CONFORMED COPY

20221208000482

COVENANT Rec: $267.50
12/8/2022 1:44 PM
KING COUNTY, WA

Return Address:
Nicholas Acklam
Toxics Cleanup Program
Department of Ecology
300 Desmond DR, SE
Lacey, WA 98503

Please print or type information **WASHINGTON STATE RECORDER'S Cover Sheet** (RCW 65.04)

Document Title(s) (or transactions contained therein): (all areas applicable to your document **must** be filled in)

1. Environmental Covenant 2. _____

3. _____ 4. _____

Reference Number(s) of Documents assigned or released:

Additional reference #'s on page _____ of document

Grantor(s) Exactly as name(s) appear on document

1. PL Plateau, LLC a Washington limited liability company

2. _____, _____

Additional names on page _____ of document.

Grantee(s) Exactly as name(s) appear on document

1. State of Washington Department of Ecology

2. _____, _____

Additional names on page _____ of document.

Legal description (abbreviated: i.e. lot, block, plat or section, township, range)

Parcel 1 of KC SP #5950330 REC #9912019002 TGW POR OF LOT 4 OF REV KC SP #674172 REC #8002251081 DAF BEG AT NE COR OF SD LOT 4

Additional legal is on page 1 of document.

Assessor's Property Tax Parcel/Account Number ☐ Assessor Tax # not yet assigned 102406-9111

The Auditor/Recorder will rely on the information provided on this form. The staff will not read the document to verify the accuracy or completeness of the indexing information provided herein.

"I am signing below and paying an additional $50 recording fee (as provided in RCW 36.18.010 and referred to as an emergency nonstandard document), because this document does not meet margin and formatting requirements. Furthermore, I hereby understand that the recording process may cover up or otherwise obscure some part of the text of the original document as a result of this request."

Barry O'Brien
Signature of Requesting Party

Note to submitter: Do not sign above nor pay additional $50 fee if the document meets margin/formatting requirements

After Recording Return
Original Signed Covenant to:
Nicholas Acklam
Toxics Cleanup Program
Department of Ecology
300 Desmond Dr SE,
Lacey, WA 98503

Environmental Covenant

Grantor: PL Plateau, LLC, a Washington limited liability company
Grantee: State of Washington, Department of Ecology (hereafter "Ecology")
Brief Legal Description: PARCEL 1 OF KC SP #S89S0330 REC #8912019002 TGW POR OF LOT 4 OF REV KC SP #674172 REC # 8602251081 DAF - BEG AT NE COR OF SD LOT 4 TH N 88-10-06 W ALG N LN THOF 85 FT TH S 01-31-46 W 15 FT TH S 88-10-06 E 85 FT TO E LN OF SD LOT 4 TH N 01-31-46 E ALG SD E LN 15 FT TO POB - SD SHORT PLATS BEING LOCATED IN NW 1/4 OF SW 1/4 OF NW 1/4 OF SEC 10-24-6 - AKA LOT A OF KC LLA #S90M0091 REC #9101250623 LESS POR DEEDED TO KING COUNTY PER 20000315001003
Tax Parcel Nos.: 102406-9111

RECITALS

a. This document is an environmental (restrictive) covenant (hereafter "Covenant") executed pursuant to the Model Toxics Control Act ("MTCA"), chapter 70.105D RCW, and Uniform Environmental Covenants Act ("UECA"), chapter 64.70 RCW.

b. The Property that is the subject of this Covenant is part or all of a site commonly known as Pine Lake Cleaners (Facility/Site ID: 43185526; Cleanup Site ID: 15257; VCP Project ID: XN0013. The Property is legally described in Exhibit A, and illustrated in Exhibit B, both of which are attached (hereafter "Property"). If there are differences between these two Exhibits, the legal description in Exhibit A shall prevail.

c. The Property is the subject of remedial action under MTCA. This Covenant is required because residual contamination remains on the Property after completion of remedial actions. Specifically, the following principal contaminants remain on the Property:

Medium	Principal Contaminants Present
Soil	Perchloroethylene (PCE) and trichloroethylene (TCE)
Soil Gas	Perchloroethylene (PCE) and trichloroethylene (TCE)
Groundwater	Not applicable
Surface Water/Sediment	Not applicable

d. It is the purpose of this Covenant to restrict certain activities and uses of the Property to protect human health and the environment and the integrity of remedial actions conducted at the site. Records describing the extent of residual contamination and remedial actions conducted are available through Ecology. These include the following documents:

- Remedial Investigation/Feasibility Study & Cleanup Action Plan, Pine Lake Cleaners, UEP, November 14, 2021

- Vapor Intrusion (VI) Sampling Plan and Barrier Inspection Work Plan, Pine Lake Cleaners, UEP, May 12, 2022

e. This Covenant grants Ecology, as holder of this Covenant, certain rights under UECA and as specified in this Covenant, and is not intended to be an ownership interest which equates to liability under MTCA or the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601 *et seq.*

COVENANT

PL Plateau, LLC, a Washington limited liability company, as Grantor and fee simple owner of the Property hereby grants to the Washington State Department of Ecology, and its successors and assignees, (hereafter "Ecology") the following covenants. Furthermore, it is the intent of the Grantor that such covenants shall supersede any prior interests the GRANTOR has in the property and run with the land and be binding on all current and future owners of any portion of, or interest in, the Property.

Section 1. General Restrictions and Requirements.

The following general restrictions and requirements shall apply to the Property:

a. Interference with Remedial Action. The Grantor shall not engage in any activity on the Property that may impact or interfere with the remedial action and any operation, maintenance, inspection or monitoring of that remedial action without prior written approval from Ecology.

b. Protection of Human Health and the Environment. The Grantor shall not engage in any activity on the Property that may threaten continued protection of human health or the environment without prior written approval from Ecology. This includes, but is not limited to, any activity that results in the release of residual contamination that was contained as a part of the remedial action or that exacerbates or creates a new exposure to residual contamination remaining on the Property.

c. Continued Compliance Required. Grantor shall not convey any interest in any portion of the Property without providing for the continued adequate and complete operation, maintenance and monitoring of remedial actions and continued compliance with this Covenant.

d. Leases. Grantor shall restrict any lease for any portion of the Property to uses and activities consistent with this Covenant and notify all lessees of the restrictions on the use of the Property.

e. Amendment to the Covenant. Grantor must provide written notice and obtain approval from Ecology at least sixty (60) days in advance of any proposed activity or use of the Property in a manner that is inconsistent with this Covenant. Before approving any proposal, Ecology must issue a public notice and provide an opportunity for the public to comment on the proposal. If Ecology approves the proposal, the Covenant will be amended to reflect the change.

Section 2. Specific Prohibitions and Requirements.

In addition to the general restrictions in Section 1 of this Covenant, the following additional specific restrictions and requirements shall apply to the Property.

Containment of Soil and Soil Gas below the Dry Cleaners Facility. The final remedial action for the Property is based on containing contaminated soil and soil gas under a cap consisting of an existing continuous (no expansion joints) 6-inch thick concrete floor and underlying plastic

moisture barrier located across the entire dry cleaner facility, as illustrated in Exhibit C. The concrete floor and moisture barrier are referred to collectively as the "cap." The primary purpose of the cap is to prevent direct contact and vapor intrusion. As such, the following restrictions shall apply within the area illustrated in Exhibit C.

- Any activity on the Property that will compromise the integrity of the cap (including drilling; digging; piercing the cap with sampling device, post, stake or similar device; grading; excavation; installation of underground utilities; removal of the cap; or application of loads in excess of the cap load bearing capacity) is prohibited without prior written approval by Ecology. The Grantor shall report to Ecology within forty-eight (48) hours of the discovery of any damage to the cap. Unless an alternative plan has been approved by Ecology in writing, the Grantor shall promptly repair the damage and submit a report documenting this work to Ecology within thirty (30) days of completing the repairs.
- The Grantor shall not alter or remove the existing structures on the Property in any manner that would expose contaminated soil, result in a release to the environment of contaminants, or create a new exposure pathway, without prior written approval of Ecology. Should the Grantor propose to remove all or a portion of the existing structures illustrated in Exhibit C so that access to the underlying contamination is feasible, Ecology may require treatment or removal of the underlying contaminated soil.
- The Grantor covenants and agrees that it shall perform vapor intrusion monitoring and barrier inspections in accordance with the protocols and schedule in the Vapor Intrusion Sampling Plan and Barrier Inspection Work Plan attached as Exhibit D.
- Subslab vapor probes and indoor locations are located on the Property to monitor the performance of the remedial action. The Grantor shall maintain clear access to these devices and protect them from damage. The Grantor shall report to Ecology within forty-eight (48) hours of the discovery of any damage to any monitoring device. Unless Ecology approves of an alternative plan in writing, the Grantor shall promptly repair the damage and submit a report documenting this repair work to Ecology within thirty (30) days of completing the repairs.

Section 3. Access.

a. The Grantor shall maintain clear access to all remedial action components necessary to construct, operate, inspect, monitor and maintain the remedial action.

b. The Grantor freely and voluntarily grants Ecology and its authorized representatives, upon reasonable notice, the right to enter the Property at reasonable times to evaluate the effectiveness of this Covenant and associated remedial actions, and enforce compliance with this Covenant and those actions, including the right to take samples, inspect any remedial actions conducted on the Property, and to inspect related records.

c. No right of access or use by a third party to any portion of the Property is conveyed by this instrument.

Section 4. Notice Requirements.

a. Conveyance of Any Interest. The Grantor, when conveying any interest within the area of the Property described and illustrated in Exhibits B and C, including but not limited to title, easement, leases, and security or other interests, must:

Provide written notice to Ecology of the intended conveyance at least thirty (30) days in advance of the conveyance.

ii. Include in the conveying document a notice in substantially the following form, as well as a complete copy of this Covenant:

NOTICE: THIS PROPERTY IS SUBJECT TO AN ENVIRONMENTAL COVENANT GRANTED TO THE WASHINGTON STATE DEPARTMENT OF ECOLOGY ON [DATE] AND RECORDED WITH THE KING COUNTY AUDITOR UNDER RECORDING NUMBER [RECORDING NUMBER]. USES AND ACTIVITIES ON THIS PROPERTY MUST COMPLY WITH THAT COVENANT, A COMPLETE COPY OF WHICH IS ATTACHED TO THIS DOCUMENT.

iii. Unless otherwise agreed to in writing by Ecology, provide Ecology with a complete copy of the executed document within thirty (30) days of the date of execution of such document.

b. Reporting Violations. Should the Grantor become aware of any violation of this Covenant, Grantor shall promptly report such violation in writing to Ecology.

c. Emergencies. For any emergency or significant change in site conditions due to Acts of Nature (for example, flood, fire) resulting in a violation of this Covenant, the Grantor is authorized to respond to such an event in accordance with state and federal law. The Grantor must notify Ecology in writing of the event and response actions planned or taken as soon as practical but no later than within 24 hours of the discovery of the event.

d. Any required written notice, approval, reporting or other communication shall be personally delivered or sent by first class mail to the following persons. Any change in this contact information shall be submitted in writing to all parties to this Covenant. As an alternative to providing written notice and change in contact information by mail, these documents may be provided electronically in an agreed upon format at the time of submittal.

PL Plateau, LLC 115 Dorffel Dr. East Seattle, WA 98112 Attn: P. Bryan Syrdal, Manager	Environmental Covenants Coordinator Washington State Department of Ecology Toxics Cleanup Program P.O. Box 47600 Olympia, WA 98504 – 7600 (360) 407-6000 ToxicsCleanupProgramHQ@ecy.wa.gov

Section 5. Modification or Termination.

a. If the conditions at the site requiring a Covenant have changed or no longer exist, then the Grantor may submit a request to Ecology that this Covenant be amended or terminated. Any amendment or termination of this Covenant must follow the procedures in MTCA and UECA and any rules promulgated under these chapters.

Section 6. Enforcement and Construction.

a. This Covenant is being freely and voluntarily granted by the Grantor.

b. Grantor shall provide Ecology with an original signed Covenant and proof of recording within ten (10) days of execution of this Covenant.

c. Ecology shall be entitled to enforce the terms of this Covenant by resort to specific performance or legal process. All remedies available in this Covenant shall be in addition to any and all remedies at law or in equity, including MTCA and UECA. Enforcement of the terms of this Covenant shall be at the discretion of Ecology, and any forbearance, delay or omission to exercise its rights under this Covenant in the event of a breach of any term of this Covenant is not a waiver by Ecology of that term or of any subsequent breach of that term, or any other term in this Covenant, or of any rights of Ecology under this Covenant.

d. The Grantor, upon request by Ecology, shall be obligated to pay for Ecology's costs to process a request for any modification or termination of this Covenant and any approval required by this Covenant.

e. This Covenant shall be liberally construed to meet the intent of MTCA and UECA.

f. The provisions of this Covenant shall be severable. If any provision in this Covenant or its application to any person or circumstance is held invalid, the remainder of this Covenant or its application to any person or circumstance is not affected and shall continue in full force and effect as though such void provision had not been contained herein.

g. A heading used at the beginning of any section or paragraph or exhibit of this Covenant may be used to aid in the interpretation of that section or paragraph or exhibit but does not override the specific requirements in that section or paragraph.

The undersigned Grantor warrants it holds the title to the Property and has authority to execute this Covenant.

EXECUTED this 29th day of September, 2022

PL PLATEAU, LLC
a Washington limited liability company

By: P. Bryan Syrdal

Title: Manager

STATE OF WASHINGTON
COUNTY OF KING

On this 29th day of September, 2022 I certify that P. Bryan Syrdal personally appeared before me, acknowledged that he is the Manager of PL Plateau, LLC, the limited liability company that executed the within and foregoing instrument, and signed said instrument by free and voluntary act and deed of said limited liability company, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument for said corporation.

CYNTHIA A MILLER NOTARY PUBLIC 116485 COMMISSION EXPIRES 2-19-26 STATE OF WASHINGTON

Cynthia A. Miller
Notary Public in and for the State of Washington
Residing at Seattle, WA
My appointment expires 2/19/2026

The Department of Ecology, hereby accepts the status as GRANTEE and HOLDER of the above Environmental Covenant.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

NICHOLAS M. ACKLAM

by: _____

Title: TCP SECTION MANAGER-HQ

Dated: 10/12/2022

STATE ACKNOWLEDGMENT

STATE OF Washington

COUNTY OF King

On this 12th day of October, 2022, I certify that Nicholas Acklam personally appeared before me, acknowledged that **he/she** is the Section Manager, TCP of the state agency that executed the within and foregoing instrument, and signed said instrument by free and voluntary act and deed, for the uses and purposes therein mentioned, and on oath stated that **he/she** was authorized to execute said instrument for said corporation.

