Preliminary Air and Vapor Results and Next Steps

1801 Alexander Avenue, Tacoma, Washington

July 2023

BACKGROUND

This is a summary of the sample results collected in June 2023 by Maul Foster & Alongi, Inc. (MFA). The purpose of obtaining these samples was to assess whether or not chemicals identified beneath the floor slabs at the buildings located at 1801 Alexander Avenue (the Property) are present in the air of the buildings where the occupants work. Our preliminary analysis indicates that these chemicals are not present at concentrations that pose a significant risk to occupants.

The investigation at the Property and neighboring properties is required by the Washington State Department of Ecology (Ecology) as part of a larger investigation of the Taylor Way & Alexander Avenue Fill Site to assess historical releases of contaminants to soil and groundwater.

SAMPLING AND RESULTS

On June 11, 2023, MFA collected six indoor air samples from the three on-Property buildings (Quonset Hut 1, Quonset Hut 2, and the shop building; [see the attached figure]) and two outdoor air samples, which were analyzed for:

- Volatile organic compounds (VOCs)
- Air-phase hydrocarbons

The purpose of the sampling was to measure indoor air concentrations and compare them to concentrations measured in outdoor air. Tables 1 and 2 present detected concentrations of chemicals in indoor and outdoor air, respectively. Sample results were compared to Ecology air cleanup levels, as well as Occupational Health and Safety Administration (OSHA) Permissible Exposure Limits (PELs). Chemicals exceeding Ecology screening criteria are highlighted in the table. Our findings are summarized as follows:

- Most chemicals in indoor and outdoor air are detected below Ecology screening levels. Many chemicals were not detected in indoor air samples at all.
- Trichloroethene (TCE), which has a short-term action level associated with potential fetal heart malformation during the first trimester of a pregnancy, was not detected in any indoor air samples; therefore, no immediate action is required.
- Chemicals in indoor air exceeding Ecology screening levels are likely <u>not</u> the result of contamination beneath the buildings:
  - Acrolein and carbon tetrachloride exceedances in indoor air samples are also present at similar or higher concentrations in outdoor air, suggesting

ambient sources (e.g., emissions from nearby operational sources) are the source of these chemicals.

  - Similarly, the benzene exceedance in indoor air in Quonset Hut 2 is likely associated with emissions associated with activities in the building rather than sub-slab contamination.
  - None of the chemicals exceeding screening criteria in indoor air within the buildings were detected in soil gas samples collected from beneath the buildings. This indicates that the exceedances in indoor air are from sources other than the contamination beneath the buildings.
- No chemicals were detected in indoor air above OSHA PELs. An OSHA PEL is used to evaluate worker exposure to chemicals in the workplace over an 8-hour time weighted exposure duration (i.e., a standard workday).

In addition to the indoor/outdoor air sampling described above, on June 12, 2023, MFA supplemented its August 2022 soil gas investigation by collecting seven soil gas samples beneath the building slabs of Quonset Hut 2 and the shop building. The sub-slab soil gas samples were analyzed for:

- VOCs
- Air-phase hydrocarbons
- Methane, oxygen, and carbon dioxide

The purpose of the sub-slab gas sampling was to provide a basis for comparison with the results obtained in 2022. Table 3 presents concentrations of chemicals detected in sub-slab soil gas samples in comparison to their respective Ecology screening criteria. Key takeaways from MFA's sub-slab soil gas sampling:

- The same chemicals that exceeded screening levels during MFA's August 2022 soil gas sampling (see attached memo) exceed screening levels during the June 2023 investigation.
- Chemicals detected in sub-slab soil gas samples above Ecology's soil gas screening levels are not present in indoor air at concentrations above indoor air screening levels.
  - Heptane and tetrachloroethene were not detected in any indoor air samples.
  - Similarly, trichloroethene, which was detected in sub-slab gas samples above screening values, including the short-term action level, was not detected in any indoor air samples.
  - N-hexane was detected in sub-slab soil gas samples above screening levels but was well below its respective screening level in indoor air samples.
  - Petroleum hydrocarbon screening is ongoing. Petroleum hydrocarbons were detected in sub-slab soil gas samples above screening levels but were also detected in indoor and outdoor air samples at similar concentrations to one another, suggesting outdoor air is impacting indoor air quality.
- Based on these preliminary data, the vapor intrusion risk to building workers from sub-slab contamination appears to be low.

