INDOOR AIR SAMPLING AND ANALYSIS PLAN

TAYLOR WAY AND ALEXANDER AVENUE FILL AREA
FORMER POTTER PROPERTY
1801 E ALEXANDER AVENUE, TACOMA, WA

AGREED ORDER NO. DE 14260
FACILITY/SITE NO. 1403183
CLEANUP SITE ID NO. 4692

Prepared for
PORT OF TACOMA
January 12, 2023
Project No. M0615.20.006

Prepared by
Maul Foster & Alongi, Inc.
2815 2nd Avenue, Suite 540, Seattle, WA 98121

MAUL
FOSTER
ALONGI

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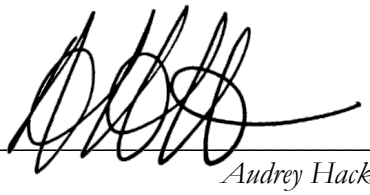
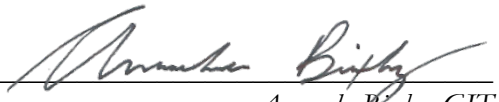
The material and data in this plan were prepared under the supervision and direction of the undersigned.

MAUL FOSTER & ALONGI, INC.



Audrey Hackett
Senior Environmental Scientist

Carolyn R. Wise, LHG
Project Hydrogeologist



Amanda Bixby, GIT
Staff Geologist

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ACRONYMS AND ABBREVIATIONS

Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
LCS	laboratory control sample
MFA	Maul Foster & Alongi, Inc.
PCE	tetrachloroethene
the Port	Port of Tacoma
the Property	1801 E Alexander Avenue, Tacoma, Washington
QA	quality assurance
QC	quality control
SAP	sampling and analysis plan
SOP	standard operating procedure
TCE	trichloroethene
TPH	total petroleum hydrocarbons
TWAAFA	Taylor Way and Alexander Avenue Fill Area
VI	vapor intrusion
VOC	volatile organic compound

1 INTRODUCTION

Maul Foster & Alongi, Inc. (MFA), prepared this indoor air sampling and analysis plan (SAP) consistent with the requirements of Washington Administrative Code 173-340-820 on behalf of the Port of Tacoma (the Port) to guide indoor air and sub-slab vapor sample collection at 1801 E Alexander Avenue in Tacoma, Washington (the Property). The approximately 1.7-acre parcel Property is part of the Taylor Way and Alexander Avenue Fill Area (TWAAFA) site (See Figure 1-1) (Facility/Site No. 1403183) (Cleanup Site ID No. 4692), is located between two dangerous waste facilities, and is currently used for shipping container and vehicle maintenance operations by the Port's tenant, Handan Containers. Figure 1-2 shows the observed property and building features that may be relevant for evaluating potential vapor intrusion (VI), including slab conditions, interior walls, utility penetrations, drains, and doors. Relevant building features are also depicted in photographs in Appendix A.

1.1 Regulatory Background

The potential for VI is being investigated on the Property and across the TWAAFA site. The VI investigations are part of a broader scope of data gaps investigations that are being performed under Agreed Order No. DE 14260/Enforcement Order No. 19410 between Washington State Department of Ecology (Ecology) and potentially liable persons for the TWAAFA site. Dalton, Olmsted & Fuglevand, Inc., prepared the *Aboveground Site Conditions and Existing Groundwater Monitoring Network Evaluation and Recommendations Memorandum* to identify VI status, make recommendations for each parcel in the TWAAFA site, and resolve data gaps. Ecology provided an opinion letter for the memo and requested sub-slab sampling be conducted at the Property, among other recommendations for further investigation at other parcels and buildings in the TWAAFA site (Ecology 2021). MFA prepared a vapor SAP (MFA 2021) for the Property that Ecology conditionally approved via email on December 16, 2021, and in writing on March 8, 2022 (Ecology 2022b).

1.2 Previous Sub-Slab Vapor Sampling

In July 2022, MFA completed sub-slab soil vapor sampling at the Property, consistent with the Ecology-approved vapor SAP. A total of nine sub-slab vapor samples were collected from three buildings at the Property: Quonset Hut 1, Quonset Hut 2, and the shop building (see building locations on Figure 1-2 and field photographs in Appendix A). Total petroleum hydrocarbons (TPH) and volatile organic compounds (VOCs), including chloroform, heptane, n-hexane, tetrachlorethene (PCE), and trichloroethene (TCE) exceeded applicable Model Toxics Control Act Method B and/or Method C cleanup levels in one or more sub-slab vapor samples. The sub-slab vapor samples exhibiting TPH and VOC concentration exceedances were collected from Quonset Hut 2 and the shop building (See Figure 1-2).

2 SCOPE OF WORK

2.1 Investigation Purpose

Previously, MFA installed nine sub-slab vapor pins at the Property (see Figure 2-1). Sub-slab soil vapor samples collected from the shop building and Quonset Hut 2 exceeded Model Toxics Control Act Method B or Method C cleanup levels (MFA 2022). Based on the results, Ecology requested that MFA install additional vapor pins to further evaluate the extent of sub-slab soil vapor contamination (Ecology 2022c).

Based on the sub-slab vapor sampling results, a Tier II indoor air assessment is needed to evaluate potential contamination caused exclusively by VI. Indoor air samples will be analyzed for contaminants that exceeded soil vapor screening criteria (Ecology 2022a). MFA will work with the tenant to eliminate or reduce indoor and ambient (i.e., outdoor) contaminant sources to the extent practicable. The results of the indoor air assessment will inform whether mitigation or cleanup action is warranted.

MFA plans to conduct indoor air sampling in the winter to enable a timely assessment of indoor air conditions and potential VI; however, the high water table will likely prohibit concurrent sub-slab vapor sample collection during the wet season. Therefore, the sub-slab vapor samples will be collected during optimal conditions, anticipated to occur in the summer when the groundwater elevation is sufficiently low. MFA will resample indoor air, along with sub-slab vapor during this summer event.

2.2 Property Preparation

MFA will complete the following preparation tasks prior to conducting air sampling:

- Inspect and document the conditions of each building to develop a conceptual site model of potential routes and mechanisms by which VI could impact indoor air quality, including the following:
  - Concrete slab condition, including type of foundation, changes to foundations or construction, cracks, sumps, utility penetrations, or other gaps in the barrier.
  - Ventilation methods. No heating, ventilation, or air conditioning systems are installed in any of the buildings on the Property, though portable heaters are present. MFA will inspect for doors, windows, and gaps in the walls and roofs.
- Complete the air sampling questionnaire included in Standard Operating Procedure (SOP) 17 (see Appendix B).
- Identify potential sources of TPH and VOCs associated with current operations using visual and olfactory observations and a photoionization detector to measure bulk VOCs. MFA will coordinate with the Port's tenant to eliminate or reduce operational sources prior

to conducting fieldwork. Source reduction activities may include moving equipment or containers deemed to be potential VOC sources (e.g., paints and varnishes) away from indoor air sample locations. Indoor air sample collection may also be performed during off-peak hours (e.g., weekend) to minimize potential VOC contributions from operational activities.

