TECHNICAL MEMORANDUM

To:	Mary Monahan, Site Manager	Date:	August 16, 2019
From:	Yen-Vy Van, LHG	MFA Project No.:	0818.02.01-16
RE:	Indoor Air Quality Assessment: Former Tiger Oil Site, West Nob Hill, Yakima		

On behalf of the City of Yakima (the City), Maul Foster & Alongi, Inc. (MFA) has conducted an indoor air quality assessment to evaluate the potential for vapor intrusion from residual light non-aqueous phase liquid (LNAPL) and the dissolved-phase contaminants in groundwater at the former Tiger Oil facility, located at 2312 West Nob Hill Boulevard, Yakima, Washington (Washington State Department of Ecology [Ecology] Facility Site No. 469, Cleanup Site No. 4919 – the Site). The assessment was performed in accordance with Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Ecology, 2016).

INDOOR AIR SAMPLING

On July 8, 2019, MFA conducted a walk-through of businesses adjoining the former Tiger Oil facility including the Xochimilco Mexican Restaurant, Barber HQ, and 1 Up Games (refer to the attached Figure) to inventory the potential presence of materials that could be sources of petroleum volatile organic compounds. No materials of products with this potential were observed. The Xochimilco Mexican Restaurant is undergoing remodeling and the building has been closed since October 2018 to the present time. The heating, ventilation, and air conditioning (HVAC) system inside of the restaurant was not operating during MFA's inspection. The HVAC system was operational at the Barber HQ and 1 Up Games shops.

On July 9 and 10, 2019, MFA conducted indoor air sampling at each of the businesses. The locations of the indoor air samples were designed to evaluate indoor air quality within these adjoining businesses per the following criteria:

- Within the breathing zone of the dining occupants in the central dining area of the Xochimilco Mexican Restaurant—Indoor Air Sample RestaurantIA-1.
- Within the breathing zone/working zone in the kitchen area—Indoor Air Sample RestaurantIA-2.

- Within the breathing zone of the barber shop—Indoor Air Sample BarberIA.
- Within the breathing zone of the video games shop—Indoor Air Sample VideoIA.

Tasks were completed in accordance with the following process:

- Set up four 6-liter SUMMA canisters that were individually certified by H&P Mobile Geochemistry, Inc. Each canister was outfitted with an 8-hour air flow controller. A summa canister is a stainless steel electropolished (or "summa" polished) passivated vessel used to collect a whole air sample.
- Place the four SUMMA canisters at the locations described above (refer to Attachment A). Document the initial vacuum volume in each SUMMA canister. Open the valves on each canister to begin indoor air sampling.
- Monitor the SUMMA canisters throughout the 8- to 8.5-hour testing period to ensure that the canisters are steadily collecting air. Document the changes in the vacuum pressure of each canister. The field table for Air Sampling into SUMMA is provided as Attachment B.
- Allow each canister to collect indoor air until the gauge of each canister registers -5 inches of mercury (Hg) (the required air pressure which indicates that the canister is full). The total time for indoor air sampling (to obtain the necessary required air pressure) ranged from 7 hours 37 minutes to 8 hours 39 minutes.
- Ship canisters to H&P Mobile Geochemistry laboratory in Carlsbad, California following standard chain of custody industry standard protocols. Submit canisters for laboratory analysis of total petroleum hydrocarbons (TPH) as gasoline range organics (GRO) and TPH-associated volatile organic compounds via U.S. Environmental Protection Agency (USEPA) Method TO-15.

Photographic documentation of the indoor air sampling locations is provided in Attachment A.

INDOOR AIR SAMPLING RESULTS

Laboratory analytical results were screened against Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Ecology, 2016) for both carcinogenic and non-carcinogenic chemicals of concern. Laboratory analytical results for the four indoor air samples indicated the following results:

- TPH GRO concentrations were detected at the Xochimilco Mexican Restaurant and Barber HQ (at 150 to 190 micrograms per cubic meter [ug/m^3]). These concentrations are above Ecology Vapor Intrusion Indoor Air Method B cancer CULs of 140 ug/m^3 (refer to the attached Table).

- Elevated levels of benzene (0.45 to 0.49 ug/m^3) were detected above the Ecology Vapor Intrusion Indoor Air Method B cancer CUL (0.32 ug/m^3) at the Xochimilco Mexican Restaurant indoor air sampling locations (refer to the attached Table).

- Indoor air analytical results indicated no detectable concentrations above the Ecology Vapor Intrusion Indoor Air Method B cancer CULs for those analytes at the Barber HQ indoor air sampling location (refer to the attached Table)

Analytical results produced during the indoor air quality assessment were reviewed for usability and are qualified consistent with USEPA procedures as well as appropriate laboratory and method-specific guidelines. This review was performed consistent with accepted USEPA procedures for evaluating laboratory analytical data (USEPA, 1986, 2016). Laboratory analytical reports and a data validation memorandum summarizing data evaluation procedures, data usability, and deviations from specific field and/or laboratory methods for the indoor air data are provided as Attachments C and D, respectively. The data are considered acceptable for their intended use, with the appropriate data qualifiers assigned.

CONCLUSIONS:

Findings from the indoor air quality assessment are as follows:

- Indoor air quality results indicate that the potential exists for vapor intrusion.
- The benzene and TPH GRO exceedances are very close to the screening levels. The screening levels do not distinguish a safe from an unsafe level.
- The TPH GRO and benzene detections do not indicate an acute risk.
- The detections indicate that additional indoor air quality assessment is necessary.

