January 14, 2012

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SUBJECT: RESPONSIBLE PARTY PERJURY STATEMENT FOR ALAMEDA COUNTY FTP WEBSITE TECHNICAL REPORT SUBMITTAL REQUIREMENT FOR REPORTING OF Workplan for Soil Gas Sampling & Down Gradient Groundwater Grab Sampling for the Kawahara Nursery, 16550 Ashland Ave., San Lorenzo, CA

To Alameda County Environmental Health,

"*I* declare under penalty of perjury that the information and/or recommendations contained in the technical document designated above is true and correct to the best of my knowledge."

John T. Kawahara

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SUBJECT: Workplan for Soil Gas Sampling & Down Gradient Groundwater Grab Sampling for the Kawahara Nursery, 16550 Ashland Ave., San Lorenzo, CA

Ms. Jakub,

This workplan summarizes the procedures to be performed to install three (3) soil gas probes adjacent to the existing residence to determine if there is any potential for intrusion of benzene vapors to indoor air and to obtain a down gradient groundwater “grab sample.”

This soil gas workplan is provided as required in compliance with your May 09, 2012 letter, Technical Comments, item 2, page 2.

The proposed subsurface investigation work complies with the “phased approach” to performing correction action as outlined in State Board Resolution 92-49 which states;

“WHEREAS: *15. A phased approach to site investigation should facilitate adequate delineation of the nature and extent of the pollution, and may reduce overall costs and environmental damage, because: (1) investigations inherently build on information previously gained; (2) often data are dependent on seasonal and other temporal variations; and (3) adverse consequences of greater cost or increased environmental damage can result from improperly planned investigations and the lack of consultation and coordination with the Regional Water Board. However, there are circumstances under which a phased, iterative approach may not be necessary to protect water quality, and there are other circumstances under which phases may need to be compressed or combined to expedite cleanup and abatement;”*

State Board Resolution 92-49 also states that the cost of corrective action must also be taken into consideration;

The Regional Water Board shall:

> *B. Consider whether the burden, including costs, of reports required of the discharger during the investigation and cleanup and abatement of a discharge bears a reasonable relationship to the need for the reports and the benefits to be obtained from the reports;*

C. Require the discharger to consider the effectiveness, feasibility, and relative costs of applicable alternative methods for investigation, and cleanup and abatement. Such comparison may rely on previous analysis of analogous sites, and shall include supporting rationale for the selected methods;

Considering that the concentrations of residual hydrocarbons, as identified in the subsurface beneath the site to date, pose no immediate and significant threat to human health and the waters of the state, the iterative approach is warranted in order to save costs.

The data obtained from the completion of the proposed subsurface investigation will help determine the course of corrective action for this site and the parameters necessary for UST site closure.

Franklin J. Goldman
Certified Hydrogeologist No. 466

SUBSURFACE INVESTIGATION WORKPLAN

RATIONALE FOR PROPOSED SOIL BORING DEPTHS AND LOCATIONS

Proposed soil gas borings Sgas1, Sgas2, and Sgas3 are to be located between the house and SB-4 and Z5, to a depth of five (5) feet bgs, where concentrations of gasoline related constituents were identified in 1999 and 2012, respectively. GW-grab1 is a soil boring that will be drilled to approximately 15 feet bgs in order to obtain a groundwater "grab" sample in the down gradient direction (SEE FIGURE 1 PROPOSED SOIL GAS AND SOIL BOREHOLE LOCATION MAP).

PROPOSED SOIL AND SOIL GAS DRILLING AND SAMPLING PROCEDURES

A soil boring permit will be obtained from the Alameda County Public Works Agency prior to the drilling of seven (7) investigative soil borings [one 15 foot soil boring to groundwater, three soil gas probes to five feet bgs, and three companion soil boring to obtain soil samples at five feet bgs].

A site health and safety plan to protect site workers will be prepared and kept on site during field activities. A health and safety meeting will be held with drilling staff and the client's representative on site prior to the commencement of field activities.

The Alameda County Environmental Health staff will be given a 72 hour notice prior to the initiation of field work. County staff is welcome to come to the site during field activities and observe, document field activities, ask questions, collect duplicate samples, and make recommendations.

The borehole locations will be marked at the site in white paint prior to the commencement of drilling excavation activities for Underground Service Alert.

