Strategies for Evaluating the Vapor Intrusion Pathway

Vapor Intrusion In Commercial and Industrial Buildings

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Outline

- Information Sources
  - Building Inventory
- Sampling Strategy
  - QA/QC Samples
- Data Interpretation
  - Laboratory Data Verification
- Background Sources
  - Industrial Supplies
  - Office Products

Information Sources

- Manufacturing Processes
  - Paint Booths
  - Parts Washing
  - Metals Fabrication
  - Refrigeration
  - Foam
  - Urethanes

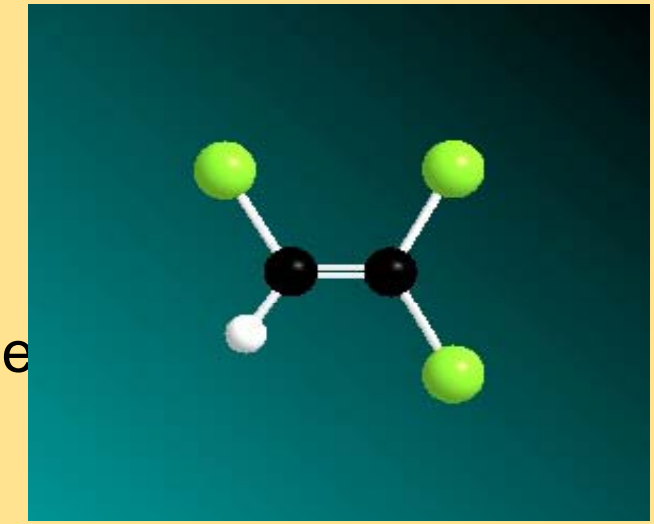
Information Sources

- Building Inventory
  - Products
  - Supplies
  - Cleaners
  - Fuels
  - Maintenance Areas
  - Satellite Storage

CCl_2CCl_2 - PCE

Informational Sources

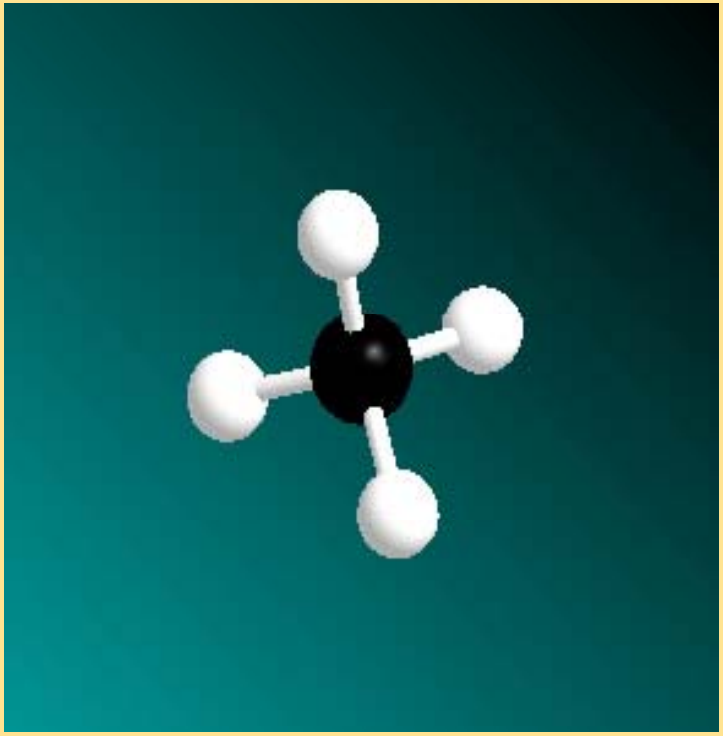
- Existing Environmental Investigation Reports
  - Soil, Groundwater and Soil Vapor
  - Detected VOCs (?)
- Building Construction
  - Facility Diagram
  - Products and Processe
  - HVAC Vents
- Neighboring property use



$CHClCCl_2$ - Trichloroethene

Sampling Strategy

- Biased or Unbiased
  - Receptors
  - Areas of Impact
  - Known or Unknown
- Soil Data
- Soil Vapor Data
- Groundwater Data