MFA is in the process of evaluating the preliminary analytical results for the June 2023 samples (see the attached lab reports). Final results will be documented in a formal report and submitted to Ecology in August 2023.

NEXT STEPS

MFA will validate the data and submit a formal report to Ecology in August 2023. The preliminary results indicate that sub-slab conditions are not adversely affecting indoor air quality and that short-term actions are not required to mitigate indoor air concentrations. The Port and MFA will continue working with Ecology to characterize environmental conditions at the Property and will keep occupants of the Property informed about next steps.

CONTACT US

If you have questions or concerns, please contact the Port or the MFA project manager.

Scott Hooton, Port of Tacoma
253-383-9428; shooton@portoftacoma.com

Audrey Hackett, MFA
206-556-2015; ahackett@maulfoster.com

ATTACHMENTS

Figure—Air Sample Locations

Table 1—Indoor Air Results for Detected Chemicals

Table 2—Outdoor Air Results for Detected Chemicals

Table 3—Soil Gas Results for Detected Chemicals

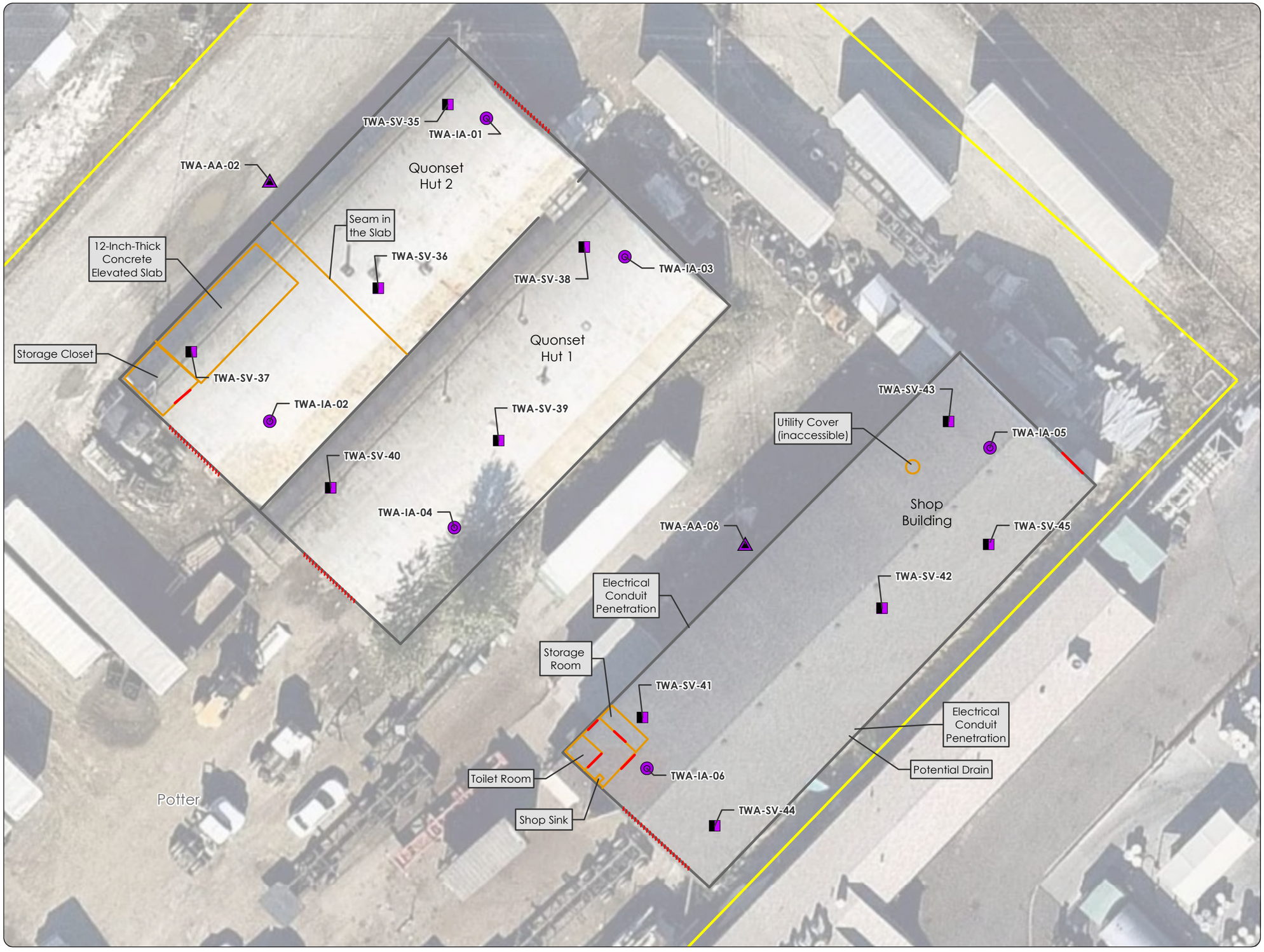
Memo—August 2022 Preliminary Vapor Results and Next Steps

