VAPOR INTRUSION ASSESSMENT REPORT

Former Hahn Motors
1201 South 1st Street
Yakima, WA 98901

Prepared for:

Manjarrez & De Leon Inc PS
Debra Manjarrez
2010 W Nob Hill Blvd.
Yakima, WA 98902

November 14, 2024

Prepared by:

Blue Mountain Environmental & Consulting Company, Inc.
125 Main / PO Box 545
Waitsburg, WA 99361
509-337-6403
WWW.BMECINC.NET

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1.0 INTRODUCTION

This Vapor Intrusion Assessment (VIA) report has been prepared by Blue Mountain Environmental & Consulting Company, Inc (BMEC) for the Former Hahn Motor Company located at 1201 South 1st Street, Yakima, Washington 98901 (hereinafter referred to as "the Site"). The Site Location Map is shown on **Figure 1**. The Site is listed in the Washington State Department of Ecology's (Ecology) Database as Facility Site ID # 502; Cleanup Site ID# 4927; and VCP Project # CE0529.

This report documents field operations performed during the VIA sampling event conducted on October 13, 2024, and provided a discussion of the analytical results as they pertain to the potential for vapor intrusion into the building interior at the Site.

2.0 BACKGROUND INFORMATION

As of February 23, 2016, the property was owned by Mr. Richard Hahn. The current owner of the property is the Estate of Douglas F Bettarel, represented by Ms. Debra Manjarrez of Manjarrez and De Leon Inc, PS. BMEC is currently working for Manjarrez and De Leon Inc, PS.

2.1 Background Information

The 1.5-acre (approximate) Site is located in the City of Yakima, Yakima County, Washington, at the southeast corner of the intersection of South 1st Street and East Arlington Street. The Site Location Map is included as **Figure 1**. The Site consists of one tax parcel (191330-13032) and is located in the southwest quarter of the northeast quarter of Section 30, Township 13 North, Range 19 East Willamette Meridian. The elevation is approximately 1,040 feet above mean sea level and the Site is relatively flat with primarily asphalt ground cover. The nearest major body of water is the Yakima River approximately 1.5 miles east of the Site. The Site is surrounded by commercial then residential property to the east, commercial property then light industry to the north, commercial property to the northwest, commercial property then railroad property to the west, and commercial property to the south. There are no flood zones or wetlands associated with the Site.

One building is located on the Site. The rectangular building located on the northwest corner of the property consists of an automobile showroom with offices on the western half, bathrooms and break room near the center of the building, and an automobile repair and automobile wash bay in the eastern half of the building.

The existing facility was built in 1946 by Hahn Motors Company. A 2,000-gallon heating oil underground storage tank (UST) for the oil-fired boiler was installed in the northwest side of the building's basement to provide heat for the facility. A second 2,000-gallon UST was installed at the facility in the mid-1970's and both USTs were used to store used oil after the boiler was converted to burn used motor oil, which was plentiful, available from the on-site conducted car services.

2.2 Environmental History - Prior to BMEC

It was determined by Ecology on July 9, 2007, and documented via certified mail dated July 26, 2007, that Hahn Motor Company was in Non-Compliance with the Underground Storage Tank Regulations Chapter 173-360 for not properly registering and upgrading their 2,000-gallon USTs prior to storage of waste oil. Via directive from Ecology as defined in the July 26, 2007 certified mail, both USTs were decommissioned by removal and backfill in November 2007. Approximately 50 cubic yards of petroleum-contaminated soil (PCS) and asphalt were hauled off-site and disposed of at the Anderson Disposal Facility in Yakima, Washington.

During the November 9, 2007, UST decommissioning activities, three soil samples were collected from the west, north, and east side of the eastern UST, yielding one heavy oil detection of 396 milligrams per Kilogram (mg/Kg) in the west sample. Similarly, three soil samples were collected from the west, north, and east side of the eastern UST, yielding heavy oil detections ranging between 155 – 492 mg/Kg. The Model Toxics Control Act (MTCA) Method A Cleanup Level (CUL) for heavy oil is 2,000 mg/Kg. No gasoline range hydrocarbons were identified by laboratory analysis in any soil samples collected. Significant lead concentrations were detected in residual soil sampled and analyzed from the tank bottom(s).

In 2017, Ecology conducted semi-annual groundwater sampling of the Yakima Railroad Area (YRRA) groundwater monitoring network which is a six-square mile area located along the railroad corridor in the cities of Yakima and Union Gap, Washington. The YRRA was defined in 1991. The Site is located near the center of the YRRA which is impacted by chlorinated solvents, primarily tetrachloroethene (PCE). Circa 2017, 15 of the 39 groundwater samples collected from wells within the YRRA yielded concentrations ranging from 5 to 9,110 micrograms per liter (µg/L). The MTCA Method A CUL for PCE in groundwater is 5 µg/L.

2.3 BMEC Field Activities

- February 2022 - Subsurface Investigation involving advancement of six borings via rotary sonic with collection of soil and grab groundwater samples for analysis of total petroleum hydrocarbons – diesel range (TPH-D) and TPH – heavy oil range (TPH-O), volatile organic compounds (VOCs), heavy metals (i.e., arsenic, cadmium, chromium, and lead), polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs).
- July 2022 - Dry Well Removal involving removal of two dry wells south of the main onsite building and collected 13 confirmation soil samples for analysis of BTEX, TPH-D, TPH-O, TPH-G, arsenic, cadmium, chromium, and lead.
- September 2022 - Additional Subsurface Investigation via sonic drilling involving installation of six monitoring wells (MW1 through MW6) and analysis of soil and groundwater samples for TPH-D, TPH-O, TPH-G, VOCs (including BTEX + naphthalene), heavy metals (including arsenic, barium, cadmium, lead, mercury, selenium, and silver).
- December 2022 – Groundwater Sampling Event (GWSE) involving collection of groundwater samples from all six monitoring wells (MW1 through MW6) and analyzing the samples for TPH-D, TPH-O, VOCs (including PCE and BTEX), and total metals (including arsenic, barium, cadmium, chromium, lead, mercury, and selenium).
- March 2023 - GWSE involving the collection of groundwater from six monitoring wells (MW1 through MW6) for the analysis of TPH-D, TPH-O, VOCs (including PCE), and heavy metals (including arsenic, cadmium, chromium, lead, and mercury).
- May 2023 - Monitoring Well Installation involving the installation of four monitoring wells (replacement well MW3A, MW7, MW8, and MW9) and the collection of soil samples for analysis of TPH-D, TPH-O, PCE, as well as heavy metals (arsenic, cadmium, chromium, lead, mercury, silver, and selenium).
- June 2023 - GWSE involving the collection of groundwater samples from newly installed monitoring wells MW3A, MW7, MW8, and MW9 for analysis of TPH-D, TPH-O, PCE, and heavy metals (arsenic, cadmium, chromium, mercury, and lead).
- September 2023 - GWSE involving the collection of groundwater samples from all nine monitoring wells for analysis of TPH-D, TPH-O, PCE, and heavy metals (arsenic, cadmium, chromium, mercury, and lead).

- December 2023 - GWSE involving the collection of groundwater samples from all nine monitoring wells for analysis of TPH-D, TPH-O, PCE, and heavy metals (arsenic, cadmium, chromium, mercury, and lead).
- March 2024 - GWSE involving the collection of groundwater samples from all nine monitoring wells for analysis of TPH-D, TPH-O, PCE, and heavy metals (arsenic, cadmium, chromium, mercury, and lead).
- June 2024 - GWSE involving the collection of groundwater samples from all nine monitoring wells for analysis of PCE and heavy metals (arsenic, cadmium, chromium, mercury, and lead).
- September 2024 - GWSE involving the collection of groundwater samples from all nine monitoring wells for analysis of PCE and heavy metals (arsenic, cadmium, chromium, mercury, and lead).

2.4 Chemicals and Media of Concern

Based on the findings of the early BMEC investigations carried out at the Site, the primary COCs in soil and groundwater were determined to be TPH-D, heavy metals (arsenic, chromium, mercury, and lead), and PCE. As of the most recent BMEC field activities performed by BMEC, the primary COCs in groundwater beneath the Site have been determined to be heavy metals (arsenic, chromium, and lead) and PCE, as well as potential chlorinated solvents related to the attenuation of PCE. Subsequent to the most recent GWSE conducted on September 17, 2024, heavy metals and PCE are no longer COCs in groundwater. However, per a phone conversation between BMEC and Ecology on September 26, 2024, Ecology has required a second Tier II VIA to be performed at the Site with PCE being the primary COC for which to analyze. The purpose of this VIA is to assess if the vapor intrusion pathway is closed. If the VI pathway is not closed then the results should establish the COCs in vapor that are relevant for the Site that will require mitigation.

3.0 VAPOR INTRUSION ASSESSMENT

On October 13, 2024, all VIA field activities were supervised by a Washington State licensed Site Assessor experienced in site assessment and sampling activities. Field activities were performed in accordance with the Site's Health and Safety Plan.

3.1 Objectives and Scope

The VIA was intended to assess the concentration of chlorinated solvent constituents in sub-slab soil gas, as well as indoor air and outdoor air at selected locations of the Site. The objectives of this sampling event included the following:

- Determine the concentrations of COCs in soil gas under the automobile sales building on-site.
- Collect outdoor air samples in upwind and downwind locations to assess ambient air quality at the Site.
- Assess the concentrations of COCs in indoor air at the Site.
- Compare analytical results with regulatory cleanup levels to assess if any of the samples exceed these standards.
- Perform a comparative analysis of the sample results to identify the potential source of vapors detected in the samples.

The specific scope of the Tier II VIA sampling event included the following:

- Collection of seven sub-slab soil gas samples from under the automobile sales building and basement.
- Collection of two ambient air outdoor samples at upwind and downwind locations distributed across the Site.
- Collection of ten ambient air indoor samples inside the automobile sales building.
- Obtain atmospheric data measured during the sampling event (e.g., wind speed, wind direction, barometric pressure and precipitation) from the nearest National Weather Service (NWS) monitoring station in the Site vicinity (e.g., KWAUNION58 – Union Gap, Washington).

3.2 Ambient Air Sampling

A total of 12 ambient air samples (e.g., AA-01 through AA-12) were collected during this Tier II VIA. Ten of the ambient air samples were collected inside of the main building (e.g., AA-01 through AA-10) and two ambient air samples were collected outside the main building (e.g., AA-11 and AA-12). The locations of all 12 air samples are shown on **Figures 2 and 3** and described below. It should be noted that an inventory of stored chemicals used inside the store and products sold for retail sales was not performed prior to sampling.

3.1.1 Indoor Ambient Air Samples

- AA-01 – Inside the automobile shop building on the main floor near the northern floor drain.
- AA-02 – Inside the boiler room in the basement.
- AA-03 – Inside the storage room in the basement.

- AA-04 – Inside an office located near the northeast corner of the basement.
- AA-05 – Inside a closet located near the northeast corner of the basement.
- AA-06 – Inside the automobile shop building on the main floor near the southern floor drain.
- AA-07 – Inside the automobile shop building on the main floor near the northern floor drain.
- AA-08 – Inside the sales waiting area of the main floor.
- AA-09 – Near the sump located in the northeast corner of the basement.
- AA-10 – Inside the show room on the main floor, immediately west of office space.

Indoor air samples were collected from each sampling location using a six-liter Summa canister equipped with 8-hour flow controllers described in further detail in standard operating procedure (SOP)-4 (**Appendix B**). Sampling information for each collected indoor air sample is documented in an Indoor Air Sampling form presented in **Appendix A.**

3.1.2 Outdoor Ambient Air Samples

- AA-11 – Downwind NE
- AA-12 – Upwind SW

Outdoor air samples were collected from each sampling location using a six-liter Summa canister equipped with 8-hour flow controllers described in further detail in SOP-4 (**Appendix B**). Sampling information for each collected indoor air sample is documented in an Indoor Air Sampling form presented in **Appendix A**.

3.2 Sub-Slab Soil Gas Sampling

BMEC installed semi-permanent soil gas sampling points utilizing Cox-Colvin & Associates (Cox- Colvin) Vapor Pin™ soil gas sampling devices. Installation of the Vapor Pin™ soil gas sampling devices was completed in accordance with the methods described in the SOPs 2 and 3 attached to the Tier II Vapor Assessment work plan dated October 13, 2023. Copies of the SOPs are included in **Appendix B**. Prior to collecting each sample, a water cup test was preformed to determine whether the Vapor Pin™ was properly sealed from atmospheric air. The Vapor Pin™ sampling locations (SS-01 through SS-07) are illustrated on **Figures 2 and** 3 and described below:

- SS-01 – Main floor in the automobile shop-North
- SS-02 – Main floor in the automobile shop-Center
- SS-03 – Main floor in the automobile shop-South
- SS-04 – Basement-Compressor Storage
- SS-05 – Basement Closet East
- SS-06 – Basement- 5’ From Floor Drain
- SS-07 – Basement-Center Large Open Area

Sub-slab soil gas samples were collected by BMEC from these seven sampling locations using a one-liter Summa canister equipped with 20-minute flow controller in accordance with accepted soil gas sampling methodology. Sampling information for each soil gas sample is documented in a soil gas sampling form presented in **Appendix A**.