RECOMMENDATIONS:

Per Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State, vapor intrusion mitigation measures are recommended when indoor receptors may be "threatened, or potentially threatened, by indoor air contaminated by soil gas" (Ecology, 2016). The mitigation measures may be passive to provide a short-term remedial solution to protect indoor receptors.

Potential mitigation technologies that would be effective and applicable to the existing structures at the adjoining businesses may include:

- Incorporation of industrial fans within the work areas at the Xochimilco Mexican Restaurant and Barber HQ
- Keep the front and/or back doors open
- Adjust the HVAC system to provide a slight positive pressure in the building

- Repair/seal obvious cracks and openings in floors/walls that are in direct contact with the soil below the building

Further indoor air quality assessment at the Property would be necessary after incorporating the selected passive mitigation measure to assess its efficacy and whether elevated levels of TPH gasoline and/or benzene from vapor intrusion have been abated.

REFRENCES

Ecology. 2018. Petroleum Vapor Intrusion (PVI): Updated Screening Levels, Cleanup Levels, and Assessing PVI Threats to Future Buildings – Implementation Memorandum No. 18. Washington State Department of Ecology Toxics Cleanup Program. Publication no. 17-09-043. January 2018.

Ecology. 2016. Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action – Washington State Department of Ecology Toxics Cleanup Program. Publication no. 09-09-047. Review Draft Revised February 2016.

USEPA. 1986. Test methods for evaluating solid waste: physical/chemical methods. EPA-530/SW-846. Update V. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. September (revision 1, July 2014).

USEPA. 2016. USEPA contract laboratory program, national functional guidelines for Superfund organic methods data review. EPA 540-R-2016-002. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. August.

ATTACHMENTS

Table – Summary of Indoor Air Analytical Results
Figure – Site Features
Attachment A – Site Photographs
Attachment B - Field Table for Air Sample Collection via SUMMA Canister
Attachment C - Laboratory Analytical Report
Attachment D – Data Validation Memorandum

TABLE



Table
Summary of Indoor Air Analytical Results
Xochimilco Mexican Restaurant, Barber HQ, 1 Up Games
Former Tiger Oil, Yakima, WA

Location	Ecology Indoor Air CUL, Method B [a]	Barber	Restaurant-1	Restaurant-2	Video
Sample Name		Barber IA	Restaurant IA-1	Restaurant IA-2	Video IA
Collection Date		7/10/2019	7/10/2019	7/10/2019	7/9/2019
VOCs (ug/m^3)					
Benzene	0.32	0.32	0.49	0.45	0.32
Diisopropyl ether	NV	0.85 U	0.85 U	0.85 U	0.85 U
Ethylbenzene	460	0.44 U	0.88	1.4	0.44 U
m,p-Xylene	NV	1.5	3.8	6.2	0.92
Methyl tert-butyl ether	9.6	0.91 U	0.91 U	0.91 U	0.91 U
o-Xylene	NV	0.66	1.7	2.7	0.44
tert-Amyl methyl ether	NV	0.85 U	0.85 U	0.85 U	0.85 U
tert-Butyl alcohol	NV	3.6	1.5 U	1.5 U	1.5 U
tert-Butyl ethyl ether	NV	0.85 U	0.85 U	0.85 U	0.85 U
Toluene	2300	1.6	2.6	2.3	1.5
Xylenes, total [b]	46	2.16	5.5	8.9	1.36
TPH (ug/m^3)					
Gasoline Range Hydrocarbons	140[c]	180	150	190	110

Notes:

Shaded results indicate exceedance of Method B CUL.

CUL = cleanup level

NV = no value.

TPH = total petroleum hydrocarbon.

U = Result is non-detect to method reporting limit.

ug/m3 = micrograms per cubic meter.

[a] CUL applied is the lower of available cancer or noncancer Method B CULs.

[b] Total xylenes is the sum of m,p- and o-xylene.

[c] Generic TPH CUL.

