

SOIL VAPOUR SAMPLING USING SUMMA CANISTERS



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COLLECTING SOIL VAPORS



- Stainless Steel Canisters (*SUMMA*)
- Tedlar Bags
- Sorbent Tubes - *Thermal, Solvent Extraction, Derivatization*
- Impingers



WHAT IS A SUMMA CANISTER?

Evacuated, highly polished, stainless steel sampling container



Canisters prevent permeation of VOCs through the vessel wall, and degradation due to exposure to sunlight during shipment to the analytical laboratory.



SUMMA CANISTERS



6 LITER

variety of sizes, depending on the application

Does not require a pump...evacuated to -30 inches Hg



1.4 LITER



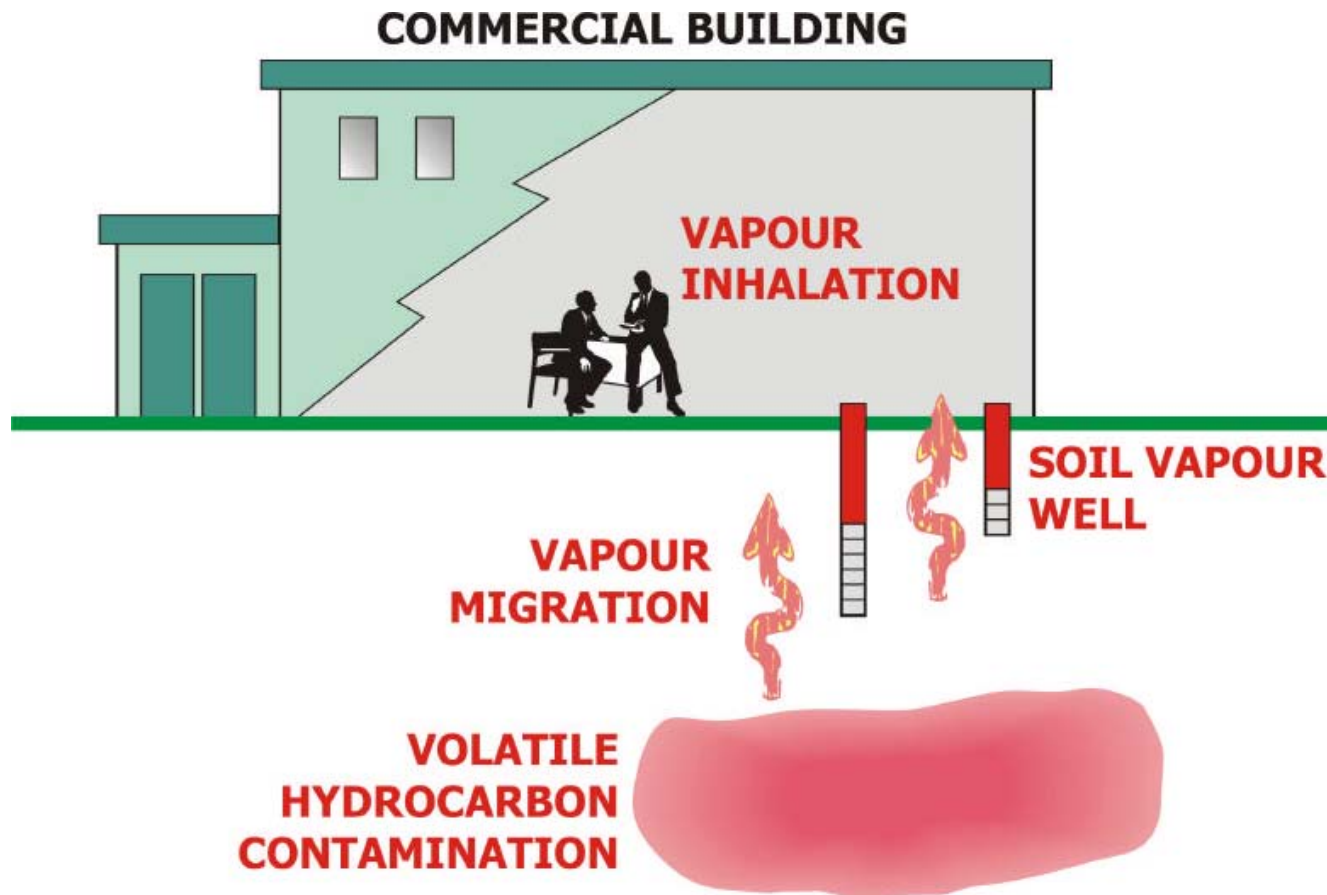
CANISTER FLOW CONTROLLER

Flow controller is connected to the valve of the Summa canister to regulate air flow over a specific time period (e.g. 5 min, 1 hr, 8 hr, etc)