3.3 Atmospheric Conditions

The NWS maintains a monitoring station located at Yakima, Washington (Terrace Heights - KWAYAKIM135), which is located 0.53 miles southeast of the Site. Wind direction data for this station for October 13, 2024, was reviewed on the Weather Underground website[1] to identify the prevailing wind directions during the VI sampling event. The average wind direction on October 13, 2024, was predominately from the SSW. The prevailing wind direction at the start of the sampling event was reported by field staff from the southwest. Wind speed averaged 2.0 mph during the sampling event, barometric pressure was rising during the sampling event from a low of 28” to 29”, and there was no precipitation. Field observations were used to select outdoor air sampling locations as discussed in the following section.

3.4 Laboratory Analysis

Sub-slab (SS-01 through SS-07) soil gas and ambient air (AA-01 through AA-12) samples were submitted by BMEC to Friedman and Bruya Inc. in Seattle, Washington for analysis for VOCs using Environmental Protection Agency (EPA) Method TO-15, primarily for analytes PCE, trichloroethene (TCE), vinyl chloride (VC), (cis) 1,2-dichloroethene [(cis)1,2-DCE], and (trans) 1,2-DCE. All samples were packaged and shipped to Friedman and Bruya in accordance with procedures required by the laboratory. A chain-of-custody form was completed and submitted with samples.

3.5 Investigation of Derived Waste

No investigation derived waste (IDW) was generated during this phase of site investigation. Solid waste (e.g., used gloves, garbage, disposable equipment, etc.) was disposed of in the onsite dumpster.

4.0 ANALYTICAL RESULTS

Analytical results are reported as micrograms per cubic meter (µg/m³). **Table 1** presents summaries of the analytical results for the ambient air samples (indoor and outdoor). The analytical results were compared to the MTCA Method B indoor air CULs.

TABLE 1 – AMBIENT AIR SAMPLE RESULTS (µg/m³)

SAMPLE	LOCATION	DATE	Vinyl Chloride	(Trans) 1,2-Dichloroethene	Cis 1,2-Dichloroethene	Trichloroethene (TCE)	Tetrachloroethene (PCE)
INDOOR AMBIENT AIR SAMPLES							
AA-01	Auto shop Floor drain	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
AA-02	Basement -Boiler room	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
AA-03	Basement – Storage room	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
AA-04	Basement office	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
AA-05	Basement closet	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
AA-06	Auto shop – south drain	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
AA-07	Auto shop – north drain	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
AA-08	Sales area	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
AA-09	Basement NE sump	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
AA-10	Show room	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
OUTDOOR AMBIENT AIR SAMPLES							
AA-11	NE building	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
AA-12	SW building	10/13/24	< 0.26	< 0.4	< 0.4	< 0.11	< 6.8
INDOOR AIR CLEANUP LEVELS (µg/m^3)							
METHOD B - NONCANCER			45.7	18.3	18.3	0.914	18.3
METHOD B - CANCER			0.284	--	--	0.334	9.62

4.1 Indoor Ambient Air Analytical Results

Indoor ambient air analytical results are reported as µg/m³ and summarized above on **Table 1**.

None of the five chlorinated solvents tested for were detected at levels above the laboratory practical quantitation limits (PQLs). These results suggest that no source of PCE or related chlorinated solvents exists at the Site in the ambient air within the building.

4.2 Outdoor Ambient Air Analytical Results

Outdoor ambient air analytical results are reported as µg/m³ and summarized above on **Table 1**.

None of the five chlorinated solvents tested for were detected at levels above the laboratory PQLs. These results suggest that no source of PCE or related chlorinated solvents exists at the Site in the ambient air outside the building.

4.3 Sub-Slab Soil Gas Analytical Results

Table 2 presents summaries of the analytical results for the sub-slab soil gas samples. The analytical results were compared to the MTCA Method B soil gas CULs.

TABLE 2 – SUB-SLAB SOIL GAS SAMPLE RESULTS (µg/m^3)

SAMPLE	**LOCATION**	**DATE**	**Vinyl Chloride**	**(Trans) 1,2-Dichloroethene**	**Cis 1,2-Dichloroethene**	**Trichloroethene (TCE)**	**Tetrachloroethene (PCE)**
SS-01	Auto shop North	10/13/24	< 2.1	< 3.3	< 3.3	< 0.9	< 57
SS-02	Auto shop Center	10/13/24	< 1.4	< 2.2	< 2.2	< 0.59	**95**
SS-03	Auto shop South	10/13/24	< 4.1	< 6.3	< 6.3	< 1.7	< 110
SS-04	Basement closet	10/13/24	< 2.1	< 3.2	< 3.2	< 0.87	< 55
SS-05	Basement compressor	10/13/24	< 2.2	< 3.4	< 3.4	**3.3**	**180**
SS-06	Basement floor drain	10/13/24	< 2.1	< 3.3	< 3.3	**2.4**	**160**
SS-07	Basement open area	10/13/24	< 2.2	< 3.4	< 3.4	**1.2**	**140**
SOIL GAS METHOD B SCREENING LEVELS (µg/m3)							
METHOD B - NONCANCER			1500	610	610	30	610
METHOD B - CANCER			9.5	--	--	11	320

None of the five chlorinated solvents were detected above the laboratory PQLs in sub-slab samples SS-01, SS-03, and SS-04. The locations of sub-slab samples SS-01 and SS-03 are in the vicinity of the floor drain of the automobile shop on the main floor as illustrated on **Figure 2**. The location of sub-slab sample SS-04 is in the vicinity of an office beneath the automobile shop in the basement as illustrated on **Figure 3**.

PCE was detected in four of the seven sub-slab samples at concentrations ranging from 95 µg/m^3 in sub-slab SS-02 to 180 µg/m^3 in sub-slab sample SS-05. Concentrations of PCE do not exceed the Soil Gas Method B (cancer) Screening Level of 320 µg/m^3 in all four PCE detections.

TCE was detected in three of the seven sub-slab samples at concentrations ranging from 1.2 µg/m³ in sub-slab SS-07 to 3.3 µg/m³ in sub-slab sample SS-05. Concentrations of TCE do not exceed the Soil Gas Method B (cancer) Screening Level of 11 µg/m³ in all three TCE detections.

5.0 DISCUSSION

BMEC reviewed the analytical data and compared the results to applicable CULs. A discussion of the sample results is provided below.

5.1 Outdoor and Indoor Ambient Air Results

None of the five chlorinated solvents tested for were detected at levels above the laboratory PQLs in the 12 ambient air samples. These results suggest that no source of PCE or related chlorinated solvents exists at the Site in the ambient air within the building.

5.2 Sub-Slab Soil Gas Results

None of the five chlorinated solvents were detected above the laboratory PQLs in sub-slab samples SS-01, SS-03, and SS-04.

PCE was detected in four of the seven sub-slab samples at concentrations ranging from 95 µg/m³ in sub-slab SS-02 to 180 µg/m³ in sub-slab sample SS-05. Concentrations of PCE do not exceed the Soil Gas Method B (cancer) Screening Level of 320 µg/m³ in all four PCE detections.

TCE was detected in three of the seven sub-slab samples at concentrations ranging from 1.2 µg/m³ in sub-slab SS-07 to 3.3 µg/m³ in sub-slab sample SS-05. Concentrations of TCE do not exceed the Soil Gas Method B (cancer) Screening Level of 11 µg/m³ in all three TCE detections.

6.0 QUALIFICATIONS

BMEC personnel performed these VIA field activities on October 13, 2024, in accordance with generally accepted environmental practices and procedures. We employed the degree of care and skill ordinarily exercised under similar circumstances by reputable environmental professionals practicing in the discipline of environmental sciences. The air vapor sampling activities completed were conducted in accordance with standard engineering and geologic standards. However, BMEC was limited by data gaps that were encountered due to previous fieldwork inadequacies and improper documentation. This report is based on the limited data that was provided to BMEC and if additional field data or documentation that was not made available to BMEC, we cannot be held accountable for such data gaps or inconsistencies recognizable in this report.

Respectfully Submitted,

Blue Mountain Environmental and Consulting Company, Inc.

State of Washington
Hydrogeologist
2267
Licensed Geologist
Brent N. Bergeron
Expires 1/3/25

Brent N Bergeron

Brent N. Bergeron, LHG, LG

P Trabusiner

Peter Trabusiner, Engineer

7.0 REFERENCES

Blue Mountain Environmental and Consulting Company, Inc., MARCH 2024 GROUNDWATER SAMPLING EVENT REPORT FOR HAHN MOTOR COMPANY 1201 SOUTH 1ST STREET YAKIMA, WASHINGTON 98901, Facility Site ID No. 502, Cleanup Site ID No. 4927, VCP Project No. CE0529, April 1, 2024.

Blue Mountain Environmental and Consulting Company, Inc., SEPTEMBER 2023 GROUNDWATER SAMPLING EVENT REPORT FOR HAHN MOTOR COMPANY 1201 SOUTH 1ST STREET YAKIMA, WASHINGTON 98901, Facility Site ID No. 502, Cleanup Site ID No. 4927, VCP Project No. CE0529, October 5, 2023.

Blue Mountain Environmental and Consulting Company, Inc., JUNE 2023 GROUNDWATER SAMPLING EVENT REPORT FOR HAHN MOTOR COMPANY 1201 SOUTH 1ST STREET YAKIMA, WASHINGTON 98901, Facility Site ID No. 502, Cleanup Site ID No. 4927, VCP Project No. CE0529, July 10, 2023.

Blue Mountain Environmental and Consulting Company, Inc., MARCH 2023 GROUNDWATER SAMPLING EVENT REPORT FOR HAHN MOTOR COMPANY 1201 SOUTH 1ST STREET, YAKIMA, WASHINGTON 98901, Facility Site ID No. 502, Cleanup Site ID No. 4927, VCP Project No. CE0529, April 24, 2023.

Blue Mountain Environmental and Consulting Company, Inc., DECEMBER 2022 GROUNDWATER SAMPLING EVENT REPORT FOR HAHN MOTOR COMPANY 1201 SOUTH 1ST STREET, YAKIMA, WASHINGTON 98901, Facility Site ID No. 502, Cleanup Site ID No. 4927, VCP Project No. CE0529, January 27, 2023.

Blue Mountain Environmental and Consulting Company, Inc., SEPTEMBER 2022 ADDITIONAL SUBSURFACE INVESTIGATION REPORT FOR HAHN MOTOR COMPANY, 1201 SOUTH 1ST STREET, YAKIMA, WASHINGTON 98901, Facility Site ID No. 502, Cleanup Site ID No. 4927, VCP Project No. CE0529, October 17, 2022.

Blue Mountain Environmental and Consulting Company, Inc., DRYWELL DECOMMISSIONING AND CONTAMINATED SOIL REMOVAL REPORT FOR HAHN MOTOR COMPANY, 1201 SOUTH 1ST STREET, YAKIMA, WASHINGTON 98901, Facility Site ID No. 502, Cleanup Site ID No. 4927, VCP Project No. CE0529, August 1, 2022.

Blue Mountain Environmental and Consulting Company, Inc., FEBRUARY 1, 2022 SUBSURFACE INVESTIGATION REPORT FOR HAHN MOTOR COMPANY, 1201 SOUTH 1ST STREET, YAKIMA, WASHINGTON 98901, Facility Site ID No. 502, Cleanup Site ID No. 4927, VCP Project No. CE0529, March 4, 2022.

Google Maps, 2022.

PETCO INCORPORATED, Underground Storage Tank Decommissioning & Site Assessment Report For UST Site #200130, 1201 South 1st St., Yakima, Washington, February 2008.Interstate Technology & Regulatory Council (ITRC). 2014. Petroleum Vapor Intrusion; Fundamentals of Screening, Investigation, and Management. Petroleum Vapor Intrusion Team. 50 F Street NW, Suite 350, Washington, D.C. 20001. October.

Washington State Department of Ecology, personal communication via phone call, 1201 South 1st Street, Yakima, Washington, September 26, 2024.

Washington State Department of Ecology, Letter – Re: Further Action at the Site, 1201 South 1st Street, Yakima, Washington, January 12, 2024.

Washington State Department of Ecology, Letter – Re: Acceptance Letter -Voluntary Cleanup Program, 1201 South 1st Street, Yakima, Washington, November 12, 2021.