- Review data from a nearby weather station to determine the predominant wind direction in the area.

MFA will complete the following preparation tasks prior to conducting sub-slab vapor sampling:

- Conduct public and private utility-locating services and review available site plans to check for underground utilities or obstructions before installing sub-slab vapor pins (see SOP 18 in Appendix B).
- Install two additional sub-slab vapor pins in the shop building (TWA-SV-44 and TWA-SV-45).
- Install two data-logging manometers (one in Quonset Hut 2 at TWA-SV-37 and one in the shop building at TWA-SV-43)[1] to measure the pressure differential between sub-slab vapor and indoor air in the buildings. Pressure differential data will be collected for several days to determine if the pressure differential favors migration from the sub-slab to the indoor air. Measurements will continue throughout the sub-slab vapor sample collection period.

2.3 Vapor Pin Installation

MFA will install two additional vapor pins in the shop building (TWA-SV-44 and TWA-SV-45). Proposed locations are shown on Figure 2-1, though locations may be altered in the field based on accessibility or feedback from the tenant. The additional vapor pins will not be installed in areas where the slab appears to be in contact with groundwater. If groundwater is encountered in either of the sub-slab vapor pins, the sample location will be abandoned.

2.4 Sub-Slab Vapor Sampling

MFA will collect a total of seven sub-slab vapor samples, one each from the five previously installed vapor pins with TPH or VOC exceedances and two newly installed vapor pins (see SOP 16 in Appendix B and Figure 2-1). Samples will be collected in 1-liter, stainless steel Summa cannisters with 5-minute regulators at a flow rate of 200 milliliters per minute. At each sampling location MFA will fill a small shroud around the sampling apparatus and sampling location with helium, which will serve as a leak-check compound (see SOP 16 in Appendix B). The Summa canister will be analyzed for

[1] Ecology recommended data-logging manometers be installed at vapor pins TWA-SV-36 and TWA-SV-42 (Ecology 2022d). However, TWA-SV-36 and TWA-SV-42 are in high traffic areas where ongoing daily activities, including operating and moving truck trailers (see Attachment A), present risk for the manometers to be disturbed or damaged during the several days of data collection. As such, the locations where manometer readers were previously collected are proposed.

helium by the analytical laboratory as a quality assurance measure. The samples will also be collected in Tedlar bags.

Duplicate vapor samples for TO-15 and air phase hydrocarbon analyses will be collected by using a T-splitter at the point of sample collection to divide the sample stream into two separate canisters. Duplicate samples will be collected on a daily frequency, as applicable, and are anticipated to be collected from sub-slab vapor points TWA-SV-36 and TVA-SV-41.

MFA will record field data on field sampling data sheets before and after sampling, including sampling start and stop times, initial and final canister vacuum readings (see Appendix C). Observed conditions that may influence sampling results (e.g., significant odors) will be recorded in the field notebook.

2.5 Indoor Air Sampling

MFA will collect six primary indoor air samples (TWA-IA-01 through TWA-IA-06), two from each of the three buildings on the Property (Quonset Hut 1, Quonset Hut 2, and the shop building) and one field duplicate sample near TWA-SV-35 (proposed locations are shown on Figure 1-2). Proposed indoor air sample locations are positioned in areas near sub-slab vapor sampling locations that contained TPH or VOC exceedances and maintain adequate spatial distribution across each building and are located at least 5 feet away from the outer walls of the respective buildings. TWA-SV-45 is located as close as practical to the neighboring Emerald Services Building's break room.

Samples will be collected in 6-liter, stainless steel Summa canisters with 8-hour flow controllers. Canisters will be placed in the breathing zone, 3 to 5 feet above the floor, in areas with sufficient air flow. MFA will coordinate with the Port and tenant to collect samples outside of normal operating hours to minimize the potential for introduction indoor volatile sources used in the tenant's operations. Any deviations from normal working conditions will be noted by field staff. Detailed sampling procedures are provided in SOP 17 (see Appendix B).

MFA will record field data on field sampling data sheets before and after sampling, including sampling start and stop times, initial and final canister vacuum readings (see Appendix C). Observed conditions that may influence sampling results (e.g., nearby presence or use of VOCs that could not be eliminated or reduced) will be recorded in the field notebook.

2.6 Ambient Air Sampling

MFA will collect ambient air samples contemporaneous with indoor air sampling to estimate the potential contribution of TPH and VOCs to indoor air from background sources. MFA will collect four ambient air samples (TWA-AA-01 through TWA-AA-04) from around the conjoined Quonset Huts and four ambient air samples (TWA-AA-05 through TWA-AA-08) from around the shop building. MFA will then review weather station data from the day of sample collection to identify the predominant wind direction. Using this information, MFA will identify the two upwind sample locations for laboratory analysis. Samples will be collected in 6-liter, stainless steel Summa canisters with 8-hour flow controllers. Canisters will be placed away from local point sources of emissions, proximate to the building, and at the height of the buildings' air intake. Ambient air sampling will begin at least 1 hour before collecting indoor air and will continue until at least 30 minutes before

indoor air sampling is complete, as recommended by the U.S. Environmental Protection Agency (EPA) (EPA 2015). Detailed sampling procedures are provided in SOP 17 (see Appendix B).

MFA will record field data on field sampling data sheets before and after sampling, including sampling start and stop times and initial and final canister vacuum readings (see Appendix C). Observed conditions that may influence sampling results will be recorded in the field notebook.

2.7 Sample Nomenclature

Sample locations are named with an abbreviation indicating the sample matrix and the location number. The following matrix abbreviations are used:

- SV = soil vapor
- IA = indoor air
- AA = ambient air

Samples will be labelled with the date they are collected in MMDDYY format. Field duplicate samples will have "DUP" in place of the sample location number. For example, an indoor air sample collected at location TWA-IA-03 on December 15, 2022, would be named "TWA-IA-03-121522." A field duplicate sample collected at the same location would be named "TWA-IA-DUP-121522."