A Geoprobe drilling machine operated by TEG, a State of California C-57 licensed drilling contractor. TEG is also a state certified mobile laboratory qualified to collect soil gas samples. TEG will construct a minimum of three semi-permanent vapor wells which will be installed by driving a probe to less than five (5) feet bgs to collect a vapor sample. If groundwater is encountered, which is considered unlikely unless it is perched, soil gas sampling will be performed above the water table or piezometric surface. If tight soils are encountered, the sampling location will be moved laterally to another location until a more suitable soil condition is encountered.

Each soil gas probe location will be drilled with a companion soil boring Cb1, Cb2, and Cb3 which will be drilled to approximately five feet bgs to obtain a soil sample to compare with soil gas sampling at the same depth.

Soil Sampling

The direct push method of drilling will be used to drill. The soil samples collected at a depth of approximately five feet bgs will be cored with a core barrel with sampling runs two feet in length using an acetate liner to contain the samples.

A large bore Geoprobe soil sampler, that is two feet in length, and has a 1& ½ inch O.D, will be used for sampling.

This will be advanced to the target depth by connecting the sampler to three foot long sections of steel rod that are 1.25 inch O.D.

Relatively undisturbed soil will be continuously extruded, at a rate of approximately one foot per minute, inside the acetate liners by the continuous compressive force of the Geoprobe drill rig. The soil filled acetate liners will be cut with a hack saw into six inch to one foot long sections to be physically examined for soil description purposes and to identify obvious olfactory and visual evidence of hydrocarbon contamination. One half (½) foot long samples will be selected from the sample runs of acetate filled liners which are the most representative of soil conditions and demonstrate the presence of hydrocarbon contamination. Each ½ foot long soil filled acetate liner will be cut flush with the end of the liner and capped with Teflon sheets and plastic end caps at each end. The caps will be further adhered to the outside of the liners with non-toluene impregnated Duct Tape. The soil samples will be labeled with a non-toxic ink field marker as to the depth and location the sample was collected, the sample number, and the project name, and will be inserted into a plastic Zip-Lock bag and placed into an ice chest. The soil samples will then be placed in an ice chest and kept at 4 degrees centigrade. The ice chest with the samples will then be transported to American Analytics, Inc. of Chatsworth, California, a State-certified analytical laboratory, under a proper chain-of-custody, to be analyzed by EPA Method 8260b and the final lab report will document TPHg and BTEX constituents.

Soil Gas Sampling

Soil gas samples will be collected in SUMMA canisters by TEG's field staff. Proposed soil gas samples will be collected in SUMMA canisters according to the Standard Operating Procedures outlined in Appendix A (See Appendix A for Standard Soil Gas Sampling Procedures).

A tracer compound, either difluoroethane or iso-propanol, will be used to test for leaks around the probe rod or tubing where it exits the ground and in the sampling system. The tracer will be placed under the shroud during sample collection. If the tracer is detected per DTSC advisory specifications, the cause of the leak is determined, corrected, and another sample is collected.

Prior to purging the sampling train or sampling soil gas, a shut-in test will be conducted to check for leaks in the above ground fittings. The shut-in test consists of assembling the above ground section of the sampling train (e.g. valves lines fittings flow controllers and summa downstream from the top of the probe), and evacuating the lines to a measured vacuum of about 100 inches of water, then shutting the valves at either end of the above ground section of the sampling train and observing the vacuum for at least one minute. If there is any observable loss of vacuum, the fittings will be adjusted as needed until the vacuum in the above ground section of the sample train does not noticeably dissipate.

After the shut-in test has been conducted, hydrated bentonite will be placed around the probe rod or tubing where it exits the ground. A shroud of sufficient size will be placed over the sampling point covering the sample tubing and the valve at the shroud end of the above ground sampling train section. The sampling train runs under the shroud to the SUMMA.

The three soil gas sample SUMMA canisters will be delivered to American Analytics, Inc., a state certified laboratory and will be analyzed for gasoline range organics, BTEX, and percentage of oxygen in soil gas according to the following lab analyses:

1. Volatile Organic Compounds in Soil Gas by GC/MS: EPA method TO-15
2. Gasoline Range Organics (GRO) in Soil Gas by GC/MS: EPA method TO-3
3. Oxygen Concentration in Soil Gas: Gas Chromatography with Thermal Conductivity Detection GC/TCD.

The holes will be sealed with a cement/bentonite slurry which will be poured down the hole. All equipment will be triple rinsed with an Alconox water solution. Investigation derived waste, if generated will be disposed of at a legal point of disposal.