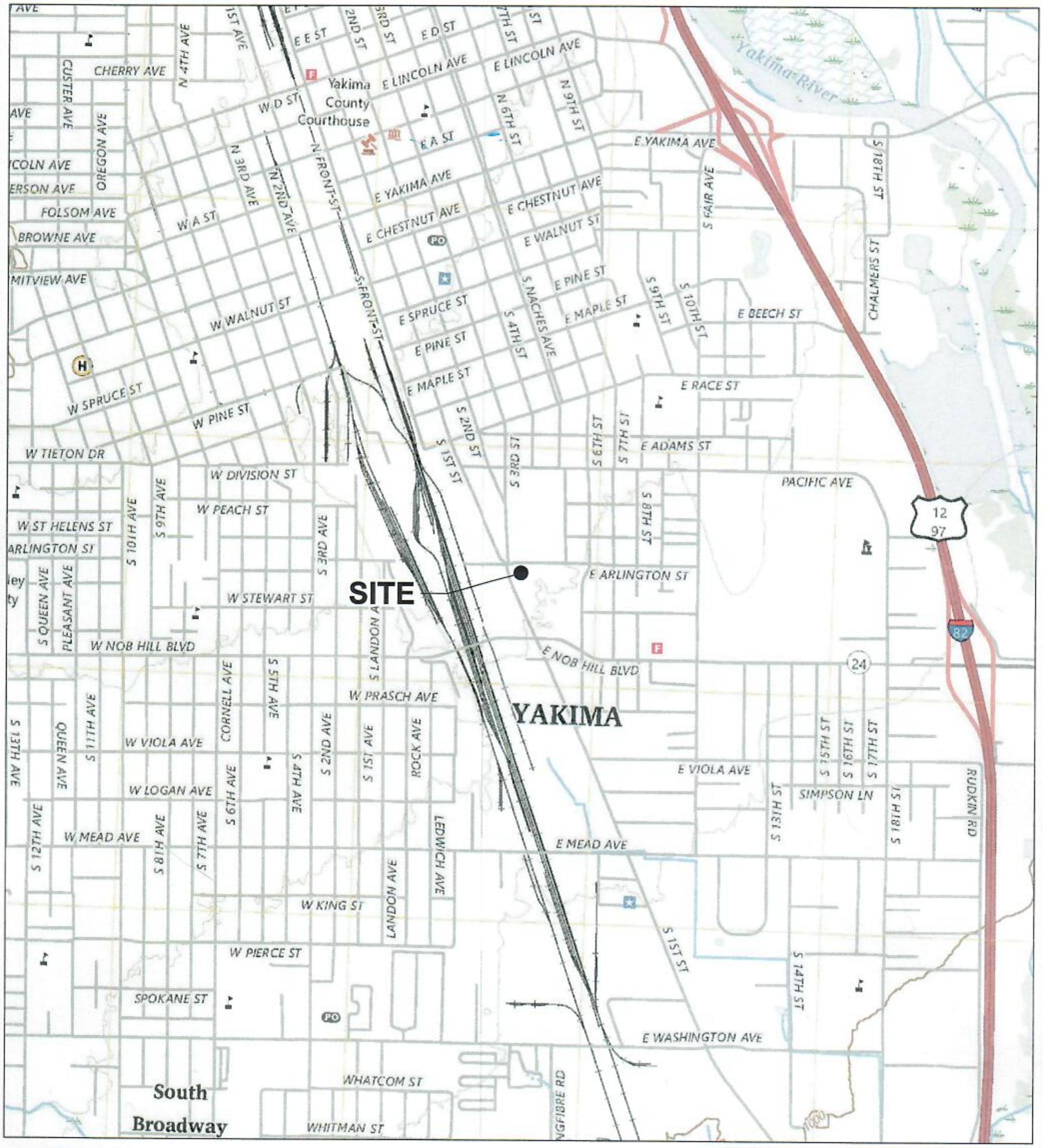
Washington State Department of Ecology, Yakima Railroad Area PCE Contamination – Groundwater Quality Performance Monitoring Data Summary 2017, July 2018.

Washington State Department of Ecology, Letter – Re: Further Action at the Site, 1201 South 1st Street, Yakima, Washington, February 23, 2016.

Washington State Department of Ecology, Model Toxics Control Act Statute and Regulation, Revised November 2007.Washington Department of Ecology (Ecology). 2015. Guidance for Evaluating Soil Vapor Intrusion in the Washington State – Investigation and Remedial Action; Publication No. 09-09-047. Toxics Cleanup Program. October 2009. Table B-1, updated April 2015.

Washington Department of Ecology (Ecology). 2018. Petroleum Vapor Intrusion (PVI): Updated Screening Levels, Cleanup Levels, and Assessing PVI Threats to Future Buildings – Implementation Memorandum 18. Toxics Cleanup Program. January 2018.

FIGURE 1: SITE LOCATION MAP



NOTE(S):
USGS, YAKIMA WEST AND YAKIMA EAST QUADRANGLES
WASHINGTON - YAKIMA COUNTY
7.5 MINUTE SERIES (TOPOGRAPHIC)

0 2000 4000
SCALE IN FEET
1" = 2000'

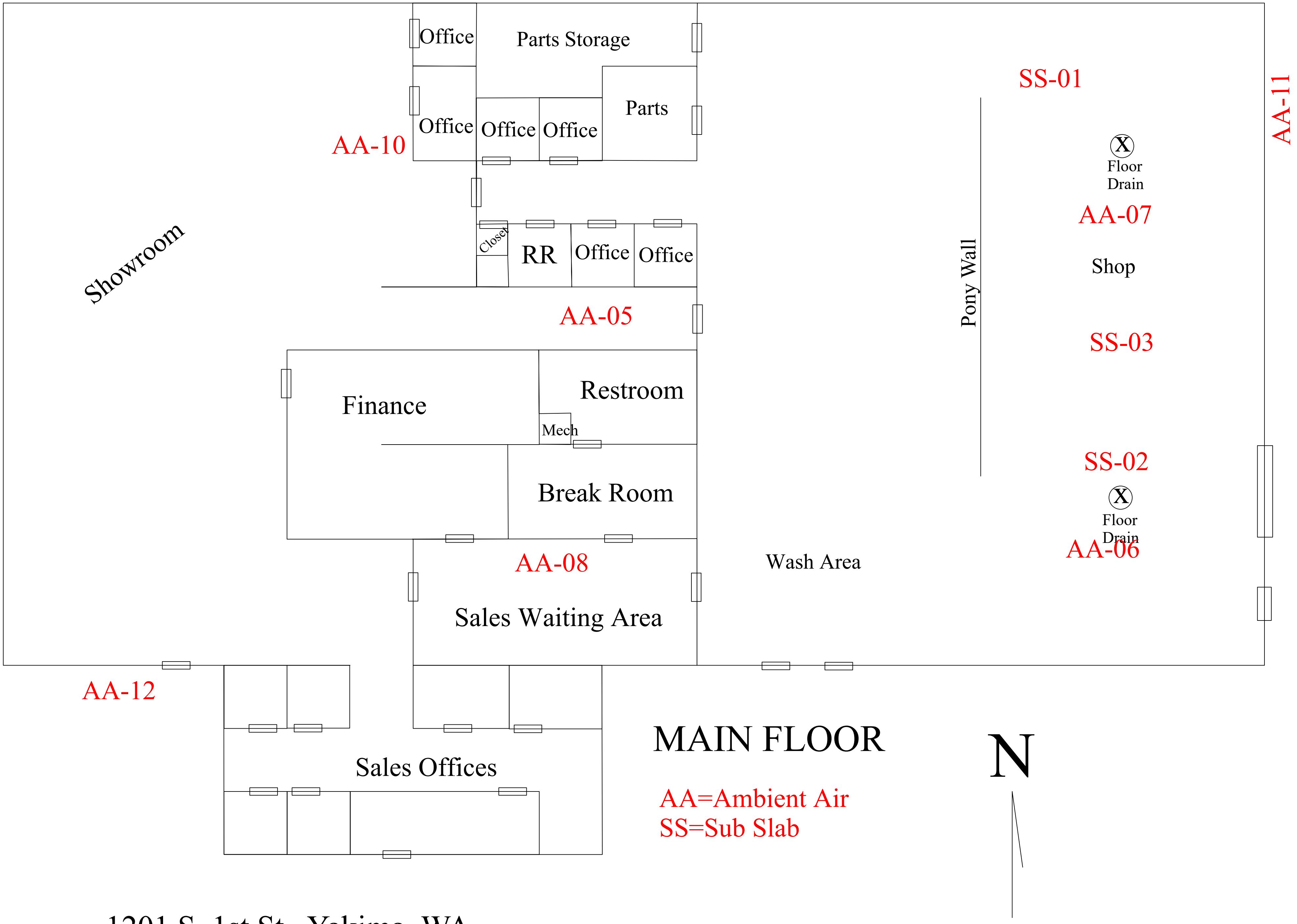
DATE: 07-30-24
DWN: MW
CHK: JT
APPROVED: JT
PRJ. MGR: CS
PROJECT NO:
10170-001

FIGURE 1
SITE LOCATION MAP

VAPOR INTRUSION ASSESSMENT
1201 SOUTH 1ST STREET
YAKIMA, WASHINGTON

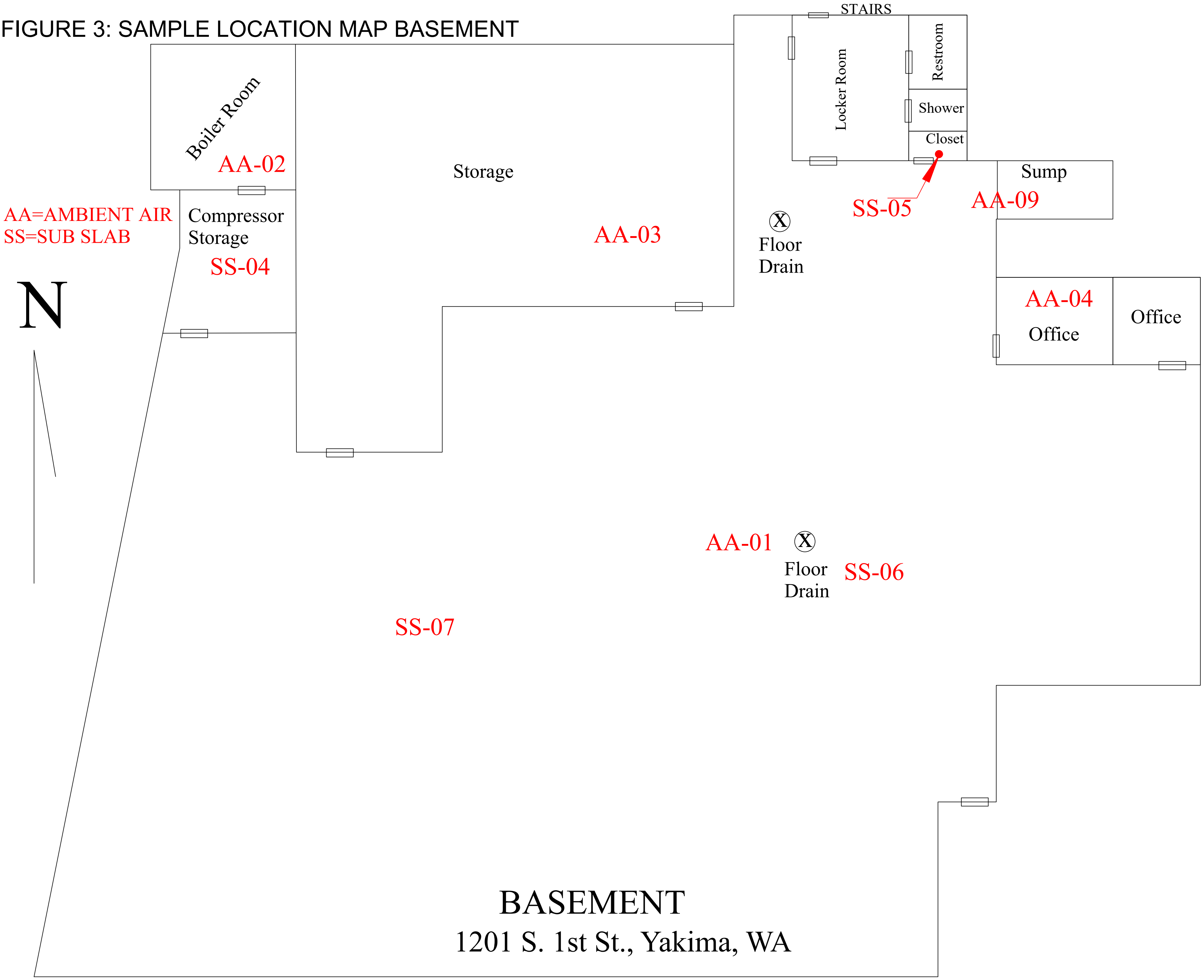
S:\2024 Projects\10170-002 BMEC Former Hahn Motors\Figures\CAD\10170-002_DRAFT.dwg

FIGURE 2: SAMPLE LOCATION MAP MAIN FLOOR



1201 S. 1st St., Yakima, WA

FIGURE 3: SAMPLE LOCATION MAP BASEMENT



APPENDIX A

FIELD FORMS

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-01
Sample Location Basement 5' From Drain
Date Basement Parts Room
10/13/2024

Project Name VI II
Project # E2024 1002
Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs
Temperature 71°f
Humidity 36%
Final Time: 1730hrs
Temperature 89°f
Humidity 27%

