16:33 • (MS) R3985998-3 10/12/23 16:57 • (MSD) R3985998-4 10/12/23 17:19

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
TOC (Total Organic Carbon)	25000	U	25000	24900	100	99.7	1	80.0-120			0.320	20

Method Blank (MB)

(MB) R3986340-1 10/14/23 11:03

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Calcium,Dissolved	U		79.3	1000
Iron,Dissolved	U		18.0	100
Manganese,Dissolved	U		0.934	10.0
Potassium,Dissolved	288	J	261	2000
Silicon,Dissolved	U		27.9	200
Sodium,Dissolved	U		504	3000

Method Blank (MB)

(MB) R3986916-1 10/16/23 21:42

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Magnesium,Dissolved	U		85.3	1000

Method Blank (MB)

(MB) R3987220-1 10/17/23 12:51

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Silicon,Dissolved	U		27.9	200

Laboratory Control Sample (LCS)

(LCS) R3986340-2 10/14/23 11:06

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Calcium,Dissolved	10000	10000	100	80.0-120	
Iron,Dissolved	10000	9830	98.3	80.0-120	
Manganese,Dissolved	1000	1010	101	80.0-120	
Potassium,Dissolved	10000	10100	101	80.0-120	
Silicon,Dissolved	1000	1010	101	80.0-120	
Sodium,Dissolved	10000	10200	102	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3986916-2 10/16/23 21:45

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Magnesium,Dissolved	10000	9640	96.4	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3987220-2 10/17/23 12:53

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Silicon,Dissolved	1000	941	94.1	80.0-120	

L1663868-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663868-01 10/14/23 11:08 • (MS) R3986340-4 10/14/23 11:37 • (MSD) R3986340-5 10/14/23 11:40

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Calcium,Dissolved	10000	13700	24600	24500	109	108	1	75.0-125			0.413	20
Iron,Dissolved	10000	21.6	10000	9920	99.8	99.0	1	75.0-125			0.800	20
Manganese,Dissolved	1000	U	1010	1000	101	100	1	75.0-125			0.773	20
Potassium,Dissolved	10000	4990	14800	14800	98.3	97.8	1	75.0-125			0.305	20
Sodium,Dissolved	10000	29900	39100	39200	92.1	93.1	1	75.0-125			0.268	20

L1663868-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663868-01 10/16/23 21:48 • (MS) R3986916-4 10/16/23 21:53 • (MSD) R3986916-5 10/16/23 21:56

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Magnesium,Dissolved	10000	6770	16200	16100	94.0	93.2	1	75.0-125			0.503	20

L1663868-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663868-01 10/17/23 12:56 • (MS) R3987220-4 10/17/23 13:02 • (MSD) R3987220-5 10/17/23 13:05

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Silicon,Dissolved	1000	22400	23400	23300	97.4	84.9	1	75.0-125	E	E	0.537	20

Method Blank (MB)

(MB) R3985686-1 10/12/23 20:10

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Calcium	U		79.3	1000
Magnesium	U		85.3	1000

Laboratory Control Sample (LCS)

(LCS) R3985686-2 10/12/23 20:12

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Calcium	10000	10200	102	80.0-120	
Magnesium	10000	9760	97.6	80.0-120	

L1663800-15 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663800-15 10/12/23 20:15 • (MS) R3985686-4 10/12/23 20:20 • (MSD) R3985686-5 10/12/23 20:23

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Calcium	10000	27700	36600	36500	88.4	87.8	1	75.0-125			0.165	20
Magnesium	10000	13800	22500	22600	86.5	87.4	1	75.0-125			0.416	20

Method Blank (MB)

(MB) R3985095-1 10/11/23 22:42

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Antimony	U		1.03	4.00
Arsenic	U		0.180	2.00
Barium	U		0.381	2.00
Beryllium	U		0.190	2.00
Cadmium	U		0.150	1.00
Chromium	U		1.24	2.00
Copper	U		1.51	5.00
Cobalt	U		0.0596	2.00
Lead	U		0.849	2.00
Nickel	U		0.816	2.00
Selenium	U		0.300	2.00
Silver	U		0.0700	2.00
Thallium	U		0.121	2.00
Vanadium	U		0.664	5.00
Zinc	U		3.02	25.0

