EHS–International, Inc.
1011 Klickitat Way, Ste. 104
Seattle, WA 98134
Phone 206-381-1128
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June 13, 2018

Clifford Jo
Finance and Business Director
Administrative Center and Library
3005 112th Street East
Tacoma, WA 98446

Subject: Ambient Air and Soil Gas Testing Results
Buckley Public Library
EHSI Project 10949-04.1

Dear Clifford:

At your request, EHS-International, Inc. (EHSI), an environmental health and safety consulting firm, conducted ambient air and soil gas testing at the Buckley Library located at 123 South River Road, Buckley, Washington. This report provides the results from that monitoring.

EHSI is pleased to provide our professional industrial hygiene services. If you have any questions concerning this report or if EHSI can provide further services to you, please call me at 206-381-1128.

Sincerely,
EHS-International, Inc.

Clinton Holzhauer
Manager, Industrial Hygiene & Indoor Air Quality Services
(o) 206-381-1128
(c) 425-766-5697

Buckley Library
Ambient Air & Soil Gas Test Results

Buckley Library
123 South River Road
Buckley, Washington

Prepared for:

Clifford Jo
Finance and Business Director
Administrative Center and Library
3005 112th Street East
Tacoma, WA 98446

June 13, 2018
EHSI Project 10949-04.1

EHS–International, Inc.

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EHS–International, Inc.

AMBIENT AIR & SOIL GAS SAMPLING RESULTS
Buckley Library
Buckley, Washington

EXECUTIVE SUMMARY

On April 30th, 2018, EHS-International, Inc. (EHSI), an environmental health and safety consulting firm, conducted ambient air and soil gas sampling at the Buckley Library, located at 123 South River Road, Buckley, Washington. Sampling was conducted because contamination caused by a release of petroleum hydrocarbons associated with past use of the site as a gasoline service station have been identified near the library building. The air sampling work described in this report was conducted to determine whether off-gassing from the contamination is being transmitted through the building's concrete slab and deleteriously impacting the air quality in the library. This process is known as "vapor intrusion".

Results from samples collected from ambient air and soil gas were compared to the Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) maximum allowable clean-up levels and risk calculations (CLARC) values set forth in the CLARC Data Tables, formerly referred to as Table B-1, in the Ecology *Guidance for Evaluating Soil Vapor Intrusion in Washington State.* Based on MTCA, health risks are not expected to arise if the CLARC values in the CLARC Data Tables are not exceeded. EHSI tested for several ranges of air phase hydrocarbons (APH) that are used to indicate the presence of gasoline and diesel range petroleum hydrocarbons. The collected samples were also analyzed for benzene, toluene, ethylbenzene, xylenes, toluene, acetaldehyde, chloroform, and naphthalene.

Benzene, naphthalene, acetaldehyde, and chloroform concentrations exceeded the CLARC Data Table values for the ambient air samples. However, based on the available data it is unlikely that the concentrations of these chemicals in indoor air is due entirely to vapor intrusion from contamination.

Three (3) of four (4) soil gas samples had concentrations of chloroform and acetaldehyde that exceeded the applicable CLARC Data Table value. Neither chloroform nor acetaldehyde were identified in any of the soil samples collected from the area of contamination. All other soil gas results had concentrations of chemicals of concern that were less than the applicable CLARC values.

Based on these results there are likely to be no adverse health effects to library users and staff because of any potential vapor intrusion from the identified contamination. EHSI anticipates that one more round of ambient air and soil gas sampling will take place in July 2018.

BACKGROUND INFORMATION

Contamination including gasoline, diesel, oil, benzene, ethylbenzene, total xylenes, and naphthalene have been identified at the Buckley Library site due to the historical use of the site as a gasoline service station. Most of the contamination is in the northeast portion of the site but there is some groundwater and soil vapor contamination south of the library building as well. EHSI's "*Additional Site Characterization Report – Buckley Library*" dated February 2018, provides additional information regarding the encountered contamination.

Testing of ambient indoor air at the library was initially conducted in August and December of 2017. EHSI's report, *Ambient Air Testing Results – Buckley Public Library* with information regarding the initial sampling episode was issued on September 11th, 2017, as EHSI Project 10949-03 (EHSI 2017b). A final report regarding the testing of ambient air and soil gas conducted in December 2017, *Ambient Air and Soil Gas Testing Results*, was issued on January 31st, 2018.

APPROACH

On April 30th, 2018, two (2) samples of ambient indoor air were collected for laboratory analysis. One indoor sample was collected from the Sitting Area on the northwest side of the library and the other indoor sample was collected from the Children's Area (or Child Area) on the northeast side of the library. One sample of outdoor ambient air was collected from the southwest side of the building as a comparator sample.

