PACIFIC FACILITIES SERVICE OFFICE
UNITED STATES POSTAL SERVICE

March 21, 2012

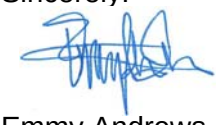
Ms. Barbara Jakub,
Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502

Re: USPS Oakland Vehicle Maintenance Facility
Perjury Statement, Soil Vapor Investigation Workplan

Dear Ms. Jakub:

I declare, under the penalty of perjury, that to the best of my knowledge the information and recommendations as represented to me in the attached Soil Vapor Investigation Workplan are true and correct.

Sincerely:



Emmy Andrews
Project Manager

Attachments

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March 19, 2012
180497.2

Ms. Barbara Jakub
Hazardous Materials Specialist
ALAMEDA COUNTY ENVIRONMENTAL HEALTH
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

RE: WORKPLAN FOR SOIL VAPOR INVESTIGATION
USPS OAKLAND VMF
1675 7TH STREET
OAKLAND, CALIFORNIA

Dear Ms. Jakub:

On behalf of the United States Postal Service (USPS), we are submitting the following work plan for an investigation at the USPS's Oakland Vehicle Maintenance Facility (VMF) located at 1675 7th Street in Oakland, California (Figure 1). Based on our correspondence with you and the results of our previous work, an evaluation of soil vapor quality is required at the Site. The purpose of performing this investigation is to determine if potential fuel leaks from the former underground storage tanks (USTs) at the fueling operations area of the VMF may have impacted soil gas at the Site and to evaluate possible soil vapor intrusion concerns for the nearby VMF offices.

THE PROJECT

The Site is located along 7th Street between Oak and Wood Streets in Oakland, California, and is occupied by the USPS's General Mail Facility and VMF (see Figure 1). The VMF operations include a fueling area for the fleet vehicles maintained and repaired at the Site. Fuel USTs containing gasoline and diesel were removed in 1991 and 1992, and three new USTs were installed near the southwest corner of the USPS parking garage (Figure 1).The purpose of this work plan is to provide follow-up environmental investigations related to benzene detected in the soil during our previous environmental investigations at the Site.

SITE ENVIRONMENTAL BACKGROUND

In November 1991, one 750-gallon-waste oil underground storage tank (UST), one 5,000 gallon gasoline UST, and two 10,000-gallon diesel USTs were removed from the Oakland VMF (site); an additional 10,000-gallon diesel UST was removed from the site in June 1992. Strong hydrocarbon odors and visible contamination were present within the UST pit excavations, and a small hole in the bottom of the gasoline UST was identified during removal. Sampling and analysis of the soil and groundwater from below the USTs and product piping was performed concurrently with excavation activities. Soil analytical results from these areas indicated the presence of elevated concentrations of total petroleum hydrocarbons as

diesel (TPHd), gasoline (TPHg), and benzene, toluene, ethylbenzene, and xylenes (collectively known as BTEX compounds) (Professional Service Industries, Inc. [PSI] 2002). Metals (cadmium, chromium, lead, nickel, and zinc) were also detected in soil samples collected from the former 750 gallon UST excavation, but odors and discoloration of soil were not present. Groundwater was not encountered from the base of the 1991 UST excavations (at 16-feet below ground surface [bgs]), but was encountered at the base of the 1992 UST excavation (at 12 feet bgs). Groundwater collected from the 1992 UST excavation contained elevated concentrations of TPHd (72,000 micrograms per liter [µg/L]), benzene (3.8 µg/L), and xylenes (12 µg/L). Following the UST removals, GeoResource Consultants oversaw the installation of three new 12,000-gallon USTs (one gasoline and two diesel USTs) near the southwest corner of the USPS parking garage, and one new 1,000-gallon waste-oil aboveground storage tank (AST).

Based on the elevated concentrations of TPHd, benzene, and xylenes detected in soil and groundwater sampled during UST removal activities, the Alameda County Department of Environmental Health (ACDEH) requested a groundwater investigation and further evaluation of soil contamination. Later in 1992, following the June excavation activities, additional hydrocarbon-impacted soil was removed from the site near the location of two former diesel USTs (PSI, 2002).