Laboratory Control Sample (LCS)

(LCS) R3985095-2 10/11/23 22:45

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony	50.0	54.9	110	80.0-120	
Arsenic	50.0	54.5	109	80.0-120	
Barium	50.0	54.3	109	80.0-120	
Beryllium	50.0	55.2	110	80.0-120	
Cadmium	50.0	54.5	109	80.0-120	
Chromium	50.0	56.1	112	80.0-120	
Copper	50.0	50.9	102	80.0-120	
Cobalt	50.0	55.1	110	80.0-120	
Lead	50.0	54.8	110	80.0-120	
Nickel	50.0	54.4	109	80.0-120	
Selenium	50.0	57.9	116	80.0-120	
Silver	50.0	58.5	117	80.0-120	
Thallium	50.0	53.8	108	80.0-120	
Vanadium	50.0	55.3	111	80.0-120	
Zinc	50.0	53.4	107	80.0-120	

L1663702-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1663702-01 10/11/23 22:48 • (MS) R3985095-4 10/11/23 22:55 • (MSD) R3985095-5 10/11/23 22:58

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	50.0	U	53.3	53.2	107	106	1	75.0-125			0.107	20
Arsenic	50.0	U	51.3	53.0	103	106	1	75.0-125			3.28	20
Barium	50.0		71.9	73.5	106	110	1	75.0-125			2.29	20
Beryllium	50.0	U	54.0	53.7	108	107	1	75.0-125			0.646	20
Cadmium	50.0	0.168	55.0	54.3	110	108	1	75.0-125			1.28	20
Chromium	50.0	2.16	54.3	746	104	1490	1	75.0-125		J3 J5	173	20
Copper	50.0	U	50.0	67.6	100	135	1	75.0-125		J3 J5	30.0	20
Cobalt	50.0	0.0862	51.5	57.2	103	114	1	75.0-125			10.4	20
Lead	50.0		53.3	53.8	107	108	1	75.0-125			0.955	20
Nickel	50.0	0.939	53.2	373	104	743	1	75.0-125		J3 J5	150	20
Selenium	50.0		58.9	56.6	118	113	1	75.0-125			4.12	20
Silver	50.0		57.4	56.9	115	114	1	75.0-125			0.730	20
Thallium	50.0	0.165	51.7	52.3	103	104	1	75.0-125			1.25	20
Vanadium	50.0	U	51.9	57.0	104	114	1	75.0-125			9.23	20
Zinc	50.0	3.31	53.2	53.4	99.8	100	1	75.0-125			0.396	20

Method Blank (MB)

(MB) R3985563-3 10/09/23 10:35

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acetone	U		11.3	50.0
Acrolein	U		2.54	50.0
Acrylonitrile	U		0.671	10.0
Benzene	U		0.0941	1.00
Bromobenzene	U		0.118	1.00
Bromodichloromethane	U		0.136	1.00
Bromoform	U		0.129	1.00
Bromomethane	U		0.605	5.00
n-Butylbenzene	U		0.157	1.00
sec-Butylbenzene	U		0.125	1.00
tert-Butylbenzene	U		0.127	1.00
Carbon tetrachloride	U		0.128	1.00
Chlorobenzene	U		0.116	1.00
Chlorodibromomethane	U		0.140	1.00
Chloroethane	U		0.192	5.00
Chloroform	U		0.111	5.00
Chloromethane	U		0.960	2.50
2-Chlorotoluene	U		0.106	1.00
4-Chlorotoluene	U		0.114	1.00
1,2-Dibromo-3-Chloropropane	U		0.276	5.00
1,2-Dibromoethane	U		0.126	1.00
Dibromomethane	U		0.122	1.00
1,2-Dichlorobenzene	U		0.107	1.00
1,3-Dichlorobenzene	U		0.110	1.00
1,4-Dichlorobenzene	U		0.120	1.00
Dichlorodifluoromethane	U		0.374	5.00
1,1-Dichloroethane	U		0.100	1.00
1,2-Dichloroethane	U		0.0819	1.00
1,1-Dichloroethene	U		0.188	1.00
cis-1,2-Dichloroethene	U		0.126	1.00
trans-1,2-Dichloroethene	U		0.149	1.00
1,2-Dichloropropane	U		0.149	1.00
1,1-Dichloropropene	U		0.142	1.00
1,3-Dichloropropane	U		0.110	1.00
cis-1,3-Dichloropropene	U		0.111	1.00
trans-1,3-Dichloropropene	U		0.118	1.00
2,2-Dichloropropane	U		0.161	1.00
Di-isopropyl ether	U		0.105	1.00
Ethylbenzene	U		0.137	1.00
Hexachloro-1,3-butadiene	U		0.337	1.00