Lorna L. Gadwa
Notary Public in and for the State of Washington

Residing at Olympia, WA

My appointment expires September 17, 2023

LORNA L GADWA
COMMISSION EXPIRES
NOTARY
Comm No.
44949
PUBLIC
9-17-2023
STATE OF WASHINGTON

Exhibit A

LEGAL DESCRIPTION

PARCEL 1, KING COUNTY SHORT PLAT NO S89S0330, RECORDED UNDER RECORDING NUMBER
8912019002, AND THAT PORTI0N OF LOT 4, KING COUNTY SHORT PLAT NO 674172 (REVISED),
RECORDED UNDER RECORDING NUMBER 8602251081, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID LOT 4,
THENCE NORTH 88°10'06" WEST ALONG THE NORTH LINE OF SAID LOT 4 A DISTANCE OF
85.00 FEET;
THENCE SOUTH 0°31'46" WEST PARALLEL WITH THE WEST LINE OF SECTION 10, TOWNSHIP 24
NORTH, RANGE 6 EAST, W.M., IN KING COUNTY, WASHINGTON, A DISTANCE OF 15.00 FEET,
THENCE SOUTH 88°10'06" EAST 85.00 FEET TO THE EAST LINE OF SAID LOT 4,
THENCE NORTH 01°31'46" EAST ALONG THE EAST LINE OF SAID LOT 4 A DISTANCE OF 15.00
FEET TO BEGINNING;

(ALSO KNOWN AS LOT A OF KING COUNTY LOT LINE ADJUSTMENT NO. S90M0091, RECORDED
UNDER RECORDING NUMBER 9101250623);

EXCEPT THE WEST 8 FEET THEREOF, AS CONVEYED TO KING COUNTY BY DEED RECORDED UNDER
RECORDING NUMBER 20000315001003;

SITUATE IN THE CITY OF SAMMAMISH, COUNTY OF KING, STATE OF WASHINGTON.

Exhibit B

PROPERTY MAP

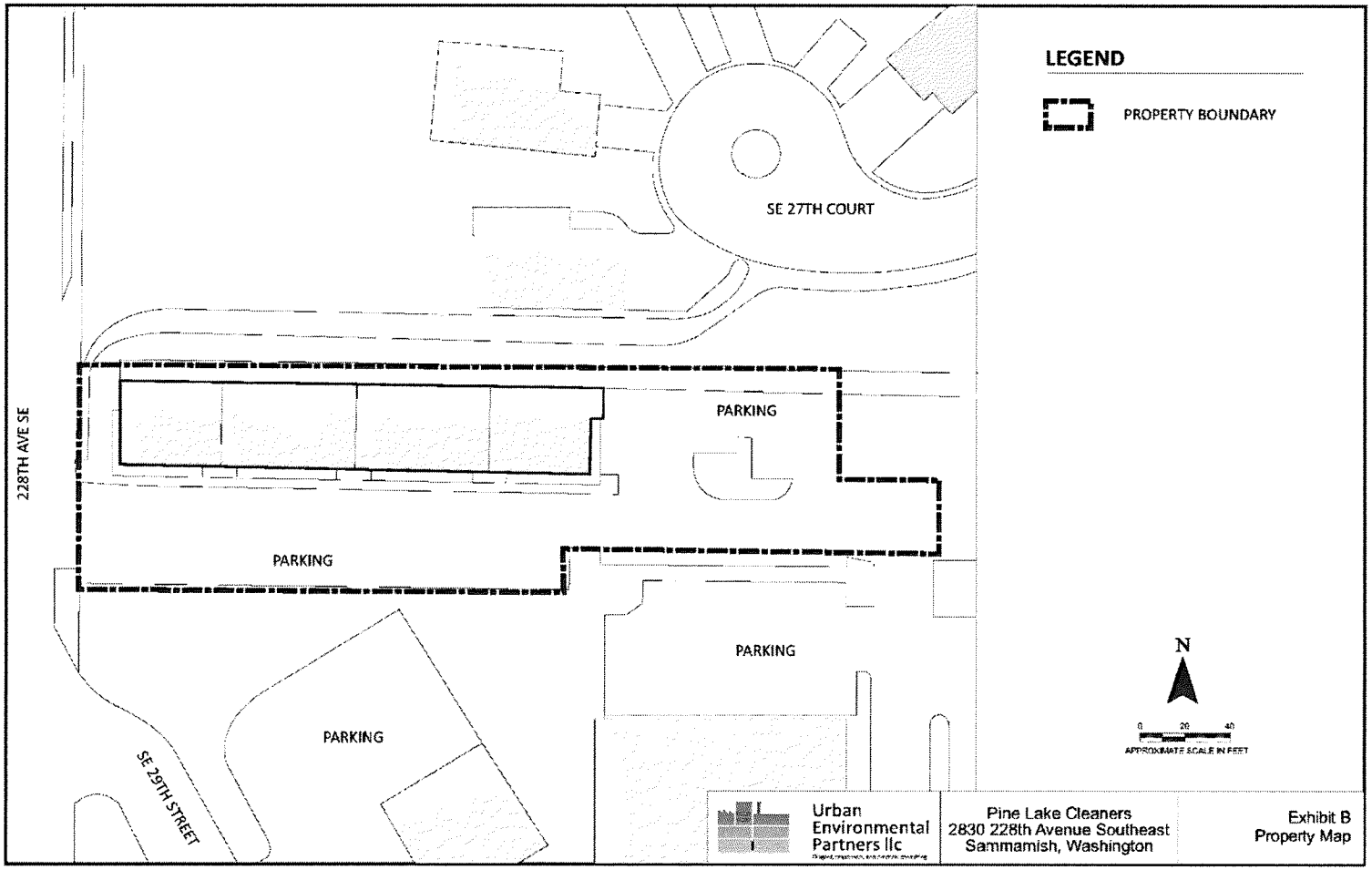


Exhibit C

MAP ILLUSTRATING LOCATION OF RESTRICTIONS

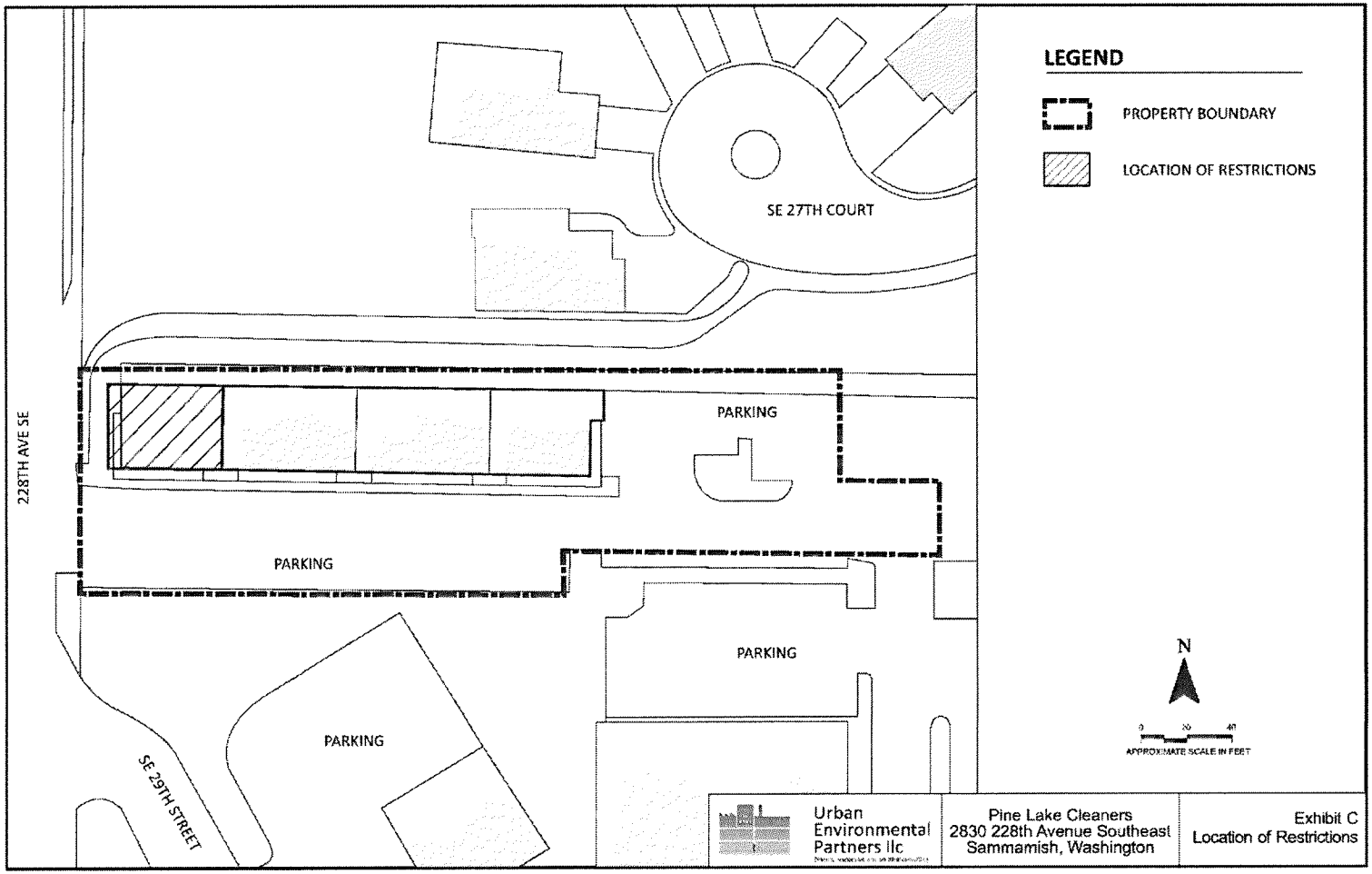


Exhibit D

VAPOR INTRUSION SAMPLING PLAN AND BARRIER INSPECTION WORK PLAN

Urban Environmental Partners llc

Vapor Intrusion (VI) Sampling Plan and Barrier Inspection Work Plan

Pine Lake Cleaners
2830 228th Avenue Southeast
Sammamish, WA 98075
VCP Project ID: XN0013

Prepared By:
Urban Environmental Partners llc
2324 First Avenue, Suite 203
Seattle, WA 98121

Report Date:
May 12, 2022

Diligent, responsive, and practical consulting!

Urban Environmental Partners llc

Professional Certification

This document was prepared under my direction. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I hereby certify that I was in responsible charge of the work performed for this document.

Roy Kuroiwa
Environmental Engineer
Washington P.E. Registration No. 32174

May 12, 2022
Date

Table of Contents

ATTACHMENTS

List of Acronyms & Abbreviations

Acronym	Explanation
APH	Air-phase Petroleum Hydrocarbons
bgs	Below ground surface
DCE	Dichloroethene
CFR	Code of Federal Regulations
CLARC	Cleanup Level and Risk Calculation
COPC	Constituent or Contaminant of Potential Concern
DRPH	Diesel Range Petroleum Hydrocarbons
EC	Environmental Covenant
Ecology	Washington State Department of Ecology
HVAC	Heating, Ventilation, and Air Conditioning
IA	Indoor Air
MTCA	Model Toxics Control Act
PCE	Tetrachloroethene
PID	Photoionization Detector
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
SL	Screening Level
SSSG	Subslab Soil Gas
TCE	Trichloroethene
UEP	Urban Environmental Partners llc
USEPA	United States Environmental Protection Agency
VCP	Voluntary Cleanup Program
VI	Vapor Intrusion
VOC	Volatile Organic Compound
WAC	Washington Administrative Code

1.0 Introduction

1.1. PURPOSE AND INTRODUCTION

The purpose of this vapor intrusion (VI) Sampling Plan and Barrier Inspection Work Plan (Work Plan) is to present the plan for VI monitoring and associated laboratory testing and for existing barrier inspection that will provide data and information (e.g., multiple lines of evidence) to assess and document the Site's VI pathway. This Work Plan was prepared in general accordance with WAC 173-340-820 (Sampling and Analysis Plans) and Ecology guidance. The Site has no relevant (e.g., very deep) or impacted groundwater (RI/FS/CAP Pine Lake Cleaners, 11/14/21) therefore there is no Groundwater Compliance Monitoring Plan associated with this Site. As presented in the Site's Cleanup Action Plan, proposed monitoring elements for the continued protection from the VI pathway includes:

- Paired subslab soil gas and indoor air samples
- Concurrent ambient air samples
- Subslab, indoor and outdoor pressure and temperature readings, including barometric pressure
- Inspection and repairs, as necessary, to the existing ground-level concrete floor (barrier)
- Property specific Environmental Covenant (EC)

This Work Plan is focused on potential indoor air and human health exposures associated with the VI pathway since that is the primary pathway of potential concern for the site at this time. The data and information collected as part of this Work Plan will be used to determine: a) if the VI pathway presents an unacceptable risk for retailers and commercial workers at the Site; and b) contribute to the data needed to make a No Further Action (NFA) determination per the Site's Focused FS and Cleanup Action Plan.

This Work Plan also presents inspection and reporting details of the building's existing concrete floor slab, considered a critical physical barrier to the VI pathway. These barrier inspection measures are typical to ensure compliance with the VI pathway.

An inspection and monitoring schedule for both barrier and VI monitoring are provided below. This schedule includes the sampling and inspection events, how and when the data will be evaluated and, if appropriate, events terminated (or continued) from future monitoring tasks as justified/appropriate. Also included is the 5-year review period/event with Ecology.

Environmental Covenant. This plan will be incorporated into a property-specific environmental covenant, which will include the following conditions and requirements:

- The elements detailed in this VI Sampling and Barrier Inspection plan.

- Maintain the presence and good condition of the subgrade barrier, which consists of the concrete floor slab.
- Recognition of the CVOC-impacted shallow soil below the Pine Lake Cleaners building and commitment to maintain the presence and good condition of the building.
- Should the building be removed, a commitment to cleanup CVOC-impacted soil to meet applicable CULs.
- And, standard Ecology Access, Notice and Reporting requirements.

1.2. SITE BACKGROUND AND LOCATION

The Property is located at 2830 – 228th Avenue Southeast in Sammamish, Washington, approximately 2 miles south of downtown Sammamish, Washington, as shown in Figure 1. Figure 2 depicts a plan view/layout of the Property. The Property consists of an irregularly shaped tax parcel (King County Parcel No. 1024069111) that covers approximately 30,501 square feet (0.70 acres).

The Property's one-story commercial building is heated by electricity. The Property building is constructed in four separate sections, with each section to the east approximately four feet higher in elevation than the last. Pine Lake Cleaners occupies the lowest elevation and Plateau Jewelers occupying the second lowest elevation. Each section of the building is built with a 6-inch thick, continuous (e.g., no expansion joints) concrete floor slab separated by an 8-inch thick, 4-foot-high concrete footing between each flooring elevation. The building has a continuous plastic sheet below the slab that functions as a moisture barrier. Additional improvements include parking areas to the south and east of the building as shown on Figure 2.

Cleaners' Operations. The cleaner first opened when the building was newly developed in 1990. Its location at the far west end of the building has not changed since then. During its operations, the cleaner has operated initially as a chemical-based dry machine (cleaner) and recently as a water-based, detergent machine (laundry machine).

In 2000, PLC replaced the cleaner with a new, solvent-based machine (SuperStar machine) and installed it in a new location, about 5 feet west of the boiler room. The machine was set on a commercial grade, steel-floor pan, separating and protecting the floor of the premises. Solvent spot cleaning then resumed in a space south of the boiler room (former location of the 1990 cleaner). It was reported by PLC that they used a spot cleaner called Picrin®, which contained 75%-by-weight the solvent trichloroethylene (TCE).

In 2019, PLC replaced the solvent-based cleaner with a hydrocarbon-based (i.e., solvent free) cleaner (Union HL840) in the same location (Figure 3). The cleaner removal and replacement were observed by an Ecology representative. Spot cleaning was continued in the same location, south of the boiler room using a solvent-free spot cleaner (Picrin® discontinued).

