

September 26, 2016

Mr. Mark Detterman - Senior Hazardous Materials Specialist, PE, CEG
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502

Subject: *Modification to Workplan for Additional Soil and Soil Vapor Sampling Required for Underground Storage Tank Closure, Former Charles Lowe Facility, 1400 Park Avenue, Emeryville, CA*

Dear Mr. Detterman,

As discussed in our meeting on September 20, 2016 (meeting), Dudek would like to modify our May 2016 Workplan for Additional Soil and Soil Vapor Sampling Required for Underground Storage Tank (UST) Closure at the Former Charles Lowe Facility located at 1400 Park Avenue in Emeryville, California (Site). The requested modifications are designed to:

1. Present the results of previous testing of soils from beneath the USTs for naphthalene, thus satisfying the requirement for analysis of soils for this chemical of concern;
2. Provide documentation of DTSC approval of the use of a GEM 2000 for testing methane, oxygen and carbon dioxide, thus allowing for the use of this testing methodology;
3. Address the comments submitted by Alameda County Department of Environmental Health (ACDEH) in their letter dated June 30, 2016 by changing the depth of soil vapor samples and through the suggested use helium as a real time leak check compound
4. Change the number and locations of soil vapor samples collected and analyzed for methane, oxygen and carbon dioxide, as discussed in our meeting.

Previous Naphthalene Soil Sample Data

On November 13, 1995, following the removal of the two gasoline USTs and one diesel/motor oil UST at the Site, a soil sample was collected from the stockpile of impacted soils and labelled STKP-11/13 (Aqua Science Engineers, January, 1996). This grab sample of the hydrocarbon impacted soils was analyzed for SVOCs via EPA Method 8270, the results of which are included in this letter as **Attachment A**. The laboratory analytical results show a detection of naphthalene in soil at 2.0 mg/kg. This concentration is below the United States EPA Region 9 Screening Levels (RSLs) for both residential (3.8 mg/kg) and commercial (17 mg/kg) land use. No DTSC HERO Note 3 values exist for naphthalene in soil. Since the sample analyzed for naphthalene represented the worst hydrocarbon impacted soils excavated from below the USTs, the concentrations of naphthalene remaining in Site soils do not present a significant threat to human health, and require no additional sampling to allow for Low Threat Closure of the USTs and the Site.

DTSC Acceptance of Use of Hand Held Instruments for Monitoring Methane in Soil Vapor

As stated in the 2012 DTSC Advisory – Active Soil Gas Investigations:

“Methane may also be measured with a hand held gas emissions monitor or analyzer....”

- *Fixed and biogenic gases such as oxygen, carbon dioxide, methane and ethylene should be analyzed to determine whether methanogenesis is occurring. The RL for oxygen and carbon dioxide should be one percent or less....*

Hand-held instruments should be calibrated in accordance with the manufacturer’s specifications. At least 10 percent of all positive detections with concentrations of more than 5,000 parts per million by volume (ppmV) should be confirmed by another hand-held instrument (either different unit or a different brand)....”

Accordingly, soil vapor samples will be collected from the installed temporary vapor probes and analyzed for methane, carbon dioxide and oxygen using a GEM 5000 meter. This meter’s accuracy falls within the DTSC specified limits, with the following accuracy:

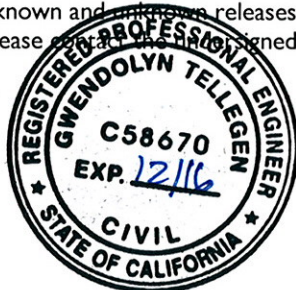
- Methane +/- 0.3% to 0.5% at concentrations less than 70-15%
- Oxygen +/- 1% at concentrations less than 25%
- Carbon Dioxide +/- 0.3% to 0.5% at concentrations less than 60%.

These reporting limits and accuracy are documented in the Gem 5000 manufacturer’s fact sheet included as **Attachment B**. Two GEM 5000 will be brought to the Site, to allow for confirmation measurements, if needed. Each of the hand-held meters will be calibrated using manufacturer’s specification before their use in the field. As specified in the DTSC guidance document, if concentrations of methane in excess of 5,000 ppmV or 0.5% are detected, a second hand-held instrument will be used to confirm the detection.