In September 1993, Harding Lawson Associates (HLA) performed a subsurface investigation in which nine borings were drilled, and 25 soil samples were collected and analyzed for TPHd, TPHg, and BTEX compounds. Five of the drilled borings were converted to monitoring wells (MW-1 through MW-5) which were completed to a depth of 20 feet bgs. Elevated concentrations of TPHd (2,400 milligrams per kilogram [mg/Kg]), TPHg (53 mg/Kg), and xylenes (0.087 mg/Kg) were detected in soil at 3 feet beneath the fuel dispenser island at MW-4 (boring B-4 location); elevated concentrations of TPHd (84 mg/Kg), TPHg (180 mg/Kg), benzene (0.15 mg/Kg), toluene (0.35 mg/Kg), ethylbenzene (2.1 mg/Kg), and xylenes (13 mg/Kg) were detected in soil at 6 feet beneath the fuel dispenser island near well MW-3 (boring B-8); and benzene (0.04 mg/Kg) was detected in soil at 2.5-feet deep near well MW-2 (boring B-2). TPHd was detected in a groundwater sample collected from monitoring well MW-4 at a concentration of 580 µg/L. No other petroleum hydrocarbons were detected in any of the other groundwater samples collected during the investigation.

Quarterly groundwater monitoring was initiated at the site in January 1994. In December 1994, in response to the construction of Interstate 880 in the vicinity of the site (Cypress Freeway Reconstruction Project), the ACDEH approved the abandonment of well MW-5, which was located up-gradient of the UST removal areas and had been non-detect for petroleum hydrocarbons since being installed in 1993. By June 1995, free product was discovered in well MW-4 and removed with absorbent socks and bailers. TPHd concentrations increased from June 1994 to June 1995 in wells MW-1, MW-2, MW-3 and MW-4.

In accordance with a request from the ACDEH, by June 1997, HLA performed a well search, chemical data compilation of groundwater and soil contamination, and a screening human health risk assessment (Tier I) to evaluate and assess whether site closure is justifiable. Mr. Kayode Kadara (USPS) presented Ms. Jennifer Eberle (ACDEH) with the HLA report in June 1997 and to Mr. Larry Seto (ACDEH) by February 1998, indicating that “no risk-based remediation is necessary and case closure is recommended”. The request for site closure was reviewed and denied by Mr. Seto and Madhulla Logan (ACDEH) in May 1998. ACDEH indicated that the maximum concentrations of benzene detected in shallow soils at the site exceeded Tier I

cleanup levels, and that a Tier II ASTM Risk Based Corrective Action (RBCA) or Human Health Risk Assessment (HHRA) should be done for the site using a construction worker scenario (due to the presence of impacted soil within 5 feet of the ground surface).

Additionally, in 1997, Herbst Engineering removed three hydraulic lifts within the VMF building. During the removal, Herbst Engineering contracted JB Environmental to characterize and dispose of the observed soil contamination in these hydraulic lift areas. For disposal, the stockpiled and drummed soil and sludge was analyzed for metals (CAM 17), TPHg, TPHd, BTEX compounds, TPH as motor oil (TPHmo), and chlorinated volatile organic compounds (VOCs). Analytical results indicated the impacted soil and sludge contained high concentrations of TPHmo (up to 12,000 mg/Kg), and traces of chlorinated hydrocarbons. An initial investigation of the soil and groundwater impacted by leaking hydraulic lift was conducted by Lowney Associates (now known as TRC) in August 1999. The investigation identified high concentrations of total recoverable petroleum hydrocarbons (TRPH) in soil (up to 48,000 mg/Kg), and in groundwater (TRPH up to 61 mg/Kg); benzene in groundwater was detected at 0.0065 (mg/L). The follow up soil and groundwater investigation, conducted by Lowney Associates in March 2000, consisted of seven borings in the vicinity of the former leaking-hydraulic lifts where soil and groundwater was previously tested for TRPH and BTEX compounds. The investigation revealed that the impacts from the leaking hydraulic lifts were limited to the area immediately surrounding the lifts, with no significant migration of contaminants.

