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Sampling and Analysis Plan for Soil Vapor and Fixed Gases – SFPP Norwalk Pump Station

Prepared for:

Kinder Morgan, Inc.
15306 Norwalk Boulevard, Norwalk, California

February 15, 2023

Sampling and Analysis Plan for Soil Vapor and Fixed Gases – SFPP Norwalk Pump Station

Client name:	Kinder Morgan, Inc.		
Project name:	SFPP Norwalk Pump Station		
Address:	15306 Norwalk Boulevard, Norwalk, California	**Project no:**	KMNWSA22
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Doc status:	Final	**Prepared by:**	Todd Kremmin
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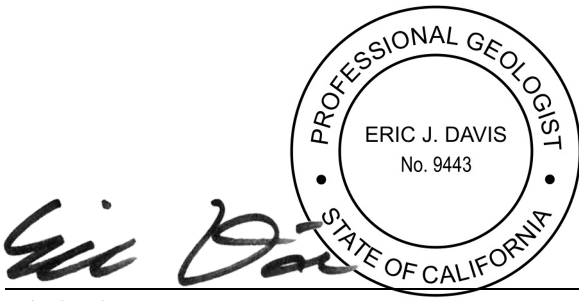
Certification

The material and data presented in this report were prepared consistent with current and generally accepted consulting principles and practices. This work was supervised by the following Jacobs licensed professional.



Eric Davis
California Professional Geologist, No. 9443

February 15, 2023
Date

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Acronyms and Abbreviations

µg/L	microgram(s) per liter
ASTM	ASTM International
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CH2M	CH2M HILL, now part of Jacobs Engineering Group Inc.
CO_2	carbon dioxide
COC	chemical of concern
COPC	contaminant(s) of potential concern
CSM	conceptual site model
DFSP	Defense Fuel Support Site
DTSC	Department of Toxic Substances Control
EQEDD	Equis Electronic Data Deliverable
ft/ft	foot per foot
HHRA	Human Health Risk Assessment
IRAP	Interim Remedial Action Plan
Jacobs	Jacobs Engineering Group Inc.
Kinder Morgan	Kinder Morgan, Inc.
LNAPL	light nonaqueous phase liquid
MTBE	methyl tertiary butyl ether
No.	number
NSZD	Natural Source Zone Depletion
PID	photoionization detections
RAP	remedial action plan
Regional Board	California Regional Water Quality Control Board
RSL	regional screening level
SAP	sampling and analysis plan
SFPP	Santa Fe Pacific Pipelines, L.P.
SVE	soil vapor extraction
SVM	soil vapor monitoring
SVP	soil vapor probe
TFE	total fluids extraction

The site	SFPP, L.P. Norwalk Pump Station located within Defense Fuel Support Point Norwalk, at 15306 Norwalk Boulevard, Norwalk, California
TPH	total petroleum hydrocarbons
TPH-d	TPH quantified as diesel fuel
TPH-g	TPH quantified as gasoline
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

1. Introduction

On behalf of Santa Fe Pacific Pipelines, L.P. (SFPP), an indirect subsidiary of Kinder Morgan, Inc. (Kinder Morgan), Jacobs Engineering Group Inc. (Jacobs) has prepared this soil vapor and fixed gases Sampling and Analysis Plan (SAP), which reviews the site soil vapor monitoring (SVM) point data (historically through the fourth quarter 2022), and recommends sampling and laboratory analysis locations going forward at the SFPP Norwalk Pump Station, located within Defense Fuel Support Point (DFSP) Norwalk (the site), at 15306 Norwalk Boulevard, Norwalk, California (Figure 1).

On October 4, 2022, the Los Angeles Regional Water Quality Control Board (Regional Board) provided conditional approval of the *Interim Remedial Action Plan (IRAP) – Implementing a Natural Source Zone Depletion (NSZD) Remedy* (Jacobs, 2022a). As part of this conditional approval, the Regional Board requested Kinder Morgan submit a SVM plan to monitor both onsite and offsite soil vapor and fixed gas concentrations. This SAP, and underlying quantitative evaluation, serves to complete that request and will supersede the interim soil vapor monitoring sampling plan upon review and approval by the Regional Board.

Revisions to this SAP may be considered and recommended in future soil vapor and fixed gases monitoring reports.

1.1 Objectives

The SVM network (Table 1) at the site is used for compliance monitoring of vadose zone soil gases, evaluating human health risks associated with potential vapor intrusion, field monitoring of vadose zone soil gases to optimize active remedial systems (i.e., biosparging and soil vapor extraction), and evaluating the NSZD remedy performance.

This SAP will be used to accomplish the following objectives:

1. Monitor the extent and concentrations of petroleum hydrocarbon related contaminants of potential concern (COPCs) spatially and temporally in the south-central, southeastern, and offsite/south-central areas of the site.
2. Evaluate NSZD remedy performance (gradient method calculations).
3. Document findings and results in an annual report, providing updated recommendations to the Regional Board.

1.2 Report Organization

This SAP is organized into the following sections:

Section 1 – Introduction
Section 2 – Background
Section 3 – Proposed Soil Vapor and Fixed Gases Monitoring Program
Section 4 – Field and Laboratory Procedures
Section 5 – Quality Assurance/Quality Control
Section 6 – Reporting
Section 7 – References

2. Background

The DFSP facility is located in the central portion of the Los Angeles Basin at an elevation of approximately 75 feet above mean sea level. The ground surface at the site slopes slightly to the southwest. The DFSP facility is bounded to the west by Norwalk Boulevard, to the north by Excelsior Street, to the east by Holifield Park, and to the south by a residential area.

2.1 Site Description

The DFSP is located at 15306 Norwalk Boulevard in Norwalk, California (Figure 1), and consists of two adjacent parcels of land referred to as the 36-acre parcel to the west (currently owned by the Federal Government), and the 15-acre parcel to the east (currently owned by the City of Norwalk). Previously, Kinder Morgan operated a pump station near the south-central area of the facility (within the 36-acre parcel) and had other equipment related to refined petroleum product pipelines in the southernmost portion of the facility along the southern block wall. Currently, Kinder Morgan has an easement for its three refined petroleum products pipelines that traverse the facility along the southern block wall boundary.

2.2 Shallow Hydrogeologic Setting

The hydrogeologic units underlying the 50-acre tank farm area consist of the following units (see IRAP for complete details of the Bellflower and Exposition units):

- Uppermost groundwater zone (discussed in greater detail below)
- Bellflower aquitard
- Exposition aquifer

The uppermost groundwater zone in the site vicinity is a semi-perched unit with a vadose zone from ground surface to approximately 25 feet below ground service (bgs) and a saturated zone approximately between 25 and 50 feet bgs. The lithology within the uppermost groundwater zone consists of poorly graded sand, silty sand, clayey sand, and sandy silt. Overall, there is a general pattern that the lower 20 feet (from 20 to 50 feet bgs) consists of mostly sandy or clean sand materials while the upper 30 feet (from ground surface to 30 feet bgs) consists of more interbedded sand, silty sand, clayey sand, and sandy silt.

Groundwater flow within the uppermost groundwater zone, as interpreted during previous assessments and monitoring at DFSP, is historically observed on average to be towards the north under a horizontal gradient of approximately 0.002 foot per foot (ft/ft). Hydraulic conductivity of the uppermost groundwater zone has been reported to range between 12 and 73 feet per day in the south-central area to 20 to 60 feet per day in the southeastern area (AMEC, 2010). The average porosity of the uppermost zone is approximately 0.25 (unitless). Based on the hydraulic gradients and conductivities, groundwater velocities are approximately 0.09 to 4 feet per day in the uppermost groundwater aquifer (Jacobs, 2019a).

2.3 Contaminants of Potential Concern

Contaminants of potential concern (COPCs) in the vadose zone are related to volatilization and biodegradation of shallow soil and groundwater impacts from the remaining residual light nonaqueous phase liquid (LNAPL) (Geomatrix, 2006). Current COPCs are listed on Table 2. In addition, several non-COPCs are listed in Table 2 that were recently detected from the most recent second half 2022 sampling event (Jacobs, 2022c). These non-COPCs, specifically total petroleum hydrocarbons (TPH) quantified as gasoline (TPH-g) serve as a surrogate for all other COPCs.

Previous site assessments have shown soil impacts from COPCs including TPH, benzene, toluene, ethylbenzene, and xylene (BTEX), and methyl tert-butyl ether (MTBE) at various locations within the DFSP facility and offsite portions immediately adjacent to the south-central and southeastern areas

(CH2M, 2013 and 2018). Impacts are limited and low concentrations, where present, are primarily observed in the smear zone near the groundwater surface. The remedial activities performed historically to present, especially soil vapor extraction (SVE) and biosparging, have demonstrated removal of vapor-phase hydrocarbons to near asymptotic conditions in all areas of the site. Following active treatment, as each area transitions to passive management, biodegradation continues via NSZD (Jacobs, 2022d, *in press*).

Additional details on the petroleum hydrocarbon-related subsurface impacts can be found in the latest conceptual site model (CSM) report (CH2M, 2013) and more recent LNAPL CSM report (CH2M, 2018). An update on the progress of remediation at the site using various active and passive treatments is available to review in quarterly remediation progress reports, available for download on "GeoTracker," the Regional Board's internet-accessible database system. In addition, a brief review of remediation systems at the site, currently and no longer active, is provided in the follow section below.

2.4 Kinder Morgan Remediation Systems

Kinder Morgan's remedial operations are located in the southern portion of the DFSP site. Three Kinder Morgan pipelines heading eastward along the southern boundary of the DFSP facility (one of which bends at the southeastern corner of the facility and continues northward within the eastern easement) remain in service and continue to convey fuels, including gasoline, diesel, and jet fuel. Kinder Morgan's remediation management is focused on the area adjacent to the southern property boundary of the site.

Subsurface assessments have been performed at the DFSP facility since 1986. Approximately 265 groundwater/ remediation and/or monitoring wells and 31 SVM and/or soil vapor probe (SVP) locations (some dual-nested or triple-nested) have been installed at the site for monitoring (see Section 2.5) and as components of groundwater and soil vapor remediation systems at the request of the Regional Board. The investigations have evaluated subsurface soil and groundwater within the uppermost groundwater zone that have been impacted, in part, by petroleum hydrocarbons from historical releases from Kinder Morgan's pipelines. The primary impacts are to groundwater associated with fuel product that historically leaked from block valves on the pipelines and migrated vertically downward through the vadose zone to the water table.

Remediation in the south-central and southeastern areas has consisted of vertical and horizontal SVE, total fluids extraction (TFE), horizontal biosparging, and NSZD (Figure 2). At several well locations, vertical SVE is coupled with TFE in a process referred to as dual-phase (i.e., vapor phase and liquid phase) extraction. The objectives of the remediation system have been to contain and control the migration of hydrocarbon constituents in groundwater and soil vapor and to remove hydrocarbon mass from soil and groundwater. Within the past few years, portions of these systems have been deactivated to evaluate the feasibility of transitioning to the NSZD remedy. The performance of the various treatment systems is discussed in greater detail in the IRAP (Jacobs, 2022a). Additional information regarding treatment system operations and performance is provided in the quarterly remediation progress reports.

2.5 Existing Soil Vapor Probe Monitoring Network

Kinder Morgan has historically collected laboratory analytical samples from a network of 31 dual- and triple-nested SVPs located within and around three areas of ongoing remediation/treatment and monitoring at the site: the south-central area in the 36-acre parcel, the offsite/south-central area in the residential area south of the 36-acre parcel, and the southeastern area in the 15-acre parcel (Figure 2). The 31 SVPs comprised 66 unique sample intervals from approximately 5, 10, 15, and 22 feet bgs, with up to 70 sample locations sampled historically. These 31 SVPs were available for sampling through the first half of 2022. However, as part of the modified monitoring and sampling plan developed in 2022 (Jacobs, 2022b), several SVPs were destroyed in May 2022, after the first half 2022 sampling event was conducted, due to construction and redevelopment activities. Destroyed SVPs include offsite/south-central SVP "SVM-15" and southeastern area SVPs "SVM-17," "SVM-18," "SVM-19," and "SVM-20."

Therefore, in May 2022, the SVP network was reduced from 31 to 26 dual- and triple-nested SVPs, with 55 unique sample intervals available for sampling (Table 1).

Historically, soil vapor sampling has consisted of using a 1.4-liter Summa canister. Sampling has been performed in accordance with the Department of Toxic Substances Control's (DTSC) *Advisory for Active Soil Gas Investigations* (DTSC, 2015). Samples are analyzed by the American Analytics laboratory for volatile organic compounds (VOCs) using the United States Environmental Protection Agency (USEPA) Method TO-15, Total petroleum hydrocarbon – gasoline (TPH-g) using USEPA Method TO-3, Fixed gases (carbon dioxide, methane, and oxygen) using ASTM International (ASTM) Method D1946M. Further details on soil vapor sampling are provided in the most recent soil vapor report (Jacobs, 2022c). In addition, all historical SVM analytical data, including fixed gases, have been included in this report (Appendix A).

During the most recent soil vapor and fixed gas sampling event in late-2022, no COPCs were detected in any SVP sampled, as indicated in Table 2. Several non-COPC compounds that were detected included 2,2,4-trimethylpentane, acetone, bromodichloromethane, carbon disulfide, chloroform, ethanol, tetrachloroethylene (PCE), and TPH-g (C4-C12). The only exceedance of criteria (residential regional screening level [RSL]) was for TPH-g (C4-C12) at deeper sample ports SVP-108-10 (790 micrograms per liter [µg/L]) and SVM-6-13 (22,000 µg/L). Both of these locations are bounded above by soil vapor samples which did not exceed criteria, USEPA's RSL for air (USEPA, 2021) and Human and Ecological Risk Office (HERO) Note 2 for calculating DTSC-modified screening levels (DTSC, 2020), and are within, or adjacent to, active remedial operations (biosparging and SVE). The screening levels stated above are noted on Table 2.

Ongoing monitoring and evaluation of data from the existing SVP network highlights the infrequent and relatively low concentrations of VOCs detected in the shallow soil vapor (defined as the upper 10 feet of soil), which, objectively, do not pose an unacceptable human health risk to site workers or nearby residents. In addition, as concluded in the IRAP (Jacobs, 2022a) and other documents such as the *Review of the Offsite Soil Vapor Monitoring Probe Network* (Jacobs, 2020a) and *Updated Human Health Risk Assessment for the Offsite/South-Central and Offsite/Southeastern Areas* (Jacobs, 2020b), exposure pathways are largely incomplete and insignificant for the petroleum releases in groundwater, subsurface soil, and subsequent soil vapor. Moreover, multiple lines of evidence point to the biologically active zone in shallow soil where aerobic biodegradation controls the diffusion of hydrocarbon fuel related VOCs to the ground surface, further mitigating potential exposure pathways.

Based on the current understanding of the COPC distribution at the site and the objectives described in Section 1, the primary purpose/objective of the SVP network at this time is to meet the secondary objective of fixed field gas monitoring (evaluation of the NSZD remedy performance). The first objective of the SVP network (monitor the extent and concentrations of petroleum hydrocarbon related COPC spatially and temporally in the south-central, southeastern, and offsite/south-central areas of the site) will continue to be met by sampling a subset of the SVPs. Appendix B details the criteria for determining which locations will be monitored going forward, the monitoring frequency, and contains the statistical summary of historical data for each SVM point. The criteria selected for determining ongoing soil vapor sampling is conservative and generally retains sampling from locations where COPCs have been recently detected as well as locations vertically bounding recent COPC detections.

3. Proposed Soil Vapor and Fixed Gases Monitoring Program

3.1 Soil Vapor Probe Network and Sampling

The SVP locations and sampling program are designed to meet the three objectives of this SAP: monitor the extent and concentrations of fuel impacts in the south-central, southeastern, and offsite/south-central areas of the site; evaluate NSZD remedy performance (gradient method calculations); and document findings and results in an annual report, providing updated recommendations to the Regional Board.

Based on the evaluation of contaminant trends provided in Appendix B, and in consideration of the updated site management strategy outlined in the IRAP (Jacobs, 2022a), a smaller subset of SVM probes are proposed for ongoing sampling for laboratory analysis of COPCs. As illustrated on Figure 3 and detailed in Table 3, some probes will be sampled semiannually (i.e., twice per year) and some probes will be sampled annually (i.e., once per year). This plan includes monitoring 22 discrete sample intervals at 10 probes, comprising 40 soil vapor analytical samples per year, including duplicates and ambient air samples.