Revised Workplan

With your approval Dudek will sample soil vapor from temporary vapor probes advanced to 6.5 feet below ground surface (ft bgs) in 3 locations surrounding the former USTs (see **Figure 1** – sample points SV1, SV2 and SV3). Following a 3 volume purge, soil vapor samples will be collected from the vapor probes and measured for methane, carbon dioxide and oxygen levels using a GEM 5000 meter. 3 soil vapor samples will also be collected in thermal desorption tubes for analysis for naphthalene using EPA Method TO-17 and shipped under chain of custody documentation to ALS Laboratories. At the time of collection of these soil vapor samples, a helium tracer will be used as a leak detection compound.

If elevated levels of methane are measured in these three soil vapor points, two additional vapor probes (DSVA and DSVB) will be installed and sampled at 2 locations far from the USTs to look for potential vapor impacts related to other known and unknown releases from neighboring properties. If you have any questions regarding this Workplan, please contact me at (949) 378-8448.



Respectfully submitted,

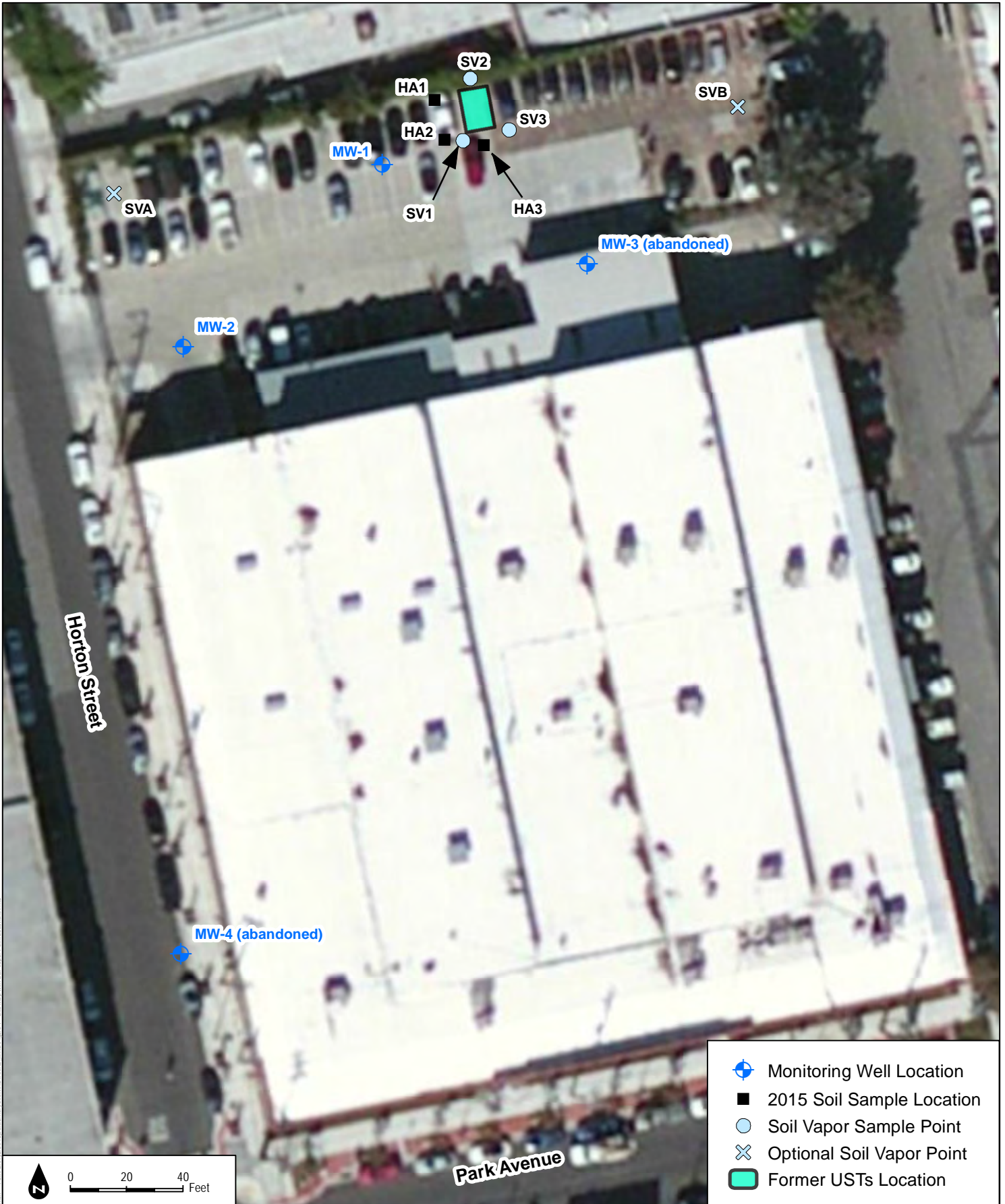
Gwen Tellegen, PE
Principal Engineer






Attachments:

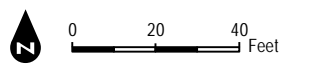
Figure 1 – Soil Vapor Sample Locations

Attachment A – Previous Laboratory Data for Naphthalene in Soil at USTs

Attachment B – Excerpts of DTSC Active Soil Gas Advisory Document Describing Allowable Methane Measurement Methods



-  Monitoring Well Location
-  2015 Soil Sample Location
-  Soil Vapor Sample Point
-  Optional Soil Vapor Point
-  Former USTs Location



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1400 Park Avenue, Emeryville, California

FIGURE 1
Site Map with Soil Vapor Point Locations

May 2016

ATTACHMENT A
LABORATORY ANALYTICAL DATA FOR NAPHTHALENE IN SOIL AT USTS

CHROMALAB, INC.

Environmental Services (SDB)

November 17, 1995

Submission #: 9511222

MCCAMPBELL ANALYTICAL, INC.