Method Blank (MB)

(MB) R3985563-3 10/09/23 10:35

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Isopropylbenzene	U		0.105	1.00
p-Isopropyltoluene	U		0.120	1.00
2-Butanone (MEK)	U		1.19	10.0
Methylene Chloride	U		0.430	5.00
4-Methyl-2-pentanone (MIBK)	U		0.478	10.0
Methyl tert-butyl ether	U		0.101	1.00
Naphthalene	U		1.00	5.00
n-Propylbenzene	U		0.0993	1.00
Styrene	U		0.118	1.00
1,1,1,2-Tetrachloroethane	U		0.147	1.00
1,1,2,2-Tetrachloroethane	U		0.133	1.00
1,1,2-Trichlorotrifluoroethane	U		0.180	1.00
Tetrachloroethene	U		0.300	1.00
Toluene	U		0.278	1.00
1,2,3-Trichlorobenzene	U		0.230	1.00
1,2,4-Trichlorobenzene	U		0.481	1.00
1,1,1-Trichloroethane	U		0.149	1.00
1,1,2-Trichloroethane	U		0.158	1.00
Trichloroethene	U		0.190	1.00
Trichlorofluoromethane	U		0.160	5.00
1,2,3-Trichloropropane	U		0.237	2.50
1,2,4-Trimethylbenzene	U		0.322	1.00
1,2,3-Trimethylbenzene	U		0.104	1.00
1,3,5-Trimethylbenzene	U		0.104	1.00
Vinyl chloride	U		0.234	1.00
Xylenes, Total	U		0.174	3.00
(S) Toluene-d8	*110*			*80.0-120*
(S) 4-Bromofluorobenzene	*99.6*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*112*			*70.0-130*

Method Blank (MB) - TENTATIVELY IDENTIFIED COMPOUNDS

(MB) R3985563-3 10/09/23 10:35

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l	CAS #

Number of TICs found: 0

Tentatively Identified compounds (TIC) refers to substances not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search routine of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist. Quantitation is accomplished by relative peak area of the TIC compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is 10% or more of that of the nearest internal standard.

Laboratory Control Sample (LCS)