1.3. REGULATORY CONTEXT

The requirements of the Model Toxics Control Act (MTCA) will be addressed through the supervision of the Department of Ecology's Toxics Cleanup Program under their Expedited Voluntary Cleanup Program (Exp-VCP). The Exp-VCP Project ID is XN0013 and the Site Name is Pine Lake Cleaners.

1.4. WORK PLAN ORGANIZATION

This Work Plan is organized as follows:

- Section 1: Introduction
- Section 2: Summary of Existing Results
- Section 3: Vapor Intrusion Sampling Plan
- Section 4: Quality Assurance and Project Plan
- Section 5: Reporting

2.0 SUMMARY OF EXISTING RESULTS

Since the VI pathway is the primary exposure pathway of potential concern at this time and the subject of this Work Plan, a summary of existing soil gas and indoor air results is presented in this section to support the design of VI monitoring activities. A detailed presentation of the Site's conceptual model, including soil, soil gas and indoor air quality is provided in the Site's Remedial Investigation, Feasibility Study and Cleanup Action Plan (RI/FS/CAP) Report (UEP, November 2021).

Section 3 provides the details of the subslab soil gas (SSSG) and indoor air (IA) sampling plan to demonstrate and confirm that the VI pathway is incomplete for occupants of the retail space.

2.1. VAPOR INTRUSION PATHWAY

2.1.1. Current COPCs for the VI Pathway

For the purposes of this Work Plan, a constituent was identified as a contaminant of potential concern (COPC) for the VI pathway if the maximum detected concentration in any previous SSSG or IA sample exceeded the SSSG or IA screening level (SL) for unrestricted land use. The identified COPCs for the VI pathway at this time are:

- PCE or perchloroethene (also known as tetrachloroethylene)
- TCE or trichloroethene

Additional COPCs may be identified based on the results obtained pursuant to implementing the Work Plan. For future data presentation, all analytes detected during future monitoring events will be presented and evaluated against their appropriate screening levels or cleanup levels.

2.1.2. SLs for the VI Pathway

Subslab soil gas screening levels (SLs) and indoor air cleanup levels (CULs) were determined using the MTCA Method B cancer values, modified per Equation 750-2 for commercial activity exposure for each COPC.

- PCE: Screening Level for SSSG = 320 ug/m3 and IA CUL = 9.6 ug/m3
- TCE: Screening Level for SSSG = 11 ug/m3 and IA CUL = 0.33 ug/m3 (early life adjustment) and 2.1 ug/m3 (commercial activity)

2.1.3. Historic Subslab Soil Gas Sampling Results

As a result of the subsurface soil impacts at the Site, SSSG was sampled as a Tier 1 (outside the building) evaluation for potential, future indoor air exposure scenarios and related to a potential vapor intrusion pathway. This data is also used to estimate the 'strength' of the

pathway potential for VI. Throughout this work, SSSG samples from the cleaners will be co-located with IA samples to collect and evaluate multiple lines of evidence with regards to the VI pathway.

Three rounds of SSSG sampling were conducted – 10/5/2018, 11/18/2018, and paired SSSG and IA samples on 8/5/2020, 1/20/2021 and 2/24/2021. There were multiple incidents when SSSG sample results for PCE exceeded its respective SL by a factor of 10 or close to 100 times and three incidences when sample results for TCE exceeded its SL 2 to 10 times, indicating a 'strong' potential for a future VI pathway (Table 1, UEP RI/FS/CAP, November 2021).

2.1.4. Historic Indoor Air Sampling Results

Co-located indoor air sampling events on 8/5/2020, 1/20/2021 and 2/24/2021 confirmed low detections of PCE and TCE in the cleaners' shop. Early samples (2020, prior to the solvent-based cleaner replacement) contained both PCE and TCE just below or slightly above their respective SLs. However, by the 2021 IA sampling, all PCE and TCE results were considerably below the respective IA CULs or below their laboratory detection limits. Vinyl chloride was never detected above the reporting limit in IA samples. See Table 2 of the RI/FS/CAP Report for a summary of these data (UEP, November 14, 2021).

3.0 VAPOR INTRUSION SAMPLING AND ANALYSIS PLAN

The purpose of this VI sampling and analysis plan (SAP) is to present methodology for collecting and analyzing soil gas and indoor air samples in general accordance with WAC 173-340-820 and Ecology's Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology, March 2022).

3.1. SAMPLING DESIGN AND SCHEDULE

Several vapor intrusion investigations consisting of soil gas and indoor air sampling have been completed at the Site beginning in 2018 through 2021. Based on the last two rounds if IA monitoring and comparison to MTCA Method B commercial CULs, the data indicate there is currently not a VI risk to building occupants, specifically in the cleaners' space but also in the adjacent jeweler space. Subslab soil gas monitoring indicates a continued presence of elevated PCE and TCE soil gas concentrations below the concrete slab floor.

This VI monitoring plan continues the evaluation of the VI pathway using multiple lines of evidence approach to confirm that the VI exposure pathway is incomplete and remains that way over time. The paired SSSG and IA samples in the cleaners' space will be combined with differential pressure and temperature gradient measurements to establish the multiple lines of evidence. Other conditions required for effective VI monitoring include a thorough inspection of and inventory of chemicals present in the cleaners' space and one ambient air sample upgradient of the sampled indoor space. The paired SSSG and IA quality sampling includes the following sampling locations and functions shown in Figure 4 and described in the below. Note that 'VI' Monitoring locations are paired SSSG and VI samples.

Paired Sampling Locations and Functions:

VI Monitoring ID	Location - Function	Comments
VI-1	Dry cleaner space, at former solvent cleaner location and spot cleaning station – confirm no VI pathway	Paired SSSG and IA samples at historic (2018) elevated SSSG and IA sample results. Data will establish basis for NFA determination/reopener, as appropriate.
VI-2	Dry cleaner space, adjacent to public access, counter for pickup and drop off – confirm no VI pathway	Paired SSSG and IA samples in immediately adjacent to public counter. Data will establish basis for NFA determination/reopener, as appropriate.

Amb-1	Approx. 25-feet from cleaner front door and predominate upwind direction – evaluate potential background contribution	Ambient Air - Outside at an (measured) upwind location. Background un-related to site activities. Location determined at time of sampling based on wind vector.

'VI' in this table indicates a paired SSSG and IA sample location.

To support the NFA (with institutional controls) determination for the site, VI monitoring events at the Site will be conducted as outlined below, and begin with Year 1 monitoring, which should be performed within 12 months after recording the Environmental Covenant for the Site, as detailed in the RI/FS/CAP (UEP, November 14, 2021).

VI monitoring and barrier inspections will be performed as follows:

- Year 1 – initial VI monitoring event within 12 months after the recording of the Environmental Covenant.
- Year 2 – follow up monitoring event within 6 to 12 months of the initial event.
- Year 3 – follow up monitoring event within 6 to 12 months of the initial event.
- Year 5 – the final VI monitoring event for the first five-year period. Results for all events will be reported to Ecology in the 5-year review report.
- Year 10 – a second VI monitoring event within the second five-year period. Results will be reported to Ecology in the 5-year review report.
- Year 15 – the first VI monitoring event within the third five-year period. Results will be reported to Ecology in the 5-year review report.

No additional VI monitoring events will be performed following Year 10 or Year 15 if all prior monitoring events beginning with Year 1 are below the VI screening levels. Should building or barrier demolition occur during the required VI monitoring period, cleanup of the residual CVOC-impacted soil and groundwater below the building will be performed soon following demolition and the confirmation results reported to Ecology. VI monitoring will no longer be required.

A flow diagram detailing the step-by-step decision making involved with indoor air sampling for Years 1 through 5 then Years 5 through 15 are provided in Appendix A. These diagrams were provided by Ecology and are included as shown.

Reporting Indoor Air Results. Indoor air results below the screening levels will be reported at the first five-year review event. At any time during this monitoring schedule, Ecology shall be notified within 48-hours of receipt of laboratory results if an IA sample result exceeds a screening level.

3.2. SAMPLING ROLES AND RESPONSIBILITIES

The project team for implementing this plan will consist of experienced field technicians and the PMs from UEP and Friedman & Bruya, Inc. laboratory.

3.3. FIELD SAMPLING PROCEDURES

The following steps will be performed for all VI sampling events. Field inspection forms are attached as Appendix A to guide in collecting the appropriate data during the sampling event.

3.3.1. Preparation Activities Prior to Sample Collection

In order for field sampling to begin, the following activities will be completed:

- Notify the building owner and tenants of all commercial spaces of the date and time of sampling, and provide explanation of method of sample collection.
- Coordinate with and ensure that the tenants have removed all chemicals from their tenant spaces at least 36 hours prior to sampling (to the extent practicable).
- Complete health and safety preparation tasks. Obtain all necessary equipment and supplies, including sampling containers.
- Coordinate with the laboratory regarding key elements of the SAP / Quality Assurance Project Plan (QAPP). Verify initial Summa® Canister vacuums measured by Friedman & Bruya, Inc. A canister with an initial vacuum of less than -27 inches of mercury will be returned to Friedman & Bruya, Inc. in exchange for a replacement canister.
- Document the temperature difference between outdoor and indoor sampling spaces upon arrival and departure. Use readily available devices (space heating thermostat) and a weather App to obtain measurements. Schedule sampling events when outdoor temperatures are falling and at least 30 degrees F lower than indoor temperatures, if feasible. Also document any precipitation events within the past 48 hours – avoid sampling events during or immediately after a heavy rain (for soil gas sampling outside the building footprint).
- Document the pressure difference between outdoor, indoor and subslab conditions upon arrival and departure (see below for additional details). A VI monitoring event will only proceed when indoor air pressure is equal to or less than the measured subslab pressure. More than one visit to obtain the ideal pressure readings may be necessary.
- Conduct a pre-sampling reconnaissance of each sampling space/shop and fill out the Indoor Air Sampling – Building Survey Checklist (Appendix A). Pay special attention to potential preferential pathways (e.g., utilities that penetrate the surface, significant cracks in the concrete slab); inventory and catalog the name/type of any chemical

products stored or used in the sampling spaces. Record any new evidence of changes or observed modifications to the space floor, such as penetrations or cracks.

- All windows and doors in the sampling spaces will be closed prior to sampling and will remain closed for the duration of the sampling (doors will only be opened to allow individuals to pass through as necessary to conduct business or sampling activities).
- The HVAC systems will be operated in a manner similar to normal workday conditions (e.g., the heat will be on during the winter sampling event). To comply with pressure gradient requirements, the central heating system may be reduced or turned off during the sampling event (to lower the internal pressures).

3.3.2. Sub-Slab Soil Gas Sampling

Subslab soil gas samples will be collected using the vapor pin procedures outlined in Appendix B. Each SSSG vapor sample will be collected as co-located and concurrently (same day) as practicable with the associated paired IA sample. Each SSSG sample will be collected using a 1-L SUMMA® sample container indicated in Table 1 over an approximately 5- to 8-minute period, with the flow rate controlled by the intake regulator provided by the laboratory. Sampling will stop when the remaining canister vacuum is approximately -3" to -5" of Hg or after eight hours of sampling, whichever occurs first. The final canister vacuum will be recorded on the laboratory supplied chain-of-custody. See Appendix C for the SSSG sampling instructions. To minimize concerns regarding cross-contamination, the SSSG samples will be collected just after all co-located IA samples have been retrieved.

3.3.3. Indoor Air Sampling

Each IA sample will be collected as co-located and concurrently (same day) as practicable with the associated paired SSSG sample. Indoor air samples will be collected using 6-L SUMMA® containers indicated in Table 1 at breathing height (approximately five feet above ground surface), over an approximately eight-hour period to assess typical working conditions or to provide a time-weighted average. The sampling period and flow rate are controlled by the intake regulator provided by the laboratory. Sampling will stop at or near an 8-hour period; cannisters should not fall below -3" Hg. Cannisters reaching -5" Hg prior to 8 hours will be closed. (Note, final cannister vacuums of 8" – 10" Hg are typical). The final canister vacuum will be recorded on the chain-of-custody.

3.3.4. Ambient Air Sampling

In order to estimate ambient air background concentrations during the sampling period, an upwind ambient air sample will be collected at the general location shown on Figure 4 each day that paired SSSG and IA samples are collected. The wind direction will be determined by observations immediately prior to sample collection or by using a wind rose generated with at least one year of wind data from a nearby meteorological station if there is no obvious

wind direction during the day of sampling. Ambient air samples will be collected using the containers indicated in Table 1 at breathing height (approximately five feet above ground surface), over an approximately eight-hour period. Sampling will stop when the remaining canister vacuum contains approximately three to five inches of mercury or after eight hours of sampling, whichever occurs first. The final canister vacuum will be recorded on the chain-of-custody.

If a central heating and colling unit is located and operating, an alternative or additional ambient air background sample should be located at the intake of the unit.

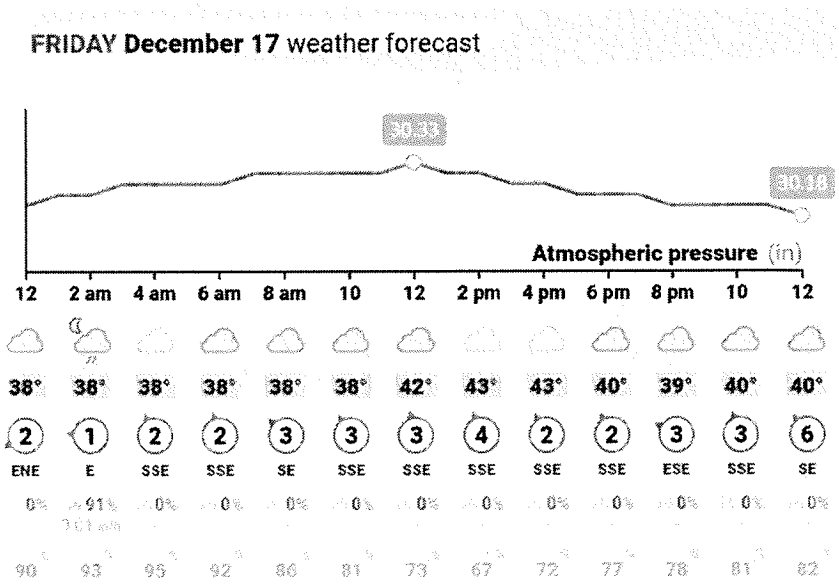
3.3.5. Pressure Gradient Measurements

The VI monitoring event will consider pressure differential (inside and outside) measurements and daily barometric pressure trends. The preferred conditions for the VI monitoring event include:

- The inside pressure should be equal to or less than the subslab pressure during the entire monitoring period (8 hours). Since the existing vapor pins will be used for subslab soil gas collection, differential pressure readings will be made upon arrival with a manometer hooked to the sub-slab vapor pin and also the inside air of the tenant space, and again at conclusion of sampling, before departure from the site. The outside ambient pressure will also be measured using the same pressure reading device.
- Stable or falling barometric pressure, which tends to lead to soil gas flowing out of the ground as the above and below ground pressures seek to equalize. See the figure below as an acceptable sampling period.

Pressure readings will be made with handheld equipment, such as a manometer. Minimize the tubing length and select measurement locations and elevations that can be easily repeated. At vapor pin locations, seal around the floor pin per the standard protocol (Appendix B).

