Memorandum

DATE: January 31, 2025

TO: John Mefford, Department of Ecology

FROM: Kyle Johnson, LG / Tom Mergy, LHG

PROJECT: Coleman Oil Yakima Bulk Plant Site
Ecology Agreed Order No. DE 23182
PBS No. 41392.000, Phase 0021, Task 03A

REGARDING: Preliminary Results of the Soil Vapor Extraction Pilot Test – November 2024

This memorandum summarizes the results of the Soil Vapor Extraction (SVE) pilot test conducted at the Coleman Oil Yakima Bulk Plant. The test was conducted on November 7, 2024, and performed as outlined in the approved Pilot Test Work Plan (PBS, 2024). The test aimed to evaluate the feasibility of SVE for remediating hydrocarbon contamination in the vadose zone, as a contingent component of the combined remedy. The pilot test included the installation of a vapor extraction well (VEW1) and three vapor monitoring points (VMP1, VMP2, and VMP3), blower-based soil vapor extraction, and the monitoring of vacuum, vapor phase hydrocarbons, and airflow.

WELL INSTALLATION AND SAMPLING

Three vapor monitoring points (VMP1, VMP2, and VMP3) and one vapor extraction well (VEW1) were installed to support the bioventing and SVE pilot tests. Monitoring points were placed at varying distances to observe subsurface gas movement and microbial activity. VEW1 was drilled to a depth of 12.5 feet below ground surface (bgs) with a 2-inch diameter PVC casing and a 5-foot screen. The depth was chosen to allow a spacing of five feet above the water table. VMP1 and VMP3 were each drilled to 12 feet bgs, with a 6-inch vapor screen at the bottom connected to the surface by ¼-inch Teflon tubing. VMP2 was drilled to 16.5 feet bgs with a 6-inch vapor screen placed approximately 1 foot above the water table. The depth to groundwater was measured at 17.5 feet below ground surface (bgs) in MW-4.

- VMP1: 10 feet from VEW1.
- VMP2: 20 feet from VEW1.
- VMP3: 40 feet from VEW1.

Soil samples were collected from all boreholes at depths of 2–3 feet bgs and from the bottom 1 foot of each hole. Soil samples were analyzed for gasoline range hydrocarbons (TPH-Gx); diesel range hydrocarbons (TPH-Dx); benzene, toluene, ethylbenzene, and xylenes (BTEX); soil moisture; pH; particle sizing; alkalinity; total iron; and nutrients. See Table 1 and Table 4 (appended) for results.

SOIL VAPOR EXTRACTION PILOT TEST

The SVE pilot test was conducted to evaluate vacuum propagation, contaminant volatilization, and airflow in the vadose zone. A regenerative blower was used to apply vacuum to VEW1 at step-test variable flow rates for approximately six hours. Data collected during the extraction test included: vapor-phase hydrocarbons measured using a photoionization detector (PID) at the wellhead and in effluent air and air velocity and pressure readings at

the blower. VMP1 (10 ft from VEW1), VMP2 (20 ft from VEW1), and VMP3 (40 ft from VEW1) were monitored for vacuum propagation and vapor-phase hydrocarbons.

A Vapor Extraction skid-mounted blower system was delivered to the project site and used for the pilot test. The blower system was equipped with a GAST 1.5 horsepower regenerative blower and 55-gallon moisture knockout tank (see attached schematic). The blower was connected to a single-phase 240-volt power through an extension cord and step up transformer. A schematic of the SVE pilot test layout is presented below. The VEW and vapor point locations at the project site are shown on Figure 2 (attached).

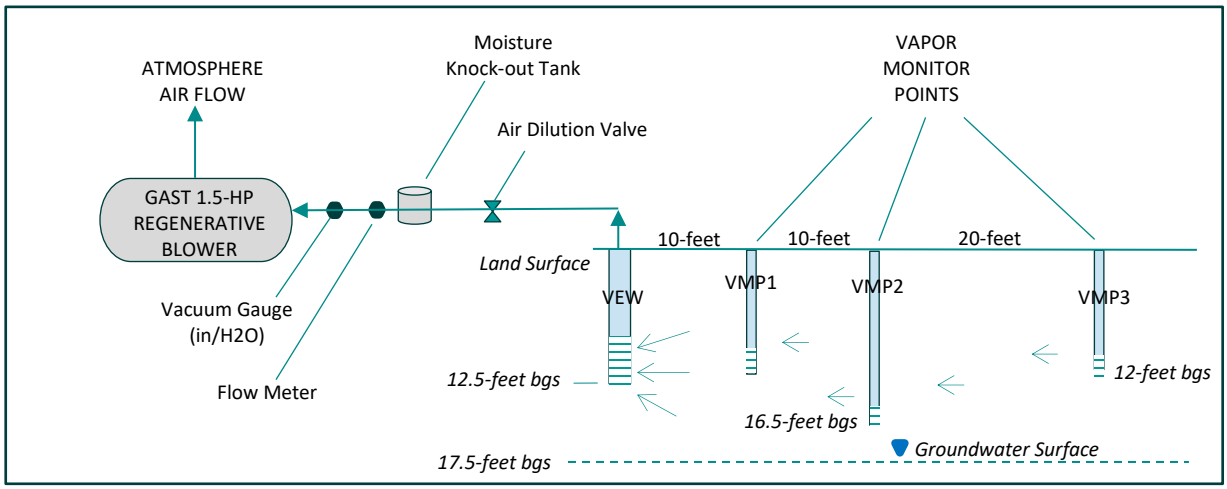


Figure 1: SVE pilot test schematic

Results

Baseline Conditions (Before Extraction – 11/7/2024))

Baseline conditions were measured at all monitoring points prior to the start of extraction to establish reference levels for evaluating changes during and after the test:

- VEW1: Vacuum at the wellhead was 0 inches water (in. H_2O), with no detectable hydrocarbons (PID = 0).
- VMP1, VMP2, and VMP3: Vacuum readings were 0 in. H_2O, with PID readings of 0.4 ppm, 0.2 ppm, and 0.02 ppm, respectively.

Initial Tests (-1 and -4 in. H_2O)

The blower vacuum was adjusted to -1 in. H_2O (dilution valve ¼ closed) and then to -4 in. H_2O (dilution valve ½ closed) over the first 11 minutes of operation.

- VEW1: PID remained at 0 ppm.
- VMP1 (10 ft): Vacuum reached -0.2 in. H_2O at -4 in. H_2O blower vacuum.
- VMP2 (20 ft): Vacuum reached -0.1 in. H_2O at -1 in. H_2O blower vacuum.
- VMP3 (40 ft): Vacuum remained negligible (~0 in. H_2O).

First Step Test (-8 in. H_2O)

The blower vacuum was increased to -8 in. H_2O at 11:43 AM, by closing the dilution valve to ¾ closed. The first step test was conducted over a period of one hour.

- VEW1: PID remained at 0 ppm.

- VMP1 (10 ft): Vacuum fluctuated slightly up to 0.3 in. H_2O, stabilizing at -0.2 in. H_2O.
- VMP2 (20 ft): Vacuum fluctuated slightly up to 0.2 in. H_2O, stabilizing at -0.1 in. H_2O.
- VMP3 (40 ft): Vacuum increased to -0.1 in. H_2O after approximately 25 minutes.

Second Step Test (-12 in. H_2O)

The blower vacuum was increased to -12 in. H_2O at 12:43 PM, by closing the air dilution valve fully. During this test a more precise magnehelic gauge was used to measure differential pressure. The second step test was conducted over a period of one hour.

- VEW1: PID readings at the wellhead increased steadily to 0.2 ppm. Effluent Air PID readings began increasing after approximately 30 minutes to 0.8 by the end of the test.
- VMP1 (10 ft): Vacuum quickly stabilized at approximately -0.32 in. H_2O.
- VMP2 (20 ft): Vacuum quickly stabilized at -0.12 in. H_2O.
- VMP3 (40 ft): Vacuum quickly stabilized at -0.06 to -0.07 in. H_2O.

Constant Rate Test (-12 in. H_2O)

The blower was maintained at -12 in. H_2O for 2 hours and 47 minutes during the constant rate test, with the air dilution valve completely closed.

- VEW1: Effluent air PID readings increased steadily, peaking at 13.3 ppm at 3:47 PM, before gradually declining to 9.2 ppm by the end of the test. Wellhead PID concentrations followed a similar pattern, peaking at 7.3 ppm.
- VMP1 (10 ft): Vacuum remained stable at -0.32 in. H_2O.
- VMP2 (20 ft): Vacuum remained stable at -0.12 in. H_2O.
- VMP3 (40 ft): Vacuum remained stable at -0.06 in. H_2O.

Post Extraction Period

The blower was turned off at 4:30 PM. Vacuum levels at all monitoring points dissipated rapidly, returning to baseline conditions within seconds.

- VEW1: Effluent air PID dropped from 9.2 ppm at the time of shutdown to below detection limits within 10 minutes. Wellhead PID similarly decreased from 2.4 ppm to undetectable levels shortly after shutdown.
- VOC concentrations measured 2.4 ppm immediately after shutdown and increased gradually, reaching 4.1 ppm for the final reading approximately 30 minutes after shutdown.
- VOC concentrations measured 1.3 ppm immediately after shutdown and decreased gradually, reaching 0.6 ppm for the final reading approximately 30 minutes after shutdown.
- VOC concentrations measured 5.4 ppm immediately after shutdown and decreased gradually, reaching 0.6 ppm for the final reading approximately 30 minutes after shutdown.

VAPOR SAMPLING

As outlined in the work plan, vapor samples were collected during the SVE pilot test to evaluate the composition of influent and effluent soil vapors. Samples were analyzed using EPA Method TO-15 for VOCs. Major gasses were also analyzed. Effluent air was sampled at VEW1 during the peak of VOC extraction, while influent air was sampled at the same time, approximately 30 feet away, to establish background conditions. See Table 3 and the laboratory report (appended) for full results.

- Major Gases: Effluent air contained 9.12% oxygen and 1.75% carbon dioxide, while influent air measured 10.5% oxygen with no detectable carbon dioxide. The reduced oxygen and elevated carbon dioxide levels

in the effluent air indicate microbial respiration in the subsurface, likely influenced by prior bioventing activities.

- VOCs: Xylenes were the only VOCs detected in the effluent air, with m,p-xylene at 110 µg/m³ (25 ppbv) and o-xylene at 77 µg/m³ (18 ppbv). All other tested VOCs, including benzene, toluene, and ethylbenzene, were below detection limits in both the effluent and influent air. A trace detection of 0.70 µg/m³ of trichloroethene (TCE) was identified in the influent air, but none was detected in the effluent air. This indicates that the detected TCE represents background atmospheric conditions rather than subsurface contamination.

The absence of significant VOCs in the influent air, aside from trace levels of TCE, confirms that hydrocarbons extracted during the test originated from the subsurface.

RADIUS OF INFLUENCE

The radius of influence (ROI) for the SVE pilot test was evaluated based on the propagation of vacuum pressure, the redistribution of VOCs, and the capture of hydrocarbons in the effluent air. Observations indicate that the SVE system effectively influenced subsurface conditions up to 40 feet from VEW1.