Atten: Ed Hamilton

Project: A.S./E.P.
Received: November 14, 1995

Project#: 5271

re: One sample for Semivolatile Organics (BNAs) analysis.
Method: EPA 3550/8270

SampleID: STKP-11/13

Sample #: 110472

Matrix: SOIL

Extracted: November 14, 1995

Sampled: November 13, 1995

Run: 9371-A

Analyzed: November 16, 1995

| Analyte | RESULT (mg/Kg) | REPORTING LIMIT (mg/Kg) | BLANK RESULT (mg/Kg) | BLANK SPIKE RESULT (%) |
|-------------------------------|-------------------|-------------------------------|----------------------------|------------------------------|
| PHENOL | N.D. | 1.0 | N.D. | -- |
| BIS (2-CHLOROETHYL) ETHER | N.D. | 1.0 | N.D. | -- |
| 2-CHLOROPHENOL | N.D. | 1.0 | N.D. | 74 |
| 1,3-DICHLOROBENZENE | N.D. | 1.0 | N.D. | -- |
| 1,4-DICHLOROBENZENE | N.D. | 1.0 | N.D. | -- |
| BENZYL ALCOHOL | N.D. | 2.0 | N.D. | -- |
| 1,2-DICHLOROBENZENE | N.D. | 1.0 | N.D. | -- |
| o-METHYLPHENOL | N.D. | 1.0 | N.D. | -- |
| BIS (2-CHLOROISOPROPYL) ETHER | N.D. | 1.0 | N.D. | -- |
| m+p-METHYLPHENOL | N.D. | 2.0 | N.D. | -- |
| N-NITROSO-DI-N-PROPYLAMINE | N.D. | 1.0 | N.D. | 64 |
| HEXACHLOROETHANE | N.D. | 1.0 | N.D. | -- |
| NITROBENZENE | N.D. | 1.0 | N.D. | -- |
| ISOPHORONE | N.D. | 1.0 | N.D. | -- |
| 2-NITROPHENOL | N.D. | 1.0 | N.D. | -- |
| 2,4-DIMETHYLPHENOL | N.D. | 1.0 | N.D. | -- |
| BIS (2-CHLOROETHOXY) METHANE | N.D. | 1.0 | N.D. | -- |
| 2,4-DICHLOROPHENOL | N.D. | 1.0 | N.D. | -- |
| 1,2,4-TRICHLOROBENZENE | N.D. | 1.0 | N.D. | 62 |
| NAPHTHALENE | 2.0 | 1.0 | N.D. | -- |
| 4-CHLOROANILINE | N.D. | 2.0 | N.D. | -- |
| HEXACHLOROBUTADIENE | N.D. | 1.0 | N.D. | -- |
| 4-CHLORO-3-METHYLPHENOL | N.D. | 2.0 | N.D. | 89 |
| 2-METHYLNAPHTHALENE | 3.2 | 1.0 | N.D. | -- |
| HEXACHLOROCYCLOPENTADIENE | N.D. | 1.0 | N.D. | -- |
| 2,4,6-TRICHLOROPHENOL | N.D. | 1.0 | N.D. | -- |
| 2,4,5-TRICHLOROPHENOL | N.D. | 1.0 | N.D. | -- |
| 2-CHLORONAPHTHALENE | N.D. | 5.0 | N.D. | -- |
| 2-NITROANILINE | N.D. | 1.0 | N.D. | -- |
| DIMETHYL PHTHALATE | N.D. | 5.0 | N.D. | -- |
| ACENAPHTHYLENE | N.D. | 1.0 | N.D. | -- |