(LCS) R3985563-1 10/09/23 09:34

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	25.0	29.2	117	19.0-160	
Acrolein	25.0	26.5	106	10.0-160	
Acrylonitrile	25.0	29.1	116	55.0-149	
Benzene	5.00	5.66	113	70.0-123	
Bromobenzene	5.00	5.38	108	73.0-121	
Bromodichloromethane	5.00	5.39	108	75.0-120	
Bromoform	5.00	4.94	98.8	68.0-132	
Bromomethane	5.00	5.47	109	10.0-160	
n-Butylbenzene	5.00	5.15	103	73.0-125	
sec-Butylbenzene	5.00	5.63	113	75.0-125	
tert-Butylbenzene	5.00	5.62	112	76.0-124	
Carbon tetrachloride	5.00	5.82	116	68.0-126	
Chlorobenzene	5.00	5.48	110	80.0-121	
Chlorodibromomethane	5.00	5.15	103	77.0-125	
Chloroethane	5.00	5.81	116	47.0-150	
Chloroform	5.00	5.45	109	73.0-120	
Chloromethane	5.00	6.41	128	41.0-142	
2-Chlorotoluene	5.00	5.56	111	76.0-123	
4-Chlorotoluene	5.00	5.42	108	75.0-122	
1,2-Dibromo-3-Chloropropane	5.00	4.57	91.4	58.0-134	
1,2-Dibromoethane	5.00	5.56	111	80.0-122	
Dibromomethane	5.00	5.49	110	80.0-120	
1,2-Dichlorobenzene	5.00	5.34	107	79.0-121	
1,3-Dichlorobenzene	5.00	5.55	111	79.0-120	
1,4-Dichlorobenzene	5.00	5.25	105	79.0-120	
Dichlorodifluoromethane	5.00	5.98	120	51.0-149	
1,1-Dichloroethane	5.00	5.74	115	70.0-126	
1,2-Dichloroethane	5.00	5.53	111	70.0-128	
1,1-Dichloroethene	5.00	5.66	113	71.0-124	
cis-1,2-Dichloroethene	5.00	5.88	118	73.0-120	
trans-1,2-Dichloroethene	5.00	5.73	115	73.0-120	
1,2-Dichloropropane	5.00	5.62	112	77.0-125	
1,1-Dichloropropene	5.00	5.59	112	74.0-126	
1,3-Dichloropropane	5.00	5.61	112	80.0-120	
cis-1,3-Dichloropropene	5.00	5.35	107	80.0-123	
trans-1,3-Dichloropropene	5.00	5.18	104	78.0-124	
2,2-Dichloropropane	5.00	5.97	119	58.0-130	
Di-isopropyl ether	5.00	5.52	110	58.0-138	
Ethylbenzene	5.00	5.19	104	79.0-123	
Hexachloro-1,3-butadiene	5.00	5.71	114	54.0-138	

Laboratory Control Sample (LCS)

(LCS) R3985563-1 10/09/23 09:34

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Isopropylbenzene	5.00	5.45	109	76.0-127	
p-Isopropyltoluene	5.00	5.75	115	76.0-125	
2-Butanone (MEK)	25.0	25.7	103	44.0-160	
Methylene Chloride	5.00	5.64	113	67.0-120	
4-Methyl-2-pentanone (MIBK)	25.0	27.7	111	68.0-142	
Methyl tert-butyl ether	5.00	5.38	108	68.0-125	
Naphthalene	5.00	3.11	62.2	54.0-135	
n-Propylbenzene	5.00	5.41	108	77.0-124	
Styrene	5.00	5.04	101	73.0-130	
1,1,1,2-Tetrachloroethane	5.00	5.35	107	75.0-125	
1,1,2,2-Tetrachloroethane	5.00	5.17	103	65.0-130	
1,1,2-Trichlorotrifluoroethane	5.00	5.45	109	69.0-132	
Tetrachloroethene	5.00	5.73	115	72.0-132	
Toluene	5.00	5.56	111	79.0-120	
1,2,3-Trichlorobenzene	5.00	4.65	93.0	50.0-138	
1,2,4-Trichlorobenzene	5.00	4.61	92.2	57.0-137	
1,1,1-Trichloroethane	5.00	5.57	111	73.0-124	
1,1,2-Trichloroethane	5.00	5.28	106	80.0-120	
Trichloroethene	5.00	5.77	115	78.0-124	
Trichlorofluoromethane	5.00	6.48	130	59.0-147	
1,2,3-Trichloropropane	5.00	5.91	118	73.0-130	
1,2,4-Trimethylbenzene	5.00	5.51	110	76.0-121	
1,2,3-Trimethylbenzene	5.00	5.52	110	77.0-120	
1,3,5-Trimethylbenzene	5.00	5.39	108	76.0-122	
Vinyl chloride	5.00	6.03	121	67.0-131	
Xylenes, Total	15.0	16.3	109	79.0-123	
(S) Toluene-d8			*108*	*80.0-120*	
(S) 4-Bromofluorobenzene			*102*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*111*	*70.0-130*	

GLOSSARY OF TERMS

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.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RT	Retention Time.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
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
C3	The reported concentration is an estimate. The continuing calibration standard associated with this data responded low. Method sensitivity check is acceptable.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