In February 2000, Mr. Thomas Peacock, manager of the ACDEH local oversight program (LOP), submitted a letter to Mr. Sean McFadden of the USPS entitled "Intent to Make a Determination That No Further Action Is Required", indicating that the LOP intended to make a determination that no further action is required or to issue a closure letter. An additional letter sent to Mr. Sean McFadden (USPS) from Mr. Larry Seto (ACDEH) indicated that groundwater had not been tested for methyl-tert butyl ether (MTBE). The letter indicated that in addition to a Tier II RBCA, before site closure could be issued, another groundwater sample must be taken from well MW-4 and analyzed for TPHg, TPHd, BTEX, and MTBE. In another letter dated November 8, 2000, Mr. Larry Seto (ACDEH) indicated receipt of the Tier II Human Health Risk Appraisal dated October 11, 1999 by Lowney Associates. The letter also indicated that the ACDEH had not received the laboratory analysis for the groundwater sample from MW-4, and that a groundwater sample must be taken from MW-4 before case closure could be issued and that Mr. Tom Peacock would be the new case officer for the site at ACDEH. On November 1, 2000, Lowney Associates collected a groundwater sample from well MW-4, at which time the well contained 1 to 2 inches of free product. The subsequent Groundwater Quality Evaluation report (January 2001), recommended quarterly groundwater monitoring at the site

Mr. Barney Chan (ACDEH) responded in a letter on April 9, 2001, directing Mr. Sean McFadden (USPS) to resume quarterly groundwater monitoring, with an addition of polyaromatic hydrocarbons (PAHs) to the list of contaminants to be analyzed (in addition to TPHg, TPHd, BTEX, MTBE). Mr. Chan (ACDEH) also requested clarification of the case by indicating that the USPS provide: 1) a map indicating the location of the soil samples from past tank removals, 2) a tabulation of the initial and confirmation soil sample results, 3) a map indicate location of hydraulic lifts and samples relative to the former and existing USTs, 4) an analysis of residual concentrations of hydraulic fluid in soil and groundwater, and 5) an analysis of the need for further site characterization.

Quarterly groundwater monitoring was initiated by the USPS in March 2002 by Professional Service Industries (PSI), which included sampling of groundwater from wells MW-1 through MW-4. Wells MW-1 through MW-3 were analyzed for TPHg, TPHd, and VOCs (including BTEX and MTBE); because of the presence of free product, well MW-4 was analyzed for semi-volatile organic compounds (SVOCs) (PAHs). TPHd was detected in MW-3 (0.54 mg/L), MTBE was also detected in MW-3 (3.8 µg/L) and MW-4 (8.5 µg/L). Additional volatile organic compounds (VOCs) and SVOCs were detected in groundwater from MW-4 (sec-butylbenzene, napthalene, n-propylbenzene, anthracene, di-n-octylphalate, flourene, 2-methylnapthalene, naphthalene, phenanthrene, and pyrene), but only naphthalene was above the EPA Region IX Preliminary Remediation Goals (PRG) at 46 µg/L.

As a result of subsequent correspondence between Mr. Chan (ACDEH), Mr. Roland Queyquep (USPS) and Mr. Ross and Mr. Burfield of PSI (consultant for the USPS) during May through August 2002, the ACDEH made the following requests:

- Clarification of data presented in the Tier II HHRA and an assessment of the continued validity of the HHRA conclusions;
- Sampling and analysis of the free product in MW-4;
- Removal of free product from MW-4; and
- Delineation of the free product plume.

PSI addressed Mr. Chan's (ACDEH) requests in the submitted "Workplan: Site Investigation & Free-Product Removal" dated July 17, 2002. The ACDEH approved the Workplan in their letter dated July 19, 2002. Modifications to the Workplan, including screening and analysis of soil samples from the proposed boring and clarification of the groundwater sampling method and installation of permanent well, was sent by PSI on August 19, 2002, and approved by the ACDEH in their letter dated August 23, 2002.