Example of stable or gently falling, predicted barometric pressure in Seattle, WA



3.3.6. Physical Barrier Inspection

This section of the plan presents an inspection and reporting plan for the existing, continuous concrete floor slab in the cleaners' space, which acts as a barrier to prevent vapor intrusion of SSSG to IA. Performed at the same time as soil gas and indoor air sampling, barrier inspection ensures that the barrier remains intact, in good condition, and continues to provide a physical barrier for the VI pathway. We recommend continued annual barrier inspections and documentation past the Year 10 or 15 IA monitoring events, to ensure that the floor remains an effective barrier.

The buildings concrete floor slab is continuous throughout the commercial building and supports no obvious penetrations or openings, other than an occasional floor drain, which are hard piped to the sanitary side sewer. Visual inspection will occur on all slabs where indoor air sampling occurs. Photos will record inspection conditions and observed cracks/repairs or changes in the floor slab as appropriate. A record of the inspection will be provided in the attached form (Appendix B) along with photos during each inspection.

3.4. RECORDKEEPING

Field staff will complete the following forms for each monitoring event (Appendix B). The field checklist and documentation form incorporate the multiple lines of evidence data points and observations as discussed in this plan. These include a site reconnaissance and inventory, temperature and pressure measurements, and details on the paired SSSG and IA samples. In addition, representative photos will be taken to support documentation of the field conditions and sampling procedures.

3.5. VI MONITORING CONTINGENCY PLAN

In accordance with the Site's Cleanup Action Plan, a VI monitoring contingency plan will be implemented when IA sampling results exceed the IA cleanup levels. The contingency plan involves a progressive use of action steps that are generally followed by an IA sampling event. These steps will continue until two rounds of IA results are collected that comply with the IA CULs, or other steps are required by Ecology. If there's an IA exceedance, the monitoring schedule begins again at Year 1. In all cases, any exceedances of the IA cleanup levels will be reported to Ecology immediately.

1. Reinspect the concrete floor surfaces and inventory the space. Note any changes during this inspection. Check sewer and drainage pipes and culverts for conditions. Repair or replace any noted concerns, such as a crack in the floor, deteriorated drainage/pipes, or walls, or storage of new chemicals in the space. Consider applying a 2-part epoxy coating (10-mil dry film thickness) on the concrete floors or walls.

   After suitable correction, repeat a round of IA sampling in accordance with this plan. If the IA results are still above the cleanup levels, then repeat this step. If the IA results are above the cleanup level, discuss these results with Ecology and consider continuing with:

2. Design and install a sub-slab depressurization system (SSDS) in the former cleaner space. These SSDS units are typically 'off-the-shelf' and can be provided by local vendors with a 3- to 6-month turnaround.

3. Perform 2 rounds (separate events) of IA sampling in accordance with this plan. If the IA results are both above the CULs, then meet with Ecology to develop a plan for additional site characterization (identify what has changed) and additional IA mitigation measures.

3.6. LABORATORY ANALYSES AND SAMPLE CONTAINERS

The laboratory analyses that are relevant to each media are shown in Table 1. For this site (an active dry cleaner with a non-solvent machine), the project laboratory will be directed to report only the analytical results for the following specific list of chlorinated solvents – PCE and TCE. The analytical method (EPA Method TO-15), sample container expectations, preservation requirements, and holding times for these laboratory analyses are presented in Table 1. Sample containers will be provided by the laboratory.

3.6.1. Sample Labelling and Shipment

Sample labels will clearly indicate the Site location, sample number identification, date, time, sampler's initials, and testing method. Each sample number identification will be unique and will adhere to the sample identification in Figure 4+ to the extent practicable. The sample canister and flow controller serial numbers will be recorded on the chain of custody.

Canisters for SSSG and IA samples will be packed in cardboard boxes (e.g., the containers the laboratory used to ship the canisters) without preservation (i.e., no ice). Samples will be shipped or returned (likely by car with the field technician) to the laboratory on the same day.

3.6.2. Chain-of-Custody Documentation

Chain-of-custody procedures will be followed to maintain and document sample possession. A sample is considered under a person's custody if it is in that person's physical possession, within visual sight of that person after taking physical possession, secured by that person so that the sample cannot be tampered with, or secured by that person in an area that is restricted to unauthorized personnel.

The originator (the sampler) will complete requested information on the custody record, including signature and date. Original signed custody records listing the samples in the sample shipping container will accompany sample shipments. The originator of the custody record will retain a copy of the custody record.

4.0 QUALITY ASSURANCE PROJECT PLAN

The purpose of this QAPP is to summarize the methodology for ensuring usable sampling and analysis data of acceptable quality are generated.

4.1. FIELD QUALITY CONTROL SAMPLES

Field quality control (QC) samples are optional and include field duplicates. If performed, one indoor air duplicate will be collected during a sampling event at random locations selected by the field sampling team. Field duplicates will be collected simultaneously with the primary air sample using a T-splitter at the point of sample collection. The duplicate will be identified with the same Site ID and analyzed for the same analytes as the primary sample. Blind duplicates will not be collected

4.2. LABORATORY QUALITY CONTROL SAMPLES

Friedman & Bruya, Inc. (FBI) will be responsible for conducting laboratory QC procedures and reporting laboratory QC results in accordance with the analytical methods and their standard operating procedures. Laboratory QC samples provide important qualitative results used to evaluate the laboratory QC procedures. Laboratory samples for TO-15 QC includes method blank, laboratory control sample (also known as blank spikes) and sample duplicates (randomly selected) once per batch of analyses. In addition, it is also expected that FBI will perform, and report results of surrogate recovery for every sample. Expectations for laboratory control limits for laboratory control samples and surrogate recoveries are shown in Table 2.

4.3. LABORATORY TARGET REPORTING LIMITS

Analytical methods and the laboratory have been selected to achieve low target reporting limits. For EPA Method TO-15, the VOC analyte list and a comparison of target reporting limits along with the subslab soil gas and indoor air SLs for unrestricted use are presented in Table 3. Almost all of the target reporting limits are less than the corresponding SLs for unrestricted land use. More importantly, all of the COPCs for the VI pathway have target reporting limits that are less than the SLs for unrestricted land use. Although the target reporting limits for some non-COPCs exceed a SL for unrestricted land use, the target reporting limits are reasonably sensitive. Therefore, the target reporting limits are considered appropriate for the purposes of this investigation.

4.4. DATA QUALITY REVIEW AND VALIDATION

An evaluation of data quality will be performed for all field and lab data. Specifically, field records will be reviewed by UEP or an independent, qualified firm for completeness, accuracy, and legibility. The laboratory will review their results relative to method criteria and laboratory QC procedures as the data

are generated. The laboratory will report their QC results and qualify data as necessary in a report suitable for a Level II data validation. An independent data quality validator may be selected to evaluate precision, accuracy, representativeness, comparability, completeness, and sensitivity by reviewing the following items relative to analytical method criteria, laboratory control limits, and national functional guidelines (USEPA 2016) as necessary:

- Comparison of actual analyses versus requested analyses
- Comparison of consistency between laboratory reports and associated electronic data deliverables
- Holding times
- Field QC sample results
- Lab QC sample results
- Actual reporting limits

The data quality validator may reject data or add other qualifications in addition to the laboratory qualifications. The data quality validation documentation will be included with the applicable laboratory reports for reporting purposes.

4.5. CORRECTIVE ACTION

The need for corrective action will be evaluated as appropriate for deviations from the SAP/QAPP and other potential data quality issues that arise in the field or the laboratory. Relatively minor field issues will be discussed, resolved, and documented by the UEP Project Manager, field personnel, and/or the laboratory. Potential corrective action decisions may include one or more of the following:

- Revising the sampling and analysis methodology
- Collecting a new sample
- Reanalyzing an existing sample
- Accepting the data with a recognized level of uncertainty
- Revising the sampling design

5.0 REPORTING

All records associated with this monitoring plan will be provided to Ecology at the 5-year reporting period(s). When an exceedance of a screening level is discovered, validated data will be provided to Ecology within 30 days followed by an in-person meeting to review the results and discuss next steps.

Periodic or five-year review reports will include, at a minimum, the following materials:

- Summary of analytical results for SSSG and IA sampling
- Figures depicting the location of samples
- If needed, a discussion of the sampling event and unique or significant findings
- A copy of the reconnaissance report and a discussion of any unique or significant findings
- A summary of the temperature, pressure and meteorological conditions during the monitoring event
- A copy of the laboratory analytical report.

6.0 REFERENCES

Ecology 2016. Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies, December.

Ecology 2022. Guidance for Evaluating Vapor Intrusion in Washington State: Investigation and Remedial Action, Final: March 2022.

Ecology 2021. Toxics Cleanup Program's Cleanup Levels and Risk Calculations database, https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx, accessed January.

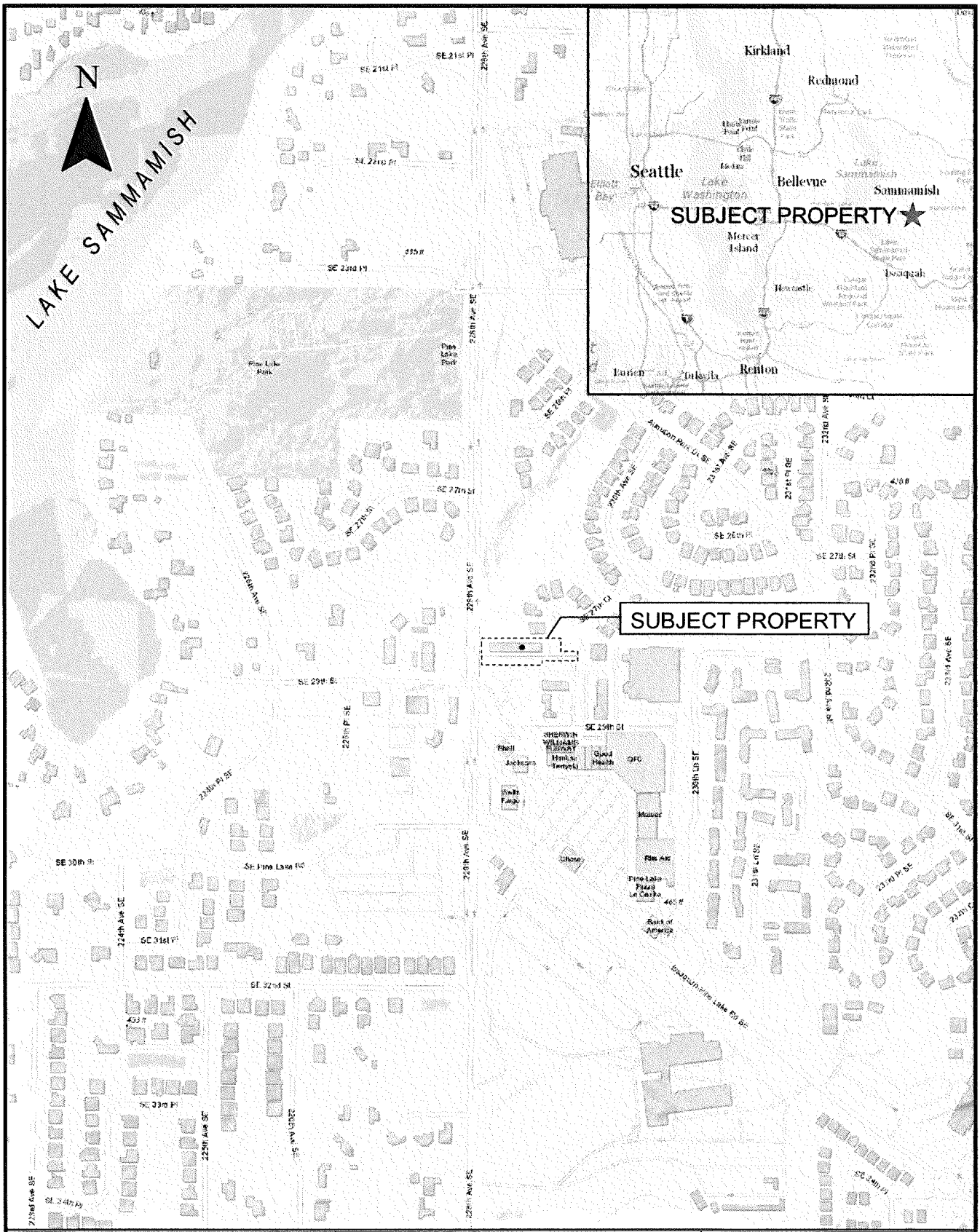
Urban Environmental Partners llc, 2021, Remedial Investigation/Feasibility Study & Cleanup Action Plan, Pine Lake Cleaners Site, 2830 228th Avenue SE, Sammamish, WA, November 14, 2021.

Pioneer Technologies Corporation, 2021, Vapor Intrusion Investigation Report, Pine Lake Cleaners Site, 2830 228th Avenue SE, Sammamish, WA, May, 2021.

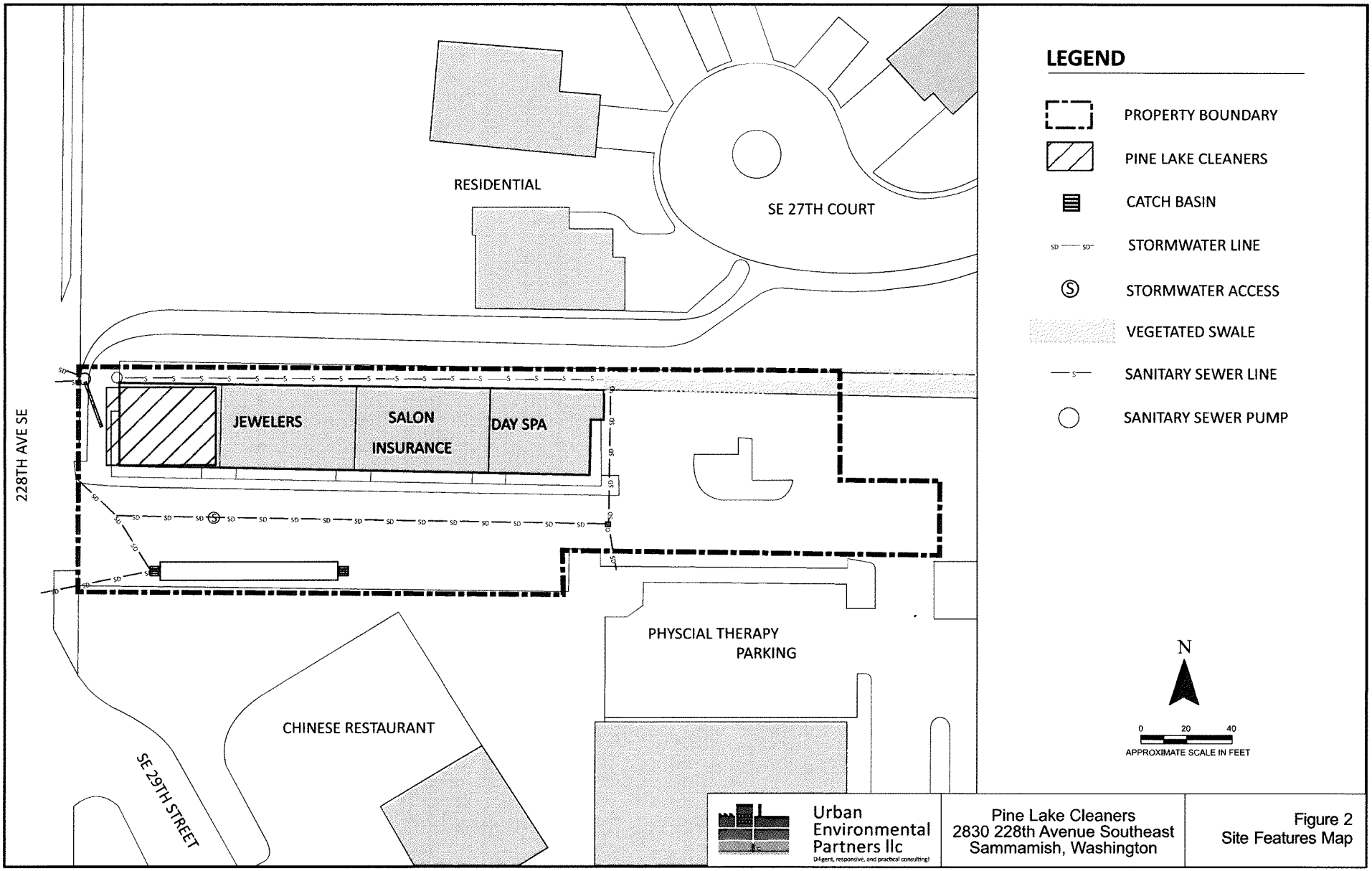
USEPA 1989. Risk Assessment Guidance for Superfund (RAGS): Volume I. Human Health Evaluation Manual (Part A. Office of Emergency and Remedial Response, Washington, DC. EPA/540/1-89/002. December.