GROUNDWATER "GRAB" SAMPLING PROCEDURES

The down-gradient borehole GW-grab1 will be logged by a State of California licensed professional geologist who will identify the depth to the groundwater first encountered. No soil samples will be collected for analysis.

Drilling will be applied by the continuous compressive force of the Geoprobe drill rig at a rate of approximately one foot per minute until a depth of 15 feet bgs is reached or until the bottom of the open borehole has yielded enough groundwater to obtain a groundwater "grab" sample. A 1 ½ inch temporary PVC casing (5 foot blank and 10 feet of 0.01inch slotted screen) will be placed down the open borehole, with a plastic end cap at the bottom, and allowed to fill with groundwater. A weighted plastic disposable check valve bailer will be lowered down to the bottom of the screen to capture a groundwater "grab" sample. The groundwater will be decanted from the bottom of the bailer using a valve release tube to unplug the bailer. The groundwater will be drained from the bottom of the bailer into a 40 ml VOA glass vial with HCL preservative provided by the laboratory. The VOA will be filled with water so that there is no escape of volatiles. The three VOA vials will be inverted to make sure there are no bubbles present. The VOAs will then be placed in an ice chest and kept at 4 degrees centigrade. The ice chest with the samples will then be transported to American Analytics, Inc. of Chatsworth, California, a State-certified analytical laboratory, under a proper chain-of-custody, to be analyzed by EPA Method 8260b and the final lab report will document TPHg and BTEX constituents.

Prior to closing up the temporary well, the PVC casing will be removed and the Geoprobe soil boring excavation will be properly abandoned with a cement bentonite grout to the surface after tagging the bottom with a measuring tape to make sure there are no obstructions. The soil sampler will be decontaminated before and after each use by rinsing with an Alconox solution wash and fresh tap water rinse. Rinseate water, if generated from drilling, will be placed in 55 gallons drums onsite to be transported to a legal point of disposal. The small volume of soil sample waste (i.e. less than one quarter of a drum) will be consumed as part of the samples submitted to the laboratory.

FIELD CLEANUP

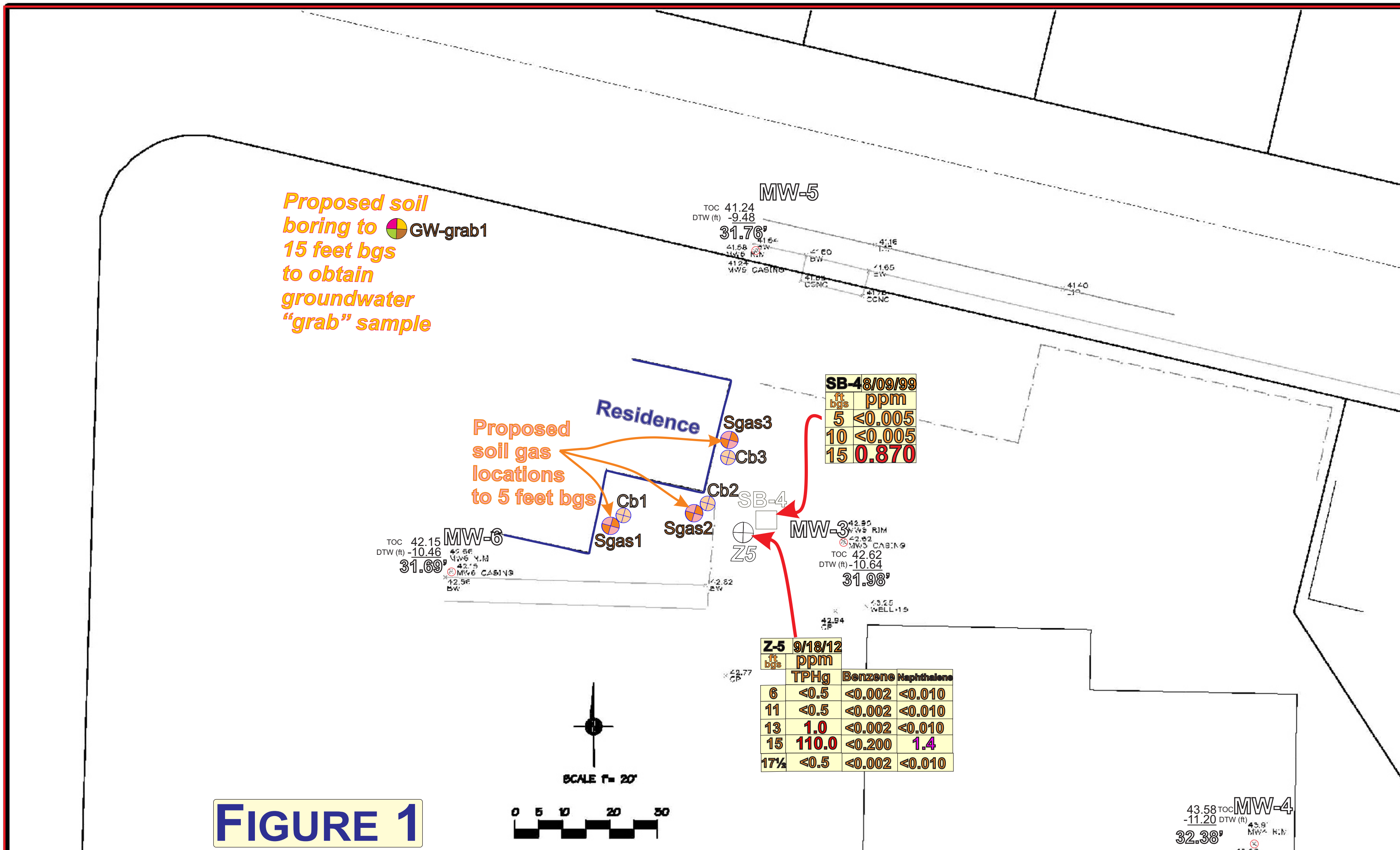
Soil waste, rinseate water, and monitor well development and purge water will be placed in properly labeled 55 gallon Department of Transportation (DOT) approved drums left on-site for transport to a legal point of disposal.

