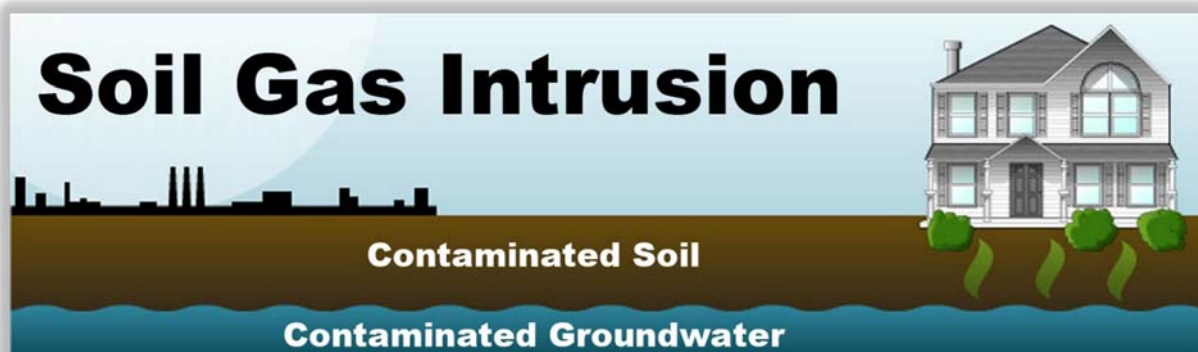




Soil Gas Tube



Introduction



Soil gas/vapor intrusion happens when VOC/SVOC in the air matrix space of soil find their pathway into a buildings, whether residential or commercial. And the measurement of soil gas exposure is an evaluation of potential impact to human health.

The soil gas/vapor, which come from chemicals in contaminated soil or groundwater, migrate through foundation cracks, fractures in basement floors or walls, crawl spaces and small gaps around pipes and utility lines.

Camsco offers a Soil Vapor Intrusion tube for general purposes (see Application Note #12344), but we also offer a Soil Gas tube (Camsco Part Number **SU60525**) for specific soil contamination by gasoline, diesel or other petroleum products.

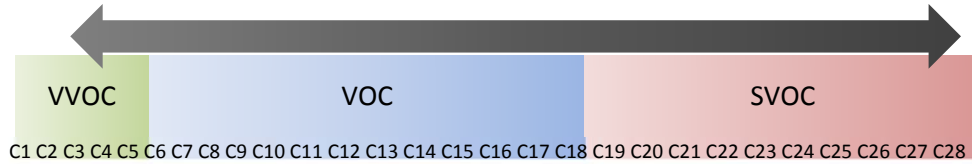


The picture above shows oil floating above water on the ground soil of southern New Orleans in 2008. In case of such a petroleum spill, the light VOC such as propane and butane from gasoline quickly evaporate under normal ambient conditions, and are not the subjects for sustained contamination. The combination of Tenax TA and Carbograph™ 5 ignores some WOC but does a great job covering VOC and SVOC.

Soil Gas Tube Configuration

- Tenax® TA plus Carbograph™ 5
- Sorbents are separated by 3 mm plugs of glass wool.
- Carbograph™ 5 is equivalent to Carbopack™ X

Volatility Range C3~C26



- C3 ~ C26 for air volumes of 1 ~ 10 L for indoor air quality.
- Air volume is often less than a liter for micro chamber containing heated soil samples.

Temperatures

Maximum Temperature:	350°C
Conditioning Temperature:	320°C
Desorption Temperature:	300°C

Pros

- Covers a wide range from gasoline to diesel components, suitable for petroleum related soil contamination.
- All sorbents are highly hydrophobic and well suited for moisture-containing soil gas
- simpler and more cost-effective than the “Universal Tube”, extended heavy DRO range than the

Cons

- Tenax® TA limits the desorption temperature and background noise of the tube

Technical Guide

Soil Gas Tube



- As its name suggests, the Soil Gas Tube is a dual-bed tube suitable for active/pumped sampling aimed at soil gas contaminated by petroleum-related compounds.
- Soil Gas Tubes come standard with stainless steel tubes, but many users prefer inert-coated stainless steel tubes.
- Even though the sorbent configuration looks different, this tube is a modified version of the SVI tube. The goal is to cover the entire diesel range organics (by Tenax TA) with an emphasis on signature petroleum components such as BTEX and 1,3-butadiene (by Carbograph™ 5).
- This tube is often used to obtain the total petroleum hydrocarbon (TPH) profile, which not only provides risk evaluation, but also the potential source of contamination
- Soil gas often contains high moisture, thus a dry purge should be considered mandatory for soil gas tubes before sample introduction.

Comparison to other Tubes

- Compared to the SVI Tube, the Soil Gas tube has higher background due to the use of Tenax® TA, but extending the upper volatility range to C26 more than makes up for it when it comes to DRO analysis.
- Compared to a single-bed Tenax® TA tube (Camsco Part Number **SU60520-60**), the Soil Gas tube is more confident collecting BTEX and butadiene without breakthrough.
- Compared to a single-bed Carbograph 5TD tube (BTEX Tube, Camsco Part Number **SU60524**), the Soil Gas tube has extended capability in heavy DRO range, and less vulnerability to contamination due to the protective Tenax® TA layer. However, the desorption temperature is limited by Tenax® TA.