REFERENCES

Ecology. 2022. *Guidance for Evaluating Vapor Intrusion in Washington State, Investigation and Remedial Action*. Publication No. 09-09-047. Toxics Cleanup Program, Washington State Department of Ecology, Olympia, Washington. March.

Figure
Air Sample Locations

Port of Tacoma
Former Potter Property
1801 E Alexander Avenue
Tacoma, Washington



Legend

- Indoor Air Sample
- Sub-Slab Vapor Pin
- Ambient Air Sample
- Chain Link Gate
- Door
- Building
- Feature
- Property

Notes
All features are approximate.

0 10 20
Feet

Data Sources
Aerial photograph obtained from Mapbox;
tax parcel obtained from Pierce County Assessor.

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Project: M0615.20.006 Produced By: sturner Reviewed By: jlenahansen Print Date: 6/29/2023

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Table 1
Indoor Air Results for Detected Chemicals
Port of Tacoma Former Potter Property

Building:	MTCA Method B, Air[1]		MTCA Method C, Air[1]		OSHA Permissible Exposure Limits[a][2]	Quonset Huts					Shop Building	
Location:						TWA-IA-01		TWA-IA-02	TWA-IA-03	TWA-IA-04	TWA-IA-05	TWA-IA-06
Sample Name:	Noncancer	Cancer	Noncancer	Cancer		TWA-IA-01-061123	TWA-IA-DUP-061123	TWA-IA-02-061123	TWA-IA-03-061123	TWA-IA-04-061123	TWA-IA-05-061123	TWA-IA-06-061123
Collection Date:						06/11/2023	06/11/2023	06/11/2023	06/11/2023	06/11/2023	06/11/2023	06/11/2023
VOCs (ug/m^3)												
1,2-Dichloroethane	3.2	0.096	7	0.96	202,000[b]	0.069	0.049	0.04 U	0.065	0.069	0.073	0.073
2,2,4-Trimethylpentane	NV	NV	NV	NV	NV	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U
Acetone	NV	NV	NV	NV	2,400,000	13 J	9.7 J	15 J	13 J	10 J	15 J	14 J
Acrolein	0.0091	NV	0.02	NV	250	0.17	0.13	0.2	0.19	0.2	0.26	0.26
Benzene	14	0.32	30	3.2	31,900[b]	0.39	0.38	0.67	0.32 U	0.32 U	0.32 U	0.32 U
Carbon tetrachloride	46	0.42	100	4.2	62,900[b]	0.45	0.46	0.45	0.45	0.45	0.47	0.47
Chloroform	45	0.11	98	1.1	240,000[c]	0.11	0.11	0.11	0.1	0.098	0.11	0.098
cis-1,2-Dichloroethene	18	NV	40	NV	NV	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Cyclohexane	2,700	NV	6,000	NV	1,050,000	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U
Dichlorodifluoromethane (Freon 12)	46	NV	100	NV	4,950,000	2.3	2.2	2.4	2.2	2.1	2.1	2.4
Ethanol	NV	NV	NV	NV	1,900,000	11	11	16	9.6	8.8	9	9.4
Ethylbenzene	460	NV	1,000	NV	435,000	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U
Heptane	180	NV	400	NV	2,000,000	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U
m,p-Xylene	NV	NV	NV	NV	NV	0.87 U	0.87 U	1.2	0.87 U	0.87 U	1	1.3
n-Butane	NV	NV	NV	NV	NV	8.9	8.2	21	4.8 U	4.8 U	4.8 U	4.8 U
n-Hexane	320	NV	700	NV	1,800,000	3.5 U	3.5 U	3.9	3.5 U	3.5 U	3.5 U	3.5 U
n-Pentane	460	NV	1,000	NV	2,950,000	7.8	7.4	14	5.9 U	5.9 U	5.9 U	5.9 U
o-Xylene	46	NV	100	NV	NV	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.53
Tetrachloroethene	18	9.6	40	96	678,000[b]	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U
trans-1,2-Dichloroethene	18	NV	40	NV	NV	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Trichloroethene	0.91	0.33	2	6.1	537,000[b]	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Xylenes, total[d]	46	NV	100	NV	435,000	0.87 U	0.87 U	1.4	0.87 U	0.87 U	1.2	1.8
APH (ug/m^3)												
C5-C8 Aliphatic hydrocarbons	NV	NV	NV	NV	NV	130	140	180	100	93	120	100
C9-C12 Aliphatic hydrocarbons	NV	NV	NV	NV	NV	25 U	25 U	25 U	25 U	25 U	94	25 U