Vacuum propagation was most pronounced near VEW1, with measurable negative vapor pressure at all monitoring points during the -12 in. H_2O step and constant rate tests. The stabilized vacuum values at VMP1, VMP2, and VMP3 show a clear decline in influence with distance, supporting the interpretation that subsurface permeability decreases farther from VEW1. Hydrocarbon removal, as indicated by effluent air PID readings, confirmed effective capture within the ROI.

An analysis of vacuum distribution indicates that the observed decrease in vacuum with distance is consistent with a logarithmic trend, as expected in a relatively homogeneous subsurface. Vacuum stabilized at approximately -0.32 in. H_2O at VMP1 (10 ft), -0.12 in. H_2O at VMP2 (20 ft), and -0.06 in. H_2O at VMP3 (40 ft). This gradual decrease suggests a uniform subsurface without significant barriers or preferential pathways that would cause sharp deviations in vacuum propagation.

VOC redistribution during the post-extraction period suggests that hydrocarbon vapors were mobilized during the extraction process. The increase at VMP1 and decreases at VMP2 and VMP3 indicate that residual migration was concentrated closer to the extraction well.

Using linear extrapolation of vacuum measurements, the radius at which vacuum would approach zero is estimated to be approximately 46 feet.

CONCLUSIONS

The SVE pilot test demonstrated the effectiveness of the system in creating a substantial ROI for vacuum propagation and hydrocarbon removal. Vacuum propagation during the step tests and constant rate test showed measurable effects at all monitoring points, with vacuum decreasing predictably with distance from VEW1. Effluent air PID readings confirmed hydrocarbon removal, peaking at 13.3 ppm during the constant rate test, and the absence of significant rebound effects in VOC concentrations during the post-extraction period supports the effectiveness of the system in capturing and removing vapor-phase hydrocarbons.

The redistribution of VOCs during the post-extraction period also aligns with the vacuum pattern, with VOC increases observed closer to VEW1 (VMP1) and declines farther away (VMP2 and VMP3). This trend reinforces the conclusion that the SVE system effectively mobilized residual hydrocarbons toward the extraction well, with limited rebound effects observed.

The ROI for the SVE system extended to at least 40 feet from VEW1, with an estimated ROI of 46 feet based on linear extrapolation. The results of the SVE pilot test confirm that the SVE system is an effective remediation strategy for mobilizing and removing vapor-phase hydrocarbons from the vadose zone and provides a solid basis for designing a full-scale SVE system.

Sincerely,

Kyle Johnson
2025.01.31
17:23:58 -08'00'

Kyle Johnson, LG
Project Geologist

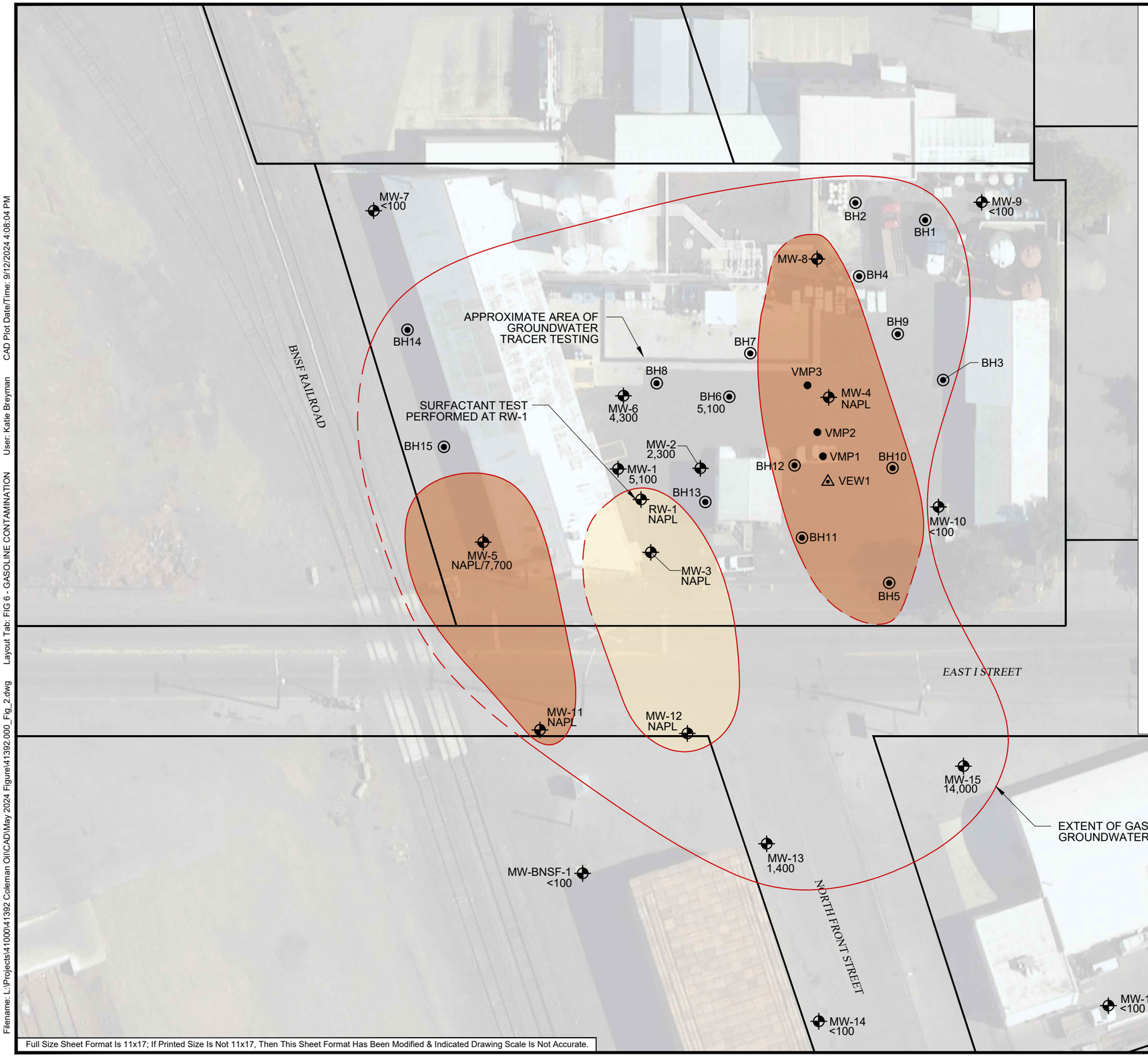
Tom Mergy
Digitally signed by Tom Mergy
Date: 2025.01.31 17:18:13 -08'00'

Tom Mergy, LHG
Principal Geologist

State of Washington
Hydrogeologist
1921
Licensed Geologist
Thomas J Mergy

Attachments:
Figure 2 – Pilot Test Plan
Table 1 – Soil Analytical Results
Table 3 – Soil Gas Analytical Results
Table 4 – Soil Grain Size Distribution
Field Notes
Analytical Results

Reviewer: TM



LEGEND

	APPROXIMATE PARCEL BOUNDARIES FROM YAKIMA COUNTY GIS, ACCESSED ON 12/15/23
MW-1	EXISTING GROUNDWATER MONITORING WELL
BH1	EXISTING SOIL BORING
VEW1	VAPOR EXTRACTION WELL
VMP1	VAPOR MONITORING PROBE
2,100	CONCENTRATION OF GASOLINE IN GROUNDWATER (µg/L) (JUL 2022)
NAPL	WELL CONTAINS MEASURABLE NON-AQUEOUS PHASE LIQUIDS (NAPL). GROUNDWATER SAMPLE NOT COLLECTED.
	AREAS CONTAINING NAPL IN THE FORM OF WEATHERED FUEL
	AREA CONTAINING NAPL IN THE FORM OF MIXED FRESH & WEATHERED FUEL
MTCA CUL	MODEL TOXICS CONTROL ACT METHOD A GROUNDWATER CLEANUP LEVEL FOR GASOLINE (800 µg/L)
(µg/L)	MICROGRAMS PER LITER

NOTE: ALL LOCATIONS APPROXIMATE

GENERAL NOTES

1. SOIL BIOVENTING TEST; INSTALL ONE VAPOR EXTRACTION WELL AND TWO VAPOR/PRESSURE MONITORING PROBES. THE 2-DAY VAPOR EXTRACTION PILOT TEST WILL USE THE VEW-1 AS POINT OF EXTRACTION.

2. SURFACTANT NAPL TEST; INTRODUCE A KNOWN QUANTITY OF SURFACTANT INTO THE RW-1 LOCATION. MEASUREMENT OF NAPL LEVELS AND CONTENT WILL BE CONDUCTED AT RW-1, MW-1, AND MW-3. WITHIN 24 HOURS OF SURFACTANT INJECTION, USE A SUBMERSIBLE PUMP IN RW-1 TO WITHDRAW WATER/NAPL AT APPROXIMATE 3-TIMES THE QUANTITY OF SURFACTANT INTRODUCED INTO RW-1. CONTAINERIZE ALL LIQUIDS EXTRACTED FOR OFF-SITE DISPOSAL

Scale 1" = 40'

0' 20' 40' 80'

PREPARED FOR: COLEMAN OIL

PBS Engineering and Environmental Inc.
214 East Galer Street, Ste. 300
Seattle, WA 98102
206.233.9639
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PBS

PILOT TEST PLAN

COLEMAN OIL

1 EAST I STREET, YAKIMA, WASHINGTON

PROJECT	41392.000
DATE	JUNE 2024
SHEET ID	2

TABLE 1
SOIL ANALYTICAL RESULTS
PILOT TEST DRILLING
Coleman Oil: 1 East I St., Yakima, WA
PBS Project No. 41392.000

Location - Depth	Sample Date	pH	TPH			BTEX				Metals		Conventional Chemistry				
			Gasoline	Diesel	Heavy Oil	Benzene	Toluene	Ethyl-benzene	Xylenes	Total Iron	Total Potassium	Total Nitrate + Nitrite	TKN	Total Nitrogen	TOC	Total Phosphorus
Comparison Criteria	**MTCA Method A Cleanup Levels For Soil[a]**	**-**	**100 30**	**2,000**	**2,000**	**1500**	**7**	**6**	**9**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
VMP1-12.0	11/5/2024	7.0	<5 h	<50 h	<250 h	<0.02 h	<0.02 h	<0.02 h	<0.06 h	34,800	1,050	73.5	153	227	<0.05	655
VMP2-3.0	11/5/2024	8.2	<5	<50	<250	<0.02	<0.02	<0.02	<0.06	38,100	1,380	94.1	402	496	0.162	531
VMP2-16.0	11/5/2024	7.6	<5 h	<50 h	<250 h	<0.02 h	<0.02 h	<0.02 h	<0.06 h	27,800	790	125	148	272	<0.05	498
VMP3-12.0	11/5/2024	7.1	<5 h	<50 h	<250 h	<0.02 h	<0.02 h	<0.02 h	<0.06 h	30,700	719	113	162	275	<0.05	622
VEW1-12.0	11/5/2024	7.2	<5 h	<50 h	<250 h	<0.02 h	<0.02 h	<0.02 h	<0.06 h	34,000	1,300	78.3	132	210	<0.05	525

Notes:
Gasoline analyzed by Northwest Total Petroleum Hydrocarbon Method - Volatile Petroleum Products (Extended) (NWTPH-Gx)
Diesel and Heavy Oil analyzed by Northwest Total Petroleum Hydrocarbon Method - Semi-volatile Petroleum Products (Extended) (NWTPH-Dx)
BTEX constituents analyzed by Environmental Protection Agency Method 8021B
Metals analyzed by EPA Method 6010D
Conventional chemistry analyzed by various standard methods (SM)

Footnotes:
[a] From Model Toxics Control Act Table 740-1 Soil Cleanup Levels for Unrestricted Land Use
[h] The analysis was performed outside the method or client-specified holding time requirement.