In addition, all SVPs, including probes not scheduled for ongoing sampling and laboratory analysis, will continue to be monitored for fixed field gases using a photo-ionization detector (PID) and field gas meter annually, at a minimum, as part of ongoing NSZD performance monitoring to confirm that related remedial action objectives (i.e., ongoing hydrocarbon degradation) are being met, as detailed in the IRAP (Jacobs, 2022a). Probes that are not sampled for laboratory testing will be maintained for possible future sampling, on a contingency basis, if COPC concentrations increase or the extent of COPCs significantly changes over time.

Data collected as part of this SAP will be evaluated using the methods summarized in Appendix B and presented to the Regional Board in an annual report, as described below. Future revisions to this SAP may be appropriate as field conditions change. Recommendations for revisions will be presented in annual reports, as necessary.

4. Field and Laboratory Procedures

4.1 Soil Vapor and Fixed Gas Analyses

Soil vapor samples will be collected and analyzed for COPCs and non-COPCs (recently detected analytes), listed in Table 2, using EPA Method TO-15, TPH-gas using EPA Method TO-3, and fixed gases using ASTM Method D1946M.

In accordance with the DTSC Advisory (DTSC, 2015), field duplicate soil vapor samples will be collected at a minimum frequency of one per every 20 soil vapor samples collected. Duplicate soil vapor samples will be collected simultaneously with the native samples. The duplicate samples will be analyzed in the same manner as the native samples. In addition, ambient air samples should be collected once per day for each field event.

4.2 Pre-Sampling and Testing

Soil Vapor Monitoring

The SVPs at each monitoring point will be purged and sampled in accordance with recommended guidelines in the DTSC Advisory (DTSC, 2015). Those guidelines indicate SVPs from each unique interval/depth will be purged and sampled using a vacuum/pressure sampling pump calibrated to a flow rate between 100 to 200 mL/min. Further details of sampling procedures, including purge volume, shut-in, and leak tests are described below and presented in Appendix C.

Purge Volume Test

A default of 3-purge volumes is assumed per DTSC guidance.

Shut-In Test

After the SVPs have been purged, a shut-in test will be conducted to check for leaks in the above-ground sampling train (values, tubing and fittings from downstream from the top of the probe). A vacuum of approximately 5 inches of mercury (in-Hg) will be applied to the above-ground sampling train. The vacuum will be monitored for approximately one minute. If the vacuum dissipates during the shut-in test, all above-ground fittings will be adjusted, and the test will be repeated until the vacuum in the above-ground sampling train does not noticeably dissipate.

Leak Test

During purging and sampling at each SVP, a leak test will be conducted using a liquid tracer compound such as isobutane (from shaving cream) or 2-propanol to evaluate potential leaks of ambient air into the sampling train. The liquid tracer compound will be applied to a towel or clean rags and placed around the entire sampling train and included in the method analyte list for soil vapor samples.

In the event the primary leak-check compound is detected in the sample at a concentration equal to or greater than ten times the reporting limits for target analytes, corrective action will be taken by Jacobs and Kinder Morgan, including evaluating the cause of the leak and possible retesting. If the leak persists, a secondary tracer compound may be used, and another soil vapor sample will be collected to further assess potential intrusion of ambient air and to eliminate the possibility that the primary leak-check compound is present in the soil vapor. If both the primary and secondary tracer compounds are detected at concentrations of equal to or greater than ten times the reporting limits for target analytes, the probe will be recommended for destruction and a replacement probe may be considered if adjacent probes are determined to be insufficient for evaluating soil gas at the compromised probe location.

4.3 Sampling and Analysis

Analytical sampling will occur annually using 22 discrete sample intervals at 10 probes, comprising 40 soil vapor analytical samples per year, including duplicates and ambient air samples. All 55 probes (2-single probes, 19-double nested probes, and 5-triple nested probes) will be monitored for fixed field gases (CO_2. O_2, CH_4, and VOCs) using a PID and field gas meter annually in support of NSZD monitoring.

Laboratory samples will be collected from the subset of locations and frequencies described in Table 3. An ambient sample will be collected daily during this sampling (estimated 1-2 days), and a duplicate sample will also be collected per 20 samples (2 duplicates. The sampling events will also include concurrent collection of VOC readings using a PID and vacuum readings using a manometer after purging the vapor probes.

The laboratory contractor will provide the onsite sampling personnel to collect samples (Low Reporting Limit Lab) for VOCs (EPA Method TO-15), fixed gases (oxygen, carbon dioxide, and methane) (ASTM Method D1946M), TPH-gas analysis (EPA Method TO-3), and all equipment necessary to purge the vapor probes, collect, and transport the soil vapor samples.

Soil vapor sampling and analysis will be performed in accordance with the DTSC Advisory (DTSC, 2015), and reporting limits must meet soil gas screening levels based on the most current DTSC guidance (Human Health Risk Assessment [HHRA] Note 3; DTSC, November 2020).

Field notes and field forms (Appendix D) will be filled out for record of sampling events and submitted as part of the annual report.

5. Quality Assurance/Quality Control

5.1 QC Samples

Field Duplicate Samples

A field duplicate sample is a second sample collected at the same location as the original sample. These samples are used to assess precision of the entire data collection activity, including sampling, analysis, and site heterogeneity. Duplicate samples will be collected simultaneously, using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis.

Ambient Air Samples

Ambient air samples will be collected in order to compare and monitor naturally occurring background sources, during collection of samples for volatile components. The ambient air samples will be analyzed by setting the summa canister on the ground, not connected to the manifold (no leak test performed). Ambient air laboratory analysis will be the same as SVP samples. in the same manner as the primary samples. If the ambient air samples exhibit excessive contamination, the field crew will be instructed to evaluate sample collection procedures and to also investigate the source of the contamination. Associated sample results may be qualified due to excessive contamination in the ambient air samples.

5.2 Field Documentation

Procedures to ensure the custody and integrity of the samples begin at the time of sampling and continue through transport, sample receipt, preparation, analysis and storage, data generation and reporting, and sample disposal. Records concerning the custody and condition of the samples should be maintained in field records and combined with the laboratory records.

The following sample information will be documented on the chemical of concern (COC) form:

- Unique sample ID for each sample collected
- Date and time of sample collection
- Source of sample (including name, location, and sample type)
- Analyses required
- Name of collector(s)
- Start and end canister vacuums
- Canister tag IDs for Summa canisters
- Serial numbers, IDs of custody seals and transportation cases (if used)
- Bill of lading or transporter tracking number (if applicable)
- Custody transfer signatures and dates and times of sample transfer from the field to transporters and to the laboratory or laboratories

5.3 Data Quality

Electronic Data

The laboratory will provide data in the Jacobs Equis Electronic Data Deliverable (EQEDD) format for uploading to the project database for data validation.

Data Verification/Validation

The data verification/validation performed by Jacobs will use guidance from the USEPA National Functional Guidelines (USEPA, 2020). This may include but is not limited to:

- Sampling documentation (COC form, etc.)
- Preservation summary and technical holding times
- Presence of all analyses and analytes requested
- Use of the required sample preparation and analysis procedures
- Evaluation of the method detection and RLs against the project requirements
- The correctness of the concentration units
- Case narrative
- Assessing method blanks
- Assessing LCS recoveries
- Reviewing surrogate spike recoveries
- Assessing ambient air concentrations
- Assessing field duplicate precision

6. Reporting

Soil vapor and fixed gas analytical sampling results will be presented in an annual monitoring report submitted to the Regional Board in the first quarter of the new calendar year. The report, submitted via email to the Regional Board and uploaded to GeoTracker, will include the following information:

- Descriptions of field and laboratory methods.
- Tables of current and historical SVP analytical results.
- A figure depicting the most up to date SVP network, along with historical/abandoned probes.
- A brief discussion of analytical results, statistical trends, and a comparison to the previous and historical sampling events.
- Time series charts for select SVPs presented as an appendix (as needed).
- Field sampling forms, laboratory analytical reports, and chain-of-custody documentation will be submitted as appendices to the report.
- Recommendations on revisions to the SAP based on new data.

Annual reports will be prepared under the supervision of a California Registered Geologist or Professional Engineer and will be submitted to the Regional Board approximately 60 days following the end of the calendar year (approximately March 1 of each new calendar year). Revisions to this SAP may be considered and recommended in future annual reports.

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Tables

Table 1. Soil Vapor Monitoring Details

SFPP Norwalk Pump Station, Norwalk, California

Location	Easting	Northing	Top of Screen (ft. bgs.)	Bottom of Screen (ft. bgs.)
SV-10S	6540267.797	1782708.769	5	5.5
SV-12S	6539753.345	1782829.667	5	5.5
SV-14S	6540106.046	1782578.069	5	5.5
SV-17S	6541215.289	1782771.241	5	5.5
SV-2SS	6541235.093	1782827.926	0	0.5
SV-4S	6540608.994	1782810.542	5	5.5
SV-6S	6540261.953	1782812.013	5	5.5
SV-7AS	6540091.235	1782773.231	5.5	6
SV-7ASS	6540091.235	1782773.231	0	0.5
SV-7SS	6540091.235	1782773.231	0	0.5
SV-8ASS	6540091.768	1782718.355	0	0.5
SV-8S	6540091.768	1782718.355	5.5	6
SV-8SS	6540091.768	1782718.355	0	0.5
SV-9SS	6540148.554	1782688.239	0	0.5
SVM-01D	6539934.158	1782751.202	15	15.5
SVM-01S	6539934.158	1782751.202	5	5.5
SVM-02D	6539915.418	1782654.309	14.5	15
SVM-02S	6539915.418	1782654.309	5	5.5
SVM-03D	6540352.913	1782727.013	15	15.5
SVM-03S	6540352.913	1782727.013	5	5.5
SVM-04D	6540443.669	1782822.529	14.5	15
SVM-04S	6540443.669	1782822.529	5	5.5
SVM-05D	6540258.286	1782817.347	15	15.5
SVM-05S	6540258.286	1782817.347	5	5.5
SVM-06D	6540063.541	1782775.007	13	13.5
SVM-06S	6540063.541	1782775.007	7	7.5
SVM-07D	6540126.172	1782701.947	13	13.5
SVM-07S	6540126.172	1782701.947	7	7.5
SVM-08D	6540256.879	1782712.476	15	15.5
SVM-08S	6540256.879	1782712.476	5	5.5
SVM-09D	6541218.214	1782917.453	14.5	15
SVM-09S	6541218.214	1782917.453	5	5.5
SVM-10D	6540114.074	1782567.878	15	15.5
SVM-10S	6540114.074	1782567.878	7.5	8
SVM-11D	6540094.409	1783048.449	22	22.5
SVM-11M	6540094.409	1783048.449	15	15.5
SVM-11S	6540094.409	1783048.449	7	7.5
SVM-12D	6539846.272	1782941.099	22	22.5
SVM-12M	6539846.272	1782941.099	15	15.5
SVM-12S	6539846.272	1782941.099	7	7.5
SVM-13D	6540111.667	1782935.598	22	22.5
SVM-13M	6540111.667	1782935.598	15	15.5
SVM-13S	6540111.667	1782935.598	7	7.5
SVM-14D	6540263.685	1782908.941	22	22.5
SVM-14M	6540263.685	1782908.941	15	15.5
SVM-14S	6540263.685	1782908.941	7	7.5
SVM-14RD	6540263.685	1782908.941	22	22.5
SVM-14RM	6540263.685	1782908.941	16	16.5
SVM-14RS	6540263.685	1782908.941	8	8.5

Table 1. Soil Vapor Monitoring Details

SFPP Norwalk Pump Station, Norwalk, California

Location	Easting	Northing	Top of Screen (ft. bgs.)	Bottom of Screen (ft. bgs.)
SVM-15D	6540050.251	1782841.391	22	22.5
SVM-15M	6540050.251	1782841.391	15	15.5
SVM-15S	6540050.251	1782841.391	7	7.5
SVM-16D	6540255.489	1782631.499	22	22.5
SVM-16M	6540255.489	1782631.499	16	16.5
SVM-16S	6540255.489	1782631.499	7	7.5
SVM-17D	6541150.721	1782934.107	14.5	15
SVM-17S	6541150.721	1782934.107	5	5.5
SVM-18D	6541173.614	1783140.197	14.5	15
SVM-18S	6541173.614	1783140.197	5	5.5
SVM-19D	6541044.618	1783056.483	14.5	15
SVM-19S	6541044.618	1783056.483	5	5.5
SVM-20D	6541168.995	1783039.791	14.5	15
SVM-20S	6541168.995	1783039.791	5	5.5
SVM-21D	6541178.744	1782873.691	14.5	15
SVM-21S	6541178.744	1782873.691	5	5.5
SVM-22D	6541265.209	1782872.123	14.5	15
SVM-22S	6541265.209	1782872.123	5	5.5
SVM-23D	6541353.950	1782871.308	14.5	15
SVM-23S	6541353.950	1782871.308	5	5.5
SVM-24D	6541189.441	1782750.500	10	10.5
SVM-24S	6541189.441	1782750.500	5	5.5
SVM-25D	6541358.591	1782748.693	10	10.5
SVM-25S	6541358.591	1782748.693	5	5.5
SVM-26S	6540745.140	1782736.030	10	10.5
SVM-26D	6540745.140	1782736.030	5	5.5
SVM-27S	6541011.400	1782737.530	10	10.5
SVM-27D	6541011.400	1782737.530	5	5.5
SVP-105D	6539634.209	1782925.319	10	10.5
SVP-105S	6539634.209	1782925.319	5	5.5
SVP-106D	6539730.236	1782930.562	10	10.5
SVP-106S	6539730.236	1782930.562	5	5.5
SVP-107D	6539946.272	1782906.510	10	10.5
SVP-107S	6539946.272	1782906.510	5	5.5
SVP-108D	6540562.436	1782924.664	10	10.5
SVP-108S	6540562.436	1782924.664	5	5.5
SVP-109D	6540729.130	1782904.636	10	10.5
SVP-109S	6540729.130	1782904.636	5	5.5

Notes:

D = Deep

ft bgs = feet below ground surface

M = Middle

S = Shallow

SV = Historical Soil Vapor Location (no longer accessible)

SVM = Soil Vapor Monitoring

SVP = Soil Vapor Probe

Text = Destroyed or Abandoned

Table 2. Field Measurements and Laboratory Soil Vapor Analytical Results - August and September 2022
SFPP Norwalk Pump Station, Norwalk, California