ACCREDITATIONS & LOCATIONS

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	LA000356
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:
PBS Engineering & Env.- POR

390 NE Emerson Ave
Suite 201
Bend. OR 97701

Billing Information:
Accounts Payable
4412 S Corbett Ave
Portland, OR 97239

Pres Chk

Report to:
Holly Burnett

Email To: Holly.Burnett@pbsusa.com toby.scott@pbsusa.com

Project Description: Moth East

City/State Collected: Bend, OR

Please Circle: (PT) MT CT ET

Phone: 541-388-9290

Client Project # 81087.000

Lab Project # PBSENGPOR-MOONPIT

Collected by (print): Holly Burnett

Site/Facility ID #

P.O. #

Collected by (signature): HBurnett

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	COD 250mlHDPE-H2SO4	FF Alk(tot,bi,ca) 125mlHDPE-NoPres	FF Ammonia 250mlHDPE-H2SO4	FF Cl,F,SO4 125mlHDPE-NoPres	FF Diss Metals** 250mlHDPE HNO3	Spec Con,Tot Alk 250mlHDPE-NoPres	TDS,TSS 1L-HDPE NoPres	TOC 250mlAmb-HCl	Total Metals* 250mlHDPE-HNO3	VOCs+TICs 8260TIC 40mlAmb-HCl	Remarks	Sample # (lab only)
ME-Powell-01	G	GW		10-5-23	838	14	X	X	X	X	X	X	X	X	X	X		-01

Chain of Custody Page 1 of 1

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 # 166388

F052

Acctnum: PBSENGPOR
Template: T239069
Prelogin: P1028670
PM: 110 - Brian Ford
PB:

Shipped Via:

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

Remarks: *Total Metals=Ag,As,Ba,Be,Cd,Co,Cr,Cu,Ni,Pb,Sb,Se,Tl,V,Zn 6020;Ca,Mg 6010;Hard.
**FF Diss Metals=Ca,Fe,K,Mg,Mn,Na,Si,SILICA 6010.

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 6841 8340 0522

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)	Trip Blank Received: Yes (No) HCL / MeoH TBR
HBurnett	10-5-23	1500		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:
				CCA8 5:0:5
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:
				10/6/23 9:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / (OK)

Burlington, WA *Corporate Laboratory (a)*
1620 S Walnut St - Burlington, WA 98233 - **800.755.9295** • 360.757.1400

Bellingham, WA *Microbiology (b)*
805 Orchard Dr Ste 4 - Bellingham, WA 98225 - 360.715.1212

Portland, OR *Microbiology/Chemistry (c)*
9725 SW Commerce Cr Ste A2 - Wilsonville, OR 97070 - 503.682.7802

Corvallis, OR *Microbiology/Chemistry (d)*
1100 NE Circle Blvd, Ste 130 - Corvallis, OR 97330 - 541.753.4946

Bend, OR *Microbiology (e)*
20332 Empire Blvd Ste 4 - Bend, OR 97701 - 541.639.8425

Data Report

Client Name: PBS Engineering and Environmental
390 NE Emerson Ave
STE 201
Bend, OR 97701

Reference Number: **23-30755**
Project: Roth East

Report Date: 10/12/23

Date Received: 10/5/23
Approved by: pap
Authorized by:

Michelle R Angland
Lab Manager, Bend

Sample Description: RE-Powell-01 Roth East | Matrix W | Sample Date: 10/5/23 8:38 am
Lab Number: 61153 | Sample Comment: | Collected By: HB

CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment
14797-65-0	**NITRITE-N**	ND	0.010	0.006	**mg/L**	1.0	SM4500-NO3 F	c	10/6/23	PDK	cno3_231006	
14797-55-8	**NITRATE-N**	0.39	0.005	0.0035	**mg/L**	1.0	SM4500-NO3 F	c	10/6/23	PDK	cno3_231006	

Notes:

ND = Not detected above the listed practical quantitation limit (PQL) or not above the Method Detection Limit (MDL), if requested.
PQL = Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions.
D.F. - Dilution Factor

If you have any questions concerning this report contact us at the above phone number.