FIGURE



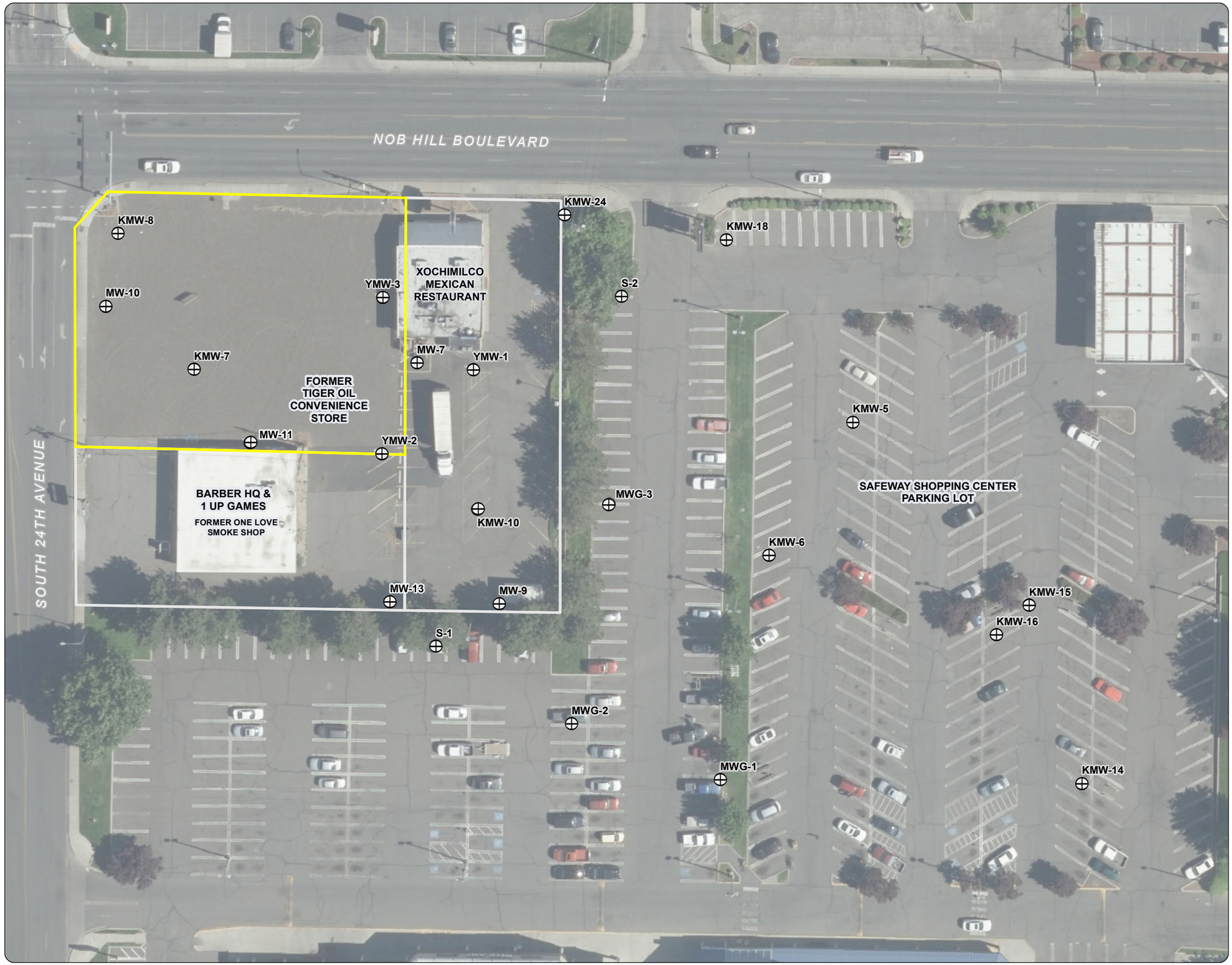


Figure
Site Features

Former Tiger Oil Site
2312 West Nob Hill Boulevard
Yakima, Washington

Legend

- Monitoring Well
- Former Tiger Oil Property Boundary
- Adjacent Taxlot Boundaries

0 25 50
Feet

Source: Aerial photograph obtained from Esri ArcGIS Online; Infiltration Gallery delineated by Maul Foster & Alongi, Inc.; stormwater line and taxlot boundaries obtained from City of Yakima; all other features obtained from PLSA.

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Path: X:\0818.02 City of Yakima\Projects\GW Monitoring Plan\Fig2_Site Features v2.mxd
Print Date: 3/26/2019
Approved By: mstringer
Produced By: mjosef
Project: 0818.02.01-01

ATTACHMENT A

SITE PHOTOGRAPHS

MAUL FOSTER ALONGI

SITE PHOTOGRAPHS
Former Tiger Oil
2312 West Nob Hill Boulevard
Yakima, Washington 98902
Project No. 0818.02.01

INDOOR AIR SAMPLING—JULY 9–10, 2019



Photo 1. View of a 6-liter SUMMA canister placed within the 1 UP Games customer service area at the Property for assessment of indoor air quality (air sample VideoIA).

MAUL FOSTER ALONGI

SITE PHOTOGRAPHS
Former Tiger Oil
2312 West Nob Hill Boulevard
Yakima, Washington 98902
Project No. 0818.02.01



Photo 2. View of a 6-liter SUMMA canister placed within the dining area at the Xochimilco Mexican Restaurant (which is undergoing remodeling) for assessment of indoor air quality (air sample RestaurantIA-1).



Photo 3. View of a 6-liter SUMMA canister within the kitchen area at the Xochimilco Mexican Restaurant (which is undergoing remodeling) for assessment of indoor air quality (air sample RestaurantIA-2).

ATTACHMENT B

FIELD TABLE FOR AIR SAMPLE COLLECTION VIA SUMMA CANISTER

H&P

Air Sampling into Summa (Indoor, Outdoor, Ambient)

Site Address: 2312 WEST NOB HILL BLVD, YAKIMA, WA Date: 7/9/2019 & 7/10/2019

Project Name: FORMER TIGER OIL - INDOOR AIR QUALITY ASSESSMENT Arrival Time:

Sample Collector: Y. VAN Departure Time:

	Sample Information					Sample Start		Sample Check		Sample Check		Sample End		Field Notes
	Sample ID	Date	Summa ID #	Flow Controller ID #	Flow Rate (hrs or cc/min)	Start Time	Initial Vacuum (" Hg)	Check Time	Check Vacuum (" Hg)	Check Time	Check Vacuum (" Hg)	End Time	End Vacuum (" Hg)	
1	RESTAURANT IA-1	7/10/19	479	F132	11.6	0736	-29.29	1104	-17.50	1450	-6.50	1615	-4.50	XOCHILMILCO M, RESTAURANT BUILDING ARE
2	RESTAURANT IA-2	7/10/19	503	F186	11.5	0737	-29.30	1105	-18.50	1451	-6.00	1616	-3.50	XOCHILMILCO M, RESTAURANT KITCHEN *
3	BARBER IA	7/10/19	504	F218	11.6	0806	-29.32	1102	-21.50	1428	-8.00	1627	-4.50	BARBER HQ
4	VIDEO IA	7/9/18	505	F224	11.6	0952	-29.30	1245	-21.50	1600	-9.50	1739	-5.00	LUP GAMES
5														
6														Note: no brass caps on flow
7														controllers.
8														* Restaurant has been close
9														since October 2018
10														

Weather Conditions

Weather Summary: Sunny 85° F

Barometric Pressure:

Ambient Temp Avg:

Ambient Temp High/Low:

Indoor Air Temp Avg:

Wind Speed/Direction:

Other:

Potential Outdoor Sources of Pollution

Source	Location
Vehicles emission	parking lot/adjacent streets

Household Products

Type	Ingredient(s)

ATTACHMENT C

LABORATORY ANALYTICAL REPORT

Mobile Geochemistry Inc.

26 July 2019

Yen-Vy Van
Maul Foster & Alongi, Inc.
2815 2nd Avenue, Suite 540
Seattle, WA 98121

H&P Project: MFA071519-13
Client Project: Former Tiger Oil / 0318.02.01-16

Dear Yen-Vy Van:

Enclosed is the analytical report for the above referenced project. The data herein applies to samples as received by H&P Mobile Geochemistry, Inc. on 15-Jul-19 which were analyzed in accordance with the attached Chain of Custody record(s).

The results for all sample analyses and required QA/QC analyses are presented in the following sections and summarized in the documents:

- Sample Summary
- Case Narrative (if applicable)
- Sample Results
- Quality Control Summary
- Notes and Definitions / Appendix
- Chain of Custody
- Sampling Logs (if applicable)

Unless otherwise noted, I certify that all analyses were performed and reviewed in compliance with our Quality Systems Manual and Standard Operating Procedures. This report shall not be reproduced, except in full, without the written approval of H&P Mobile Geochemistry, Inc.

We at H&P Mobile Geochemistry, Inc. sincerely appreciate the opportunity to provide analytical services to you on this project. If you have any questions or concerns regarding this analytical report, please contact me at your convenience at 760-804-9678.

Sincerely,

Janis La Roux
Laboratory Director

H&P Mobile Geochemistry, Inc. is certified under the California ELAP and the National Environmental Laboratory Accreditation Conference (NELAC). H&P is approved as an Environmental Testing Laboratory and Mobile Laboratory in accordance with the DoD-ELAP Program and ISO/IEC 17025:2005 programs, accreditation number 69070 for EPA Method TO-15, H&P Method TO-15, EPA Method 8260B and H&P 8260SV.

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Maul Foster & Alongi, Inc.	Project: MFA071519-13	
2815 2nd Avenue, Suite 540	Project Number: Former Tiger Oil / 0318.02.01-16	Reported:
Seattle, WA 98121	Project Manager: Yen-Vy Van	26-Jul-19 10:17

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Video IA	E907068-01	Vapor	09-Jul-19	15-Jul-19
Restaurant IA-1	E907068-02	Vapor	10-Jul-19	15-Jul-19
Restaurant IA-2	E907068-03	Vapor	10-Jul-19	15-Jul-19
Barber IA	E907068-04	Vapor	10-Jul-19	15-Jul-19

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2815 2nd Avenue, Suite 540	Project Number: Former Tiger Oil / 0318.02.01-16	Reported:
Seattle, WA 98121	Project Manager: Yen-Vy Van	26-Jul-19 10:17

DETECTIONS SUMMARY

Sample ID: **Video IA** Laboratory ID: **E907068-01**

Analyte	Result	Reporting Limit	Units	Method	Notes
Benzene	**0.32**	0.16	ug/m3	EPA TO-15	
Toluene	**1.5**	0.76	ug/m3	EPA TO-15	
m,p-Xylene	**0.92**	0.44	ug/m3	EPA TO-15	
o-Xylene	**0.44**	0.44	ug/m3	EPA TO-15	
TPHv (C5 - C12)	**110**	100	ug/m3	EPA TO-15	

Sample ID: **Restaurant IA-1** Laboratory ID: **E907068-02**

Analyte	Result	Reporting Limit	Units	Method	Notes
Benzene	**0.49**	0.16	ug/m3	EPA TO-15	
Toluene	**2.6**	0.76	ug/m3	EPA TO-15	
Ethylbenzene	**0.88**	0.44	ug/m3	EPA TO-15	
m,p-Xylene	**3.8**	0.44	ug/m3	EPA TO-15	
o-Xylene	**1.7**	0.44	ug/m3	EPA TO-15	
TPHv (C5 - C12)	**150**	100	ug/m3	EPA TO-15	