Groundwater results from the quarterly sampling program in 2002 by PSI indicated 4.32 inches of free product observed in MW-4. The free product itself was fingerprinted as degraded diesel. PSI removed the free product (approximately 1 to 2 gallons) from well MW-4 during August through October 2002, until the free product was no longer apparent within the well. In September 2002, well MW-6 was installed approximately 60 feet down-gradient of wells MW-3 and MW-4 by PSI per the ACDEH request for delineation of the plume down-gradient of the fuel island. In general, the analytical results for the 2002 groundwater sampling program indicated no TPHg in any of the wells except MW-4; TPHd was detected in wells MW-1, MW-3, and MW-4, but decreased rapidly from the first to the fourth quarter; BTEX was not detected in any wells except for toluene at low concentrations in MW-6; and MTBE was detected in wells MW-1 through MW-4, ranging from 4 µg/L to 7 µg/L.

By December 30, 2002, PSI submitted their "Historic Summary Report and Closure Request, USPS GMF/VMF" to Mr. Barney Chan (ACDEH). In their report, PSI reviewed the Tier II HHRA indicating that the conclusions of the HHRA with respect to estimated health risk "are not only valid, but are conservative for current site conditions". PSI also concluded that there had been no significant leak of gasoline fuel, supported by the general absence of TPHg and BTEX constituents and the low levels of MTBE in groundwater; they also concluded that additional remedial efforts to address residual concentrations of

hydraulic fluid in soil and groundwater should not be required. PSI's efforts to remove TPHd free product from MW-4 appeared successful, and that based on the volume of the free product, the amount of discharge of TPHd to the groundwater was on the order of 1 to 2 gallons, and occurred suddenly during a short duration or single event release of diesel fuel centered around or within MW-4. On February 24, 2003, PSI submitted the Fourth Quarter 2002 Groundwater Monitoring Report to Mr. Barney Chan (ACDEH) and requested closure for the site.

Based on our review of the ACDEH LOP case files for the site, no further correspondence occurred regarding site closure after early 2003, and no site characterization or monitoring activities have occurred since 2002.

However, ACDEH sent a letter to the USPS dated July 3, 2008, identifying the site as having not being claimed in GeoTracker. A subsequent Notice of Violation (NOV) sent by the ACDEH dated July 24, 2009, was received by Mr. Roland Queyquep (USPS); the NOV was issued for failing to claim the site in a timely fashion.

On March 11, 2010, Barbara Jakub of ACDEH performed a site Closure Review which was posted to GeoTracker. In it, she identifies potential vapor intrusion as one of the main impediments to obtaining case closure.

In December 2010, TRC conducted a groundwater monitoring event at the site. Since the wells at the site had not been sampled in eight years, TRC redeveloped the six wells at the site prior to sampling and surveyed wells afterwards. Laboratory analyses of groundwater from monitoring wells MW-1, MW-3, and MW-4 detected TPHd as dissolved phase hydrocarbons above the laboratory reporting limits and environmental screening levels (ESLs) ranging from 161 to 6,620 µg/L. TPHmo was detected in wells MW-2 and MW-4 above the laboratory reporting limits and ESLs. TPHg and BTEX compounds were not detected above the laboratory reporting limits or ESLs. MTBE was detected in groundwater from wells MW-3, MW-4, and MW-6, but was well below the groundwater ESL of 5 µg/L. Other fuel oxygenates, including tertiary butyl alchohol (TBA), diisopropyl ether (DIPE), ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME), and semi-volatiles 1,2-DCA , naphthalene, or other PAHs were not detected above groundwater ESLs.

The results of the December 2010 monitoring event were submitted to the ACDEH in the *Fourth Quarter 2010 Groundwater Monitoring Report* dated March 18, 2011. ACDEH responded to the report in a letter dated July 22, 2011 entitled *Request for Work Plan and Product Removal for Fuel Leak Case No. RO0000016*. In their letter, ACDEH requested resumption of quarterly groundwater monitoring at the site, submittal of a soil vapor investigation workplan and upload of boring logs to GeoTracker. USPS responded in a letter dated September 12, 2011, requesting a reduction of groundwater monitoring frequency to semiannually and an extension on the deadline for submittal of the soil vapor investigation workplan. During a telephone conference on February 10, 2012, TRC proposed a revised schedule for submittal of the soil vapor investigation work plan to the ACDEH of March 16, 2012. This verbal request was approved by the ACDEH in an e-mail on February 10, 2012. During this exchange, TRC confirmed that the due dates for the first and third quarter 2012 monitoring reports are March 30, 2012 and September 30, 2012, respectively.

