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Vapor Investigation Design Considerations & Sampling Best Practices

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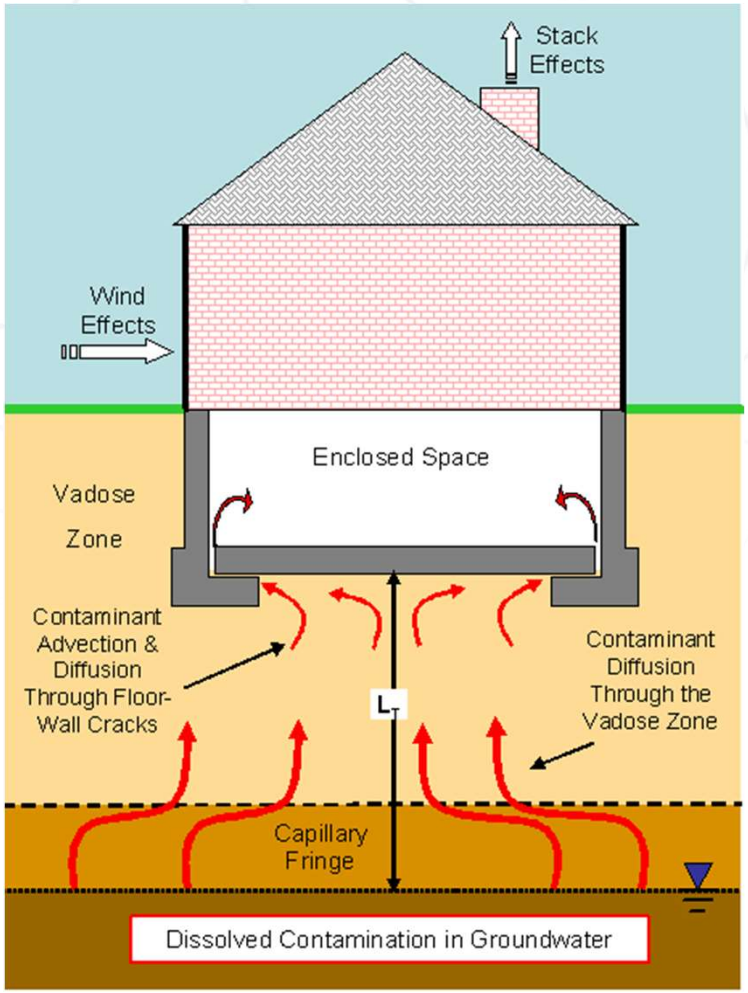
Topics

- Soil Vapor Investigation Design Considerations
- Subslab and Soil Gas Sampling – Best Practices
- Questions for the Panel