3 ANALYTICAL METHODS

3.1 Laboratory Test Methods and Reporting Limits

TPH and VOCs are chemicals of interest for the Property. In accordance with the quality assurance (QA) and quality control (QC) requirements set forth in this SAP, Friedman & Bruya, Inc., an accredited laboratory, will perform the following analyses:

- Air phase hydrocarbons by Massachusetts Air Phase Hydrocarbons Method
- VOCs by Toxics Organics-15 Method
- Methane, oxygen, and carbon dioxide by EPA 3C
- Helium by ASTM Method D1946

3.2 Laboratory Operations

In the laboratory, QC samples may include laboratory control samples (LCSs), surrogate spike samples, and method blanks, as well as other QC samples and procedures as required by the individual analytical methods (see Table 3-1).

3.2.1 Sample Handling

Soil vapor, indoor air, and ambient air samples will be collected in stainless steel Summa canisters, which do not require special preservation or temperature storage. All air samples will be delivered to the lab via courier or dropped off by MFA field staff in person. Sample custody will be tracked from point of origin through analysis and disposal, using a chain-of-custody form that will be filled out with standard sample and analytical information. Sample container and holding information is provided in Table 3-2.

3.3 Instrumentation

3.3.1 Field Instrumentation

Field instruments, including a manometer and a helium leak detector, will be used during the additional vapor investigation. Other field instruments, including a photoionization detector, will be used during the site preparation activities. Field instrument calibration and preventive maintenance will follow the manufacturers' guidelines, and deviations from the established guidelines will be documented.

3.3.2 Laboratory Instrumentation

Laboratory instrument calibration procedures, frequency of calibration, and preparation of calibration standards will be according to the method requirements.

3.3.2.1 Laboratory Calibration and Preventive Maintenance

Preventive maintenance of laboratory equipment will be the responsibility of the laboratory personnel and analysts. This maintenance includes routine care and cleaning of instruments and inspection and monitoring of laboratory equipment used in analyses. The preventive-maintenance approach for specific equipment should follow the manufacturers' specifications, good laboratory practices, and industry standard techniques.

Precision and accuracy data will be examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance should be performed when an instrument begins to change, as indicated by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet any of the QC criteria.

3.4 Laboratory Quality Assurance/Quality Control Samples

The laboratory QC samples will be used to assess the accuracy and precision of the laboratory analysis. Each category of laboratory QA/QC will be performed by the laboratory as required by method-specific guidelines. The acceptance criteria presented in the guidelines will be adhered to, and samples that do not meet the criteria will be reanalyzed or qualified, as appropriate.

3.4.1 Calibration Verification

Instruments will initially be calibrated at the start of the project or sample run, as required, and when any ongoing calibration does not meet control criteria. The number of points used in the initial calibration is defined in the analytical method. Calibration will be continued as specified in the analytical method to track instrument performance. If a continuing calibration does not meet control limits, analysis of project samples will be suspended until the source of the control failure is either eliminated or reduced to within control specifications.

3.4.2 Method Blanks

Method blanks are prepared using purified air and are processed with the same methodology (e.g., extraction, digestion) as the associated investigative samples. Method blanks are used to document contamination resulting from the laboratory's analytical process. A method blank will be prepared and analyzed for every analytical batch. The method blank results are used to verify that reagents and preparation do not impart unacceptable bias to the investigative sample results. The presence of analytes in the method blank sample will be evaluated against method-specific thresholds. If analytes are present in the method blank above the method-specific threshold, corrective action will be taken to eliminate the source of contamination before proceeding with analysis. Investigative samples of an analytical batch associated with method blank results outside acceptance limits will be qualified, as appropriate, by the data validation contractor.

3.4.3 Laboratory Control Samples

LCSs are prepared by spiking purified air with the analytes of interest or a certified reference material that has been prepared and analyzed. The result for percent recovery of the LCS is a data quality indicator of the accuracy of the analytical method and laboratory performance.

3.4.4 Field QC

MFA staff will perform field QC checks during sub-slab vapor sampling, including a shut-in test, helium shroud, and a water dam test. QC procedures for sub-slab vapor sampling are described in SOP 16 in Appendix B. MFA staff will perform field QC checks, including visual inspection of Summa canisters to ensure equipment is properly functioning before sample collection. MFA staff will record the vacuum reading on the gauge before and after sample collection to ensure readings are within acceptable equipment ranges (generally between 27 to 30 inches of mercury before sample collection and 4 to 5 inches of mercury after sample collection). Field staff will also ensure that the helium leak detector and photoionization detector calibration is performed prior to use in a manner consistent with manufacturer recommendations.

3.5 Data Reduction, Validation, and Reporting

The analytical laboratory will submit analytical data packages that include laboratory QA/QC results to permit independent and conclusive determination of data quality. MFA will determine the data

quality using the data evaluation procedures described in this section. The results of the MFA evaluation will be used to determine if the project data quality objectives have been met.

3.5.1 Field Data Reduction

Daily internal QC checks will be performed for field activities. Checks will consist of reviewing field notes and field activity memoranda to confirm that the specified measurements, calibrations, and procedures are being followed. The need for corrective action will be assessed on an ongoing basis, in consultation with the project manager.

3.5.2 Laboratory Evaluation

Initial data reduction, evaluation, and reporting at the analytical laboratory will be carried out consistent with the laboratory's internal QA manual (FBI 2019). Additional laboratory data qualifiers may be defined and reported to further explain the laboratory's QC concerns about a particular sample result. These additional data qualifiers will be defined in the laboratory's case narrative reports.

3.5.3 Data Deliverables

Electronic laboratory data deliverables are listed below.

- Transmittal cover letter
- Case narrative
- Analytical results
- Chain-of-custody form
- Surrogate recoveries
- Method blank results
- LCS results

3.5.4 Data QA/QC Review

MFA will evaluate the laboratory data for precision, completeness, accuracy, and compliance with the analytical method. MFA will review data according to applicable sections of EPA organics and inorganics procedures (EPA 2020a,b), as well as appropriate laboratory method-specific guidelines.

Data qualifiers, as defined by the EPA, are used to classify sample data according to their conformance to QC requirements. Common qualifiers are listed below:

- J—Result is estimated.
- R—Reject, data not suitable for any purpose.
- U—Result is non-detect at the laboratory detection limit/method detection limit/method reporting limit.

Poor surrogate recovery, blank contamination, or calibration problems, among other things, can require qualification of the sample data. The reasons for qualification will be stated in the data validation report. QC criteria not defined in the guidelines for evaluating analytical data are adopted, where appropriate, from the analytical method. The results of the data evaluation review will be summarized for each data package. Data qualifiers will be assigned to sample results based on EPA guidelines, as applicable.

3.5.5 Data Management and Reduction

MFA uses a database (i.e., EQuIS) to manage laboratory data. The laboratory will provide the analytical results in electronic, EQuIS-compatible format. Following data evaluation, data qualifiers will be entered into the database.