In addition, four (4) soil gas samples were collected from previously installed vapor pins (VP1 through VP4). Information regarding the location of the vapor pins is provided below and in the site plan presented in Appendix A.

VP-1 is located by the southwest book drop.
VP-2 is located north of the east main entry of the library.
VP-3 is located next to the building, behind the shrubbery, on the northeast side of the property.
VP-4 is located close to the building near the northwest side door.

The sampling was conducted on April 30th, 2018, by Mr. Clinton Holzhauer, EHSI Manager of Industrial Hygiene and Indoor Air Quality Services. All doors had been closed for at least 24-hours prior to the start of indoor ambient air sampling.

TESTING METHODOLOGY

Ambient Air Sampling

Samples of ambient air were collected using six-liter evacuated Entech Instrument Silonite canisters with four-hour regulators. Samples were collected approximately four-feet above floor level.

Soil Gas Sampling

Samples of soil gas were collected using one-liter evacuated Entech Instrument Silonite canisters with regulators set for an airflow of 0.15 liters per minute (LPM). Sampling manifolds, obtained from the analytical laboratory, were used to attach the canisters to the vapor pins with valves to allow "shut in" and "leak" testing. Prior to sampling at each location, a "shut-in" test was conducted to verify that each sampling manifold was air tight and could accommodate a vacuum. A leak check was then accomplished by placing a sealed container around each sampling apparatus and adding helium until the concentration of helium in the container was 20%. While the sampling apparatus was in this helium-rich environment, a Helium/Hydrogen Multigas Detector MGD-2002 was used to determine the helium concentration in the sampling line. Helium was not detected in any of the sampling lines. Sampling at each location was conducted over an approximately ten (10) minute period.

Laboratory Analysis - Ambient Air Samples

Once collected, samples were delivered to Friedman & Bruya, Inc. (FBI) laboratory, in Seattle, Washington, under chain-of-custody (COC) control.

At the laboratory, the canister samples were analyzed in accordance with Method MA-APH and EPA Method TO-15 using gas chromatography/mass spectrometry (GC/MS). Results were reported as micrograms per cubic meter of air ($\mu g/m^3$) and parts per billion by volume (ppbv). Laboratory analytical results are presented in Appendix B.

ANALYTICAL RESULTS

Table 1 below provides the analytical results from sampling of ambient air conducted on April 30th, 2018, as well as analytical results from the previous testing episodes conducted in August and December of 2017.

Table 1
Ambient Air Sampling Results
Buckley Library
August 28th, 2017 - December 11th, 2017 – April 30th, 2018
Results Reported as µg/m³

Analyte	Sitting Area 8/28/17	Child Area 8/28/17	Sitting Area 12/11/17	Child Area 12/11/17	Sitting Area 4/30/18	Child Area 4/30/18	MTCA CLARC Maximum Allowable Concentration Ambient Indoor Air	Outdoor Comparator 8/28/17	Outdoor Comparator 12/11/17	Outdoor Comparator 4/30/18
APH – [EC5-8 aliphatics][A]	96	100	110	110	93	83	2,700	<92	65	90
APH – [EC9-12 aliphatics][A]	<140	<140	<35	<35	<35	<35	140	<140	<35	<35
APH – [EC9-10 aromatic][A]	<100	<100	<25	<25	<25	<25	180	<100	<25	<25
Benzene	**0.90**	**0.86**	**2.0**	**2.1**	**0.33**	<0.32	0.32	**1.0**	**2.7**	**0.37**
Toluene[A]	4.3	4.0	5.2	5.8	1.3	1.2	2,290	3.4	5.6	0.55
Ethylbenzene[A]	0.54	0.53	0.89	0.9	<0.43	<0.43	457	0.46	1.1	<0.43
Xylenes[A] (Total)	2.44	2.47	4.1	4.1	<1.3	<1.3	45.7	2.05	4.2	<1.3
Chloroform	**0.21**	**0.21**	**0.38**	**0.43**	**0.26**	**0.24**	0.109	**0.14**	**0.17**	**0.11**
Acetaldehyde	**5.7[B]**	**6.0[B]**	**<9**	**<9**	**6.1**	**21**	1.14	**3.7[B]**	**<9**	**33**
Naphthalene	**0.18**[B]	**0.23**[B]	**0.22**	**0.23**	**0.18**[B]	**0.21**[B]	0.073	**0.18**[B]	**0.31**	**0.15**[B]

[A] – "non-cancer"; [B] – Laboratory Lab Qualifier; Results in **bold** exceed the MTCA Table B-1 maximum allowable levels.

Table 2 below provides the analytical results from soil gas sampling.