Vapor Investigation Design

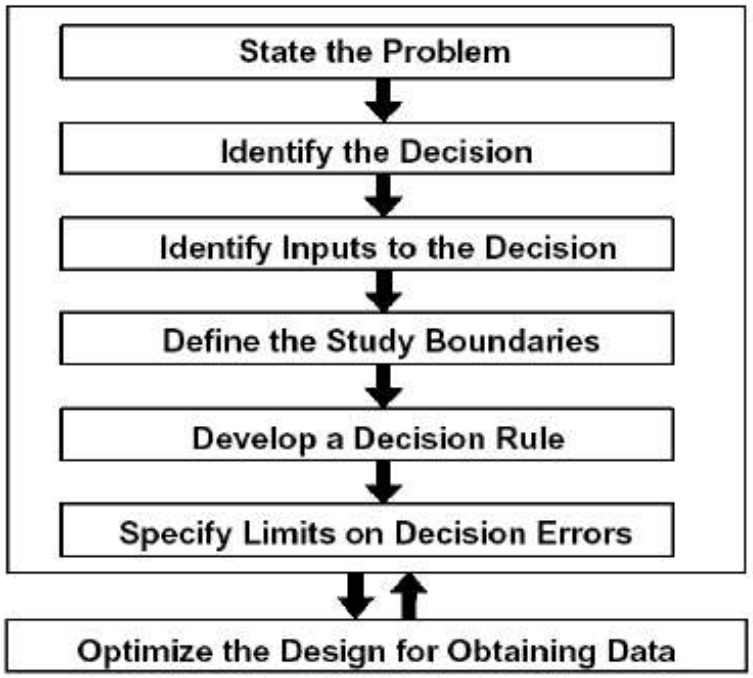


Figure 2: The US EPA Data Quality Objectives Process

- The Conceptual Site Model (CSM) helps determine the need for a vapor investigation
- The CSM will guide development of the Data Quality Objectives (DQOs)

Design Considerations

- Sampling plans are project-specific – what are your DQOs?
- What information do we have?
  - Historical information
  - Previous site investigations
  - Identified sources – current/former USTs, floor drains/sumps, septic system, dry cleaning
- What are the target/screening levels?
  - DEQ RBCs
  - Receptors
- What types of vapor sampling methods are appropriate & feasible?
  - Soil gas
  - Subslab vapor
  - Ambient air

ITRC Vapor Intrusion Investigation Example

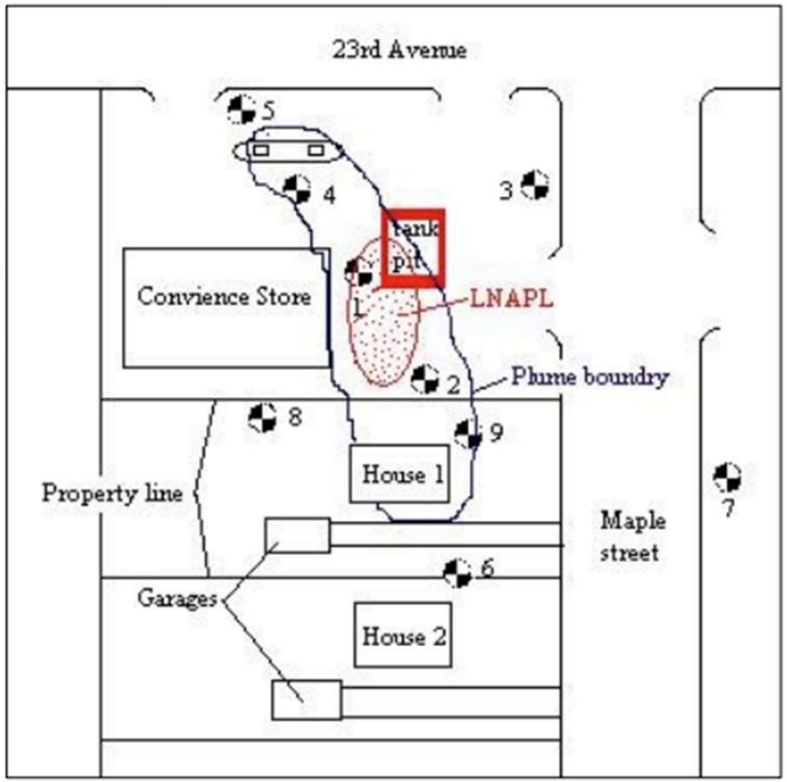
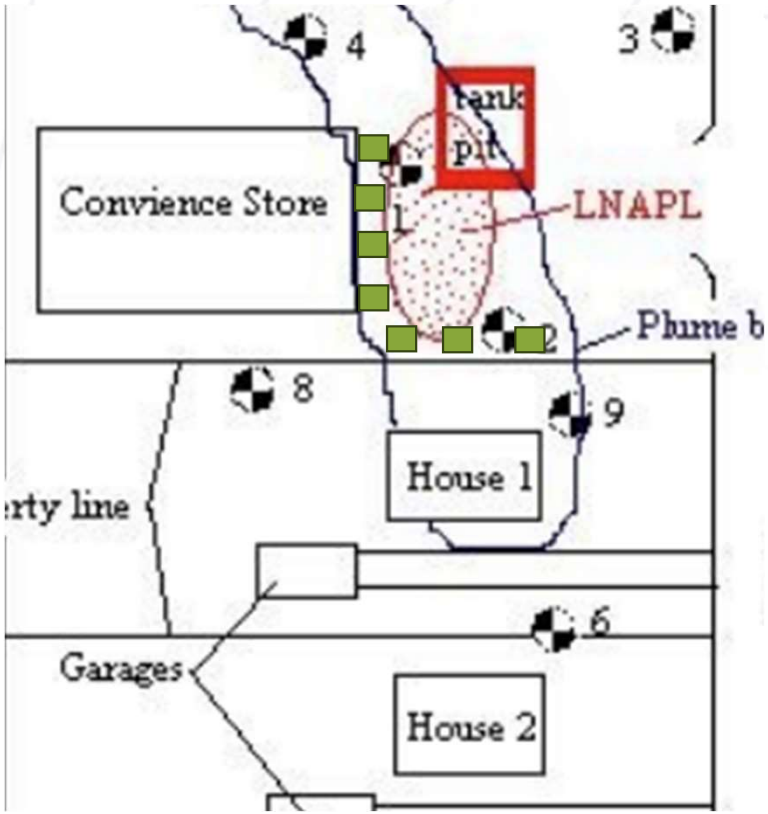