Data may be reduced to summarize particular data sets and to aid interpretation of results. Statistical analyses may also be applied to results. Data reduction QC checks will be performed on hand-entered data, calculations, and data graphically displayed. Data may be further reduced and managed using one or more of the following computer software applications:

- Microsoft Excel (spreadsheet)
- EQuIS (database)
- AutoCAD and/or ArcGIS (graphics)
- EPA ProUCL (statistical software)

4 SCHEDULE

MFA will prepare data reports for each phase of field investigation and will summarize and screen the data against the applicable sub-slab vapor and air screening level criteria. All validated data will be uploaded to Ecology's Environmental Information Management System within 30 days of validation.

LIMITATIONS

The services undertaken in completing this plan were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This plan is solely for the use and information of our client unless otherwise noted. Any reliance on this plan by a third party is at such party's sole risk.

Opinions and recommendations contained in this plan apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this plan.

REFERENCES

Ecology. 2021. Steve Teel, LHG, Washington State Department of Ecology, Toxics Cleanup Program, Southwest Regional Office. *Comments on the Aboveground Site Conditions Memorandum and Existing Groundwater Monitoring Network Evaluation and Recommendations Memorandum.* Letter to Tasya Gray, Dalton, Olmsted & Fuglevand, Inc., and Scott Hooton, Port of Tacoma. May 5.

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TABLES

Table 3-1
QC Sample Summary
Former Potter Property, Port of Tacoma
1801 E Alexander Avenue, Tacoma, Washington

QC Check Sample	Frequency
Field QC	
Field Duplicate	One per day
Laboratory QC	
Surrogate Spiking	Added to all project and QC samples (for organic analyses only)
Method Blanks	Each analytical batch of samples of every 20 (or fewer) samples received
Laboratory Control Sample	Each analytical batch of samples of every 20 (or fewer) samples received
Note: QC = quality control.	

Table 3-2
Containers, Preservation, and Holding Times
Former Potter Property, Port of Tacoma
1801 E Alexander Avenue, Tacoma, Washington

Method	Analysis	Field Container Preservative	Holding Time (Days)	Sample Container
MA DEP-APH	APH	None	30	1-L or 6-L Summa Canister[(a)]
ASTM D1946	Helium	None	30	1-L or 6-L Summa Canister[(a)]
TO-15	VOCs	None	30	1-L or 6-L Summa Canister[(a)]
EPA 3C	Methane	None	3	Tedlar bag
EPA 3C	Oxygen	None	3	Tedlar bag
EPA 3C	Carbon dioxide	None	3	Tedlar bag

Notes:

APH = air-phase hydrocarbons.

L = liter.

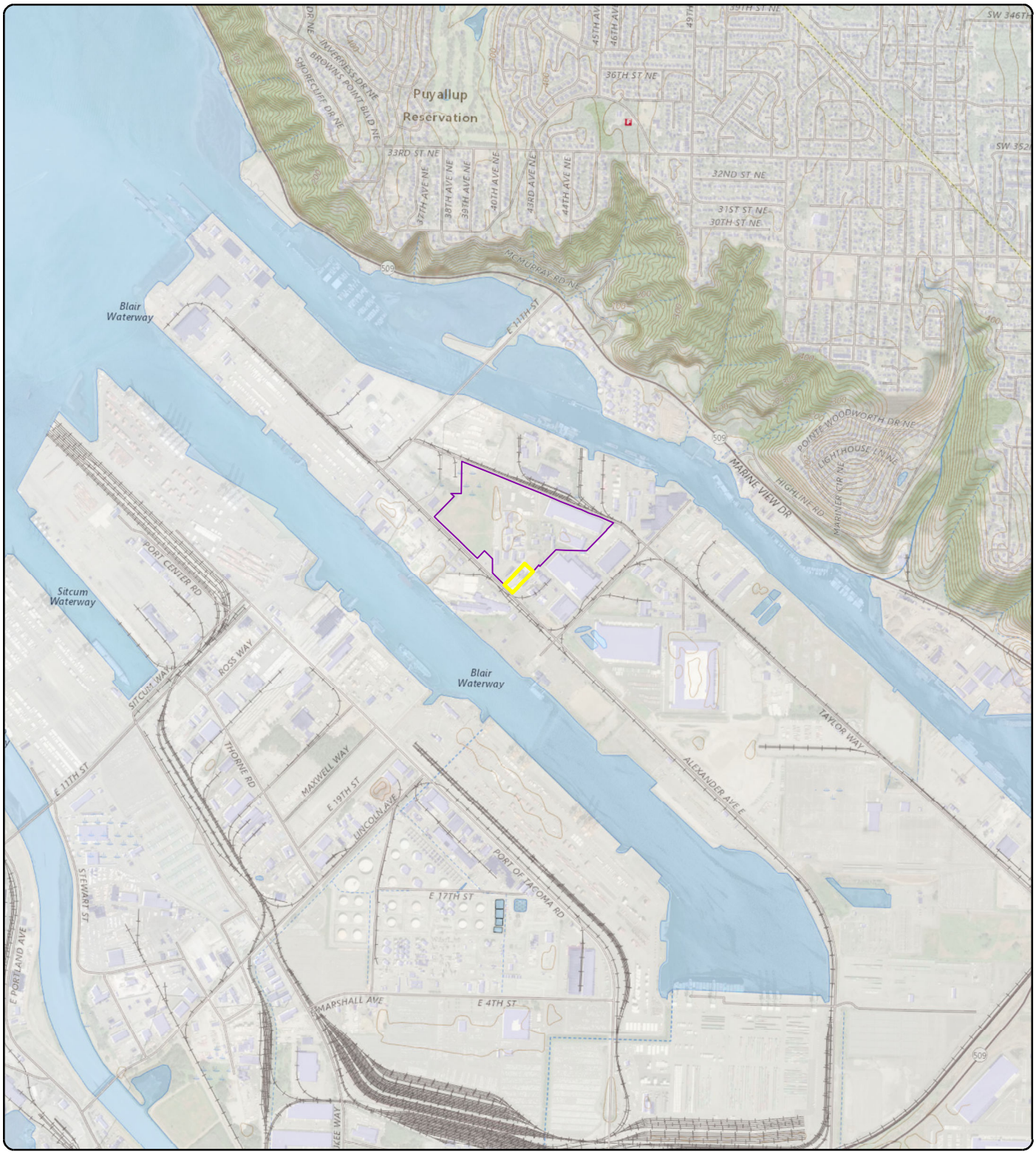
MA DEP = Massachusetts Department of Environmental Quality.

TO = toxic organics.