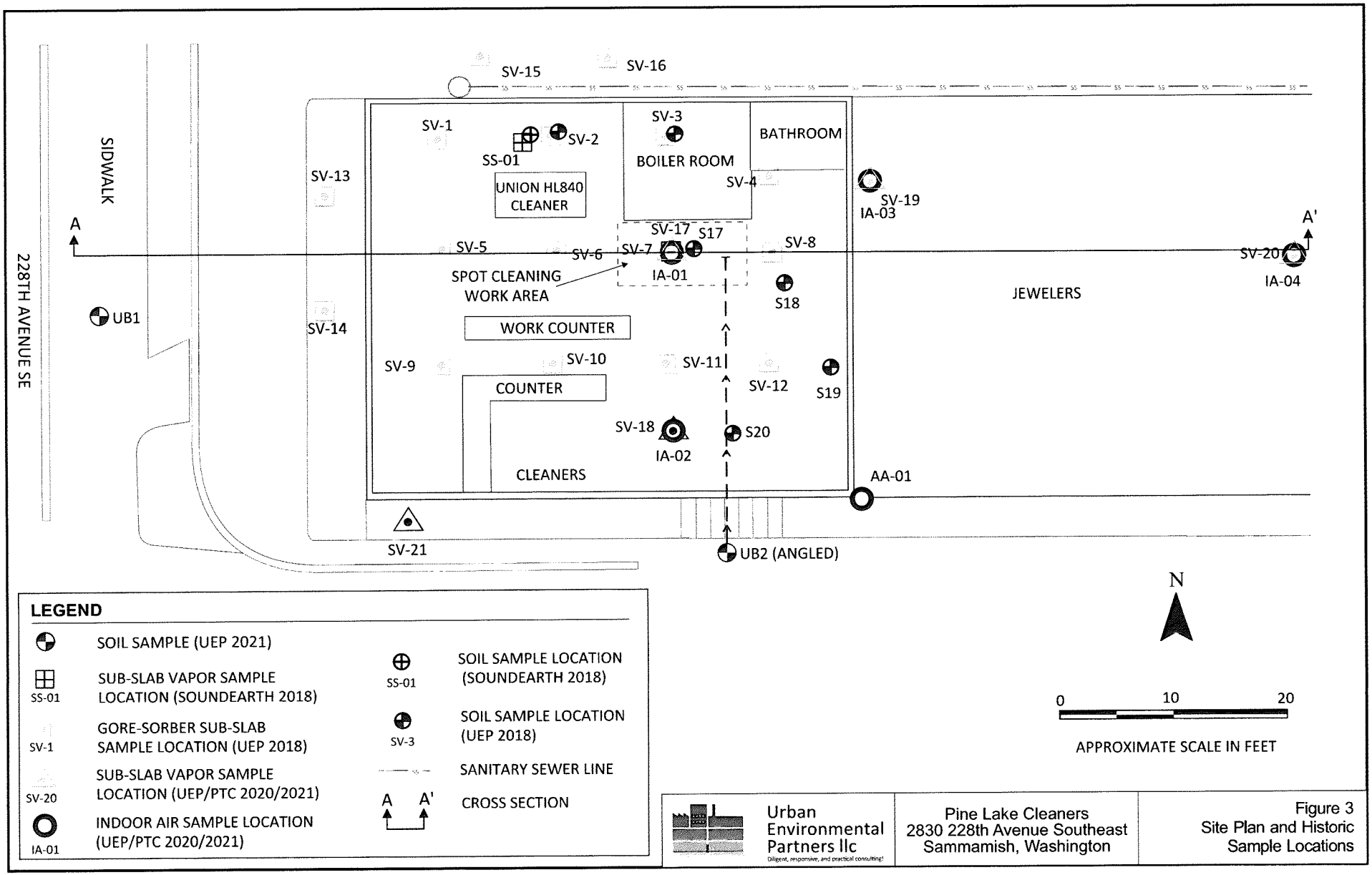
USEPA. 2011. Background Indoor Air Concentrations of Volatile Organic Compounds in North American Residences (1990-2005): A Compilation of Statistics for Assessing Vapor Intrusion, June.

USEPA 2016. National Functional Guidelines for Superfund Organic Methods Data Review. EPA-540-R-2016-002. September.



Urban Environmental Partners llc Diligent, responsive, and practical consulting!	Pine Lake Cleaners 2830 228th Avenue Southeast Sammamish, Washington	Figure 1 Site Vicnity Map

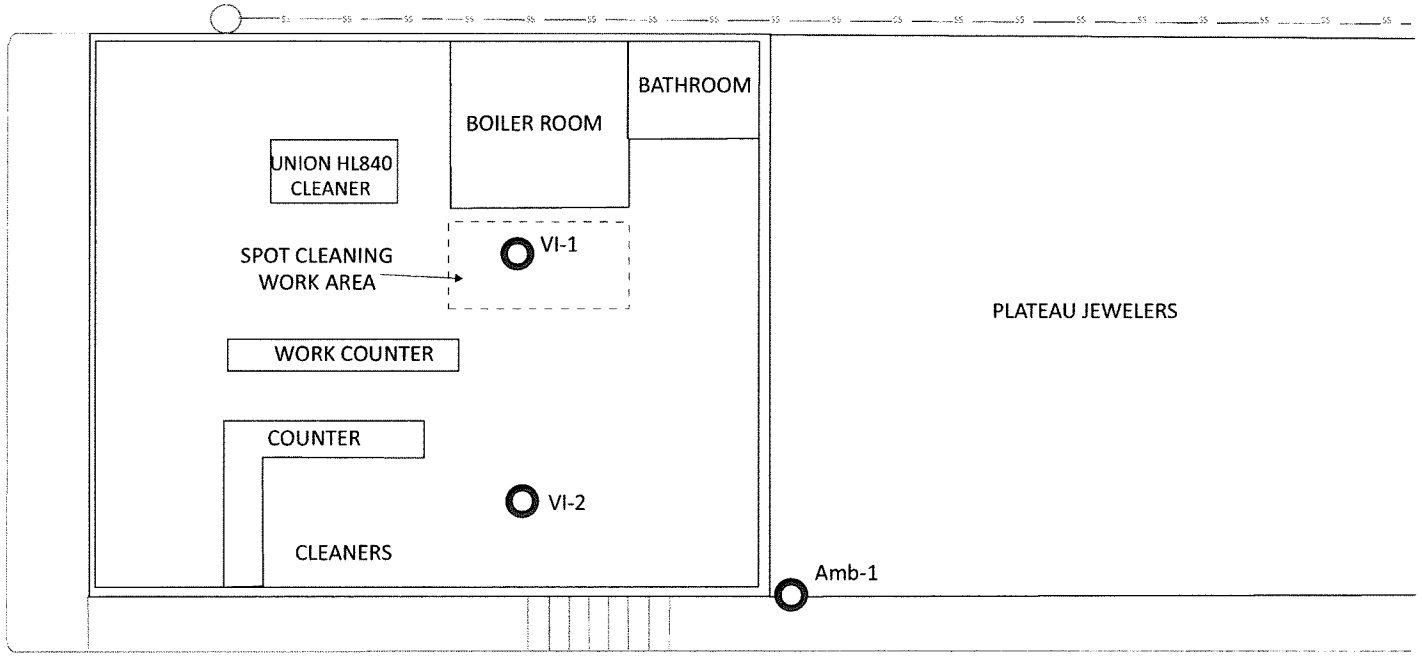

RESIDENTIAL
SE 27TH COURT
228TH AVE SE
JEWELERS
SALON
INSURANCE
DAY SPA
PHYSCIAL THERAPY
PARKING
CHINESE RESTAURANT
SE 29TH STREET
LEGEND
PROPERTY BOUNDARY
PINE LAKE CLEANERS
CATCH BASIN
STORMWATER LINE
STORMWATER ACCESS
VEGETATED SWALE
SANITARY SEWER LINE
SANITARY SEWER PUMP
N
0 20 40
APPROXIMATE SCALE IN FEET
Urban Environmental Partners llc
Diligent, responsive, and practical consulting
Pine Lake Cleaners
2830 228th Avenue Southeast
Sammamish, Washington
Figure 2
Site Features Map



Urban Environmental Partners llc
Diligent, responsive, and practical consulting!

Pine Lake Cleaners
2830 228th Avenue Southeast
Sammamish, Washington

Figure 3
Site Plan and Historic Sample Locations



LEGEND

VI-1 — INDOOR AIR SAMPLE LOCATION (UEP 2020)

SANITARY SEWER LINE

PCE: TETRACHLOROETHYLENE
TCE: TRICHLOROETHYLENE
ND: NON-DETECT (ALL LABORATORY NON-DETECT REPORTING LIMITS ARE LESS THAN APPLICABLE SCREENING OR CLEANUP LEVELS.)
NA: NOT ANALYZED
RED DENOTES COMPOUND EXCEEDS APPLICABLE CLEANUP LEVELS FOR UNRESTRICTED LAND USE.
SAMPLE CONCENTRATIONS PRESENTED IN MICROGRAMS PER CUBIC METER (UG/M^3)

MTCA INDOOR AIR CLEANUP LEVELS	PCE	TCE
METHOD B UNRESTRICTED LAND USE	9.6	0.33
METHOD C COMMERICIAL/INDUSTRIAL	40	2.0

N

0 10 20

APPROXIMATE SCALE IN FEET

Urban Environmental Partners llc
Diligent, responsive, and practical consulting!

Pine Lake Cleaners
2830 228th Avenue Southeast
Sammamish, Washington

Figure 4
VI Sample Location Plan

TABLES

Table 1 - Analytical Methods, Sample Containers, Preservation and Holding Times Friedman & Bruya, Inc., Seattle, WA

Constituents	Media	Analytical Method	Sample Containers Preservation	Extraction Hold Time Analysis Hold Time
VOCs	Sub-Slab Soil Gas (SSSG) Indoor and Ambient Air	USEPA Method TO-15 select ion monitoring (SIM)	1-liter evacuated SUMMA® Canister, set for 5-8 min grab 6-liter evacuated SUMMA® Canister, set for 8-hour duration Individually certified clean by the lab, equipped with valves and other piping, vac gauge and regulator set for duration. No preservation required	N/A 30 days

Table 2 – Laboratory Control Limits
Friedman & Bruya, Inc., Seattle, WA

Constituents	Media	Analytical Method	LCS	MS/MSD		Surrogates
			% Recovery	% Recovery	RPD	% Recovery
VOCs	Sub-Slab Soil Gas Indoor and Ambient Air	USEPA Method TO-15	70 – 130	N/A	N/A	70 - 130

Notes: LCS: Laboratory Control Sample; MS/MSD: Matrix spike/matrix spike duplicate; N/A: Not applicable; RPD: Relative percent difference

Table 3: Target Reporting Limits – EPA Method TO-15

Constituent	Sub-Slab Soil Gas Samples		Indoor Air and Ambient Air Samples	
	Target Reporting Limit [1,2] (ug/m^3)	Sub-Slab Soil Gas SL for Unrestricted Land Use [3,4] (ug/m^3)	Target Reporting Limit [1] (ug/m^3)	Indoor Air SL for Unrestricted Land Use [3,4] (ug/m^3)
1,1,1-Trichloroethane	3.1	76,000	0.55	2,300
1,1,2,2-Tetrachloroethane	0.78	1.4	0.14	0.043
1,1,2-Trichloroethane	0.31	3	0.11	0.091
1,1-Dichloroethane	2.2	52	0.40	1.6
1,1-Dichloroethene	2.2	3,000	0.40	91
1,2,4-Trichlorobenzene	4.1	30	0.74	0.91
1,2,4-Trimethylbenzene	14	910	2.5	27
1,2-Dibromoethane (EDB)	0.43	0.14	0.077	0.0042
1,2-Dichlorobenzene	3.4	3,000	0.60	91
1,2-Dichloroethane (EDC)	0.22	3.2	0.040	0.096
1,2-Dichloropropane	1.3	23	0.23	0.68
1,3,5-Trimethylbenzene	14	No Value	2.5	27
1,3-Butadiene	0.25	2.8	0.022	0.083
1,3-Dichlorobenzene	3.4	No Value	0.60	No Value
1,4-Dichlorobenzene	1.3	7.6	0.24	0.23
1,4-Dioxane	2	No Value	0.36	0.5
2,2,4-Trimethylpentane	26	No Value	4.7	No Value
2-Butanone (MEK)	16	No Value	2.9	No Value
2-Chlorotoluene	29	No Value	5.2	No Value
2-Hexanone	23	No Value	4.1	14
2-Propanol	48	No Value	8.6	No Value
3-Chloropropene	9.0	No Value	1.6	0.42
4-Ethyltoluene	14	No Value	2.5	No Value
4-Methyl-2-pentanone	23	46,000	4.1	No Value
Acetone	27	No Value	4.8	14,000
Acrolein	0.62	0.3	2.1	0.0091
Benzene	1.8	11	0.32	0.32
Benzyl chloride	0.29	1.7	0.052	0.051
Bromodichloromethane	0.38	2.3	0.067	0.068
Bromoform	12	76	2.1	2.3
Bromomethane	13	76	1.6	2.3
Butane	27	No Value	2.4	No Value
Carbon disulfide	35	11,000	6.2	320
Carbon tetrachloride	1.7	14	0.63	0.42
CFC-113	4.3	76,000	0.77	2,300
Chlorobenzene	2.6	760	0.46	23
Chloroethane	15	150,000	2.6	4,600
Chloroform	0.27	3.6	0.049	0.11
Chloromethane	15	1,400	3.7	41
cis-1,2-Dichloroethene	**2.2**	**No Value**	**0.40**	**No Value**
cis-1,3-Dichloropropene	2.5	No Value	0.45	0.63
Cyclohexane	39	No Value	6.9	2,700
Dibromochloromethane	0.48	No Value	0.085	No Value
Dichlorodifluoromethane	2.7	1,500	0.49	46
Ethanol	42	No Value	7.5	No Value
Ethyl acetate	40	No Value	7.2	32
Ethylbenzene	2.4	15,000	0.43	460
F-114	3.9	No Value	0.70	No Value
Heptane	23	No Value	4.1	180
Hexachlorobutadiene	1.2	3.8	0.21	0.11
Hexane	20	11,000	3.5	320
Isopropylbenzene	14	6,100	2.5	180
m,p-Xylene	4.9	1,500	0.87	46

Table 3: Target Reporting Limits – EPA Method TO-15

Constituent	Sub-Slab Soil Vapor Samples		Indoor Air and Ambient Air Samples	
	Target Reporting Limit [1,2] (ug/m^3)	Sub-Slab Soil Gas SL for Unrestricted Land Use [3,4] (ug/m^3)	Target Reporting Limit [1] (ug/m^3)	Indoor Air SL for Unrestricted Land Use [3,4] (ug/m^3)
Methyl ethyl ketone	8.7	76,000	2.9	2,300
Methyl methacrylate	12.3	11,000	4.1	320
Methyl t-butyl ether (MTBE)	10	320	1.8	9.6
Methylene chloride	200	2,200	87	66
Naphthalene	1.5	2.5	0.01[5]	0.074
Nonane	29	No Value	5.2	No Value
o-Xylene	2.4	1,500	0.43	46
Pentane	17	No Value	3.0	No Value
Propene	6.7	No Value	1.2	No Value
Propylbenzene	14	No Value	2.5	460
Styrene	4.8	15,000	0.85	460
t-Butyl alcohol (TBA)	67	No Value	12	No Value
Tetrachloroethene	**38**	**320**	**6.8**	**9.6[6]**
Tetrahydrofuran	3.3	No Value	0.59	910
Toluene	110	76,000	19	2,300
trans-1,2-Dichloroethene	**2.2**	**No Value**	**0.4**	**No Value**
trans-1,3-Dichloropropene	2.5	No Value	0.45	No Value
Trichloroethene	**0.62**	**11**	**0.11**	**0.33[6]**
Trichlorofluoromethane	12	11,000	2.2	320
Vinyl acetate	39	3,000	7.0	91
Vinyl bromide	2.5	No Value	0.44	No Value
Vinyl chloride	1.5	9.5	0.26	0.28

Notes:

No Value: No value exists for this constituent in the CLARC database (Ecology 2020)

Only constituents in **bold font** are identified as COPCs for the purpose of this Work Plan and will be reported by the laboratory.

