WHITMAN Environmental Sciences

6812 16th Avenue NE
Seattle, Washington 98115

Phone: (206) 523-3505
Whitenviro@yahoo.com

May 3, 2022

Mr. Alan Hereth
5407 88th Street NE
Marysville, WA 98270

Subject: Sub-Slab Soil Vapor Sampling
1048 State Avenue
Marysville, Washington

Dear Mr. Hereth:

As you have authorized, ***Whitman Environmental Sciences, (WES)*** has conducted an initial site investigation on the above referenced property to evaluate the potential for vapor intrusion in the site structure. Figure 1 is a Site Map identifying the site and surrounding area. The property is a commercial parcel of about 2.13 acres located in central Marysville, developed with a multi-tenant building of about 27,500 square feet.

Project Background

This work was conducted based on the former presence of a dry cleaning operation in the building (PDQ Laundry) and detections of chlorinated solvents in groundwater on an adjoining property. The site building was constructed in about 1963. It is my understanding that a dry cleaner was present until about 2002, with the dry-cleaning equipment located in the southeastern part of the building. The building has been remodeled since then and the current tenants in that part of the building now include a pawn shop and self-service laundromat (without current dry cleaning).

There is a Jackpot gas station and convenience store located at 1034 State Avenue, adjacent to the southwestern corner of the subject property. Time Oil Company removed underground storage tanks from that property in about 1991, and conducted cleanup of a petroleum release. During groundwater sampling at the Jackpot station they detected chlorinated solvents tetrachloroethene (PCE), trichloroethene (TCE) and cis-1,2 dichloroethene (C12DCE), which are not commonly associated with petroleum. Time Oil attributed the reported concentrations to PDQ Cleaners, which was located about 150 feet to the east, which they determined was upgradient with respect to groundwater migration.

The Washington Department of Ecology conducted a Site Hazard Assessment of the PDQ Laundry in 2002 and listed the property on the Hazardous Sites List (HSL). It remains on the most current HSL, awaiting cleanup. The hazard assessment was based on the information from the adjacent Jackpot station, however, there is no data on the 1048 State Avenue property that definitively demonstrated contamination. This current assessment was conducted as an initial step to evaluate whether or not the former dry cleaner has the potential to be the source of soil or groundwater contamination.

SUB-SLAB VAPOR ASSESSMENT

The goal of this assessment was to conduct sub-slab vapor sampling following currently accepted field and laboratory methods, and compare the results to screening levels established by the Washington Department of Ecology. The sub-slab screening levels are intended to be indicators of the potential for vapor intrusion into overlying buildings. The screening levels established by Ecology are concentrations of vapors in soil immediately below the floor slab of a building that should not result in harmful levels of vapors in the indoor air of the building. The results of this type of testing can be used to demonstrate the relative risk to building occupants and to evaluate whether or not there is a reason to suspect soil or groundwater contamination near the sampled locations.

Field Sampling Procedures

For this evaluation, WES obtained sub-slab vapor samples from four locations inside the building. The sub-slab sample locations are indicated in Figure 2, a Site and Sample Location Plan. The four locations were chosen to be in the estimated area of the former dry cleaning equipment, or at locations that would be downgradient with respect to groundwater migration. Groundwater in this area would be expected to migrate generally to the west or southwest.

Field Procedures

The sub-slab sampling was conducted on March 25th, 2022 by drilling ⅜-inch diameter holes through the concrete floor slab using a hand-held roto-hammer. The floor slab was approximately 4-inches thick, with an overlying layer of vinyl tile in two of the sampled locations. For each sample a ¼-inch diameter teflon sampling tube and manifold was installed using hydrated bentonite to seal the tube in the drilled hole. The manifold was enclosed in a polyethylene bag with an isopropyl alcohol-dampened paper towel. The alcohol is a compound detectable by the laboratory analysis, that can be used to demonstrate whether or not surface air was drawn into the sampler.

The sample was obtained by attaching a laboratory-prepared 1-liter Summa canister and purge pump to the manifold, first purging approximately 2-liters of soil vapor then conducting a 10-minute shut-in test to check the system for leaks. After that, the canister valve was opened, drawing sub-slab vapors into the sampler. Once the sampler vacuum was reduced to approximately 10 % of the initial gauge reading the valve was closed, the manifold was removed and the drill hole was sealed with a quick- setting expansive grout.