Table 2
Soil Gas Sampling Results
Buckley Library
December 11th, 2017 & January 10th, 2018 – April 30th, 2018
Results Reported as µg/m^3

Analyte	**VP1 12/11/17**	**VP2 12/11/17**	**VP3 1/10/17**	**VP4 1/10/17**	**VP1 4/30/18**	**VP2 4/30/18**	**VP3 4/30/18**	**VP4 4/30/18**	**MTCA CLARC Maximum Allowable Concentration Soil Gas**	**Outdoor Comparator 12/11/17**	**Outdoor Comparator 4/30/18**
APH – [EC5-8 aliphatics][A]	140	<110	<110	210	810	800	580	620	90,000	65	90
APH – [EC9-12 aliphatics][A]	220	<87	95	240	<350	440	<350	<350	4,700	<35	<35
APH – [EC9-10 aromatic][A]	<62	<62	<62	<62	<250	<250	<250	<250	6,000	<25	<25
Benzene	<0.8	<0.8	<0.8	1.3	<3.2	<3.2	<3.2	<3.2	10.7	**2.7**	**0.37**
Toluene[A]	1.1	1.5	4.4	1,500	<3.8	<3.8	<3.8	5.0	76,200	5.6	0.55
Ethylbenzene[A]	<1.1	<1.1	<1.1	11	<4.3	<4.3	<4.3	<4.3	15,200	1.1	<0.43
Xylenes[A] (Total)	<2.2	<3.3	3.4	39	<13	<13	<13	<13	3,100	4.2	<1.3
Chloroform	3.0	**7.1**	**3.8**	**4.8**	**3.9**	**7.5**	2.1	**4.2**	3.62	**0.17**	0.11
Acetaldehyde	<23	<23	**<23**	**<23**	**58**	**130**	<18	**60**	37.9	**<9**	**33**
Naphthalene	<0.24	<0.24	**3.9**	**8.1**	<1	1.1	1.1[B]	1.1[B]	2.45	**0.31**	0.15[B]

[A] – "non-cancer"; [B] – Laboratory Lab Qualifier; Results in **bold** exceed the MTCA Table B-1 maximum allowable levels.

DISCUSSION OF RESULTS

Ambient Air Samples

Naphthalene, acetaldehyde, and chloroform results from the ambient indoor air samples indicate that these chemicals of concern were present in greater concentrations than the applicable CLARC values presented in the CLARC Data Tables.

Results indicate that the sample collected from the Sitting Area had a benzene concentration of 0.33 µg/m^3 while the sample collected in the Children's Area had a benzene concentration that was less than 0.32 µg/m^3. The CLARC Data Table value for benzene in ambient air is 0.32 µg/m^3. The concentration of benzene in the outdoor air comparator sample was 0.37 µg/m^3, greater than the concentration in the indoor air samples.

Similarly, although the indoor samples had acetaldehyde concentrations that exceeded the applicable CLARC Data Table value the outdoor air comparator sample had an acetaldehyde concentration that was greater than the indoor samples suggesting that acetaldehyde may have been from outdoor air.

The concentrations of chloroform and acetaldehyde in three of the soil gas samples were greater than the CLARC Data Table values for soil gas. All other soil gas results were less than the applicable CLARC Data Table values. This was the first time that acetaldehyde concentrations in soil gas exceeded the applicable CLARC Data Table value.

When contaminants are identified in outdoor air it is possible to subtract the outdoor air concentration from the indoor air concentration to determine the concentration that may be present due to vapor intrusion and/or other indoor sources. When outdoor air concentrations are subtracted from the indoor air concentrations of these three chemicals only two, chloroform and naphthalene, have indoor concentrations that exceed the MTCA CLARC Data Table values for indoor air.

Soil Gas Samples

Three of the soil gas samples had concentrations of chloroform acetaldehyde that exceeded the CLARC Data Table value for soil gas samples. All soil gas sample naphthalene concentrations were less than the applicable CLARC Data Table values.

Sample Results

Indoor Air Samples

Most of the indoor concentrations of benzene, chloroform, acetaldehyde, and naphthalene on April 30th were greater than the applicable CLARC values of 0.32, 0.109, 1.14, and 0.073 µg/m^3, respectively. However, the outdoor comparator sample had benzene, chloroform, acetaldehyde, and naphthalene concentrations of 0.37, 0.11, 33, and 0.18 µg/m^3, respectively. These values suggest that the benzene, chloroform, acetaldehyde, and naphthalene in ambient indoor air are due, at least in part, to their presence in ambient outdoor air.

One possible source for chloroform in air samples is drinking and landscaping irrigation water. Chlorine is added to municipal water sources as a disinfectant. Trihalomethanes, including chloroform, form as disinfectant byproducts after chlorination. Consequently, in addition to the potential for vapor intrusion from a fuel release it is possible that chloroform is present due to irrigation of library grounds using chlorinated municipal water.

