

STATE OF CALIFORNIA
California Regional Water Quality Control Board
Los Angeles Region

INTERIM GUIDANCE FOR ACTIVE SOIL GAS INVESTIGATION
(February 25, 1997)

Introduction

Volatile organic compounds (VOCs) within the unsaturated zone partition into the adsorbed, dissolved, free liquid, and vapor phases. Measurement of VOCs through an active soil gas investigation allows: 1) evaluation of whether waste discharges of VOCs have occurred which may impact groundwater, 2) determination of spatial pattern and extent of vapor phase soil contamination, 3) establishment of vapor distribution for the design of soil vapor extraction (SVE) system, and 4) determination of the efficiency of reduction in threat to groundwater from any cleanup action, including SVE. The work plan should include, but not be limited to, the following:

1.0 Survey Design

1.1

Provide a scaled facility map depicting potential sources and proposed sampling points. Include locations and coordinates of identifiable geographic landmarks (e.g., street center-line, benchmark, street intersection, wells, north arrow, property line).

1.2

Locate initial sampling points in potential source areas and areas with known soil contamination using an adjustable 10 to 20 foot grid pattern. Provide rationale for the number, location and depth of sampling points. Screen the remainder of the site with a 100-foot or less grid pattern.

1.3

Conduct a close interval (10 to 20 foot grid pattern) and multi-level sampling (5 to 10 feet vertical distance between points) in areas with known or relatively high VOC concentrations.

1.4

Use an on-site mobile laboratory with laboratory-grade certifiable instrumentation and procedures for real-time analysis of individual VOCs. Non-specific portable organic vapor analyzers and/or GC-based handheld detectors may not be used for analysis, except for daily or weekly vapor monitoring during SVE.

1.5

Maintain flexibility in the sampling plan such that field modifications (grid pattern density, location and depth)

can be made as real-time evaluation of analytical test results occurs. Include in the work plan decision-making criteria for these adjustments and explain decisions in the report. Field decisions shall be made in consultation with Regional Board staff.

1.6

Re-sample at any sampling point if anomalous data (i.e., 2 to 3 orders of magnitude difference from surrounding samples) are obtained. Board staff may require additional points to resolve the spatial distribution of the contaminants within the interval in question.

2.0 Sample Collection

2.1

Obtain samples at an adequate depth (nominally 5 feet) below ground surface (bgs) to minimize potential dilution by ambient air.

2.2

Conduct a site-specific purge volume versus contaminant concentration test at the start of the initial soil gas survey and vapor monitoring well sampling. The purpose of the test is to purge ambient air in the sampling system with minimal disturbance of soil gas around the probe tip. Conduct this test based on soil type and where VOC concentrations are suspected to be highest. Describe specific method and equipment to determine optimal purge rates and volumes. Take into account the potential sorption of target compounds to the tubing and adjust the purge rate and time to achieve the optimal purge volume. Limit the sampling vacuum to collect proper samples. Optimum purge volume may be compound specific. "Lighter" early eluting VOCs, such as vinyl chloride, may reach their highest concentration with less purging than "heavier" late eluting VOCs like PCE. Therefore, optimize the purge volume for the compound(s) of greatest concern.

2.3

Explain the expected zone of influence for sample points, taking into consideration soil types, land cover, drive point construction and sample purge rate/time/volume. The vertical zone of influence for purging and sampling must not intersect the ground surface.

2.4

Discuss soil gas sample collection and handling procedures. Discuss the procedures to prevent collection of samples under partial vacuum and the methods to minimize equipment cross-contamination between sampling points.

2.5

Avoid making a pilot hole (e.g., using a slam bar) prior to inserting the probe rod, except to drill through asphalt or concrete. The process of making a pilot hole may promote vapor contaminant aeration and result in lower sample concentration.

2.6

Specify that the sampling equipment (e.g., gas tight syringe, sorbent trap) will not compromise the integrity of the samples. Tedlar bags may only be used for qualitative analysis.