Wind Direction 0
Atmospheric Pressure 29"
Wind Direction 1mph W/SW
Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 21442
Canister Size 6 liter
Initial Vacuum 29 (in Hg)

Flow Controller ID # 15209

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs Initial Vacuum 29 (in Hg)
End Time (date/time) 10/13/2024-1730hrs Final Vacuum 3 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

Collected 5' from Floor Drain

Sampler's Signature Richard DeLorme Date 10/13/2024

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-02
Sample Location Basement Boiler Room
Date 10/13/2024

Project Name VI II
Project # E2024 1002
Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs
Temperature 71°f
Humidity 36%
Wind Direction 0
Atmospheric Pressure 29"
Final Time: 1730hrs
Temperature 89°f
Humidity 27%
Wind Direction 1mph WSW
Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 37203
Canister Size 6 liter
Initial Vacuum 29 (in Hg)
Flow Controller ID # 15209

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs Initial Vacuum 29 (in Hg)
End Time (date/time) 10/13/2024-1730hrs Final Vacuum 3 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

Collected 5' from Floor Drain

Sampler's Signature Richard DeLorme Date 10/13/2024

Hydrocon, LLC

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-03
Sample Location Basement Parts Room
Date 10/13/2024

Project Name VI II
Project # E2024 1002
Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs
Temperature 72°f
Humidity 36%
Wind Direction 0
Atmospheric Pressure 28"

Final Time: 1730hrs
Temperature 82°f
Humidity 27%
Wind Direction 1mph SW
Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 37083
Canister Size 6 liter
Initial Vacuum 27 (in Hg)
Flow Controller ID # 07848

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs
Initial Vacuum 27 (in Hg)
End Time (date/time) 10/13/2024-1730hrs
Final Vacuum 5 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

Car Parts and Tires

Sampler's Signature Richard DeLorme
Date 10/13/2024

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-04
Sample Location Basement Office
Date 10/13/2024

Project Name VI II
Project # E2024 1002
Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs
Temperature 72°f
Humidity 36%
Final Time: 1730hrs
Temperature 78°f
Humidity 27%

Wind Direction 0
Atmospheric Pressure 29"
Wind Direction 1mph WSW
Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 18573
Canister Size 6 liter
Initial Vacuum 27 (in Hg)

Flow Controller ID # 20477

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs Initial Vacuum 27 (in Hg)
End Time (date/time) 10/13/2024-1730hrs Final Vacuum 0 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

Office Furniture and Paper Debris

Sampler's Signature Richard DeLorme Date 10/13/2024

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-05
Sample Location Main Floor-Admin CH
Date 10/13/2024

Project Name VI II
Project # E2024 1002
Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs
Temperature 70°f
Humidity 38%
Wind Direction 0
Atmospheric Pressure 29"

Final Time: 1730hrs
Temperature 75°f
Humidity 34%
Wind Direction 1mph W/SW
Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 32102
Canister Size 6 liter
Initial Vacuum 27 (in Hg)
Flow Controller ID # 07847

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs
End Time (date/time) 10/13/2024-1730hrs
Initial Vacuum 27 (in Hg)
Final Vacuum 0 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

Office Furniture, Carpet

Sampler's Signature Richard DeLorme
Date 10/13/2024

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-06
Sample Location Main Floor-Shop South
Date 10/13/2024

Project Name VI II
Project # E2024 1002
Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs
Temperature 70°f
Humidity 36%
Wind Direction 0
Atmospheric Pressure 29"

Final Time: 1730hrs
Temperature 74°f
Humidity 35%
Wind Direction 1mph W/SW
Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 37235
Canister Size 6 liter
Initial Vacuum 28 (in Hg)
Flow Controller ID # 06601

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs
Initial Vacuum 28 (in Hg)
End Time (date/time) 10/13/2024-1730hrs
Final Vacuum 0 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

Solvents, oils,transmission fluids, cars

Sampler's Signature Richard DeLorme
Date 10/13/2024

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-07
Sample Location Main Floor-Shop North
Date 10/13/2024

Project Name VI II
Project # E2024 1002
Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs
Temperature 70°f
Humidity 37%
Wind Direction 0
Atmospheric Pressure 29"

Final Time: 1730hrs
Temperature 73°f
Humidity 32%
Wind Direction 1mph W/SW
Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 20557
Canister Size 6 liter
Initial Vacuum 28 (in Hg)

Flow Controller ID # 20486

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs
End Time (date/time) 10/13/2024-1730hrs

Initial Vacuum 28 (in Hg)
Final Vacuum 0 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

Solvents, oils,transmission fluids, cars

Sampler's Signature Richard DeLorme
Date 10/13/2024

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-08
Sample Location Main Floor-Waiting Area
Date 10/13/2024

Project Name VI II
Project # E2024 1002
Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs
Temperature 69°f
Humidity 36%
Wind Direction 0
Atmospheric Pressure 29"

Final Time: 1730hrs
Temperature 75°f
Humidity 34%
Wind Direction 1mph W/SW
Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 40705
Canister Size 6 liter
Initial Vacuum 30 (in Hg)
Flow Controller ID # 19499

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs
End Time (date/time) 10/13/2024-1730hrs
Initial Vacuum 30 (in Hg)
Final Vacuum 0 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

Furniture

Sampler's Signature Richard DeLorme
Date 10/13/2024

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-09
Sample Location Basement- Sump
Date 10/13/2024

Project Name VI II
Project # E2024 1002
Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs
Temperature 72°f
Humidity 37%
Wind Direction 0
Atmospheric Pressure 29"

Final Time: 1730hrs
Temperature 78°f
Humidity 27%
Wind Direction 1mph W/SW
Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 4073
Canister Size 6 liter
Initial Vacuum 30 (in Hg)
Flow Controller ID # 05350

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs Initial Vacuum 30 (in Hg)
End Time (date/time) 10/13/2024-1730hrs Final Vacuum 4 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

Car Parts

Sampler's Signature Richard DeLorme Date 10/13/2024

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-10
Sample Location Showroom
Date 10/13/2024

Project Name VI II
Project # E2024 1002
Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs
Temperature 69°f
Humidity 37%
Final Time: 1730hrs
Temperature 75°f
Humidity 34%

Wind Direction 0
Atmospheric Pressure 29"
Wind Direction 1mph W/SW
Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 37224
Canister Size 6 liter
Initial Vacuum 30 (in Hg)

Flow Controller ID # 15208

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs Initial Vacuum 30 (in Hg)
End Time (date/time) 10/13/2024-1730hrs Final Vacuum 0 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

None

Sampler's Signature Richard DeLorme Date 10/13/2024

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-11
Sample Location Outdoors South East
Date 10/13/2024

Project Name VI II
Project # E2024 1002
Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs
Temperature 32°f
Humidity 57%
Wind Direction 0
Atmospheric Pressure 29"

Final Time: 1730hrs
Temperature 87°f
Humidity 27%
Wind Direction 1mph W/SW
Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 35332
Canister Size 6 liter
Initial Vacuum 30 (in Hg)

Flow Controller ID # 19503

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs
End Time (date/time) 10/13/2024-1730hrs

Initial Vacuum 30 (in Hg)
Final Vacuum 2 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

Asphalt Pavement

Sampler's Signature Richard DeLorme
Date 10/13/2024

INDOOR AIR SAMPLE COLLECTION

Sample I.D. SUM-AA-12

Sample Location Outdoors Northwest

Date 10/13/2024

Project Name VI II

Project # E2024 1002

Sampler Richard DeLorme

WEATHER CONDITIONS

Initial Time: 0930hrs

Temperature 52°f

Humidity 57%

Wind Direction 0

Atmospheric Pressure 29"

Final Time: 1730hrs

Temperature 87°f

Humidity 25%

Wind Direction 1mph W/SW

Atmospheric Pressure 28"

EQUIPMENT INFORMATION

Canister ID # 18563

Canister Size 6 liter

Initial Vacuum 30 (in Hg)

Flow Controller ID # 08182

SAMPLE INFORMATION

Start Time (date/time) 10/13/2024-0930hrs

Initial Vacuum 30 (in Hg)

End Time (date/time) 10/13/2024-1730hrs

Final Vacuum 3 (in Hg)

LABORATORY INFORMATION

Laboratory: Friedman & Bruya

Analytical Method: PCE, TCE, VC, (CIS) 1,2 DCE

NOTES/COMMENTS:

Asphalt Pavement

Sampler's Signature Richard DeLorme

Date 10/13/2024

A·C·C
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SOIL GAS SAMPLE COLLECTION

E, 002

Sample I.D. SS-01
Sample Location Garage
Date 10/14/24

Project Name 1201 S. First St
Project # 10170-002
Sampler S Shoemaker

EQUIPMENT INFORMATION

Canister ID # ~~7~~- 2432
Canister Size 1 Liter
Initial Vacuum Pressure 29 (in Hg)

Flow Controller ID # 72

PURGE AND LEAK CHECK DATA

Ambient PID Reading (ppmv) —
Volume of Air to Purge
Purge Rate (liters/minute)
PID Reading during purge (ppmv) —
Tightness Test Shut in Pressure (psig) 20
[✓ Pass] or Fail (circle one)
Leak Check – Leak Check Method (Helium 5.5 grade)
[✓ Pass] or Fail (circle one)

SAMPLE INFORMATION

Start Time (date/time) ~~4~~ 1351
End Time (date/time) 1351

Final Vacuum Pressure ~~4~~ 5 (in Hg)

LABORATORY INFORMATION

LABORATORY: Friedman & Bruya

Analytical Method: TO-15

NOTES/COMMENTS:

Sampler's Signature
Date 10/14/24

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SOIL GAS SAMPLE COLLECTION

#002

Sample I.D. SS-02
Sample Location Garage
Date 10/14/24

Project Name 1201 S First St.
Project # 10170-002
Sampler SS

EQUIPMENT INFORMATION

Canister ID # 4179
Canister Size 1 Liter
Initial Vacuum Pressure 30 (in Hg)

Flow Controller ID # 67

PURGE AND LEAK CHECK DATA

Ambient PID Reading (ppmv) —
Volume of Air to Purge
Purge Rate (liters/minute)
PID Reading during purge (ppmv) —
Tightness Test Shut in Pressure (psig) 20
[✓ Pass] or Fail (circle one)
Leak Check – Leak Check Method (Helium 5.5 grade)
[✓ Pass] or Fail (circle one)

SAMPLE INFORMATION

Start Time (date/time) 1515
End Time (date/time) 1518
Final Vacuum Pressure 5 (in Hg)

LABORATORY INFORMATION

LABORATORY: Friedman Bruya
Analytical Method: TO-15 + APH

NOTES/COMMENTS:

Sampler's Signature Scott S
Date 10/14/24

ACC Environmental Consultants

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An Employee Owned Company

SOIL GAS SAMPLE COLLECTION

1,000

Sample I.D. SS-03
Sample Location Garage
Date 10/14/24

Project Name 1201 S. First St
Project # 10170-002
Sampler SS

EQUIPMENT INFORMATION

Canister ID # 8527
Flow Controller ID # 80
Canister Size 1 L
Initial Vacuum Pressure 29 (in Hg)

PURGE AND LEAK CHECK DATA

Ambient PID Reading (ppmv) —
Volume of Air to Purge
Purge Rate (liters/minute)
PID Reading during purge (ppmv) —
Tightness Test Shut in Pressure (psig) 20
[✓ Pass] or Fail (circle one)
Leak Check – Leak Check Method (Helium 5.5 grade)
[✓ Pass] or Fail (circle one)

SAMPLE INFORMATION

Start Time (date/time) 1538
End Time (date/time) ~~1542~~ 1543
Final Vacuum Pressure 5 (in Hg)

LABORATORY INFORMATION

LABORATORY: Freidman & Bruya

Analytical Method: TO15 + APH

NOTES/COMMENTS:

Sampler's Signature
Date 10/14/24

ACC Environmental Consultants

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An Employee Owned Company

SOIL GAS SAMPLE COLLECTION

+.001

Sample I.D. SS.055
Sample Location E STORAGE
Date 10/14/24

Project Name 1201 S First St.
Project # 10170-002
Sampler CS

EQUIPMENT INFORMATION

Canister ID # 9892
Canister Size 1 Liter
Initial Vacuum Pressure ~~28~~ 27 (in Hg)

Flow Controller ID # 64

PURGE AND LEAK CHECK DATA

Ambient PID Reading (ppmv) —
Volume of Air to Purge
Purge Rate (liters/minute)
PID Reading during purge (ppmv) —
Tightness Test Shut in Pressure (psig) -20
[✓ Pass] or Fail (circle one)
Leak Check – Leak Check Method (Helium 5.5 grade)
[✓ Pass] or Fail (circle one)

SAMPLE INFORMATION

Start Time (date/time) 1014
End Time (date/time) 1022

Final Vacuum Pressure 5 (in Hg)

LABORATORY INFORMATION

LABORATORY: F&B

Analytical Method: TO15 + APH

NOTES/COMMENTS:

Sampler's Signature Scott Sh Date 10/15/24

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CONSULTANTS
An Employee Owned Company