| 3-NITROANILINE | N.D. | 5.0 | N.D. | -- |
| ACENAPHTHENE | N.D. | 1.0 | N.D. | 71 |
| 2,4-DINITROPHENOL | N.D. | 5.0 | N.D. | -- |
| 4-NITROPHENOL | N.D. | 5.0 | N.D. | -- |
| DIBENZOFURAN | N.D. | 1.0 | N.D. | -- |
| 2,4-DINITROTOLUENE | N.D. | 1.0 | N.D. | -- |
| 2,6-DINITROTOLUENE | N.D. | 2.0 | N.D. | -- |
| DIETHYL PHTHALATE | N.D. | 5.0 | N.D. | -- |

1220 Quarry Lane • Pleasanton, California 94566-4756

(510) 484-1919 • Facsimile (510) 484-1096

Federal ID #68-0140157

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Run: 9371-A


Analyzed: November 16, 1995

| Analyte | RESULT | REPORTING | BLANK | BLANK SPIKE |
|------------------------------|---------|-----------|---------|-------------|
| | (mg/Kg) | LIMIT | RESULT | RESULT |
| | (mg/Kg) | (mg/Kg) | (mg/Kg) | (%) |
| 4-CHLOROPHENYL PHENYL ETHER | N.D. | 1.0 | N.D. | -- |
| FLUORENE | N.D. | 1.0 | N.D. | -- |
| 4-NITROANILINE | N.D. | 5.0 | N.D. | -- |
| 4,6-DINITRO-2-METHYLPHENOL | N.D. | 5.0 | N.D. | -- |
| N-NITROSO-DI-N-PHENYLAMINE | N.D. | 1.0 | N.D. | -- |
| 4-BROMOPHENYL PHENYL ETHER | N.D. | 1.0 | N.D. | -- |
| HEXACHLOROBENZENE | N.D. | 1.0 | N.D. | -- |
| PENTACHLOROPHENOL | N.D. | 5.0 | N.D. | 68 |
| PHENATHRENE | N.D. | 1.0 | N.D. | -- |
| ANTHRACENE | N.D. | 1.0 | N.D. | -- |
| DI-N-BUTYL PHTHALATE | N.D. | 5.0 | N.D. | -- |
| FLUORANTHENE | N.D. | 1.0 | N.D. | -- |
| PYRENE | N.D. | 1.0 | N.D. | 55 |
| BUTYL BENZYL PHTHALATE | N.D. | 5.0 | N.D. | -- |
| 3,3'-DICHLOROBENZIDINE | N.D. | 2.0 | N.D. | -- |
| BENZO (A) ANTHRACENE | N.D. | 1.0 | N.D. | -- |
| BIS (2-ETHYLHEXYL) PHTHALATE | 6.6 | 5.0 | N.D. | -- |
| CHRYSENE | N.D. | 1.0 | N.D. | -- |
| DI-N-OCTYL PHTHALATE | N.D. | 5.0 | N.D. | -- |
| BENZO (B) FLUORANTHENE | N.D. | 1.0 | N.D. | -- |
| BENZO (K) FLUORANTHENE | N.D. | 2.0 | N.D. | -- |
| BENZO (A) PYRENE | N.D. | 0.5 | N.D. | -- |
| INDENO (1,2,3 C,D) PYRENE | N.D. | 2.0 | N.D. | -- |
| DIBENZ (A,H) ANTHRACENE | N.D. | 2.0 | N.D. | -- |
| BENZ (G,H,I) PERYLENE | N.D. | 2.0 | N.D. | -- |