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Table 1
Indoor Air Results for Detected Chemicals
Port of Tacoma Former Potter Property

Notes

Only analytes with one or more detections in indoor air, outdoor air, or soil gas are shown on this table.

Results were compared with screening criteria. Shading (color key below) indicates values that exceed screening criteria. When multiple criteria are exceeded, results are shaded based on the highest value.

MTCA Method B, Air, Noncancer

MTCA Method B, Air, Cancer

MTCA Method C, Air, Noncancer

APH = air-phase petroleum hydrocarbons.

J = result is estimated.

MTCA = Model Toxics Control Act.

NV = no value.

OSHA = Occupational Safety and Health Administration.

U = result is non-detect at the method reporting limit.

ug/m^3 = micrograms per cubic meter.

VOC = volatile organic compound.

[a]OSHA permissible exposure limits are 8-hour time weighted averages from OSHA Annotated Table Z-1 unless otherwise indicated.

[b]Approximate value. The Annotated OSHA Z-2 Table 8-hour time weighted average concentration in parts per million converted to micrograms per cubic meter using the following formula and rounded to three significant figures: *concentration in ug/m^3 = 0.0409 x concentration in ppb (ppm x 1,000) x molecular weight.*

[c]Ceiling limit.

[d]Total xylenes is the sum of m,p-xylene and o-xylene. When results are non-detect, half the reporting limit is used. When both results are non-detect, the highest reporting limit is shown.

References

[1]Ecology. 2023. *Cleanup Levels and Risk Calculation (CLARC) table.* Washington State Department of Ecology—Toxics Cleanup Program. January.

[2]OSHA. 2023. "Permissible Exposure Limits – Annotated Tables." *OSHA Annotated Table Z-1 and Z-2* . Accessed July 13, 2023. https://www.osha.gov/annotated-pels.