Figure 1 and Figure 2 shows Soil Gas Tubes are capable of analyzing both gasoline and diesel contaminated sand samples

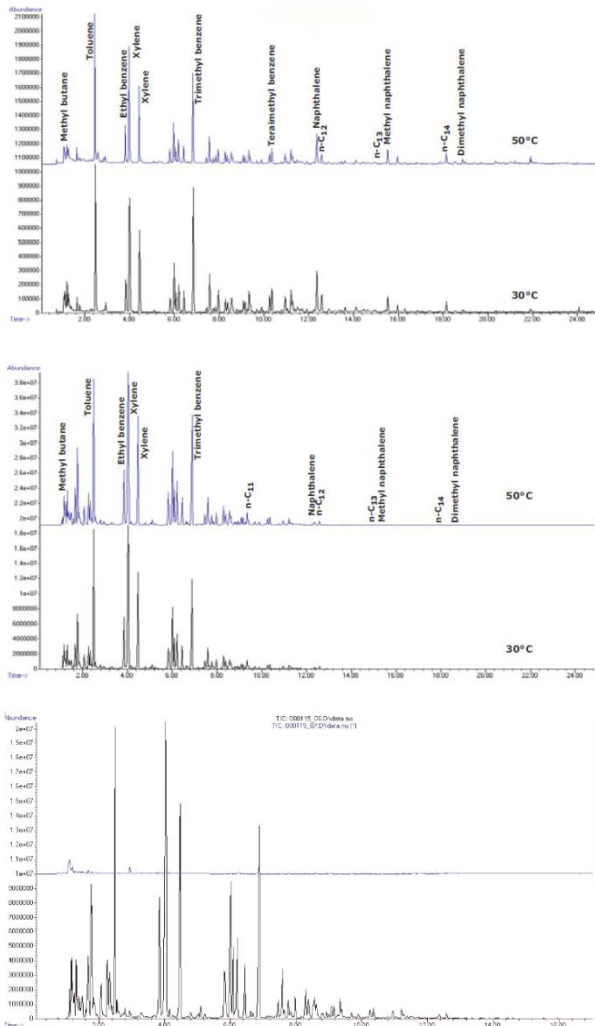


Figure 1. Top: Gasoline vapor collected from dry sand samples at 30°C and 50°C using soil gas tubes. Middle: Gasoline vapor collected from wet sand samples at 30°C and 50°C using soil gas tubes. Bottom: Gasoline vapor analysis with repeat desorption of tube showing negligible carryover.

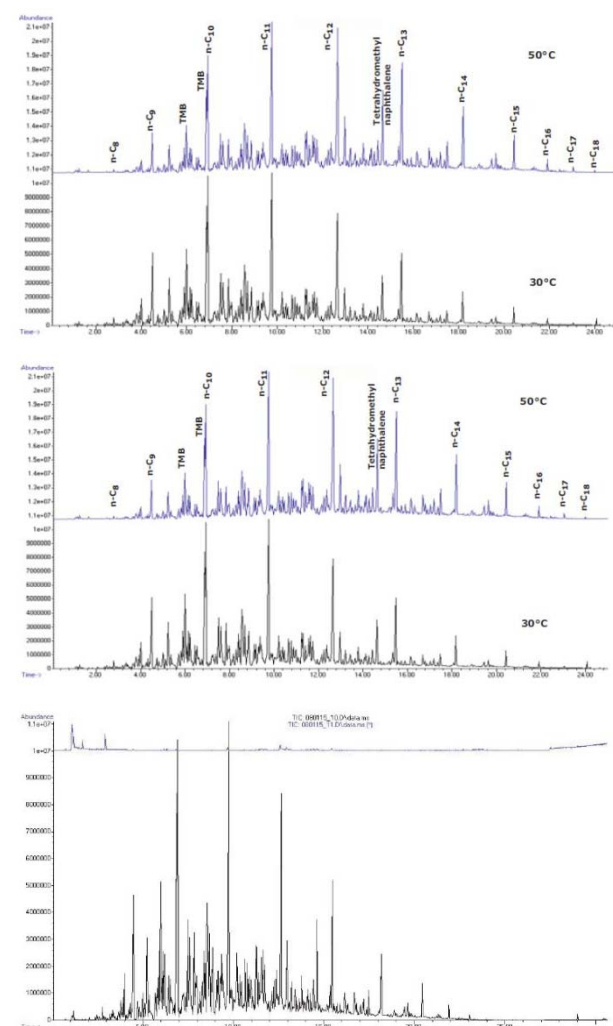


Figure 2. Top: Diesel vapor collected from dry sand samples at 30°C and 50°C using soil gas tubes. Middle: Diesel vapor collected from wet sand samples at 30°C and 50°C using soil gas tubes. Bottom: Diesel vapor analysis with repeat desorption of tube showing negligible carryover.

Figure one and Figure 2 (courtesy of P. Hughes, J. Dwan and D. Miser)

References

US EPA Method TO-17: Determination of volatile organic compounds in ambient air using active sampling onto sorbent tubes. EPA/625/R-96/010b, 1999

US EPA, Vapor Intrusion website, <http://www.epa.gov/oswer/vaporintrusion/>

UK Health and Safety Executive MDHS 72 (Volatile Organic Compounds in Air), "Laboratory Method Using Pumped Solid Sorbent Tubes, Thermal Desorption and Gas Chromatography," Methods for the Determination of Hazardous Substances (MDHS), Sheffield, UK.

Hayes HC et al, Evaluation of sorbent methodology for petroleum impacted site investigations: Proceedings of the Air and Waste Management Association conference on vapor intrusion, Sept 2007.

P. Hughes, J. Dwan and D. Miser, Recent Developments in Thermal Desorption (TD) – GCMS Technology for Further Enhancements in Monitoring Fuel Vapors in Soil Contaminated Land and Trace Level Detection,



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