Figure 1-1. Residential neighborhood gas station.

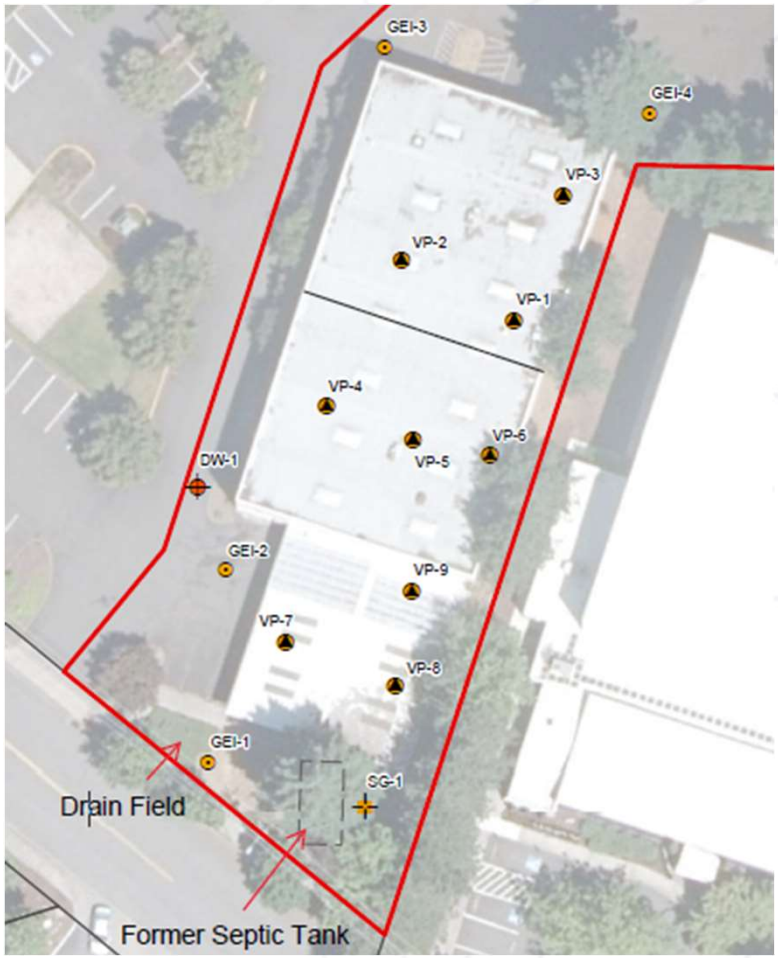
ITRC Sampling Recommendation



- Assumptions –
  - Could not access residents' properties
  - Residences have basements
- Soil gas sample at depths of 3, 8, and 13 feet bgs near residence
- Soil gas sample near surface (concrete ground surface) by store.