Soil Gas Samples

The concentration of chloroform and acetaldehyde in the soil gas samples does not correlate with our current understanding of the underground contamination but does support the hypothesis that chloroform is present because it is a byproduct of municipal water chlorination. The presence of acetaldehyde in soil gas and ambient air samples but not soil or groundwater samples suggests that any acetaldehyde present is not due to vapor intrusion.

Evaluating Health Risks

To further evaluate potential health risks associated with exposure to chloroform EHSI referenced the State of California's Office of Environmental Health Hazard Assessment (OEHHA) acute and chronic reference exposure levels (RELs) which are intended to be protective of the entire population. The OEHHA RELs were developed by toxicologists and are some of the most protective standards in current use in the United States that are not specific to vapor intrusion sources. Acute exposures are averaged over a one-hour time-period. Chronic exposures are intended to represent continuous exposure for up to a lifetime.

Table 3 below provides a comparison of the OEHHA RELs to the results from the collected ambient air samples.

Table 3
Ambient Indoor Air Sampling Results
Comparison to OEHHA RELs
Buckley Library
April 30th, 2018
Results Reported as µg/m³

	Buckley Library Samples			OEHHA RELs		
Analyte	**Sitting Area**	**Children's Area**	**Outdoor Air**	**Acute REL**	**8-Hr REL**	**Chronic REL**
Chloroform	0.26	0.24	0.14	300	---	150

--- = not established

Therefore, although the concentrations of chloroform in ambient indoor air exceeded the established MTCA CLARC values, they were well below the REL concentrations established for acute and chronic exposure by OEHHA.

SUMMARY & CONCLUSIONS

Results from collecting and analyzing ambient air and soil gases samples at Buckley Library indicate that vapor intrusion from underground petroleum contamination, if occurring, has most likely not caused the indoor concentrations of chemicals of interest to exceed the CLARC Data Table values which are maximum allowable concentrations for contaminated soil vapor intrusion.

Although vapor intrusion has most likely not caused the concentrations of chemicals of interest to be elevated above the CLARC Data Table values, the concentrations of benzene, naphthalene, acetaldehyde, and chloroform were greater in the library than their respective indoor air CLARC Data Table values.

The concentrations of benzene and acetaldehyde were greater in the ambient outdoor air comparator sample than in the indoor samples indicating that they were most likely present in the library because they were present in outdoor air.

The concentration of naphthalene in the three air samples collected were all above the applicable CLARC value and at approximately similar concentrations. The laboratory report indicates that naphthalene was also identified in the laboratory method blank. The identified naphthalene was likely predominantly from laboratory cross-contamination.

The concentration of chloroform in the three air samples were all above the applicable CLARC value. When the outdoor chloroform concentration is subtracted from the indoor chloroform concentrations the

remainder is slightly above the applicable CLARC value. Chloroform was not identified in the contaminated soils. It is possible that the chloroform is from public water disinfectants.

Only chloroform and acetaldehyde concentrations in the soil gas samples exceeded the CLARC Data Table values for soil gas. Chloroform was not identified in soil samples collected from the area of contamination. It is possible that chloroform is present because of irrigation activities around the facility.

A comparison of results from testing to reference exposure levels established by the OEHHA show that the exposures at the Buckley Library are well below the chloroform RELs for acute and chronic exposures.

The next round of ambient air and soil gas sampling is anticipated to take place in July 2018.

STANDARD OF CARE

This air and soil gas testing work was conducted by EHSI in accordance with EHSI Proposal 17-267. EHSI followed currently accepted industrial hygiene practices, including professional opinions based on observations and analytical results from a limited number of air samples. The assessment and recommendations contained in this report are in accordance with currently accepted industrial hygiene practices. Other than this, **no warranty is implied or intended.**

REFERENCES

EHSI, 2017a, *Phase II Environmental Site Assessment Report – Buckley Library*

EHSI, 2017b, *Ambient Air Testing Results – Buckley Public Library*

EHSI, 2018, *Additional Site Characterization Report – Buckley Library*

Washington State Department of Ecology (DOE), 2009, *Guidance for Evaluating Soil Vapor Intrusion in Washington State*, portions of the document including CLARC Data Tables revised in 2015.

APPENDIX A

SAMPLING LOCATIONS

Buckley Library
Ambient Air & Soil Gas Testing
Sampling Locations
April 30, 2018
EHSI Project 10949-04

APPENDIX B

LABORATORY ANALYTICAL RESULTS

FRIEDMAN & BRUYA, INC. (FBI)

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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fbi@isomedia.com
www.friedmanandbruya.com

June 8, 2018

Clinton Holzhauer, Project Manager
EHSI
1011 SW Klickitat Way, Suite 104
Seattle, WA 98134

Dear Mr Holzhauer:

Included is the amended report from the testing of material submitted on April 30, 2018 from the Buckley Library 10949, F&BI 804531 project. Acetaldehyde was added to the results.