SOIL GAS SAMPLE COLLECTION

-0.001

Sample I.D. 5S-6
Sample Location Basement
Date 10/15/24

Project Name 1201 S First St
Project # 10170-002
Sampler SS

EQUIPMENT INFORMATION

Canister ID # ~~6847~~ 0539
Canister Size 1 Liter
Initial Vacuum Pressure 29 (in Hg)

Flow Controller ID # ~~200~~ 54

PURGE AND LEAK CHECK DATA

Ambient PID Reading (ppmv) —
Volume of Air to Purge
Purge Rate (liters/minute)
PID Reading during purge (ppmv) —
Tightness Test Shut in Pressure (psig) 20
[✓ Pass] or Fail (circle one)
Leak Check – Leak Check Method (Helium 5.5 grade)
[✓ Pass] or Fail (circle one)

SAMPLE INFORMATION

Start Time (date/time) ~~1104~~ 1132
End Time (date/time) 1138

Final Vacuum Pressure 5 (in Hg)

LABORATORY INFORMATION

LABORATORY: F & B

Analytical Method: TO 15 + APH

NOTES/COMMENTS:

Sampler's Signature Scott Sh

Date 10/15/24

HydroCon

SOIL GAS SAMPLE COLLECTION

+0.000

Sample I.D. 55-07
Sample Location Basement 1
Date 10/15/24

Project Name 1201 S. First
Project # 10170-002
Sampler SC

EQUIPMENT INFORMATION

Canister ID # 9992
Canister Size 1 Liter
Initial Vacuum Pressure 27.5 (in Hg) 20

Flow Controller ID # 62

PURGE AND LEAK CHECK DATA

Ambient PID Reading (ppmv) –
Volume of Air to Purge
Purge Rate (liters/minute)
PID Reading during purge (ppmv) –
Tightness Test Shut in Pressure (psig) 21
[✓ Pass] or Fail (circle one)
Leak Check – Leak Check Method (Helium 5.5 grade)
[✓ Pass] or Fail (circle one)

SAMPLE INFORMATION

Start Time (date/time) 1203
End Time (date/time) 1208

Final Vacuum Pressure 5 (in Hg)

LABORATORY INFORMATION

LABORATORY: F & B

Analytical Method: TO15 + APH

NOTES/COMMENTS:

Sampler's Signature Scott Sm
Date 10/15/24

APPENDIX B

STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE

SOIL GAS (VAPOR) MONITORING AND SAMPLING VIA SOP 1

This vapor intrusion assessment (VIA) standard operating procedure (SOP) describes procedures for performing soil gas (vapor) monitoring and sampling using direct-push drilling technology.

Because each site is unique, these procedures should be viewed as guidelines and will likely require modification based on site and subsurface conditions present.

Personnel performing the soil gas monitoring and sampling will follow site safety procedures as specified in the site-specific Health and Safety Plan.

EQUIPMENT

Soil gas monitoring and sampling will be performed using direct push sampling equipment. The direct push probe will be advanced using either a truck- or track-mounted Geoprobe rig, or for limited access areas, using portable methods such as rotary hammer drill (rotary hammer).

Coring/probe installation equipment which may be used includes the following: a rotary hammer or truck-mounted Geoprobe rig, ½-inch to 2-inch diameter concrete coring drill bit, cloth (for dust suppression during drilling), Geoprobe drill rods, ¼-inch diameter tubing (nylon, stainless steel, or Teflon®), fine-grained (20-40) silica sand, granular bentonite grout or alternative, and possibly cement in cases where the formation has a very low permeability.

Leak check equipment using helium or other pre-approved non-reactive tracer gas may include helium tank, piping, three-way valve, leak check enclosure (shroud), helium detector, paper towels or rags, and nitrile gloves.

Monitoring/sampling equipment which may be used includes the following: Summa canister (may be a one-liter or six-liter Summa canister with valve), certified flow controller, steel filter, three-way valve, extra miscellaneous valves, photo ionization detector (PID), low flow vacuum pump, vacuum gauge, barometer/thermometer/wind speed indicator.

CORING/PROBE INSTALLATION PROCEDURES

Prior to drilling or coring, an attempt will be made to locate utility lines and if inside a building, to determine whether or not the building has an existing vapor barrier or a tensioned slab.

When samples are collected beneath buildings, a minimum of one sample and one sample duplicate will be collected from beneath each building. If possible, the samples will be located in the central portion of the slab, away from the floor slab/perimeter foundation junction, where dilution is more likely to occur.

In each sample location, a small diameter (½-inch to one-inch) hole will be drilled in the foundation using a roto hammer, truck-mounted Geoprobe rig, or concrete corer. When drilling the hole, no water should be used, and care should be taken not to puncture the surface of soil underneath. If dust prevention is necessary, cover the location with a cloth or towel and drill through a pre-cut small hole in the cloth.

The probes are typically advanced to a depth of five feet below ground surface (bgs), however, other site-specific depths or multiple depths for vertical soil gas profiling may be targeted by the work plan. At target depth, the probe rod will be withdrawn approximately three to six inches to disengage the expendable probe tip and minimize the terminal void space volume. New, dedicated disposable nylon, stainless steel, or Teflon® tubing would then be fitted with a barbed steel end nut, pushed into the base of the probe rod, and threaded onto a downhole terminal fitting sealed with an O-ring to prevent vapor short-circuiting to the surface through the rod annulus.

Once the sampling probe is lowered to target depth and probe tip is exposed, the borehole shall be backfilled with sand to a depth of 2 feet above the sampling probe. The area above the sand and immediately around the probe rods shall be grouted using hydrated bentonite grout (if temporary installation) or cement (if permanent installation). Wait 30 minutes prior to sampling for bentonite or cement to congeal. VOC-free modeling clay may also be used to seal around the probe rods to prevent vapor short-circuiting to the surface.

Procedures for leak checking, soil gas purging, and sampling are described in the section below.

Following the completion of sampling, the soil boreholes will be filled with hydrated granular or powdered bentonite grout. If a building slab or pavement is present, the hole(s) will be patched with cement and finished flush with the surface.

SYSTEM SETUP

Inspect the laboratory-provided Summa canister for damage prior to use. Do not use a canister that has visible damage.

Using a wrench, remove the brass cap above the valve on the top of the Summa canister. Measure and record the initial vacuum of Summa canister. If using an external vacuum gauge, cap the gauge and attach it to the canister using a wrench. Open the canister valve only after verifying the gauge is properly capped.

Verify that the vacuum pressure of the canister is equal to that indicated on the laboratory supplied tag. If the vacuum does not match, the canister has likely leaked and should not be used. Record the initial vacuum pressure on the sample collection form.

The canister will then be fitted with the laboratory-provided steel filter. The sampling train (steel-filter, flow-controller (if used), and Summa canister) will be attached to a T-connector with an in-line vacuum gauge and vacuum tight flow valves at each end. All valves should be closed on the T-connector at this time. The valve connected to the sampling train is referred to as the sampling valve. The vacuum pump (truck-mounted or otherwise) is then attached to the second end of the T with the valve closed (referred to as the purge valve).

Lastly, the sample tubing is threaded through the leak-check shroud and connected to the soil gas sampling point and the third closed valve on the T-connector. The leak-check shroud should then be sealed against the surface (see "Leak Check – Probe Point Surface Seal" below).

LEAK CHECKING - APPARATUS

The method described below shall be used to check for leaks in the lines and fittings of the above-ground sampling apparatus:

After the sampling system is set up, make sure all valves are closed.

Open the purge valve (the valve connecting the purge pump to the apparatus, all other valves remain closed), turn on the purge pump, and apply approximately ten inches of vacuum into the T-connector and valves. Close the purge valve and check to verify that there is no loss of vacuum within the sampling apparatus (T-connector and valves) over a one-minute period of time. If there is a loss of vacuum, this indicates a leak in the purge/sample system train that must be remedied.

If necessary, recheck the system to verify that there is no leakage as described above. Document the date and time the leak check(s) were performed. Close all valves.

LEAK CHECKING – PROBE POINT SURFACE SEAL

In addition to checking for leaks in the apparatus, the probe point surface seal also needs to be checked for leakage. The preferred method uses helium gas as a tracer and permits checking for and correcting potential leaks in the field prior to sampling. Other tracer gases may be used but approval of their use should be verified prior to the start of the work. The helium tracer gas method is listed in the Interstate Technology & Regulatory Council's (ITRC) "Technical and Regulatory Guidance, Vapor Intrusion Pathway: A Practical Guideline" and "Petroleum Vapor Intrusion – Fundamentals of Screening, Investigation, and Management" guidance documents (2007 and 2014, respectively).

The ITRC guidance from which the text below is derived is also consistent with California Environmental Protection Agency and Oregon Department of Environmental Quality guidance (CalEPA 2005 and 2010; DEQ 2010).

Helium Leak Check Method

Insert sample tubing through the leak check enclosure (also referred to as a shroud) and complete sample tubing connections to the other apparatus (previously described above).

Place the enclosure flush with the ground surface, placing hydrated bentonite around the shroud to seal the shroud around the sample point.

Attach helium tubing from the helium tank regulator to the enclosure (the "helium in" tubing).

Attach the exhaust tubing ("helium out") to the enclosure and locate the discharge end of the tubing as far as possible from the helium detector.

Attach the helium detector on the exhaust line from the sample pump.

Make sure the sample valve (from the sampling probe point) is closed.

Open the helium tank valve and set the flow to approximately 200 milliliters/minute (ml/min); let it flow for about one minute to fill the leak check enclosure.

Do an initial check to make sure the helium detector is not detecting any helium.

Begin purging of soil gas as described in the section on purging below. During purging, continue monitoring helium detector, record readings. If helium is detected at over 5%, this indicates leakage; check/tighten all seals and fittings and repeat procedure. The helium exhaust line should also be monitored so that additional helium can be added to the shroud during sampling if needed.

Close valves from the probe sampling point and purge pump lines, and turn pump off.

If the helium detector reading is less than 5%, the system is considered leak free and sampling can be performed (see sampling section below).

If the helium detector reading continues to be above 5%, leakage is indicated and the probe hole abandoned.

Record helium monitoring measurements in field notes.

SOIL GAS PURGING PROCEDURES

Purging and sampling will be accomplished at a low flow rate (100 to 200 ml/min) to minimize the potential for inducing leakage. Therefore, the flow rate of a pump used for this purpose must be known. Flow rates should not exceed 200 ml/min. Purging can be accurately completed using a graduated syringe and a 3-way valve. This will ensure that samples are representative of subsurface vapors. Do not over purge, this can lead to breakthrough or collecting samples from an unknown volume.

Slowly open the vacuum pump purge valve and purge three volumes of vapor from the line, then close the purge valve.

The volume of the purge is the volume of the tubing and the sand pack. The purge volume can be calculated as shown:

Tubing Volume = $\pi*r^{2}*L$

Plus

Sand Pack Volume = $(\Phi*\pi*r\ ^{2}*L\ )_{1} - (\pi*r_{1}^{\ 2}*L\ )$

Where Φ = sand pack porosity, typically estimated at 30%

Π = PI 3.14

r = radius of tubing L = length of tubing

r_1 = radius of sand pack L_1 = length of sand pack

r_2 = inner radius of tubing (half of inner diameter) L_2 = length of tubing within the sand pack

1 in^3 = 16.4 ml Example

1/4–inch inner diameter tubing, 5 feet below ground and 5 feet above ground: $3.14*(0.125^{2})\ in^{2}*12\ in*16.4\ ml/in^{3} = 9.6\ ml/ft * 10\ ft = 96\ ml$

2-inch sand pack, 1-in sample probe, 2 ft sand pack:

.$[(0.30 * 3.14 * (1^{2})\ in^{2} * 12\ in) - (3.14 * 0.5^{2} in^{2} * 12\ in)] * 16.4\ ml/in^{3} = 30.9\ ml/ft * 2\ ft = 62\ ml$ Total single purge volume: 96ml + 62 ml = 158 ml

During purging, check for leaks as described in the section on leak checks above. Record PID measurements of purge vapors on the field form. Oxygen and carbon dioxide concentrations may be monitored in the soil gas stream if desired by the work plan. At the conclusion of purging, immediately close the purge valve and then shut off the purge pump.

SOIL GAS SAMPLING PROCEDURES

Atmospheric conditions (barometric pressure, temperature, wind speed and direction) will be recorded prior to and after sampling. A portable weather station equipped with a data logger is preferred to log site-specific conditions over the duration of sampling. However, if a weather station cannot be set-up on site, record atmospheric data from the closest weather station.

After leak testing and soil gas purging, soil gas sampling may be performed.

After purging, the purge valve will be closed prior to opening the sampling valve. The sample valve will then be opened followed by slowly opening the Summa canister valve. The canister's valve should be closed when the vacuum gauge shows a vacuum of 5 inches of mercury (inches Hg) (pressure of -5 inches Hg). The sample valve should then be closed.