For above analyte:

REPORTING LIMITS RAISED BY 10X DUE TO MATRIX INTERFERENCE


Alex Tam
Chemist


Eric Tam
Laboratory Director

| | | |
|--|--|-------------------------------|
| Aqua Science Engineers, Inc. 2411 Old Crow Canyon Rd., # 4 San Ramon, CA 94583 | Client Project ID: # 2908; Emeryville Properties | Date Sampled: 11/13/95 |
| | Client Contact: David Allen | Date Received: 11/14/95 |
| | Client P.O: | Date Extracted: 11/17/95 |
| | | Date Analyzed: 11/17-11/19/95 |

Volatile Organics By GC/MS

EPA method 624 or 8240

| Lab ID | | 58676 | | | | | |
|--|----------------|-----------------|---|---------------------------------------|----------------|-----------------|---|
| Client ID | | STKP-11/13 | | | | | |
| Matrix | | S | | | | | |
| Compound | Concentration* | Reporting Limit | | Compound | Concentration* | Reporting Limit | |
| | | W | S | | | W | S |
| Acetone ^(b) | ND< 100 | 0.5 | 5 | cis-1,3-Dichloropropene | ND< 100 | 0.5 | 5 |
| Benzene | ND< 100 | 0.5 | 5 | trans-1,3-Dichloropropene | ND< 100 | 0.5 | 5 |
| Bromodichloromethane | ND< 100 | 0.5 | 5 | Ethylbenzene | 340 | 0.5 | 5 |
| Bromoform | ND< 100 | 0.5 | 5 | Methyl butyl ketone ^(d) | ND< 100 | 0.5 | 5 |
| Bromomethane | ND< 100 | 0.5 | 5 | Methylene Chloride ^(e) | ND< 100 | 0.5 | 5 |
| Carbon Disulfide | ND< 100 | 0.5 | 5 | Methyl ethyl ketone ^(f) | ND< 100 | 0.5 | 5 |
| Carbon Tetrachloride | ND< 100 | 0.5 | 5 | Methyl isobutyl ketone ^(g) | ND< 100 | 0.5 | 5 |
| Chlorobenzene | ND< 100 | 0.5 | 5 | Styrene ^(k) | ND< 100 | 0.5 | 5 |
| Chloroethane | ND< 100 | 0.5 | 5 | 1,1,2,2-Tetrachloroethane | ND< 100 | 0.5 | 5 |
| 2-Chloroethyl Vinyl Ether ^(c) | ND< 100 | 0.5 | 5 | Tetrachloroethene | ND< 100 | 0.5 | 5 |
| Chloroform | ND< 100 | 0.5 | 5 | Toluene ^(l) | ND< 100 | 0.5 | 5 |
| Chloromethane | ND< 100 | 0.5 | 5 | 1,1,1-Trichloroethane | ND< 100 | 0.5 | 5 |
| Dibromochloromethane | ND< 100 | 0.5 | 5 | 1,1,2-Trichloroethane | ND< 100 | 0.5 | 5 |
| 1,2-Dichlorobenzene | ND< 100 | 0.5 | 5 | Trichloroethene | ND< 100 | 0.5 | 5 |
| 1,3-Dichlorobenzene | ND< 100 | 0.5 | 5 | Trichlorofluoromethane | ND< 100 | 0.5 | 5 |
| 1,4-Dichlorobenzene | ND< 100 | 0.5 | 5 | Vinyl Acetate ^(m) | ND< 100 | 0.5 | 5 |
| 1,1-Dichloroethane | ND< 100 | 0.5 | 5 | Vinyl Chloride ⁽ⁿ⁾ | ND< 100 | 0.5 | 5 |
| 1,2-Dichloroethane | ND< 100 | 0.5 | 5 | Xylenes, total ^(o) | 5200 | 0.5 | 5 |
| 1,1-Dichloroethene | ND< 100 | 0.5 | 5 | Surrogate Recoveries (%) | | | |
| cis-1,2-Dichloroethene | ND< 100 | 0.5 | 5 | Dibromofluoromethane | 112 | | |
| trans-1,2-Dichloroethene | ND< 100 | 0.5 | 5 | Toluene-d8 | 98 | | |
| 1,2-Dichloropropane | ND< 100 | 0.5 | 5 | 4-Bromofluorobenzene | 108 | | |