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
c: Stephanie Bolton
EHS0517R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
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May 17, 2018

Clinton Holzhauer, Project Manager
EHSI
1011 SW Klickitat Way, Suite 104
Seattle, WA 98134

Dear Mr Holzhauer:

Included are the results from the testing of material submitted on April 30, 2018 from the Buckley Library 10949, F&BI 804531 project. There are 20 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
c: Stephanie Bolton
EHS0517R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 30, 2018 by Friedman & Bruya, Inc. from the EHSI Buckley Library 10949, F&BI 804531 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	EHSI
804531 -01	043018-0101
804531 -02	043018-0102
804531 -03	043018-0103
804531 -04	043018-0104V(VP1)
804531 -05	043018-0105V(VP2)
804531 -06	043018-0106V(VP3)
804531 -07	043018-0107V(VP4)

Naphthalene was detected in the TO-15 method blank. The data were qualified accordingly.

Non-petroleum compounds were subtracted from the APH EC5-8 range in samples 043018-0101, 043018-0102, and 043018-0103.

All other quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	043018-0101	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-01
Date Analyzed:	05/14/18	Data File:	051408.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	81	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	83
APH EC9-12 aliphatics	<35
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	043018-0102	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-02
Date Analyzed:	05/14/18	Data File:	051409.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	77	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	93
APH EC9-12 aliphatics	<35
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	043018-0103	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-03
Date Analyzed:	05/14/18	Data File:	051410.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	80	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	90
APH EC9-12 aliphatics	<35
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	043018-0104V(VP1)	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-04 1/10
Date Analyzed:	05/14/18	Data File:	051411.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	82	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	810
APH EC9-12 aliphatics	<350
APH EC9-10 aromatics	<250

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	043018-0105V(VP2)	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-05 1/10
Date Analyzed:	05/14/18	Data File:	051412.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	77	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	800
APH EC9-12 aliphatics	440
APH EC9-10 aromatics	<250

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	043018-0106V(VP3)	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-06 1/10
Date Analyzed:	05/14/18	Data File:	051413.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	80	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	580
APH EC9-12 aliphatics	<350
APH EC9-10 aromatics	<250

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	043018-0107V(VP4)	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-07 1/10
Date Analyzed:	05/14/18	Data File:	051414.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	81	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	620
APH EC9-12 aliphatics	<350
APH EC9-10 aromatics	<250

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	EHSI
Date Received:	Not Applicable	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	Not Applicable	Lab ID:	08-1000 mb
Date Analyzed:	05/14/18	Data File:	051406.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	80	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<46
APH EC9-12 aliphatics	<35
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	043018-0101	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-01
Date Analyzed:	05/14/18	Data File:	051408.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

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

Compounds:	Concentration ug/m3	ppbv
Acetaldehyde	6.1	3.4
Chloroform	0.24	0.049
Benzene	<0.32	<0.1
Toluene	1.2	0.31
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1
Naphthalene	0.21 fb	0.041 fb

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	043018-0102	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-02
Date Analyzed:	05/14/18	Data File:	051409.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

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

Compounds:	Concentration ug/m3	ppbv
Acetaldehyde	21	11
Chloroform	0.26	0.053
Benzene	0.33	0.10
Toluene	1.3	0.35
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1
Naphthalene	0.18 fb	0.034 fb

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	043018-0103	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-03
Date Analyzed:	05/14/18	Data File:	051410.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration ug/m3	ppbv
Acetaldehyde	33	18
Chloroform	0.11	0.023
Benzene	0.37	0.11
Toluene	0.55	0.15
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1
Naphthalene	0.15 fb	0.029 fb

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	043018-0104V(VP1)	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-04 1/10
Date Analyzed:	05/14/18	Data File:	051411.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

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

Compounds:	Concentration ug/m3	ppbv
Acetaldehyde	58	32
Chloroform	3.9	0.79
Benzene	<3.2	<1
Toluene	<3.8	<1
Ethylbenzene	<4.3	<1
m,p-Xylene	<8.7	<2
o-Xylene	<4.3	<1
Naphthalene	<1	<0.2

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	043018-0105V(VP2)	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-05 1/10
Date Analyzed:	05/14/18	Data File:	051412.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

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

Compounds:	Concentration ug/m3	ppbv
Acetaldehyde	130	70
Chloroform	7.5	1.5
Benzene	<3.2	<1
Toluene	<3.8	<1
Ethylbenzene	<4.3	<1
m,p-Xylene	<8.7	<2
o-Xylene	<4.3	<1
Naphthalene	1.1 fb	0.21 fb