TABLE 3
SOIL GAS ANALYTICAL RESULTS
SOIL VAPOR EXTRACTION PILOT TEST
Coleman Oil: 1 East I St., Yakima, WA
PBS Project No. 41392.000

Results (µg/m^3)											
				Major Gasses				Volatile Organic Compounds (VOCs)			
Sample Location	**Date**	**Description**	**Helium (%)**	**Carbon Dioxide (%)**	**Nitrogen (%)**	**Oxygen (%)**	**Other Major Gasses**	**TriChloroethene**	**Xylene-o**	**Xylene-m,p**	**Other VOCs**
SVEPT-1	11/7/2024	Effluent Air	<0.6	1.75	89.1	9.12	ND	<1.6	77	110	ND
SVEPT-2	11/7/2024	Influent Air (ambient)	<0.6	<0.05	89.5	10.5	ND	0.7	<2.1	<4.2	ND

µg/m^3 - micrograms per cubic meter
<1.6 - not detected above laboratory method detection limit
ND - not detected above laboratory method detection limit

TABLE 4
SOIL GRAIN SIZE DISTRIBUTION
Coleman Oil: 1 East I St., Yakima, WA
PBS Project No. 41392.000

Results (%)														
Sample Location	**4.75 mm (Gravel)**	**4.00 mm**	**2.00 mm**	**1.00 mm (Sand)**	**0.50 mm**	**0.25 mm**	**0.125 mm**	**0.063 mm**	**0.032 mm (Silt)**	**0.016 mm**	**0.008 mm**	**0.004 mm**	**0.002 mm (Clay)**	**<0.001 mm**
VMP2-3.0	0.1	0.1	0.1	0.8	3	15.3	19.3	4.2	29.7	8.1	5.3	4.1	1.9	6.2
VMP2-16.0	10	1.5	9	5.8	9.1	24.3	9.3	6.8	4.1	3.2	3.6	2.7	2	7.5
VEW1-12.0	17.5	3.6	11.6	9.5	14	21.8	5.5	4	1.1	2.6	1.9	1.5	1	4
VMP1-12.0	9.7	3.4	13.8	11.5	11.5	14.6	7.2	5.3	4.5	4.5	4.2	2.9	1.5	4.4
VMP3-12.0	16.5	4.5	18.9	11.9	10.9	10.3	4.7	4.7	3.4	4.1	2.9	2.6	1.1	2.9

Grain size distribution was analyzed using ASTM D422

Soil Vapor Extraction Pilot Test

Baseline Measurement Form: B-1

Location: Coleman Oil - Yakima

PBS Project No. 41392

Staff: KJ & TT

DATE: 11/7/2024

Well	Distance from VEW (feet)	Date and Time	Depth to Water (ft)	VOC Headspace (PID Reading)	Vacuum (in. H2O	Notes
VEW	–			0.0	–	
VMP1	10	11/7 1054		0.4	1.5/5	
VMP2	30			0.2	1/5	
VMP3	40			0.2	1.5/5	

Water Level Instrument:

Vacuum Gage Instrument: Dwyer Magnehelic

PID Instrument: MiniRae 3000

Calibration Notes:

Soil Vapor Extraction Pilot Test

pg 1

Form B-2

Vapor Extraction Well Test Measurements

Location: VEW1 **Date:** 11/7/2024

PBS Project No. 41392 **Field Staff:** KJ & TT

Vapor Extraction Well No: _____ **Blower Used During Test:** GeoTech SVE

Barometric Pressure: _____ **Air Temperature:** _____

Time	Vacuum (in. H2O)	PID - Wellhead	PID - Effluent Air	Air Velocity	Notes
1126	~~-8~~ -1	0	0	NC	
1134	~~-8~~ -4	0	0	0	
1144	-8	0	0	20 L/min	Flow meter inoperable,
1149	-8	0	0		Used rotameter at
1156	-8	0	0		effluent
1204	-8	0	0		
1210	-8	0	0		
1215	-8	0	0		
1220	-8	0	0		
1227	-8	0	0		
1234	-8	0	0		
1242	-8	0	0		
1247	-12	0	0	~25 L/min	
1252	-12	0.1	0		
1300	-12	0.1	0		
1307	-12	0.1	0		
1313	-12	0.1	0		
1320	-12	0.1	0.3		
1329	-12	0.2	0.6		
1336	-12	0.2	0.6		
1343	-12	0.2	0.8		
1355	-12	0.2	0.8		
1407	-12	0.2	1.2		
1418	-12	0.3	1.4		
1428	-12	0.5	1.9		
1438	-12	0.7	1.9		
1449	-12	0.7	2.2		

Barametric Pressure: 0.04 in. Hg = 0.54 in. H20

Vacuum Gage Instrument: Dwyer Magnehelic

PID Instrument: MiniRae 3000

Calibration Notes:

Soil Vapor Extraction Pilot Test

P92

Form B-2

Vapor Extraction Well Test Measurements

Location: VEW1 **Date:** 11/7/24

PBS Project No. 41392 **Field Staff:** KJ & TT

Vapor Extraction Well No: _____ **Blower Used During Test:** _____

Barometric Pressure: _____ **Air Temperature:** _____

Time	Vacuum (in. H2O)	PID - Wellhead	PID - Effluent Air	Air Velocity	Notes
1503	-12	0.7	3.8		
1518	-12	1.6	5.6		
1533	-12	2.3	10.0		
1547	-12	7.3	13.3		
1607	-12	2.4	9.2		
1618	-12	2.3	8.6		
1628	-12				
1638	—	2.0			

Barametric Pressure: 0.04 in. Hg = 0.54 in. H20

Vacuum Gage Instrument: Dwyer Magnehelic

PID Instrument: MiniRae 3000

Calibration Notes:

Soil Vapor Extraction Pilot Test

Form B-3

Test Well Measurements

Location: VMP1 **Date:** 11/7/2024

PBS Project No. 41392 **Field Staff:** KJ & TT

Test Well No/Barometric Pressure/Distance from VEW/Well Screen Interval: 10 ft **Blower Used During Test:** GeoTech SVE

Air Temperature:

Start Time:

Well Diameter (Inches):

Time	Vacuum (in. H2O)	NOTES
11:35	2/5	-100 vacuum at VEW
1139	2.5/5	-4
1144	2.5/5	-8
1149	3/5	-8
1156	2.5/5	-8
1204	3/5	-8
1210	2.5/5	-8
1215	2.5/5	-8
1220	3/5	-8
1227	2.5/5	-8
1234	2.5/5	-8
1242	2.5/5	-8
1247	3/5	-12
1252	3.5/5	-12
1301	3/5 (0.32)	-12
1307	0.32	-12
1313	.32	-12
1319	.33 .32	-12
1324	.32	-12
1337	.32	-12
1343	.33	-12
1355	.32	-12
1407	.32	-12
1418	.32	-12
1429	.32	-12
1438	.34	-12
1449	.33	-12

Barametric Pressure: 0.04 in. Hg = 0.54 in. H20

Vacuum Gage Instrument: Dwyer Magnehelic

PID Instrument: MiniRae 3000

Calibration Notes:

Soil Vapor Extraction Pilot Test

Pg 2

Form B-3

Test Well Measurements

Location:	VMP1	**Date:**	11/7/24
PBS Project No.	41392	**Field Staff:**	KJ & TT
Test Well No/Barometric		**Blower Used During Test:**	
Pressure/Distance from		**Air Temperature:**	
VEW:/Well Screen	10ft	**Start Time:**	
Interval:		**Well Diameter (Inches):**	

Time	Vacuum (in. H2O)	NOTES
1503	.30	-12
1518	.30	-12
1533	.32	-12
1547	.31	-12
1603	.32	-12
1618	.32	-12
1623	.32	-12
1631	B	
1634		VOC: 2.4
1639		2.8
1641		VOC 1.4
1653		41

Barametric Pressure: 0.04 in. Hg = 0.54 in. H2O
Vacuum Gage Instrument: Dwyer Magnehelic
PID Instrument: MiniRae 3000

Calibration Notes:

Soil Vapor Extraction Pilot Test

Form B-3

Test Well Measurements

Location:	VMP2	**Date:**	11/7/2024
PBS Project No.	41392	**Field Staff:**	KJ & TT
Test Well No/Barometric		**Blower Used During Test:**	GeoTech SVE
Pressure/Distance from		**Air Temperature:**	
VEW/Well Screen	20ft	**Start Time:**	
Interval:		**Well Diameter (Inches):**	

Time	Vacuum (in. H2O)	NOTES
11:35	1.5/5	-1
1140	1.5/5	-4
1144	2/5	-8
1150	2/5	-8
1157	1.5/5	-8
1204	1.5/5	-8
1211	1.5/5	-8
1216	1.5/5	-8
1220	1.5/5	-8
1228	1.5/5	-8
1235	1.5/5	-8
1243	1.5/5	-8
1248	2/5	-12
1253	2/5	-12
1302	2/5 (0.12)	-12
1308	0.12	-12
1313	.13 HOLD	-12
1320	.13	-12
1330	.12	-12
1337	.12	-12
1343	.13	-12
1355	.12	-12
1407	.12	-12
1419	.12	-12
1429	.12	-12
1439	.12	-12
1449	.12	-12

Barametric Pressure: 0.04 in. Hg = 0.54 in. H20
Vacuum Gage Instrument: Dwyer Magnehelic
PID Instrument: MiniRae 3000

Calibration Notes:

Soil Vapor Extraction Pilot Test

Pg 2

Form B-3

Test Well Measurements

Location:	VMP2	**Date:**	11/7/24
PBS Project No.	41392	**Field Staff:**	KJ & TT
Test Well No/ Barometric		**Blower Used During Test:**	
Pressure/ Distance from		**Air Temperature:**	
VEW/ Well Screen	20 ft	**Start Time:**	
Interval:		**Well Diameter (Inches):**	

Time	Vacuum (in. H2O)	NOTES
1503	.12	-12
1518	.11	-12
1533	.12	-12
1547	.12	-12
1609	.12	-12
1619	.12	
1629	.12	-12
1632	B	
1635		VOCs 1.3
1640		0.5
1649		VOCs 0.8
1658		0.6

Barametric Pressure: 0.04 in. Hg = 0.54 in. H20
Vacuum Gage Instrument: Dwyer Magnehelic
PID Instrument: MiniRae 3000

Calibration Notes:

Soil Vapor Extraction Pilot Test

Form B-3

Test Well Measurements

Location: VMP3 **Date:** 11/7/2024

PBS Project No. 41392 **Field Staff:** KJ & TT

Test Well No./Barometric **Blower Used During Test:** GeoTech SVE

Pressure;/Distance from **Air Temperature:**

VEW;/Well Screen 40ft **Start Time:**

Interval: **Well Diameter (Inches):**

Time	Vacuum (in. H2O)	NOTES
11:35	1 1/2 / 5	-1
1140	1.5 / 5	-4
1144	1.5 / 5	-8
1150	2 / 5	-8
1157	1.5 / 5	-8
1205	1.5 / 5	-8
1211	2 / 5	-8
1216	2 / 5	-8
1221	2 / 5	-8
1228	2 / 5	-8
1235	2 / 5	-8
1243	2 / 5	-8
1248	2 / 5	-12
1253	2 / 5	-12
1302	2 / 5 (0.08) .06	-12
1308	0.08 .07	-12
1313	0.08 .07	-12
1320	.07	-12
1320	.06	-12
1337	.06	-12
1343	.07	-12
1355	06	-12
1407	.06	-12
1419	.06	-12
1429	.07	-12
1439	.07	-12
1450	.07	-12

Barametric Pressure: 0.04 in. Hg = 0.54 in. H20

Vacuum Gage Instrument: Dwyer Magnehelic

PID Instrument: MiniRae 3000

Calibration Notes:

Soil Vapor Extraction Pilot Test

Form B-3

Test Well Measurements

Location:	VMP3	**Date:**	11/7/2024
PBS Project No.	41392	**Field Staff:**	KJ & TT
Test Well No/Barometric		**Blower Used During Test:**	
Pressure: Distance from		**Air Temperature:**	
VEW/Well Screen	40 ft	**Start Time:**	
Interval:		**Well Diameter (Inches):**	

Time	Vacuum (in. H2O)	NOTES
1504	.06	-12
1518	.06	-12
1533	.06	-12
1548	.06	-12
1609	.06	-12
1619	.06	-12
1629	.06	-12
1632	B	
1636		VOC: 5.4
1640		4.6
1649		VOC 0.8
1658		0.6

Barametric Pressure: 0.04 in. Hg = 0.54 in. H20
Vacuum Gage Instrument: Dwyer Magnehelic
PID Instrument: MiniRae 3000

Calibration Notes:

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

January 20, 2025

Kyle Johnson, Project Manager
PBS Engineering and Environmental, Inc.
214 E. Galer St, Suite 300
Seattle, WA 98102

Dear Mr Johnson:

Included are the additional results from the testing of material submitted on November 6, 2024 from the Coleman Oil-Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411078 project. There are 6 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
PBS0120R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on November 6, 2025 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Coleman Oil-Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411078 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
411078 -01	VMP2-3.0
411078 -02	VMP2-16.0
411078 -03	VEW1-3.0
411078 -04	VEW1-12.0
411078 -05	VMP1-3.0
411078 -06	VMP1-12.0
411078 -07	VMP3-3.0
411078 -08	VMP3-12.0
411078 -09	Trip Blank

The NWTPH-Dx and NWTPH-Gx samples were extracted outside the method recommended holding time. The data were flagged accordingly.

All other quality control requirements were acceptable.

Date of Report: 01/20/25
Date Received: 11/06/24
Project: Coleman Oil-Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411078
Date Extracted: 01/16/25
Date Analyzed: 01/16/25

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
VMP2-16.0 ht 411078-02	<0.02	<0.02	<0.02	<0.06	<5	94
VEW1-12.0 ht 411078-04	<0.02	<0.02	<0.02	<0.06	<5	91
VMP1-12.0 ht 411078-06	<0.02	<0.02	<0.02	<0.06	<5	88
VMP3-12.0 ht 411078-08	<0.02	<0.02	<0.02	<0.06	<5	89
Method Blank 05-047 MB2	<0.02	<0.02	<0.02	<0.06	<5	92

Date of Report: 01/20/25
Date Received: 11/06/24
Project: Coleman Oil-Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411078
Date Extracted: 01/14/25
Date Analyzed: 01/14/25

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
VMP2-16.0 ht 411078-02	<50	<250	84
VEW1-12.0 ht 411078-04	<50	<250	91
VMP1-12.0 ht 411078-06	<50	<250	89
VMP3-12.0 ht 411078-08	<50	<250	87
Method Blank 05-185 MB	<50	<250	91

Date of Report: 01/20/25
Date Received: 11/06/24
Project: Coleman Oil-Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411078

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: 501138-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	1.0	77	70-130
Toluene	mg/kg (ppm)	1.0	77	70-130
Ethylbenzene	mg/kg (ppm)	1.0	75	70-130
Xylenes	mg/kg (ppm)	3.0	77	70-130
Gasoline	mg/kg (ppm)	40	70	70-130

Date of Report: 01/20/25
Date Received: 11/06/24
Project: Coleman Oil-Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411078

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: 501123-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	102	100	63-146	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	102	77-123

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported between the method detection limit and the lowest calibration point. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

411078

SAMPLE CHAIN OF CUSTODY

11/06/24 VW1/N4

Report To Kyle Johnson
Company PBS Engineering & Environmental
Address 141 NW Greenwood Ave., #
City, State, ZIP Bend, OR 97702
Phone 541.233.3202 Email kyle.johnson@pbsusa.com

SAMPLERS (*signature*)

PROJECT NAME: Coleman Oil - Yakima Bulk Plant
PO #: 41392.000 T.0021 Ph. 03B

REMARKS: Project specific RLs? - Yes / No

INVOICE TO

Page # _____ of _____

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH _____
Rush charges authorized by: _____

SAMPLE DISPOSAL
☐ Archive samples
☐ Other _____
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Moisture, pH, Reactivity	Alkalinity	Total Iron	Nutrients	ⓧ per KJ 1/13/25 ME Notes
VMP2-3.0	01 A-F	11/5/24	1130	S	6	X	X	X					X	X	X	X	
VMP2-16.0	02	11/5/24	1150	S	6	ⓧ	ⓧ	ⓧ					X	X	X	X	[redacted]
VEW1-3.0	03	11/5/24	1245	S	6	X	X	X					X	X	X	X	HOLD
VEW1-[redacted]12.0	04	11/5/24	1300	S	6	ⓧ	ⓧ	ⓧ					X	X	X	X	[redacted]
VMP1-3.0	05	11/5/24	1330	S	6	X	X	X					X	X	X	X	HOLD
VMP1-[redacted]12.0	06	11/5/24	1350	S	6	ⓧ	ⓧ	ⓧ					X	X	X	X	[redacted]
VMP3-3.0	07	11/5/24	1455	S	6	X	X	X					X	X	X	X	HOLD
VMP3-12.0	08	11/5/24	1505	S	6	ⓧ	ⓧ	ⓧ					X	X	X	X	[redacted]
Trip Blank	09 A-B	-	-	Water	2												Added at lab AP 11/06

ANALYSES REQUESTED

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Kyle Johnson	PBS	11/5/24	1630
Received by:	Anh Phan	FBI	11/06/24	08:39
Relinquished by:				
Received by:		~~Samples received at~~ 4 °C		

Friedman & Bruya, Inc.
5500 4th Ave S.
Seattle WA 98108
(206) 285-8282
office@friedmanandbruya.com

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 411078 CLIENT PES INITIALS/ DATE: AP 11/06/24

If custody seals are present on cooler, are they intact? ☑ NA ☐ YES ☐ NO

Cooler/Sample temperature 4 °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☑ YES ☐ NO

How did samples arrive?
☐ Over the Counter ☐ Picked up by F&BI ☑ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☑ YES ☐ NO Initials/ Date: AP 11/06/24
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 1 days

Are the samples clearly identified? (explain "no" answer below) ☐ YES ☑ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☑ YES ☐ NO

Were appropriate sample containers used? ☑ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☑ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☐ NA ☑ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's	☑ Yes ☐ No		☐ Not on COC/label
Date Sampled	☑ Yes ☐ No		☐ Not on COC/label
Time Sampled	☐ Yes ☑ No	Time on 4 VOAs 14:55 for VMP3-12 (OBC-F)	☐ Not on COC/label
# of Containers	☐ Yes ☑ No	Added Trip Blank at lab.	
Relinquished	☑ Yes ☐ No		
Requested analysis	☑ Yes ☐ On Hold		

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☑ NA ☐ YES ☐ NO

Number of unused TO15 canisters _____ Number of unused TO17 tubes _____

...t using this tag.

ORIGIN ID:YKMA (000) 000-0000
PBS ENVIRONMENTAL
400 BRADLEY BLVD STE 106
RICHLAND, WA 99352
UNITED STATES US

SHIP DATE: 05NOV24
ACTWGT: 44.45 LB
CAD: 6995175/SSFE2560
DIMS: 24x13x14 IN
BILL THIRD PARTY

TO
FRIEDMAN & BRUYA INC
5500 4TH AVE S
SEATTLE WA 98108
(206) 285-8282 REF:
INV:
PO: DEPT:

FedEx
Express
E

WED - 06 NOV 10:30A
PRIORITY OVERNIGHT
TRK# 0201 2814 7030 2501
AHS
98108
WA-US SEA

85 BFIA

Am Test Inc.
13600 NE 126th Place Suite C
Kirkland, WA
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

December 12, 2024

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Project: Friedman & Bruya (CHEM)
Project Number: 411078
COC Number: 411078

MICHAEL ERDAHL:

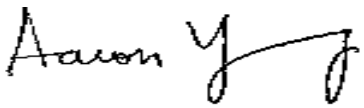
Enclosed please find the analytical data for your Friedman & Bruya (CHEM) project.

Your sample(s) were received on Thursday, November 7, 2024 and properly maintained prior to the subsequent analysis. The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA, Standard Methods or the Army Corps of Engineers.