Sample ID: **Restaurant IA-2** Laboratory ID: **E907068-03**

Analyte	Result	Reporting Limit	Units	Method	Notes
Benzene	**0.45**	0.16	ug/m3	EPA TO-15	
Toluene	**2.3**	0.76	ug/m3	EPA TO-15	
Ethylbenzene	**1.4**	0.44	ug/m3	EPA TO-15	
m,p-Xylene	**6.2**	0.44	ug/m3	EPA TO-15	
o-Xylene	**2.7**	0.44	ug/m3	EPA TO-15	
TPHv (C5 - C12)	**190**	100	ug/m3	EPA TO-15	

Sample ID: **Barber IA** Laboratory ID: **E907068-04**

Analyte	Result	Reporting Limit	Units	Method	Notes
Tertiary-butyl alcohol (TBA)	**3.6**	1.5	ug/m3	EPA TO-15	
Benzene	**0.32**	0.16	ug/m3	EPA TO-15	
Toluene	**1.6**	0.76	ug/m3	EPA TO-15	
m,p-Xylene	**1.5**	0.44	ug/m3	EPA TO-15	
o-Xylene	**0.66**	0.44	ug/m3	EPA TO-15	
TPHv (C5 - C12)	**180**	100	ug/m3	EPA TO-15	

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Maul Foster & Alongi, Inc.	Project: MFA071519-13	
2815 2nd Avenue, Suite 540	Project Number: Former Tiger Oil / 0318.02.01-16	Reported:
Seattle, WA 98121	Project Manager: Yen-Vy Van	26-Jul-19 10:17

Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
Video IA (E907068-01) Vapor Sampled: 09-Jul-19 Received: 15-Jul-19									
Tertiary-butyl alcohol (TBA)	ND	1.5	ug/m3	1	EG91906	19-Jul-19	19-Jul-19	EPA TO-15	
Methyl tertiary-butyl ether (MTBE)	ND	0.91	"	"	"	"	"	"	
Diisopropyl ether (DIPE)	ND	0.85	"	"	"	"	"	"	
Ethyl tert-butyl ether (ETBE)	ND	0.85	"	"	"	"	"	"	
Benzene	**0.32**	0.16	"	"	"	"	"	"	
Tertiary-amyl methyl ether (TAME)	ND	0.85	"	"	"	"	"	"	
Toluene	**1.5**	0.76	"	"	"	"	"	"	
Ethylbenzene	ND	0.44	"	"	"	"	"	"	
m,p-Xylene	**0.92**	0.44	"	"	"	"	"	"	
o-Xylene	**0.44**	0.44	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*106 %*		*76-134*	"	"	"	"	
Surrogate: Toluene-d8		*99.7 %*		*78-125*	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*96.9 %*		*77-127*	"	"	"	"	
Restaurant IA-1 (E907068-02) Vapor Sampled: 10-Jul-19 Received: 15-Jul-19									
Tertiary-butyl alcohol (TBA)	ND	1.5	ug/m3	1	EG91906	19-Jul-19	19-Jul-19	EPA TO-15	
Methyl tertiary-butyl ether (MTBE)	ND	0.91	"	"	"	"	"	"	
Diisopropyl ether (DIPE)	ND	0.85	"	"	"	"	"	"	
Ethyl tert-butyl ether (ETBE)	ND	0.85	"	"	"	"	"	"	
Benzene	**0.49**	0.16	"	"	"	"	"	"	
Tertiary-amyl methyl ether (TAME)	ND	0.85	"	"	"	"	"	"	
Toluene	**2.6**	0.76	"	"	"	"	"	"	
Ethylbenzene	**0.88**	0.44	"	"	"	"	"	"	
m,p-Xylene	**3.8**	0.44	"	"	"	"	"	"	
o-Xylene	**1.7**	0.44	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*102 %*		*76-134*	"	"	"	"	
Surrogate: Toluene-d8		*97.5 %*		*78-125*	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*101 %*		*77-127*	"	"	"	"	

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Volatile Organic Compounds by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
Restaurant IA-2 (E907068-03) Vapor Sampled: 10-Jul-19 Received: 15-Jul-19									
Tertiary-butyl alcohol (TBA)	ND	1.5	ug/m3	1	EG91906	19-Jul-19	19-Jul-19	EPA TO-15	
Methyl tertiary-butyl ether (MTBE)	ND	0.91	"	"	"	"	"	"	
Diisopropyl ether (DIPE)	ND	0.85	"	"	"	"	"	"	
Ethyl tert-butyl ether (ETBE)	ND	0.85	"	"	"	"	"	"	
Benzene	**0.45**	0.16	"	"	"	"	"	"	
Tertiary-amyl methyl ether (TAME)	ND	0.85	"	"	"	"	"	"	
Toluene	**2.3**	0.76	"	"	"	"	"	"	
Ethylbenzene	**1.4**	0.44	"	"	"	"	"	"	
m,p-Xylene	**6.2**	0.44	"	"	"	"	"	"	
o-Xylene	**2.7**	0.44	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*98.2 %*		*76-134*	"	"	"	"	
Surrogate: Toluene-d8		*99.6 %*		*78-125*	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*102 %*		*77-127*	"	"	"	"	
Barber IA (E907068-04) Vapor Sampled: 10-Jul-19 Received: 15-Jul-19									
Tertiary-butyl alcohol (TBA)	**3.6**	1.5	ug/m3	1	EG91906	19-Jul-19	19-Jul-19	EPA TO-15	
Methyl tertiary-butyl ether (MTBE)	ND	0.91	"	"	"	"	"	"	
Diisopropyl ether (DIPE)	ND	0.85	"	"	"	"	"	"	
Ethyl tert-butyl ether (ETBE)	ND	0.85	"	"	"	"	"	"	
Benzene	**0.32**	0.16	"	"	"	"	"	"	
Tertiary-amyl methyl ether (TAME)	ND	0.85	"	"	"	"	"	"	
Toluene	**1.6**	0.76	"	"	"	"	"	"	
Ethylbenzene	ND	0.44	"	"	"	"	"	"	
m,p-Xylene	**1.5**	0.44	"	"	"	"	"	"	
o-Xylene	**0.66**	0.44	"	"	"	"	"	"	
Surrogate: 1,2-Dichloroethane-d4		*97.1 %*		*76-134*	"	"	"	"	
Surrogate: Toluene-d8		*97.4 %*		*78-125*	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*103 %*		*77-127*	"	"	"	"	