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	043018-0106V(VP3)	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-06 1/10
Date Analyzed:	05/14/18	Data File:	051413.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration ug/m3	ppbv
Acetaldehyde	<18	<10
Chloroform	2.1	0.44
Benzene	<3.2	<1
Toluene	<3.8	<1
Ethylbenzene	<4.3	<1
m,p-Xylene	<8.7	<2
o-Xylene	<4.3	<1
Naphthalene	1.1 fb	0.21 fb

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	043018-0107V(VP4)	Client:	EHSI
Date Received:	04/30/18	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	04/30/18	Lab ID:	804531-07 1/10
Date Analyzed:	05/14/18	Data File:	051414.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

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

Compounds:	Concentration ug/m3	ppbv
Acetaldehyde	60	33
Chloroform	4.2	0.87
Benzene	<3.2	<1
Toluene	5.0	1.3
Ethylbenzene	<4.3	<1
m,p-Xylene	<8.7	<2
o-Xylene	<4.3	<1
Naphthalene	1.1 fb	0.21 fb

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	EHSI
Date Received:	Not Applicable	Project:	Buckley Library 10949, F&BI 804531
Date Collected:	Not Applicable	Lab ID:	08-1000 mb
Date Analyzed:	05/14/18	Data File:	051406.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration ug/m3	ppbv
Acetaldehyde	<1.8	<1
Chloroform	<0.049	<0.01
Benzene	<0.32	<0.1
Toluene	<0.38	<0.1
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1
Naphthalene	0.13 lc	0.025 lc

Date of Report: 05/17/18
Date Received: 04/30/18
Project: Buckley Library 10949, F&BI 804531

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD APH

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	230	97	70-130
APH EC9-12 aliphatics	ug/m3	350	107	70-130
APH EC9-10 aromatics	ug/m3	251	112	70-130

Date of Report: 05/17/18
Date Received: 04/30/18
Project: Buckley Library 10949, F&BI 804531

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Acetaldehyde	ppbv	10	124	70-130
Chloroform	ppbv	10	99	70-130
Benzene	ppbv	10	102	70-130
Toluene	ppbv	10	101	70-130
Ethylbenzene	ppbv	10	103	70-130
m,p-Xylene	ppbv	20	105	70-130
o-Xylene	ppbv	10	107	70-130
Naphthalene	ppbv	10	96	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 compound 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. Compounds in the sample matrix interfered with the quantitation of the analyte.

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.

804531

SAMPLE CHAIN OF CUSTODY

ME 04-30-18

Report To Clinton Holzhauer
Company EHS - International, Inc.
Address 1011 SW Klickitat Way Ste 207
City, State, ZIP Sea WA 98134
Phone 206-381-1128 Email clintonh@ehsintl.com

SAMPLERS (signature) Clinton Holzhauer
PROJECT NAME Buckley Library
PO # 10949
REPORTING LEVEL: [X] Indoor Air [X] Sub Slab/Soil Gas [ ] Deep Soil Gas [ ] SVE/Grab
INVOICE TO Stephanie Bolton

Page # _____ of _____

TURNAROUND TIME
[X] Standard
[ ] RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
[X] Dispose after 30 days
[ ] Archive Samples
[ ] Other

ANALYSIS REQUESTED

Sample Name	Lab ID	Canister ID	Flow Contr. ID	Date Sampled	Field Initial Press. (Hg)	Field Initial Time	Field Final Press. (Hg)	Field Final Time	TO-15 Full Scan	TO-15 BTEXN +	TO-15 cVOCs		Notes
043018-0101	01	18580	05351	4/30/18	-28.5	6:13	-4.5	10:12		X			(APH-EC 5-8 (aliphatic); APH-EC 9-12 (aliphatic); APH-EC 9-10 aromatic) + chloroform
043018-0102	02	20554	05347		-29.5	6:14		10:14		X			"
043018-0103	03	18564	05349		-29.0	6:16		10:16		X			"
043018-0104V (VP1)	04	3256	ID#150		-30.0	7:12		7:19		X			"
043018-0105V (VP2)	05	3676	ID#88		-28.0	7:54		8:01		X			"
043018-0106V (VP3)	06	3386	ID#03		-27.5	8:29		8:35		X			"
043018-0107V (VP4) 4/30/18	07	2297	ID#204		-28.5	9:05		9:11		X			Samples received at 20 C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Clinton Holzhauer	Clinton Holzhauer	EHSI	4/30/18	12:25p
Received by:	Elizabeth Webbon-Bruya	FTBI	4/30/18	12:25p
Relinquished by:				
Received by:				

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

APPENDIX C

EHSI FIELD DATA SHEETS

EHS-International, Inc.
1011 SW Klickitat Way, Ste. 104
Seattle, WA 98134
Tel: 206-381-1128
Fax: 206-254-4279