Following the analytical results you will find the Quality Control (QA/QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.
Sincerely,



Aaron Young
President
aarony@amtestlab.com

Am Test Inc.
13600 NE 126th Place Suite C
Kirkland, WA
(425) 885-1664
www.amtestlab.com

ANALYSIS REPORT

Professional Analytical Services

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

Date Received: 11/07/24
Date Reported: 12/12/24

Reported Samples

Lab ID	Sample	Matrix	Qualifiers	Date Sampled	Date Received
A24K0137-01	VMP2-3.0	Solid		11/05/2024	11/07/2024
A24K0137-02	VMP2-16.0	Solid		11/05/2024	11/07/2024
A24K0137-04	VEW1-12.0	Solid		11/05/2024	11/07/2024
A24K0137-06	VMP1-12.0	Solid		11/05/2024	11/07/2024
A24K0137-08	VMP3-12.0	Solid		11/05/2024	11/07/2024

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AMTEST LABORATORIES

Professional Analytical Services

ANALYSIS REPORT

Date Received: 11/07/24
Date Reported: 12/12/24

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

AMTEST Identification Number: A24K0137-01
Client Identification: VMP2-3.0
Sampling Date: 11/05/24 11:30

Metals by EPA 6000/7000 Series Methods

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
Total Iron	38,100	mg/kg dry		76.5	EPA 6010D	AY	11/14/2024
Total Potassium	1,380	mg/kg dry		51.0	EPA 6010D	AY	11/14/2024

Conventional Chemistry Parameters by APHA/EPA Methods

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
% Solids	83.8	%			SM 2540G_2011	HV	11/18/2024
Total Nitrate + Nitrite	94.1	mg/kg dry		1.19	SM 4500-NO3-F_2011	LF	11/11/2024
pH	8.2	pH Units			SM 4500-H+B_2011	KH	12/06/2024
Total Kjeldahl Nitrogen	402	mg/kg dry		6.0	SM 4500Norg C_2011	LF	11/22/2024
Total Nitrogen	496	mg/kg dry			Calculated	LF	11/22/2024
Total Organic Carbon (TOC)	0.162	%		0.0500	EPA 9060A_1_2004	AS	12/01/2024
Total Phosphorus (TP)	531	mg/kg dry		1.6	SM 4500-P F_2011	LF	11/22/2024

Full Grain Size (Hydrometer/Sieve)

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
PHI -2.25 (4.75 mm) Gravel	1.1	%		0.1	ASTM D422	HV	11/19/2024
PHI -2.00 (4.00 mm)	ND	%		0.1	ASTM D422	HV	11/19/2024
PHI -1.00 (2.00 mm)	0.1	%		0.1	ASTM D422	HV	11/19/2024
PHI 0.00 (1.00 mm) Sand	0.8	%		0.1	ASTM D422	HV	11/19/2024
PHI +1.00 (0.50 mm)	3.0	%		0.1	ASTM D422	HV	11/19/2024
PHI +2.00 (0.25 mm)	15.3	%		0.1	ASTM D422	HV	11/19/2024
PHI +3.00 (0.125 mm)	19.3	%		0.1	ASTM D422	HV	11/19/2024
PHI +4.00 (0.063 mm)	4.2	%		0.1	ASTM D422	HV	11/19/2024
PHI +5.00 (0.032 mm) Silt	29.7	%		0.1	ASTM D422	HV	11/19/2024
PHI +6.00 (0.016 mm)	8.1	%		0.1	ASTM D422	HV	11/19/2024
PHI +7.00 (0.008 mm)	5.3	%		0.1	ASTM D422	HV	11/19/2024
PHI +8.00 (0.004 mm)	4.1	%		0.1	ASTM D422	HV	11/19/2024
PHI +9.00 (0.002 mm) Clay	1.9	%		0.1	ASTM D422	HV	11/19/2024
PHI +10.0 (0.001 mm)	0.9	%		0.1	ASTM D422	HV	11/19/2024
PHI >10.0 (< 0.001 mm)	6.2	%		0.1	ASTM D422	HV	11/19/2024

Am Test Inc.
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(425) 885-1664
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Professional Analytical Services

ANALYSIS REPORT

Date Received: 11/07/24
Date Reported: 12/12/24

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

AMTEST Identification Number: A24K0137-01
Client Identification: VMP2-3.0
Sampling Date: 11/05/24 11:30

Am Test Inc.
13600 NE 126th Place Suite C
Kirkland, WA
(425) 885-1664
www.amtestlab.com

AMTEST LABORATORIES

Professional Analytical Services

ANALYSIS REPORT

Date Received: 11/07/24
Date Reported: 12/12/24

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

AMTEST Identification Number: A24K0137-02
Client Identification: VMP2-16.0
Sampling Date: 11/05/24 11:50

Metals by EPA 6000/7000 Series Methods

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
Total Iron	27,800	mg/kg dry		62.2	EPA 6010D	AY	11/14/2024
Total Potassium	970	mg/kg dry		41.5	EPA 6010D	AY	11/14/2024

Conventional Chemistry Parameters by APHA/EPA Methods

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
% Solids	88.0	%			SM 2540G_2011	HV	11/18/2024
Total Nitrate + Nitrite	124	mg/kg dry		1.14	SM 4500-NO3-F_2011	LF	11/11/2024
pH	7.2	pH Units			SM 4500-H+B_2011	KH	12/06/2024
Total Kjeldahl Nitrogen	148	mg/kg dry		5.7	SM 4500Norg C_2011	LF	11/22/2024
Total Nitrogen	272	mg/kg dry			Calculated	LF	11/22/2024
Total Organic Carbon (TOC)	ND	%	U	0.0500	EPA 9060A_1_2004	AS	12/01/2024
Total Phosphorus (TP)	498	mg/kg dry		1.4	SM 4500-P F_2011	LF	11/22/2024

Full Grain Size (Hydrometer/Sieve)

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
PHI -2.25 (4.75 mm) Gravel	10.0	%		0.1	ASTM D422	HV	11/19/2024
PHI -2.00 (4.00 mm)	1.5	%		0.1	ASTM D422	HV	11/19/2024
PHI -1.00 (2.00 mm)	9.0	%		0.1	ASTM D422	HV	11/19/2024
PHI 0.00 (1.00 mm) Sand	5.8	%		0.1	ASTM D422	HV	11/19/2024
PHI +1.00 (0.50 mm)	9.1	%		0.1	ASTM D422	HV	11/19/2024
PHI +2.00 (0.25 mm)	24.3	%		0.1	ASTM D422	HV	11/19/2024
PHI +3.00 (0.125 mm)	9.3	%		0.1	ASTM D422	HV	11/19/2024
PHI +4.00 (0.063 mm)	6.8	%		0.1	ASTM D422	HV	11/19/2024
PHI +5.00 (0.032 mm) Silt	4.1	%		0.1	ASTM D422	HV	11/19/2024
PHI +6.00 (0.016 mm)	3.2	%		0.1	ASTM D422	HV	11/19/2024
PHI +7.00 (0.008 mm)	3.6	%		0.1	ASTM D422	HV	11/19/2024
PHI +8.00 (0.004 mm)	2.7	%		0.1	ASTM D422	HV	11/19/2024
PHI +9.00 (0.002 mm) Clay	2.0	%		0.1	ASTM D422	HV	11/19/2024
PHI +10.0 (0.001 mm)	1.1	%		0.1	ASTM D422	HV	11/19/2024
PHI >10.0 (< 0.001 mm)	7.5	%		0.1	ASTM D422	HV	11/19/2024

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ANALYSIS REPORT

Date Received: 11/07/24
Date Reported: 12/12/24

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

AMTEST Identification Number: A24K0137-04
Client Identification: VEW1-12.0
Sampling Date: 11/05/24 13:00

Metals by EPA 6000/7000 Series Methods

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
Total Iron	34,000	mg/kg dry		73.9	EPA 6010D	AY	11/14/2024
Total Potassium	1,300	mg/kg dry		49.3	EPA 6010D	AY	11/14/2024

Conventional Chemistry Parameters by APHA/EPA Methods

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
% Solids	94.6	%			SM 2540G_2011	HV	11/18/2024
Total Nitrate + Nitrite	78.3	mg/kg dry		1.06	SM 4500-NO3-F_2011	LF	11/11/2024
pH	7.2	pH Units			SM 4500-H+B_2011	KH	12/06/2024
Total Kjeldahl Nitrogen	132	mg/kg dry		5.3	SM 4500Norg C_2011	LF	11/22/2024
Total Nitrogen	210	mg/kg dry			Calculated	LF	11/22/2024
Total Organic Carbon (TOC)	ND	%	U	0.0500	EPA 9060A_1_2004	AS	12/01/2024
Total Phosphorus (TP)	525	mg/kg dry		1.3	SM 4500-P F_2011	LF	11/22/2024

Full Grain Size (Hydrometer/Sieve)

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
PHI -2.25 (4.75 mm) Gravel	17.5	%		0.1	ASTM D422	HV	11/19/2024
PHI -2.00 (4.00 mm)	3.6	%		0.1	ASTM D422	HV	11/19/2024
PHI -1.00 (2.00 mm)	11.6	%		0.1	ASTM D422	HV	11/19/2024
PHI 0.00 (1.00 mm) Sand	9.5	%		0.1	ASTM D422	HV	11/19/2024
PHI +1.00 (0.50 mm)	14.0	%		0.1	ASTM D422	HV	11/19/2024
PHI +2.00 (0.25 mm)	21.8	%		0.1	ASTM D422	HV	11/19/2024
PHI +3.00 (0.125 mm)	5.5	%		0.1	ASTM D422	HV	11/19/2024
PHI +4.00 (0.063 mm)	4.0	%		0.1	ASTM D422	HV	11/19/2024
PHI +5.00 (0.032 mm) Silt	1.1	%		0.1	ASTM D422	HV	11/19/2024
PHI +6.00 (0.016 mm)	2.6	%		0.1	ASTM D422	HV	11/19/2024
PHI +7.00 (0.008 mm)	1.9	%		0.1	ASTM D422	HV	11/19/2024
PHI +8.00 (0.004 mm)	1.5	%		0.1	ASTM D422	HV	11/19/2024
PHI +9.00 (0.002 mm) Clay	1.0	%		0.1	ASTM D422	HV	11/19/2024
PHI +10.0 (0.001 mm)	0.5	%		0.1	ASTM D422	HV	11/19/2024
PHI >10.0 (< 0.001 mm)	4.0	%		0.1	ASTM D422	HV	11/19/2024

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Date Received: 11/07/24
Date Reported: 12/12/24

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

AMTEST Identification Number: A24K0137-06
Client Identification: VMP1-12.0
Sampling Date: 11/05/24 13:50

Metals by EPA 6000/7000 Series Methods

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
Total Iron	34,800	mg/kg dry		62.8	EPA 6010D	AY	11/14/2024
Total Potassium	1,050	mg/kg dry		41.9	EPA 6010D	AY	11/14/2024

Conventional Chemistry Parameters by APHA/EPA Methods

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
% Solids	95.6	%			SM 2540G_2011	HV	11/18/2024
Total Nitrate + Nitrite	73.5	mg/kg dry		1.05	SM 4500-NO3-F_2011	LF	11/11/2024
pH	7.0	pH Units			SM 4500-H+B_2011	KH	12/06/2024
Total Kjeldahl Nitrogen	153	mg/kg dry		5.2	SM 4500Norg C_2011	LF	11/22/2024
Total Nitrogen	227	mg/kg dry			Calculated	LF	11/22/2024
Total Organic Carbon (TOC)	ND	%	U	0.0500	EPA 9060A_1_2004	AS	12/01/2024
Total Phosphorus (TP)	655	mg/kg dry		1.3	SM 4500-P F_2011	LF	11/22/2024

Full Grain Size (Hydrometer/Sieve)