2.7

Assure that the probe tip, probe and probe connectors have the same diameter to provide a good seal between the formation and the sampling assembly. If a space develops between the probe and the formation, as a result of probe advancement, seal (e.g., with bentonite) the area around the probe at the surface to minimize the potential for ambient air intrusion.

2.8

Some sampling systems (e.g., Geoprobe) utilize the probe rod as a conduit for the tubing that connects to the probe tip. Assure a tight fit between the tubing and probe tip to minimize potential for leakage and dilution of the sample.

2.9

Follow the sampling method specified in the soil gas consultant's standard operating procedure (SOP). Discuss with Board staff any deviations from the SOP before it is implemented in the field.

3.0 Laboratory Analysis of Soil Gas Samples

3.1 Primary Target Compounds

1. Carbon tetrachloride
2. Chloroethane
3. Chloroform
4. 1,1-Dichloroethane
5. 1,2-Dichloroethane
6. 1,1-Dichloroethene
7. cis-1,2-Dichloroethene
8. trans-1,2-Dichloroethene
9. Dichloromethane (methylene chloride)
10. Tetrachloroethene
11. 1,1,1,2-Tetrachloroethane
12. 1,1,2,2-Tetrachloroethane
13. 1,1,1-Trichloroethane

14. 1,1,2-Trichloroethane
15. Trichloroethene
16. Vinyl chloride
17. Benzene
18. Toluene
19. Ethylbenzene
20. Xylenes
21. Trichlorofluoromethane (Freon 11)
22. Dichlorodifluoromethane (Freon 12)
23. 1,1,2-Trichloro-trifluoroethane (Freon 113)

3.2 Other Target Compounds

Analyze for other VOCs (e.g., methyl ethyl ketone, methyl isobutyl ketone, ethylene dibromide, petroleum hydrocarbons, etc.) based upon site history and conditions.

3.3 Detection Limit (DL)

Attain a DL of not more than 1 µg/L for all target compounds. A higher DL is acceptable only for the compound(s) whose concentration exceeds the initial calibration range.

3.4 Detectors

Use the following detectors in appropriate combinations:

Electrolytic conductivity detector (ELCD) (e.g., Hall)
Photoionization detector (PID)

Flame ionization detector (FID)
Mass spectrometer (MS)
Electron capture detector (ECD)

3.5.0 Identification of Calibration Standards & Laboratory Control Sample (LCS)

3.5.1

Properly and clearly identify all calibration standards and LCS. The identification must agree with the data on record for the standards and LCS.

3.5.2

Prepare LCS from a second source standard that is totally independent from the standards used for the initial calibration. Second source means a different supplier (whenever possible) or a different lot from the same supplier.

3.6.0 GC Conditions

3.6.1

Use a type of column that can separate all the target compounds. Coelution of the target compounds is not acceptable unless the compounds are distinguished and quantified by two different types of detectors in use at that time.

3.6.2

Analyze the initial calibration and daily mid-point calibration check standards, LCS, blank, and samples using the same GC conditions (i.e., detector, temperature program, etc.).

3.6.3

Use a GC run time that is long enough to identify and quantify all the target compounds.

3.7.0 Initial Calibration (Record in Table 1)

3.7.1

Perform an initial calibration:

1. for all 23 compounds listed in Section 3.1;
2. when the GC column type is changed;
3. when the GC operating conditions have changed;
4. when the daily mid-point calibration check cannot meet the requirement in Section 3.8.3; and
5. when specified by Regional Board staff based on the scope and nature of the investigation.

3.7.2

Include at least three different concentrations of the standard in the initial calibration, with the lowest one not exceeding 5 times the DL for each compound.