Analyte Type	Analyte	Unit	Current Residential Soil Gas Screening Level [a, b]	Current Commercial Soil Gas Screening Level [a, b]	SVM-1-5 09/01/22 SVM-1 5-5.5	SVM-1-15 09/01/22 SVM-1 15-15.5	SVM-1-15 DUP 09/01/22 SVM-1 15-15.5	SVM-2-5 09/01/22 SVM-2 5-5.5	SVM-3-5 08/31/22 SVM-3 5-5.5	SVM-3-15 08/31/22 SVM-3 15-15.5	SVM-5-5 08/31/22 SVM-5 5-5.5	SVM-5-15 08/31/22 SVM-5 15-15.5	SVM-6-7 09/01/22 SVM-6 7-7.5	SVM-6-13 09/01/22 SVM-6 13-13.5	SVM-7-7 09/01/22 SVM-7 7-7.5	SVM-7-13 09/01/22 SVM-7 13-13.5	SVM-8-5 08/31/22 SVM-8 5-5.5
Field Measurements	Pressure	inches H_2O	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	PID	ppmv	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oxygen	percent	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
COPCs[c]	1,2,4-Trimethylbenzene	µg/L	63	260	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
	1,2-Dichloroethane	µg/L	0.18	0.47	< 0.0080 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 48 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
	1,3,5-Trimethylbenzene	µg/L	63	260	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
	2-Propanol (leak test compound)	µg/L	--	--	< 0.40 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 2400 U	< 0.20 U	< 0.20 U	< 0.20 U
	Benzene	µg/L	0.097	0.42	< 0.0060 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 36 U	< 0.0030 U	< 0.0030 U	< 0.0030 U
	Ethylbenzene	µg/L	1.1	4.9	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
	Isopropylbenzene (aka Cumene)	µg/L	420	1800	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
	m,p-Xylenes	µg/L	100	440	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
	Methyl tert-butyl ether (MTBE)	µg/L	11	47	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
	Naphthalene	µg/L	0.083	0.36	< 0.0060 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 36 U	< 0.0030 U	< 0.0030 U	< 0.0030 U
	n-Butylbenzene	µg/L	210	880	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
	n-Propylbenzene (propylbenzene)	µg/L	1000	4400	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
	o-Xylene	µg/L	100	440	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
	sec-Butylbenzene	µg/L	1000	4400	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
	tert-Butanol (TBA)	µg/L	--	--	< 4.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 24000 U	< 2.0 U	< 2.0 U	< 2.0 U
	Toluene	µg/L	310	1300	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
Other Detected Compounds	2,2,4-Trimethylpentane	µg/L	--	--	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	**0.066**	**2400**	< 0.020 U	< 0.020 U	< 0.020 U
	Acetone	µg/L	--	--	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	**0.033**	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	**0.024**
	Bromodichloromethane	µg/L	0.076	0.33	< 0.0050 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	**0.032**	**0.022**	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 30 U	< 0.0025 U	< 0.0025 U	< 0.0025 U
	Carbon Disulfide	µg/L	730	3,070	< 0.040 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 240 U	< 0.020 U	< 0.020 U	< 0.020 U
	Chloroform	µg/L	0.12	0.53	< 0.0080 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	**0.034**	**0.072**	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 48 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
	Ethanol	µg/L	--	--	< 0.040 U	**0.044**	< 0.020 U	**0.048**	**0.19 J**	**0.049 J**	**0.28 J**	**0.028**	**0.032**	< 240 U	**0.035**	**0.056 J**	**0.096 J**
	Tetrachloroethylene (PCE)	µg/L	0.46	2	< 0.020 U	**0.013**	**0.012**	**0.012**	< 0.010 U	< 0.010 U	< 0.010 U	**0.017**	< 0.010 U	< 120 U	**0.026**	< 0.010 U	< 0.010 U
	TPH-G (C4-C12)	µg/L	630	2600	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	**0.51**	< 0.50 U	< 0.50 U	< 0.50 U	**1.5**	**22000**	< 0.50 U	< 0.50 U	< 0.50 U
Fixed Gases	Methane	% v/v	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	Oxygen	% v/v	--	--	**14**	**14**	**11**	**18**	**22**	**22**	**21**	**21**	**10**	**4.0**	**18**	**17**	**20**
	Carbon Dioxide	% v/v	--	--	< 0.20 U	**2.0**	**1.7**	**3.5**	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	**1.0**	**15**	**3.8**	**3.2**	< 0.20 U

Notes:
[a] Source for the Indoor Air Screening Levels: DTSC, 2020. *Human Health Risk Assessment (HHRA) Note: Human and Ecological Risk Office (HERO) HHRA Note Number: 3, DTSC-modified Screening Levels (DTSC-SLs).* November.
DTSC has developed modified screening levels based on U.S. Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) for use in the human health risk assessment process at hazardous waste sites and permitted facilities.
[b] Attenuation factor for current land use = 0.001. Source for the attenuation factors: DTSC, 2011. *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (Vapor Intrusion Guidance). October.
[c] Chemicals of potential concern identified from the 2006 soil gas investigation and HHRA (Geomatrix, 2006). *Vapor Intrusion Sampling and Human Health Risk Assessment, DFSP Norwalk Facility, Norwalk, California.* December.
[1A]-https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables (carcinogenic screening level) November 2020
[1B]-https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables (noncarcinogenic screening level)
[2A]-https://dtsc.ca.gov/wp-content/uploads/sites/31/2019/04/HHRA-Note-3-June-2020-A.pdf (carcinogenic screening level)
[2B]-https://dtsc.ca.gov/wp-content/uploads/sites/31/2019/04/HHRA-Note-3-June-2020-A.pdf (noncarcinogenic screening level)
http://www.dtsc.ca.gov/AssessingRisk/upload/Final_VIG_Oct_2011.pdf.

Bold Values indicates a detectable concentration

SVM-1-5	Light blue highlighting indicates offsite soil vapor probe locations.
	Yellow highlighting indicates concentration exceeds human health screening level under residential scenario.
	Orange highlighting indicates concentration exceeds human health screening level under the commerical scenario.

3/14/2022 - 3/16/2022 and 4/12/2022 = sample dates
SVM-1 = sample location
SVM-1-5 = sample ID
5-5.5 = sample depth in feet below ground surface
--- = not available
% v/v = percent volume by volume
<0.02 = not detected at the laboratory minimum reporting limit
U = not detected above listed laboratory reporting limit
UJ = estimated nondetect due to quality control exceedances
µg/L = micrograms per liter
COPC = contaminant of potential concern
TPH-g = total petroleum hydrocarbons quantified as gasoline

Table 2. Field Measurements and Laboratory Soil Vapor Analytical Results – August and September 2022
SFPP Norwalk Pump Station, Norwalk, California

Analyte Type	Analyte	Unit	Current Residential Soil Gas Screening Level [a, b]	Current Commercial Soil Gas Screening Level [a, b]	SVM-8-15 08/31/22 SVM-8 15-15.5	SVM-9-5 08/30/22 SVM-9 5-5.5	SVM-9-14.5 08/30/22 SVM-9 14.5-15	SVM-10-15 09/01/22 SVM-10 15-15.5	SVM-11-7 08/30/22 SVM-11 7-7.5	SVM-11-15 08/30/22 SVM-11 15-15.5	SVM-11-22 08/30/22 SVM-11 22-22.5	SVM-11-22 DUP 08/30/22 SVM-11 22-22.5	SVM-12-7 08/29/22 SVM-12 7-7.5	SVM-12-15 08/29/22 SVM-12 15-15.5	SVM-12-22 08/29/22 SVM-12 22-22.5	SVM-13-7 08/29/22 SVM-13 7-7.5	SVM-13-15 08/29/22 SVM-13 15-15.5
Field Measurements	Pressure	inches H_2O	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	PID	ppmv	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oxygen	percent	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
COPCs[c]	1,2,4-Trimethylbenzene	µg/L	63	260	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	1,2-Dichloroethane	µg/L	0.18	0.47	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
	1,3,5-Trimethylbenzene	µg/L	63	260	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	2-Propanol (leak test compound)	µg/L	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	Benzene	µg/L	0.097	0.42	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U
	Ethylbenzene	µg/L	1.1	4.9	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Isopropylbenzene (aka Cumene)	µg/L	420	1800	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	m,p-Xylenes	µg/L	100	440	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Methyl tert-butyl ether (MTBE)	µg/L	11	47	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Naphthalene	µg/L	0.083	0.36	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U
	n-Butylbenzene	µg/L	210	880	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	n-Propylbenzene (propylbenzene)	µg/L	1000	4400	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	o-Xylene	µg/L	100	440	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	sec-Butylbenzene	µg/L	1000	4400	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	tert-Butanol (TBA)	µg/L	--	--	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
	Toluene	µg/L	310	1300	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
Other Detected Compounds	2,2,4-Trimethylpentane	µg/L	--	--	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Acetone	µg/L	--	--	**0.023**	**0.021**	**0.024**	< 0.020 U	< 0.020 U	< 0.020 U	**0.021**	**0.028**	< 0.020 U	< 0.020 U	< 0.020 U	**0.026**	< 0.020 U
	Bromodichloromethane	µg/L	0.076	0.33	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U
	Carbon Disulfide	µg/L	730	3,070	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Chloroform	µg/L	0.12	0.53	< 0.0040 U	< 0.0040 U	< 0.0040 U	**0.0048**	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
	Ethanol	µg/L	--	--	**0.30 J**	**0.058 J**	**0.045**	**0.072 J**	**0.036**	**0.033**	**0.029 J**	**0.062 J**	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Tetrachloroethylene (PCE)	µg/L	0.46	2	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	**0.024**	**0.031**	< 0.010 U	< 0.010 U	**0.020**	< 0.010 U	< 0.010 U
	TPH-G (C4-C12)	µg/L	630	2600	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Fixed Gases	Methane	% v/v	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	Oxygen	% v/v	--	--	**21**	**19**	**21**	**21**	**19**	**19**	**8.0**	**7.8**	**19**	**15**	**8.7**	**21**	**19**
	Carbon Dioxide	% v/v	--	--	< 0.20 U	**3.7**	< 0.20 U	< 0.20 U	**1.6**	**1.8**	**9.1**	**9.0**	**1.9**	**5.1**	**13**	**0.75**	**1.1**

Notes:

[a] Source for the Indoor Air Screening Levels: DTSC, 2020. *Human Health Risk Assessment (HHRA) Note: Human and Ecological Risk Office (HERO) HHRA Note Number: 3, DTSC-modified Screening Levels (DTSC-SLs).* November. DTSC has developed modified screening levels based on U.S. Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) for use in the human health risk assessment process at hazardous waste sites and permitted facilities.

[b] Attenuation factor for current land use = 0.001. Source for the attenuation factors: DTSC, 2011. *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (Vapor Intrusion Guidance). October.

[c] Chemicals of potential concern identified from the 2006 soil gas investigation and HHRA (Geomatrix, 2006). *Vapor Intrusion Sampling and Human Health Risk Assessment, DFSP Norwalk Facility, Norwalk, California.* December.

[1A]-https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables (carcinogenic screening level) November 2020

[1B]-https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables (noncarcinogenic screening level)

[2A]-https://dtsc.ca.gov/wp-content/uploads/sites/31/2019/04/HHRA-Note-3-June-2020-A.pdf (carcinogenic screening level)

[2B]-https://dtsc.ca.gov/wp-content/uploads/sites/31/2019/04/HHRA-Note-3-June-2020-A.pdf (noncarcinogenic screening level)

http://www.dtsc.ca.gov/AssessingRisk/upload/Final_VIG_Oct_2011.pdf.

Bold Values indicates a detectable concentration

SVM-1-5	Light blue highlighting indicates offsite soil vapor probe locations.
	Yellow highlighting indicates concentration exceeds human health screening level under residential scenario.
	Orange highlighting indicates concentration exceeds human health screening level under the commerical scenario.

3/14/2022 - 3/16/2022 and 4/12/2022 = sample dates
SVM-1 = sample location
SVM-1-5 = sample ID
5-5.5 = sample depth in feet below ground surface
--- = not available
% v/v = percent volume by volume
<0.02 = not detected at the laboratory minimum reporting limit
U = not detected above listed laboratory reporting limit
UJ = estimated nondetect due to quality control exceedances

µg/L = micrograms per liter
COPC = contaminant of potential concern
TPH-g = total petroleum hydrocarbons quantified as gasoline

Table 2. Field Measurements and Laboratory Soil Vapor Analytical Results – August and September 2022

SFPP Norwalk Pump Station, Norwalk, California

Analyte Type	Analyte	Unit	Current Residential Soil Gas Screening Level [a, b]	Current Commercial Soil Gas Screening Level [a, b]	SVM-13-22 08/29/22 SVM-13 22-22.5	SVM-14R-7 08/29/22 SVM-14R 7-7.5	SVM-14R-16 08/29/22 SVM-14R 16-16.5	SVM-14R-22 08/29/22 SVM-14R 22-22.5	SVM-16-7 08/31/22 SVM-16 7-7.5	SVM-16-16 08/31/22 SVM-16 16-16.5	SVM-16-22 08/31/22 SVM-16 22-22.5	SVM-21-5 08/30/22 SVM-21 5-5.5	SVM-21-14.5 08/30/22 SVM-21 14.5-15	SVM-22-5 08/30/22 SVM-22 5-5.5	SVM-22-14.5 08/30/22 SVM-22 14.5-15	SVM-23-5 08/30/22 SVM-23 5-5.5	SVM-23-14.5 08/30/22 SVM-23 14.5-15
Field Measurements	Pressure	inches H_2O	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	PID	ppmv	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oxygen	percent	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
COPCs[c]	1,2,4-Trimethylbenzene	µg/L	63	260	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	1,2-Dichloroethane	µg/L	0.18	0.47	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
	1,3,5-Trimethylbenzene	µg/L	63	260	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	2-Propanol (leak test compound)	µg/L	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	Benzene	µg/L	0.097	0.42	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U
	Ethylbenzene	µg/L	1.1	4.9	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Isopropylbenzene (aka Cumene)	µg/L	420	1800	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	m,p-Xylenes	µg/L	100	440	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Methyl tert-butyl ether (MTBE)	µg/L	11	47	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Naphthalene	µg/L	0.083	0.36	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U
	n-Butylbenzene	µg/L	210	880	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	n-Propylbenzene (propylbenzene)	µg/L	1000	4400	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	o-Xylene	µg/L	100	440	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	sec-Butylbenzene	µg/L	1000	4400	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	tert-Butanol (TBA)	µg/L	--	--	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
	Toluene	µg/L	310	1300	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
Other Detected Compounds	2,2,4-Trimethylpentane	µg/L	--	--	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Acetone	µg/L	--	--	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	**0.031**	**0.030**	**0.026**	**0.020**	**0.021**	< 0.020 U	**0.028**	< 0.020 U	**0.025**
	Bromodichloromethane	µg/L	0.076	0.33	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U
	Carbon Disulfide	µg/L	730	3,070	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Chloroform	µg/L	0.12	0.53	< 0.0040 U	< 0.0040 U	**0.045**	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	**0.049**	< 0.0040 U	< 0.0040 U	**0.0075**
	Ethanol	µg/L	--	--	< 0.020 U	< 0.020 U	**0.035**	< 0.020 U	< 0.020 U	**0.29 J**	**0.18 J**	**0.023**	**0.029**	< 0.020 U	**0.022**	**0.034**	**0.082 J**
	Tetrachloroethylene (PCE)	µg/L	0.46	2	< 0.010 U	**0.014**	**0.019**	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U
	TPH-G (C4-C12)	µg/L	630	2600	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	**0.62**	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Fixed Gases	Methane	% v/v	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	Oxygen	% v/v	--	--	**16**	**18**	**17**	**8.7**	**22**	**21**	**21**	**21**	**21**	**20**	**21**	**22**	**21**
	Carbon Dioxide	% v/v	--	--	**2.2**	**2.8**	**3.9**	**9.8**	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	**0.59**	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U

Notes:

[a] Source for the Indoor Air Screening Levels: DTSC, 2020. *Human Health Risk Assessment (HHRA) Note: Human and Ecological Risk Office (HERO) HHRA Note Number: 3, DTSC-modified Screening Levels (DTSC-SLs).* November. DTSC has developed modified screening levels based on U.S. Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) for use in the human health risk assessment process at hazardous waste sites and permitted facilities.