Ensure the canister valve is tightly closed. The sample train should be immediately disassembled by removing the steel particulate filter, flow controller, and the Summa canister. Immediately cap the Summa canister fitting. The final vacuum reading from the canister should be recorded on the chain of custody, sample collection form, and canister identification tag. If the final canister vacuum is less than 0.1 inches Hg (more than -0.1 inches Hg of pressure, or is a positive pressure), then the sample should be disregarded and a new sample collected.

Soil vapor samples will be shipped to a certified laboratory for analysis.

FIELD RECORDS

The field technician maintains the Soil Gas Collection Form to record the following:

- Sample Location.
- Sample Identification.
- Date and time of sample collection.
- Sampling depth.
- Tubing type, length, and volume.
- Purge Data (i.e. pump used, volume, PID screening information, purge start and stop time, purge vacuum reading).
- Weather conditions.
- Sampling methods and devices.
- Volume of sampling device.
- Sampling start and end date/time.
- Vacuum of canisters before and after samples collected.
- Apparent moisture content (dry, moist, or saturated, etc.) of the sampling zone.
- Chain of custody protocols and records used to track samples from sampling point to analysis.
- Other notes as applicable to site specific observations, sampling issues and mitigation of problems encountered.

REFERENCES

Cal EPA. 2005 (February 7 rev.). Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air. Department of Toxic Substances Control, Interim Final. California Environmental Protection Agency.

Cal EPA. 2010 (March). *Advisory – Active Soil Gas Investigation (Draft).* California Environmental Protection Agency.

DEQ. 2010 (March 25). Guidance for Assessing and Remediating Vapor Intrusion in Buildings.

Oregon Department of Environmental Quality.

ITRC, 2007 (January). Technical and Regulatory Guidance, Vapor Intrusion Pathway: A Practical Guideline. Interstate Technology & Regulatory Council.

ITRC, 2014 (October). Petroleum Vapor Intrusion – Fundamentals of Screening, Investigation, and Management. Interstate Technology & Regulatory Council.

EPA, 2015 (June). Technical Guide for Assessing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites. U.S. Environmental Protection Agency.

EPA, 2015 (June). OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air. U.S. Environmental Protection Agency.

STANDARD OPERATING PROCEDURE SUB-SLAB VAPOR PROBE CONSTRUCTION

VIA SOP 2

This Standard Operating Procedure (SOP) describes the method for installation of temporary or permanent sub-slab soil vapor sampling and monitoring probes.

MATERIALS

- Tubing: Nylon, Teflon™, or stainless steel tubing with nominally ⅛-inch or ¼-inch outer diameter (OD). Polyethylene tubing should not be used due to its higher potential to introduce background analytes, absorb contaminants, and decrease sample recovery. Nylon and Teflon™ tubing are more flexible and easier to work with than stainless steel tubing; however, stainless steel tubing is preferred, especially for permanent installations.
- Vapor Sampling Point: Stainless steel, aluminum, ceramic, or plastic. Stainless steel screened points can be put on the end if desired to give a longer screen interval. Points are typically used in permanent installations.
- Surface Termination: Swagelok® fittings and valves are preferred. The selection often depends on whether the probes are temporary or permanent and whether they need to be installed flush with the surface. All vapor sampling points should be constructed following the same technique/protocol, which should be explicitly outlined in the site specific work plan.

PROBE INSTALLATION PROTOCOL

Note that if sub-slab and deeper subsurface soil gas samples are to be collected, they should be collected from separate boring locations in order to maintain a proper seal unless nested points are constructed in the same boring.

7.1.1.1 Sub-Slab Vapor Probe Construction

- Insure all sub-slab utilities (public and building specific) are marked prior to installation. This includes contacting the public utility notification service and identifying private utilities on-site.
- Review as-built construction logs of existing vapor monitoring points as applicable.
- Sub-slab sample locations should be located in the central portion of the slab, away from the floor slab/perimeter foundation junction, where dilution is more likely to occur. The site specific work-plan should provide justification for all sample locations.
- Determine the desired surface termination (flush, recessed, or protruding). If a flush or recessed surface termination is required, a larger diameter hole (one inch) in the upper inch of the slab may be useful to leave enough room for the fitting on the probe tubing.
- During the course of probe installation, it is important to minimize disturbance of the sub-slab region by not applying significant pressures that might affect vapor concentrations. Pressure sources include the running of appliances or fans, excessive opening/closing of interior doors, and opening/closing exterior doors and windows.

- Drill a ½- to one-inch outer diameter hole through the slab using a rotary hammer drill or other similar device. Do not use water. If dust prevention is necessary, cover the location with a towel/cloth and drill through a pre-cut hole in the cloth. Care should be taken not to penetrate beyond the sub-slab material (e.g. beyond the sub-slab fill material).

- Measure slab thickness. Cut the tubing to the desired length, such that the vapor sampling point reaches the material immediately below the slab. Stainless steel tubing is preferred and if possible should be pre-cut to desired lengths (if slab thickness is known prior to installation).
- Insert tubing. Add silica sand to cover tip (tubing end or vapor sampling point) with approximately one inch of sand above the tip.
- Grout to the surface using bentonite, modeling clay, or other non-VOC containing and non-shrinking products (if temporary installation) or cement (if permanent installation) to seal the boring and prevent infiltration of ambient air.
- Wait a minimum of 30 minutes prior to sampling for bentonite/cement seal to congeal.
- Refer to Standard Operating Procedure VIA SOP 3 Sub-Slab Vapor Sample Collection for monitoring and sampling for leak detection, purging, and sampling procedures and documentation.
- If the sample point is temporary, remove all sampling equipment after sampling is complete and patch the hole(s) in the concrete slab with cement finishing flush with the concrete surface.

STANDARD OPERATING PROCEDURE SUB-SLAB VAPOR SAMPLE COLLECTION VIA SOP 3

This Vapor Intrusion Assessment (VIA) Standard Operating Procedure (SOP) describes the method for sub-slab vapor sample collection from both temporary and permanently installed soil vapor probes (implants). Sub-Slab probe installation/construction methods are detailed in VIA SOP 2. Because each site is unique, these procedures should be viewed as guidelines and will likely require modification based on site and subsurface conditions present.

Personnel performing the soil gas monitoring and sampling will follow site safety procedures as specified in the site-specific Health and Safety Plan.

EQUIPMENT/MATERIALS

- Tubing: ⅛-inch or ¼-inch outer diameter (OD) inert, impermeable tubing such as nylon (Nylaflow®), Teflon® tubing, or stainless steel.
- Sample Containers: Stainless steel Summa canisters (one-liter Summa canisters are preferred; however, the site specific work plan may justify another appropriate size), syringe, or tedlar bag.
- Monitoring and sampling equipment may include the following: Certified flow controllers (if flow controllers are used, ensure flow controllers are dedicated to the canister/sample location), stainless steel t-fitting, stainless-steel particulate filter, photoionization detector (PID), low flow vacuum pump, vacuum gauge, portable weather station, and/or barometric pressure data loggers.
- Leak check equipment using helium or other pre-approved non-reactive tracer gas may include: helium tank, piping, and valve, leak check enclosure (shroud), helium detector, paper towels or rags, and nitrile gloves. Tracer gas should be laboratory grade and the grade noted on the sample form (e.g. 100% pure helium by volume).

COLLECTION PROTOCOL

Since sub-slab sampling is from very shallow depths (typically two to six-inches below surface), minimum purge volumes and low volume samples are preferred to minimize potential breakthrough from the surface. Regardless of sample depth, a 30 minute flow controller (minimum) should be used. Tracer/leak gas (helium is preferred) will be used to ensure breakthrough does not occur. Note that if sub-slab and deeper subsurface soil gas samples are to be collected, they should be collected from separate boring locations in order to maintain a proper seal. Constructing nested sampling points is possible, but breakthrough is more likely and nested construction is not preferred. If possible, shallow samples should be collected prior to deeper samples to ensure surface seal.

Syringe Grab Samples

If only syringe samples are to be collected, connect syringe to probe tubing using the T-valve. If the syringe is connected directly to the probe implant, no purging is required. If a connecting tube is used between the syringe and the implant, purge out one to two dead-volumes of the connecting tubing (approximately one cubic centimeter per foot (cc/ft) for ⅛-inch OD tubing and five cc/ft for ¼-inch OD tubing). Leave syringe connected to implant the tubing. Sample by extracting soil gas via the syringe plunger.

Summa Canisters

Inspect the laboratory-provided Summa canister for damage prior to use. Do not use a canister that has visible damage.

Using a wrench, remove the brass cap above the valve on the top of the Summa canister. Measure and record the initial vacuum of Summa canister. If using an external vacuum gauge, cap the gauge and attach it to the canister using a wrench. Open the canister valve only after verifying the gauge is properly capped.

Verify that the vacuum pressure of the canister is equal to that indicated on the laboratory supplied tag. If the vacuum does not match, the canister has likely leaked and should not be used. Record the vacuum pressure on the sample collection form.

The canister will then be fitted with the laboratory-provided steel filter. The sampling train (steel-filter, flow-controller (if used), and Summa canister) will be attached to a T-connector with an in-line vacuum gauge and vacuum tight flow valves at each end. All valves should be closed on the T connector at this time. The valve connected to the sampling train is referred to as the sampling valve. The vacuum pump (truck-mounted or otherwise) is then attached to the second end of the T with the valve closed (referred to as the purge valve).

Lastly, the sample tubing is threaded through the leak-check shroud and connected to the sub-slab sampling point and the third closed valve on the T-connector. The leak-check shroud should then be sealed against the slab surface (see “Leak Check – Probe Point Surface Seal” below).

7.1.1.2 Leaking Checking - Apparatus

The method described below shall be used to check for leaks in the lines and fittings of the above ground sampling apparatus:

After the sampling system is set up, double check all valves are closed.

Open the purge valve (the valve connecting the purge pump to the apparatus, all other valves remain closed), turn on the purge pump, and apply approximately ten inches of vacuum into the T-connector and valves. Close the purge valve and check to verify that there is no loss of vacuum within the sampling apparatus (T-connector and valves) over a one minute period of time. If there is a loss of vacuum, this indicates a leak in the purge/sample system train that must be remedied.

If necessary, recheck the system to verify that there is no leakage as described above.

Document the date and time the leak check(s) were performed on the sampling form. Ensure all valves remain closed.

7.1.1.3 Leaking Checking – Probe Point Surface Seal

In addition checking for leaks in the apparatus, the probe point surface seal also needs to be checked for leakage. The preferred method uses helium gas as a tracer and permits checking for and correcting potential leaks in the field prior to sampling. Other tracer gases may be used but approval of their use should be verified prior to the start of the work. The helium tracer gas method is listed in ITRC’s “Technical and Regulatory Guidance, Vapor Intrusion Pathway: A Practical

Guideline" dated January 2007 (ITRC, 2007), and as described below. The ITRC guidance from which the text below is derived is consistent with California Environmental Protection Agency and Oregon Department of Environmental Quality guidance (CalEPA, 2005, 2010; DEQ 2010).

7.1.1.4 Helium Leak Check Method

- Insert sample tubing through the leak check enclosure (also referred to as a shroud) and complete sample tubing connections to the other apparatus (previously described above).

- Place the enclosure shroud flush with the ground surface, placing hydrated bentonite around the shroud to seal the shroud around the sample point.
- Attach helium tubing from the helium tank regulator to the enclosure (the “helium in” tubing).
- Attach the exhaust tubing (“helium out”) to the enclosure and locate the discharge end of the tubing as far as possible from the helium detector.
- Attach the helium detector on the exhaust line from the sample pump.
- Make sure the sample valve (from the sampling probe point) is closed.
- Open the helium tank valve and set the flow at 200 milliliter per minute (ml/min) or less; let it flow for about one minute to fill the leak check enclosure.
- Do an initial check to make sure the helium detector is not detecting any helium.
- Begin purging of soil gas as described in the section on purging below. During purging, continue monitoring helium detector, record readings. If helium is detected at over 5%, this indicates leakage; check/tighten all seals and fittings and repeat procedure. The helium exhaust line should also be monitored so that additional helium can be added to the shroud during sampling if needed.
- Close valves from the probe sampling point and purge pump lines, and turn pump off.
- If the helium detector reading is less than 5%, the system is considered leak free and sampling can be performed (see sampling section below).
- If the helium detector reading continues to be above 5%, leakage is indicated and the sub-slab abandoned.
- Record helium monitoring measurements in field notes.

7.1.1.5 Soil Gas Purging Procedures

Purging and sampling will be accomplished at a low flow rate (100 to 200 ml/min) to minimize the potential for inducing leakage. Flow rates should not exceed 200 ml/min. Purge vapors will be monitored using a PID for the presence of volatile organic compounds.

Slowly open the vacuum pump purge valve and purge three volumes of vapor from the dead space (volume of tubing and sand pack combined), then close the purge valve. Tubing volume can be estimated at 44 milliliters per foot (mm/ft) of 0.25-inch inner diameter (ID) tubing. For the sand pack volume calculation it is important to note that 1 cubic inch is equivalent to 16.387 milliliters. The sand pack volume can be calculated as shown:

Sand pack volume = $(\Phi * \pi * r_1^2 * L_1) - (\pi * r_2^2 * L_2)$

Where Φ = sand pack porosity, typically estimated at 30% r_1 = radius of sand pack

L_1 = length of sand pack

r_2 = outer radius of tubing (half of outer diameter) L_2 = length of tubing within the sand pack

Care will be taken not to purge an excessive volume, or at an excessive rate, so as to minimize the chances of inducing leakage from the surface. The pump will also be monitored for signs that it is laboring, a possible indication of a clogged probe or tubing.