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Table 2
Outdoor Air Results for Detected Chemicals
Port of Tacoma Former Potter Property

Building:	MTCA Method B, Air[1]		MTCA Method C, Air[1]		OSHA Permissible Exposure Limits[a][2]	Quonset Huts	Shop Building
Location:						TWA-AA-02	TWA-AA-06
Sample Name:	Noncancer	Cancer	Noncancer	Cancer		TWA-AA-02-061123	TWA-AA-06-061123
Collection Date:						06/11/2023	06/11/2023
VOCs (ug/m^3)							
1,2-Dichloroethane	3.2	0.096	7	0.96	202,000[b]	0.069	0.049 U
2,2,4-Trimethylpentane	NV	NV	NV	NV	NV	4.7 U	5.6 U
Acetone	NV	NV	NV	NV	2,400,000	13 J	14 J
Acrolein	0.0091	NV	0.02	NV	250	0.39	0.3
Benzene	14	0.32	30	3.2	31,900[b]	0.32 U	0.22 J
Carbon tetrachloride	46	0.42	100	4.2	62,900[b]	0.45	0.46
Chloroform	45	0.11	98	1.1	240,000[c]	0.098	0.11
cis-1,2-Dichloroethene	18	NV	40	NV	NV	0.4 U	0.48 U
Cyclohexane	2,700	NV	6,000	NV	1,050,000	6.9 U	8.3 U
Dichlorodifluoromethane (Freon 12)	46	NV	100	NV	4,950,000	2.4	2.3
Ethanol	NV	NV	NV	NV	1,900,000	7.5 U	9 U
Ethylbenzene	460	NV	1,000	NV	435,000	0.43 U	0.52 U
Heptane	180	NV	400	NV	2,000,000	4.1 U	4.9 U
m,p-Xylene	NV	NV	NV	NV	NV	0.87 U	1 U
n-Butane	NV	NV	NV	NV	NV	4.8 U	5.7 U
n-Hexane	320	NV	700	NV	1,800,000	3.5 U	4.2 U
n-Pentane	460	NV	1,000	NV	2,950,000	5.9 U	7.1 U
o-Xylene	46	NV	100	NV	NV	0.43 U	0.52 U
Tetrachloroethene	18	9.6	40	96	678,000[b]	6.8 U	8.1 U
trans-1,2-Dichloroethene	18	NV	40	NV	NV	0.4 U	0.48 U
Trichloroethene	0.91	0.33	2	6.1	537,000[b]	0.11 U	0.13 U
Xylenes, total[a]	46	NV	100	NV	435,000	0.87 U	1 U
APH (ug/m^3)							
C5-C8 Aliphatic hydrocarbons	NV	NV	NV	NV	NV	96	140
C9-C12 Aliphatic hydrocarbons	NV	NV	NV	NV	NV	25 U	25 U

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Table 2
Outdoor Air Results for Detected Chemicals
Port of Tacoma Former Potter Property

Notes

Only analytes with one or more detections in indoor air, outdoor air, or soil gas are shown on this table.

Results were compared with screening criteria. Shading (color key below) indicates values that exceed screening criteria. When multiple criteria are exceeded, results are shaded based on the highest value.

MTCA Method B, Air, Noncancer

MTCA Method B, Air, Cancer

MTCA Method C, Air, Noncancer

APH = air-phase petroleum hydrocarbons.

J = result is estimated.

MTCA = Model Toxics Control Act.

NV = no value.

OSHA = Occupational Safety and Health Administration.

U = result is non-detect at the method reporting limit.

ug/m^3 = micrograms per cubic meter.

VOC = volatile organic compound.

[(a)]OSHA permissible exposure limits are 8-hour time weighted averages from OSHA Annotated Table Z-1 unless otherwise indicated.

[(b)]Approximate value. The Annotated OSHA Z-2 Table 8-hour time weighted average concentration in parts per million converted to micrograms per cubic meter using the following formula and rounded to three significant figures:
concentration in ug/m^3 = 0.0409 x concentration in ppb (ppm x 1,000) x molecular weight.

[(c)]Ceiling limit.

References

[(1)]Ecology. 2023. *Cleanup Levels and Risk Calculation (CLARC) table.* Washington State Department of Ecology—Toxics Cleanup Program. January.

[(2)]OSHA. 2023. "Permissible Exposure Limits – Annotated Tables." *OSHA Annotated Table Z-1 and Z-2* . Accessed July 13, 2023. https://www.osha.gov/annotated-pels.