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[1B]-https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables (noncarcinogenic screening level)

[2A]-https://dtsc.ca.gov/wp-content/uploads/sites/31/2019/04/HHRA-Note-3-June-2020-A.pdf (carcinogenic screening level)

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Bold Values indicates a detectable concentration

SVM-1-5	Light blue highlighting indicates offsite soil vapor probe locations.
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3/14/2022 - 3/16/2022 and 4/12/2022 = sample dates

SVM-1 = sample location

SVM-1-5 = sample ID

5-5.5 = sample depth in feet below ground surface

--- = not available

% v/v = percent volume by volume

<0.02 = not detected at the laboratory minimum reporting limit

U = not detected above listed laboratory reporting limit

UJ = estimated nondetect due to quality control exceedances

µg/L = micrograms per liter

COPC = contaminant of potential concern

TPH-g = total petroleum hydrocarbons quantified as gasoline

Table 2. Field Measurements and Laboratory Soil Vapor Analytical Results – August and September 2022
SFPP Norwalk Pump Station, Norwalk, California

Analyte Type	Analyte	Unit	Current Residential Soil Gas Screening Level [a, b]	Current Commercial Soil Gas Screening Level [a, b]	SVM-24-5 08/31/22 SVM-24 5-5.5	SVM-24-10 08/31/22 SVM-24 10-10.5	SVM-25-5 08/31/22 SVM-25 5-5.5	SVM-25-10 08/31/22 SVM-25 10-10.5	SVM-26-5 08/31/22 SVM-26 5-5.5	SVM-26-10 08/31/22 SVM-26 10-10.5	SVM-27-5 08/31/22 SVM-27 5-5.5	SVM-27-10 08/31/22 SVM-27 10-10.5	SVP-105-5 08/29/22 SVP-105 5-5.5	SVP-105-10 08/29/22 SVP-105 10-10.5	SVP-105-10 DUP 08/29/22 SVP-105 10-10.5	SVP-106-5 08/29/22 SVP-106 5-5.5	SVP-106-10 08/29/22 SVP-106 10-10.5
Field Measurements	Pressure	inches H_2O	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	PID	ppmv	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Oxygen	percent	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
COPCs[c]	1,2,4-Trimethylbenzene	µg/L	63	260	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	1,2-Dichloroethane	µg/L	0.18	0.47	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
	1,3,5-Trimethylbenzene	µg/L	63	260	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	2-Propanol (leak test compound)	µg/L	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	Benzene	µg/L	0.097	0.42	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U
	Ethylbenzene	µg/L	1.1	4.9	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Isopropylbenzene (aka Cumene)	µg/L	420	1800	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	m,p-Xylenes	µg/L	100	440	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Methyl tert-butyl ether (MTBE)	µg/L	11	47	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Naphthalene	µg/L	0.083	0.36	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U
	n-Butylbenzene	µg/L	210	880	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	n-Propylbenzene (propylbenzene)	µg/L	1000	4400	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	o-Xylene	µg/L	100	440	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	sec-Butylbenzene	µg/L	1000	4400	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	tert-Butanol (TBA)	µg/L	--	--	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
	Toluene	µg/L	310	1300	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
Other Detected Compounds	2,2,4-Trimethylpentane	µg/L	--	--	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Acetone	µg/L	--	--	**0.050**	**0.064 J**	**0.038**	**0.068 J**	**0.023**	**0.042**	**0.027**	**0.031**	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	**0.028**
	Bromodichloromethane	µg/L	0.076	0.33	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U
	Carbon Disulfide	µg/L	730	3,070	**0.023**	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Chloroform	µg/L	0.12	0.53	< 0.0040 U	**0.0042**	**0.012**	**0.014**	< 0.0040 U	< 0.0040 U	**0.0085**	**0.062**	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
	Ethanol	µg/L	--	--	**0.050 J**	**0.031**	**0.057 J**	**0.045**	**0.080 J**	**0.040**	**0.042**	**0.034**	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Tetrachloroethylene (PCE)	µg/L	0.46	2	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	**0.014**	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	**0.018**	**0.019**	**0.014**	< 0.010 U
	TPH-G (C4-C12)	µg/L	630	2600	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Fixed Gases	Methane	% v/v	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	Oxygen	% v/v	--	--	**21**	**21**	**18**	**19**	**20**	**20**	**20**	**21**	**20**	**20**	**19**	**20**	**19**
	Carbon Dioxide	% v/v	--	--	**0.55**	**1.2**	**3.0**	**2.7**	**1.8**	**1.8**	**1.8**	**2.3**	**1.2**	**1.8**	**1.8**	**0.85**	**1.8**

Notes:
[a] Source for the Indoor Air Screening Levels: DTSC, 2020. *Human Health Risk Assessment (HHRA) Note: Human and Ecological Risk Office (HERO) HHRA Note Number: 3, DTSC-modified Screening Levels (DTSC-SLs).* November.
DTSC has developed modified screening levels based on U.S. Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) for use in the human health risk assessment process at hazardous waste sites and permitted facilities.
[b] Attenuation factor for current land use = 0.001. Source for the attenuation factors: DTSC, 2011. *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (Vapor Intrusion Guidance). October.
[c] Chemicals of potential concern identified from the 2006 soil gas investigation and HHRA (Geomatrix, 2006). *Vapor Intrusion Sampling and Human Health Risk Assessment, DFSP Norwalk Facility, Norwalk, California.* December.
[1A]-https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables (carcinogenic screening level) November 2020
[1B]-https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables (noncarcinogenic screening level)
[2A]-https://dtsc.ca.gov/wp-content/uploads/sites/31/2019/04/HHRA-Note-3-June-2020-A.pdf (carcinogenic screening level)
[2B]-https://dtsc.ca.gov/wp-content/uploads/sites/31/2019/04/HHRA-Note-3-June-2020-A.pdf (noncarcinogenic screening level)
http://www.dtsc.ca.gov/AssessingRisk/upload/Final_VIG_Oct_2011.pdf.

Bold Values indicates a detectable concentration

SVM-1-5	Light blue highlighting indicates offsite soil vapor probe locations.
	Yellow highlighting indicates concentration exceeds human health screening level under residential scenario.
	Orange highlighting indicates concentration exceeds human health screening level under the commerical scenario.

3/14/2022 - 3/16/2022 and 4/12/2022 = sample dates
SVM-1 = sample location
SVM-1-5 = sample ID
5-5.5 = sample depth in feet below ground surface
--- = not available
% v/v = percent volume by volume
<0.02 = not detected at the laboratory minimum reporting limit
U = not detected above listed laboratory reporting limit
UJ = estimated nondetect due to quality control exceedances
µg/L = micrograms per liter
COPC = contaminant of potential concern
TPH-g = total petroleum hydrocarbons quantified as gasoline

Table 2. Field Measurements and Laboratory Soil Vapor Analytical Results – August and September 2022

SFPP Norwalk Pump Station, Norwalk, California

Analyte Type	Analyte	Unit	Current Residential Soil Gas Screening Level [a, b]	Current Commercial Soil Gas Screening Level [a, b]	SVP-107-5 08/29/22 SVP-107 5-5.5	SVP-107-10 08/29/22 SVP-107 10-10.5	SVP-108-5 08/29/22 SVP-108 5-5.5	SVP-108-10 08/29/22 SVP-108 10-10.5	SVP-109-5 08/30/22 SVP-109 5-5.5	SVP-109-10 08/30/22 SVP-109 10-10.5	AMBIENT AIR 08/29/22	AMBIENT AIR 08/30/22	AMBIENT AIR 08/31/22	AMBIENT AIR 09/01/22
Field Measurements	Pressure	inches H_2O	--	--	--	--	--	--	--	--	--	--	--	--
	PID	ppmv	--	--	--	--	--	--	--	--	--	--	--	--
	Oxygen	percent	--	--	--	--	--	--	--	--	--	--	--	--
COPCs[c]	1,2,4-Trimethylbenzene	µg/L	63	260	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	1,2-Dichloroethane	µg/L	0.18	0.47	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.064 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
	1,3,5-Trimethylbenzene	µg/L	63	260	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	2-Propanol (leak test compound)	µg/L	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 3.2 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	Benzene	µg/L	0.097	0.42	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.048 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U
	Ethylbenzene	µg/L	1.1	4.9	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Isopropylbenzene (aka Cumene)	µg/L	420	1800	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	m,p-Xylenes	µg/L	100	440	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Methyl tert-butyl ether (MTBE)	µg/L	11	47	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Naphthalene	µg/L	0.083	0.36	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.048 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U	< 0.0030 U
	n-Butylbenzene	µg/L	210	880	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	n-Propylbenzene (propylbenzene)	µg/L	1000	4400	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	o-Xylene	µg/L	100	440	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	sec-Butylbenzene	µg/L	1000	4400	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	tert-Butanol (TBA)	µg/L	--	--	< 2.0 U	< 2.0 U	< 2.0 U	< 32 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
	Toluene	µg/L	310	1300	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
Other Detected Compounds	2,2,4-Trimethylpentane	µg/L	--	--	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Acetone	µg/L	--	--	**0.026**	**0.032**	< 0.020 U	< 0.32 U	**0.032**	**0.091 J**	< 0.020 U	**0.022**	**0.030**	**0.023**
	Bromodichloromethane	µg/L	0.076	0.33	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.040 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U	< 0.0025 U
	Carbon Disulfide	µg/L	730	3,070	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U	< 0.020 U
	Chloroform	µg/L	0.12	0.53	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.064 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
	Ethanol	µg/L	--	--	< 0.020 U	< 0.020 U	< 0.020 U	< 0.32 U	**0.032**	**0.038**	**0.026**	**0.071 J**	**0.038**	**0.026**
	Tetrachloroethylene (PCE)	µg/L	0.46	2	< 0.010 U	< 0.010 U	< 0.010 U	< 0.16 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U
	TPH-G (C4-C12)	µg/L	630	2600	< 0.50 U	< 0.50 U	**1.1**	**790**	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Fixed Gases	Methane	% v/v	--	--	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U
	Oxygen	% v/v	--	--	**19**	**19**	**16**	**6.7 J**	**22**	**22**	**21**	**21**	**15**	**21**
	Carbon Dioxide	% v/v	--	--	**2.2**	**2.0**	**5.2**	**13 J**	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U	< 0.20 U

Notes:

[a] Source for the Indoor Air Screening Levels: DTSC, 2020. *Human Health Risk Assessment (HHRA) Note: Human and Ecological Risk Office (HERO) HHRA Note Number: 3, DTSC-modified Screening Levels (DTSC-SLs).* November.
DTSC has developed modified screening levels based on U.S. Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) for use in the human health risk assessment process at hazardous waste sites and permitted facilities.

[b] Attenuation factor for current land use = 0.001. Source for the attenuation factors: DTSC, 2011. *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (Vapor Intrusion Guidance). October.

[c] Chemicals of potential concern identified from the 2006 soil gas investigation and HHRA (Geomatrix, 2006). *Vapor Intrusion Sampling and Human Health Risk Assessment, DFSP Norwalk Facility, Norwalk, California.* December.

[1A] -https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables (carcinogenic screening level) November 2020

[1B] -https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables (noncarcinogenic screening level)

[2A] -https://dtsc.ca.gov/wp-content/uploads/sites/31/2019/04/HHRA-Note-3-June-2020-A.pdf (carcinogenic screening level)

[2B] -https://dtsc.ca.gov/wp-content/uploads/sites/31/2019/04/HHRA-Note-3-June-2020-A.pdf (noncarcinogenic screening level)

http://www.dtsc.ca.gov/AssessingRisk/upload/Final_VIG_Oct_2011.pdf.

Bold Values indicates a detectable concentration

SVM-1-5	Light blue highlighting indicates offsite soil vapor probe locations.
(yellow)	Yellow highlighting indicates concentration exceeds human health screening level under residential scenario.
(orange)	Orange highlighting indicates concentration exceeds human health screening level under the commerical scenario.

3/14/2022 - 3/16/2022 and 4/12/2022 = sample dates
SVM-1 = sample location
SVM-1-5 = sample ID
5-5.5 = sample depth in feet below ground surface
--- = not available
% v/v = percent volume by volume
<0.02 = not detected at the laboratory minimum reporting limit
U = not detected above listed laboratory reporting limit
UJ = estimated nondetect due to quality control exceedances
µg/L = micrograms per liter
COPC = contaminant of potential concern
TPH-g = total petroleum hydrocarbons quantified as gasoline

Table 3. Soil Vapor and Fixed Gases Sampling and Analysis Plan

SFPP Norwalk Pump Station, Norwalk, California

Location	Easting	Northing	Top of Screen (ft. bgs.)	Bottom of Screen (ft. bgs.)	Laboratory Analytical			Annual Field Gas Monitoring	Frequency
					TO-15	TO-3	ASTM Method D1946M		
SVM-01D	6539934.158	1782751.202	15	15.5				X	Annual Field Gas
SVM-01S	6539934.158	1782751.202	5	5.5				X	Annual Field Gas
SVM-02S	6539915.418	1782654.309	5	5.5				X	Annual Field Gas
SVM-03D	6540352.913	1782727.013	15	15.5	X	X	X	X	Semiannual
SVM-03S	6540352.913	1782727.013	5	5.5	X	X	X	X	Semiannual
SVM-05D	6540258.286	1782817.347	15	15.5				X	Annual Field Gas
SVM-05S	6540258.286	1782817.347	5	5.5				X	Annual Field Gas
SVM-06D	6540063.541	1782775.007	13	13.5	X	X	X	X	Semiannual
SVM-06S	6540063.541	1782775.007	7	7.5	X	X	X	X	Semiannual
SVM-07D	6540126.172	1782701.947	13	13.5				X	Annual Field Gas
SVM-07S	6540126.172	1782701.947	7	7.5				X	Annual Field Gas
SVM-08D	6540256.879	1782712.476	15	15.5				X	Annual Field Gas
SVM-08S	6540256.879	1782712.476	5	5.5				X	Annual Field Gas
SVM-09D	6541218.214	1782917.453	14.5	15				X	Annual Field Gas
SVM-09S	6541218.214	1782917.453	5	5.5				X	Annual Field Gas
SVM-10D	6540114.074	1782567.878	15	15.5	X	X	X	X	Annual
SVM-11D	6540094.409	1783048.449	22	22.5				X	Annual Field Gas
SVM-11M	6540094.409	1783048.449	15	15.5				X	Annual Field Gas
SVM-11S	6540094.409	1783048.449	7	7.5				X	Annual Field Gas
SVM-12D	6539846.272	1782941.099	22	22.5	X	X	X	X	Annual
SVM-12M	6539846.272	1782941.099	15	15.5	X	X	X	X	Annual
SVM-12S	6539846.272	1782941.099	7	7.5	X	X	X	X	Annual
SVM-13D	6540111.667	1782935.598	22	22.5				X	Annual Field Gas
SVM-13M	6540111.667	1782935.598	15	15.5				X	Annual Field Gas
SVM-13S	6540111.667	1782935.598	7	7.5				X	Annual Field Gas
SVM-14RD	6540263.685	1782908.941	22	22.5	X	X	X	X	Annual
SVM-14RM	6540263.685	1782908.941	16	16.5	X	X	X	X	Annual
SVM-14RS	6540263.685	1782908.941	8	8.5	X	X	X	X	Annual
SVM-16D	6540255.489	1782631.499	22	22.5	X	X	X	X	Annual
SVM-16M	6540255.489	1782631.499	16	16.5	X	X	X	X	Annual
SVM-16S	6540255.489	1782631.499	7	7.5	X	X	X	X	Annual
SVM-21D	6541178.744	1782873.691	14.5	15	X	X	X	X	Semiannual
SVM-21S	6541178.744	1782873.691	5	5.5	X	X	X	X	Semiannual
SVM-22D	6541265.209	1782872.123	14.5	15				X	Annual Field Gas
SVM-22S	6541265.209	1782872.123	5	5.5				X	Annual Field Gas
SVM-23D	6541353.950	1782871.308	14.5	15				X	Annual Field Gas
SVM-23S	6541353.950	1782871.308	5	5.5				X	Annual Field Gas
SVM-24D	6541189.441	1782750.500	10	10.5				X	Annual Field Gas
SVM-24S	6541189.441	1782750.500	5	5.5				X	Annual Field Gas
SVM-25D	6541358.591	1782748.693	10	10.5				X	Annual Field Gas
SVM-25S	6541358.591	1782748.693	5	5.5				X	Annual Field Gas

Table 3. Soil Vapor and Fixed Gases Sampling and Analysis Plan
SFPP Norwalk Pump Station, Norwalk, California

Location	Easting	Northing	Top of Screen (ft. bgs.)	Bottom of Screen (ft. bgs.)	Laboratory Analytical: TO-15	TO-3	ASTM Method D1946M	Annual Field Gas Monitoring	Frequency
SVM-26S	6540745.140	1782736.030	10	10.5	X	X	X	X	Semiannual
SVM-26D	6540745.140	1782736.030	5	5.5	X	X	X	X	Semiannual
SVM-27S	6541011.400	1782737.530	10	10.5	X	X	X	X	Semiannual
SVM-27D	6541011.400	1782737.530	5	5.5	X	X	X	X	Semiannual
SVP-105D	6539634.209	1782925.319	10	10.5				X	Annual Field Gas
SVP-105S	6539634.209	1782925.319	5	5.5				X	Annual Field Gas
SVP-106D	6539730.236	1782930.562	10	10.5				X	Annual Field Gas
SVP-106S	6539730.236	1782930.562	5	5.5				X	Annual Field Gas
SVP-107D	6539946.272	1782906.510	10	10.5				X	Annual Field Gas
SVP-107S	6539946.272	1782906.510	5	5.5				X	Annual Field Gas
SVP-108D	6540562.436	1782924.664	10	10.5	X	X	X	X	Semiannual
SVP-108S	6540562.436	1782924.664	5	5.5	X	X	X	X	Semiannual
SVP-109D	6540729.130	1782904.636	10	10.5				X	Annual Field Gas
SVP-109S	6540729.130	1782904.636	5	5.5				X	Annual Field Gas
				Totals	22	22	22	55	