REPORTING

All field activities and observations made will be summarized in a technical report with all appropriate interpretations and interpolations along with conclusions and recommendations.

LIMITATIONS

This report has been prepared in accordance with generally accepted environmental, geological and engineering practices. No warranty, either expressed or implied, is made as to the professional advice presented herein. The analyses, conclusions and recommendations contained in this report are based upon site conditions as they existed at the time of the investigation and they are subject to change. The conclusions presented in this report are professional opinions based solely upon visual observations of the site and vicinity, and interpretation of available information as described in this report. All users of this technical report, recognize that the limited scope of services performed in execution of this investigation may not be appropriate to satisfy the needs, or requirements of other state agencies, or of other users. Any use or reuse of this document or its findings, conclusions or recommendations presented herein, is done so at the sole risk of the said user.



SB-4	8/09/99
ft bgs	ppm
5	<0.005
10	<0.005
15	0.870

Z-5 ft bgs	9/18/12 ppm TPHg	Benzene	Naphthalene
6	<0.5	<0.002	<0.010
11	<0.5	<0.002	<0.010
13	1.0	<0.002	<0.010
15	110.0	<0.200	1.4
17½	<0.5	<0.002	<0.010

Proposed Soil Gas and Soil Boring Locations

For the Kawahara Nursery

Site Located at 16550 Ashland Avenue, San Lorenzo, CA

ACCURATE LAND SOLUTIONS
1271 WASHINGTON AVE, #533, SAN LEANDRO, CA 94577
(510) 553-9700 FAX 1-866-231-6537

TOPOGRAPHIC SURVEY
APN 413-0023-067
ALAMEDA COUNTY

Kawahara Nursery
16550 Ashland Ave
San Lorenzo, CA

FILENAME: TOPO
CHECKED BY:
DRAWN BY: RAK
PROJECT NO. 2012.047
SHEET NO. 1 of 1

Appendix A

Soil Gas Sampling Procedures (SOP) for Sampling with SUMMA Canisters

1.3 Sampling Problems and Troubleshooting

1.3.1 Zone of Influence, Atmospheric Breakthrough, Leak Test:

1. Depending on the specific lithologic unit in which the sampling is taking place, the pumping process prior to sampling will effect a larger or smaller volume of space surrounding the sample probe tip. The effected volume of space is referred to as the zone of influence. This is the zone from which soil gas can migrate to the probe tip during the pumping process. The zone of influence is a function of lithology, land cover, drive point construction and sample purge time/rate/volume. For example. when pumping the same volume, the zone of influence will be much greater for a soil with a small effective porous space as compared to that of a soil with a larger effective porous space. When sampling soil gas, care must be taken so that the vertical zone of influence does not intersect the ground surface. If this occurs, atmospheric air will be drawn through the ground to the sample probe tip and dilute the soil gas sample, producing artificially low results for the VOC's. This problem usually occurs with shallow soil gas sampling (5 feet) but can occur when sampling at larger depths. With knowledge of the lithology, the purge rate/time/volume can be adjusted so that the zone of influence does not intersect the ground surface. In certain soil types the outer surface of the soil gas sample probe rod may not form a good seal with the soil formation. If this occurs atmospheric breakthrough may occur along the outer surface of the probe rod down to the sample probe tip and dilute the soil gas sample, producing artificially low results for the VOC's. Atmospheric breakthrough along the outer surface of the rod in contact with the soil can be determined by performing a leak test using tracer compounds such as pentane, hexane, isopropanol, isobutane, propane, and butane if a detection limit of 10 µg/L or less can be achieved for the compound selected. Some of these compounds such as isobutane are present in commercially available products such as shaving cream. The shaving cream is applied at the ground surface where the soil gas probe tubing contacts the ground. This procedure must be performed at each and every sample location. If atmospheric breakthrough is occurring, the tracer compound such as isobutane present in the shaving cream will travel with the atmospheric air to the sample point location and will ultimately