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
PHI -2.25 (4.75 mm) Gravel	9.7	%		0.1	ASTM D422	HV	11/19/2024
PHI -2.00 (4.00 mm)	3.4	%		0.1	ASTM D422	HV	11/19/2024
PHI -1.00 (2.00 mm)	13.8	%		0.1	ASTM D422	HV	11/19/2024
PHI 0.00 (1.00 mm) Sand	11.5	%		0.1	ASTM D422	HV	11/19/2024
PHI +1.00 (0.50 mm)	11.5	%		0.1	ASTM D422	HV	11/19/2024
PHI +2.00 (0.25 mm)	14.6	%		0.1	ASTM D422	HV	11/19/2024
PHI +3.00 (0.125 mm)	7.2	%		0.1	ASTM D422	HV	11/19/2024
PHI +4.00 (0.063 mm)	5.3	%		0.1	ASTM D422	HV	11/19/2024
PHI +5.00 (0.032 mm) Silt	4.5	%		0.1	ASTM D422	HV	11/19/2024
PHI +6.00 (0.016 mm)	4.5	%		0.1	ASTM D422	HV	11/19/2024
PHI +7.00 (0.008 mm)	4.2	%		0.1	ASTM D422	HV	11/19/2024
PHI +8.00 (0.004 mm)	2.9	%		0.1	ASTM D422	HV	11/19/2024
PHI +9.00 (0.002 mm) Clay	1.5	%		0.1	ASTM D422	HV	11/19/2024
PHI +10.0 (0.001 mm)	0.8	%		0.1	ASTM D422	HV	11/19/2024
PHI >10.0 (< 0.001 mm)	4.4	%		0.1	ASTM D422	HV	11/19/2024

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Date Received: 11/07/24
Date Reported: 12/12/24

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

AMTEST Identification Number: A24K0137-08
Client Identification: VMP3-12.0
Sampling Date: 11/05/24 15:05

Metals by EPA 6000/7000 Series Methods

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
Total Iron	30,700	mg/kg dry		58.2	EPA 6010D	AY	11/14/2024
Total Potassium	719	mg/kg dry		38.8	EPA 6010D	AY	11/14/2024

Conventional Chemistry Parameters by APHA/EPA Methods

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
% Solids	96.8	%			SM 2540G_2011	HV	11/18/2024
Total Nitrate + Nitrite	113	mg/kg dry		1.03	SM 4500-NO3-F_2011	LF	11/11/2024
pH	7.1	pH Units			SM 4500-H+B_2011	KH	12/06/2024
Total Kjeldahl Nitrogen	162	mg/kg dry		5.2	SM 4500Norg C_2011	LF	11/22/2024
Total Nitrogen	275	mg/kg dry			Calculated	LF	11/22/2024
Total Organic Carbon (TOC)	ND	%	U	0.0500	EPA 9060A_1_2004	AS	12/01/2024
Total Phosphorus (TP)	622	mg/kg dry		1.3	SM 4500-P F_2011	LF	11/22/2024

Full Grain Size (Hydrometer/Sieve)

PARAMETER	RESULT	UNITS	Q	R.L.	METHOD	ANALYST	DATE
PHI -2.25 (4.75 mm) Gravel	16.5	%		0.1	ASTM D422	HV	11/19/2024
PHI -2.00 (4.00 mm)	4.5	%		0.1	ASTM D422	HV	11/19/2024
PHI -1.00 (2.00 mm)	18.9	%		0.1	ASTM D422	HV	11/19/2024
PHI 0.00 (1.00 mm) Sand	11.9	%		0.1	ASTM D422	HV	11/19/2024
PHI +1.00 (0.50 mm)	10.9	%		0.1	ASTM D422	HV	11/19/2024
PHI +2.00 (0.25 mm)	10.3	%		0.1	ASTM D422	HV	11/19/2024
PHI +3.00 (0.125 mm)	4.7	%		0.1	ASTM D422	HV	11/19/2024
PHI +4.00 (0.063 mm)	4.7	%		0.1	ASTM D422	HV	11/19/2024
PHI +5.00 (0.032 mm) Silt	3.4	%		0.1	ASTM D422	HV	11/19/2024
PHI +6.00 (0.016 mm)	4.1	%		0.1	ASTM D422	HV	11/19/2024
PHI +7.00 (0.008 mm)	2.9	%		0.1	ASTM D422	HV	11/19/2024
PHI +8.00 (0.004 mm)	2.6	%		0.1	ASTM D422	HV	11/19/2024
PHI +9.00 (0.002 mm) Clay	1.1	%		0.1	ASTM D422	HV	11/19/2024
PHI +10.0 (0.001 mm)	0.5	%		0.1	ASTM D422	HV	11/19/2024
PHI >10.0 (< 0.001 mm)	2.9	%		0.1	ASTM D422	HV	11/19/2024

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ANALYSIS REPORT

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3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
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Friedman & Bruya, Inc.
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Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

Quality Control

Metals by EPA 6000/7000 Series Methods

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBK0168 - EPA 3050A (Acid Digest - Soil)										
Blank (BBK0168-BLK1)					Prepared: 11/13/24 Analyzed: 11/14/24					
Iron	ND	U	0.150	mg/kg wet						
Potassium	ND	U	1.00	mg/kg wet						
LCS (BBK0168-BS1)					Prepared: 11/13/24 Analyzed: 11/14/24					
Iron	2.02		0.150	mg/kg wet	2.000		101%	85-115%		
Potassium	1.76		1.00	mg/kg wet	2.000		88%	85-115%		
Calibration Blank (BBK0168-CCB1)					Prepared: 11/13/24 Analyzed: 11/14/24					
Iron	ND	U		mg/kg wet						
Potassium	ND	U		mg/kg wet						
Calibration Check (BBK0168-CCV1)					Prepared: 11/13/24 Analyzed: 11/14/24					
Iron	2.02		0.150	mg/kg wet	2.000		101%	85-115%		
Potassium	4.00		1.00	mg/kg wet	4.000		100%	85-115%		
Matrix Spike (BBK0168-MS1)		**Source: A24K0137-08**			Prepared: 11/13/24 Analyzed: 11/14/24					
Potassium	833		41.5	mg/kg dry	83.03	719	137%	70-130%		
Matrix Spike Dup (BBK0168-MSD1)		**Source: A24K0137-08**			Prepared: 11/13/24 Analyzed: 11/14/24					
Potassium	804		40.2	mg/kg dry	80.39	719	106%	70-130%	4	25

Quality Control

Conventional Chemistry Parameters by APHA/EPA Methods

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBK0133 - No Prep - WC Soil										
Calibration Blank (BBK0133-CCB1)					Prepared: 11/21/24 Analyzed: 11/22/24					
Total Kjeldahl Nitrogen	1.7			mg/kg wet						
Calibration Check (BBK0133-CCV1)					Prepared: 11/21/24 Analyzed: 11/22/24					
Total Kjeldahl Nitrogen	20.0		5.0	mg/kg wet	20.00		100%	85-115%		
Duplicate (BBK0133-DUP1)		**Source: A24K0137-08**			Prepared: 11/21/24 Analyzed: 11/22/24					

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Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

Quality Control
(Continued)

Conventional Chemistry Parameters by APHA/EPA Methods (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBK0133 - No Prep - WC Soil (Continued)										
Duplicate (BBK0133-DUP1)		**Source: A24K0137-08**			Prepared: 11/21/24 Analyzed: 11/22/24					
Total Kjeldahl Nitrogen	154		5.2	mg/kg dry		162			5	25
Batch: BBK0134 - No Prep - WC Soil										
Blank (BBK0134-BLK1)					Prepared & Analyzed: 11/11/24					
Total Nitrate + Nitrite	ND	U	1.00	mg/kg wet						
LCS (BBK0134-BS1)					Prepared & Analyzed: 11/11/24					
Total Nitrate + Nitrite	25.9		1.00	mg/kg wet	25.00		104%	90-110%		
Calibration Blank (BBK0134-CCB1)					Prepared & Analyzed: 11/11/24					
Total Nitrate + Nitrite	0.0009			mg/kg wet						
Calibration Check (BBK0134-CCV1)					Prepared & Analyzed: 11/11/24					
Total Nitrate + Nitrite	49.6		1.00	mg/kg wet	50.00		99%	85-115%		
Duplicate (BBK0134-DUP1)		**Source: A24K0137-08**			Prepared & Analyzed: 11/11/24					
Total Nitrate + Nitrite	122		1.03	mg/kg dry		113			7	20
Matrix Spike (BBK0134-MS1)		**Source: A24K0137-08**			Prepared & Analyzed: 11/11/24					
Total Nitrate + Nitrite	2,840		1.03	mg/kg dry	2,789	113	98%	70-130%		
Batch: BBK0248 - No Prep - WC Soil										
Blank (BBK0248-BLK1)					Prepared: 11/21/24 Analyzed: 11/22/24					
Total Phosphorus (TP)	ND	U	0.5	mg/kg wet						
LCS (BBK0248-BS1)					Prepared: 11/21/24 Analyzed: 11/22/24					
Total Phosphorus (TP)	5.1		0.5	mg/kg wet	5.000		102%	70-130%		
Calibration Blank (BBK0248-CCB1)					Prepared: 11/21/24 Analyzed: 11/22/24					
Total Phosphorus (TP)	0.004			mg/kg wet						
Calibration Check (BBK0248-CCV1)					Prepared: 11/21/24 Analyzed: 11/22/24					
Total Phosphorus (TP)	10.8		0.5	mg/kg wet	10.00		108%	85-115%		
Duplicate (BBK0248-DUP1)		**Source: A24K0137-08**			Prepared: 11/21/24 Analyzed: 11/22/24					

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Date Received: 11/07/24
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Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

Quality Control
(Continued)

Conventional Chemistry Parameters by APHA/EPA Methods (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBK0248 - No Prep - WC Soil (Continued)										
Duplicate (BBK0248-DUP1)		**Source: A24K0137-08**			Prepared: 11/21/24 Analyzed: 11/22/24					
Total Phosphorus (TP)	671		1.3	mg/kg dry		622			7	40
Matrix Spike (BBK0248-MS1)		**Source: A24K0137-08**			Prepared: 11/21/24 Analyzed: 11/22/24					
Total Phosphorus (TP)	1,760		1.3	mg/kg dry	1,052	622	108%	65-135%		
Batch: BBK0295 - No Prep - WC Soil										
Duplicate (BBK0295-DUP1)		**Source: A24K0284-05**			Prepared & Analyzed: 11/18/24					
% Solids	72.7			%		72.8			0.2	20
Duplicate (BBK0295-DUP2)		**Source: A24K0284-05**			Prepared & Analyzed: 11/18/24					
% Solids	72.4			%		72.8			0.6	20
Batch: BBL0091 - No Prep - WC Soil										
Calibration Check (BBL0091-CCV1)					Prepared: 12/05/24 Analyzed: 12/06/24					
pH	6.9			pH Units	6.860		100%	85-115%		
Calibration Check (BBL0091-CCV2)					Prepared: 12/05/24 Analyzed: 12/06/24					
pH	6.9			pH Units	6.860		100%	85-115%		
Duplicate (BBL0091-DUP1)		**Source: A24L0112-01**			Prepared: 12/05/24 Analyzed: 12/06/24					
pH	5.6			pH Units		5.6			0.7	10
Duplicate (BBL0091-DUP2)		**Source: A24L0112-05**			Prepared: 12/05/24 Analyzed: 12/06/24					
pH	5.2			pH Units		5.2			0.2	10
Batch: BBL0110 - No Prep - WC Soil										
Blank (BBL0110-BLK1)					Prepared & Analyzed: 12/01/24					
Total Organic Carbon (TOC)	ND	U	0.0500	%						
Calibration Blank (BBL0110-CCB1)					Prepared & Analyzed: 12/01/24					
Total Organic Carbon (TOC)	ND	U		%						
Calibration Check (BBL0110-CCV1)					Prepared & Analyzed: 12/01/24					
Total Organic Carbon (TOC)	53.4		0.0500	%	47.00		114%	75-125%		

