



The Soil Vapour Advantage

Featuring: Thermal Desorption (TD) Tubes

1. Principle
2. CARO's SVI™ TD Tube Development Advantages
3. Achieving the Lowest Detection Limits in the Industry

1. Principle

Ambient air or soil vapour samples are collected onto sorbent media using calibrated air sampling pumps. Compounds are quantified using thermal desorption (TD) and gas chromatography. This approach is cost effective, allows for a broad list of parameters from a single analytical run, and allows for the analysis of larger volumes of air and lower detection limits than direct air approaches.

CARO has evaluated the advantages and disadvantages of various soil vapour collection approaches and has determined that soil vapour provides the best possible solution to our clients.

Thermal Desorption (TD) We have chosen specific sorbent media (TD Tubes) that provide our clients with the most cost effective, practical and technically sound approach for collecting and analyzing soil vapour. This approach is becoming the industry's predominant soil vapour method.

Instrumentation CARO was the first Western Canadian laboratory with TD "recollection" ability, allowing duplicates and dilution of high samples. Historically, TD Tubes had provided a single analysis opportunity which caused issues when concentrations exceeded the instrument calibration range. CARO's state-of-the-art equipment greatly improves performance with the broadest scope of detectable parameters and unmatched low-level resolution.

CALA Accreditation CARO was the first Canadian laboratory to gain accreditation for soil vapour by TD (www.cala.ca)

BCMOE Standard Methods CARO authored the provincial VOC and VHv by TD methods.

Research and Development Our study, "*Assessment of Volatile Organic Compounds from Tubing Used for Soil Vapour Sample Collection*" conducted in partnership with the SABCS has standardized industry sampling material selection. ([Study here.](#))



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2. CARO's SVI™ TD Tube Development Advantages

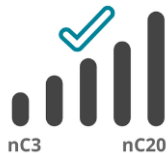
Common perception is that all TD tubes are equivalent, but this is not the case. Developed in partnership with PerkinElmer, the Soil Vapor Intrusion (SVI™) TD Tube has important performance benefits over traditional TD tubes and has now become the industry standard. It combines positive attributes of existing TD tubes with new sorbent media technology to improve data quality and save you time and money on your next sampling project:



✓ **High Safe Sampling Volumes (SSVs)** - This is the only TD tube we've tested (using BCMOE procedures) with SSVs greater than 10 L for Schedule 3.3 VOC list. VOCs are retained by a multi-bed sorbent specifically designed to enhance retention of low molecular weight VOCs, thereby **preventing breakthrough**.



✓ **Hydrophobic Media** – TD sorbent media had traditionally been susceptible to soil moisture which decreases sorption potential. CARO has worked to develop a custom hydrophobic TD media optimized for VOC's and moist conditions. Data indicates that up to 30L of 90% RH air can be sampled without VOC breakthrough. Also, less water allows better GC/MS chromatography, thereby **improving data quality**.



✓ **Broad Performance Range** – Excellent sorption/desorption performance from nC3 to nC20. This allows larger sample volumes for analytes ranging from LMW chlorinated VOCs to CCME F2 (nC16) fractions and even PAHs. It also helps protect TD tube integrity. The result is that **less test samples are needed** and more reproducible results are possible.

3. The Lowest Detection Limits in the Industry, and we did it for YOU!

The Industry Challenge: Achieving DLs

Early soil vapour approaches achieved low regulatory-level detection limits (DLs) by collecting high sampling volumes – sometimes an excess of 50 L. However, high volumes resulted in **high concentration samples** up to seven orders of magnitude above DLs. This required dilutions that proportionally raised DLs, in many cases above regulatory standards, and TD tube **overload**, leading to suspect data as analytes break through or are under-reported.

The CARO Solution



During development of the SVI™ TD tube, we also developed proprietary procedures to significantly reduce soil vapour DLs, without running the risk of instrument down time.

CARO's industry leading DLs allow us to report lower levels than previously possible for risk assessment, and helped solved the industry's most pressing challenges.

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Advantages to CARO's Lower DLs:

1. **Reduced Sampling Time** – As little as 5 minutes are necessary (0.5L @ 0.1L/min) for CARO to achieve the BC CSR target DLs. This saves our clients considerable field time and expense.
2. **Minimized Tube Overload** – By reducing sample volumes, VOC loading is reduced and the impact of high concentration samples is minimized. This leads to the generation of more usable data the first time, and virtually eliminates the need for follow-up sampling due to tube overload.
3. **Minimized Water Effects** – By reducing moisture loading, we improve GC/MS chromatography performance and prevent unnecessary instrument down-time as is common in our industry.



Ask us about our
Soil Vapour
Guarantee!

Why choose CARO for your next vapour project? It's simple:

- **Your Big-Picture Sidekicks**
We understand client's perspective through consultation and hands-on field experience.
- **Reporting is clear, comprehensive and flexible**
Excel, PDF, custom EDDs, and 24/7 real-time online data retrieval.
- **Equipment, and easy-to-use guides**
SVI™ TD tubes, calibrated pumps, manometers, tubing, etc.
- **Proprietary methods**
Reduce detection limits and sampling time and increase data quality.
- **Ask the experts!**
Our team: 100+ staff, and the highest proportion of professional chemists (P.Chem.) of any commercial lab in Canada.
- **Plus:**
Defensible aliphatic-aromatic fractionation for risk assessment; interpretation of difficult samples; product characterization.

Charismatic Scientists, driven to make the world a safer and healthier place.

Through collaboration and technical know-how, CARO provides the most flexible, practical, technically sound and cost-effective soil vapour solution on the market. We are proud of our accomplishments and are continuing efforts to lead the industry. Please contact us: teamcaro@caro.ca or 877.765.9646

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