arrive in the gas tight syringe or other sample container during the sampling event. The detection of the tracer compounds from the analysis of the soil gas confirms the occurrence of atmospheric breakthrough.

2. Helium shroud Leak Detection System: This system is comprised of a plastic enclosure equipped with four (4) ports for concurrent purging and subsequent soil gas sample collection from up to four (4) nested soil gas sampling probes. The shroud is also equipped with two additional ports, one (1) for helium inoculation and one (1) for introducing the helium meter sampling probe into the shroud for measuring the helium sub-shroud concentration. The shroud is inverted, placed over the soil gas sampling probe and inoculated with helium to assess possible bridging of the sub-surface sampling point with the soil surface enclosed by the shroud. If bridging is present, the helium in the shroud will migrate to the sub-surface sample point and flow with the soil gas to the surface. If helium is detected in the soil gas at a concentration greater than five (5) percent of the helium sub-shroud concentration there may be a problem with the sampling probe construction that will require corrective action.
3. The leak test must include an analysis of the leak check compound. If a leak check compound is detected in the sample the following actions must be taken:
    - The cause of the leak should be evaluated, determined and corrected through confirmation sampling.
    - If the leak check compound is suspected or detected as a site specific contaminant, a new leak check compound must be used.
    - If a leak is confirmed and the problem cannot be corrected, the soil gas probe should be properly decommissioned.
    - A replacement probe should be installed at least five (5) feet from the original probe decommissioned due to confirmed leakage, or consult with the agency.
    - The leak check compound concentration detected in the soil gas sample should be included and discussed in the report.

1.4 Optimum Purge Volume Determination

1.4.1 Before soil gas sampling can be performed, the optimal purge volume must be determined in order to obtain samples that are representative of the volatile organic contaminant levels in the formation around the probe tip. The purge volume or "dead space" volume can be estimated from the summation of the following components: (a) the internal volume of tubing used; (b) the void space of the sand pack around the probe tip; and (c) the dry bentonite in the annular space. Sample containers are not included in the purge volume calculation, except when non-evacuated glass bulbs are used. In those instances, the volume occupied by the non-evacuated glass bulbs should be added to the purge volume to account for mixing and dilution of gases inside the glass bulb. Step purge tests of one (1), three (3), and seven (7) purge volumes are recommended as a means to determine the purge volume to be applied at all sampling points. In accordance with the draft California EPA Advisory – Active Soil Gas Investigation dated March 2010 step purge tests of one (1), three (3), and ten (10) purge volumes are recommended as a means to determine the purge volume. A typical system "dead" volume when obtaining a five (5) foot soil gas sample from a soil gas probe installed in a two inch (2") borehole with one foot (1') of sand pack constructed with one quarter inch OD (0.25") tubing is ~ 220 mL. For this calculation, a dimension of 0.19 inches was used for the tubing inner diameter and the effective porosity of the sand was assumed to be 30%. The procedure of determining the optimum purge volume is by conducting a site specific purge volume versus contaminant concentration test where the VOC levels are expected to be highest. A plot of the contaminant concentration vs. purge volume is made and the optimal purge volume is the point at which the contaminant concentration maximizes. The purge time is then set at a value which will generate the optimal purge volume at the specified purge rate.