VOCs = volatile organic compounds.

[(a)]Sub-slab vapor samples will be collected in 1-L Summa canisters while ambient and indoor air samples will be collected in 6-L Summa canisters.

FIGURES



Note:
TWAAFA = Taylor Way and Alexander Avenue Fill Area.

Legend

- Property
- TWAAFA Site Boundary

Figure 1-1
Property Location

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

0 1,000 2,000
Feet

Data Sources:
U.S. Geological Survey (2021) 7.5-minute topographic quadrangle: Tacoma, Washington.
Township 21 North, Range 3 East, Section 35.
Tax parcel obtained from Pierce County Assessor.
TWAAFA site boundary obtained from Exhibit A of Agreed Order No. DE 14260.

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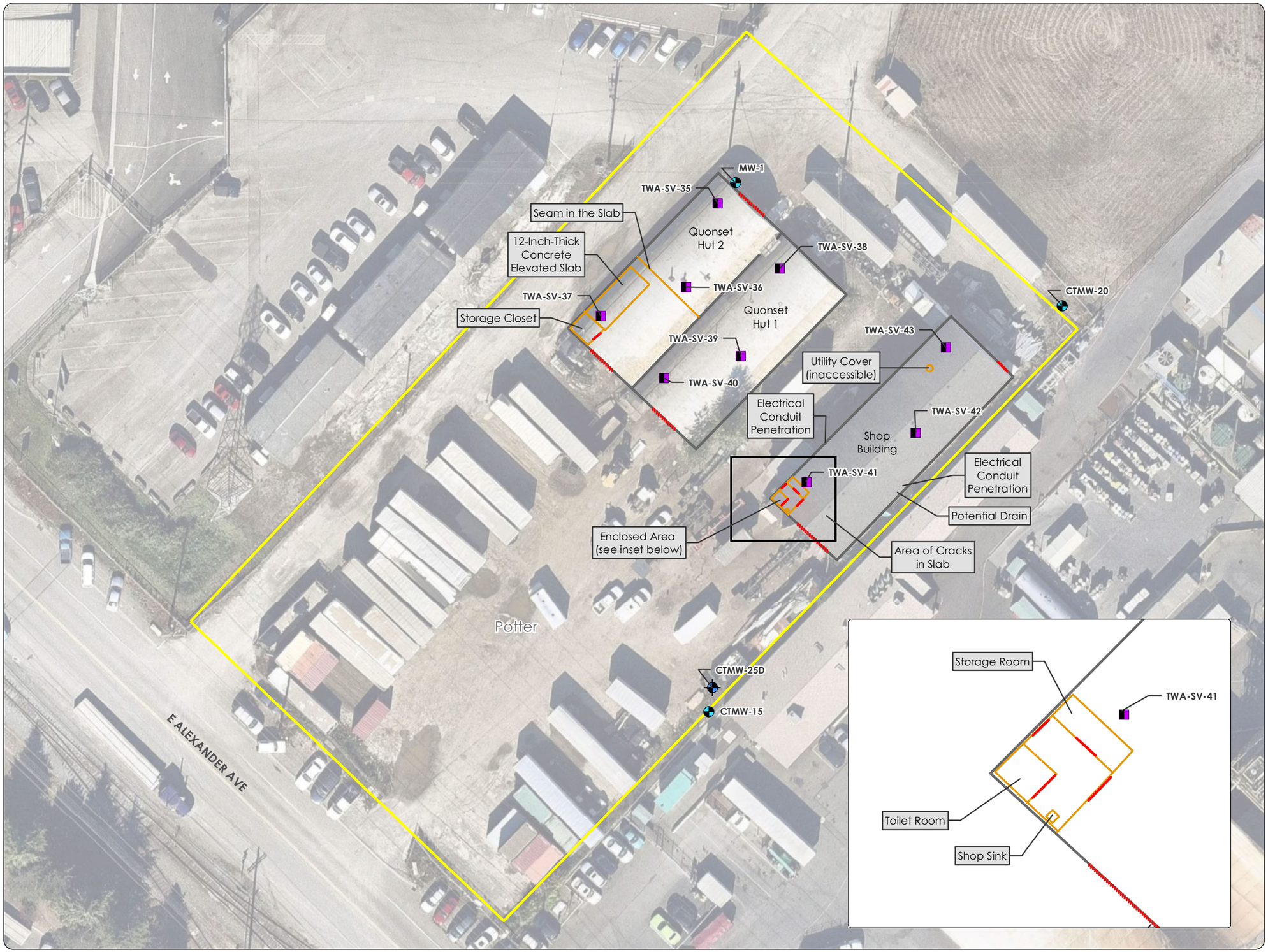
Print Date: 10/17/2022
Reviewed By: jlenahansen
Produced By: abixby
Project: M0615.20.006

Figure 1-2
Property Features

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



Legend

- Sub-Slab Vapor Pin
- Shallow Monitoring Well
- Deep Monitoring Well
- Chain Link Gate
- Door
- Feature
- Building
- Property
- Tax Parcel

Note:
All features are approximate.

0 25 50
Feet

Data Sources:
Aerial photograph obtained from Mapbox.
Tax parcels obtained from Pierce County Assessor.

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Figure 2-1
Proposed Sample Locations

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

Legend

- Proposed Indoor Air Sample
- Proposed Ambient Air Sample
- Proposed Sub-Slab Vapor Pin
- Sub-Slab Vapor Pin
- Sub-Slab Soil Gas CUL Exceedance
- Chain Link Gate
- Door
- Building
- Feature
- Property

Notes:
All features are approximate.
Only two upwind ambient air samples will be analyzed.
Proposed sample locations are approximate and may be altered based site conditions.
Sub-slab soil gas CUL exceedances are based on MTCA Method B or Method C CULs.
CUL = cleanup level.
MTCA = Model Toxics Control Act.

0 10 20
Feet

Data Sources:
Aerial photograph obtained from Mapbox.
Tax parcel obtained from Pierce County Assessor.

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APPENDIX A

PHOTO ARRAY

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PHOTOGRAPHS

Project Name: Former Potter Property
Project Number: M0615.20.006
Location: 1801 E Alexander Avenue, Tacoma, Washington

Photo No. 1.

Description
View of Shop Building looking north.
Shop building entrance gates are comprised of corrugated metal attached to chain-link fencing. Shop building gates typically remain open during business operations by the Port of Tacoma (the Port)'s tenant.

Photo No. 2.

Description
Interior of the Shop Building. The slab in the main work area shows minor cracking.

MAUL FOSTER ALONGI

PHOTOGRAPHS

Project Name: Former Potter Property
Project Number: M0615.20.006
Location: 1801 E Alexander Avenue, Tacoma, Washington

Photo No. 3.