Comments: j

* water and vapor samples are reported in ug/L, soil samples in ug/kg and all TCLP extracts in ug/L

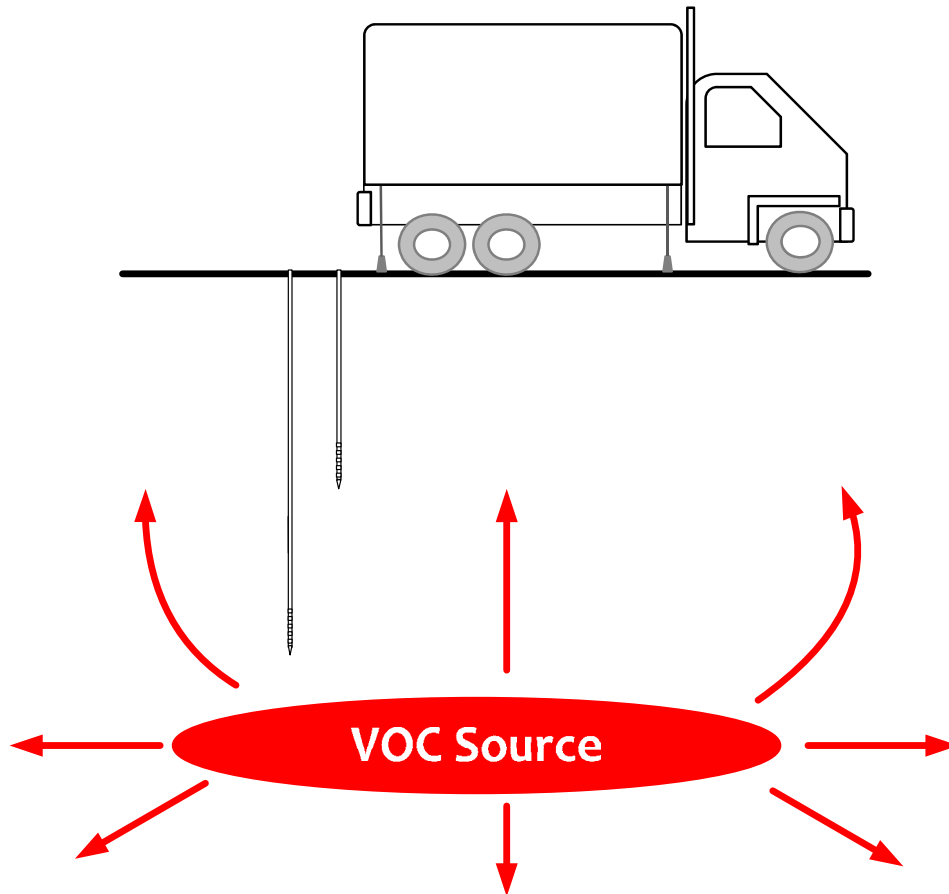
ND means not detected above the reporting limit; N/A means analyte not applicable to this analysis

(b) 2-propanone or dimethyl ketone; (c) (2-chloroethoxy) ethene; (d) 2-hexanone; (e) dichloromethane; (f) 2-butanone; (g) 4-methyl-2-pentanone or isopropylacetone; (h) lighter than water immiscible sheen is present; (i) liquid sample that contains greater than ~ 5 vol. % sediment; (j) sample diluted due to high organic content; (k) ethenylbenzene; (l) methylbenzene; (m) acetic acid ethenyl ester; (n) chloroethene; (o) dimethylbenzenes.