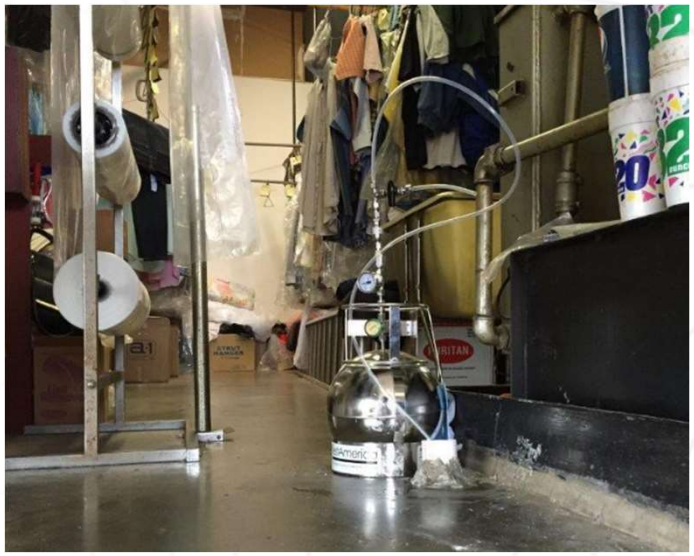
Design Considerations - Continued

- Phase II ESA
- 30,000 sq ft industrial building
- Potential point sources
  - Septic system
  - Drain field
- Unknown point sources
  - Long term industrial use



Subslab Vapor Sampling

- Best predictor of vapor intrusion into existing buildings
- Considerations –
  - Requires installation of vapor pins in the building slab
  - Crystalline silica dust
  - Asbestos-containing materials
  - Rebar/ subslab utilities
  - Concrete thickness
- Ambient Air Intrusion
  - Look for cracks or preferential flow pathways
  - Leaks in the sampling setup



Where are the leaks coming from?