SCOPE OF WORK

Based on the ACDEH letter to the USPS, dated July 22, 2011, TRC proposes to collect three sub-surface soil vapor samples in the area of the former USTs, in accordance with the attached standard operating procedures (SOP) in Appendix A. The SOP was developed in accordance with the following guidance documents:

- Draft Advisory – Active Soil Gas Investigations (DTSC/LARWQCB, 2003; revised March 2010; final revision expected in March, 2012),
- Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance, DTSC, 2011), and
- Geoprobe Subsurface Vapor Sampling Guidelines (San Mateo County Draft GPP Guidance, 2003).

Furthermore, the scope of work presented below is in general accordance with the ASTM Designation E 2600 - 10 *Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions.*

The scope of work for this soil gas investigation will include the following:

- Mobilization activities (scheduling and logistics, marking locations, utility clearance, etc.);
- Soil gas sampling and analysis per the attached SOP;
- Preparation of a soil gas investigation report in which we will compare analytical results with California Human Health Screening Levels (CHHSLs) and Environmental Screening Levels (ESLs) and determine the likelihood of potential vapor intrusion for the VMF building nearby.

Pre-Field Activities

Prior to beginning work, a work plan and drilling permit application will be submitted to Alameda County Public Works Agency for their approval. We also will prepare a Health and Safety Plan for our proposed work.

To attempt to locate public underground utilities in the area of the proposed soil vapor borings, we will contact Underground Service Alert and use a private utility locator to further help reduce the risk of damaging underground utilities and existing USTs during drilling.

Subsurface Investigations

To evaluate soil vapor quality in the area of the former USTs, three (3) borings (Figure 1) will be completed in the near following locations:

- The former gasoline dispenser island and former 10,000 gallon diesel USTs,
- The former diesel dispenser island and MW-4, and
- The eastern side of the VMF offices.

The locations of borings are based on the results of previous soil quality investigations where the highest concentrations of benzene were detected.

Based on the shallow depth to groundwater (from 7.6 to 9.4 feet deep as measured in February 2012) at the project site and to minimize the effect of breakthrough of ambient air, the soil vapor borings will be advanced to a depth of approximately 5 feet below ground surface (bgs). The borings will be advanced by hydraulically driving the probes to the desired depth using direct-push drilling methods, then removing all push rods and installing a temporary soil-vapor sampling well, as described in the SOP presented in Appendix A. After a minimum equilibration time of approximately 24 hours, the soil vapor samples will be collected in 6-liter Summa canisters and submitted to a certified analytical laboratory for analysis.

Leak checks will be performed prior to sample collection by establishing a highly concentrated atmosphere of helium within a shroud enclosing the sampling manifold. A handheld helium meter will be used to monitor the concentration within the shroud and within the sampling train. If helium concentrations within the sampling train exceed 1 percent of the shroud atmosphere concentration, leaks will be identified and corrected.

Laboratory Analyses

Three soil vapor samples will be submitted to a California-certified laboratory for analysis of VOCs (EPA Test Method TO-15) and fixed gases including oxygen (O_2), carbon dioxide (CO_2), and methane (ASTM Test Method D1946), as described in the SOP. Additionally, one sample will be collected from the sampling shroud atmosphere and analyzed for the leak check compound helium (ASTM Test Method D1946), to verify the field measurements. We will request a standard one-week laboratory response; however, the actual laboratory response will depend on the laboratory's workload.

GPS Data Collection

To more accurately locate and map the borings, we will use a hand-held GIS data collection system (GeoExplorer II). The GIS data will permit easy sample relocation at a future date, in the event elevated contaminant concentrations are detected and additional samples are required in a specific area.

Soil Cuttings and Steam Cleaning Rinsate

Drilling equipment will be decontaminated prior to and between boring locations to prevent cross-contamination. A decontamination area will be set up to contain the fluids and soils washed off equipment during the decontamination process. Decontamination water and soil cuttings will be stored in Department of Transportation (DOT)-approved 55-gallons drums and stored on-site pending receipt of analytical results for disposal.

Report

Following completion of the soil vapor sampling activities, a report of findings will be prepared for the ACDEH presenting the results of our investigation and summarizing our conclusions and recommendations. Our conclusions and recommendations will be based on readily available information, observations of existing conditions, and our interpretation of the analytical data. The report will include a site plan showing sampling locations and copies of permits and laboratory data sheets.