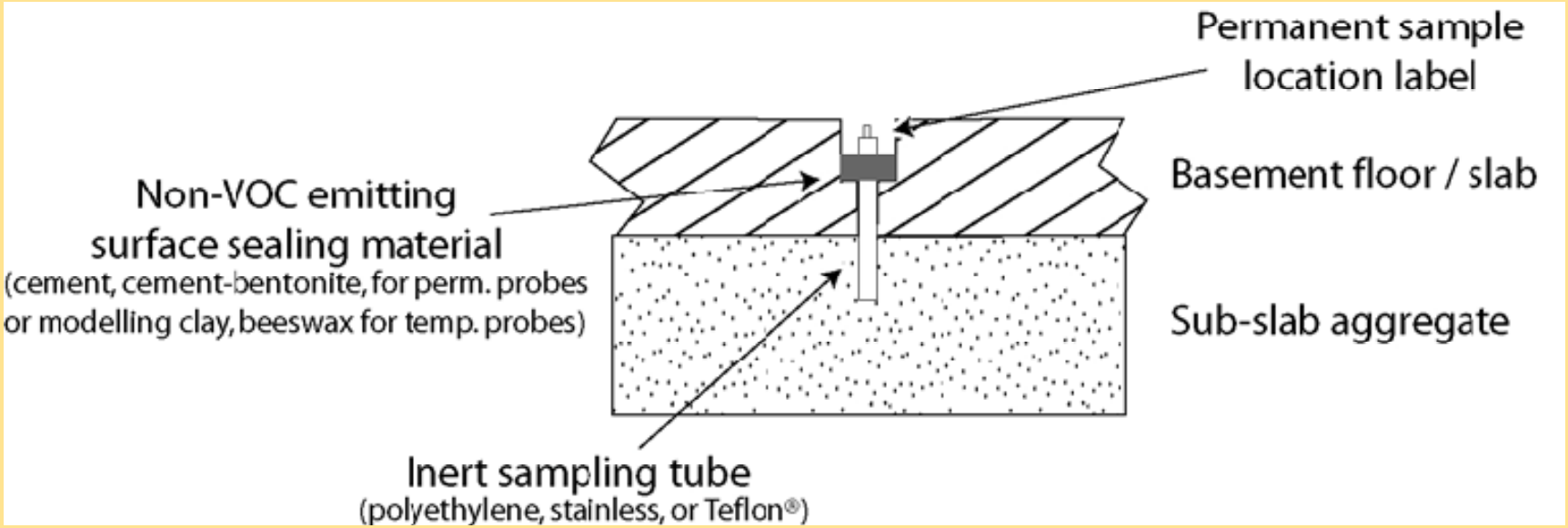
CH_4 - Methane

Sampling Strategy

- Field Screening
  - Soil Vapor
    - Tedlar Bag
    - Evacuated Canister
    - PID/ GC-FID
  - Ambient Air
    - ppB Meter (µRAE)
  - Vacuum Readings
    - Back-up Cans/Controllers

Sampling Strategy

- Sub-slab Samples
  - Semi-permanent Point (AMS GVP Tip)
  - Sand Pack with Bentonite Seal



Sampling Strategy

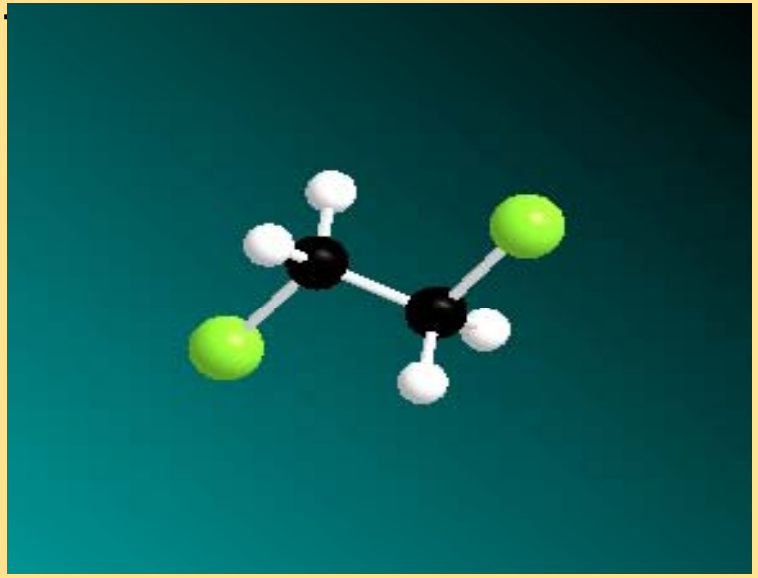
- Sampling Time
  - 8 hr vs. 24 hr
  - Worker Exposure
  - Residential Exposure
  - Diurnal effects (?)
- Sample Size
  - 6 L vs. 1 L
  - TCE Action Level

Sampling Strategy

- Field Quality Assurance
  - Blank Samples
    - Container Certification
    - Batch vs. Individual
  - Duplicate Samples
    - Sequential
    - Simultaneous
    - Co-located
  - Matrix Spike (?) Samples
  - Background Samples