3.7.3

Calculate the response factor (RF) for each compound and calibration concentration prior to analyzing any site samples. Calculate the average RF for each compound. The percent relative standard deviation (%RSD) for each target compound must not exceed 20% except for the following compounds which must not exceed 30%:

Trichlorofluoromethane (Freon 11)
Dichlorodifluoromethane (Freon 12)
Trichlorotrifluoromethane (Freon 113)
Chloroethane
Vinyl chloride

3.7.4

Verify the true concentration of the standard solutions used with the LCS after each initial calibration. Conduct the verification using a LCS with a mid-point concentration within the initial calibration range. The LCS must include all the target compounds. The RF of each compound must be within $\pm 15\%$ difference from the initial calibration, except for freon 11, 12 and 113, chloroethane, and vinyl chloride which must be within $\pm 25\%$ difference from the initial calibration.

3.8.0 Daily Mid-point Calibration Check (Record in Table 1)

3.8.1

Check the calibration using the calibration standard solution with a mid-point concentration within the linear range of the initial calibration before any sample is analyzed.

3.8.2

Include in the daily mid-point calibration check standard the following compounds and **every** compound expected or detected at the site:

1. 1,1-Dichloroethane
2. 1,2-Dichloroethane
3. 1,1-Dichloroethene
4. cis-1,2-Dichloroethene
5. trans-1,2-Dichloroethene
6. Tetrachloroethene
7. 1,1,1-Trichloroethane
8. 1,1,2-Trichloroethane
9. Trichloroethene
10. Benzene
11. Toluene
12. Xylenes

3.8.3

Assure that the RF of each compound (except for freons 11, 12 and 113, chloroethane, and vinyl chloride) is within $\pm 15\%$ difference from the initial calibration's average RF. The RF for freons 11, 12 and 113, chloroethane, and vinyl chloride must be within $\pm 25\%$.

3.9.0 Blank

3.9.1

Analyze field blank(s) to detect any possible interference from ambient air.

3.9.2

Investigate and determine the source(s) and resolve any laboratory contamination problem prior to analyzing any samples if the blank shows a measurable amount ($\geq 1 \mu\text{g/L}$) of the target compound(s).

3.10.0 Sample Analysis

3.10.1

Assure that the requirements for initial calibration, daily mid-point check, blank, and LCS are met before any site samples are analyzed.

3.10.2

Analyze samples within 30 minutes after collection to minimize VOC loss. Longer holding time may be allowed if the laboratory uses a special sampling equipment (e.g., sorbent trap, glass bulb) and demonstrates that the holding time can exceed 30 minutes with no decrease in results.

3.10.3

Assure that the concentrations of constituent(s) in a sample do not exceed 50% of the highest concentration in the calibration range. Reanalyze the sample using a smaller volume or dilution if the detected concentration exceed 50% of the highest concentration in the calibration range.

3.10.4

Attain DL of not more than 1 µg/L for all target compounds. If lesser sample volumes or dilutions are used to off-set possible high concentration of constituents in the initial run, use the initial run to calculate the results for constituents that are not affected by the high concentration so that DL of 1 µg/L for these compounds can be achieved.

3.10.5

Quantify sample results using the average RF from the most recent initial calibration.

3.10.6

Add surrogate compounds to all samples. Assure that the surrogate compound concentration is within the initial calibration range. Two to three different surrogate compounds [one aromatic hydrocarbon and two chlorinated compounds (early and middle eluting, except gases)] should be used to cover the different temperature programming range for each GC run.

3.10.7

Calculate the surrogate recovery for each GC run. Surrogate recovery must not exceed ±25% difference from the true concentration of the surrogate, as the sample result would be considered questionable and may be rejected by this Regional Board.

3.11.0 Compound Confirmation

3.11.1

Conduct compound confirmation by GC/MS whenever possible. Use second column confirmation with surrogate for compound confirmation if GC/MS is not used.

3.11.2

Add surrogate compounds to standards and site samples for second column confirmation to monitor the relative retention time (RRT) shift between GC runs. This is required for better compound identification when ELCD, PID, ECD, and FID are used for analysis.