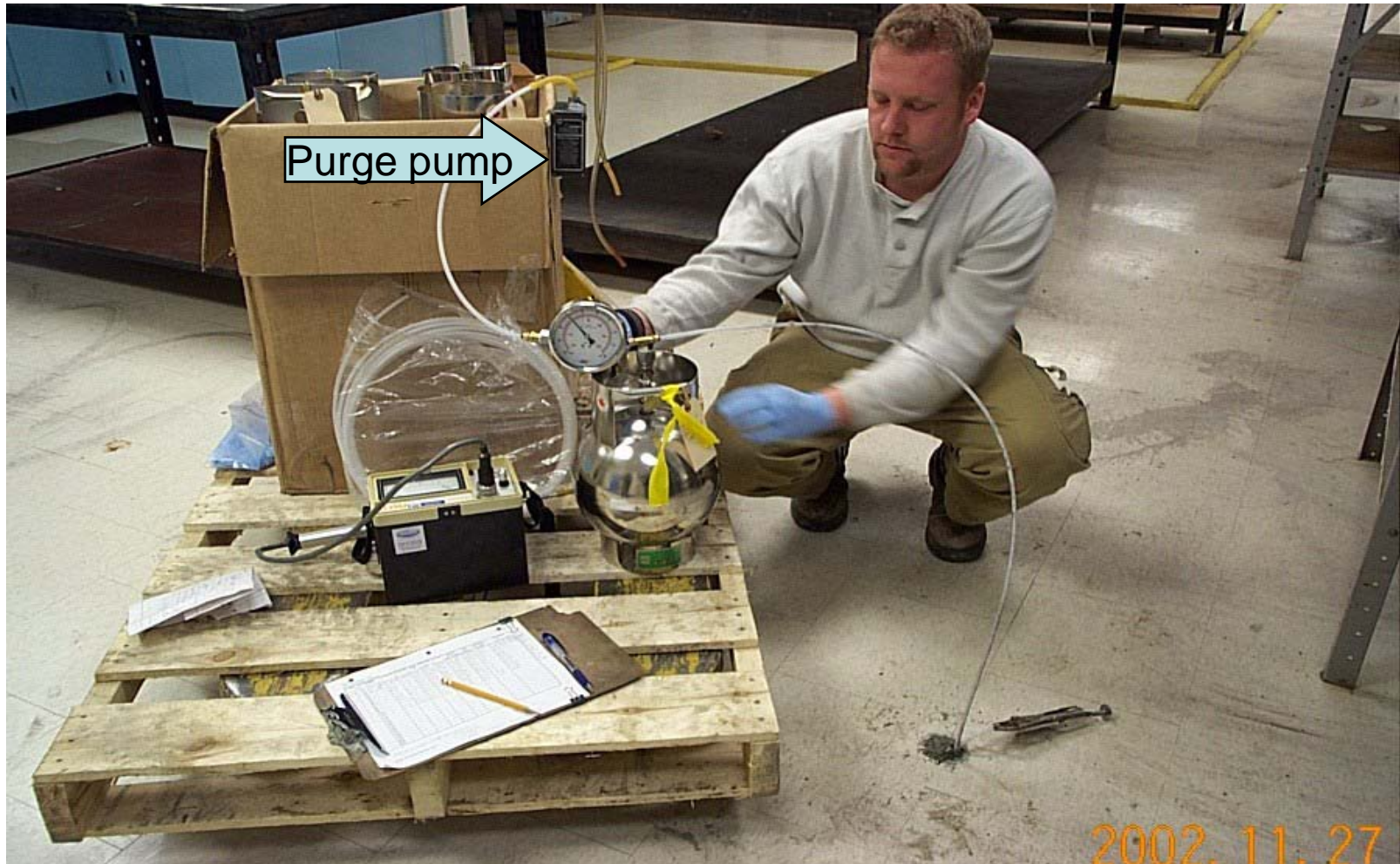
No controller = Grab sample,
Summa will fill within several
seconds



Soil Vapor – What is it?



COLLECTING SOIL VAPORS



Soil Gas Monitoring – with permission from Kevin Brunner



VOCs by EPA Method TO15A

- Collection by SUMMA Canister
- Analysis by cryo-focusing GC/MS
(sample is cooled to -70°C)
- 5-point calibration of GC/MS
- Primary gaseous calibration standards
- Secondary source calibration checks



QC - EPA Method TO15A

Field QC can include:

- Duplicate using Y-splitter and single flow controller
- Field spike using gaseous calibration standard
- Travel blank with purified air



EPA Method TO15A

Laboratory QC includes:

- Lab blank (purified air)
- Lab blank spike
- Sample Duplicate analysis
- Sample Matrix Spike
- Addition of gaseous surrogates prior to analyses
- Standard 3rd party certified reference material
- Continuing calibration standard



EPA Method TO15A

Method TO15A defines VOCs:

“...as organic compounds having a vapour pressure greater than 10^{-1} Torr at 25°C and 760 mm Hg.”

Such VOCs include.....