Description
Detail photo of significant slab cracks near entrance doors of Shop Building.

Photo No. 4.

Description
Indoor enclosed area with restroom, utility sink, and storage room within. Parallel doors to the outdoors and the interior of the Shop Building. Viewed from interior of Shop Building, facing northwest.

PHOTOGRAPHS

Project Name: Former Potter Property
Project Number: M0615.20.006
Location: 1801 E Alexander Avenue, Tacoma, Washington

Photo No. 5.

Description
Restroom in Shop Building. No floor drains observed in restroom.

Photo No. 6.

Description
Utility sink outside of restroom. No floor drains observed in this area.

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PHOTOGRAPHS

Project Name: Former Potter Property
Project Number: M0615.20.006
Location: 1801 E Alexander Avenue, Tacoma, Washington

Photo No. 7.

Description
Storage room with flammables cabinet, equipment, paint, and other miscellaneous materials. No floor drains seen in storage room.

Photo No. 8.

Description
Potential drain in floor and conduit penetration near east circuit breaker panel in Shop Building. Drain is visible below coiled extension cord in photo and was plugged with debris.

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PHOTOGRAPHS

Project Name: Former Potter Property
Project Number: M0615.20.006
Location: 1801 E Alexander Avenue, Tacoma, Washington

Photo No. 9.

Description
Potential utility cover on floor in northwest portion of Shop Building. Feature was beneath a semitrailer and was inaccessible during site visit.

Photo No. 10.

Description
View of the interior of Quonset Hut 1 used for storage of trailers and minor equipment. The slab shows minor cracking.

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PHOTOGRAPHS

Project Name: Former Potter Property
Project Number: M0615.20.006
Location: 1801 E Alexander Avenue, Tacoma, Washington

Photo No. 11.

Description
Miscellaneous equipment storage in Quonset Hut 1.

Photo No. 12.

Description
Entrance gate to Quonset Hut 2. The entrance gate to Quonset Hut 2 is comprised of light-duty polyethylene tarps attached to chain-link fencing. The entrance gate typically remains open during business operations by the Port's tenant.

PHOTOGRAPHS

Project Name: Former Potter Property
Project Number: M0615.20.006
Location: 1801 E Alexander Avenue, Tacoma, Washington

Photo No. 13.

Description
Semitrailer maintenance in Quonset Hut 2.

Photo No. 14.

Description
Approximately 12-inch-thick elevated concrete slab in Quonset Hut 2. Storage closet in background.

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PHOTOGRAPHS

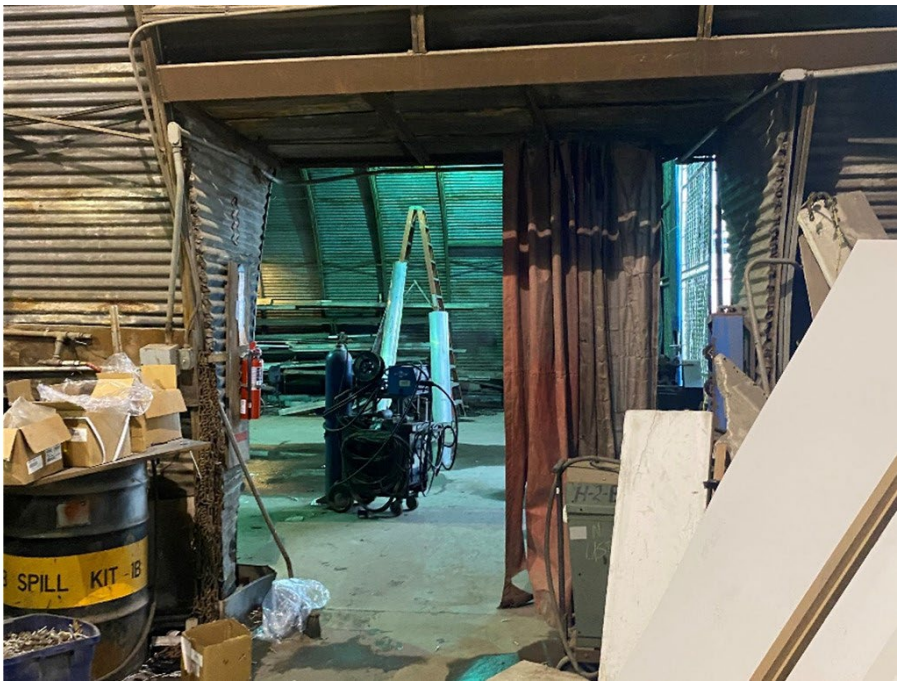
Project Name: Former Potter Property
Project Number: M0615.20.006
Location: 1801 E Alexander Avenue, Tacoma, Washington

Photo No. 15.

Description
Seam in concrete slab in Quonset Hut 2.

Photo No. 16.

Description
Open passthrough between Quonset Huts 1 and 2.



APPENDIX B

STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE

Soil Vapor Sampling

SOP Number: 16
Date: 3/9/2021
Revision Number: 0.1

SCOPE AND APPLICATION

This standard operating procedure (SOP) describes the methods for collecting soil vapor samples from temporary or permanent equipment installed in unsaturated subsurface soil. Sample collection may require drilling through concrete or asphalt to gain access to subsurface soils.

EQUIPMENT AND MATERIALS REQUIRED

The following materials are necessary for this procedure:

- Personal protective equipment
- Tubing and wrenches
- Laboratory-supplied sample canister, manifolds, and flow controllers
- Leak-detection equipment (helium tank, two-stage regulator, and gas-flow-control valve; and helium leak detector)
- Peristaltic pump
- Laboratory chain-of-custody form
- Soil vapor field sampling data sheet and field notebook

METHODOLOGY

When the project-specific sampling and analysis plan (SAP) provides additional or different requirements for vapor sampling, it takes precedence over this SOP. In the absence of a SAP, the procedures in this SOP shall be used.

Complete the attached questionnaire before beginning vapor sampling activities. The intent of this questionnaire is to document potential sources of vapors that could require the collection of vapor samples that are not representative of vapors present in subsurface soil.

General Sampling Procedure:

Sample collection from a temporary or permanent boring

- Installation of the sample point may be completed by a drilling subcontractor.
- Vapor point construction details, including screen length and depth placement, annular material, and seal specifications, may be project-specific and should be described in the project SAP.
- Clear the ground surface of brush, root mat, grass, leaves, and other debris.
- Remove soil to the target depth, verify that the sample depth is correct, and record the depth in the field notebook and the boring log.
- Assemble and attach the sampling equipment as described below. Before sampling, sampling points for permanent sub-slab sample points must equilibrate for two hours.