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ANALYSIS REPORT

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Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

Date Received: 11/07/24
Date Reported: 12/12/24

Quality Control
(Continued)

Conventional Chemistry Parameters by APHA/EPA Methods (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit

Quality Control
(Continued)

Full Grain Size (Hydrometer/Sieve)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit

Batch: BBK0297 - Hydrometer/Sieve

Duplicate (BBK0297-DUP1)		**Source: A24K0284-05**		Prepared & Analyzed: 11/19/24						
PHI +1.00 (0.50 mm)	43.2		0.1	%		39.6			9	200
PHI +10.0 (0.001 mm)	ND		0.1	%		ND				200
PHI +2.00 (0.25 mm)	36.8		0.1	%		39.5			7	200
PHI +3.00 (0.125 mm)	2.5		0.1	%		3.8			41	200
PHI +4.00 (0.063 mm)	0.1		0.1	%		0.5			133	200
PHI +5.00 (0.032 mm) Silt	ND		0.1	%		0.8			200	200
PHI +6.00 (0.016 mm)	ND		0.1	%		ND				200
PHI +7.00 (0.008 mm)	ND		0.1	%		ND				200
PHI +8.00 (0.004 mm)	ND		0.1	%		ND				200
PHI +9.00 (0.002 mm) Clay	ND		0.1	%		ND				200
PHI >10.0 (< 0.001 mm)	2.7		0.1	%		2.7			0	200
PHI 0.00 (1.00 mm) Sand	12.4		0.1	%		11.2			10	200
PHI -1.00 (2.00 mm)	2.2		0.1	%		1.8			20	200
PHI -2.00 (4.00 mm)	0.1		0.1	%		0.1			0	200
PHI -2.25 (4.75 mm) Gravel	ND		0.1	%		ND				200
Duplicate (BBK0297-DUP2)		**Source: A24K0284-05**		Prepared & Analyzed: 11/19/24						
PHI +1.00 (0.50 mm)	41.2		0.1	%		39.6			4	200
PHI +10.0 (0.001 mm)	ND		0.1	%		ND				200
PHI +2.00 (0.25 mm)	36.3		0.1	%		39.5			8	200
PHI +3.00 (0.125 mm)	2.3		0.1	%		3.8			49	200
PHI +4.00 (0.063 mm)	0.1		0.1	%		0.5			133	200
PHI +5.00 (0.032 mm) Silt	0.1		0.1	%		0.8			156	200
PHI +6.00 (0.016 mm)	ND		0.1	%		ND				200
PHI +7.00 (0.008 mm)	ND		0.1	%		ND				200
PHI +8.00 (0.004 mm)	ND		0.1	%		ND				200
PHI +9.00 (0.002 mm) Clay	ND		0.1	%		ND				200
PHI >10.0 (< 0.001 mm)	2.7		0.1	%		2.7			0	200
PHI 0.00 (1.00 mm) Sand	15.2		0.1	%		11.2			30	200

Am Test Inc.
13600 NE 126th Place Suite C
Kirkland, WA
(425) 885-1664
www.amtestlab.com

AMTEST LABORATORIES

Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

Date Received: 11/07/24
Date Reported: 12/12/24

Quality Control
(Continued)

Full Grain Size (Hydrometer/Sieve) (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BBK0297 - Hydrometer/Sieve (Continued)										
Duplicate (BBK0297-DUP2)			**Source: A24K0284-05**		Prepared & Analyzed: 11/19/24					
PHI -1.00 (2.00 mm)	2.1		0.1	%		1.8			15	200
PHI -2.00 (4.00 mm)	0.1		0.1	%		0.1			0	200
PHI -2.25 (4.75 mm) Gravel	ND		0.1	%		ND				200

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ANALYSIS REPORT

Professional Analytical Services

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: Friedman & Bruya (CHEM)
Project #: 411078

Date Received: 11/07/24
Date Reported: 12/12/24

Notes and Definitions

Item	Definition
U	The compound was analyzed for but was not detected (Non-detect) at or above the MRL/MDL.
Dry	Sample results reported on a dry weight basis.
ND	Analyte NOT DETECTED at or above the reporting limit.
RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was matrix spiked or duplicated.

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

AZ4K0137

Page # 1 of 1

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 5500 4th Ave S

City, State, ZIP Seattle, WA 98108

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Amtest

PROJECT NAME/NO.	PO #
411078	E-503

REMARKS

TURNAROUND TIME
- ☒ Standard TAT
- ☐ RUSH

Rush charges authorized by:

SAMPLE DISPOSAL
- Dispose after 30 days
- Return samples
- Will call with instructions

	Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED: Particle Size	Alkalinity	Total Iron	Nutrients							Notes
01	VMP2-3.0		11/5/2024	1130	soil	1	x	x	x	x							
02	VMP2-16.0		11/5/2024	1150	soil	1	x	x	x	x							
03	VEW1-3.0		11/5/2024	1245	soil	1	~~x~~	~~x~~	~~x~~	~~x~~							HOLD
11/18/24 04 ~~05~~	VEW1-12.0		11/5/2024	1300	soil	1	x	x	x	x							
05	VMP1-3.0		11/5/2024	1330	soil	1	~~x~~	~~x~~	~~x~~	~~x~~							HOLD
06	VMP1-12.0		11/5/2024	1350	soil	1	x	x	x	x							
07	VMP3-3.0		11/5/2024	1455	soil	1	~~x~~	~~x~~	~~x~~	~~x~~							HOLD
08	VMP3-12.0		11/5/2024	1505	soil	1	x	x	x	x							

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
~~Relinquished by:~~		Michael Erdahl	Friedman & Bruya	11/7/24	0910
Received by:		SF	AmTest	11/7/24	
Relinquished by:					
Received by:					

7.3°C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

November 27, 2024

Kyle Johnson, Project Manager
PBS Engineering and Environmental, Inc.
141 NW Greenwood Ave
Bend, OR 97703

Dear Mr Johnson:

Included are the results from the testing of material submitted on November 8, 2024 from the Coleman Oil- Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411134 project. There are 9 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
PBS1127R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on November 8, 2024 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Coleman Oil- Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411134 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
411134 -01	SVEPT-1
411134 -02	SVEPT-2

Non-petroleum compounds identified in the air phase hydrocarbon (APH) ranges were subtracted per the MA-APH method.

The samples were sent to Alliance Technical Group for major gases analysis. The report is enclosed.

The TO-15 calibration standard for vinyl chloride and 1,1,2-trichloroethane exceeded the acceptance criteria. The compounds were not detected, therefore this did not represent an out of control condition, and were qualified with a "k" qualifier.

All other quality control requirements were acceptable.

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVEPT-1	Client:	PBS Engineering and Environmental
Date Received:	11/08/24	Project:	Coleman Oil- Yakima Bulk Plant
Date Collected:	11/07/24	Lab ID:	411134-01 1/15
Date Analyzed:	11/14/24	Data File:	111327.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	96	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<3.8 k	<1.5 k
Chloroethane	<40	<15
1,1-Dichloroethene	<5.9	<1.5
trans-1,2-Dichloroethene	<5.9	<1.5
1,1-Dichloroethane	<6.1	<1.5
cis-1,2-Dichloroethene	<5.9	<1.5
1,2-Dichloroethane (EDC)	<0.61	<0.15
1,1,1-Trichloroethane	<8.2	<1.5
Benzene	<4.8	<1.5
Trichloroethene	<1.6	<0.3
Toluene	<110	<30
1,1,2-Trichloroethane	<0.82 k	<0.15 k
Tetrachloroethene	<100	<15
Ethylbenzene	<6.5	<1.5
m,p-Xylene	110	25
o-Xylene	77	18
Naphthalene	<3.9	<0.75

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVEPT-2	Client:	PBS Engineering and Environmental
Date Received:	11/08/24	Project:	Coleman Oil- Yakima Bulk Plant
Date Collected:	11/07/24	Lab ID:	411134-02 1/4.8
Date Analyzed:	11/13/24	Data File:	111326.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	95	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<1.2 k	<0.48 k
Chloroethane	<13	<4.8
1,1-Dichloroethene	<1.9	<0.48
trans-1,2-Dichloroethene	<1.9	<0.48
1,1-Dichloroethane	<1.9	<0.48
cis-1,2-Dichloroethene	<1.9	<0.48
1,2-Dichloroethane (EDC)	<0.19	<0.048
1,1,1-Trichloroethane	<2.6	<0.48
Benzene	<1.5	<0.48
Trichloroethene	0.70	0.13
Toluene	<36	<9.6
1,1,2-Trichloroethane	<0.26 k	<0.048 k
Tetrachloroethene	<33	<4.8
Ethylbenzene	<2.1	<0.48
m,p-Xylene	<4.2	<0.96
o-Xylene	<2.1	<0.48
Naphthalene	<1.3	<0.24

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Coleman Oil- Yakima Bulk Plant
Date Collected:	Not Applicable	Lab ID:	04-2768 mb
Date Analyzed:	11/13/24	Data File:	111312.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	85	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26 k	<0.1 k
Chloroethane	<2.6	<1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
1,1-Dichloroethane	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01
1,1,1-Trichloroethane	<0.55	<0.1
Benzene	<0.32	<0.1
Trichloroethene	<0.11	<0.02
Toluene	<7.5	<2
1,1,2-Trichloroethane	<0.055 k	<0.01 k
Tetrachloroethene	<6.8	<1
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1
Naphthalene	<0.26	<0.05

Date of Report: 11/27/24
Date Received: 11/08/24
Project: Coleman Oil- Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411134
Date Extracted: 11/18/24
Date Analyzed: 11/19/24

RESULTS FROM THE ANALYSIS OF AIR SAMPLES FOR HELIUM USING METHOD ASTM D1946

Results Reported as % Helium

Sample ID Laboratory ID	Helium
SVEPT-1 411134-01	<0.6
SVEPT-2 411134-02	<0.6
Method Blank O4-2846 MB	<0.6

Date of Report: 11/27/24
Date Received: 11/08/24
Project: Coleman Oil- Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411134

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 411133-03 1/7.5 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Vinyl chloride	ug/m3	<1.9	<1.9	nm
Chloroethane	ug/m3	<20	<20	nm
1,1-Dichloroethene	ug/m3	<3	<3	nm
trans-1,2-Dichloroethene	ug/m3	<3	<3	nm
1,1-Dichloroethane	ug/m3	<3	<3	nm
cis-1,2-Dichloroethene	ug/m3	<3	<3	nm
1,2-Dichloroethane (EDC)	ug/m3	<0.3	<0.3	nm
1,1,1-Trichloroethane	ug/m3	<4.1	<4.1	nm
Benzene	ug/m3	12	13	8
Trichloroethene	ug/m3	<0.81	<0.81	nm
Toluene	ug/m3	57	<57	nm
1,1,2-Trichloroethane	ug/m3	<0.41	<0.41	nm
Tetrachloroethene	ug/m3	<51	<51	nm
Ethylbenzene	ug/m3	3.8	3.7	3
m,p-Xylene	ug/m3	8.7	8.6	1
o-Xylene	ug/m3	3.5	3.4	3
Naphthalene	ug/m3	<2	2.0	nm