Data Interpretation

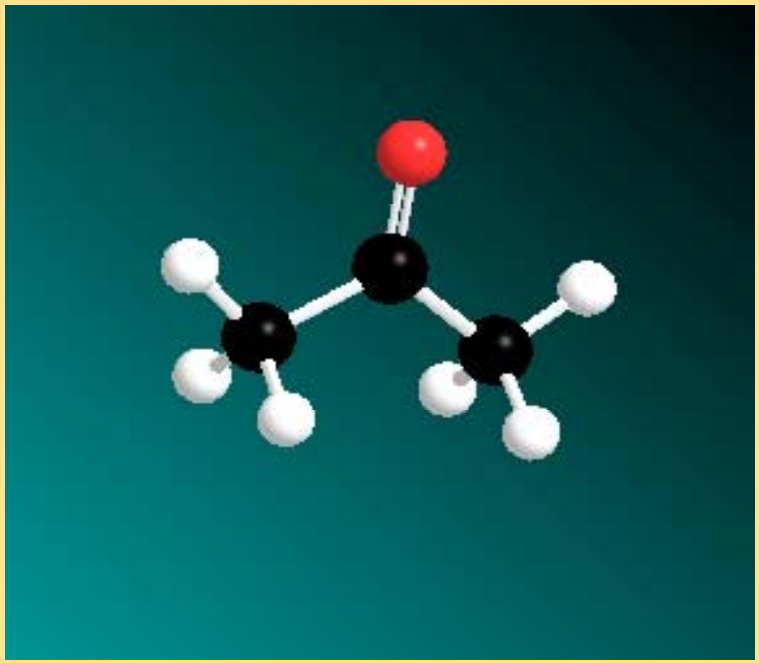
- Compendium of Methods for the Analysis of Toxic Organic Compounds in Air
  - Volatiles – TO-15
    - Site-Specific List
    - Volatiles Scan – Not Defined by Method
  - Semi-Volatiles – TO-1



CH_2Cl-CH_2Cl – 1,2-Dichloroethane

Data Interpretation

- Method Blanks
  - Container Certification
    - Batch/Individual
- Laboratory Control Samples
  - Accuracy
- Matrix Duplicates
  - Precision



$CH_3(CO)CH_3$ - Acetone

Laboratory Data Verification

- Data Deliverables
  - Standard Package
    - Method Blanks, LCS, Form 1 Results
  - Extended Package
    - Run logs,
    - Quantitation Reports
    - Chromatograms/Spectra

Background Sources

- Sampling Materials
  - Tygon vs. HDPE
- Laboratory Sources
  - Carryover
  - Extraction Systems
- Ambient Air
  - Upwind Location

Indoor Air Background – Existing Literature Data

- Shah & Singh/EPA National Ambient VOC Database (1988)
- Stolwijk (1990)
- Vermont (1992)
- MADEP (2002)
- NYSDOH (1989-1996, 1997-2003)
- Adgate et al (2004)
- RIOPA (2005)

Information Resources

- Material Safety Data Sheets
- Household Product Database
  - EPA
  - National Institute of Health
- OSHA Encyclopedia

Industrial Sources

- **Product Name: Lacquer Spraying, Clear, TT-L-58E**
  - **Form:** spray
  - **Manufacturer:** Pratt and Lambert, Inc.
    - Industrial Coatings Division
    - **Components:**
    - Isopropanol, Isobutyl alcohol, Methyl ethyl ketone, Ethylbenzene, Toluene,
    - Isobutyl acetate, Hexane, Heptane, Xylene (mixed isomers)

Industrial Sources

- **Product Name: Solvent Cleaner and Degreasers**
  - **Form:** aerosol
- Components:
  - Trichloroethylene 0-99%
  - 1,2 Butylene Oxide 1-10%
  - Carbon dioxide 1-10%

Industrial Sources – Office

- **Product Name: Sprayway Spray Adhesive**
  - Cyclohexane **30-35%**
  - Dimethyl ether **0-15%**
  - Heptane **10-15%**
  - Butadiene, styrene, divinylbenzene polymer **3-5 %**
  - Petroleum gases, liquefied **30-35%**

Industrial Sources - Office

- **Product Name: Sprayway Toner Aide**
- **Ingredients from MSDS/Label**
  - Acetone 5-10%
  - Propane 40-50%
  - Trichloroethylene 10-20%
  - 2-Butoxyethanol 0-5%
  - Butyl acetate 20-30%
  - Stoddard solvent 0-5%

Floor Sealants and Paints

- **Product Name: Sherwin-Williams Armorseal Epoxy Floor Coating**
  - Naphthalene- 0.5%
  - Propoxy-2-propanol 4%
  - Ethylene glycol monopropyl ether 10%
  - Titanium dioxide 26%
  - Talc (non-fibrous) 9%
  - Solvent naphtha, petroleum, aromatic 53%

Residential Sources

- **Product Name: Formby's Furniture Cleaner**
- **Form:** liquid

- Ethane, 1,1,1-trichloro- 25 %
- Mineral oil, white 10%
- Solvent naphtha, petroleum, aliphatic 70%

Summary

- Origin of Detected “Indoor Air” Contaminants
  - Sampling Equipment
  - Analytical Methods
  - Manufacturing processes
  - Facility Utilities
  - Office products
  - Soil Vapor

Thank You

- State and Federal vapor intrusion guidance and references used in this presentation can be found at:

  http://www.haleyaldrich.com/vi%20services.html

- Questions?