Sample collection from a sub-slab sample point

Sub-slab soil-gas sampling points consist of a Cox-Colvin & Associates, Inc. (Cox-Colvin) Vapor Pin system. The procedures developed by Cox-Colvin for installing and removing the Vapor Pin system, including the secure cover, are attached.

Assembly and attachment of sampling equipment

- Connect the sampling equipment as shown in the attached figure such that the equipment can be purged, leak tested, shut-in tested, and sampled in the field.
- The vapor pin installed in an asphalt or cement slab will be connected to the ¼ turn ball valve (Valve #1—sampling valve) using Tygon tubing. The sampling valve is connected to a vacuum gauge, which is attached to the flow controller.
- At the flow controller, a tee connection will be fitted to the canister and to a second ¼ turn ball valve (Valve #2—purge valve) used to isolate the purging equipment during actual sampling.
- The canister has a built-in valve that allows isolation of the canister during purging and leak-checking activities. On the other side of the purge valve (#2), a vacuum pump will be connected in order to induce vacuum for purging and shut-in testing.

Leak detection

- Helium will be contained around the sampling apparatus and sampling pin to serve as a leak-check compound. Helium will be released into a small structure (shroud) that is placed over the sampling pin and sampling train.
- With the canister valve closed, a sample of the soil gas collected during purging (described below) will be contained in a Tedlar bag.
- A field helium detector will be used to sample the air purged through the sampling train to verify the presence or absence of helium. A helium concentration greater than 10 percent of the concentration in the containment structure indicates that a leak is occurring.
- If a leak is detected, the sampling and purging train fittings will be tightened and the leak check will be repeated.
- The absence of helium during the purging process verifies the integrity of the sampling system before the sample is collected.
- The canister will also be analyzed for helium by the analytical laboratory as a quality assurance measure.

Sampling

- After the sampling train is purged and no leaks are detected in the sampling train, close the valve leading to the vacuum pump (Valve #2—purge valve), open the valve leading to the sampling pin (Valve #1—sample valve), and then open the valve on the canister to collect the sample over the duration of time required.
- Record field data during the sampling on the soil vapor field sampling datasheet, including the sampling start and stop times, the initial and final canister vacuum readings, and weather conditions.
- The sample will be rejected if the initial canister pressure is not at least -25 inch of mercury or if the final canister pressure is greater than -0.1 inch of mercury. The final canister pressure is recommended at or near -5 inch of mercury.

Data Recording

In a field log notebook and soil vapor field sampling data sheet, record the following:

- Project name, sample date, sampling location, canister serial number, initial vacuum reading, final pressure reading, and sampling time.

- Weather conditions during sampling (temperature, barometric pressure, humidity, sunny/cloud cover, wind).
- Date and amount of most recent prior rainfall.

Abandonment of Sampling Points

- Temporary Borings: Abandon each borehole in accordance with local and state regulations/procedures. The abandonment procedure typically consists of filling the boring with granular bentonite and hydrating the bentonite with water. Match the surface completion to the surrounding materials.
- Sub-Slab Vapor Pin: The sub-slab vapor pin will be properly decommissioned consistent with the attached Cox-Colvin procedure. The slab borehole will be filled with grout and/or concrete.

STANDARD OPERATING PROCEDURE

Indoor and Ambient Air Sampling

SOP Number: 17
Date: 10/14/22
Revision Number: 02

SCOPE AND APPLICATION

This standard operating procedure (SOP) describes the methods for collecting indoor and ambient air samples using laboratory-supplied canisters with flow controllers.

EQUIPMENT AND MATERIALS REQUIRED

The following materials are necessary for this procedure:

- Personal protective equipment (as specified in the health and safety plan)
- Photoionization detector (PID) or other portable field sampling device
- Measuring tape, Teflon tape
- Wrenches
- Identification placards to inform the public (as needed)
- Straps or chains to secure outdoor samples
- Laboratory-supplied sample canister (e.g., Summa) and flow controllers
- Laboratory chain-of-custody form
- Decontamination materials
- Field forms or notebook for documenting the sampling procedures

METHODOLOGY

When the project-specific sampling and analysis plan (SAP) specifies additional or different requirements for ambient air sampling, it takes precedence over this SOP. In the absence of a SAP, the procedures in this SOP shall be used.

Pre-Sampling Procedure

- Complete the attached questionnaire before beginning indoor ambient air sampling activities.
- Identify potential sources of target or interfering compounds from inside the building or from the product inventory portion of the questionnaire. Use a PID during the inventory to help identify indoor sources.
- Remove the potential sources, to the extent possible, before beginning sampling. Document ambient air conditions after removing these potential sources using a PID.
- Identify other potential factors that may influence sample results, such as weather, ventilation and heating system operations, and foundation conditions.

General Sampling Procedure

- Place sample containers for indoor sampling between 3 and 5 feet above the floor to represent sampling from a typical human breathing zone. Protect containers from disturbance for the duration of the sampling. Canisters can either be time-weighted (preferred) or grab.
- It is recommended that ambient air samples also be collected during indoor air sampling to quantify the potential contribution from sources. Place sample containers upwind of the building, away from local point sources of emissions (such as an exhaust stack), proximate to the building. Use

meteorological information to identify the predominant wind direction. Samples should be placed at a height upwind of any rooftop exhaust vents, and at the height of the building's air intake.

- Record field data before and after the sampling, including the sampling start and stop times, the initial and final canister vacuum readings, temperature, relative humidity, and observations of conditions that may influence sampling results (e.g., presence or use of petroleum products, open windows or doors). The sample will be rejected if the initial canister pressure is not at least -25 inch of mercury or if the final canister pressure is greater than -0.1 inch of mercury.
- Slowly open the control valve to allow collection of the sample. Return to the sampler before the programmed sample duration so that some vacuum remains in the container. Close the sample container valve and process the sampling container for shipment to the analytical laboratory.
- Other items to record in the field notebook or form include the sampling location, canister serial number, and weather conditions (temperature, barometric pressure, humidity, sunny or cloudy, wind).

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STANDARD OPERATING PROCEDURE

Underground Utility Locates

SOP Number: 18
Date: 3/9/2021
Revision Number: 0.1

SCOPE AND APPLICATION

This standard operating procedure (SOP) describes the practices for locating underground utilities. Refer to the MFA health and safety plan (HASP), if available, for additional information regarding communication procedures to be followed when an inadvertent utility strike occurs, as well as regarding methods for mitigating hazards during a utility strike.