Laboratory Testing of Environmental Samples

The vapor samples were submitted to Friedman & Bruya, Inc., a Washington-state certified laboratory, for environmental analyses following Washington State approved methods. The vapor samples were analyzed for a list of chlorinated volatile organic compounds typically associated with dry cleaning by EPA Compendium Method TO-15. This test can identify PCE and a variety of related compounds that are sometimes generated by the breakdown of PCE in the environment. These include TCE, C12DCE and vinyl chloride (VC). Each of these compounds have different screening levels based on the differing toxicity of the vapors.

The analytical results are summarized in Table 1 and the laboratory reports are attached in Appendix A.

TABLE 1
Summary of Sub-Slab Vapor Sample Results
1048 State Avenue
Marysville, Washington

Detected Volatile Organic Compounds (ug/m^3)	***Sub-Slab Sample I.D.***				***Ecology Sub-Slab Screening Level (ug/m^3)***
	Laundry SW	***Laundry N***	***Pawn SW***	***Pawn SE***	
Tetrachloroethene (PCE)	***45,000***	***1,200,000***	***1,800***	***2,100,000***	320
Trichloroethene (TCE)	***13,000***	***310,000***	***87***	***91,000***	11
1,1-Dichloroethene	<5.9	370	<3.3	<200	3,000
cis-1,2- Dichloroethene	3,200	170,000	76	25,000	NV
trans-1,2-Dichloroethene	***1,500***	***21,000***	4.7	***5,300***	610
1,2-Dichloroethane (EDC)	<0.61	<10	0.80	<20	3.2
Vinyl Chloride (VC)	<3.8	***410***	<2.1	<130	9.5

Table Notes:
Chlorinated volatile organic compounds by EPA Compendium Method TO-15.
<XX - Compound not detected at the identified level.
NV - No published sub-slab screening level in current Ecology guidance documents.
Reported concentrations exceeding Ecology Sub-slab Screening Levels noted in ***Bold Italic***.

All laboratory testing met the quality assurance/quality control requirements of the project. Laboratory analyses are typically completed with detection limits that allowed direct comparison to Department of Ecology established sub-slab screening levels. However, due to very high reported concentrations, some parameters in the laboratory analyses exceeded the calibration range of the instruments used for testing. As a result, sample dilutions were required, which makes other compounds in the samples difficult to detect if they are at lower levels. Any sample that has raised detection limits for some compounds has one or more detections that greatly exceeds the applicable screening levels, so it does not affect the uses of the data at this stage of investigation.

FINDINGS AND CONCLUSIONS

The sub-slab vapor sampling found very high concentrations of PCE, TCE and C12DCE, as well as lesser concentrations of other related compounds. The sample Pawn SE was likely located closest to the former location of the dry cleaning equipment and contained 2,100,000 ug/m^3 of PCE compared to an Ecology screening level of 320 ug/m^3. (The units ug/m^3 are micrograms per cubic meter of air.) The sample also contained 91,000 ug/m^3 of TCE and 5,300 ug/m^3 of trans-1,2, dichloroethene, both at levels greatly exceeding Ecology's sub-slab screening levels for those compounds. Cis-1,2-dichloroethene was detected at 25,000 ug/m^3, but there is no current published screening level for that compound. It is a common breakdown product of PCE once released into the environment.

The concentrations reported in the three other samples suggest migration has occurred to the southwest, at levels less than seen in sample Pawn SE, decreasing with distance. However, all of the samples detected PCE and TCE at concentrations up to thousands of times greater than Ecology's sub-slab screening levels. The sample Laundry N was the only sample to contain detectable vinyl chloride, evidence of relatively advanced breakdown of PCE in the environment.

The findings suggest there is a source of PCE and TCE vapors in the vicinity of the tested locations, most likely in the form of contaminated soil or groundwater. The underlying soil is fine sand, which represents a pathway for vapors to migrate into the building. Based on the very high concentrations detected by this testing, it may be appropriate to sample indoor air in the two tenant spaces to evaluate whether or not vapors have impacted air quality in the building. If necessary, actions can be taken to change building ventilation or take active measures to control vapors beneath the floor slab.