Semiannual	12
Annual	10

SVP Samples	34
Duplicates	2
Air	4
TOTAL	40

Notes:
D = Deep
ft bgs = feet below ground surface
M = Middle
S = Shallow
SVM = Soil Vapor Monitoring
SVP = Soil Vapor Probe
Text = Destroyed or Abandoned
ASTM Method D1946 Fixed Gases (CO2, O2, Methane)
TO-3 TPH-gas
TO-15 benzene, toluene, ethylbenzene, total xylenes (collectively, BTEX), MTBE, naphthalene, tert-butyl alcohol (TBA), 1,2-DCA, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, n-butylbenzene, sec-butylbenzene, isopropylbenzene, chloroform, cyclohexane, acetone, and n-propylbenzene

Figures

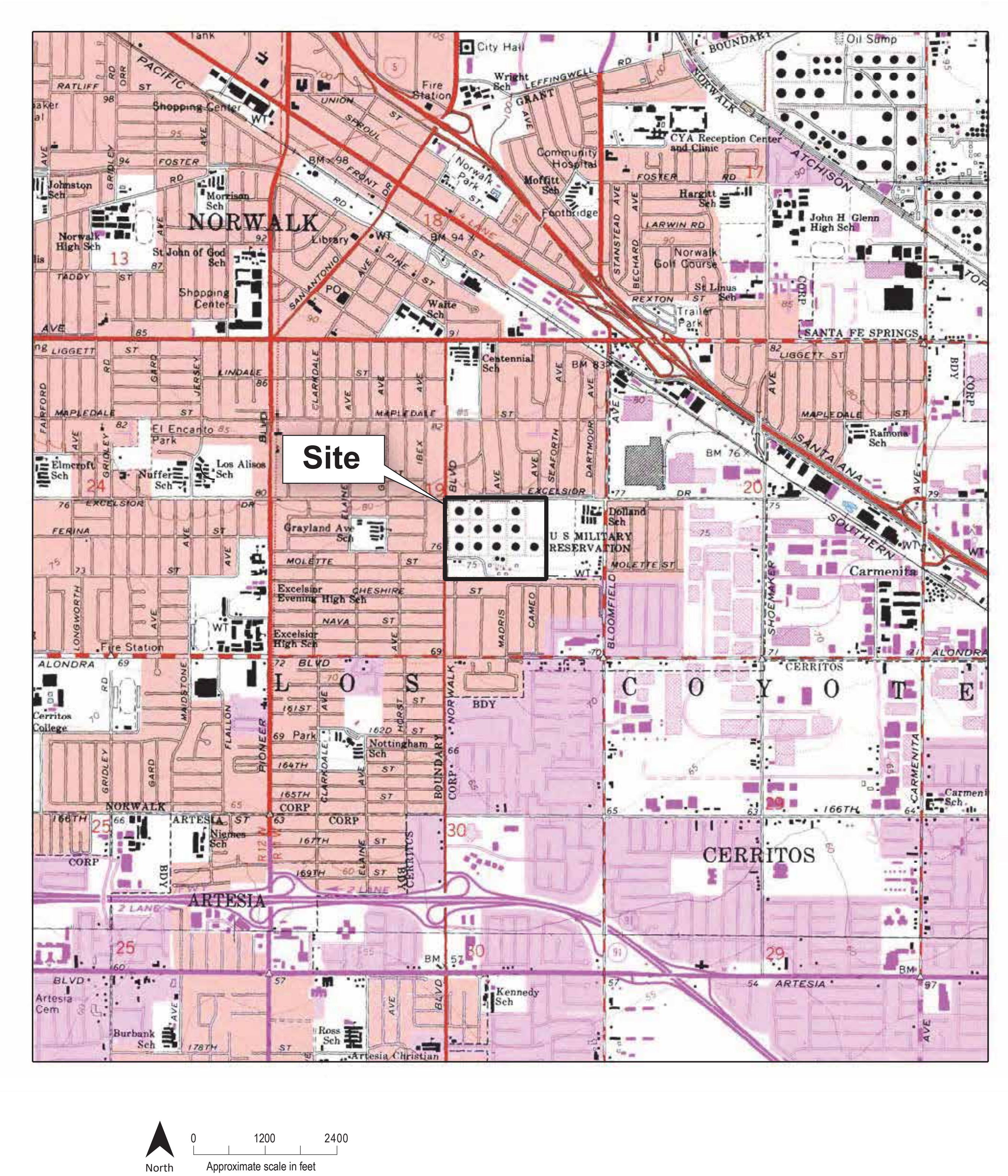
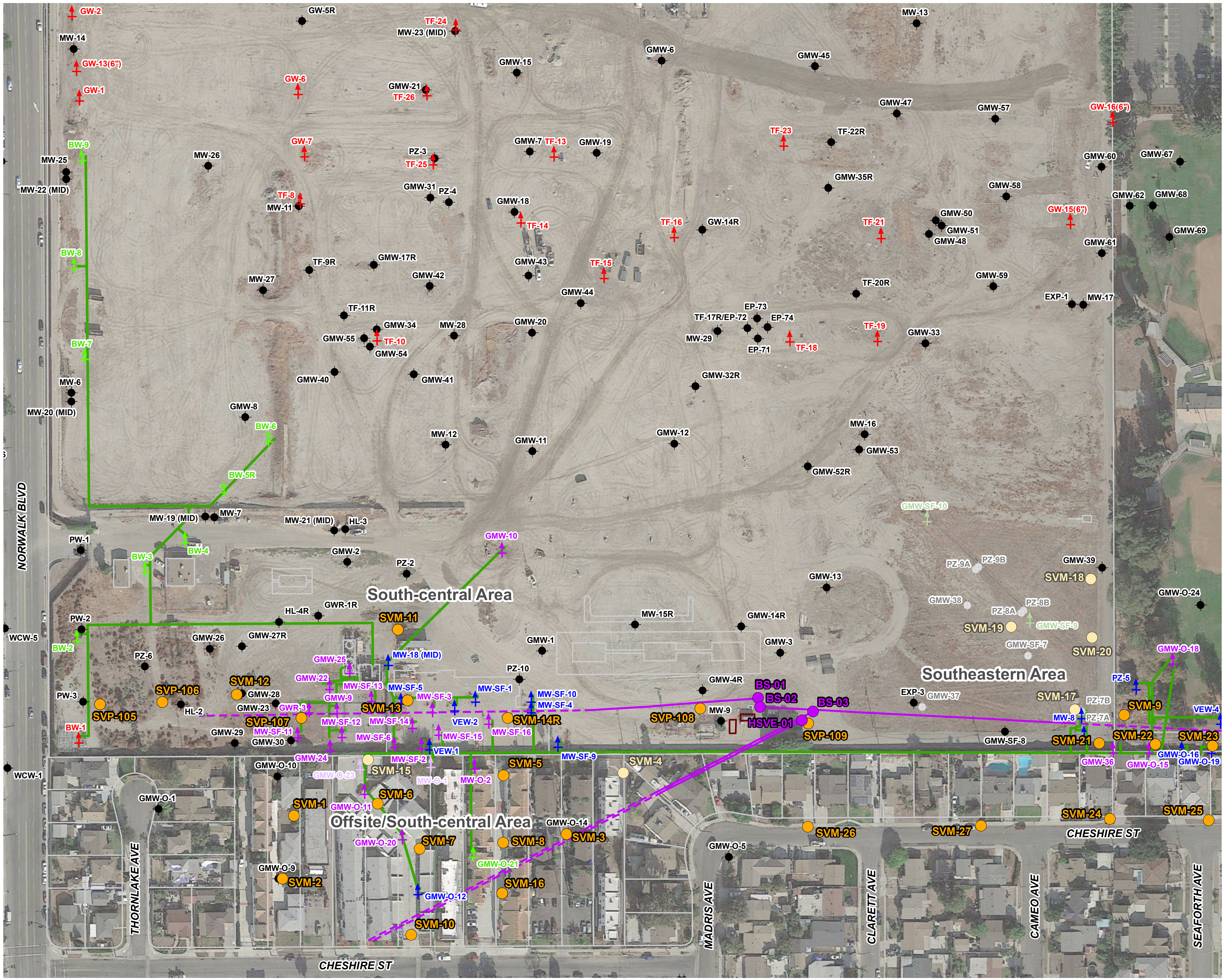


Figure 1. Site Location Map
SFPP Norwalk Pump Station
Norwalk, California

BASEMAP MODIFIED FROM U.S.G.S. 7.5 MINUTE QUADRANGLE MAP
LOS ALAMITOS 1964, CALIFORNIA. PHOTO-REVISED 1981.
WHITTIER 1965, CALIFORNIA. PHOTO-REVISED 1981.

Jacobs



LEGEND

- Soil Vapor Probe/Soil Vapor Monitoring Probe
- Destroyed Soil Vapor Probe/Soil Vapor Monitoring Probe
- Horizontal Biosparge Well Entry Point
- Existing Groundwater Monitoring Well
- Abandoned/Destroyed Groundwater Monitoring Well
- Existing Remediation Well
- Kinder Morgan Combined Soil Vapor and Total Fluids Extraction Wells
- Kinder Morgan Combined Soil Vapor and Total Fluids Extraction Wells (Abandoned)
- Kinder Morgan Soil Vapor Extraction Wells
- Kinder Morgan Total Fluids and/or Groundwater Extraction Wells
- Kinder Morgan Total Fluids and/or Groundwater Extraction Wells (Abandoned)
- Kinder Morgan Remediation Piping Layout (Above Ground and Below Ground)
- Horizontal Biosparge Well (Dashed Line Depicts Approximate Lateral Extent of Well Screen)
- Air Compressor System

Imagery Source:
Google Earth December 3, 2017.

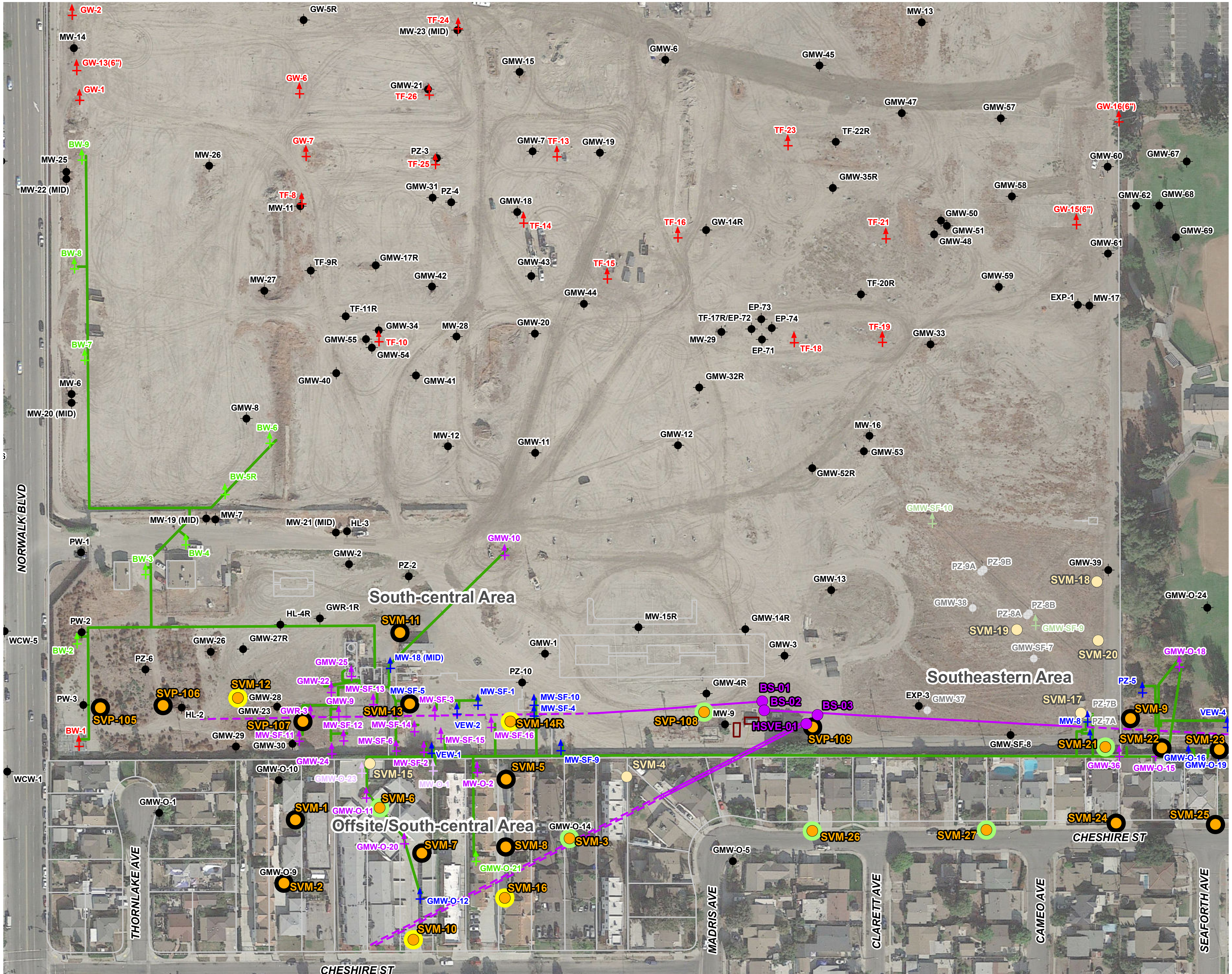
N

0 75 150 300
Feet

1 inch = 150 feet

Figure 2. Current and Historical Remediation System Layout(s)
SFPP Norwalk Pump Station
Norwalk, California

Jacobs



\\DC1VS01\GISPROJ\K\KINDERMORGAN\NORWALK\MAPFILES\2022\FIGURE_3_2023 SVP SAP PROPOSED.MXD AESPEJO 2/7/2023

LEGEND

- Soil Vapor Probe/Soil Vapor Monitoring Probe
- Destroyed/Abandoned Soil Vapor Probe/Soil Vapor Monitoring Probe

2023 SVP SAP

- Annual Sampling
- Semi-Annual Sampling
- Fixed Field Gas Sampling for NSZD
- Horizontal Biosparge Well Entry Point
- Existing Groundwater Monitoring Well
- Abandoned/Destroyed Groundwater Monitoring Well
- Existing Remediation Well
- Kinder Morgan Combined Soil Vapor and Total Fluids Extraction Wells
- Kinder Morgan Combined Soil Vapor and Total Fluids Extraction Wells (Abandoned)
- Kinder Morgan Soil Vapor Extraction Wells
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- Kinder Morgan Total Fluids and/or Groundwater Extraction Wells (Abandoned)
- Kinder Morgan Remediation Piping Layout (Above Ground and Below Ground)
- Horizontal Biosparge Well (Dashed Line Depicts Approximate Lateral Extent of Well Screen)
- Air Compressor System

Imagery Source:
Google Earth December 3, 2017.

N

0 75 150 300
Feet
1 inch = 150 feet

Figure 3. Sampling and Analysis (SAP) Monitoring Locations and Frequency (Soil Vapor and Fixed Gases)
SFPP Norwalk Pump Station
Norwalk, California

Jacobs

Appendix A
Historical Soil Vapor Probe Analytical Data

Appendix A is provided in the full version available on GeoTracker.

Appendix B
Statistical Trend Analyses Results

Attachment B

Statistical Trend Analyses Results

Recently detected soil vapor analytes (Table 2) were evaluated using a statistical approach (descriptive and quantitative trends). See the most recent second half 2022 soil vapor technical memorandum available on "GeoTracker" for a detailed breakdown of the statistical methodology. The eight soil vapor analytes recently detected as of August and September 2022 were:

1. 2,2,4-Trimethylpentane
2. Acetone
3. Bromodichloromethane
4. Carbon Disulfide
5. Chloroform
6. Ethanol
7. Tetrachloroethene
8. Gasoline (TPH-g)

All other analytes were not detected during the last sampling event (August and September 2022). All historical analytical data (including detect and non-detect data) are compiled in Appendix A. The quantitative results of the data evaluation are profiled below.