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Petroleum Hydrocarbon Analysis by EPA TO-15

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Dilution Factor	Batch	Prepared	Analyzed	Method	Notes
Video IA (E907068-01) Vapor Sampled: 09-Jul-19 Received: 15-Jul-19									
TPHv (C5 - C12)	**110**	100	ug/m3	1	EG91906	19-Jul-19	19-Jul-19	EPA TO-15	
Restaurant IA-1 (E907068-02) Vapor Sampled: 10-Jul-19 Received: 15-Jul-19									
TPHv (C5 - C12)	**150**	100	ug/m3	1	EG91906	19-Jul-19	19-Jul-19	EPA TO-15	
Restaurant IA-2 (E907068-03) Vapor Sampled: 10-Jul-19 Received: 15-Jul-19									
TPHv (C5 - C12)	**190**	100	ug/m3	1	EG91906	19-Jul-19	19-Jul-19	EPA TO-15	
Barber IA (E907068-04) Vapor Sampled: 10-Jul-19 Received: 15-Jul-19									
TPHv (C5 - C12)	**180**	100	ug/m3	1	EG91906	19-Jul-19	19-Jul-19	EPA TO-15	

H&P Mobile
Geochemistry Inc.

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Maul Foster & Alongi, Inc.	Project: MFA071519-13	
2815 2nd Avenue, Suite 540	Project Number: Former Tiger Oil / 0318.02.01-16	Reported:
Seattle, WA 98121	Project Manager: Yen-Vy Van	26-Jul-19 10:17

Volatile Organic Compounds by EPA TO-15 - Quality Control

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EG91906 - TO-15										
Blank (EG91906-BLK1)				Prepared & Analyzed: 19-Jul-19						
Tertiary-butyl alcohol (TBA)	ND	1.5	ug/m3							
Methyl tertiary-butyl ether (MTBE)	ND	0.91	"							
Diisopropyl ether (DIPE)	ND	0.85	"							
Ethyl tert-butyl ether (ETBE)	ND	0.85	"							
Benzene	ND	0.16	"							
Tertiary-amyl methyl ether (TAME)	ND	0.85	"							
Toluene	ND	0.76	"							
Ethylbenzene	ND	0.44	"							
m,p-Xylene	ND	0.44	"							
o-Xylene	ND	0.44	"							
Surrogate: 1,2-Dichloroethane-d4	*44.5*		*"*	*42.7*		*104*	*76-134*			
Surrogate: Toluene-d8	*40.5*		*"*	*41.6*		*97.4*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*72.9*		*"*	*72.6*		*100*	*77-127*			
LCS (EG91906-BS1)				Prepared & Analyzed: 19-Jul-19						
Benzene	13.9	0.16	ug/m3	13.0		108	69-119			
Toluene	15.6	0.76	"	15.4		101	66-119			
Ethylbenzene	21.3	0.44	"	17.7		120	70-124			
m,p-Xylene	21.2	0.44	"	17.7		120	61-134			
o-Xylene	21.2	0.44	"	17.7		120	67-125			
Surrogate: 1,2-Dichloroethane-d4	*46.0*		*"*	*42.7*		*108*	*76-134*			
Surrogate: Toluene-d8	*40.6*		*"*	*41.6*		*97.8*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*71.9*		*"*	*72.6*		*99.0*	*77-127*			
LCS Dup (EG91906-BSD1)				Prepared & Analyzed: 19-Jul-19						
Benzene	14.0	0.16	ug/m3	13.0		108	69-119	0.463	25	
Toluene	15.8	0.76	"	15.4		103	66-119	1.22	25	
Ethylbenzene	21.5	0.44	"	17.7		122	70-124	1.03	25	
m,p-Xylene	21.5	0.44	"	17.7		122	61-134	1.23	25	
o-Xylene	21.3	0.44	"	17.7		120	67-125	0.414	25	
Surrogate: 1,2-Dichloroethane-d4	*44.8*		*"*	*42.7*		*105*	*76-134*			

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Seattle, WA 98121	Project Manager: Yen-Vy Van	26-Jul-19 10:17

Volatile Organic Compounds by EPA TO-15 - Quality Control

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EG91906 - TO-15										
LCS Dup (EG91906-BSD1)				Prepared & Analyzed: 19-Jul-19						
Surrogate: Toluene-d8	*41.0*		*ug/m3*	*41.6*		*98.6*	*78-125*			
Surrogate: 4-Bromofluorobenzene	*72.6*		*"*	*72.6*		*100*	*77-127*			