We look forward to your approval of the proposed work. If you have any questions, please call and we will be glad to discuss them with you.

Very truly yours,

TRC

Charles Mettler, P.G.
Principal Geologist

GG:JPZ:CCM;jcm

Copies: Addressee (email)

Attachment: Figure 1 – Proposed Soil Vapor Well Locations
Appendix A – Standard Operating Procedure (SOP)

OK:USPS Oakland Soil Vapor WP 031612_Emmy ES GG.docx

REFERENCES

Department of Toxic Substances Control (DTSC), March 2010, *Advisory – Active Soil Gas Investigation.*

Department of Toxic Substances Control (DTSC), October 2011, *Vapor Intrusion Guidance*

DiGiulio, Dominic, *Draft Standard Operating Procedure (SOP) for Installation of Sub-Slab Vapor Probes and Sampling Using EPA Method TO-15 to Support Vapor Intrusion Investigations.*

Milano, Deno, Soil Gas Advisory Forum - *Problems Using Geoprobe, Benefits of Using a Shroud, Problems with Rain*, March 2008.

San Mateo County Department of Environmental Health, *Using a Geoprobe to Collect Subsurface Vapor Samples for Human Health Risk Evaluation*, March 9, 2006.


LEGEND
Approximate locations of:
Monitoring well
Proposed soil vapor well
DIESEL UST
DIESEL UST
DIESEL UST
GENERAL MAIL FACILITY (GMF)
VEHICLE MAINTENANCE FACILITY (VMF)
FORMER 10,000-GALLON DIESEL
FORMER 5,000-GALLON GASOLINE
MW-1
VMF OFFICES
MW-2
MW-3
MW-4
FUEL ISLAND CANOPY
FORMER 750-GALLON WASTE OIL TANK
FUEL DISPENSERS
MW-6
N
SCALE (FEET)
0
40
AERIAL PHOTO SOURCE: Google Earth, October 2009.
PROPOSED SOIL VAPOR WELL LOCATIONS
United States Postal Service
Vehicle Maintenance Facility
1675 7th Street
Oakland, California
TRC
180497
FIGURE 1

APPENDIX A
STANDARD OPERATING PROCEDURE: SOIL VAPOR SAMPLING

PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to establish a protocol for the collection of soil vapor samples. The following guidelines will ensure that the soil vapor samples are collected in a high quality and consistent manner. However, this is an SOP that may be varied or changed as required, dependent on site conditions, equipment limitations, or limitations imposed by the procedure.

PROCEDURES

1. Position and set-up truck-mounted Geoprobe rig over proposed boring location. Load the dual wall split-spoon sampler with the sample liner inside the outer casing. Advance outer casing and inner split spoon simultaneously at 4- to 5-foot intervals and log soil samples for lithology.

2. Upon reaching the desired depth, retract the probe from the boring. Insert ¾-inch PVC tubing with the desired sampling intervals marked on the outside, down the boring to construct the single-level vapor probe. PVC tubing will be retracted as the vapor probe is constructed.

3. Construct vapor probes consisting of a small stainless steel filter and 1/8-inch-outer diameter Teflon or nylon tubing based on the depths of the desired sampling intervals.

4. Insert approximately 1 inch of #2/20 sand at the bottom of the boring. Set the vapor probe down the middle of the PVC. Backfill with several inches of #2/20 sand, followed by hydrated bentonite up to ground surface. Withdraw the PVC tubing as the backfill is placed in the annulus. Figure 1 presents a schematic of the single-level vapor probe and the sampling apparatus.

5. Terminate the vapor probe by attaching air-tight three-way valves (closed to atmosphere) to the end of the tubing, leaving a tail of approximately 2 to 3 feet.

6. Secure well head from on-site operational activities and traffic by placing appropriate barricades, traffic cones over the well head and/or installing temporary well boxes. Allow cement or granular activated bentonite to cure for at least 24 hours prior to sampling (see Soil Vapor Well Construction Diagram Figure 1A).