3.11.3

Usually one sample is adequate and quantitation is not required for second column confirmation. Second column confirmation can be done with a different GC.

The representative sample can be collected in Tedlar bag and confirmation can be done off site.

3.11.4

Second column confirmation is not necessary if the compounds present have been confirmed from previous soil gas investigations.

3.12.0 Samples with High Concentration

3.12.1

DL may be raised above 1 µg/L for compounds with high results (i.e., the limit as specified in Section 3.10.3) and those closely eluting compounds for which quantitation may be interfered by the high concentrations.

3.12.2

Quantify sample results according to Section 3.10.4 for analytes which are not affected by the high concentration compounds.

3.12.3

If high VOC concentration in an area is known from previous soil gas analysis, Sections 3.12.1 and 3.12.2 are not necessary when analyzing samples from the area in question.

3.12.4

When dilution with ambient air is used for samples with high results, dilute and analyze in duplicate each day at least one sample to verify the dilution procedure. Ambient air should be checked periodically during each day of analysis.

3.13.0 Shortened Analysis Time

3.13.1

Shorten the GC run time under the following conditions only:

1. The exact number and identification of compounds are known from previous soil and soil gas investigations; and
2. The consultant has been given permission by Regional Board staff to analyze only for specific compounds.

3.13.2

Meet the following requirements when shortening GC run-time:

1. Regional Board staff must approved the shortened run time;
2. The compounds must not coelute;

3. Perform initial calibration and daily mid-point calibration check and analyze LCS and samples under the same conditions as the shorter GC run-time;
4. Quantitate using the average RF from the initial calibration utilizing the shorter run-time; and
5. Perform a normal run-time analysis whenever peaks are detected within retention time windows where coelution, as indicated by the calibration chromatograms, is likely.

3.14.0 Last GC Test Run Per Day of Analysis (Record in Table 1)

3.14.1

A LCS as the last GC run of the day is not mandatory, except under conditions in Section 3.14.2. Include the same compounds used in the daily mid-point calibration check analysis, as listed in Section 3.8.2. Attain RF for each compound within $\pm 20\%$ difference from the initial calibration's average RF, except for freons 11, 12, 113, chloroethane, and vinyl chloride which must be within $\pm 30\%$.

3.14.2

Analyze a LCS at the detection limit concentration instead of the mid-point concentration if all samples from same day of analysis show non-detect (ND) results. The recovery for each compound must be at least 50%. If it is less than 50%, all the ND results of the samples become questionable.

3.15.0 On-site Evaluation Check Sample

3.15.1

Analyze on-site the evaluation check sample as part of the QA/QC procedures when presented with such a check sample by Regional Board staff. Provide preliminary results on-site.

3.15.2

If the results show that the soil gas consultant has problems with the analysis, all the results generated during the same day may be rejected. Correct all problems before any more samples are analyzed.

3.16.0 Site Inspection

3.16.1

Unannounced, on-site inspection by Regional Board staff is routine. Provide upon request hard copies of the complete laboratory data, including raw data for initial calibration, daily mid-point check, LCS and blank results. Failure to allow such inspection or to present these records or field data may result in rejection of all sample results.

3.16.2

The soil gas consultant must understand the instruments, analytical and QA/QC procedures and must be capable of responding to reasonable inquiries.

3.17.0 Recordkeeping in the Mobile Laboratory

Maintain the following records in the mobile laboratory:

1. A hard copy record of calibration standards and LCS with the following information:
 - a. Date of receipt
 - b. Name of supplier
 - c. Lot number
 - d. Date of preparation for intermediate standards (dilution from the stock or concentrated solution from supplier)
 - e. ID number or other identification data
 - f. Name of person who performed the dilution
 - g. Volume of concentrated solution taken for dilution
 - h. Final volume after dilution
 - i. Calculated concentration after dilution
2. A hard copy of each initial calibration for each instrument used for the past few months.
3. The laboratory standard operating procedures.