During purging, check for leaks as described in the section on leak checks above. Record PID measurements of purge vapors on the field form. At the conclusion of purging, immediately close the purge valve and then shut off the purge pump.

7.1.1.6 Soil Gas Sample Collection Procedures - Grab Sampling

Atmospheric conditions (barometric pressure, temperature, wind speed and direction) will be recorded prior to and after sampling. A portable weather station equipped with a data logger is preferred to log site-specific conditions over the duration of sampling. However, if a weather station cannot be set-up on site, record atmospheric data from the closest weather station.

After leak testing and soil gas purging, soil gas sampling may be performed.

After purging, the purge valve will be closed prior to opening the sampling valve. The sample valve will then be opened followed by slowly opening the Summa canister valve. The canister's valve should be closed when the vacuum gauge shows a vacuum of 5 inches of mercury (in Hg) (pressure of -5 in Hg). The sample valve should then be closed.

Ensure the canister valve is tightly closed. The sample train should be immediately disassembled by removing the steel particulate filter, and the Summa canister. Immediately cap the Summa canister fitting. The final vacuum reading from the canister should be recorded on the chain of custody, sample collection form, and canister identification tag. If the final canister vacuum is less than 0.1 in Hg (more than -0.1 in Hg of pressure, or is a positive pressure), then the sample should be disregarded and a new sample collected.

Soil vapor samples will be shipped to a certified laboratory for analysis.

7.1.1.7 Sampling Procedures using a flow controller

The sampling procedure is the same as above except that a laboratory certified in-line flow controller for a pre-specified sampling time (i.e. 30 minutes) will be used. The flow controller fits between the laboratory provided steel particulate filter and the Summa canister. The entire sample train (laboratory-provided steel particulate filter, flow-controller, and summa canister) should be pre- assembled prior to connecting to the sampling valve.

7.1.1.8 Other Collection Notes

For larger canisters (greater than one liter), sample flow rates are not to exceed 200 milliliters per minute (ml/min) to minimize potential for vacuum extraction of contaminants from the soil phase. If large volume canisters is used (three or more liters) without a flow controller to ensure the flow rate remains below 200 ml/min, a purge volume test may be required to ensure sample dilution from other zones is not occurring.

FIELD RECORDS

The field technician maintains a log sheet summarizing:

- Sample Location.
- Sample Identification.

- Date and time of sample collection.
- Sampling depth.
- Tubing type, length, and volume.

- Purge Data (i.e. pump used, volume, PID screening information, purge start and stop time, purge vacuum reading).
- Weather conditions.
- Sampling methods and devices.
- Volume of sampling device.
- Sampling start and end date/time.
- Vacuum of canisters before and after samples collected.
- Apparent moisture content (dry, moist, or saturated, etc.) of the sampling zone.
- Chain of custody protocols and records used to track samples from sampling point to analysis.
- Other notes as applicable to site specific observations, sampling issues and mitigation of problems encountered.

REFERENCES

Cal EPA. 2005 (February 7 rev.). Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air. Department of Toxic Substances Control, Interim Final. California Environmental Protection Agency.

Cal EPA. 2010 (March). *Advisory – Active Soil Gas Investigation (Draft).* California Environmental Protection Agency.

DEQ. 2010 (March 25). Guidance for Assessing and Remediating Vapor Intrusion in Buildings. Oregon Department of Environmental Quality.

ITRC, 2007 (January). Technical and Regulatory Guidance, Vapor Intrusion Pathway: A Practical Guideline.

Interstate Technology & Regulatory Council.

ITRC, 2014 (January). Petroleum Vapor Intrusion – Fundamentals of Screening, Investigation, and Management. Interstate Technology & Regulatory Council.

EPA, 2015 (June). Technical Guide for Assessing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites. U.S. Environmental Protection Agency.

EPA, 2015 (June). OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air. U.S. Environmental Protection Agency.

STANDARD OPERATING PROCEDURE INDOOR AIR SAMPLING

VIA SOP 4

This vapor intrusion assessment (VIA) standard operating procedure (SOP) describes procedures for collecting indoor air samples. This SOP describes the collection of time- integrated samples from the human breathing zones of areas potentially impacted by volatile environmental contaminants. Because each site is unique, these procedures should be viewed as guidelines and will likely require modification based on site and surface conditions present.

Personnel performing the air sampling will follow site safety procedures as specified in the site-specific Health and Safety Plan.

PRE-SAMPLING BUILDING SURVEY

The physical layout and environment of the building, including potential sample locations, should be evaluated a minimum of two weeks prior to collecting indoor air samples. The purpose of the pre-sampling inspection is to identify conditions that may affect or interfere with sample collection and, as feasible, temporarily mitigate those conditions. This will minimize the potential for background sources to influence sample results. Details of the building survey, including a generic building survey form are attached. The building survey is a vital part of indoor air sample collection and must be completed prior to conducting sampling. If the building poses complications outside of the scope of the generic form attached to this SOP, the site-specific work plan may develop survey forms for individual buildings or individual rooms, as warranted.

EQUIPMENT/MATERIALS

Indoor air sampling generally requires the following equipment:

- Certified clean and evacuated Summa canister, typically six-liter (based on analytical method and desired reporting limits).
- Certified clean flow controller, set at desired sampling rate, typically between eight and 24 hours based on project-specific work scope.
- Shipping container suitable for protection of Summa canisters during shipment.
- Wrenches and tools appropriate for connecting fittings and making adjustments to the flow controller, if necessary.
- Negative pressure (vacuum) gauge (oil free and clean) either installed within the sample train or an external gauge used to check canister vacuum prior to and after sampling is complete. In-line gauges are preferred.
- Field data sheets include air sample collection form and daily field notes form.
- Timepiece (to record start and end time of sample collection).
- On-site weather station and barometric pressure data loggers, if available.

INDOOR AIR SAMPLING PROCEDURE

In general, the air sample should be collected under normal seasonal building conditions (i.e. ventilation or heating systems operating normally for routine building occupation).

Normally, buildings will be inventoried and products containing volatile chemicals will be removed with the building ventilated at least 48 hours prior to indoor air sampling. However, the site specific work plan should explicitly state the desired building conditions at the time of sampling as some situations may require windows be closed and ventilation systems be shut-off prior to collecting samples.

Clean sampling procedures must be followed at all times when handling and collecting samples. This includes care in packaging, storing, shipping, and use of the sampling equipment. Individuals performing the sampling must not smoke, must not wear perfume or strong deodorants, and must wear clean clothing (not dry cleaned) and proper personal protective equipment.

Sample Preparation

The following steps should be followed when preparing to collect indoor air samples:

- Inspect the canister for damage. Do not use a canister that has visible damage.
- Using a wrench, remove the brass cap above the valve on the top of the Summa canister.
- If using an external vacuum gauge, cap the gauge and attach it to the canister using a wrench. Open the canister valve only after verifying the gauge is properly capped.
- Verify that the vacuum pressure of the canister is equal to that indicated on the laboratory supplied tag. If the vacuum does not match, the canister has likely leaked and should not be used. Record the vacuum pressure on the sample collection form.
- Close the canister valve and remove the vacuum gauge if the flow controller is fitted with an independent gauge. Otherwise, leave the gauge in place.
- On the sample collection form, record the sample location, sample date, sample collection height, and canister and flow controller serial numbers. Record notes regarding sample location (i.e. room number/identifier, sample number, location relative to pertinent building infrastructure, etc.). Also note any other observations which could influence analytical results.
- Connect the laboratory certified flow controller to the canister. Pay special attention to air flow arrows or “OUT” notation on the flow controller so that it is correctly fitted to the canister. Tighten the fitting, as to be leak free but do not over tighten (¼ turn past finger snug is usually sufficient).
- Place the canister(s) at locations within the structure where representative sampling will occur in the breathing zone (typically between three and five feet above ground surface). The occupants and uses of the building should be considered. For example, a daycare with small children should be sampled closer to the ground. The site specific work plan should have incorporated these considerations and specify a sample collection height.
- Remove all work articles that will not remain with the sampling apparatus from the sampling area, including tools, vehicles, personnel, and any other equipment.

Sample Collection

When ready to begin sample collection follow the steps listed below:

- Record the sample start time on the sample collection form.

- Slowly open the valve on the canister approximately one full turn.
- Document pertinent weather information on the sample collection form, including temperature, wind speed and direction, humidity, atmospheric pressure, and overall outdoor weather conditions (sunny, cloudy, rainy, etc.). If a weather station is not set-up on site, record this information from the closest weather station.
- At the end of the sample period, verify residual vacuum remains in sample canister (optimally 5 inches Mercury [in Hg] vacuum [-5 in Hg total pressure]), then close the canister valve finger tight. If using an external vacuum gauge one must remove the closed canister from the sample train, securely fix the external vacuum gauge to the canister, and open the canister to verify the vacuum. Immediately close the canister after recording the final vacuum pressure. If the final canister vacuum is less than 0.1 in Hg (more than -0.1 in Hg total pressure, or is a positive pressure), then the sample should be disregarded and a new sample collected. Record the sample end time on the collection form and record the final weather conditions.
- Ensure the canister valve is tightly closed. Remove the flow controller and external vacuum gauge, if used. Document the final canister vacuum on the sample collection form. The Summa canister should have remaining vacuum, optimally -5 in Hg total pressure, but at a minimum less than -0.1 in Hg. Replace the brass cap and tighten gently.
- Record on the sample tag the sample date, time, project number, sample location/name, initial and final canister vacuum, and attach it to the canister.
- Prepare the chain-of-custody form and indicate analysis requested to be performed by the lab. Initial and final canister vacuum should be noted on the chain-of-custody.
- When packaging for shipment, verify that the valve and valve caps are snug and use sufficient clean packaging to prevent the valves from rubbing against any hard surfaces.

APPENDIX C

LABORATORY RESULTS

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

October 30, 2024

Richard Delorme, Project Manager
Blue Mountain Environmental & Consulting Inc. Co
125 Main/P.O Box 545
Waitsburg, WA 99361

Dear Mr Delorme:

Included are the results from the testing of material submitted on October 15, 2024 from the E2024 1002, F&BI 410310 project. There are 16 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
NAA1030R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on October 15, 2024 by Friedman & Bruya, Inc. from the Blue Mountain Environmental & Consulting E2024 1002, F&BI 410310 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Blue Mountain Environmental & Consulting
410310 -01	SUM-AA-01
410310 -02	SUM-AA-02
410310 -03	SUM-AA-03
410310 -04	SUM-AA-04
410310 -05	SUM-AA-05
410310 -06	SUM-AA-06
410310 -07	SUM-AA-07
410310 -08	SUM-AA-08
410310 -09	SUM-AA-09
410310 -10	SUM-AA-10
410310 -11	SUM-AA-11
410310 -12	SUM-AA-12

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-01	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-01
Date Analyzed:	10/25/24	Data File:	102512.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-02	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-02
Date Analyzed:	10/25/24	Data File:	102513.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	98	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-03	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-03
Date Analyzed:	10/25/24	Data File:	102514.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-04	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-04
Date Analyzed:	10/25/24	Data File:	102515.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	98	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-05	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-05
Date Analyzed:	10/25/24	Data File:	102516.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-06	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-06
Date Analyzed:	10/25/24	Data File:	102517.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-07	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-07
Date Analyzed:	10/25/24	Data File:	102518.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-08	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-08
Date Analyzed:	10/25/24	Data File:	102519.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	103	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-09	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-09
Date Analyzed:	10/25/24	Data File:	102520.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	102	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-10	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-10
Date Analyzed:	10/26/24	Data File:	102521.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	103	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-11	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-11
Date Analyzed:	10/26/24	Data File:	102522.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-AA-12	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/15/24	Project:	E2024 1002, F&BI 410310
Date Collected:	10/13/24	Lab ID:	410310-12
Date Analyzed:	10/26/24	Data File:	102523.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Blue Mountain Environmental & Consulting
Date Received:	Not Applicable	Project:	E2024 1002, F&BI 410310
Date Collected:	Not Applicable	Lab ID:	04-2512 MB
Date Analyzed:	10/25/24	Data File:	102511.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Date of Report: 10/30/24
Date Received: 10/15/24
Project: E2024 1002, F&BI 410310

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

Laboratory Code: 410310-12 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Vinyl chloride	ug/m3	<0.26	<0.26	nm
trans-1,2-Dichloroethene	ug/m3	<0.4	<0.4	nm
cis-1,2-Dichloroethene	ug/m3	<0.4	<0.4	nm
Trichloroethene	ug/m3	<0.11	<0.11	nm
Tetrachloroethene	ug/m3	<6.8	<6.8	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Vinyl chloride	ug/m3	35	110	70-130
trans-1,2-Dichloroethene	ug/m3	54	112	70-130
cis-1,2-Dichloroethene	ug/m3	54	112	70-130
Trichloroethene	ug/m3	73	110	70-130
Tetrachloroethene	ug/m3	92	116	70-130

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 below the standard reporting limit. 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.