1.4.2 The purge test location should be selected as near as possible to the anticipated or confirmed contaminant source, and in an area where soil gas concentrations are expected to be greatest based on lithology. The first purge test location should be selected through the workplan approval process or as a field decision in conjunction with agency staff. If VOCs are not detected for this testing event, a default purge volume of three (3) system "dead" volumes must be used for additional samples taken at the site.

1.4.3 Additional purge volume tests should be performed to ensure appropriate purge volumes are extracted if:

1. Widely variable or different site soils are encountered
2. The default purge volume is used and a VOC is newly detected.

3. If a new purge volume is selected after additional step purge tests are conducted, the soil gas investigation should be continued as follows.
    - In areas of the same or similar lithologic conditions
    - Re-sample ten (10) percent of the previously completed probes. This re-sampling requirement may be reduced or waived in consultation with agency staff, depending on site conditions. If re-sampling indicates higher detections (e.g.,more than 50 percent difference in samples detected at greater than or equal to 10 µg/L), all other previous probes should be re-sampled using the new purge volume.
    - In areas of different lithologic conditions continue the soil gas investigation with the newly selected purge volume in the remaining areas.

1.4.4 The purge test data (calculated purge volume, rate and duration of each purge step) should be included in the report to support the purge volume selection.

1.5 Purge/Sample Flow Rate and Applied Vacuum

1.5.1 Purge/sample flow rates between 100 to 200 mL/min and vacuums less than 100 inches of water for standard small diameter (1/8 to 1/4 inch) tubing should be maintained to minimize partitioning of vapors from pore water to soil gas (i.e., stripping), and prevent ambient air from diluting the soil gas samples. Low flow purge/sample rates and vacuums of less than 100 inches of water increases the likelihood that representative samples will be collected. The purge/sample rate may be modified based on conditions encountered in individual vapor wells. These modified rates should be documented in the soil gas report. A flow rate greater than 200 mL/min may be used in certain cases, such as when larger diameter tubing are used with deeper vapor wells that are greater than 40 feet bgs. However, a vacuum of 100 inches of water or less must be maintained during sampling whenever a higher flow rate is used. Large volume sample containers, such as the 6 L SUMMA® canisters should be avoided for shallow samples collected at less than five feet bgs.

1.5.2 Soils that are saturated with water, or soils that are comprised of tightly packed fine particulates resulting in a very small effective porous space, may show no or very low permeability to soil gas regardless of the vacuum applied to the sampling system.

1.5.3 When a soil gas sampling probe is constructed in a soil exhibiting the above properties, the vacuum gauge on the sampling manifold will not return to zero when the vacuum pump is turned off. If this problem is universally present throughout the site the soil gas sampling must cease. In addition, it is recommended that soil vapor sampling should not be conducted during or immediately after a significant rain event (0.5" or greater) or onsite watering

1.5.4 In some soils exhibiting low permeation to soil gas (no or low flow conditions) the needle on the vacuum gauge may return to zero very slowly. The time it takes for the needle to return to zero is called the recovery time and is indicative of relative soil permeability. Recovery times that are greater than 10 minutes should be considered suspect and if the recovery time exceeds 10 minutes the sampling probe should be removed and a sample taken at a different location where the soil may exhibit a greater permeability to soil gas.

1.6 Shut-In Test

6.6.1 Prior to purging or sampling soil gas, a shut-in test must be conducted to check for leaks in the above ground fittings. The shut-in test consists of assembling the above-ground apparatus (e.g. – valves, lines and fittings downstream from the top of the probe), and evacuating the lines to a measured vacuum of about 100 inches of water column (in-H_2O), then shutting the vacuum in with closed valves on opposite ends of the sampling train. The vacuum gauge located on the sampling manifold in line with the sampling system is observed for at least one minute, and if there is any observable loss of vacuum, the fittings are adjusted as needed until the vacuum in the above-ground portion of the sample train does not noticeably dissipate.

1.7 Soil Gas Collection in Glass Syringes

1.7.1 Soil gas is collected in glass gas tight syringes for analysis in an on-site mobile laboratory. The procedure is as follows:

1. Remove the well box cover if present, and access the soil gas sampling probe tube to be sampled. If the soil gas sampling probe is a nested system, select the soil gas sampling probe tube based on the label.
2. Connect a three way valve to the end of the soil gas sampling probe.
3. Connect the tube from one of the sample ports on the vacuum manifold to the three way valve. The vacuum manifold is equipped with three (3) sample ports to which additional soil

gas sampling probe tubes can be connected for concurrent purging of nested probe systems.