Soil Vapor Sample Collection (after a minimum of 24 hours after vapor probe installation)

1. Inspect sample Summa canister and associated paperwork to ensure the canister has been certified clean, has an acceptable initial vacuum (greater than or equal to 30 inches Hg), and is free from obvious damage or defects.

2. Connect a Swagelok® tee fitting to the top of the sample Summa canister. Both sample and purge Summa canisters will have pre-installed vacuum gauges.

3. Connect 1 to 2 feet of tubing to one end of the tee fitting on the sample Summa canister to the purge Summa canister.

4. Connect a 200 milliliter per minute (ml/min) flow regulator equipped with a laboratory-supplied particulate filter to the top of the tee fitting on the sample Summa canister.

5. Connect the three-way valve in Step #8 to the downhole side of the particulate filter/flow regulator with 1 to 2 feet of tubing. Connect 1 to 2 feet of tubing to the remaining side of the three-way valve for the helium meter probe and close off end with a clamp.

6. Seal all connections with silicon tape.

7. Vacuum test the connections between the Summa canisters and vapor-tight valve on the down hole side of the flow regulator for 10 minutes by opening the purge canister valve to place a test vacuum on the assembly. Terminate further work if gauge vacuum of approximately -20 to -30 inches Hg cannot be maintained for 10 minutes.

8. Field-check potential leaks between sampling train and three-way valve by establishing tracer gas (i.e., helium) atmosphere around the sampling apparatus. During leak-checking and sampling, the target concentration of helium around the sampling apparatus (within the shroud) is greater than 5 percent. Ensure that the three-way valve is closed on the down hole side, allowing passage from the sampling train to the helium meter tubing from step #5. Place shroud over vapor probe and sampling apparatus. Attach hose to helium-tank flow regulator and place opposite end inside shroud. Establish helium atmosphere by opening flow regulator on helium tank. Measure and record helium concentrations within the shroud. Remove clamp and connect helium-meter probe to tubing in Step #5. Measure and record helium concentrations within the sampling apparatus. If the helium concentration within the sampling apparatus is greater than 1 percent of the measured concentration within the shroud, fix seals by re-taping and tightening connections. Continue field-checking seals until helium concentrations within sampling are below 1 percent.

9. Remove shroud and adjust three-way valve so that the sampling train side is in the closed position, allow passage from the down hole side into the helium meter tubing. Repeat #8 to field-check potential leaks from vapor probe to the three-way valve. After field-checking for leaks is complete, disconnect helium meter from tubing and close off tubing with a clamp.

10. Remove the helium shroud and adjust the three-way valve to allow passage from the down hole side to the sampling train. Open the valve on the purge canister to begin purging ambient air from the sampling apparatus and borehole (record the time purging commenced). The required purge volume will be determined by the length of the vapor probe tubing, the borehole diameter, and the porosity of the sand pack.

11. Close the purge canister valve when three volumes of air have been purged from the sample apparatus and borehole (the adequacy of purging will be based on the inches of pressure drop on the purge canister gauge and not time).

12. Open the sample canister valve to begin sample collection (record the time sample collection begins). Replace the shroud and re-establish the helium atmosphere within the shroud. Record helium concentrations within the shroud at least every 30 seconds.

13. Remove the shroud and close the sample canister valve when the sample canister gauge indicates approximately 5 inches Hg of vacuum remain in the canister.