Date of Report: 11/27/24
Date Received: 11/08/24
Project: Coleman Oil- Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411134

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Vinyl chloride	ug/m3	35	141 vo	70-130
Chloroethane	ug/m3	36	123	70-130
1,1-Dichloroethene	ug/m3	54	123	70-130
trans-1,2-Dichloroethene	ug/m3	54	119	70-130
1,1-Dichloroethane	ug/m3	55	130	70-130
cis-1,2-Dichloroethene	ug/m3	54	112	70-130
1,2-Dichloroethane (EDC)	ug/m3	55	123	70-130
1,1,1-Trichloroethane	ug/m3	74	124	70-130
Benzene	ug/m3	43	115	70-130
Trichloroethene	ug/m3	73	123	70-130
Toluene	ug/m3	51	112	70-130
1,1,2-Trichloroethane	ug/m3	74	137 vo	70-130
Tetrachloroethene	ug/m3	92	129	70-130
Ethylbenzene	ug/m3	59	109	70-130
m,p-Xylene	ug/m3	120	104	70-130
o-Xylene	ug/m3	59	112	70-130
Naphthalene	ug/m3	71	82	70-130

Date of Report: 11/27/24
Date Received: 11/08/24
Project: Coleman Oil- Yakima Bulk Plant 41392.000 T.0021 Ph.03B, F&BI 411134

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR HELIUM USING METHOD ASTM D1946

Laboratory Code: (Duplicate)

Analyte	Sample Result (%)	Duplicate Result (%)	Relative Percent Difference	Acceptance Criteria
Helium	<0.6	<0.6	nm	0-20

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported between the method detection limit and the lowest calibration point. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

411134

SAMPLE CHAIN OF CUSTODY

11/08/24

Report To Kyle Johnson
Company PBS
Address 141 NW Greenwood Ave
City, State, ZIP Bend, OR
Phone _____ Email Kyle.johnson@pbsusa.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS: Coleman Oil - Yakima Bulk Plant

PO # 41392.000 T.0021 Ph.03B

NOTES: SVE Pilot Test

INVOICE TO

TURNAROUND TIME
√Standard
RUSH _____
Rush charges authorized by: _____

SAMPLE DISPOSAL
Default: Clean following final report delivery
Hold (Fee may apply): _____

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium	O_2, CO_2, CH_4, N D1946 mod	Notes
SVEPT-1	01	9984	75	IA / (SG)	11/7	30	1554	2	1602		X	X		X	X	
SVEPT-AMBIENT-2 FD	02	8098	105	IA / SG	11/7	30	1555	3	1602		X	X		X	X	Ambient
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

Friedman & Bruya, Inc.
5500 4th Avenue South
Seattle, WA 98108
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Kyle Johnson	PBS	11/7/24	1630
Received by:	Anh Phan	FBI	11/08/24	09:16
Relinquished by:		Samples received at 18 °C		
Received by:				

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 411134 CLIENT PBS INITIALS/ DATE: AP 11/08/24

If custody seals are present on cooler, are they intact? ☒ NA ☐ YES ☐ NO

Cooler/Sample temperature 18 °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☐ YES ☒ NO

How did samples arrive?
☐ Over the Counter ☐ Picked up by F&BI ☒ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☒ YES ☐ NO Initials/ Date: AP 11/08/24
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory _____ days

Are the samples clearly identified? (explain "no" answer below) ☒ YES ☐ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☒ YES ☐ NO

Were appropriate sample containers used? ☒ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☒ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☒ NA ☐ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's	☒ Yes ☐ No	☐ Not on COC/label
Date Sampled	☒ Yes ☐ No	☐ Not on COC/label
Time Sampled	☒ Yes ☐ No	☐ Not on COC/label
# of Containers	☒ Yes ☐ No	
Relinquished	☒ Yes ☐ No	
Requested analysis	☒ Yes ☐ On Hold	

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☐ NA ☐ YES ☒ NO

Number of unused TO15 canisters _____ Number of unused TO17 tubes _____

ORIGIN ID:YKMA (000) 000-0000

PBS ENVIRONMENTAL
400 BRADLEY BLVD STE 106

RICHLAND, WA 99352
UNITED STATES US

SHIP DATE: 07NOV24
ACTWGT: 5.30 LB
CAD: 6995176/SSFE2560
DIMS: 10x10x16 IN

BILL THIRD PARTY

Part # 156297-435 RRDB EXP 09/25

TO FRIEDMAN & BRUYA INC.
SAMPLE RECEIVING
5500 4TH AVE SO.

SEATTLE WA 98108
(206) 285-8282
INV:
PO: REF:
DEPT:

FedEx
Express

E

J244024091001uv

TRK# 0201 2815 5663 6426

FRI - 08 NOV 10:30A
PRIORITY OVERNIGHT

85 BFIA

98108
WA-US SEA

3600 Fremont Ave N
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
5500 4th Ave S
Seattle, WA 98108

RE: 411134,
Work Order Number: 2411385

November 26, 2024

Attention Michael Erdahl:

Fremont Analytical, Inc, an Alliance Technical Group company, received 2 sample(s) on 11/19/2024 for the analyses presented in the following report.

Major Gases by EPA Method 3C

All analyses were performed according to our accredited Quality Assurance program. Please contact the laboratory if you should have any questions about the results.

Please note, while the appearance of our logo and branding will update, our commitment to accuracy, speed, and customer service remain values celebrated and shared by Alliance Technical Group. Thank you for the opportunity to serve you.

Sincerely,

Kelley Lovejoy
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.4 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Original

Date: *11/26/2024*

CLIENT: Friedman & Bruya
Project: 411134
Work Order: 2411385

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2411385-001	SVEPT-1	11/19/2024 11:15 AM	11/19/2024 1:20 PM
2411385-002	SVEPT-2	11/19/2024 11:15 AM	11/19/2024 1:20 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2411385**

Date: **11/26/2024**

CLIENT: Friedman & Bruya

Project: 411134

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Major gases are reported as % ratio of the Major Gases analyzed (Carbon dioxide, Carbon Monoxide, Methane, Nitrogen, Oxygen and Hydrogen).

The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS). The LCS is processed with the samples to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Note: The estimated BTU calculation is based off of the methane result.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2411385**
Date Reported: **11/26/2024**

CLIENT: Friedman & Bruya
Project: 411134

Lab ID: 2411385-001 **Collection Date:** 11/19/2024 11:15:00 AM
Client Sample ID: **SVEPT-1** **Matrix:** Air

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Major Gases by EPA Method 3C				Batch ID: R95957		Analyst: CO
Carbon Dioxide	1.75	0.0500		%	1	11/20/2024 1:12:00 PM
Carbon Monoxide	ND	0.0500		%	1	11/20/2024 1:12:00 PM
Methane	ND	0.0500		%	1	11/20/2024 1:12:00 PM
Nitrogen	89.1	0.0500		%	1	11/20/2024 1:12:00 PM
Oxygen	9.12	0.0500		%	1	11/20/2024 1:12:00 PM
Hydrogen	ND	0.0500		%	1	11/20/2024 1:12:00 PM
BTU	0.0273			BTU/ft^3	1	11/20/2024 1:12:00 PM

Lab ID: 2411385-002 **Collection Date:** 11/19/2024 11:15:00 AM
Client Sample ID: **SVEPT-2** **Matrix:** Air

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Major Gases by EPA Method 3C				Batch ID: R95957		Analyst: CO
Carbon Dioxide	ND	0.0500		%	1	11/20/2024 1:33:00 PM
Carbon Monoxide	ND	0.0500		%	1	11/20/2024 1:33:00 PM
Methane	ND	0.0500		%	1	11/20/2024 1:33:00 PM
Nitrogen	89.5	0.0500		%	1	11/20/2024 1:33:00 PM
Oxygen	10.5	0.0500		%	1	11/20/2024 1:33:00 PM
Hydrogen	ND	0.0500		%	1	11/20/2024 1:33:00 PM
BTU	ND			BTU/ft^3	1	11/20/2024 1:33:00 PM

Work Order: 2411385
CLIENT: Friedman & Bruya
Project: 411134

QC SUMMARY REPORT

Major Gases by EPA Method 3C

Sample ID: **LCS-R95957** SampType: **LCS** Units: **%** Prep Date: **11/20/2024** RunNo: **95957**
Client ID: **LCSW** Batch ID: **R95957** Analysis Date: **11/20/2024** SeqNo: **2002315**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Carbon Dioxide	99.1	0.0500	100.0	0	99.1	90	110				
Carbon Monoxide	99.3	0.0500	100.0	0	99.3	90	110				
Methane	99.1	0.0500	100.0	0	99.1	90	110				
Nitrogen	100	0.0500	100.0	0	100	90	110				
Oxygen	101	0.0500	100.0	0	101	90	110				
Hydrogen	99.6	0.0500	100.0	0	99.6	90	110				

Sample ID: **2411384-001AREP** SampType: **REP** Units: **%** Prep Date: **11/20/2024** RunNo: **95957**
Client ID: **BATCH** Batch ID: **R95957** Analysis Date: **11/20/2024** SeqNo: **2002310**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Carbon Dioxide	2.26	0.0500						2.261	0.0539	30	
Carbon Monoxide	ND	0.0500						0		30	
Methane	ND	0.0500						0		30	
Nitrogen	87.9	0.0500						87.86	0.0127	30	
Oxygen	9.87	0.0500						9.874	0.0702	30	
Hydrogen	ND	0.0500						0		30	
BTU	ND							0.03043	200	30	

Sample Log-In Check List

Client Name:	FB	Work Order Number:	2411385
Logged by:	Clare Griggs	Date Received:	11/19/2024 1:20:00 PM

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
4.	Was an attempt made to cool the samples?	Yes ☐	No ☐	NA ☑
5.	Were all items received at a temperature of >2°C to 6°C *	Yes ☐	No ☐	NA ☑
6.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
7.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
8.	Are samples properly preserved?	Yes ☑	No ☐	
9.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
10.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
11.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
12.	Does paperwork match bottle labels?	Yes ☑	No ☐	
13.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
14.	Is it clear what analyses were requested?	Yes ☑	No ☐	
15.	Were all hold times (except field parameters, pH e.g.) able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

17. Additional remarks:

Item Information

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2411385

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 5500 4th Ave S

City, State, ZIP Seattle, WA 98108

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER
Alliance Technical Group

PROJECT NAME/NO.	PO #
411134	E-523

REMARKS

TURNAROUND TIME
☒ Standard TAT
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	major gases										Notes
																Dilution
SVEPT-1		11/19/2024	11:15	vapor	1	x										2.1
SVEPT-2		11/19/2024	11:15	vapor	1	x										2.2

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	11/19/24	1150
Received by:		gina gerrard	AFG	11/19/24	1:20PM
Relinquished by:					
Received by:					