410310

SAMPLE CHAIN OF CUSTODY

10/15/24 —

Page # 1 of 2

Report To Richard Delorme
Company Blue Mountain Environmental & Consulting Inc. Co.
Address 125 Main / PO Box 545
City, State, ZIP Waitsburg, WA 99361
Phone 509-778-3869 Email rjdelorme@charter.net

SAMPLERS (signature) Richard DeLorme

PROJECT NAME & ADDRESS
E2024 1002
1201 1st St. Yakima, WA 98901

PO #

NOTES:

INVOICE TO
bmecinc@gmail.com

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	APH	Chlorinated VOCs	Helium		Vinyl chloride trans-1,2-Dichloroethene cis-1,2-Dichloroethene Trichloroethene Tetrachloroethene Notes
SUM-AA-01	01	21442	15209	[✓ IA] / SG	10/13/24	29	0930	3	1730		X	X				↓
SUM-AA-02	02	37203	15212	[✓ IA] / SG	10/13/24	27	0930	3	1730							
SUM-AA-03	03	370083	07848	[✓ IA] / SG	10/13/24	27	0930	5	1730							
SUM-AA-04	04	18573	20477	[✓ IA] / SG	10/13/24	27	0930	0	1730							
SUM-AA-05	05	32102	07847	[✓ IA] / SG	10/13/24	27	0930	0	1730							
SUM-AA-06	06	37235	06601	[✓ IA] / SG	10/13/24	28	0930	0	1730							
SUM-AA-07	07	20557	20486	[✓ IA] / SG	10/13/24	29	0930	0	1730							
SUM-AA-08	08	40705	19499	[✓ IA] / SG	10/13/24	30	0930	0	1730		↓	↓				

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: Richard DeLorme	Richard DeLorme	BMEC	10/14/24	10:00
Received by:	Anh Phan	FBI	10/15/24	16:06
Relinquished by:		Samples received at 21 °C		
Received by:				

FORMS\COC\COCTO-15.DOC

410310

SAMPLE CHAIN OF CUSTODY

10/15/24 —

Report To Richard Delorme
Company Blue Mountain Environmental & Consulting Inc. Co.
Address 125 Main / PO Box 545
City, State, ZIP Waitsburg, WA 99361
Phone 509-778-3869 Email rjdelorme@charter.net

SAMPLERS (signature) Richard DeLorme

PROJECT NAME & ADDRESS E2024 1002 1201 1st St. Yakima, WA 98901	PO#
NOTES:	INVOICE TO bmecinc@gmail.com

Page # 2 of 2

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	APH	Chlorinated VOCs	Helium		Vinyl chloride trans-1,2-Dichloroethene cis-1,2-Dichloroethene Trichloroethene Tetrachloroethene ↓ Notes
SUM-AA-09	09	40703	05350	[✓ IA] / SG	10/13/24	27	0930	4	1730		X	X				
SUM-AA-10	10	37224	15208	[✓ IA] / SG	10/13/24	30	0930	0	1730		↓	↓				
SUM-AA-11	11	35332	19503	[✓ IA] / SG	10/13/24	30	0930	2	1730		↓	↓				
SUM-AA-12	12	18563	08182	[✓ IA] / SG	10/13/24	30	0930	3	1730		↓	↓				↓
				[✓ 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:	Richard DeLorme	Richard DeLorme	BMEC	10/14/24	10:00
Received by:		Anh Phan	FBI	10/15/24	16:06
Relinquished by:			Samples received at 21 °C		
Received by:					

FORMS\COC\COCTO-15.DOC

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 410310 CLIENT BMEC INITIALS/ DATE: AP 10/15/24

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

Cooler/Sample temperature 21 °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 10/16/24
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 2 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 ______

FRIEDMAN & BRUYA, INC./FORMS/CHECKIN/SAMPLECONDITION.doc Rev. 05/01/24

FROM: (509) 778-3869
RICHARD JOSEPH DELORME

133 SPRUCE AVE

Prosser WA 99350
US

SHIP DATE: 14OCT24
ACTWGT: 34.35 LB
CAD: 6995175/SSFE2541
DIMMED: 21 X 21 X 21 IN

Part# 156297-435 RRDB EXP 06/25

TO **FRIEDMAN & BRUYA INC**

5500 4TH AVE S

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

FedEx
Ground
G

J244024091001uv

3 of 3
MPS# 2806 1809 6501
Mstr# 2806 1809 6486

98108

9 **9 2806 1809 6501**

0989
[illegible]
0011
9622001900005750908800280618096501
10/15/2024 00:00:21

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

October 30, 2024

Richard Delorme, Project Manager
Blue Mountain Environmental & Consulting Inc. Co
125 Main /P.O Box 545
Waitsburg, WA 99361

Dear Mr Delorme:

Included are the results from the testing of material submitted on October 16, 2024 from the E2024 1002, F&BI 410323 project. There are 11 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
NAA1030R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on October 16, 2024 by Friedman & Bruya, Inc. from the Blue Mountain Environmental & Consulting E2024 1002, F&BI 410323 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Blue Mountain Environmental & Consulting
410323 -01	SUM-SS-01
410323 -02	SUM-SS-02
410323 -03	SUM-SS-03
410323 -04	SUM-SS-04
410323 -05	SUM-SS-05
410323 -06	SUM-SS-06
410323 -07	SUM-SS-07

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-SS-01	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/16/24	Project:	E2024 1002, F&BI 410323
Date Collected:	10/14/24	Lab ID:	410323-01 1/8.4
Date Analyzed:	10/16/24	Data File:	101621.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	98	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Vinyl chloride	<2.1	<0.84
trans-1,2-Dichloroethene	<3.3	<0.84
cis-1,2-Dichloroethene	<3.3	<0.84
Trichloroethene	<0.9	<0.17
Tetrachloroethene	<57	<8.4

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-SS-02	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/16/24	Project:	E2024 1002, F&BI 410323
Date Collected:	10/14/24	Lab ID:	410323-02 1/5.5
Date Analyzed:	10/16/24	Data File:	101615.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	97	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<1.4	<0.55
trans-1,2-Dichloroethene	<2.2	<0.55
cis-1,2-Dichloroethene	<2.2	<0.55
Trichloroethene	<0.59	<0.11
Tetrachloroethene	95	14

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-SS-03	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/16/24	Project:	E2024 1002, F&BI 410323
Date Collected:	10/14/24	Lab ID:	410323-03 1/16
Date Analyzed:	10/16/24	Data File:	101622.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	97	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<4.1	<1.6
trans-1,2-Dichloroethene	<6.3	<1.6
cis-1,2-Dichloroethene	<6.3	<1.6
Trichloroethene	<1.7	<0.32
Tetrachloroethene	<110	<16

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-SS-04	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/16/24	Project:	E2024 1002, F&BI 410323
Date Collected:	10/14/24	Lab ID:	410323-04 1/8.1
Date Analyzed:	10/16/24	Data File:	101617.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	97	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Vinyl chloride	<2.1	<0.81
trans-1,2-Dichloroethene	<3.2	<0.81
cis-1,2-Dichloroethene	<3.2	<0.81
Trichloroethene	<0.87	<0.16
Tetrachloroethene	<55	<8.1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-SS-05	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/16/24	Project:	E2024 1002, F&BI 410323
Date Collected:	10/14/24	Lab ID:	410323-05 1/8.6
Date Analyzed:	10/16/24	Data File:	101620.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Vinyl chloride	<2.2	<0.86
trans-1,2-Dichloroethene	<3.4	<0.86
cis-1,2-Dichloroethene	<3.4	<0.86
Trichloroethene	3.3	0.61
Tetrachloroethene	180	26

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-SS-06	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/16/24	Project:	E2024 1002, F&BI 410323
Date Collected:	10/14/24	Lab ID:	410323-06 1/8.2
Date Analyzed:	10/16/24	Data File:	101619.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Vinyl chloride	<2.1	<0.82
trans-1,2-Dichloroethene	<3.3	<0.82
cis-1,2-Dichloroethene	<3.3	<0.82
Trichloroethene	2.4	0.45
Tetrachloroethene	160	23

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SUM-SS-07	Client:	Blue Mountain Environmental & Consulting
Date Received:	10/16/24	Project:	E2024 1002, F&BI 410323
Date Collected:	10/14/24	Lab ID:	410323-07 1/8.5
Date Analyzed:	10/16/24	Data File:	101618.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Vinyl chloride	<2.2	<0.85
trans-1,2-Dichloroethene	<3.4	<0.85
cis-1,2-Dichloroethene	<3.4	<0.85
Trichloroethene	1.2	0.22
Tetrachloroethene	140	20

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Blue Mountain Environmental & Consulting
Date Received:	Not Applicable	Project:	E2024 1002, F&BI 410323
Date Collected:	Not Applicable	Lab ID:	04-2505 mb
Date Analyzed:	10/16/24	Data File:	101612.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	98	70	130

	Concentration	
Compounds:	ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Date of Report: 10/30/24
Date Received: 10/16/24
Project: E2024 1002, F&BI 410323

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

Laboratory Code: 410323-02 1/5.5 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Vinyl chloride	ug/m3	<1.4	<1.4	nm
trans-1,2-Dichloroethene	ug/m3	<2.2	<2.2	nm
cis-1,2-Dichloroethene	ug/m3	<2.2	<2.2	nm
Trichloroethene	ug/m3	<0.59	<0.59	nm
Tetrachloroethene	ug/m3	95	95	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Vinyl chloride	ug/m3	35	127	70-130
trans-1,2-Dichloroethene	ug/m3	54	116	70-130
cis-1,2-Dichloroethene	ug/m3	54	110	70-130
Trichloroethene	ug/m3	73	119	70-130
Tetrachloroethene	ug/m3	92	123	70-130

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 below the standard reporting limit. 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.

410323

SAMPLE CHAIN OF CUSTODY

10/16/24

Page # 1 of 1

Report To Richard Delorme

Company Blue Mountain Environmental & Consulting Inc. Co.

Address 125 Main / PO Box 545

City, State, ZIP Waitsburg, WA 99361

Phone 509-778-3869 Email rjdelorme@charter.net

SAMPLERS (signature) Richard DeLorme

PROJECT NAME & ADDRESS
E2024 1002
1201 1st St. Yakima, WA 98901

PO #

NOTES:

INVOICE TO
bmecinc@gmail.com

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	APH	Chlorinated VOCs	Helium		Vinyl chloride trans-1,2-Dichloroethene cis-1,2-Dichloroethene Trichloroethene Tetrachloroethene Notes
SUM-SS-01	01	2432	72	SG	10/14/24	29	1351	5	1357		X	X				
SUM-SS-02	02	4179	67	SG	10/14/24	27	1513	5	1518		↓	↓				↓
SUM-SS-03	03	8527	80	SG	10/14/24	30	1538	5	1543		↓	↓				↓
SUM-SS-04	04	9882	69	SG	10/14/24	27	1700	5	1706		↓	↓				↓
SUM-SS-05	05	9892	64	SG	10/~~14~~ 15/24	27	1014	5	1020		↓	↓				↓
SUM-SS-06	06	8539 ~~9897~~	54 ~~289~~	SG	10/~~14~~ 15/24	27	1132	5	1138		↓	↓				↓
SUM-SS-07	07	9992	62	SG	10/~~14~~ 15/24	28	1203	5	1208		↓	↓				↓
				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: Richard DeLorme	Richard DeLorme	BMEC	10/15/24	1300
Received by:	Nhan Phan	FBI	10/16/24	1134
Relinquished by:				
Received by:		Samples received at 20 °C		

FORMS\COC\COCTO-15.DOC

FROM: (509) 778-3869
RICHARD JOSEPH DELORME

133 SPRUCE AVE

Prosser WA 99350
US

SHIP DATE: 15OCT24
ACTWGT: 30.80 LB
CAD: 6995176/SSFE2541
DIMMED: 20 X 20 X 20 IN

[illegible]
Part # 156297-435 RRDB EXP 06/25

TO **FRIEDMAN & BRUYA**

5500 4TH AVE SOUTH

Seattle WA 98108 **(US)**
(206) 285-8282 REF:
INV:
PO: DEPT:

FedEx
Ground

G

J2440240910001uv

TRK# **2806 7930 2092**

98108

9622 0019 0 (000 000 0000) 0 00 2806 7930 2092

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 410323 **CLIENT** Blue Mountain Env. **INITIALS/ DATE:** NP 10/16/24

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

Cooler/Sample temperature 20 °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:** NP 10/16
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 1≥2 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)
Notes: -07. FC bended.

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

Number of unused TO15 canisters **Number of unused TO17 tubes**
(1) 1 LT Can S/N 9897 and 1 6LT Can S/N 18565