The findings also suggest (but do not directly show) that groundwater may be impacted and migrating to the southwest, away from the original source area. Although it is a distance of over 150 feet, this could corroborate the prior suggestions that the PDQ Laundry was the source of PCE found in samples from the Jackpot service station to the southwest. Additional investigation would be needed to determine soil and groundwater conditions on the property.

Based on the findings of this assessment further investigation and/or vapor mitigation action appears warranted.

CLOSURE

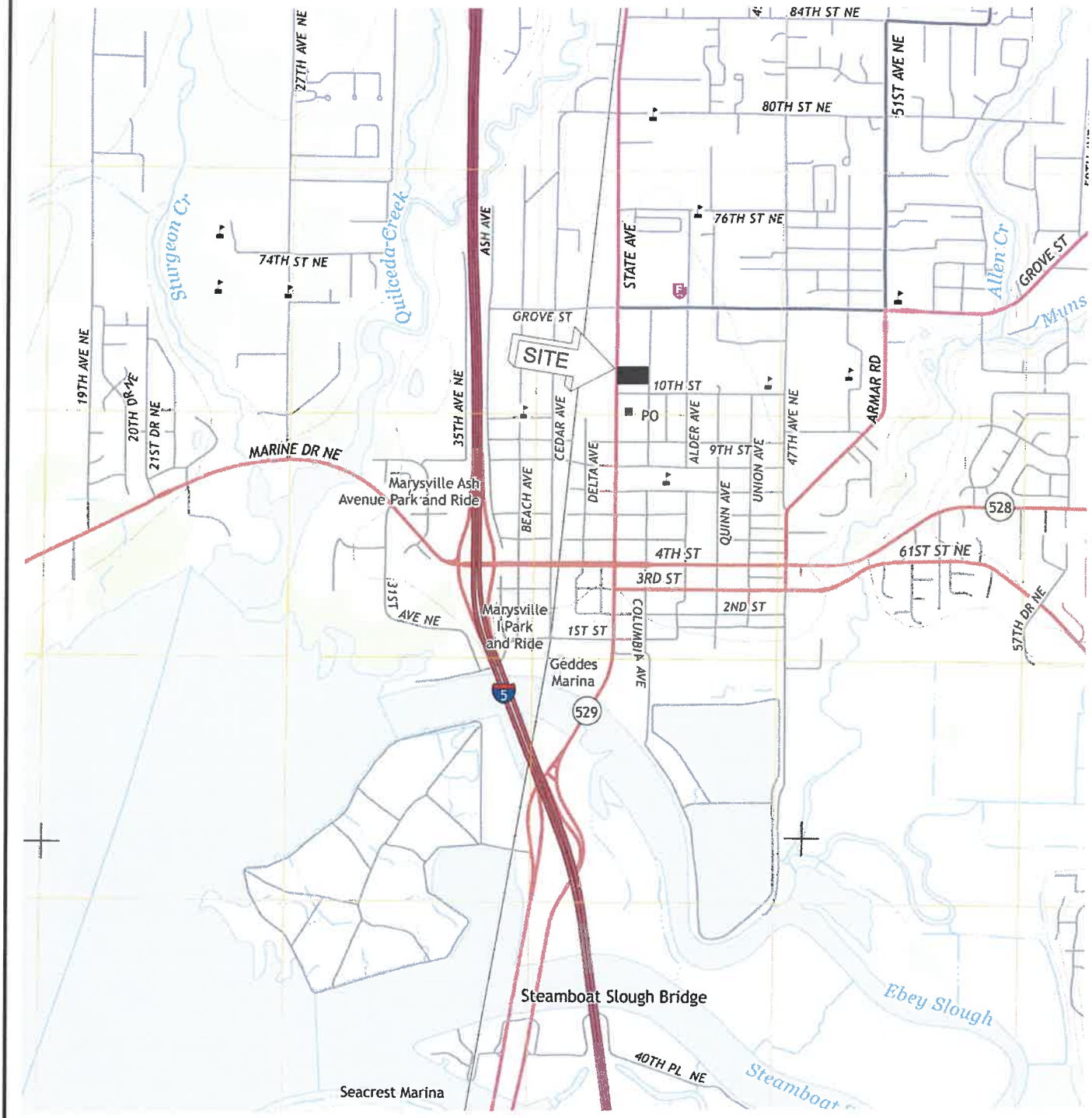
Whitman Environmental Sciences has been pleased to be of service in this matter. If you have any questions regarding the information contained in this report, or if we may be of any further assistance, please feel free to contact me.