Connection between flow controller and tubing

Connection between Summa canister and flow controller

Seal between vapor pin and concrete

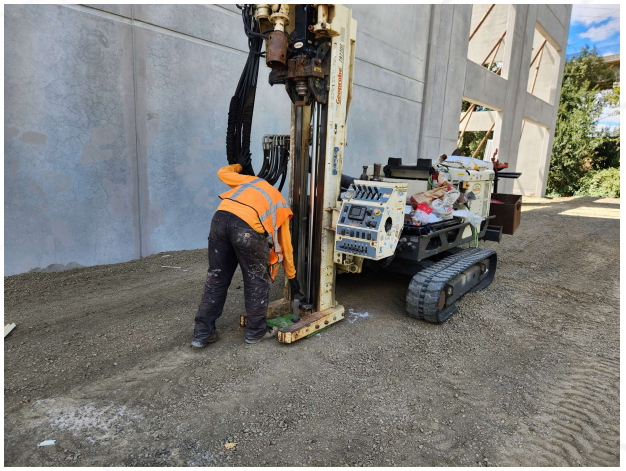
Subslab Sampling Leak Tests

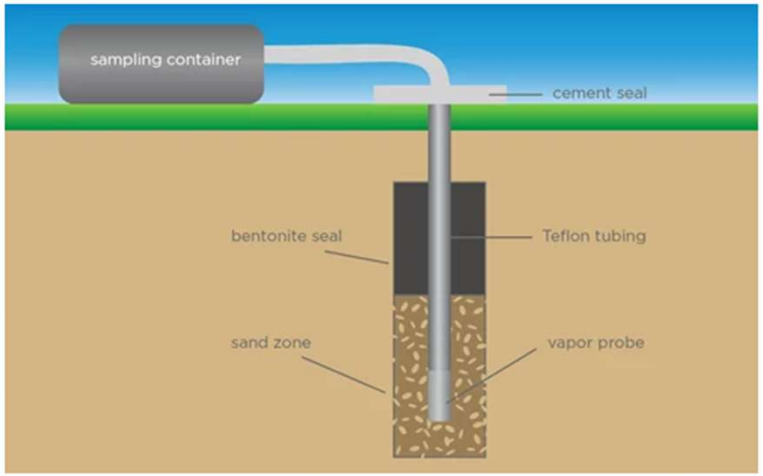
- Shut-In Test

- Water-Dam Test

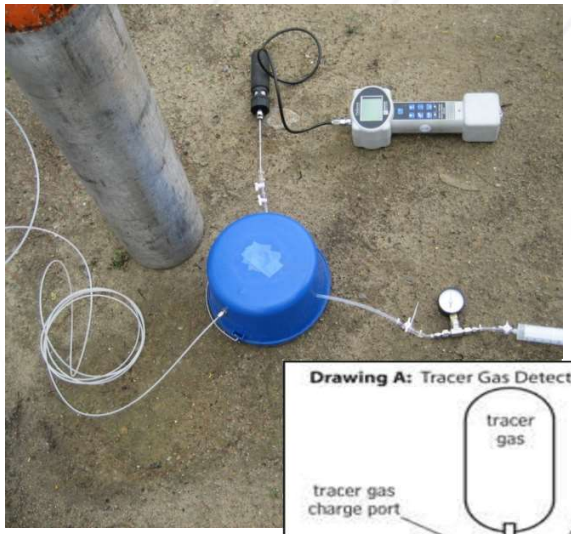
Soil Gas Sampling

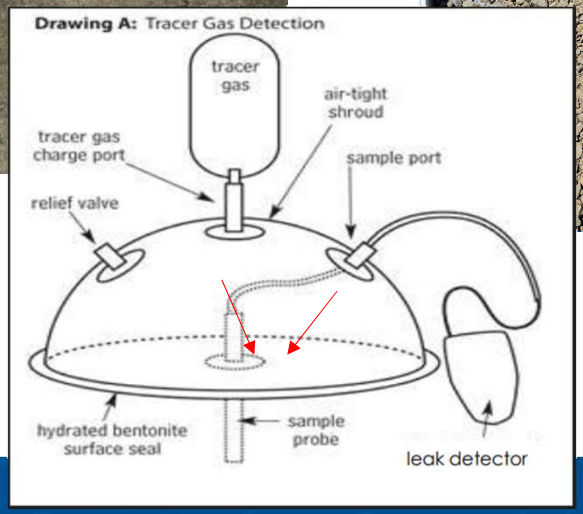
- Considerations
  - System equilibration
  - Purge volume
  - Utility pre-clearance (no air knife)
  - Leaks