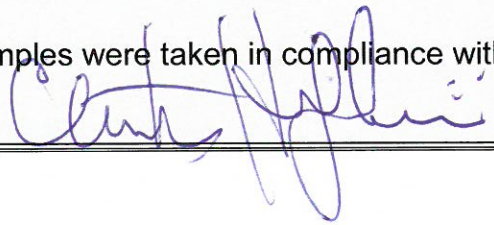
Date April 30, 2018
EHSI Project No. 10949-03
Project Name Buckley Library
Technician C. Holzhauer
Analyte

SUMMA CANISTER AIR MONITORING SAMPLING SHEET

Sample #	Location	Summa ID#	Regulator ID #	Pressures "Hg Initial	Pressures "Hg Final	On / Off	Elapsed Time (min.)	Activities/Comments
043018-0101	children's area	18580	05351	-28.5	-4.5	6:13 / 10:12		
043018-0102	reading area	20554	05347	-29.5	-4.5	6:14 / 10:14		
043018 0103	OA	18564	05349	-29.0	-4.5	6:16 / 10:16		

Technician Certification:

I certify that the above samples were taken in compliance with applicable standards, regulations and project specifications.

Technician Signature  Date: 4/30/18 Page 1 of 1

SUB-SLAB SOIL GAS SAMPLING FORM

EHS–International, Inc.

Date April 30, 2018

EHSI Project No: 10949-03

Project Name: Buckley Library

Project Address: 123 S River Ave Buckley WA

Technician: C. Holzhauser

Chemicals of Concern: MA-APH EC5-8; MA-APH-EC9-12; MA APH EC9-10; BTEX, chloroform, naphthalene

Sample Information

EHSI Sample #: 043018-0104V	Sample Location: by book drop - VP1

Shut-In Test

To Test Air-Tightness of Manifold

Pressure: -20 "Hg

Duration (> 1 min): >1 min

Leak Test

To Determine Whether Ambient Air is Introduced into Soil Gas Sample

% Helium in Shroud: 19.5%

ppm Helium in line: 0 ppm

Purge Volume = 200 ml

Diameter of Probe (in): 3/16 Length of Probe (in): 24	Area = $\pi \cdot r^2 = \pi \cdot d^2/4$ 1 in^3 = 16.4 ml	Area of Probe: 0.028 in^2 Volume of Probe: 0.672 in^3 (diameter x length) 11 ml

SUB-SLAB SOIL GAS SAMPLING FORM

EHS-International, Inc.

TO-15 One (1) Liter Canister

Sample Information

Canister S/N: 3256	Start Time: 7:12
Regulator S/N: ID#150	Starting Pressure: -30.0
	Stop Pressure: -4.0
	Stop Time: 7:19

TO-17 Thermal Desorption Tube or Purge Canister

Using Low Flow Pump	or	Using Purge Canister
Low Flow Pump #:		Purge Canister S/N:
Flow Rate 1:		Purge Regulator S/N:
Start Time:		Start Pressure:
Stop Time:		Start Time:
Flow Rate 2:		Stop Time:
Rotameter ID:		Stop Pressure:

Technician Certification:

I certify that the above samples were collected in compliance with applicable standards, regulations and project specifications.

Technician Signature: [signature]

Date: 4/30/18

SUB-SLAB SOIL GAS SAMPLING FORM

EHS–International, Inc.

Date April 30, 2018

EHSI Project No: 10949-03

Project Name: Buckley Library

Project Address: 1233 River Ave. Buckley WA

Technician: C. Holzhauer

Chemicals of Concern: MA-APH EC5-8; MA APH EC 9-12; MA-APH EC9-10; BTEX, chloroform, naphthalene

Sample Information

EHSI Sample #: 043018-0105V	Sample Location: by front door VP20

Shut-In Test

To Test Air-Tightness of Manifold

Pressure: -20.0 "Hg

Duration (> 1 min): >1 min

Leak Test

To Determine Whether Ambient Air is Introduced into Soil Gas Sample

% Helium in Shroud: 20.2%

ppm Helium in line: 0 ppm

Purge Volume = 200 ml

Diameter of Probe (in): 3/16 Length of Probe (in): 24	Area = $\pi \cdot r^2 = \pi \cdot d^2/4$ 1 in^3 = 16.4 ml	Area of Probe: 0.028 in^2 Volume of Probe: 0.672 in^3 (diameter x length) 11 ml

SUB-SLAB SOIL GAS SAMPLING FORM

EHS–International, Inc.