4.0 Reporting of Soil Gas Sample Results and QA/QC Data (Record in Table 1 and 2)

4.1

Report all sample test results and QA/QC data using the reporting formats in Appendix A. Compounds may be listed by retention time or in alphabetical order. Include in the table of sample results all compounds in the analyte list. Report unidentified or tentatively identified peaks. Submit upon request all data in electronic format and raw data, including the chromatograms. Identify the source(s) of the contaminants detected in the investigation, as indicated by the data.

4.2

Report the following for all calibration standards, LCS and environmental samples:

1. Site name
2. Laboratory name
3. Date of analysis
4. Name of analyst
5. Instrument identification
6. Normal injection volume
7. Injection time
8. Any special analytical conditions/remark

4.3

Provide additional information, as specified, for different types of analyses. Tabulate and present in a clear legible format all information according to the following grouping:

1. Initial calibration
 - a. Source of standard (**STD LOT ID NO.**)
 - b. Detector for quantitation (**DETECTOR**)
 - c. Retention time (**RT**)
 - d. Standard mass or concentration (**MASS/CONC**)
 - e. Peak area (**AREA**)
 - f. Response factor (**RF**)
 - g. Average response factor (**RF_{ave}**)
 - h. Standard deviation (**SD_{n-1}**) of RF, i.e.,
$$\frac{n}{\left[\sum_{i=1}^n (RF_{ave} - RF_i)^2 / (n - 1)\right]^{1/2}}$$

n = number of points in initial calibration
 - i. Percent relative standard deviation (**% RSD**), i.e., $(SD_{n-1} / RF_{ave}) \times 100$ (%)
 - j. Acceptable range of %RSD (**ACC RGE**)
2. Daily calibration check sample
 - a. Source of standard
 - b. Detector
 - c. Retention time (RT)
 - d. Standard mass or concentration
 - e. Peak area
 - f. Response factor (RF)
 - g. Percent difference between RF and RF_{ave} from initial calibration (**% DIFF**)
 - h. Acceptable range of %DIFF (**ACC RGE**)
3. LCS. Same format as daily calibration
4. Environmental sample
 - a. Sample identification
 - b. Sampling depth
 - c. Purge volume
 - d. Vacuum pressure
 - e. Sampling time
 - f. Injection time
 - g. Injection volume
 - h. Dilution factor (or concentration factor if trap is used)
 - i. Detector for quantitation
 - j. Retention time (RT)
 - k. Peak area
 - l. Concentration in µg/L (**CONC**)
 - m. Total number of peaks found by each detector
 - n. Unidentified peaks and/or other analytical remarks

5. Surrogate and second column confirmation

Mark RT and compound name on: a) second column chromatogram of standard and b) second column chromatogram of confirmation sample.

4.4

Discuss the method(s) to be used for data interpolation (contouring). Provide isoconcentration maps for each VOC detected, total chlorinated volatile organics, total aromatic hydrocarbons, and petroleum-based hydrocarbons for each sampling depth, as applicable. Provide cross-section(s) depicting the geology and changes in contaminant concentration with depth, as justified by the data.

5.0 Companion Soil Sampling

5.1

Discuss soil boring locations with Regional Board staff. Locate borings and sampling depths based on all available information including soil gas test results.

5.2

Conduct the soil sampling and analysis per this Regional Board's **Well Investigation Program General Requirements for Subsurface Investigations, Requirements for Subsurface Soil Investigation and Laboratory Requirements for Soil and Water Sample Analyses.**

6.0 Soil Vapor Monitoring Well/Vertical Profiling

Install soil vapor monitoring wells for vertical profiling in areas where significant VOC concentrations were identified during the vapor investigation. The objectives of vertical profiling are to: 1) assess the vertical distribution of VOCs in the vapor phase within the unsaturated zone, 2) determine the spatial pattern of vapor phase soil contamination at different depths within the unsaturated zone, 3) identify migration pathways at depth along which VOCs may have migrated from sources, and 4) serve as discrete monitoring points to evaluate the efficiency of a cleanup action. Soil vapor monitoring wells offer the opportunity to resample as many times as necessary to monitor soil vapor changes over time.