4. Connect the vacuum pump to the vacuum port of the vacuum manifold.
5. Prior to sample collection, perform the system shut in test (Section 6.6). Close the three way valve between the vacuum manifold and the soil gas sampling probe and turn on the vacuum pump. The system should "dead head" as observed by a rapid increase in the vacuum reading on the minihelic located on the vacuum manifold. When the reading on the minihelic vacuum gauge "pegs" out, close the isolation valve at the vacuum pump suction port and turn off the pump. Observe the vacuum reading on the minihelic gauge for at least a minute. If there is no observable loss of vacuum, the system is leak free and you can continue with sampling. If there is an observable loss of vacuum, the fittings on the sampling system must be adjusted until the problem is corrected.
6. Inoculate with the tracer compound of choice as specified in Section 6.3 of this SOP. Liquid tracers such as IPA and hexane are first applied on a paper towel and placed in close proximity to the point where the soil gas sampling probe emerges from the ground. Isobutane is inoculated by applying shaving cream (Barbasol) at the point of contact of the soil gas probe tube with the ground surface. Shaving cream contains encapsulated isobutane which is used in the shaving cream can as a propellant.
7. Gas tracers such as helium require the use of a shroud (Section 6.3). The shroud is inverted, placed over the soil gas sampling probe and inoculated with helium. The helium concentration is maintained in the sub-shroud at approximately 10% by volume and is monitored with a hand held field analyzer. As a result of a leak if helium is detected in the soil gas at a concentration greater than five (5) percent of the helium sub-shroud concentration there may be a problem with the sampling probe construction that will require corrective action.
8. Optimum Purge Volume Determination: To perform the optimum purge volume determination, soil gas samples must be collected from the soil gas sampling probe at 1, 3, and 7 or 10 system "dead space" volumes. The system "dead space" volume can be estimated from the summation of the following components: (a) the internal volume of tubing used; (b) the void space of the sand pack around the probe tip; and (c) the dry bentonite in the annular space (See Section 6.4). The soil gas sampling probe purge time can

then be calculated by dividing the system “dead space” volume by the volumetric flow rate. For example if the system “dead space” volume is 1000 mL and the soil gas sample probe is purged at 200 mL/min the probe must be purged for a time period of 5 minutes to extract a volume of soil gas the equivalent of one (1) system “dead space” volume. When one (1) volume is extracted, to complete the extraction of three (3) volumes, two (2) additional volumes must be extracted by purging for an additional 10 minutes. To complete the extraction of seven (7) volumes, four (4) additional volumes must be extracted by purging the soil gas sampling probe for an additional 20 minutes. The procedure of determining the optimum purge volume is by conducting a site specific purge volume versus contaminant concentration test where the VOC levels are expected to be highest. A plot of the contaminant concentration vs. purge volume is made and the optimal purge volume is the point at which the contaminant concentration maximizes. The purge time is then set at a value which will generate the optimal purge volume at the specified purge rate.

9. Open the three way valve located between the soil gas sampling probe and the vacuum manifold.
10. Open the valve located at the suction port of the vacuum pump.
11. Turn on the vacuum pump, start the timer used to record purge time and adjust the flow rate to a value of 200 mL/min using the rotameter flow controller located on the vacuum manifold.
12. Observe the vacuum reading on the minihelic located on the vacuum manifold. The vacuum reading must not exceed 100 inches (100”) of water column during the soil gas purge event (See Section 6.5).
13. When the required time has elapsed, which for sample collection is the time in minutes required to extract a sample volume from the soil gas sampling probe equal to the determined optimum purge volume, shut off the three way valve located between the soil gas sampling probe and the vacuum manifold and turn off the vacuum pump. This action will disrupt flow of soil gas from the soil gas sampling probe.
14. Connect the valve attached to the male luer lock fitting of a glass gas tight syringe to the female luer lock connector of the three way valve located between the soil gas sampling probe and the vacuum manifold.
15. Orient the hub on the three way valve as to line up pneumatically the soil gas sampling probe with the syringe and slowly pull back the syringe plunger to draw soil gas at a

rate not to exceed 200 mL/min. The size of the syringe used and the volume of soil gas extracted will depend on the project specific detection limit criteria. It is good practice to extract adequate volume of soil gas to perform a second analysis if required.

16. Close the valve on the syringe and submit to the mobile laboratory for chemical analysis. To prevent the potential degradation of light sensitive compounds, wrap the syringe in aluminum foil immediately after sample collection.