Target reporting limits in bold font exceed a corresponding SL.

[1] It may not be possible to achieve these reporting limits in all samples (e.g., samples requiring extra dilution to achieve laboratory control limits, interferences).

[2] Sub-slab soil vapor samples are analyzed by the laboratory with a three fold dilution resulting in reporting limits that are three times higher than the indoor air and ambient air sample reporting limits, which are not diluted.

[3] Some SLs may need to be adjusted up to the practical quantitation limit or background per WAC 173-340-740(5)(c) or WAC 173-340-750(5)(c) if used as the basis for a cleanup level.

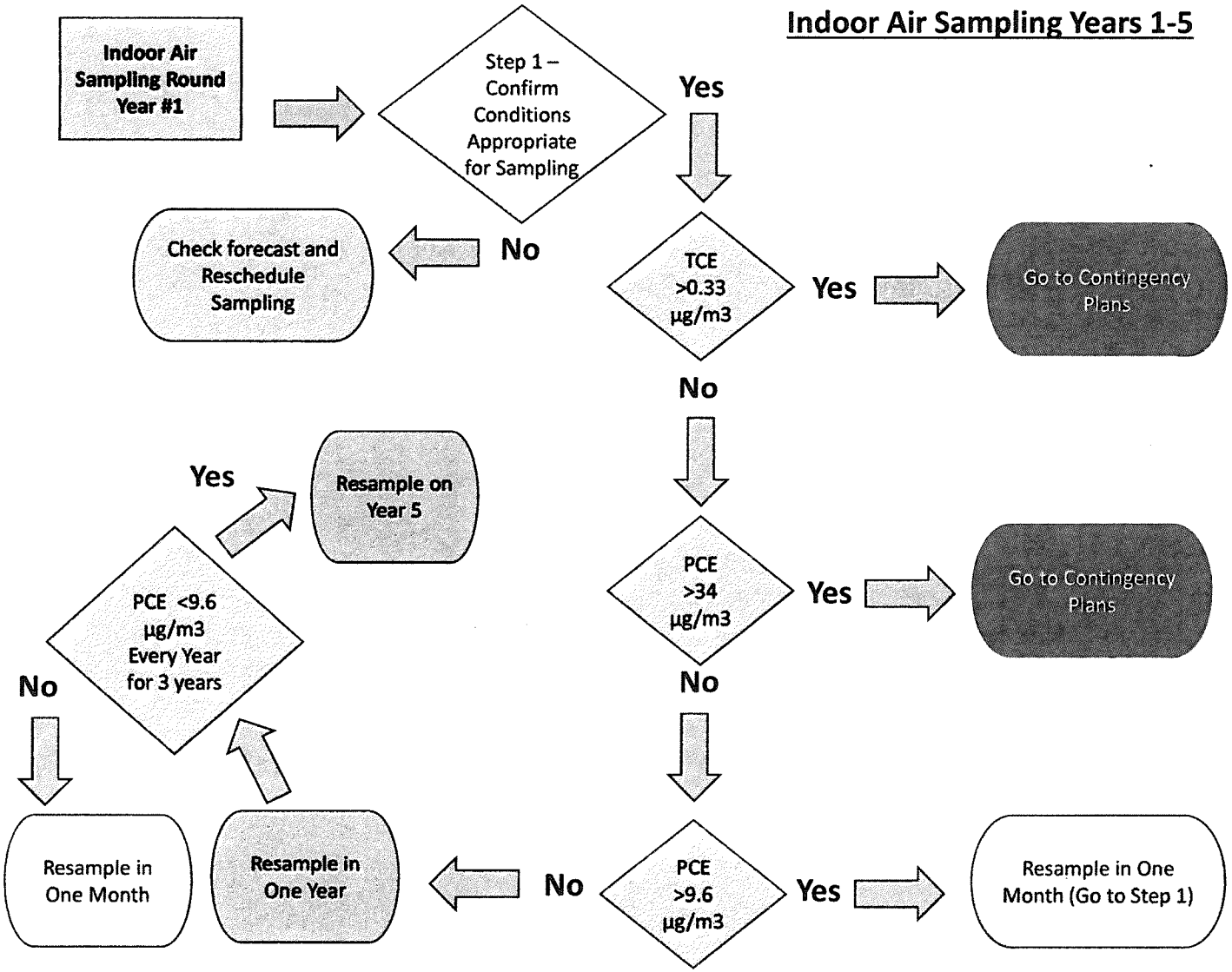
[4] Indoor air and sub-slab soil vapor SLs for unrestricted land use are used in this table for the sole purpose of evaluating target reporting limits. The SLs are the most stringent of the Method B carcinogenic and non-carcinogenic values from the CLARC database (Ecology 2020).

[5] To achieve the indoor air SL for unrestricted land use for naphthalene in indoor air and ambient air samples, naphthalene will be reported at the method detection limit of 0.01 ug/m^3, below the laboratory reporting limit of 0.26 ug/m^3.

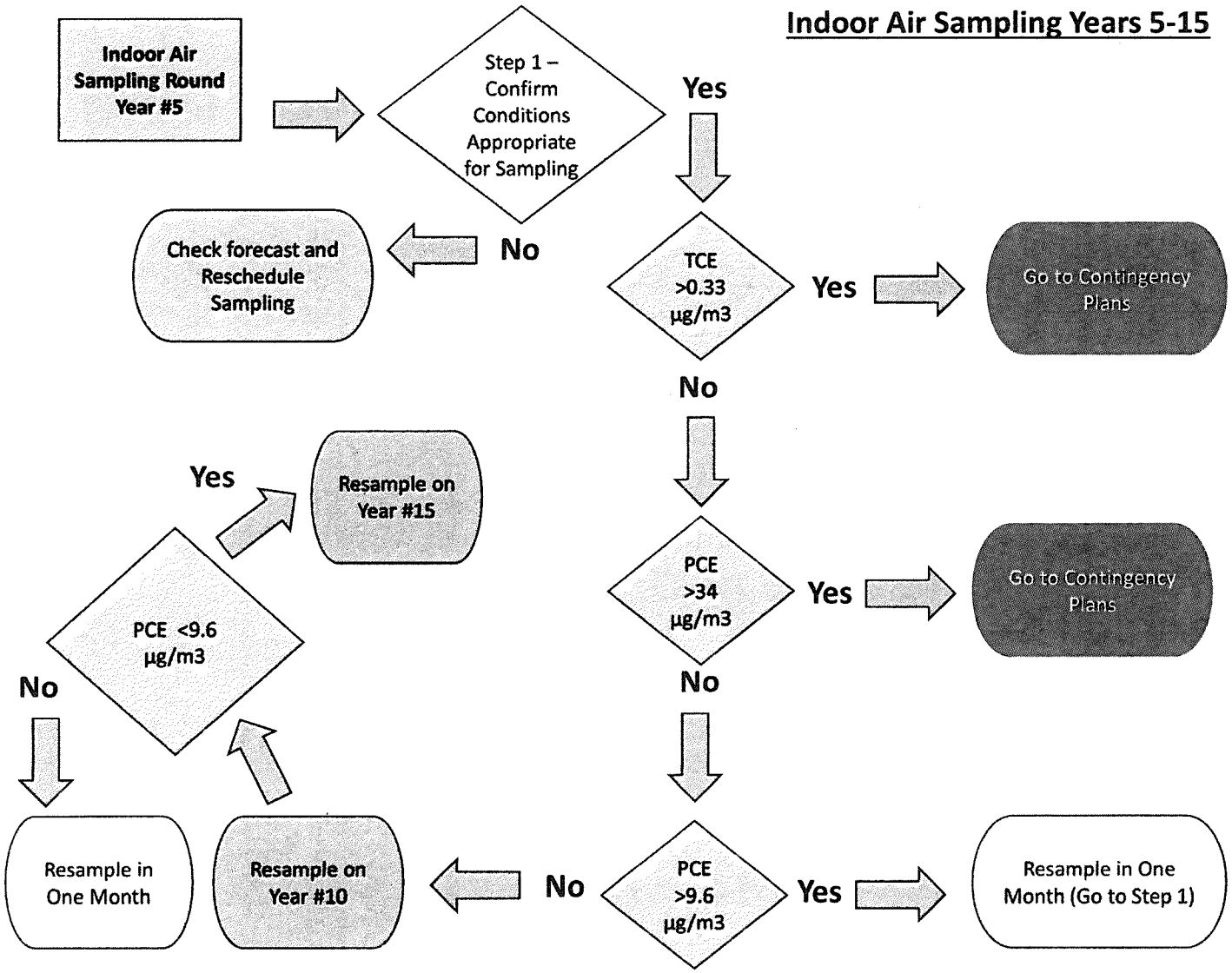
[6] Indoor Air SLs for commercial/industrial land use for tetrachloroethene and trichloroethene are 40 and 2 ug/m^3, respectively.

Attachment A: Indoor Air Sampling Flow Diagram (provided by Ecology)

Indoor Air Sampling Years 1-5



Indoor Air Sampling Years 5-15



Attachment B: VI Monitoring and Barrier Inspection Field Forms

FIELD CHECKLIST
UEP IIc

Project/Task Name: _____ Site Location: _____

Requested By / Date: _____ Work Deadline: _____

SERVICES REQUESTED	COMPLETED
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO

ADDITIONAL STANDARD INSTRUCTIONS	COMPLETED		COMPLETED
☐ Review Docs: _____	☐ YES ☐ NO	☐ Health & Safety Meeting	☐ YES ☐ NO
☐ Agency NOI / Utility Locate / Concrete Coring	☐ YES ☐ NO	☐ Call PM from Site	☐ YES ☐ NO
☐ Coordinate Access: _____	☐ YES ☐ NO	☐ Draw Site Map _____	☐ YES ☐ NO
☐ Coordinate Sub / Equip: _____	☐ YES ☐ NO	☐ Cuttings / Purge Water Characterization & Disposal	
☐ Purchase / Rent Equip: _____	☐ YES ☐ NO	☐ Potential HW _____	☐ YES ☐ NO
☐ Client/Agency Coordination: _____	☐ YES ☐ NO	☐ Non-Haz _____	☐ YES ☐ NO
☐ Calibrate Equipment: _____	☐ YES ☐ NO	☐ Background _____	☐ YES ☐ NO

_____

_____

SAMPLING REQUIREMENTS

☐ Field Testing: _____

☐ Lab Testing: _____ Laboratory: _____

☐ Lab Testing: _____ Laboratory: _____

☐ Lab Testing: _____ Laboratory: _____

FIELD SUPPLIES NEEDED

☐ Site Map ☐ Camera ☐ Survey Equip / GPS ☐ Vehicle

☐ Std Field Equip (keys, forms, SAP, HASP, PPE, decon, tools)

☐ Drilling Equip (PID, references, knife, baggies, tape)

☐ Soil Equip (SS bowls, spoon/shovel, hand auger, pick, sieves)

☐ GWM (pump, tubing, gen., compres., bailers, rope/string, PDB)

☐ Pump / Slug Test Equip (GWM Equip, slug, stopwatch)

☐ Water Level Indicator / Interface Probe

☐ Water Quality Meter _____ ☐ Field Test Kits _____

☐ Sample Kit / Cooler / COC / Ice _____

☐ IDW: ☐ Drums _____ ☐ 5-gal buckets _____

☐ Other: _____

☐ Other: _____

DAILY FIELD REPORT
UEP IIc

Date:_____ Site Location: _____ Site Arrival Time: _____ Site Departure Time :_____

WEATHER
TEMPERATURE
WIND

Clear Sun	Overcast	Drizzle	Rain	Snow
To 32	32-50	50-70	70-85	85 Up
Calm	Med.	Strong	Severe	

PEOPLE PRESENT ON-SITE

NAME	ASSOCIATION	TIME ON-SITE AND OFF-SITE

NOTES ON WORK COMPLETED

SIGNATURE:_____ DATE:_____

VAPOR INTRUSTION BUILDING SURVEY
and SAMPLING FORM (including Barrier Inspection)

Preparer's name: _____ Date: _____

Preparer's affiliation: _____ Phone #: _____

Site Name: _____ Project #: _____

Part I - Occupants

Building Address: _____

Property Contact: _____ Owner / Renter / other: _____

Contact's Phone: home ( )_____ work ( )_____ cell ( )_____

# of Building occupants: Children under age 13 _____ Children age 13-18 _____ Adults _____

Occupation and Hours in Space: _____

Part II – Building Characteristics

Building type: residential / multi-family residential / office / strip mall / commercial / industrial

Describe building: _____ Year constructed: _____

Sensitive population: day care / nursing home / hospital / school / other (specify): _____

Number of floors below grade: _____ (full basement / crawl space / slab on grade)

Number of floors at or above grade: _____

Depth of basement below grade surface: _____ ft. Basement size: _____ ft^2

Basement floor construction: concrete / dirt / floating / stone / other (specify): _____

Foundation walls: poured concrete / cinder blocks / stone / other (specify) _____

Basement sump present? *Yes / No* Sump pump? *Yes / No* Water in sump? *Yes / No*

Type of heating system (circle all that apply):

hot air circulation	hot air radiation	wood	steam radiation
heat pump	hot water radiation	kerosene heater	electric baseboard

describe: _____

Type of ventilation system (circle all that apply):

central air conditioning	mechanical fans	bathroom ventilation fans individual air
conditioning units	kitchen range hood fan	outside air intake

describe: _____

Type of fuel utilized (circle all that apply):

Natural gas / electric / fuel oil / wood / coal / solar / kerosene

Are the basement walls or floor sealed with waterproof paint or epoxy coatings? *Yes / No*

Is there a whole space/house fan? *Yes / No*

Septic system? *Yes / Yes (but not used) / No*

Irrigation/private well? *Yes / Yes (but not used) / No*

Type of ground cover outside of building: grass / concrete / asphalt / other (specify) _____

Existing subsurface depressurization (radon) system in place? *Yes / No* *active / passive*

Sub-slab vapor/moisture barrier in place? *Yes / No*
Type of barrier: _____

Part III - Outside Contaminant Sources

Known contaminated site (1000-ft. radius): _____

Other stationary sources nearby (gas stations, emission stacks, etc.): _____

Heavy vehicular traffic distance (or other mobile sources): _____

Part IV – Indoor Contaminant Sources

Identify all potential indoor sources found in the building (including attached garages), the location of the source (floor and room), and whether the item was removed from the building 48 hours prior to indoor air sampling event. Any ventilation implemented after removal of the items should be completed at least 24 hours prior to the commencement of the indoor air sampling event.