ATTACHMENT B
DTSC ACCEPTED METHANE SAMPLING METHODS IN SOIL VAPOR FROM

Department of Toxic Substances Control, California Regional Water Quality Control Board Los Angeles/San Francisco Regions, Advisory – Active Soil Gas Investigations, April 2012.

**ADVISORY
ACTIVE SOIL GAS INVESTIGATIONS**



**California Environmental Protection Agency
Department of Toxic Substances Control
Los Angeles Regional Water Quality Control Board
San Francisco Regional Water Quality Control Board**

April 2012

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ADVISORY – ACTIVE SOIL GAS INVESTIGATIONS

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7.0 METHANE AND HYDROGEN SULFIDE SAMPLING PROGRAMS

7.1 METHANE

There are several analytical methods appropriate for methane, including:

- USEPA Methods 8015B modified;
- TO-3, 3C;
- ASTM Method D1945; or
- ASTM Method D1946.

Methane may also be measured with a hand held gas emissions monitor or analyzer. The RLs for methane analysis should be determined by project-specific DQOs.

7.1.1 Methane Field Collection

The following procedures should be followed when collecting samples for methane analysis:

- Methane should be collected in gas-tight sample containers such as passivated stainless steel canisters or polymer gas sampling bags.
- Fixed and biogenic gases such as oxygen, carbon dioxide, methane and ethylene should be analyzed to determine whether methanogenesis is occurring. The RL for oxygen and carbon dioxide should be one percent or less.
- Prior to sampling, tubing or probe pressure should be recorded in the field logs and reported along with the methane concentration to determine if the area is pressurized.

7.1.2 Methane Laboratory Analysis

GC calibration curves for analytes such as methane should be recorded and reported. Hand-held instruments should be calibrated in accordance with the manufacturer's specifications. At least 10 percent of all positive detections with concentrations more than 5,000 parts per million by volume (ppmv) should be confirmed by another hand-held instrument (either different unit or a different brand) or by a GC method when a hand-held instrument is used.

7.2 HYDROGEN SULFIDE

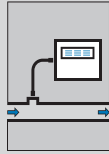
Hydrogen sulfide may be analyzed using:

- South Coast Air Quality Management District Method 307-91;
- ASTM D5504;
- USEPA Method 16;
- Draeger™ tubes; or
- Other equivalent methods.



GEM™5000

**PORTABLE GAS ANALYZER
INSTRUMENTATION**



The Next Generation of GEM™ Instrument

The GEM™5000 is designed specifically for use on landfills to monitor Landfill Gas (LFG) Collection & Control Systems. The GEM™5000 samples and analyzes the methane, carbon dioxide and oxygen content of landfill gas with options for additional analysis.

- **Six Times More Accurate and Twice as Fast**
- **NEW Annual** recommended factory service
- **Available with GPS and additional gas detection**



➤ *Used For*

Landfill Gas Collection & Control Systems
Environmental Compliance
Landfill Gas to Energy
Subsurface Migration Probes

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GEM™5000

PORTABLE GAS ANALYZER INSTRUMENTATION



► Features

- ◆ Measures % CH₄, CO₂ and O₂ Volume, static pressure and differential pressure
- ◆ Calculates balance gas, flow (SCFM) and calorific value
- ◆ CO and H₂S (on Plus models only)
- ◆ High Accuracy and Fast Response Time
- ◆ Lighter and More Compact
- ◆ Certified intrinsically safe for landfill use
- ◆ Annual recommended factory service
- ◆ Calibrated to ISO/IEC 17025
- ◆ 3 year warranty with optional service plan