EQUIPMENT AND MATERIALS REQUIRED

The following materials are necessary for this procedure:

- Personal protective equipment (as specified in the HASP)
- Marking materials (e.g., marking paint, stakes, flags)
- Field documentation materials

METHODOLOGY

When the project-specific sampling and analysis plan (SAP) specifies additional or different requirements for underground utility locates, it takes precedence over this SOP. In the absence of a SAP, the procedures in this SOP shall be used.

Before Conducting Utility Locates:

- Ensure that the locate will be conducted reasonably soon before the excavation work begins, e.g., within 48 hours. There may be project-specific conditions, e.g., weather and/or ground features that could cause markings to fade, which would require scheduling of the excavation work sooner than 48 hours after the locate.
- Clearly define the boundary of the work and the locations of all proposed excavations. Prepare a map of the project area showing the excavation locations.
- Interview site managers/property owners and obtain plans or drawings, if available, showing on-site utilities.
- For project work that will not take place in the public right-of-way, ensure that the public rights-of-way nearest to the project are identified and communicated during the one-call notification.
- Identify the township and range of the project area. This information can be easily attained by a quick email to MFA's GIS Exchange.
- If feasible, conduct a site visit to identify site conditions that could cause fading or disruption of marking paint. Such conditions could include gravel or ground sensitive to erosion and high traffic.
- Check the weather forecast to assess the potential for snow or rain to make marking utilities difficult or cause the markings to fade.

One-Call Utility Notification:

- If possible, initiate the one-call utility notification at least one week before the proposed work begins.
- Include a map or GPS coordinates when submitting the notification.
- Before conducting any excavation activities, confirm with each public utility that the utility locate has been completed.

- On remote or complicated sites, consider meeting public locators on site.
- Document the one-call ticket number and results in the project files.
- Provide the one-call ticket number to subcontractors who will be doing the excavations.

Private Utility Locate:

- Conduct the private utility locate only after confirmation that the public utility locate has been completed and all public utilities have been marked and the results reviewed by MFA staff who will be overseeing the excavations.
- Meet the private locator on site and participate in the entire private utility locate. Be engaged in the process, ask questions, and take time to walk the site thoroughly with the locator.
- Bring a copy of the one-call utility ticket and results of the one-call utility locater to check against the utility markings on the ground.
- If possible, have a site/property representative knowledgeable of on-site utilities participate in the private utility locate.
- If paint alone may not suffice to ensure clear marking of utilities, add vertical markers such as stakes or flags.
- Visually assess the area of the proposed excavation(s) to identify features potentially indicative of buried utilities. Have the private utility locator examine each feature identified below to assess the presence of buried utilities.
  - Examine adjacent public rights-of-way where public utilities have been marked for evidence of utilities that may extend onto the project site.
  - Identify nearby light poles, telephone poles, electrical utility poles, or other overhead utility poles with wires or conductors that run from the overhead utility, down the pole, and into the ground.
  - Identify the location of gas meters, water meters, or other aboveground junction boxes for evidence of utilities extending from these features into the ground.
  - Examine asphalt and concrete ground surfaces for discontinuities in the surface indicative of utility installations. Discontinuities may include recent patches of asphalt or concrete inlaid within older concrete or asphalt surfaces.
  - Identify manholes and catch basins indicative of buried storm or sanitary sewer pipes. Open manholes to examine the orientation of associated pipes to assess whether the utilities may be present near proposed excavations.
  - Identify tank ports and vent pipes.
  - Identify irrigation systems and associated features such as valve boxes and controllers.
  - Identify any other signs indicating the presence of buried utilities.
  - Be wary of utility marks that suddenly begin or dead end.

Preparing to Perform Subsurface Activities after a Locate:

- Ensure that the markings are still visible when the work begins.
- Adjust locations, as needed, to avoid identified utilities, or use alternative methods such as nonmechanical excavation means (i.e., manual excavation or air-knifing) to a minimum depth of 5 feet.

Table
APWA UNIFORM COLOR CODE

	WHITE—Proposed Excavation
	PINK—Temporary Survey Markings
	RED—Electric Power Lines, Cables, Conduit and Lighting Cables
	YELLOW—Gas, Oil, Steam, Petroleum or Gaseous Materials
	ORANGE—Communication, Alarm or Signal Lines, Cables or Conduit
	BLUE—Potable Water
	PURPLE—Reclaimed Water, Irrigation and Slurry Lines
	GREEN—Sewers and Drain Lines

Source: APWA. 1999. *Uniform Color Codes, ANSI Standard Z535.1*. American Public Works Association. Revised April.
APWA = American Public Words Association

APPENDIX C

FIELD SAMPLING DATA SHEET

Sampler(s):

Indoor/Ambient Air Field Sampling Data Sheet
Former Potter Property, Port of Tacoma
1801 E Alexander Avenue, Tacoma, Washington

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Sample ID	Sample Type	Date	Summa Canister ID	Manifold ID	Canister Size (L)	Collection Duration	Sample			
							Begin Time	End Time	Initial Vacuum ("Hg)[a]	Final Vacuum ("Hg)
Example 1	Indoor Air	04/06/2021	21484	07870	6	8 hour	9:45	17:45	-30+	-9
Example 2	Indoor Air	04/06/2021	18577	07846	6	8 hour	9:48	17:48	-30+	-6
Example 3	Ambient Air	04/06/2021	18578	08181	6	8 hour	9:50	17:50	-30+	-7

Notes

"Hg = inches of mercury.

L = liter.

[a]-30+ indicates that the vacuum gauge was above the maximum pressure value of 30"Hg.

Sampler(s):

Subslab Soil Vapor, Indoor Air, and Ambient Air Sampling Data Sheet
Former Potter Property, Port of Tacoma
1801 E Alexander Avenue, Tacoma, Washington

Sample ID	Date	Shut-in Test Pass/ Fail	Summa Canister ID	Manifold ID	Canister Type/Rate	Purge				Helium		Sample			
						Begin Time	End Time	Volume (L)	Helium (ppm)	Indoor Ambient Air (ppm)	Under Shroud (%) (ideal = 40)	Begin Time	End Time	Initial Vacuum ("Hg)	Final Vacuum ("Hg)
Example	04/06/2021	Pass	3671	225	1 L Summa	13:46	13:51	1	50	0	43.9	13:55	14:00	-30	-5
Example	04/06/2021	Pass	3347	204	1 L Summa	13:05	13:10	1	175	0	58	13:13	13:19	-29	-5

Notes

1% = 10,000 ppm.

To avoid data rejection during validation, the amount of helium in the sample must be less than 5% of the helium concentration under the shroud. For example, if there is 50% helium in the shroud, your sample may contain up to 2.5%, (25,000 ppm) helium.

"Hg = inches of mercury.

L = liter.

ppm = parts per million.