1.8 Soil Gas Sample Collection in Stainless Steel Internally Passivated Canisters

1.8.1 Perform the steps described in sections 6.7.1 above to perform the functions of connecting the soil gas sampling system to the soil gas sampling probe, inoculate with the tracer, and purge the soil gas sampling probe in preparation for sampling.

1.8.2 If there is a mobile laboratory on site conducting the soil gas investigation and the canisters are collected for confirmation analysis in a fixed laboratory, the optimum purge volume determination is performed by the mobile laboratory. When the soil gas sampling probe is purged by removing a soil gas volume equal to the optimum purge volume the soil gas sample is collected in the canister. If the entire soil gas investigation is performed by collecting soil gas samples in canisters, and a mobile laboratory is not present to determine the optimum purge volume, a default purge volume of three (3) system "dead space" is used prior to collecting soil gas samples in the canisters.

1.8.3 When the soil gas sampling probe is purged as described above, close the three way valve between the vacuum manifold and the soil gas sampling probe and disconnect the vacuum manifold from the three way valve. Connect the sampling train to the three way valve and then connect the evacuated 1.4 L canister to the sampling train by engaging the male micro QT connector on the canister into the female micro QT connector on the sampling train.

1.8.4 When the canister is connected to the sampling train record the canister vacuum reading as indicated on the vacuum gauge located on the sampling train. This vacuum should not be less than 26 inches of mercury (in. Hg). The canisters normally ship to the field under a vacuum of approximately 29 inches of mercury (in. Hg).

1.8.5 Open the three way valve now located between the soil gas sampling probe and the sampling train/canister assembly to allow soil gas to flow into the evacuated canister. When the valve is opened, and the sampling begins, record the sampling time.

1.8.6 As the soil gas flows into the canister, the vacuum in the canister will decrease as a function of sampling time. When the vacuum gauge on the sampling train reads 5 inches of mercury (in. Hg), close the three way valve located between the soil gas sampling probe and the sampling train/canister assembly to disrupt the soil gas flow into the canister.

1.8.7 Disconnect the sampling train/canister assembly from the soil gas sampling probe, and then disconnect the canister from the sampling train.

1.8.8 Document the canister initial pressure, final pressure, sampling time, and sample ID on the label attached to the canister.

1.9 Soil Gas Sample Collection in a Tedlar Bag

1.9.1 Perform the steps described in sections 6.7.1 above to perform the functions of connecting the soil gas sampling system to the soil gas sampling probe, inoculate with the tracer, and purge the soil gas sampling probe in preparation for sampling.

1.9.2 When the soil gas sampling probe is purged as described above, close the three way valve between the vacuum manifold and the soil gas sampling probe and disconnect the vacuum manifold from the three way valve. Attach a section of ¼" OD Nylaflow tubing to the three way valve and push the other end of the tubing through the sample port on the vacuum gland box such that it extends about one inch (1") beyond the fitting into the gland box enclosure. Place the Tedlar bag in the gland box enclosure and connect the inlet valve stem of the Tedlar bag to the sample tube protruding from the sample port on the vacuum manifold by pushing the valve stem firmly into the tubing.

1.9.3 Open the valve on the Tedlar bag by rotating the valve knob counter clockwise.

1.9.4 Connect the vacuum manifold to the vacuum port on the gland box.

1.9.5 Open the three way valve located between the soil gas sampling probe and the gland box to allow soil gas to flow into the Tedlar bag. When the valve is opened and the sampling begins, record the sampling time.

1.9.6 As the air is removed from the gland box by the vacuum pump, the pressure in the gland box becomes sub-atmospheric thus creating a differential pressure between the subsurface sampling point and the Tedlar bag causing the flow of soil gas into the Tedlar bag. The flow of soil gas into the Tedlar bag can be controlled by adjusting the vacuum pump flow rate with the rotameter/flow controller located on the vacuum manifold.

1.9.7 As the Tedlar bag begins to fill, observe it carefully as it expands in the gland box and isolate the flow into the bag by closing the three-way valve located between the soil gas sampling probe and the gland box. If the Tedlar bag is allowed to overfill it could rupture resulting in the loss of the sample.

1.9.8 Open the cover on the gland box, close the valve on the Tedlar bag by rotating clockwise, disconnect the valve stem from the nylaflow tubing and remove the bag from the gland box.

1.9.9 Record the sample ID, sample date, time and any other information required by the client on the Tedlar bag label. Do not place the Tedlar bags in a refrigerated container for transport to the laboratory to avoid condensation of the VOCs on the inner surface of the bag.