► Key Benefits

- ◆ Designed specifically for use on landfills to monitor landfill gas (LFG) extraction systems, flares, and migration control systems.
- ◆ No need to take more than one instrument to site
- ◆ Can be used for monitoring subsurface migration probes and for measuring gas composition, pressure and flow in gas extraction systems
- ◆ The user is able to set up comments and questions to record information at site and at each sample point
- ◆ Ensures consistent collection of data for better analysis
- ◆ Streamlined user experience reduces operational times

► Applications

- ◆ Landfill Gas Collection & Control Systems
- ◆ Environmental Compliance
- ◆ Landfill Gas to Energy
- ◆ Subsurface Migration Probes

► Technical Specification

Gas Ranges

| | | | | |
|----------------|-----------------------|---|--------------------|-------------------|
| Gases Measured | CH ₄ | By dual wavelength infrared cell with reference channel | | |
| | CO ₂ | By dual wavelength infrared cell with reference channel | | |
| | O ₂ | By internal electrochemical cell | | |
| | CO | By internal electrochemical cell | | |
| | H ₂ S | By internal electrochemical cell | | |
| Ranges | CH ₄ | 0-100% (vol) | | |
| | CO ₂ | 0-100% (vol) | | |
| | O ₂ | 0-25% (vol) | | |
| | CO | 0-2000ppm*** | | |
| | H ₂ S | 0-500ppm*** | | |
| Gas Accuracy* | CH ₄ | 0-5% ± 0.3% (vol) | 0-70% ± 0.5% (vol) | 70-100% ± 1.5% FS |
| | CO ₂ | 0-5% ± 0.3% (vol) | 0-60% ± 0.5% (vol) | 60-100% ± 1.5% FS |
| | O ₂ | 0-25% ± 1.0% (vol) | | |
| | CO(H ₂)** | 0-2000ppm ± 1.0% FS | | |
| | H ₂ S | 0-500ppm ± 2.0% FS | | |

* Typical accuracy after calibration as recommended in the operations manual.
 **Hydrogen compensated Carbon Monoxide measurement.
 ***Additional ranges available, contact LANDTEC for more information

Other Parameters

| | Unit | Resolution | Comments |
|-----------------------|----------------------|----------------------------|-------------------------------------|
| Energy | BTU/hr | 1000 BTU/hr | Calculated from specific parameters |
| Static Pressure | in. H ₂ O | 0.1 in. H ₂ O | Direct Measurement |
| Differential Pressure | in. H ₂ O | 0.001 in. H ₂ O | Direct Measurement |

Important Note: The information in this document is correct at the time of generation. We do, however, reserve the right to change the specification without prior notice as a result of continuing development.

Pump

| | |
|--|------------------------|
| Flow | Typically 550cc/min |
| Flow with 80 in. H ₂ O vacuum | Approximately 80cc/min |

Environmental Conditions

| | |
|------------------------------|---|
| Operating Temperature Range | 14°F – 122°F (-10°C – 50°C) |
| Operating Pressure | -100 in. H ₂ O, +100 in. H ₂ O (-250mbar, +250mbar) |
| Relative Humidity | 0-95% non condensing |
| Barometric Pressure | ± 14.7 in.Hg (±500mbar) from calibration pressure |
| Barometric Pressure Accuracy | ± 1% typically |

Power Supply

| | |
|--------------|---|
| Battery Life | Typical use 8 hours from fully charged |
| Charge Time | Approximately 3 hours from complete discharge |

Certification Rating

| | |
|----------|--|
| ATEX | II 2G Ex ib IIA T1 Gb (Ta= -10°C to +50°C) |
| ISO17025 | ISO/IEC17025:2010 Accreditation #66916 |
| CSA | Ex ib IIA T1 (Ta= -10°C to +50°C) (Canada), AEx ib IIA T1 (Ta= -10°C to +50°C) USA |

► Associations



► Certifications



► Contacts

LANDTEC North America
 850 South Via Lata, Suite 112
 Colton, CA 92324
 Phone (800) LANDTEC - (909) 783-3636

Western Sales Office
 (800) 821-0496 • Fax (909) 825-0591

Eastern Sales Office
 (800) 390-7745 • Fax (301) 391-6546

LANDTEC South America
 +55 (11) 5181-6591 • Fax +55 (11) 5181-6585
 www.LANDTEC.com.br



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