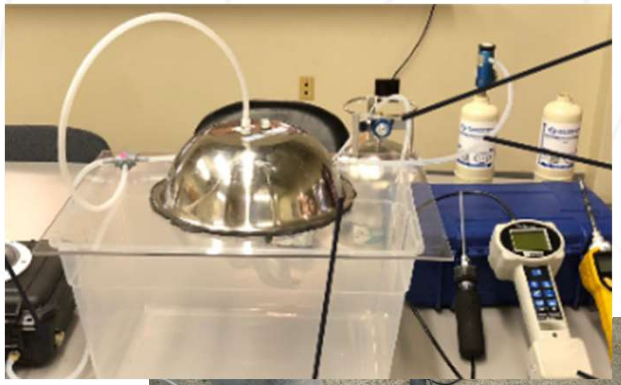
Soil Gas Sampling Leak Tests

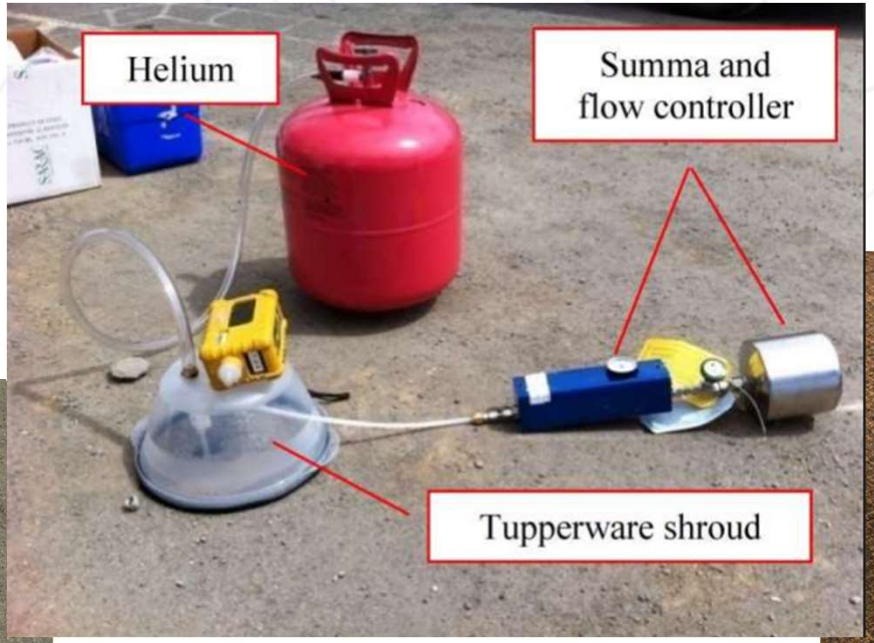




- Shut-In Test
- Sample Point Leaks
  - Post-sample leak monitoring
    - Inert gas
    - Several cons to this method
  - Tracer gas leak test
    - Equipment needs, air pump, helium, helium detector, shroud.
    - >5% ambient air leakage is not acceptable

Shrouds Come in All Shapes and Sizes





Field QA/QC

- Avoid actions that may cause sampling interference
  - Fueling or running vehicles
  - Permanent marking pens
  - Smoking
  - Freshly dry-cleaned clothing
  - New materials
  - Perfumes/fragrances

Questions?

<u>Reference Materials</u>

EPA, 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process. February.

DEQ, 2010. Guidance for Assessing and Remediating Vapor Intrusion in Buildings. March. *Updated DEQ Guidance is Coming Soon!

ITRC, 2007. Vapor Intrusion Pathway: A Practical Guide. January.

ITRC, 2007. Vapor Intrusion Pathway: Investigative Approaches for Typical Scenarios. January.

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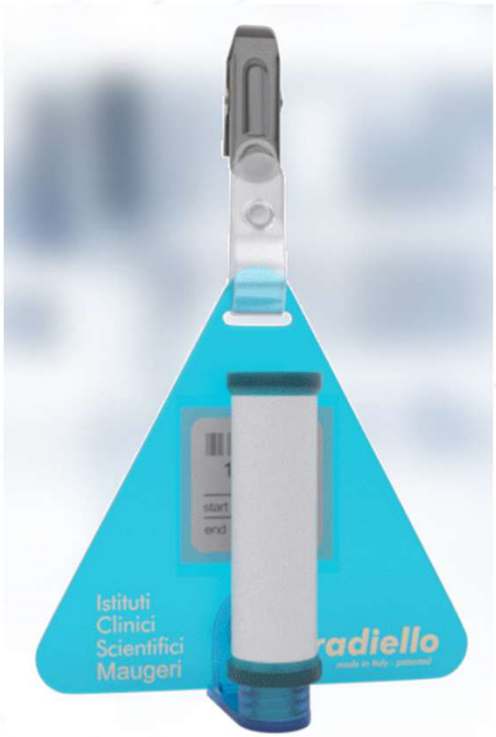
Ambient Air Sampling