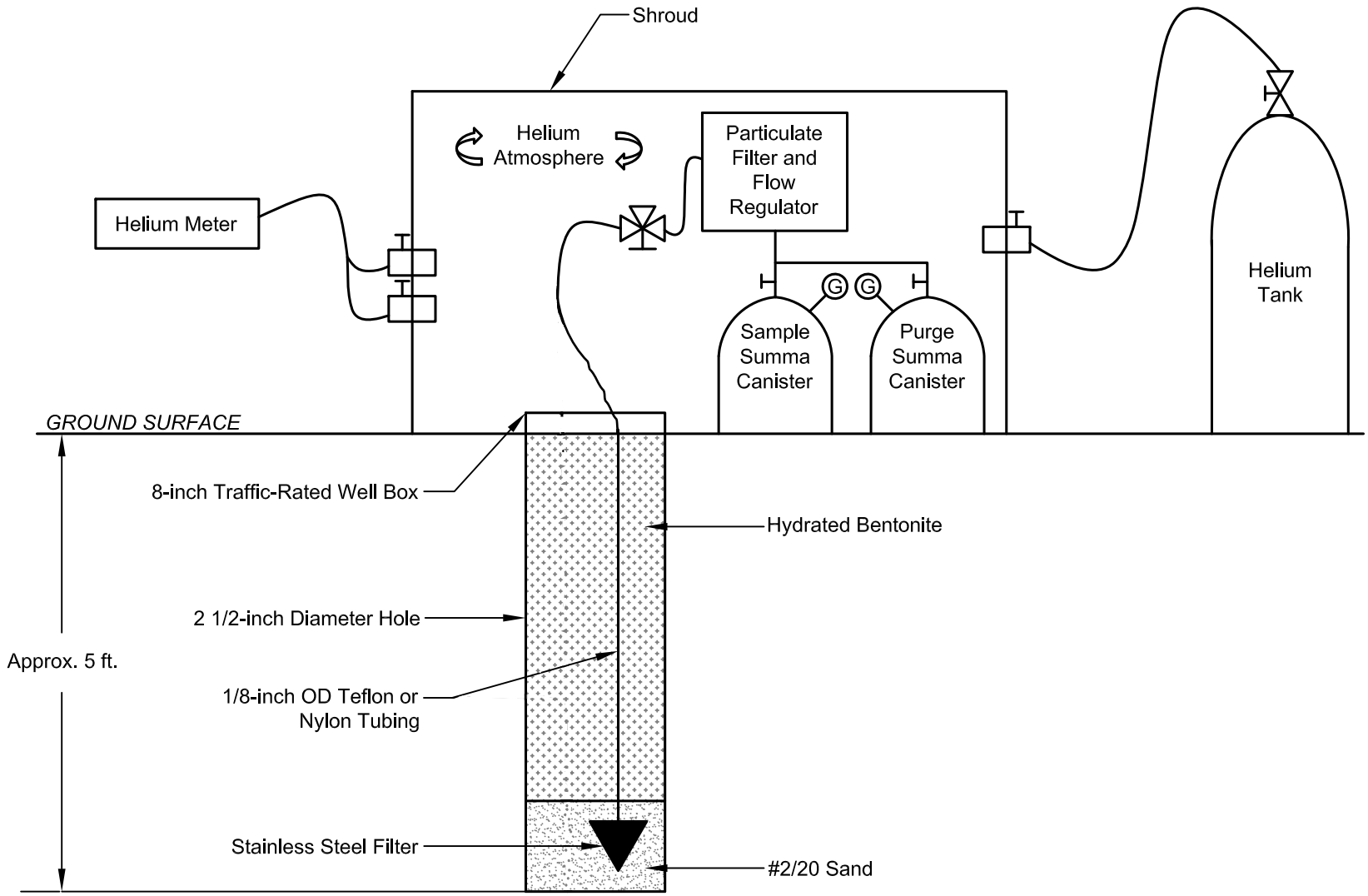
14. Record the time sample collection was terminated and replace the tee fitting on the sample canister with the laboratory supplied brass plug.

15. Label the sample and record on the chain of custody form the sample name, final vacuum, and the canister and flow controller serial numbers.

16. Store the sample in a container that blocks sunlight, do not subject the sample to significant changes in pressure and temperature, and do not chill the samples (discard if condensation is observed in the sample tubing).

17. Laboratory analyses for volatile organic compounds and biogenic gases will be performed by a state-certified laboratory.

18. After sampling is completed, the vapor probe will be destroyed according to regulatory borehole abandonment standards. Typically the borings will be over-drilled using 2-inch Direct-push drill rods, the sample liners will be inspected to ensure that the filter pack and bentonite seal has been successfully removed, and the borings will be sealed with neat cement to the surface, in accordance with regulatory guidelines.



SOIL VAPOR WELL CONSTRUCTION DIAGRAM

United States Postal Service
Vehicle Maintenance Facility
1675 7th Street
Oakland, California

TRC | 180497 | **FIGURE 1A**

FILE NAME: Z:\Templates\Soil Vapor Well_Single_Construction Diagram\SV Single Well Construction Diagram.dwg | Layout Tab: 8x11