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Table 3
Soil Gas Results for Detected Chemicals
Port of Tacoma Former Potter Property

Location:	MTCA Method B, Vapor Intrusion, Sub-Slab Soil Gas[1]		MTCA Method C, Vapor Intrusion, Sub-Slab Soil Gas[1]		Short-Term Action Level, Subsurface Soil Gas[2]	Methane Lower Explosive Limit[3]	TWA-SV-35	TWA-SV-36	TWA-SV-41		TWA-SV-42	TWA-SV-43	TWA-SV-44	TWA-SV-45
Sample Name:							TWA-SV-35-061223	TWA-SV-36-061223	TWA-SV-41-061223	TWA-SV-DUP-061223	TWA-SV-42-061223	TWA-SV-43-061223	TWA-SV-44-061223	TWA-SV-45-061223
Collection Date:	Noncancer	Cancer	Noncancer	Cancer	Nonresidential		06/12/2023	06/12/2023	06/12/2023	06/12/2023	06/12/2023	06/12/2023	06/12/2023	06/12/2023
Permanent Gases (%)														
Carbon dioxide	NV	NV	NV	NV	NA	NA	13.1	2.86	0.05 U	0.05 U	1.79	2.48	1.54	2.64
Methane	NV	NV	NV	NV	NA	5	0.818	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Oxygen	NV	NV	NV	NV	NA	NA	1.57	16.2	20.4	20.4	20.3	18.8	20.6	18.0
VOCs (ug/m^3)														
1,2-Dichloroethane	110	3.2	230	32	NA	NA	10 U	0.21 U	0.65 U	0.65 U	0.65 U	0.33 U	0.69 U	0.65 U
2,2,4-Trimethylpentane	NV	NV	NV	NV	NA	NA	42,000 J	25 U	75 U	75 U	75 U	38 U	79 U	75 U
Acetone	NV	NV	NV	NV	NA	NA	1,200 U	25 U	76 U	76 U	76 U	38 U	81 U	76 U
Acrolein	0.3	NV	0.67	NV	NA	NA	29 U	0.61 U	1.8 U	1.8 U	1.8 U	0.93 U	1.9 U	1.8 U
Benzene	460	11	1,000	110	NA	NA	80 U	1.7 U	5.1 U	5.1 U	5.1 U	2.6 U	5.4 U	5.1 U
Carbon tetrachloride	1,500	14	3,300	140	NA	NA	79 U	1.7 U	5 U	5 U	5 U	2.5 U	5.3 U	5 U
Chloroform	1,500	3.6	3,300	36	NA	NA	12 U	2.5	1.2	1.2	0.78 U	0.44	1.8	0.78 U
cis-1,2-Dichloroethene	610	NV	1,300	NV	NA	NA	99 U	2.1 U	6.3 U	6.3 U	6.3 U	3.2 U	18	6.3 U
Cyclohexane	91,000	NV	200,000	NV	NA	NA	20,000 J	36 U	110 U	110 U	110 U	56 U	120 U	110 U
Dichlorodifluoromethane (Freon 12)	1,500	NV	3,300	NV	NA	NA	250 U	5.2 U	16 U	16 U	16 U	8 U	17 U	16 U
Ethanol	NV	NV	NV	NV	NA	NA	1,900 U	40 U	120 U	120 U	120 U	61 U	130 U	120 U
Ethylbenzene	15,000	NV	33,000	NV	NA	NA	110 U	2.9	6.9 U	6.9 U	6.9 U	3.5 U	7.4 U	6.9 U
Heptane	6,100	NV	13,000	NV	NA	NA	29,000 J	22 U	66 U	66 U	66 U	33 U	70 U	66 U
m,p-Xylene	NV	NV	NV	NV	NA	NA	220 U	10	14 U	14 U	14 U	7 U	15 U	14 U
n-Butane	NV	NV	NV	NV	NA	NA	1,200 U	25 U	76 U	76 U	76 U	39 U	81 U	76 U
n-Hexane	11,000	NV	23,000	NV	NA	NA	24,000 J	19 U	56 U	56 U	56 U	29 U	60 U	56 U
n-Pentane	NV	NV	NV	NV	NA	NA	2,400	31 U	94 U	94 U	94 U	48 U	100 U	94 U
o-Xylene	NV	NV	NV	NV	NA	NA	170	2.6	6.9 U	6.9 U	6.9 U	3.5 U	7.4 U	6.9 U
Tetrachloroethene	610	320	1,300	3,200	NA	NA	1,700 U	43	4,900 J	4,900 J	730	240	6,100 J	2,300 J
trans-1,2-Dichloroethene	610	NV	1,300	NV	NA	NA	99 U	2.1 U	6.3 U	6.3 U	6.3 U	3.2 U	120	6.3 U
Trichloroethene	30	11	67	200	250	NA	27 U	0.57 U	75	75	1.7 U	0.87 U	930	1.7 U
Xylenes, total[a]	1,500	NV	3,300	NV	NA	NA	280	13	14 U	14 U	14 U	7 U	15 U	14 U
APH (ug/m^3)														
C5-C8 Aliphatic hydrocarbons	NV	NV	NV	NV	NA	NA	670,000 J	410	1,200 U	1,200 U	1,200 U	840	1,300 U	2,100
C9-C12 Aliphatic hydrocarbons	NV	NV	NV	NV	NA	NA	230,000 J	200	400 U	400 U	400 U	200 U	420 U	400 U
TPH (ug/m^3)														
TPH[b][c][2]	1,500	NV	1,500	NV	NA	NA	904,000 J	712	1,200 U	1,200 U	1,200 U	1,080	1,300 U	2,580