TO-15 One (1) Liter Canister

Sample Information

Canister S/N: 3676	Start Time: 7:54
Regulator S/N: ID #88	Starting Pressure: -28.0 "Hg
	Stop Pressure: -4.5 "Hg
	Stop Time: 8:01

TO-17 Thermal Desorption Tube or Purge Canister

Using Low Flow Pump	or	Using Purge Canister
Low Flow Pump #:		Purge Canister S/N:
Flow Rate 1:		Purge Regulator S/N:
Start Time:		Start Pressure:
Stop Time:		Start Time:
Flow Rate 2:		Stop Time:
Rotameter ID:		Stop Pressure:

Technician Certification:

I certify that the above samples were collected in compliance with applicable standards, regulations and project specifications.

Technician Signature: [signature]

Date: 4/30/18

SUB-SLAB SOIL GAS SAMPLING FORM

EHS–International, Inc.

Date April 30, 2018

EHSI Project No: 10949-03

Project Name: Buckley Library

Project Address: 123 S River Ave Buckley WA

Technician: C. Holzhauer

Chemicals of Concern: MA APH EC 5-8; MA-APH EC 9-12; MA-APH EC 9-10; BTEX, chloroform, naphthalene

Sample Information

EHSI Sample #: 043018-0106V	Sample Location: north side (towards Main St.) near bldg - behind bushes - VP3

Shut-In Test

To Test Air-Tightness of Manifold

Pressure: -20.0 "Hg

Duration (> 1 min): >1 min

Leak Test

To Determine Whether Ambient Air is Introduced into Soil Gas Sample

% Helium in Shroud: 21.7%

ppm Helium in line: 800 ppm

Purge Volume 300 mL

Diameter of Probe (in): 3/16

Length of Probe (in): 24" + 12" = 36"

Area = $\pi \cdot r^2 = \pi \cdot d^2/4$

1 in^3 = 16.4 ml

Area of Probe: 0.028 in^2

Volume of Probe: 1 in^3 (diameter x length) ≈ 20 mL

SUB-SLAB SOIL GAS SAMPLING FORM

EHS–International, Inc.

TO-15 One (1) Liter Canister

Sample Information

Canister S/N: 3386	Start Time: 8:29
Regulator S/N: ID #03	Starting Pressure: -27.5 "Hg
	Stop Pressure: -4.5 "Hg
	Stop Time: 8:35

TO-17 Thermal Desorption Tube or Purge Canister

Using Low Flow Pump	or	Using Purge Canister
Low Flow Pump #:		Purge Canister S/N:
Flow Rate 1:		Purge Regulator S/N:
Start Time:		Start Pressure:
Stop Time:		Start Time:
Flow Rate 2:		Stop Time:
Rotameter ID:		Stop Pressure:

Technician Certification:

I certify that the above samples were collected in compliance with applicable standards, regulations and project specifications.

Technician Signature: [signature]

Date: 4/30/18

SUB-SLAB SOIL GAS SAMPLING FORM

EHS–International, Inc.

Date April 30, 2018

EHSI Project No: 10949-03

Project Name: Buckley Library

Project Address: 123 S River Ave. Buckley WA

Technician: C. Holzhauer

Chemicals of Concern: MA APH EC 5-8; MA APH EC 9-12; MA APH EC 9-10; BTEX, chloroform, naphthalene

Sample Information

EHSI Sample #: 043018-0107V	Sample Location: back door near reading area VP4

Shut-In Test

To Test Air-Tightness of Manifold

Pressure: -20.0 "Hg

Duration (> 1 min): >1 min

Leak Test

To Determine Whether Ambient Air is Introduced into Soil Gas Sample

% Helium in Shroud: 21.4%

ppm Helium in line: 0 ppm

Purge Volume 500 ml

Diameter of Probe (in): 3/16 Length of Probe (in): 72"+12" = 84"	Area = $\pi \cdot r^2 = \pi \cdot d^2/4$ 1 in^3 = 16.4 ml	Area of Probe: 0.028 in^2 Volume of Probe: 2.4 in^3 (diameter x length) ~ 40ml

SUB-SLAB SOIL GAS SAMPLING FORM

EHS-International, Inc.

TO-15 One (1) Liter Canister

Sample Information

Canister S/N: 2297	Start Time: 9:05
Regulator S/N: ID #204	Starting Pressure: -28.5 "Hg
	Stop Pressure: -4.5 "Hg
	Stop Time: 9:11

TO-17 Thermal Desorption Tube or Purge Canister

Using Low Flow Pump	or	Using Purge Canister
Low Flow Pump #:		Purge Canister S/N:
Flow Rate 1:		Purge Regulator S/N:
Start Time:		Start Pressure:
Stop Time:		Start Time:
Flow Rate 2:		Stop Time:
Rotameter ID:		Stop Pressure:

Technician Certification:

I certify that the above samples were collected in compliance with applicable standards, regulations and project specifications.

Technician Signature: [signature]

Date: 4/30/18