Trend testing was conducted using the eight analytes of the recently (as of August and September 2022) detected data, spanning a time frame from September 2014 through September 2022. A summary table of the trend analysis results along with descriptive statistics are profiled further below in this appendix. Overall, to summarize the results:

- There were 553 cases (A combination of sample points and analytes) evaluated using the Mann-Kendall test
  - Ten (2%) cases have a statistically significant trends
    - Increasing trends are observed in four cases (SVM-03D, SVM-12D, SVM-14RM, and SVM-16D)
      - All of which are non-COPCs (Bromodichloromethane, Tetrachloroethene, Chloroform, and Acetone)
    - Decreasing trends are observed in six cases (SVM-14D, SVM-12D, SVM-21D, SVM-23D, SVP-109D, and SVP-109S)
  - There were 510 cases (92%) of non-significant test results (i.e., no trend), meaning that the null hypothesis could not be rejected at the specified 95 percent confidence level
    - Of the 510 cases:
      - 501 locations are ≥50% non-detect
      - 5 locations (SVM-24D, SVM-25S, SVM-11D, SVM-21S, and SVM-23S) demonstrate stable trends based on the coefficient of variation (CV) <1.0

  - 4 locations (SVP-108D, SVM-25D, SVM-26D, and SVM-03S) demonstrate a non-stable trend based on the CV >1.0
    - These non-stable trends are associated to Tetrachloroethene and Chloroform for all but SVP-108D
    - SVP-108D recently had a detection of 790 µg/L for TPH-g, but has significantly reduced (91%) from its observed historical maximum
- There were 33 cases (6%) of insufficient data for analysis (IS), meaning three or fewer observations for that unique location and analyte were available and therefore a trend test could not be conducted

Based on this evaluation of trends and statistics and the anticipated remedial plan at the site, as discussed in the IRAP (Jacobs, 2022a), the following criteria based on TPH-g* have been selected for determining the SVP network:

Remove a location from the sampling plan if all of the following are true at that location:

a) n (number of samples)≥5, and;

b) All results have been ≥50% non-detect for TPH-g, and;

c) 2 or more consecutive sampling events of non-detect for TPH-g, and;

d) All other analytical results for COPCs are below USEPA's RSL and HERO Note 2, and;

e) No significant Mann-Kendall increasing trend exists for COPCs, and;

f) Nested pairs (i.e., S, M, or D) at location name (i.e., SVM-01) also fit (a), (b), (c), (d), and (e) above.

Annual sampling will occur at a location if one of the following are true at that location:

a) n (number of samples)<5, or;

b) All results have been <50% non-detect for TPH-g, or;

c) Less than 2 consecutive sampling events of non-detect for TPH-g, or;

d) Other analytes for COPCs have results above USEPA's RSL and HERO Note 2, or;

e) Significant Mann-Kendall increasing trends exist for COPCs, or;

f) Nested pairs (i.e., S, M, or D) at location name (i.e., SVM-01) also fit (a), (b), (c), (d), and (e) above.

Semi-Annual sampling if neither criterion (Remove or Annual) from above are met.

*In review of all soil vapor analytical data collected historically (Appendix A), hydrocarbon fuel related compounds, including benzene, toluene, ethylbenzene, xylene (BTEX) and TPH-g, have been the most prevalent and detected compounds at the site. Therefore, TPH-g is a useful surrogate for all other detected data at the site and is the primary compound relied upon for further in-depth analysis and logic described above.

**Removal of the soil vapor probe, including nested pairs, from the sampling plan not physical removal of the vapor probe, as locations will continue to be used for the NSZD remedy on an as-needed basis (fixed field gas monitoring).

The soil vapor probe network will be re-evaluated as often as annually against these criteria for future modification.

Appendix B. Statistical Trend Results

SFPP Norwalk Pump Station, Norwalk, California

Mann-Kendall Test Data (All Data)																								
LOCATION	**Site_Location**	**Analyte**	**COUNT**	**DET**	**CEN**	**PER.DET**	**MIN.CEN**	**MAX.CEN**	**MIN.DET**	**MAX.DET**	**MEAN**	**MEDIAN**	**SD**	**CV**	**LASTVALUE**	**LASTDATE**	**DIFF**	**S**	**PVAL**	**SLOPE**	**RESULT**	**TREND**	**STABILITY**	**MIN.LAG**
SVM-01D	SCOff	TPH-g	28	1	27	3.57	0.5	20	2.20	2.20	15.8821	20	8.0353	0.5059	ND (0.5)	Sep-2022	77%	-23	0.3335	---	66.6% (-)	No Trend	>50% ND	2
SVM-01S	SCOff	TPH-g	26	0	26	0.00	0.5	20	---	---	16.25	20.00	7.8374	0.4823	ND (0.5)	Sep-2022	N/A	0	0.5087	---	49.1% (+)	No Trend	>50% ND	20
SVM-02D	SCOff	TPH-g	1	0	1	0.00	20.00	20.00	---	---	20	20.00	---	---	ND (20)	Oct-2014	N/A	IS	IS	IS	IS	IS	IS	
SVM-02S	SCOff	TPH-g	27	1	26	3.70	0.50	20.00	0.81	0.81	16.4004	20.00	7.6947	0.4692	ND (0.5)	Sep-2022	38%	20	0.35	---	65.3% (+)	No Trend	>50% ND	20
SVM-03D	SCOff	TPH-g	27	3	24	11	0.5	20	1	24	1.4963	20	4.3238	2.8896	ND (0.5)	Aug-2022	98%	15	0.386	---	61.4% (+)	No Trend	>50% ND	20
SVM-03S	SCOff	TPH-g	27	2	25	7	0.5	20	1	22	1.2982	20	4.06	3.1273	0.51	Aug-2022	98%	37	0.228	---	77.2% (+)	No Trend	>50% ND	20
SVM-05D	SCOff	TPH-g	27	2	25	7	0.5	20	2	19	3	20	6.4042	1.8995	ND (0.5)	Aug-2022	97%	-51	0.15	---	85% (-)	No Trend	>50% ND	20
SVM-05S	SCOff	TPH-g	27	0	27	0	0.5	20	---	---	16.3889	20	7.719	0.471	ND (0.5)	Aug-2022	N/A	0	0.5083	---	49.2% (+)	No Trend	>50% ND	20
SVM-06D	SCOff	TPH-g	30	3	27	10	0.5	20	31	22000	1101.4833	20	4353.5541	3.9524	22000	Sep-2022	0%	42	0.2335	---	76.6% (+)	No Trend	>50% ND	1
SVM-06S	SCOff	TPH-g	28	2	26	7.14	0.5	20	1.50	150.00	6.0804	20	27.7006	4.5558	1.5	Sep-2022	99%	51	0.163	---	83.7% (+)	No Trend	>50% ND	2
SVM-07D	SCOff	TPH-g	27	1	26	3.70	0.50	20.00	10	10	16.0185	20.00	7.7788	0.4856	ND (0.5)	Sep-2022	95%	-24	0.3175	---	68.2% (-)	No Trend	>50% ND	20
SVM-07S	SCOff	TPH-g	27	0	27	0	0.5	20	---	---	16.3889	20	7.719	0.471	ND (0.5)	Sep-2022	N/A	0	0.5083	---	49.2% (+)	No Trend	>50% ND	20
SVM-08D	SCOff	TPH-g	27	0	27	0	0.5	20	---	---	16.3889	20	7.719	0.471	ND (0.5)	Aug-2022	N/A	0	0.5083	---	49.2% (+)	No Trend	>50% ND	20
SVM-08S	SCOff	TPH-g	27	0	27	0	0.5	20	---	---	16.3889	20	7.719	0.471	ND (0.5)	Aug-2022	N/A	0	0.5083	---	49.2% (+)	No Trend	>50% ND	20
SVM-09D	SE	TPH-g	11	1	10	9	0.5	20	16.5	16.5	14.3636	20	8.9641	0.6241	ND (0.5)	Aug-2022	97%	-10	0.247	---	75.3% (-)	No Trend	>50% ND	132
SVM-09S	SE	TPH-g	11	0	11	0	0.50	20.00	---	---	14.6818	20.00	9.1084	0.6204	ND (0.5)	Aug-2022	N/A	0	0.5313	---	46.9% (+)	No Trend	>50% ND	132
SVM-10D	SCOff	TPH-g	26	1	25	4	0.5	20	4.8	4.8	16.4154	20	7.5311	0.4588	ND (0.5)	Sep-2022	90%	23	0.316	---	68.4% (+)	No Trend	>50% ND	20
SVM-10S	SCOff	TPH-g	2	0	2	0.00	20.00	20.00	---	---	20	20	0	0	ND (20)	Dec-2020	N/A	IS	IS	IS	IS	IS	IS	1681
SVM-11D	SC	TPH-g	26	1	25	4	0.5	20	0.73	0.73	16.2588	20	7.819	0.4809	ND (0.5)	Aug-2022	32%	17	0.363	---	63.7% (+)	No Trend	>50% ND	20
SVM-11M	SC	TPH-g	26	0	26	0.00	0.50	20.00	---	---	16.25	20.00	7.8374	0.4823	ND (0.5)	Aug-2022	N/A	0	0.51	---	49.1% (+)	No Trend	>50% ND	20
SVM-11S	SC	TPH-g	26	1	25	3.85	0.50	20.00	830.00	830	47.4038	20.00	159.8094	3.3712	ND (0.5)	Aug-2022	100%	-11	0.414	---	58.6% (-)	No Trend	>50% ND	20
SVM-12D	SC	TPH-g	28	6	22	21.43	0.50	20.00	1	21000	997.9846	20.00	3919.6832	3.9276	ND (0.5)	Aug-2022	100%	-69	0.09	---	91% (-)	No Trend	>50% ND	20
SVM-12M	SC	TPH-g	29	1	28	3.45	0.50	20.00	510.00	510	33.5345	20.00	91.9412	2.7417	ND (0.5)	Aug-2022	100%	-10	0.434	---	56.6% (-)	No Trend	>50% ND	2
SVM-12S	SC	TPH-g	29	0	29	0.00	0.50	40.00	---	---	17.33	20.00	8.6482	0.4991	ND (0.5)	Aug-2022	N/A	0	0.507	---	49.3% (+)	No Trend	>50% ND	2
SVM-13D	SC	TPH-g	27	2	25	7.41	0.50	20.00	74.00	1500.00	58.7593	20.00	282.9907	4.8161	ND (0.5)	Aug-2022	100%	-43	0.192	---	80.8% (-)	No Trend	>50% ND	21
SVM-13M	SC	TPH-g	26	0	26	0	0.50	20.00	---	---	16.25	20.00	8	0	ND (0.5)	Aug-2022	N/A	0	0.5087	---	49.1% (+)	No Trend	>50% ND	21
SVM-13S	SC	TPH-g	27	0	27	0	0.5	20	---	---	16.3889	20	7.719	0.471	ND (0.5)	Aug-2022	N/A	0	0.51	---	49.2% (+)	No Trend	>50% ND	21
SVM-14D	SC	TPH-g	11	11	0	100.00	---	---	27	170000	23351.7273	2400.00	51384.8521	2.2005	300	Oct-2017	100%	-43	0.00	-11518.235	99.9% (sig -)	Decreasing	---	21
SVM-14M	SC	TPH-g	12	3	9	25.00	20.00	20	570	22000	2237.5	20.00	6062.6014	2.7095	ND (20)	Jun-2019	100%	-22	0.076	---	92.4% (-)	No Trend	>50% ND	21
SVM-14RD	SC	TPH-g	16	2	14	12.50	0.5	20	0.6	35	2.675	20	8.3464	3.1201	ND (0.5)	Aug-2022	99%	-3	0.4645	---	53.5% (-)	No Trend	>50% ND	48
SVM-14RM	SC	TPH-g	15	0	15	0	0.5	20	---	---	13.5	20	9.515	0.7048	ND (0.5)	Aug-2022	N/A	0	0.52	---	48% (+)	No Trend	>50% ND	48
SVM-14RS	SC	TPH-g	16	0	16	0	0.50	20	---	---	13.9062	20.00	9.3349	0.6713	ND (0.5)	Aug-2022	N/A	0	0.52	---	48.2% (+)	No Trend	>50% ND	48
SVM-14S	SC	TPH-g	11	2	9	18.18	20.00	20	890.00	1600	242.7273	20.00	496.1321	2.044	ND (20)	Oct-2017	99%	-9	0.271	---	72.9% (-)	No Trend	>50% ND	21
SVM-15D	SCOff	TPH-g	26	1	25	4	0.5	20	310	310	28.1538	20	57.9284	2.0576	ND (0.5)	Mar-2022	100%	-19	0.347	---	65.3% (-)	No Trend	>50% ND	20
SVM-15M	SCOff	TPH-g	26	1	25	4	0.5	20	30.1	30.1	17.3885	20	7.6044	0.4373	ND (0.5)	Mar-2022	98%	-25	0.3	---	70% (-)	No Trend	>50% ND	20
SVM-15S	SCOff	TPH-g	26	1	25	4	0.50	20	1.9	1.9	17.0538	20.00	7.0503	0.4134	1.9	Mar-2022	0%	25	0.3	---	70% (+)	No Trend	>50% ND	20
SVM-16D	SCOff	TPH-g	28	8	20	29	0.5	20	0.6	240000	9429.2499	20	44439.7019	4.713	ND (0.5)	Aug-2022	100%	44	0.2	---	80% (+)	No Trend	>50% ND	1
SVM-16M	SCOff	TPH-g	28	1	27	4	0.5	20	28	28	16.8036	20	7.8862	0.4693	ND (0.5)	Aug-2022	98%	-27	0.305	---	69.5% (-)	No Trend	>50% ND	1
SVM-16S	SCOff	TPH-g	27	0	27	0	0.5	20	---	---	16.3889	20	7.719	0.471	ND (0.5)	Aug-2022	N/A	0	0.5083	---	49.2% (+)	No Trend	>50% ND	20
SVM-17D	SE	TPH-g	8	0	8	0	0.5	20	---	---	15.125	20	9.0267	0.5968	ND (0.5)	Mar-2022	N/A	0	0.548	---	45.2% (+)	No Trend	>50% ND	133
SVM-17S	SE	TPH-g	8	1	7	13	0.5	20	0.66	0.66	15.145	20	8.9898	0.5936	0.66	Mar-2022	0%	7	0.2365	---	76.4% (+)	No Trend	>50% ND	133
SVM-18D	SE	TPH-g	8	0	8	0	0.5	20	---	---	15.125	20	9.0267	0.5968	ND (0.5)	Mar-2022	N/A	0	0.548	---	45.2% (+)	No Trend	>50% ND	134
SVM-18S	SE	TPH-g	8	0	8	0	0.5	20	---	---	15.125	20	9.0267	0.5968	ND (0.5)	Mar-2022	N/A	0	0.548	---	45.2% (+)	No Trend	>50% ND	134
SVM-19S	SE	TPH-g	8	0	8	0	0.5	20	---	---	15.13	20.00	9.0267	0.5968	ND (0.5)	Mar-2022	N/A	0	0.548	---	45.2% (+)	No Trend	>50% ND	134
SVM-20D	SE	TPH-g	7	0	7	0	0.5	20	---	---	14.43	20.00	9.515	0.6595	ND (0.5)	Mar-2022	N/A	0	0.5627	---	43.7% (+)	No Trend	>50% ND	134
SVM-20S	SE	TPH-g	7	0	7	0.00	0.50	20.00	---	---	14.4286	20.00	9.515	0.6595	ND (0.5)	Mar-2022	N/A	0	0.5627	---	43.7% (+)	No Trend	>50% ND	134
SVM-21D	SE	TPH-g	8	1	7	12.50	0.50	20.00	0.62	0.62	12.7025	20.00	10.0716	0.7929	0.62	Aug-2022	0%	7	0.2365	---	76.4% (+)	No Trend	>50% ND	133
SVM-21S	SE	TPH-g	8	0	8	0	0.5	20	---	---	13	20	10.0922	0.7954	ND (0.5)	Aug-2022	N/A	0	0.548	---	45.2% (+)	No Trend	>50% ND	133
SVM-22D	SE	TPH-g	8	0	8	0	0.5	20	---	---	13	20	10.0922	0.7954	ND (0.5)	Aug-2022	N/A	0	0.548	---	45.2% (+)	No Trend	>50% ND	133
SVM-22S	SE	TPH-g	8	0	8	0.00	0.50	20.00	---	---	12.6875	20.00	10.0922	0.7954	ND (0.5)	Aug-2022	N/A	0	0.548	---	45.2% (+)	No Trend	>50% ND	133
SVM-23D	SE	TPH-g	8	0	8	0.00	0.50	20.00	---	---	12.6875	20.00	10.0922	0.7954	ND (0.5)	Aug-2022	N/A	0	0.548	---	45.2% (+)	No Trend	>50% ND	133
SVM-23S	SE	TPH-g	8	0	8	0	0.5	20	---	---	12.6875	20	10	1	ND (0.5)	Aug-2022	N/A	0	0.548	---	45.2% (+)	No Trend	>50% ND	133
SVM-24D	SE	TPH-g	5	0	5	0	0.5	20	---	---	8.3	0.5	11	1	ND (0.5)	Aug-2022	N/A	0	0.592	---	40.8% (+)	No Trend	>50% ND	134
SVM-24S	SE	TPH-g	5	0	5	0	0.5	20	---	---	8.3	0.5	11	1	ND (0.5)	Aug-2022	N/A	0	0.592	---	40.8% (+)	No Trend	>50% ND	134
SVM-25D	SE	TPH-g	5	0	5	0	0.5	20	---	---	8.3	0.5	11	1	ND (0.5)	Aug-2022	N/A	0	0.592	---	40.8% (+)	No Trend	>50% ND	134
SVM-25S	SE	TPH-g	5	0	5	0	0.5	20	---	---	8.3	0.5	11	1	ND (0.5)	Aug-2022	N/A	0	0.592	---	40.8% (+)	No Trend	>50% ND	134
SVM-26D	SE	TPH-g	4	1	3	25	0.5	0.5	0.73	0.73	0.5575	0.5	0	0	ND (0.5)	Aug-2022	32%	-1	0.5	---	50% (-)	No Trend	>50% ND	27
SVM-26S	SE	TPH-g	3	0	3	0	0.5	0.5	---	---	0.5	0.5	0	0	ND (0.5)	Aug-2022	N/A	IS	IS	IS	IS	IS	IS	134
SVM-27D	SE	TPH-g	3	0	3	0	0.5	1	---	---	0.5	1	0	0	ND (0.5)	Aug-2022	N/A	IS	IS	IS	IS	IS	IS	134
SVM-27S	SE	TPH-g	3	1	2	33	0.5	1	0.59	0.59	0.53	1	0.052	0.098	ND (0.5)	Aug-2022	15%	IS	IS	IS	IS	IS	IS	134
SVP-105D	SC	TPH-g	6	0	6	0	0.5	20	---	---	13.5	20	10.0698	0.7459	ND (0.5)	Aug-2022	N/A	0	0.5773	---	42.3% (+)	No Trend	>50% ND	21
SVP-105S	SC	TPH-g	6	0	6	0	0.5	20	---	---	13.5	20	10.0698	0.7459	ND (0.5)	Aug-2022	N/A	0	0.5773	---	42.3% (+)	No Trend	>50% ND	21
SVP-106D	SC	TPH-g	6	0	6	0	0.5	20	---	---	13.5	20	10.0698	0.7459	ND (0.5)	Aug-2022	N/A	0	0.5773	---	42.3% (+)	No Trend	>50% ND	21
SVP-106S	SC	TPH-g	6	0	6	0	0.5	20	---	---	13.5	20	10.0698	0.7459	ND (0.5)	Aug-2022	N/A	0	0.5773	---	42.3% (+)	No Trend	>50% ND	21
SVP-107D	SC	TPH-g	6	0	6	0	0.5	20	---	---	13.5	20	10.07	0.7459	ND (0.5)	Aug-2022	N/A	0	0.5773	---	42.3% (+)	No Trend	>50% ND	21
SVP-107S	SC	TPH-g	6	0	6	0	0.5	20	---	---	13.5	20	10.07	0.7459	ND (0.5)	Aug-2022	N/A	0	0.5773	---	42.3% (+)	No Trend	>50% ND	21