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Table 3
Soil Gas Results for Detected Chemicals
Port of Tacoma Former Potter Property

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Notes

Only analytes with one or more detections in indoor air, outdoor air, or soil gas are shown on this table.

Shading (color key below) indicates values that exceed screening criteria; non-detects (U and UJ) were not compared with screening criteria. When multiple criteria are exceeded, results are shaded based on the highest value (or based on MTCA B when MTCA B and MTCA C have the same value).

MTCA Method B, Vapor Intrusion, Sub-Slab Soil Gas, Noncancer

MTCA Method B, Vapor Intrusion, Sub-Slab Soil Gas, Cancer

MTCA Method C, Vapor Intrusion, Sub-Slab Soil Gas, Noncancer

MTCA Method C, Vapor Intrusion, Sub-Slab Soil Gas, Cancer

Short-Term Action Level, Subsurface Soil Gas, Nonresidential

APH = air-phase petroleum hydrocarbons.

J = result is estimated.

MTCA = Model Toxics Control Act.

NA = not applicable.

NV = no value.

TPH = total petroleum hydrocarbons.

U = result is non-detect at the method reporting limit.

ug/m^3 = micrograms per cubic meter.

UJ = result is non-detect with an estimated reporting limit.

VOC = volatile organic compound.

[a]Total xylenes is the sum of m,p-xylene and o-xylene. When results are non-detect, half the reporting limit is used. When both results are non-detect, the highest reporting limit is shown.

[b]TPH is the sum of benzene, ethylbenzene, naphthalene, toluene, total xylenes, C5-C8 aliphatic hydrocarbons, C9-C12 aliphatic hydrocarbons, and C9-C10 aromatic hydrocarbons. Non-detect results are summed at one-half the reporting limit. When all results are non-detect, the highest reporting limit is shown.

[c]TPH generic cleanup level.

References

[1]Ecology. 2023. *Cleanup Levels and Risk Calculation (CLARC) table.* Washington State Department of Ecology—Toxics Cleanup Program. January.

[2]Ecology. 2022. *Guidance for Evaluating Vapor Intrusion in Washington State.* Washington State Department of Ecology—Toxics Cleanup Program, Publication No. 09-09-047, Olympia, Washington. March.

[3]National Toxicology Program. 1992. National Toxicology Program Chemical Repository Database. Institute of Environmental Health Sciences, National Institutes of Health (NTP). Research Triangle Park, North Carolina.