Potential Sources	Location(s) – PID readings	Removed (Yes / No / NA)
Gasoline storage cans		
Gas-powered equipment		
Kerosene storage cans		
Paints / thinners / strippers		
Cleaning solvents		
Oven cleaners		
Carpet / upholstery cleaners		
Other house cleaning products		
Moth balls		
Polishes / waxes		
Insecticides/ Herbicides		
Furniture / floor polish		
Nail polish / polish remover		
Hairspray		
Cologne / perfume		
Air fresheners		
Fuel tank (inside building)		NA
Wood stove or fireplace		NA
New furniture / upholstery		
New carpeting / flooring		NA
Hobbies - glues, paints, etc.		

Part V – Miscellaneous Items

Do any occupants of the building smoke? *Yes / No* How often/last time? _____

Does the building have an attached garage directly connected to living space? *Yes / No*

If so, is a car usually parked in the garage? *Yes / No*

Are gas-powered equipment or cans of gasoline/fuels stored in the garage? *Yes / No*

Do the occupants of the building have their clothes dry cleaned? *Yes / No*

If yes, how often? weekly / monthly / 3-4 times a year

Do any of the occupants use solvents in work? *Yes (describe above) / No*

Has there ever been a fire in the building? *Yes / No* If yes, when? _____

Has painting or staining been done in the building in the last 6 months? *Yes / No*

If yes, when _____ and where? _____

Part VI – Sampling Information

Sample Technician: _____ Phone number: ( ) _____ - _____

Sample Source: Indoor Air / Sub-Slab / Shallow/Deep Soil Gas / Exterior Soil Gas

Sampler Type: Tedlar bag / Sorbent / Stainless Steel Canister / Other (specify): _____

Analytical Method: TO-15 / TO-17 / other: _____ Cert. Laboratory: _____

Sample locations (floor, room):

Field ID # _____ - _____ Field ID # _____ - _____

Field ID # _____ - _____ Field ID # _____ - _____

Were "Instructions for Occupants" followed? *Yes / No*

If not, describe modifications: _____

Part VII - Meteorological Conditions

Was there significant precipitation within 12 hours prior to (or during) the sampling event? *Yes / No*

Describe the arrival and departure weather conditions: _____

_____

Arrival Indoor/Outdoor Temp: _____ Subslab and Indoor Pressure:_____

Departure Indoor/Outdoor Temp: _____ Subslab and Indoor Pressure:_____

Include a copy of the sampling day barometric pressure chart.

Part VIII – Barrier Inspection

Walk the entire area of the sampling space and carefully inspect the concrete floor. Generally describe the condition of the floor: _____

Concrete surface: cracks / penetrations (incl.bolts and drains) / staining / ponding or spills

Utilities and penetrations (describe in detail and document on the site plan): _____

Photos of new observations.

Part IX – General Observations

Provide any information that may be pertinent to the sampling event and may assist in the data interpretation process.

_____

_____

_____

Attachment C: Vapor Pin™ Installation and Sampling SOPs

Standard Operating Procedure Installation and Extraction of the Vapor Pin® Sampling Device

Updated January 28, 2021

Scope:

This standard operating procedure describes the installation and extraction of the VAPOR PIN® sampling device for use in sub-slab soil-gas sampling.

Purpose:

The purpose of this procedure is to assure good quality control in field operations and uniformity between field personnel in the use of the VAPOR PIN® sampling device for the collection of sub-slab soil-gas samples or pressure readings.

Equipment Needed:

- Assembled VAPOR PIN® sampling device [VAPOR PIN® sampling device and silicone sleeve (Figure 1)]; Because of sharp edges, gloves are recommended for sleeve installation;
- Hammer drill;
- 5/8-inch (16mm) diameter hammer bit (hole **must** be 5/8-inch (16mm) diameter to ensure seal. It is recommended that you use the drill guide). (Hilti™ TE-YX 5/8" x 22" (400 mm) #00206514 or equivalent);
- 1½-inch (38mm) diameter hammer bit (Hilti™ TE-YX 1½" x 23" #00293032 or equivalent) for flush mount applications;
- ¾-inch (19mm) diameter bottle brush;
- Wet/Dry vacuum with HEPA filter (optional);
- VAPOR PIN® sampling device installation/extraction tool;
- Dead blow hammer;
- VAPOR PIN® sampling device flush mount cover, if desired;
- VAPOR PIN® sampling device drilling guide, if desired;
- VAPOR PIN® sampling device protective cap; and
- VOC-free hole patching material (hydraulic cement) and putty knife or trowel for repairing the hole following the extraction of the VAPOR PIN® sampling device.

PHOTO

Figure 1. Assembled VAPOR PIN® sampling device

Installation Procedure:

1) Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.

2) Set up wet/dry vacuum to collect drill cuttings.

3) If a flush mount installation is required, drill a 1½-inch (38mm) diameter hole at least 1¾-inches (45mm) into the slab. Use of a VAPOR PIN® sampling device drilling guide is recommended.

4) Drill a 5/8-inch (16mm) diameter hole through the slab and approximately 1-inch (25mm) into the underlying soil to form a void. Hole **must** be 5/8-inch (16mm) in diameter to ensure seal. It is recommended that you use the drill guide.
5) Remove the drill bit, brush the hole with the bottle brush, and remove the loose cuttings with the vacuum.

6) Place the lower end of VAPOR PIN® sampling device assembly into the drilled hole. Place the small hole located in the handle of the installation/extraction tool over the vapor pin to protect the barb fitting, and tap the vapor pin into place using a dead blow hammer (Figure 2). Make sure the installation/extraction tool is aligned parallel to the vapor pin to avoid damaging the barb fitting.

PHOTO

Figure 2. Installing the VAPOR PIN®

During installation, the silicone sleeve will form a slight bulge between the slab and the VAPOR PIN® sampling device shoulder. Place the protective cap on VAPOR PIN® sampling device to prevent vapor loss prior to sampling (Figure 3).

PHOTO

Figure 3. Installed VAPOR PIN® sampling device

7) For flush mount installations, cover the vapor pin with a flush mount cover, using either the plastic cover or the optional stainless-steel Secure Cover (Figure 4).

PHOTO

Figure 4. Secure Cover Installed

8) Allow 20 minutes or more (consult applicable guidance for your situation) for the sub-slab soil-gas conditions to re-equilibrate prior to sampling.

9) Remove protective cap and connect sample tubing to the barb fitting of the VAPOR PIN® sampling device. This connection can be made using a short

piece of Tygon™ tubing to join the VAPOR PIN® sampling device with the Nylaflow tubing (Figure 5). Put the Nylaflow tubing as close to the VAPOR PIN® sampling device as possible to minimize contact between soil gas and Tygon™ tubing.

PHOTO

Figure 5. VAPOR PIN® sampling device sample connection

10) Conduct leak tests in accordance with applicable guidance. If the method of leak testing is not specified, an alternative can be the use of a water dam and vacuum pump, as described in SOP Leak Testing the VAPOR PIN® sampling device via Mechanical Means (Figure 6). For flush-mount installations, distilled water can be poured directly into the 1 1/2 inch (38mm) hole.

PHOTO

Figure 6. Water dam used for leak detection

11) Collect sub-slab soil gas sample or pressure reading. When finished, replace the protective cap and flush mount cover until the next event. If the sampling is complete, extract the VAPOR PIN® sampling device.

Extraction Procedure:

1) Remove the protective cap, and thread the installation/extraction tool onto the barrel of the VAPOR PIN® sampling device (Figure 7). Turn the tool clockwise continuously, don't stop turning, the VAPOR PIN® sampling device will feed into the bottom of the installation/extraction tool and will extract from the hole like a wine cork, DO NOT PULL.

2) Fill the void with hydraulic cement and smooth with a trowel or putty knife.

PHOTO

Figure 7. Removing the VAPOR PIN® sampling device

- Prior to reuse, remove the silicone sleeve and protective cap and discard. Decontaminate the VAPOR PIN®

sampling device in a hot water and Alconox® wash, then heat in an oven to a temperature of 265° F (130° C) for 15 to 30 minutes. For both steps, **STAINLESS – ½ hour, BRASS 8 minutes**

3) Replacement parts and supplies are available online.

Standard Operating Procedure Installation of the Vapor Pin® Sampling Device Insert

January 28, 2021

Scope:

This standard operating procedure describes the installation the Vapor Pin® sampling device Insert (Figure 1).

Purpose:

The purpose of this procedure is to assure good quality control in field operations and uniformity between field personnel in the use of the Vapor Pin® sampling device Insert. The Vapor Pin® sampling device Insert is used to facilitate the collection of soil gas samples and pressure measurements beneath engineered vapor intrusion barriers (e.g., Geo-Seal®), or vapor mitigation coatings (e.g., Retro-Coat™).

Equipment Needed:

- Vapor Pin® sampling device Insert;
- Vapor Pin® sampling device Insert Cap;
- Hacksaw (optional);
- Power drill and small diameter bits (optional);
- Threaded rod (1/2" x 13); and
- Dead blow hammer.

Installation Procedure New Construction:

1) Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.

2) Locate the desired position (horizontally and vertically) of the top of the Vapor Pin® sampling device Insert.

3) Pierce the barrier with a threaded rod of sufficient length to extend slightly above the elevation of the finished floor and into the subgrade a sufficient depth to provide support for the Vapor Pin® sampling device Insert. Make sure the rod is perpendicular to the proposed floor surface. Avoid bending the rod, as it may inhibit its removal after the concrete has cured. Also avoid damaging the threads on the rod.

4) Dry fit the Vapor Pin® sampling device Insert and trim, or extend the length. Extend the length by sliding the Insert into a length of 1.5 inch diameter schedule 40 PVC pipe. The insert and pipe can be joined using PVC cement or similar material. Allow sufficient time for the adhesive to cure prior to sampling. Vent holes may be added at the bottom of the Insert or PVC extension to promote air flow.

5) Assemble the Vapor Pin® sampling device Insert and Cap by pressing the Cap into the top of the Insert. Position the assembly on the threaded rod so that the top of the Cap lies flush with the elevation of the finished floor. It is important that the position of the Insert be perpendicular to the slab so that the Vapor Pin® sampling device Secure Cover meets uniformly with the floor.

6) Marry the barrier to the Insert per the manufacture's specification prior to pouring the concrete slab.

7) After the concrete has set, remove the threaded rod and Cap and install the Vapor Pin® or FLX-VP Vapor Pin® sampling device product in the Insert.

Installation Procedure Existing Construction:

1) Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.

2) Prior to installation in an existing slab, a large diameter hole must be cored through the slab to either expose the barrier, or provide access to the base beneath the slab prior to the application of a vapor mitigation coating. Contact the vendor of the barrier or coating about the desired diameter of the hole, the procedures used to expose the seal, and the methods and materials used to marry the seal or coating to the Insert prior to proceeding.

3) Locate the desired position (horizontally and vertically) of the top of the Vapor Pin® sampling device Insert.

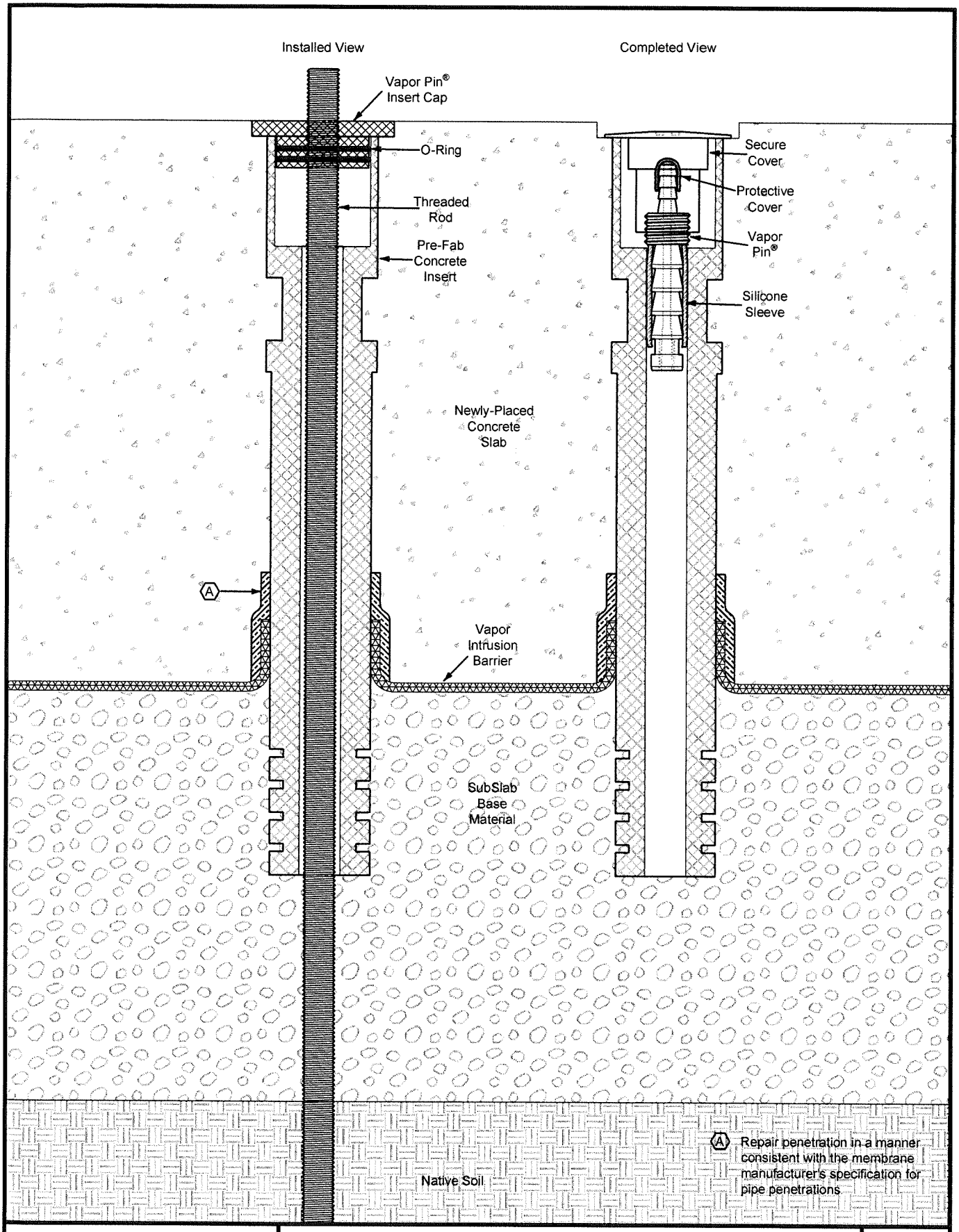
4) Pierce the barrier (if applicable) with a threaded rod of sufficient length to extend slightly above the elevation of the finished floor and into the subgrade a sufficient depth to provide support for the Vapor Pin® sampling device Insert. Make sure the rod is perpendicular to the proposed floor surface. Avoid bending the rod, as it may inhibit its removal after the concrete has cured. Also avoid damaging the threads on the rod.