Respectfully submitted,
Whitman Environmental Sciences

Daniel S. Whitman, LG
Principal

Attachments: Figure 1 - Site Location Plan
Figure 2 - Site and Sample Location Plan

Appendix A - Laboratory Analytical Report - Friedman & Bruya, Inc.



North

0 2000'

Scale 1 : 24,000

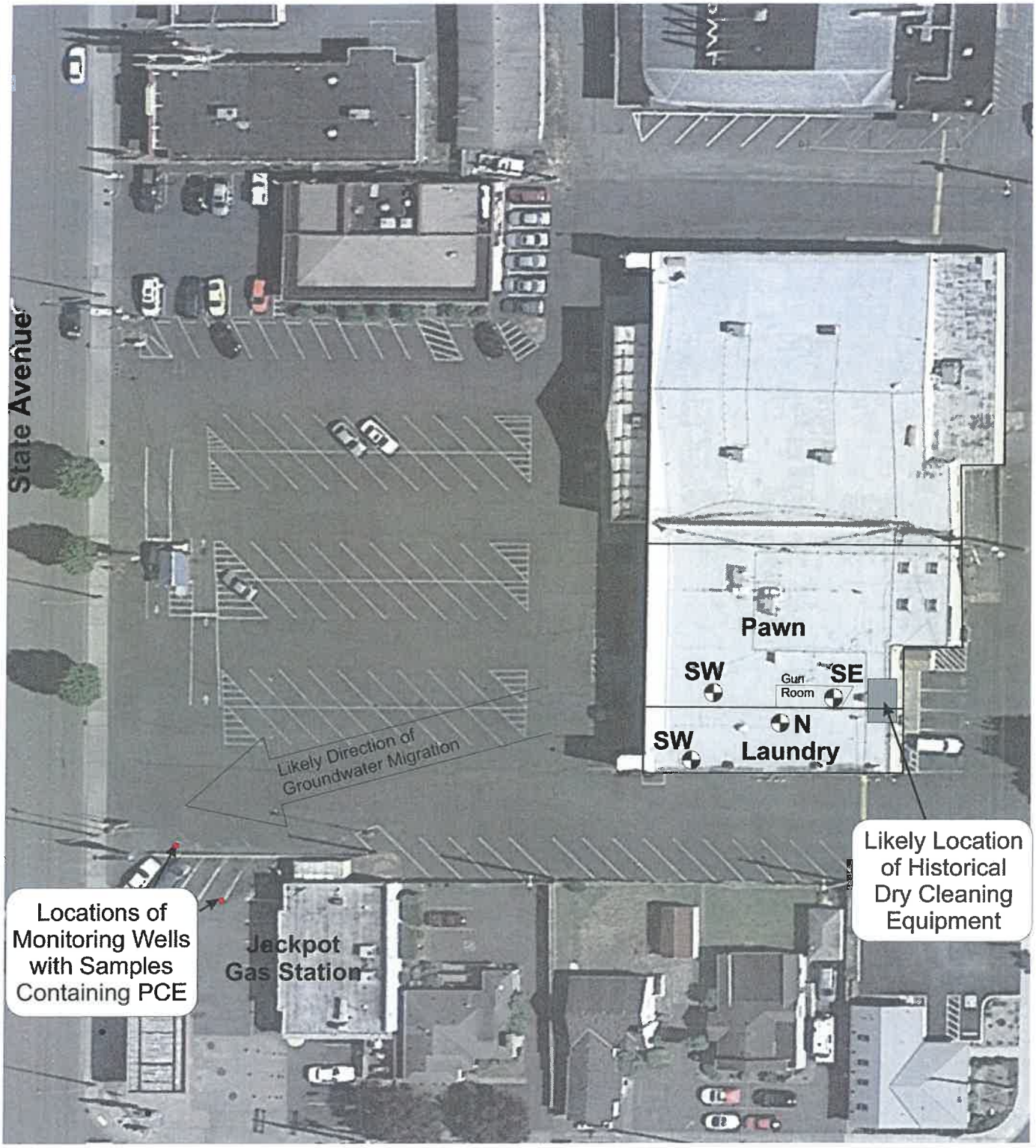
From USGS

Figure 1 - Site Map

1048 State Ave
Marysville, Washington

Project No.	WES - 1803
Date	Apr 11, 2022
File ID.	1803F1

WHITMAN
Environmental Sciences



◓ Approximate Location of Sub-Slab Vapor Points

North

0 60'

Scale 1 = Approx 60 Ft.