VOCs by EPA Method TO15A

- Chloromethane
- 1,2-Dichlorotetrafluoroethane
- Vinyl Chloride
- Bromomethane
- Chloride(Dichloromethane)
- cis-1,3-Dichloropropene
- trans-1,3-Dichloropropene
- 1,1,2-Trichloroethane
- Ethylene Dibromide
- Tetrachloroethylene
- Chlorobenzene
- Ethylbenzene
- Chloroethane
- 1,1-Dichloroethylene
- Methylene Chloride
- Trichlorotrifluoroethane
- trans-1,2-Dichloroethylene
- 1,1-Dichloroethane
- cis-1,2-Dichloroethylene
- Chloroform
- 1,2-Dichloroethane
- 1,1,1-Trichloroethane
- Carbon Tetrachloride
- 1,2-Dichloropropane
- Trichloroethylene
- Benzene
- Toluene
- p+m-Xylenes
- o-Xylene
- Styrene
- 1,1,2,2-Tetrachloroethane
- 1,3,5-Trimethylbenzene
- 1,2,4-Trimethylbenzene
- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- 1,2-Dichlorobenzene
- 1,2,4-Trichlorobenzene
- Hexachlorobutadiene

(DL low ug/m3)



Other VOCs

- Acetaldehyde (Ethanal)
- Propionaldehyde (Propanal)
- n-Butane
- Naphthalene (semi-quant)
- Bromodichloromethane
- Dibromochloromethane
- Vinyl Bromide
- Bromoform
- Dichlorodifluoromethane (FREON 12)
- Trichlorofluoromethane (FREON 11)
- 4-ethyltoluene
- 2-propanol
- Ethanol
- Benzyl chloride

(DL low ug/m³)



LOW LEVEL VOCs by GC/MS-SIM

- trans-1,2-Dichloroethylene
- 1,1-Dichloroethane
- **Chloroform**
- **1,1-Dichloroethylene**
- cis-1,2-Dichloroethylene
- **1,1,2,2-Tetrachloroethane**
- 1,1,1-Trichloroethane
- **Carbon Tetrachloride**
- **1,2-Dichloroethane**
- **Trichloroethylene**
- Vinyl Chloride
- Tetrachloroethylene
- **Ethylene dibromide**
- Methylene Chloride

(DL <1 ug/m³)



BTEX + Fractionation

- Benzene
- Toluene
- Ethylbenzene
- Total Xylenes
- Aliphatic >C5-C6
- Aliphatic >C6-C8
- Aliphatic >C8-C10
- Aromatic >C7-C8
- Aromatic >C8-C10
- Aliphatic >C10-C12
- Aliphatic >C12-C16
- Aromatic >C10-C12
- Aromatic >C12-C16
- VPH C6-C10
- LEPH C10-C16

SUMMA, TEDLAR BAG, CHARCOAL TUBE



SUMMA CANISTERS



Maxxam stocks
700 x 6 liter
and
100 x 1.4 liter



SUMMA CLEANING

Batch (1 in 16)
versus
Individual
canister proofing

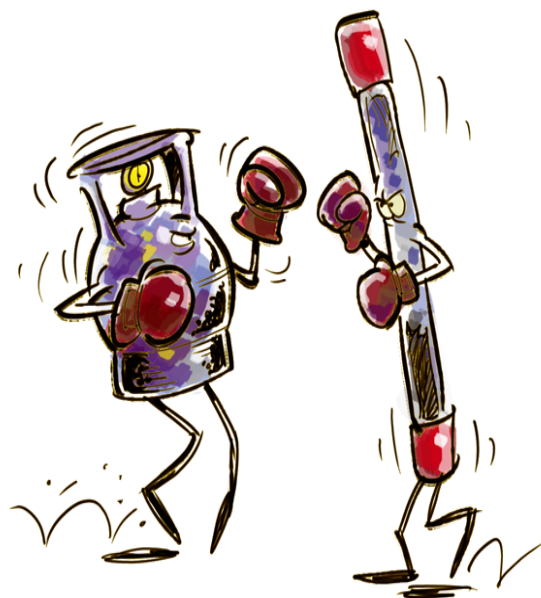
Proof requirement:
<MDL for all VOCs
to be tested



SUMMA or Sorbent Tubes?

Summa Canisters:

- Require no pump calibration
- Easy to setup and sample
- Easy to sample over set time periods
- Analysis cost is comparable – rental charges apply
- Re-analysis is possible



Sorbent Tubes:

- Low cost and readily available
- Convenient to transport and use.
- Pumps must be calibrated for specific tube types.
- Pump calibration should be verified at the end of sampling.
- Re-analysis is possible for solvent extraction but typically not for thermal desorption.



ORDERING AND SUBMITTING SUMMAS

First questions that are asked:

1. What size of canister? (6 L or 1.4 L)
2. Grab or timed sample recovery?
3. Indoor/ambient air or Soil Vapor?
4. For when is the sampling planned?