5) Dry fit the Vapor Pin® sampling device Insert and trim, or extend the length. Extend the length by sliding the Insert into a length of 1.5 inch diameter schedule 40 PVC pipe. The Insert and pipe can be joined using PVC cement or similar material. Allow sufficient time for the adhesive to cure prior to sampling. Vent holes may be added at the bottom of the Insert or PVC extension to promote air flow.

6) Assemble the Vapor Pin® sampling device Insert and Cap by pressing the Cap into the top of the Insert. Position the assembly on the threaded rod so that the top of the Cap lies flush with the elevation of the finished floor. It is important that the position of the Insert be perpendicular to the slab so that the Vapor Pin® sampling device Secure Cover meets uniformly with the floor.

7) If the Insert is used in conjunction with a vapor intrusion barrier, marry the barrier to the Insert per the barrier manufacture's specification prior to pouring the concrete slab.

8) After the concrete has set, remove the threaded rod and Cap and install the Vapor Pin® sampling device or FLX-VP Vapor Pin® sampling device product in the Insert.



VaporPin®

Vapor Pin® Insert with Cap,
Vapor Pin Enterprises, Inc.

Figure
1

Standard Operating Procedure Leak Testing the VAPOR PIN® Sampling Device Via Water Dam

Updated January 28, 2021

Scope:

The operating procedure describes the methodology to test a VAPOR PIN® sampling device or equivalent sub-slab sampling device for leakage of indoor air.

Purpose:

The purpose of this procedure is to assess the potential for indoor air to leak past the VAPOR PIN ® sampling device and dilute the sub-slab soil gas sample.

Equipment Needed:

- Water dam
- Play-Dough or VOC free modeling clay
- distilled water
- VAPOR PIN® sampling device and associated sample tubing.

Procedure:

1) Drill a 5/8" diameter hole in the concrete slab and install the VAPOR PIN® sampling device as per the Standard Operating Procedure (SOP).

2) Clean the slab within a 2-inch radius of the VAPOR PIN® sampling device to remove dust. Avoid wetting the concrete or wait until the concrete is dry before proceeding and avoid cleaning with VOC-containing substances. A whisk broom or shop vacuum is recommended. Any remaining dust can be picked up with a piece of scrap Play-Dough or modeling clay.

3) Roll a 1-inch diameter ball of Play-Doh or modeling clay between your palms to form a "snake" approximately 7 inches long and press it against the end of the water dam. Push the water dam gently against the slab to form a seal with the concrete.

4) Attach the sample tubing to the top of the VAPOR PIN® sampling device and pour enough distilled water into the water dam to immerse base of the VAPOR PIN®, and if desired, the tubing connection at the top of the VAPOR PIN® sampling device.

5) Purge the sample point as required by the data quality objectives. Concrete will absorb some of the water, which is normal; however, if water is lost to the sub-slab, stop, remove the water from the water dam, and reposition the VAPOR PIN® sampling device to stop the leakage. Reseat the leak test equipment, if needed.

6) If the VAPOR PIN® sampling device is installed in the flush-mount configuration, the larger hole can be filled with water in place of the water dam and Play-Dough.

Figure 1. Water dam used for leak detection

PHOTO

Attachment D: Subslab Soil Gas Sampling Train Instructions

Soil Gas Manifold Instructions

F&B
environmental chemists

Initial Setup

1) Cut the ¼" OD FEP tubing into 3 sections
2) Insert 1 section into each open piece of silicon tubing in the sampling tee
3) Attach the well point line and the purge line to the 3 way valve sections on the end of the tee
4) To test the initial canister vacuum: Make sure the canister is tightly capped then quickly open and close the canister while observing the vacuum gauge. If the vacuum reads below 27" Hg – contact the laboratory (206) 285-8282
5) Double-check the sample canister is closed and remove the end cap
6) Attach the sample line (center tee section without a 3 way valve) to the canister using a ¼" nut and a PTFE ferrule. Do not open the sample canister.
7) Attach a purge canister, pump or syringe to the purge line valve using a short piece of FEP or other tubing
8) If using a purge can, attach to canister using a ¼" nut and a PTFE ferrule

3 Way Valve Operation

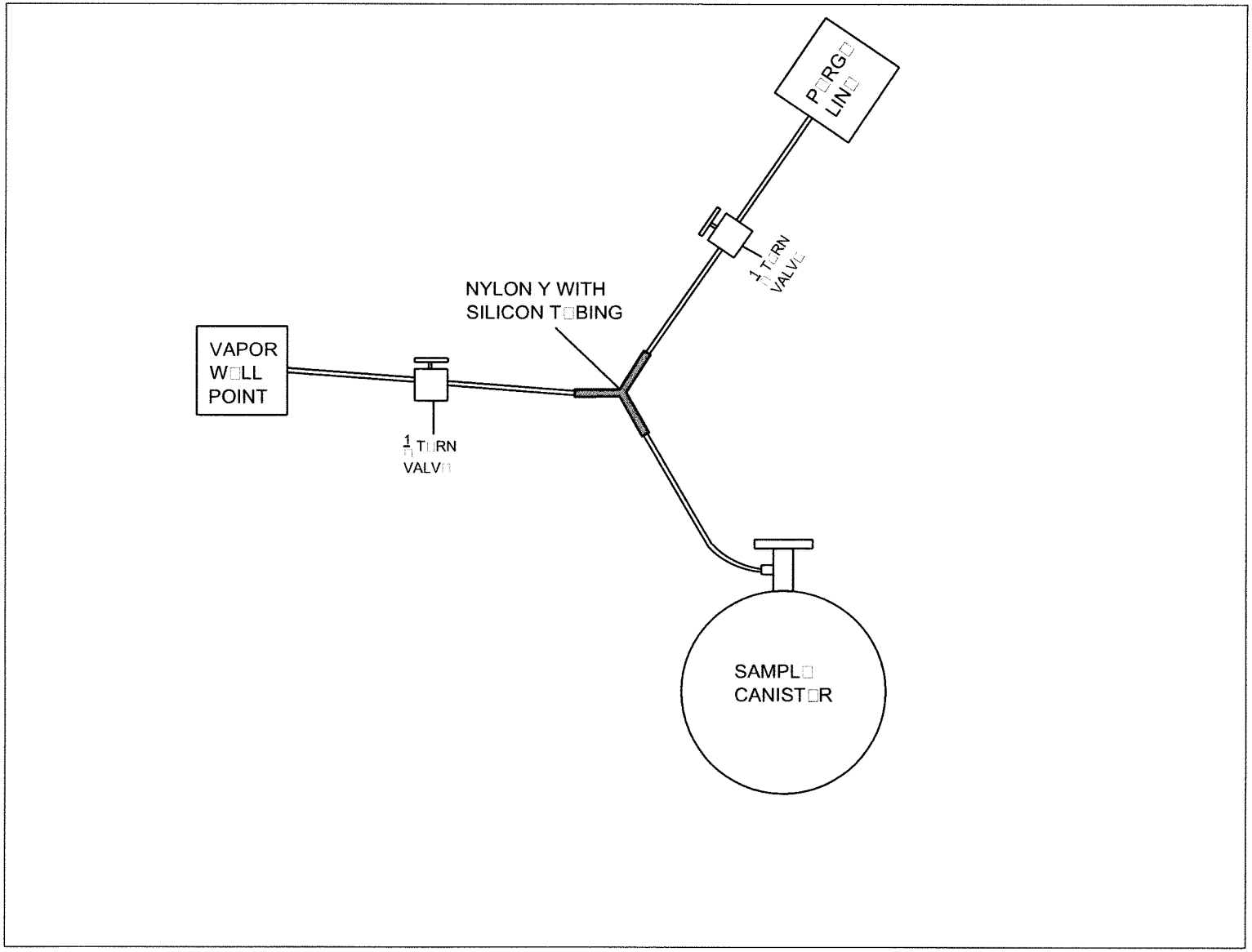
1) The valve switch reads "Off" with an arrow on it
2) ***Point the switch at the pathway to be closed***, the other 2 pathways are open

Shut-In Test Procedure

1) Close the well point valve by pointing the switch to the center of the tee
2) Open the purge line valve
3) Apply vacuum on the system using the purge line. The vacuum will be registered on the sample canister gauge. Do not open the sample canister.
4) Close the purge line valve (after applying vacuum) prior to evaluating shut-in test.

Collecting Samples

1) Before sampling, set up any leak testing equipment, if necessary.
    a. Leak evaluation can be performed using a shroud and a tracer such as helium, 1,2-difluoroethane, or IPA.
2) Open well point turn valve
3) Purge and then close purge line valve after purging
4) Open the sample canister
    a. Document the initial and final time and the initial and final vacuum on the COC


P□RG□
LIN□
1 T□RN
VALV□
NYLON Y WITH
SILICON T□BING
VAPOR
W□LL
POINT
1 T□RN
VALV□
SAMPL□
CANIST□R

Attachment D: Subslab Soil Gas Sampling Train Instructions

Soil Gas Manifold Instructions

F&B
environmental chemists

Initial Setup

1) Cut the ¼" OD FEP tubing into 3 sections
2) Insert 1 section into each open piece of silicon tubing in the sampling tee
3) Attach the well point line and the purge line to the 3 way valve sections on the end of the tee
4) To test the initial canister vacuum: Make sure the canister is tightly capped then quickly open and close the canister while observing the vacuum gauge. If the vacuum reads below 27" Hg – contact the laboratory (206) 285-8282
5) Double-check the sample canister is closed and remove the end cap
6) Attach the sample line (center tee section without a 3 way valve) to the canister using a ¼" nut and a PTFE ferrule. Do not open the sample canister.
7) Attach a purge canister, pump or syringe to the purge line valve using a short piece of FEP or other tubing
8) If using a purge can, attach to canister using a ¼" nut and a PTFE ferrule

3 Way Valve Operation

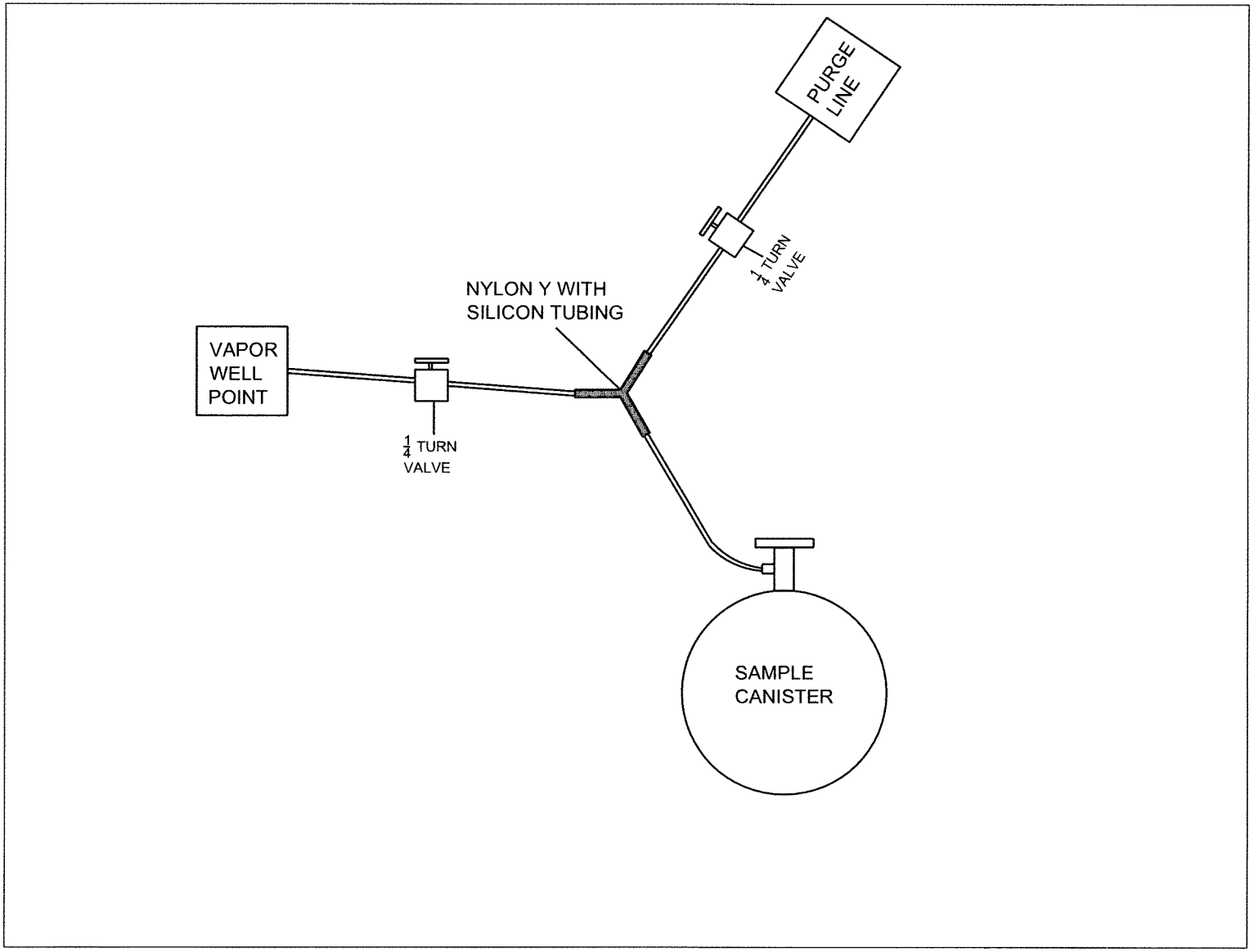
1) The valve switch reads "Off" with an arrow on it
2) ***Point the switch at the pathway to be closed***, the other 2 pathways are open

Shut-In Test Procedure

1) Close the well point valve by pointing the switch to the center of the tee
2) Open the purge line valve
3) Apply vacuum on the system using the purge line. The vacuum will be registered on the sample canister gauge. Do not open the sample canister.
4) Close the purge line valve (after applying vacuum) prior to evaluating shut-in test.

Collecting Samples

1) Before sampling, set up any leak testing equipment, if necessary.
    a. Leak evaluation can be performed using a shroud and a tracer such as helium, 1,2-difluoroethane, or IPA.
2) Open well point turn valve
3) Purge and then close purge line valve after purging
4) Open the sample canister
    a. Document the initial and final time and the initial and final vacuum on the COC


PURGE LINE
¼ TURN VALVE
NYLON Y WITH SILICON TUBING
VAPOR WELL POINT
¼ TURN VALVE
SAMPLE CANISTER