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Seattle, WA 98121	Project Manager: Yen-Vy Van	26-Jul-19 10:17

Petroleum Hydrocarbon Analysis by EPA TO-15 - Quality Control

H&P Mobile Geochemistry, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch EG91906 - TO-15										
Blank (EG91906-BLK1)				Prepared & Analyzed: 19-Jul-19						
TPHv (C5 - C12)	ND	100	ug/m3							

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Maul Foster & Alongi, Inc.	Project: MFA071519-13	
2815 2nd Avenue, Suite 540	Project Number: Former Tiger Oil / 0318.02.01-16	Reported:
Seattle, WA 98121	Project Manager: Yen-Vy Van	26-Jul-19 10:17

Notes and Definitions

LCC	Leak Check Compound
ND	Analyte NOT DETECTED at or above the reporting limit
MDL	Method Detection Limit
%REC	Percent Recovery
RPD	Relative Percent Difference

All soil results are reported in wet weight.

Appendix

H&P Mobile Geochemistry, Inc. is approved as an Environmental Testing Laboratory and Mobile Laboratory in accordance with the DoD-ELAP Program and ISO/IEC 17025:2005 programs through PJLA, accreditation number 69070 for EPA Method TO-15, H&P Method TO-15, EPA Method 8260B and H&P 8260SV.

H&P is approved by the State of California as an Environmental Laboratory and Mobile Laboratory in conformance with the Environmental Laboratory Accreditation Program (ELAP) for the category of Volatile and Semi-Volatile Organic Chemistry of Hazardous Waste, certification numbers 2740, 2741, 2743 & 2745.

H&P is approved by the State of Louisiana Department of Environmental Quality under the National Environmental Laboratory Accreditation Conference (NELAC) certification number 04138

The complete list of stationary and mobile laboratory certifications along with the fields of testing (FOTs) and analyte lists are available at www.handpmg.com/about/certifications.

Mobile Geochemistry, Inc.

2470 Impala Drive, Carlsbad, CA 92010
& Field Office - Signal Hill, CA
W handpmg.com E info@handpmg.com

VAPOR / AIR Chain of Custody

DATE: 7/10/19
Page 1 of 1

Lab Client and Project Information

Lab Client/Consultant: MAUL FOSTER & ALONGI
Lab Client Project Manager: Y. VAN
Lab Client Address: 2815 2nd AVE #540
Lab Client City, State, Zip: SEATTLE, WA 98121
Phone Number: 253-320-5378

Project Name / #: FORMER TIGER OIL
Project Location: YAKIMA, WA (618.02.01-16)
Report E-Mail(s): yvan@maulfoster.com

Sample Receipt (Lab Use Only)

Date Rec'd: 7/15/19 Control #: 190549.01
H&P Project # MFA071519-13
Lab Work Order # E907068
Sample Intact: [X] Yes [ ] No [ ] See Notes Below
Receipt Gauge ID: 70020 Temp: RT
Outside Lab:
Receipt Notes/Tracking #: 1Z93TT619049090710
Lab PM Initials: MA

Reporting Requirements

[X] Standard Report [ ] Level III [ ] Level IV
[X] Excel EDD [ ] Other EDD:
[ ] CA Geotracker Global ID:

Turnaround Time

[X] **Standard** (7 days for preliminary report, 10 days for final report)
[ ] **Rush** (specify):

Sampler Information

Sampler(s): Y. VAN
Signature:
Date: 7/ /19

Additional Instructions to Laboratory: * SHORT LIST VOCs - SEE ATTACHED MA 7/15/19

Preferred VOC units (please choose one):
[ ] µg/L [X] µg/m³ [ ] ppbv [ ] ppmv

SAMPLE NAME	FIELD POINT NAME (if applicable)	DATE mm/dd/yy	TIME 24hr clock	SAMPLE TYPE Indoor Air (IA), Ambient Air (AA), Subslab (SS), Soil Vapor (SV)	CONTAINER SIZE & TYPE 400mL/1L/6L Summa, Tedlar, Tube, etc.	CONTAINER ID (###)	Lab use only: Receipt Vac	VOCs Standard Full List [ ] 8260SV [X] TO-15	VOCs Short List / Project List [ ] 8260SV [ ] TO-15	Oxygenates [ ] 8260SV [ ] TO-15	Naphthalene [ ] 8260SV [ ] TO-15	TPHv as Gas [ ] 8260SV/m [X] TO-15m *	Aromatic/Aliphatic Fractions [ ] 8260SV/m [ ] TO-15m	Leak Check Compound [ ] DFA [ ] IPA [ ] He	Methane by EPA 8015m	Fixed Gases by ASTM D1945 [ ] CO2 [ ] O2 [ ] N2	TPH ASS-IATED VOCs - TO-15 *			
VIDEO IA		07/09/18	1739	IA	CL SUMMA	505	-3.00	X				✓					✓			
RESTAURANT IA-1		07/10/18	1615	IA	6L SUMMA	479	-2.87	X				✓					✓			
RESTAURANT IA-2		07/10/18	1616	IA	6L SUMMA	503	-2.93	X				✓					✓			
BARBER IA		07/10/18	1627	IA	6L SUMMA	504	-2.61	X				✓					✓			

Approved/Relinquished by: (Y. VAN)	Company: MFA	Date: 7/10/19	Time: 1702	Received by: Jon Illmann	Company: H&P	Date: 7/15/19	Time: 1:00pm
Approved/Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:
Approved/Relinquished by:	Company:	Date:	Time:	Received by:	Company:	Date:	Time:

*Approval constitutes as authorization to proceed with analysis and acceptance of conditions on back

H2P Mobile Geochemistry Inc.