Appendix B. Statistical Trend Results

SFPP Norwalk Pump Station, Norwalk, California

Mann-Kendall Test Data (All Data)																								
LOCATION	Site_Location	Analyte	COUNT	DET	CEN	PER.DET	MIN.CEN	MAX.CEN	MIN.DET	MAX.DET	MEAN	MEDIAN	SD	CV	LASTVALUE	LASTDATE	DIFF	S	PVAL	SLOPE	RESULT	TREND	STABILITY	MIN.LAG
SVP-108D	SC	TPH-g	7	5	2	71	20	20	5.9	9100	2561	620	3638.3664	1.4206	790	Aug-2022	91%	-8	0.155	---	84.5% (-)	No Trend	Not Stable	20
SVP-108S	SC	TPH-g	7	1	6	14	0.50	20.00	1.1	1.1	14.5143	20.00	9.3702	0.6456	1.1	Aug-2022	0%	6	0.236	---	76.4% (+)	No Trend	>50% ND	20
SVP-109D	SE	TPH-g	9	0	9	0	0.50	20.00	---	---	15.6667	20.00	8.5987	0.5489	ND (0.5)	Aug-2022	N/A	0	0.54	---	46% (+)	No Trend	>50% ND	21
SVP-109S	SE	TPH-g	9	0	9	0	0.5	20	---	---	15.6667	20	8.5987	0.5489	ND (0.5)	Aug-2022	N/A	0	0.54	---	46% (+)	No Trend	>50% ND	21

Notes:

ND	Non-Detect
N/A	Not Applicable
IS	Insufficient Data for trend analysis (valid statistical trend analysis requires 3 or more observations)
>50% ND	Valid statistical trend analysis requires 3 or more observations, with less than 50% nondetect values per well
Stable	CV is <1.0
Not Stable	CV is >1.0
No Trend	Trend in well is not statistically significant in a positive or negative direction
Increasing	Statistically significant increasing trend observed in the data over time
Decreasing	Statistically significant decreasing trend observed in the data over time
COUNT	Count of Sample Results
DET	Number of Detections
CEN	Number of Non-Detections
PER.DET	Percent Detections
MIN.CEN	Minimum Non-Detect Value in Dataset
MAX.CEN	Maximum Non-Detect Value in Dataset
MIN.DET	Minimum Detected Value in Dataset
MAX.DET	Maximum Detected Value in Dataset
SD	Standard Deviation
CV	Coefficient of Variation
LASTVALUE	Last Analytical Result Value
LASTDATE	Last Analytical Result Date
DIFF	Difference (%) from Maximum Result to Last Result
S	S Statistic for Mann-Kendall Analysis
PVAL	Probability Value
MIN.LAG	Minimum Spacing Between Consecutive Measurements in Dataset (Days)
TEXT	Removed or Abandoned Location
SC	South Central Onsite
SE	Southeast
SCOFF	South Central Offsite

Appendix C
Standard Operating Procedures (SOPs)

Indoor, Outdoor, and Crawlspace Air Sampling Using Canisters

Purpose

This Standard Operating Procedure (SOP) presents general guidelines for collecting indoor, outdoor, and crawlspace air samples using evacuated canisters. The type, number, location, and sample duration of indoor, outdoor, and/or crawlspace air samples should be determined on a project-specific basis.
A building survey should be performed before air sampling to identify potential confounding indoor sources of volatile organic compounds (VOCs) and to refine the proposed sampling locations based on building characteristics.

Equipment and Materials

- Stainless-steel sampling canister(s), certified clean and evacuated by the analytical laboratory.
- Flow controller(s) set at desired sampling rate by the analytical laboratory.
- Vacuum gauge (analog or digital) dedicated to the canister (may be permanently attached to either the canister or flow controller). This vacuum gauge will be used to monitor the canister vacuum during sampling.
- Recommended (if the canister does not have a dedicated digital vacuum gauge) – digital vacuum gauge with a -30 to 0 inches mercury (Hg) range, and 0.50 inches Hg accuracy. This vacuum gauge will be equipped with either a Swagelok 1/4-inch female connection or a Swagelok quick-connect fitting to be used to measure the initial and final canister vacuum. Digital gauges should not be shared between soil vapor samples and air samples (indoor, outdoor, or crawlspace) to prevent cross-contamination.
- Optional – T-connector (provided by the analytical laboratory) to collect simultaneous duplicate samples. This is not necessary for indoor and outdoor air samples because the two canisters can just be placed side-by-side, but may be necessary for crawlspace air samples if the canisters are not being placed into the crawlspace.
- At least two (2) adjustable crescent wrenches. A 9/16-inch wrench fits the typical 0.25-inch Swagelok fittings, which most canisters and flow controllers have.
- Shipping container, suitable for protection of canister(s) during shipping. Typically, strong cardboard boxes are used for canister shipment. The canisters should be shipped to the analytical laboratory in the same shipping container(s) in which they were received.
- Recommended – field instrument such as a MultiRAE photoionization detector (PID) to measure total VOC and carbon monoxide concentrations in the breathing zone for health and safety monitoring.
- Optional – signs identifying the canisters as an air sample, saying “Do Not Disturb” and providing contact information. The sign should be laminated and attached to the canister with a zip tie. These signs are for extended duration samples only because grab samples will not be left unattended.

Additional Crawlspace Air Sampling Equipment:

- Teflon tubing (0.25-inch outer diameter [OD]) – to extend the sample inlet from the canister into the crawlspace
- Swagelok nut and ferrule sets (part #SS-400-NFSET) – to connect the sample tubing to the canister
- Rod for placing the crawlspace air sample tubing or the canister at the desired location in the crawlspace without having to enter the enclosed space. These can be metal, plastic, or wooden rods.

Additional Outdoor Air Sampling Equipment:

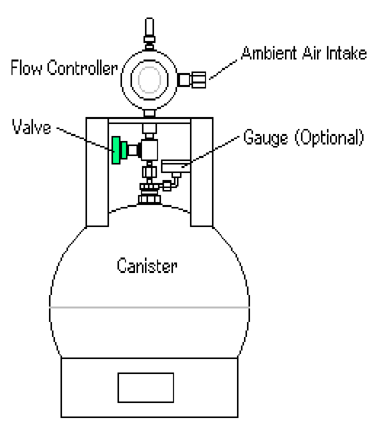
- Sampling cane, a length of Teflon tubing, or aluminum foil tent to prevent water from entering canister during sampling.
- Bike lock or chain and lock to secure the canister and prevent theft.

Procedures and Guidelines

This SOP describes the general guidelines for collecting indoor, outdoor, and crawlspace air samples using evacuated canisters. Sampling information should be recorded in the field logbook and on the attached form "Indoor, Outdoor, and Crawlspace Air Sampling Log—Canister Method".

1. Measure the initial canister vacuum with the digital vacuum gauge. The initial vacuum should be between -28 to -30 inches Hg. If it is less than -26 inches Hg, do not use the canister for sampling. If it is between -28 to -26 inches Hg, then only use the canister if there are no other spare canisters available. Note that altitude can affect vacuum readings and account for these differences (i.e., each additional 1,000 feet of elevation above sea level reduces the maximum vacuum measured in a canister by approximately 1-inch Hg).
2. In the field log, record the canister identification (ID), flow controller ID, initial vacuum, desired flow rate, sample location information, and all other information pertinent to the sampling effort.
3. If the canister has a valve to keep the sample from collecting, connect the flow controller and analog vacuum gauge to the canister (**Figure 1**). When the flow controller and vacuum gauge are attached correctly, they will not move separately from the canister (they will not spin around). If the canister is equipped with a quick-connect setup, do not attach the flow controller until it is time to initiate sample collection.

Figure 1. Assembled Canister



4. For outdoor samples, be sure that the inlet to the flow controller is protected from precipitation. Either place the canister and flow controller under a shelter (do not restrict air-flow to sample intake), use a sampling cane provided by the analytical laboratory, attach a length of tubing that hangs downward, or use a clean piece of aluminum foil to build a tent over the flow controller inlet. Secure the canister to an immovable structure with the bike lock or chain and lock to prevent theft.
5. For sampling crawlspace air through Teflon tubing, adjust the length of the sample tubing to be able to reach the desired sampling location, attach it to the rod with VOC-free tape or zip ties, and place the sample tubing into the crawlspace using the rod. Make sure the sample tubing influent is several inches above the ground level. Now connect the sample tubing to the inlet of the flow controller.
6. For indoor air samples, place the canister in the desired sampling location. Indoor air samples are typically collected at breathing zone height (3 to 5 feet above the floor) and a minimum of 5 feet away from exterior walls.
7. Attach the sign (identifying the canisters as an air sample, saying “Do Not Disturb” and providing contact information) to the canister, as appropriate.
8. For canisters equipped with a valve, to begin sampling, open the canister valve one full turn and record the sample start time. For canisters equipped with a quick-connect setup, place the can in the desired sampling location, pull back the collar on the flow controller, push fully down onto the male end on the canister, and release the collar. The flow controller will spin freely but should not be able to lift off the can if installed correctly.
9. Monitor the canister vacuum several times during the sample period to ensure the canister is filling at the desired rate and the final canister vacuum does not fall to 0-inch Hg.
10. At the end of the sample period, close the canister valve, or remove the flow controller for a quick-connect setup, and record the sample end time.
11. Measure the final canister vacuum with the digital vacuum gauge.
    a. The final vacuum for 6-liter canisters should typically be between -10 to -2 inches Hg.
    b. The final vacuum for 1-liter canisters should typically be between -5 to -2 inches Hg.
    c. If the final vacuum is 0-inch Hg, do not analyze the sample; return the canister to the analytical laboratory marked as “Do not analyze” on the sample tag and chain of custody.
    d. If the reading is between -2 to 0 inches Hg, redeploy the sample if possible; if not, submit it to the analytical laboratory for analysis but alert the sample manager to request laboratory receipt vacuums to ensure it is received with some residual vacuum.
12. Replace the protective cap on the canister.
13. Fill out the appropriate documentation (chain of custody, sample tags) and return canisters and equipment to the analytical laboratory in the same shipping container in which they were received.
14. The samples should not be cooled during shipment. DO NOT put ice in the shipping container.
15. Do not place sticky labels or tape on any surface of the canister.

Quality Control and Quality Assurance

- Canisters supplied by the analytical laboratory must follow the performance criteria and quality assurance prescribed in U.S. Environmental Protection Agency (EPA) Method TO-14/15 for canister cleaning, certification of cleanliness, and leak checking.

- Flow controllers supplied by the analytical laboratory must follow the performance criteria and quality assurance prescribed in EPA Method TO-14/15 for flow controller cleaning and adjustment.

Attachments

- Indoor, Outdoor, and Crawlspace Air Sampling Log—Canister Method
- Sign identifying the canisters as an air sample, saying "Do Not Disturb" and providing contact information.

References

U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. 2015. *Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air.* June.

STANDARD OPERATING PROCEDURE

Soil Vapor Sampling from Exterior Soil Vapor Probes (CA-DTSC)

I. Purpose

This standard operating procedure (SOP) presents general guidelines for collecting soil vapor samples from temporarily, semi-permanently, or permanently installed exterior soil vapor probes. The number, location, analytical method (including sampling container), and sampling duration of soil vapor samples should be determined on a project-specific basis.

II. Scope

This is a general description of how to purge and leak-test exterior soil vapor probes and then collect soil vapor samples with evacuated canisters in accordance with California Department of Toxic Substances Control Guidance.

III. Equipment and Materials

Purge and Helium Leak Test:

- Vacuum pump (battery-powered) with rotameter capable of a flow rate set to 200 milliliters per minute (mL/min).
- Three-way sampling manifold consisting of Swagelok gas-tight fittings, three quarter-turn Swagelok valves, and one vacuum gauge.
- Teflon tubing, 0.25-inch outside diameter.
- Swagelok nut and ferrule set (part #SS-400-NFSET) to connect probe tubing to the sampling manifold.
- Gas sampling bag (such as Tedlar brand) (1-liter or 3-liter) to collect the purged soil vapor so the approximate volume of purged soil vapor can be measured and field screening can be performed on the purged vapor.
- Wrenches and screwdriver, various sizes as needed, for connecting fittings. A 9/16-inch wrench fits the 0.25-inch Swagelok fittings.
- Helium enclosure to fit around the probe and entire sample train.
- Helium - canister of high-purity helium with 0.5-liter per minute flow regulator.
- MGD Dielectric Helium Detector.
- Optional: Photoionization detector (MiniRae or MultiRae) to monitor breathing zone volatile organic compound (VOC) concentrations. It is also optional to collect field measurements of total VOCs from the purged soil vapor; may warn the laboratory if high concentrations are detected so they can dilute the sample before analysis.