Preliminary Vapor Results and Next Steps

1801 Alexander Avenue, Tacoma, Washington

August 2022

Background

Maul Foster & Alongi, Inc. (MFA) is working for the Port of Tacoma (the Port) to evaluate vapors beneath the slab of the buildings at 1801 Alexander Avenue in Tacoma, Washington (the Property). The vapor investigation at the Property and neighboring properties is required by Washington State Department of Ecology (Ecology) as part of a larger investigation of the Taylor Way & Anderson Fill Site to assess historical releases of contaminants to soil and groundwater.

Sampling and Results

On July 26 and 27, 2022, MFA collected nine sub-slab vapor samples from the three on-Property buildings (Quonset Hut #1, Quonset Hut #2, and the shop building; see the attached figure). Vapor samples were analyzed for:

- Volatile organic compounds (VOCs)
- Air-phase hydrocarbons
- Methane, oxygen, and carbon dioxide

MFA is reviewing preliminary analytical results for vapor samples (see attached lab report). Final results will be incorporated into a formal report and submitted to Ecology in September 2022. Preliminary results were compared to screening levels established by Ecology. Sub-slab vapor screening level exceedances are summarized in the table below.

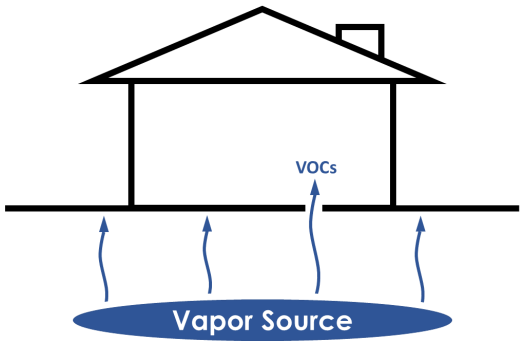
Chemical	Screening Level	Detected Exceedance Range	
		Minimum	Maximum
Chloroform	3.6	--	4.1
Heptane	6,100	42,000	43,000
n-Hexane	11,000	27,000	28,000
Tetrachloroethene	320	500	8,200
Trichloroethene	11	--	100
Total petroleum hydrocarbons	1,500	2,309	1,046,805

Notes
All results and screening levels are in micrograms per cubic meter.
Screening levels are the lowest of the Model Toxics Control Act Methods B and C, cancer and noncancer, sub-slab soil gas screening levels and the non-residential short-term vapor intrusion screening level for trichloroethene.

These results reflect concentrations of chemicals in vapors beneath the building slab—not the air inside of the building. Exceedances were generally located in Quonset Hut #1 and the shop building. The construction of the buildings (i.e., chain-link doors, large gable end vents) allow ambient air flow, which helps to reduce accumulation of vapors from beneath the slab into the buildings.

Next Steps

Per Ecology's *Guidance for Evaluating Vapor Intrusion in Washington State*, an indoor air evaluation must be performed when sub-slab vapor results exceed VOC screening levels. The Indoor air evaluation consists of inspection of the building slabs for cracks or gaps that could be routes for vapor to enter the structures, as well as indoor air sampling.



MFA and the Port need to conduct indoor air sampling at the Property as soon as feasible. The objective of the indoor air sampling is to estimate chemical concentrations in indoor air resulting from vapor intrusion (see image above).

Indoor air quality is often affected by indoor sources. MFA will need to work with you to remove as many potential sources of VOCs as possible prior to the indoor air sampling. Examples of indoor air sources of VOCs include solvents used for parts cleaning and emissions from vehicles.

MFA will need to collect indoor air samples over a period of 8 hours. If possible, MFA would like to conduct the sampling during non-operational hours (e.g., over a weekend). The indoor air sampling will be coupled with outdoor air sampling and additional sub-slab vapor sampling, so the sub-slab vapor pins will need to be made accessible.

Contact Us

If you have questions or concerns, please contact the Port or the MFA project manager.

Scott Hooton, Port of Tacoma
253-383-9428; shooton@portoftacoma.com

Audrey Hackett, MFA
206-556-2015; ahackett@maulfoster.com

References

Ecology. 2022. *Guidance for Evaluating Vapor Intrusion in Washington State, Investigation and Remedial Action*. Publication No. 09-09-047. Toxics Cleanup Program, Washington State Department of Ecology, Olympia, Washington. March.