Address appropriate items in the following sections when conducting vertical profiling.

6.1

Install nested, cluster, and/or multi-port vapor monitoring wells to obtain discrete multi-depth soil vapor data in the unsaturated zone. Provide a schematic diagram of the well design and a cross-section of the site showing the major lithologic units and zones for vapor monitoring.

6.2

Collect undisturbed soil samples if fine-grained soils are encountered during drilling of the boring for the probes. Due to air-stripping effect, VOC analysis of soil samples is not acceptable if air drilling method is used. Refer to Section 5.2 for sampling and testing requirements.

6.3

Use all available information (e.g., geologic log, organic vapor concentration reading) to select appropriate depths for vapor monitoring. Install probes at depths with elevated vapor readings (headspace) and/or slightly above fine-grained soils which can retard the migration of VOCs. The deepest probe should be installed above the capillary fringe.

6.4

Consider installing nested vapor probes in the annular space of the groundwater monitoring well to serve as a dual-purpose well if both vapor and groundwater monitoring are required. This design saves costs by installing vapor and groundwater monitoring wells in a single borehole.

6.5

Use small-diameter (e.g., $\leq 1/4$ -inch) continuous tubing attached from the vapor probe to the ground surface to minimize purge volume.

6.6

Design and construct the vapor wells to serve as long-term monitoring points to evaluate the efficiency of a cleanup action and soil vapor changes over time. Protect the tubing from being damaged or clogged by subsurface soil materials especially in deep installations (e.g., place inside a PVC casing) or consider using $1/2$ -inch PVC pipe in place of the tubing. If a tubing is used, consider attaching a weight at the probe tip and/or attaching the tubing onto a supporting pipe or rod to ensure that the probe tip remains in-place during installation.

Properly cap the top end of each tubing/pipe (e.g., control valve) and label each tubing/pipe with the correct sampling depth.

6.7

Attach the bottom-end of the tubing to an appropriate vapor probe (e.g., PVC screen, stainless steel wire screen, stainless steel probe, or brass elbow, etc). If a vacuum pump is used for purging and sampling, include a wire screen around the probe to prevent soil particles from blocking the probe's airways. Ensure that the connection between the tubing and the vapor probe is tight to prevent leakage.

6.8

Place the filter pack (e.g., sand or pea gravel) around each vapor probe and isolate each monitoring zone with bentonite seals. Use an appropriate method (e.g., tremie method) to avoid bridging or segregation during placement of the filter packs and bentonite seals.

Extend the filter pack to a sufficient distance above the probe to allow for settling of backfill materials. In general, the filter pack should not exceed 3 feet in thickness. In deep borings, the filter pack should extend about four feet above the probe to allow for settling of backfill materials and to reduce the potential for the bentonite seal settling around the probe.

Consider placing fine sand above the filter pack to prevent the bentonite seal from entering the filter pack. Place a minimum of two feet thick bentonite seal above and below the filter pack. Allow sufficient time (e.g., one-half to one hour) for bentonite seal to properly hydrate before placing filter pack or cement-based sealing materials.

6.9

Prevent infiltration of surface runoff and unauthorized access (e.g., use a locking subsurface utility vault).

6.10

Specify the schedule for sampling the vapor probes. In general, soil vapor monitoring is required a minimum of one and two months after installation. Due to the VOC stripping caused by air drilling methods, conduct soil vapor monitoring at least two and four months following well completion. Regional Board staff may require a different sampling schedule and additional sampling based upon site conditions and test results.

6.11

Specify the procedures to properly decommission vapor wells that are no longer needed. The decommissioning activity should achieve an effective and long-term seal of subsurface geologic materials and prevent cross contamination in the subsurface.