Base Photo from Google Earth

Figure 2 - Site and Sample Location Plan

1048 State Avenue
Marysville, Washington

Project No.	WES - 1803
Date	Apr 19, 2022
File ID.	1803F2

WHITMAN
Environmental Sciences

APPENDIX A

Laboratory Analytical Report
Friedman & Bruya, Inc.

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.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

April 12, 2022

Dan Whitman, Project Manager
Whitman Environmental Sciences
6812 16th Ave NE
Seattle, WA 98115

Dear Mr Whitman:

Included are the results from the testing of material submitted on March 25, 2022 from the PDQ Laundry WES 1803, F&BI 203472 project. There are 8 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
WES0412R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on March 25, 2022 by Friedman & Bruya, Inc. from the Whitman Environmental Sciences PDQ Laundry WES 1803, F&BI 203472 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Whitman Environmental Sciences
203472 -01	Laundry SW
203472 -02	Laundry N
203472 -03	Pawn SW
203472 -04	Pawn SE

The concentration of several analytes exceeded the calibration range of the instrument. The data were flagged accordingly.

Tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene were detected in the TO-15 method blank at a level greater than one tenth the concentration detected in several of the samples. The data were flagged accordingly.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Laundry SW	Client:	Whitman Environmental Sciences
Date Received:	03/25/22	Project:	PDQ Laundry WES 1803
Date Collected:	03/25/22	Lab ID:	203472-01 1/15
Date Analyzed:	04/08/22	Data File:	040732.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<3.8	<1.5
Chloroethane	<40	<15
1,1-Dichloroethene	<5.9	<1.5
trans-1,2-Dichloroethene	1,500 ve	370 ve
1,1-Dichloroethane	<6.1	<1.5
cis-1,2-Dichloroethene	3,200 ve	810 ve
1,2-Dichloroethane (EDC)	<0.61	<0.15
1,1,1-Trichloroethane	<8.2	<1.5
Trichloroethene	13,000 ve	2,300 ve
1,1,2-Trichloroethane	<0.82	<0.15
Tetrachloroethene	45,000 fb ve	6,600 fb ve

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Laundry N	Client:	Whitman Environmental Sciences
Date Received:	03/25/22	Project:	PDQ Laundry WES 1803
Date Collected:	03/25/22	Lab ID:	203472-02 1/250
Date Analyzed:	04/08/22	Data File:	040733.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	410	160
Chloroethane	<660	<250
1,1-Dichloroethene	370	94
trans-1,2-Dichloroethene	21,000 ve	5,400 ve
1,1-Dichloroethane	<100	<25
cis-1,2-Dichloroethene	170,000 ve	43,000 ve
1,2-Dichloroethane (EDC)	<10	<2.5
1,1,1-Trichloroethane	<140	<25
Trichloroethene	310,000 ve	58,000 ve
1,1,2-Trichloroethane	<14	<2.5
Tetrachloroethene	1,200,000 fb ve	180,000 fb ve

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Pawn SW	Client:	Whitman Environmental Sciences
Date Received:	03/25/22	Project:	PDQ Laundry WES 1803
Date Collected:	03/25/22	Lab ID:	203472-03 1/8.2
Date Analyzed:	04/08/22	Data File:	040731.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	<2.1	<0.82
Chloroethane	<22	<8.2
1,1-Dichloroethene	<3.3	<0.82
trans-1,2-Dichloroethene	4.7 fb	1.2 fb
1,1-Dichloroethane	<3.3	<0.82
cis-1,2-Dichloroethene	76 fb	19 fb
1,2-Dichloroethane (EDC)	0.80	0.20
1,1,1-Trichloroethane	<4.5	<0.82
Trichloroethene	87 fb	16 fb
1,1,2-Trichloroethane	<0.45	<0.082
Tetrachloroethene	1,800 fb ve	260 fb ve