- Optional: LandTec GEM Landfill Gas meter to collect field measurements of oxygen, carbon dioxide, and methane.
- Evacuated 1-liter stainless-steel sample canister(s) certified clean and evacuated by the subcontracted laboratory will be used for United States Environmental Protection Agency (USEPA) Method TO-15A and USEPA 3C analyses.
- Flow controller(s) set at desired sampling rate by the subcontracted laboratory.
- Analog vacuum gauge dedicated to the canister (provided by the subcontracted laboratory) may be permanently attached to either the canister or flow controller. This vacuum gauge will be used to monitor the canister vacuum during sampling.
- Digital vacuum gauge with a -30 to 0 inch mercury (Hg) range, and 0.50 inch Hg accuracy, which should be verified annually. This vacuum gauge will be equipped with a Swagelok 1/4-inch female fitting to be used to measure the initial and final canister vacuum. Digital gauges should not be shared between soil vapor samples and air samples (indoor, outdoor, or crawlspace); this will prevent cross-contamination.
- T-connector (provided by the subcontracted laboratory) to collect simultaneous duplicate samples.
- Shipping container, suitable for protection of canister(s) during shipping. Typically, strong cardboard boxes are used for canister shipment. The canisters should be shipped to the laboratory in the same shipping container(s) in which they were received.

IV. Procedures and Guidelines

This SOP describes the general guidelines for purging and leak-testing exterior soil vapor probes, then collecting soil vapor samples. Purging, leak-testing, and sampling information should be recorded in the field logbook and on the attached “Soil Vapor Sampling Log” form.

A. General Guidelines

- Wait at least 48 hours after installation of permanent or semipermanent soil vapor probes with direct push or the hollow stem auger before purging, leak-testing, and sampling the probes to allow the subsurface to equilibrate.
- Soil vapor sampling should not be performed until 5 days after a significant rain event (defined as greater than 0.5 inch of rainfall over a 24-hour period).

System Setup

1. Remove the protective cover (such as a flush-mount cover, or semipermanent polyvinyl chloride cover) on the soil vapor probe (if present).
2. Remove the cap from the probe tubing and connect the probe tubing to the sampling manifold.
3. Attach the vacuum pump to the sampling manifold using Teflon tubing and Swagelok nut and ferrule sets.
4. Measure the initial canister vacuum with the digital vacuum gauge. The initial vacuum should be between -28 and -30 inches Hg (USEPA Method TO-15A). If it is less than -26 inches Hg do not use the canister for sampling. If it is between -28 and -26 inches Hg only use the canister if there are no other spare canisters available. Note that altitude can affect vacuum readings and it is necessary to

account for these differences. Each additional 1,000 feet of elevation above sea level reduces the vacuum in a canister by approximately 1 inch Hg (for example, at 4,000 feet, the maximum canister vacuum would be 26 inches Hg). In the field log, record the canister identification, flow controller identification, initial vacuum, desired flow rate, sample location information, and all other information pertinent to the sampling effort.

5. Connect the flow controller and analog vacuum gauge to the canister. When the flow controller and vacuum gauge are attached correctly they will not move separately from the canister (they will not spin around).
6. Connect the canister via the flow controller to the sampling manifold.

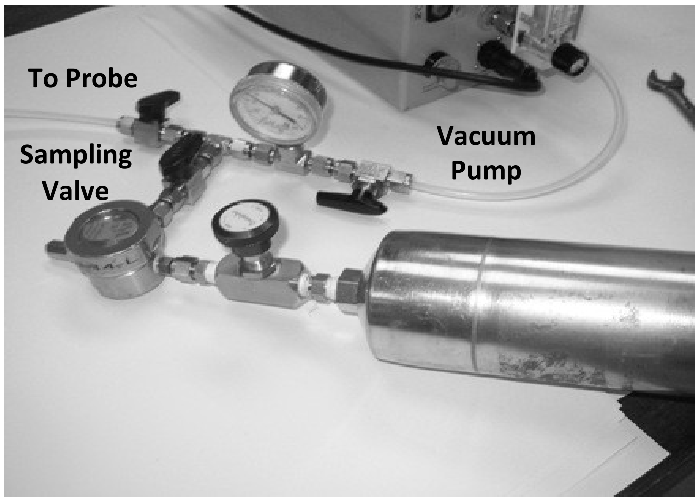


Figure 1. Sampling Manifold Setup for Canister Sampling

B. Manifold Vacuum Leak Check

The purpose of the manifold leak test is to make sure the connections in the sampling train are air-tight. For canister sampling, the connections on the sampling manifold through the flow controller to the valve on the canister will be leak-tested (**Figure 1**). For duplicate samples, the whole assembly with the T-connector should be vacuum leak-tested. For alternative sampling methods, the connections on the sampling manifold will be leak-tested.

1. Close the valve to the probe, open the valve to the pump. For canister sampling, open the sampling valve to the canister on the manifold; the valve on the canister is closed.
2. Turn the pump on and wait for the gauge on the manifold to reach approximately -10 inches Hg. Close the valve to the pump and turn the pump off. The sampling train is now a closed system.
3. Wait approximately 1 minute to ensure that the vacuum is maintained and there are no leaks (as shown by the stability of the vacuum gauge).
4. If there is a visible loss of vacuum, tighten the connections and redo the leak test until it passes.

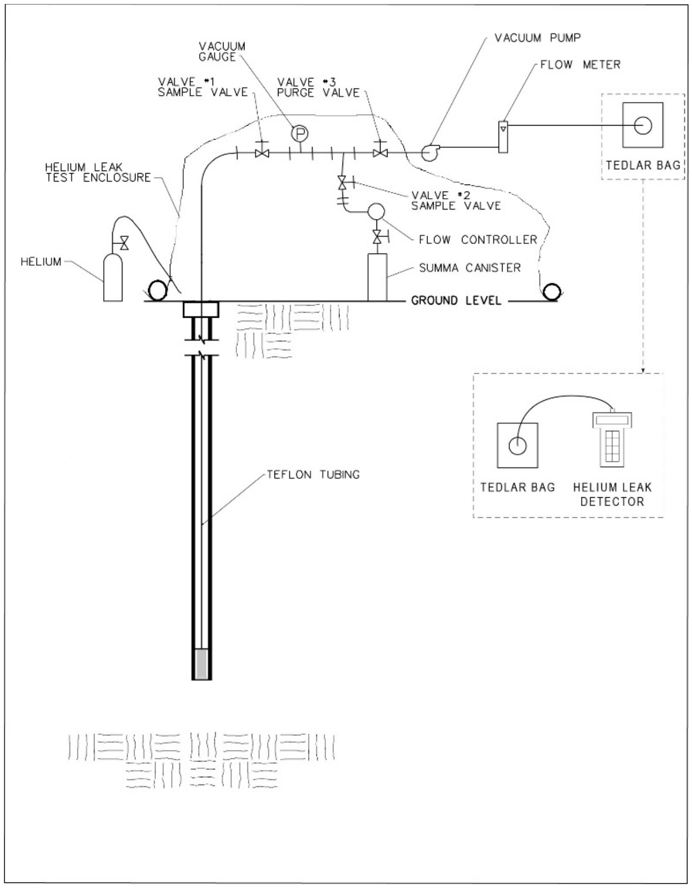


Figure 2. Schematic Diagram of Sampling System for System Purge and Helium Leak Check

C. System Purge and Helium Leak Check

A purge of the soil vapor probe and sampling manifold system is required before taking each sample (**Figure 2**). The helium leak-check procedure is also performed during this step. This helium leak check will verify the integrity of the probe seal, sampling adapter (or post-run tubing [PRT] adapter if using the Geoprobe PRT system) seal, the probe and ground interface, as well as the entire sample train; this is accomplished by completing the following steps:

1. Place the helium enclosure over the soil vapor probe and entire sample train and adjust it so that it will allow a buildup of helium in the enclosure. The helium leak-check enclosure can be weighted down slightly onto the ground surface. The enclosure should not be sealed too tight such that pressure builds up in the enclosure.
2. Start the flow of helium under the leak-check enclosure. Let the helium fill the enclosure for a couple of minutes.
3. Turn the helium leak detector on while in outdoor air and ensure that the detector is not exposed to helium because it does a zero calibration every time it is turned on.
4. Verify that the helium concentration inside the leak-check enclosure is more than 10 percent by placing the probe of the helium detector into the enclosure.
5. Purging is carried out by pulling soil vapor through the system at a rate of 200 mL/min for a period sufficient to achieve a purge volume that equals 3 to 5 dead volumes (internal volume) of the in-

ground annular space and sample line. Higher flow rates are allowed for large volume wells to avoid excessive purge times.

a. When calculating the dead volume, be sure to consider the inside diameter and length of the Teflon sample tubing, as well as the probe outside diameter and retraction distance for the annular space of temporary probes.

b. For permanent probes, calculate the volume of the annular space using a nominal 30 percent porosity for the sand pack.

c. The gas sampling bag should be attached to the vacuum pump exhaust to collect the purged soil vapor so the approximate volume of purged soil vapor can be measured and field screening can be performed on the purged vapor.

6. Open the sample valve and the purge valve and start the vacuum pump. Verify that the flow rate is still 200 mL/min.

7. If there is shallow groundwater in the area, carefully watch the tubing as the pump is turned on. If water is observed in the sample tubing, shut the pump off immediately. Soil vapor collection will not be feasible if the probe is in contact with water.

8. Monitor the purging vacuum on the sampling manifold vacuum gauge. The purging vacuum should not exceed -7 inches Hg; if it does, turn the pump off, close the valve to the pump, and wait to see if there is recovery. If there is no noticeable change in vacuum after several minutes, then there is an insufficient amount of soil vapor to collect a sample and the vacuum is too great to collect a soil vapor sample. Several factors can cause this situation, including the following (consult with the project manager and take corrective action):

   a. The soil formation is too “tight” (that is, high clay or moisture content). Try using a lower flow rate (temporary or permanent probe). Try a different depth or location (temporary probe).

   b. The probe screen, or annular space for temporary probes, may be in water even if the water has not yet come up in the tubing. Soil vapor sampling is not feasible if the probe is in contact with water. Try a different depth or location (temporary probe). Try sampling the probe again in dryer conditions (permanent probe).

   c. With a temporary probe system (such as the Geoprobe PRT system), the expendable tip may not have released when the drive rod was retracted. Try retracting the probe a little further, or use the point run popper to poke the tip loose.

   d. If purging cannot be completed without creating a vacuum exceeding -7 inches Hg, then the probe cannot be sampled.

9. Measure the helium concentration in the enclosure several times during purging to calculate an average concentration in the enclosure during the purge duration.

10. At the end of the calculated purge time and after the system is verified to be leak free, turn off the pump, close the valve to the pump, and close the valve to the probe. Close the valve on the gas sampling bag and remove the bag from the pump.

11. Measure the helium concentration in the purged soil vapor in the gas sampling bag. The helium concentration in the purged soil vapor must be less than 5 percent of what it was in the helium enclosure during purging to pass the leak test. For example, if the helium concentration in the purged soil vapor is 2,300 parts per million, that is 0.23 percent, and the average helium

concentration in the enclosure was 35 percent, then the percentage leak is 0.66 percent [0.23/35*100 = 0.66 percent].

a. If the probe fails the leak check, then corrective action is required; this includes first checking the fittings and connections and trying another purge and leak check. It may also be necessary to remove the soil vapor probe, if it is temporary, and re-install it in a nearby location.

b. Helium leak detectors may be sensitive to high concentrations of methane or other atmospheric gasses. If high methane concentrations are expected to be present in the soil vapor, then caution should be used with this technique, because false positive readings may be encountered during leak-testing. Use a LandTec GEM Landfill Gas meter to determine if methane is present in the soil vapor.

12. Optional - Field readings of total VOCs with a photoionization detector, and/or oxygen, carbon dioxide, and methane with a LandTec GEM Landfill Gas meter may be performed on the purged soil vapor.

13. Record the purge and leak-check information on the Soil Vapor Sampling Log (attached).

D. Canister Sampling

1. To begin sampling, open the canister valve one full turn and record the sample start time.
2. Monitor the canister vacuum on the analog gauge several times during the sample period to ensure the canister is filling at the desired rate and the final canister vacuum does not fall to 0 inch Hg.
3. At the end of the sample period, close the canister valve and record the sample end time. Detach the canister from the manifold or probe tubing.
4. Measure the final canister vacuum with the digital vacuum gauge. The final vacuum should be between -10 and -2 inches Hg. If it is 0 inch Hg, do not submit the sample for analysis. If it is between -2 and 0 inch Hg redeploy the sample if possible; if not, submit it to the laboratory for analysis but make sure it is received with some residual vacuum.
5. Replace the protective cap on the canister.
6. Duplicate samples should be collected simultaneously with a dedicated T-connector. Attach the T-connector to each canister and then connect one flow controller to the top of the T-connector (If there was a flow controller on each canister, then the sampling flow rate would exceed the maximum allowable flow rate of 200 mL/min). The duplicate sample will take twice as long to collect.

E. After Sample Collection is Completed

1. Disassemble the sampling system and replace the cap on the probe tubing.
2. For permanent probes, replace the protective cover (such as a flush-mount cover, or semipermanent polyvinyl chloride cover) on the soil vapor probe (if present).
3. Fill out all appropriate documentation (chain of custody, sample tags) and return samples and equipment to the laboratory in the same shipping container in which they were received. Do not place sticky labels or tape on the surface of the canister.
4. Canisters should not be cooled during shipment. DO NOT put ice in the shipping container.

V. Quality Control and Quality Assurance

- Canisters supplied by the laboratory must follow the performance criteria and quality assurance prescribed in USEPA Method TO-15A for canister cleaning, certification of cleanliness, and leak checking.
- Flow controllers supplied by the laboratory must follow the performance criteria and quality assurance prescribed in USEPA Method TO-14/15 for flow controller cleaning and adjustment.
- Field duplicates may be required. Check the work plan for frequency.

VI. Attachments

Soil Vapor Sampling Log,

VII. References

California Department of Toxic Substances Control (DTSC). 2015. *Advisory – Active Soil Gas Investigations*. July.

United States Environmental Protection Agency (USEPA). 2015. *Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air*. Office of Solid Waste and Emergency Response. June.

USEPA. 2019. *Method TO-15A: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially Prepared Canisters and Analyzed by Gas Chromatography-Mass Spectrometry (GC-MS).* September.

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Appendix D
Field Forms

KINDER MORGAN

Site Name	Site Location	Project Manager	Project Engineer	FORM: Air Sparge *Draft Revised on* 6/11/2021 AS Operation and Maintenance *SFPP Norwalk Pump Station, Norwalk, CA*
SFPP Norwalk Pump Station	Norwalk, CA	Court Reece	Danny H / Nils O	

Date & Time	Technician#1	O&M Technician#2	Equipment Type	Compressor Model	Compressor Permit and Expiration Date
			Air Sparge	Kaeser DSD 175	SCAQMD 578777

GENERAL PARAMETERS					
Compressor	(Units)	Optimal Level	Max Level	Arrival	Departure
AS Compressor Operating	(Yes/No)			Yes / No	Yes / No
AS Compressor Run Meter	(hours)				
AS Compressor Load Meter	(hours)				
AS Compressor Pressure	(psi)	110	125		
AS Compressor Temperature	(F)	185	230		
Compressed Air Receiver Tank Temperature	(F)	90 - 100			
Compressed Air Receiver Tank Pressure	(psi)	110	125		
AS Compressor Header Flow Rate	(scfm)	480 - 520	600		
AS Manifold Pressure	(psi)	80	125		
Filters	(Units)	Optimal Level	Max Level	Arrival	Departure
Moisture Filter Inspection		Green	Red	Green, Red	Green, Red
Coalescing Filter Inspection		Green	Red	Green, Red	Green, Red
Manifold	(Units)	Optimal Level	Max Level	Arrival	Departure
Sparge Leg 1	NA	NA	NA	OFF	OFF
Sparge Leg 2	NA	NA	NA	OFF	OFF
Sparge Leg 3 Regulator Pressure	(psi)	20	30		
Sparge Leg 3 Flow	(scfm)		600		
Sparge Leg 3 Leg Pressure	(psi)	4	10		
Sparge Leg 3 Run Meter	(hours)				

Parts Needed:	
Parts Installed:	

Notes (include alarms since previous visit):	Site Visit Checks
	☐ Yes / No DSD 100: COOLING OIL LEVEL (RED, GREEN, YELLOW)
	☐ Yes / No DSD 175: CHECK CONTROL CABINET FILTER MATS
	☐ Yes / No CHECK CONDENSATE DRAINAGE SYSTEM
	☐ Yes / No ALARMS?