7.0 Soil Gas Consultants

This Regional Board reserves the authority to review any soil gas consultant's work to assure compliance with all applicable statutes, regulations, orders, and guidelines. It is your responsibility to ascertain that the individual directing the field investigation is professionally qualified and conducts the field work in accordance with the Board's guidance for active soil gas investigations.

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Table 1
SOIL GAS INITIAL CALIBRATION

SITE NAME: _____ LAB NAME: _____ DATE: _____

ANALYST: _____ STD LOT ID NO.: _____ INSTRUMENT ID: _____

NORMAL INJECTION VOLUME: _____ INJECTION TIME: _____

COMPOUND	DETECTOR	1st CONC	2nd CONC	3rd CONC	RF _{ave}	SD _{n-1}	%RSD	ACC RGE
		RT/RRT MASS/CONC	RT/RRT MASS/CONC	RT/RRT	RT/RRT MASS/CONC	AREA	RF	AREA RF

----- OR -----
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COMPOUND	DETECTOR	RT/RRT	MASS/CONC	AREA	RF	RF _{ave}	SD _{n-1}	%RSD	ACC RGE
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Compound 1		_____	<u>1st conc</u>	_____	_____				
		_____	<u>2nd conc</u>	_____	_____				
		_____	<u>3rd conc</u>	_____	_____				

Compound 2
(Surrogate)

SOIL GAS DAILY MID-POINT CALIBRATION STANDARD

AND

SOIL GAS LABORATORY CONTROL SAMPLES (LCS)

SITE NAME: _____ LAB NAME: _____ DATE: _____

ANALYST: _____ STD LOT ID NO.: _____ INSTRUMENT ID: _____

NORMAL INJECTION VOLUME: _____ INJECTION TIME: _____

COMPOUND (SURROGATE)	DETECTOR	RT/RRT	MASS/CONC	AREA	RF	%DIFFACC RGE
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Table 2
SOIL GAS SAMPLE RESULTS

SITE NAME: _____ LAB NAME: _____ DATE: _____

ANALYST: _____ COLLECTOR: _____ INSTRUMENT ID: _____

NORMAL INJECTION VOLUME: _____

Sample ID	Sample 1	Sample 2	Sample 3
Sampling Depth			
Purge Volume			
Vacuum			
Sampling Time			
Injection Time			
Injection Volume			
Dilution Factor			

COMPOUND	DETECTOR	RT	AREA	CONC	RT	AREA	CONC	RT	AREA	CONC
----------	----------	----	------	------	----	------	------	----	------	------

Compound 1										
Compound 2										
Compound 3										
.										
.										
.										
.										
.										

Surrogate 1
Surrogate 2

Total Number of Peaks
by Detector 1 (specify)
by Detector 2 (specify)

Unidentified peaks and/or other analytical remarks

ALTERNATIVE FORMAT FOR REPORTING SOIL GAS SAMPLE RESULTS

SITE NAME: _____ LAB NAME: _____ DATE: _____

Sample ID Sample 1 Sample 2 Sample 3 ...
 Sampling Depth

COMPOUND CONC CONC CONC

Compound 1
 Compound 2
 Compound 3
 .
 .
 .
 .
 .

SITE NAME: _____ LAB NAME: _____ DATE: _____

ANALYST: _____ COLLECTOR: _____ INSTRUMENT ID: _____

NORMAL INJECTION VOLUME: _____

Sample ID Sample 1 Sample 2 Sample 3 ...

Sampling Depth
 Purge Volume
 Vacuum
 Sampling Time
 Injection Time
 Injection Volume
 Dilution Factor

COMPOUND DETECTOR RT AREA RT AREA RT AREA

Compound 1
 Compound 2
 Compound 3
 .
 .
 .

Surrogate 1
 Surrogate 2
 .
 .

Total Number of Peaks
 by Detector 1 (specify)
 by Detector 2 (specify)

Unidentified peaks and/or other analytical remarks