- Sample Types (active, passive, indoor, outdoor)



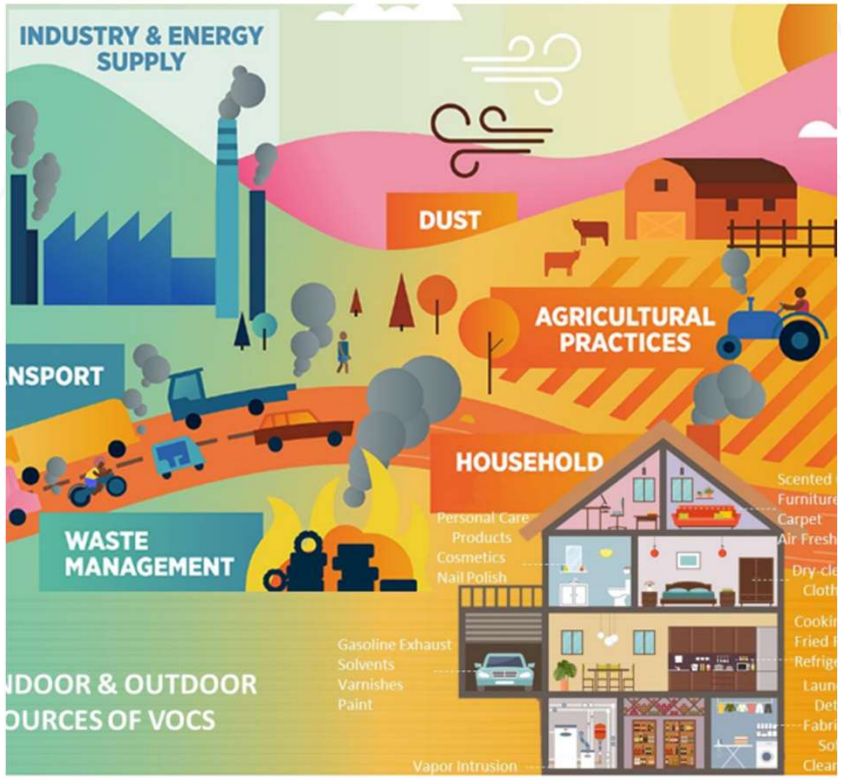
Indoor Air Sampling

- Sample Interferences
  - At least 2 weeks prior to indoor air sampling, complete building survey
  - Identify conditions that may affect or interfere with the proposed sampling
  - SO MANY THINGS!

Indoor Air Sampling

- Best Practices
  - Mitigate potential items that may interfere with sampling
  - Collect from breathing zone (approximately 3-5 feet from the floor)
  - Close doors and windows
  - Determine status of HVAC system
  - Collect an outdoor air sample at same time for comparability to outdoor ambient VOC conditions.

Outdoor Air Sampling



- Outdoor Air Sampling Interferences
  - What's around you?
  - Automobile exhaust, service station, dry cleaning operations, landscaping, other activities and industrial operations
  - Record conditions
- Best Practices
  - Collect from a representative upwind location, away from wind obstructions (trees, building)
  - Collect from breathing-zone height
  - Security

Water-Dam Leak Test

- Following vapor pin installation, perform water-dam test.
- Place water-dam around vapor monitoring point and fill with distilled water.
- Monitor water level in dam. Concrete will absorb some of the water.
- If water is lost to the vapor point, repair vapor pin slab penetration or re-install until pin passes the water-dam test.

Common VI Mitigation Options

- Easy Implementation Mitigation Options
  - Slab inspection for seal cracks or other identified preferential flow paths
  - Floor sealing products
  - Vapor barrier layer (new construction)

- Next-Level Mitigation Options
  - HVAC improvements
  - Vapor barrier layers

- Last Options
  - Subslab depressurization system