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Pawn SE	Client:	Whitman Environmental Sciences
Date Received:	03/25/22	Project:	PDQ Laundry WES 1803
Date Collected:	03/25/22	Lab ID:	203472-04 1/500
Date Analyzed:	04/08/22	Data File:	040734.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	<130	<50
Chloroethane	<1,300	<500
1,1-Dichloroethene	<200	<50
trans-1,2-Dichloroethene	5,300 fb	1,300 fb
1,1-Dichloroethane	<200	<50
cis-1,2-Dichloroethene	25,000 fb	6,200 fb
1,2-Dichloroethane (EDC)	<20	<5
1,1,1-Trichloroethane	<270	<50
Trichloroethene	91,000 fb ve	17,000 fb ve
1,1,2-Trichloroethane	<27	<5
Tetrachloroethene	2,100,000 fb ve	310,000 fb ve

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Whitman Environmental Sciences
Date Received:	Not Applicable	Project:	PDQ Laundry WES 1803
Date Collected:	04/07/22	Lab ID:	02-0792 MB
Date Analyzed:	04/07/22	Data File:	040713.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
Chloroethane	<2.6	<1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	1.6 lc	0.41 lc
1,1-Dichloroethane	<0.4	<0.1
cis-1,2-Dichloroethene	7.6 lc	1.9 lc
1,2-Dichloroethane (EDC)	<0.04	<0.01
1,1,1-Trichloroethane	<0.55	<0.1
Trichloroethene	30 lc	5.5 lc
1,1,2-Trichloroethane	<0.055	<0.01
Tetrachloroethene	980 ve lc	140 ve lc

Date of Report: 04/12/22
Date Received: 03/25/22
Project: PDQ Laundry WES 1803, F&BI 203472

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

Laboratory Code: 203474-02 1/8.4 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Vinyl chloride	ug/m3	<2.1	<2.1	nm
Chloroethane	ug/m3	<22	<22	nm
1,1-Dichloroethene	ug/m3	<3.3	<3.3	nm
trans-1,2-Dichloroethene	ug/m3	<3.3	<3.3	nm
1,1-Dichloroethane	ug/m3	<3.4	<3.4	nm
cis-1,2-Dichloroethene	ug/m3	<3.3	<3.3	nm
1,2-Dichloroethane (EDC)	ug/m3	<0.34	<0.34	nm
1,1,1-Trichloroethane	ug/m3	<4.6	<4.6	nm
Trichloroethene	ug/m3	<0.9	<0.9	nm
1,1,2-Trichloroethane	ug/m3	<0.46	<0.46	nm
Tetrachloroethene	ug/m3	2,500	2,600	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Vinyl chloride	ug/m3	35	101	70-130
Chloroethane	ug/m3	36	104	70-130
1,1-Dichloroethene	ug/m3	54	104	70-130
trans-1,2-Dichloroethene	ug/m3	54	102	70-130
1,1-Dichloroethane	ug/m3	55	109	70-130
cis-1,2-Dichloroethene	ug/m3	54	101	70-130
1,2-Dichloroethane (EDC)	ug/m3	55	102	70-130
1,1,1-Trichloroethane	ug/m3	74	126	70-130
Trichloroethene	ug/m3	73	102	70-130
1,1,2-Trichloroethane	ug/m3	74	111	70-130
Tetrachloroethene	ug/m3	92	94	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. 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 lowest calibration standard. 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.

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.

SAMPLE CHAIN OF CUSTODY

203472 — 03.25.22

Report To [redacted]
Company [redacted] Env. Services
Address [redacted] 16th Ave NE
City, State, ZIP Seattle, WA 98115
Phone _____ Email [redacted]@yahoo.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS: [redacted] PDQ Laundry

PO # 025 1803

NOTES:

INVOICE TO

Page # _____ of _____

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

SAMPLE DISPOSAL
☐ Default: Clean after 3 days
☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
Laundry SG	01	8537	305	IA / (SG)	3-25	28	11:08	0	11:15			X				
" " N	02	9569	301 Tue 3/29	IA / (SG)	"	~~28~~ 30	11:29	4	11:36			X				
Patio SG	03	8539	304	IA / (SG)	"	30	12:14	4	12:20			X				
Patio SE	04	9566	256	IA / (SG)	"	30	12:39	4	12:35			X				
				IA / SG												
				IA / SG												
				IA / SG												
				IA / SG												

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	[redacted]		[redacted]	3-25-22	3:45
Received by:	[redacted]	Tokala Christenson	FRB	3/25/22	15:45
Relinquished by:					
Received by:			Samples received at		21 °C