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Los Angeles Field Office in Signal Hill, CA
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EPA Method TO-15 (6-Liter Summa Canister)

Analyte	*CAS #*	*6-Liter RL/LOQ Vapor (µg/m³)*
Benzene	71-43-2	0.32
Toluene	108-88-3	0.76
Ethylbenzene	100-41-4	0.44
m,p-Xylene	179601-23-1	0.44
o-Xylene	95-47-6	0.44
Oxygenates		
Tertiary-butyl alcohol (TBA)	75-65-0	1.54
Methyl tertiary-butyl ether (MTBE)	1634-04-4	0.91
Diisopropyl ether (DIPE)	108-20-3	1.06
Ethyl tertiary-butyl ether (ETBE)	637-92-3	1.06
Tertiary-amyl methyl ether (TAME)	994-05-8	1.06
TPH gas		
TPH gas (C5-C12)		100

ATTACHMENT D

DATA VALIDATION MEMORANDUM

DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. 0818.02.01 | AUGUST 1, 2019 | CITY OF YAKIMA

Maul Foster & Alongi, Inc. (MFA) conducted an independent review of the quality of analytical results for indoor air samples collected at the former Tiger Oil site, located at 2312 West Nob Hill Boulevard in Yakima, Washington. The samples were collected on July 9 and 10, 2019.

H&P Mobile Geochemistry, Inc. (HP) performed the analyses. HP report MFA071519-13 was reviewed. The analyses performed and samples analyzed are listed below.

Analysis	Reference
Gasoline-Range Hydrocarbons (C5-C12)*	USEPA TO-15
Volatile Organic Compounds	USEPA TO-15

TO = Toxic Organics.
USEPA = U.S. Environmental Protection Agency.
* Reported by HP as volatile total petroleum hydrocarbons (C5-C12).

Samples Analyzed
Report 1905-111
VIDEO IA
RESTAURANT IA-1
RESTAURANT IA-2
BARBER IA

DATA QUALIFICATIONS

Analytical results were evaluated according to applicable sections of USEPA procedures (USEPA, 2017) and appropriate laboratory and method-specific guidelines (HP, 2017; USEPA, 1986, 1999).

Data validation procedures were modified, as appropriate, to accommodate quality-control requirements for methods not specifically addressed by the USEPA procedures (e.g., TO-15).

The data are considered acceptable for their intended use, with the appropriate data qualifiers assigned.

HOLDING TIMES, PRESERVATION, AND SAMPLE STORAGE

Holding Times

Extractions and analyses were performed within the recommended holding time criteria.

Preservation and Sample Storage

The samples were collected and stored appropriately.

BLANKS

Method Blanks

Laboratory method blank analyses were performed at the required frequencies. All laboratory method blanks were non-detect at laboratory reporting limits.

SURROGATE RECOVERY RESULTS

The samples were spiked with surrogate compounds to evaluate laboratory performance on individual samples with the exception of samples analyzed for gasoline-range hydrocarbons by USEPA Method TO-15. All surrogate results were within percent recovery acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

MS/MSD results are used to evaluate laboratory precision and accuracy. MS/MSDs are not required for soil vapor methods, so they were not analyzed for these reports.

LABORATORY DUPLICATE RESULTS

Duplicate results are used to evaluate laboratory precision. No laboratory duplicates were reported.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

A laboratory control sample/laboratory control sample duplicate (LCS/LCSD) is spiked with target analytes to provide information on laboratory precision and accuracy. The LCS/LCSD samples were extracted and analyzed at the required frequency. The reviewer confirmed that LCS/LCSD batch quality control samples are not reported for gasoline-range hydrocarbons analyzed by USEPA Method TO-15. All LCS/LCSD results were within acceptance limits for percent recovery and relative percent difference.

FIELD DUPLICATE RESULTS

Field duplicate samples measure both field and laboratory precision. No field duplicates were submitted for analysis.

CONTINUING CALIBRATION VERIFICATION RESULTS

Continuing calibration verification (CCV) results are used to demonstrate instrument precision and accuracy through the end of the sample batch. H&P did not report CCV results.

REPORTING LIMITS

H&P used routine reporting limits for non-detect results.

DATA PACKAGE

The data packages were reviewed for transcription errors, omissions, and anomalies. None were found.

REFERENCES

HP. 2017. Quality systems manual. Version 16. H&P Mobile Geochemistry, Inc., Carlsbad, California. March 15.

USEPA. 1986. Test methods for evaluating solid waste, physical/chemical methods. EPA publication SW-846. 3d ed. U.S. Environmental Protection Agency. Final updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), V (2015), VI phase I (2017), and VI phase II (2018), VI phase III (2019).

USEPA. 1999. Compendium Method TO-15. Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS). U.S. Environmental Protection Agency. Office of Research and Development. January.

USEPA. 2017. USEPA contract laboratory program, national functional guidelines for Superfund organic methods data review. EPA 540-R-2017-002. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. January.