Adventures In Sub-Slab Sampling

Vapor intrusion sampling was conducted at two sites in the Wausau area

- A DERP site that is currently being used as a thrift store.
- VPLE site at a closed industrial facility.

Vapor intrusion sampling at both sites followed similar paths

- 1st tried to use temporary sample points.
- Experienced leakage problems using temporary samplers that could not be resolved.
- Had to return to the site to install permanent or permanent-like sample ports.

Vapor intrusion sampling at both sites followed similar paths

- Showed that the installation of sampling ports is critical to collecting usable samples.
- Showed that leak testing is necessary even with the use of permanent samplers.
- Sometimes the equipment will give elevated readings with the helium meter.

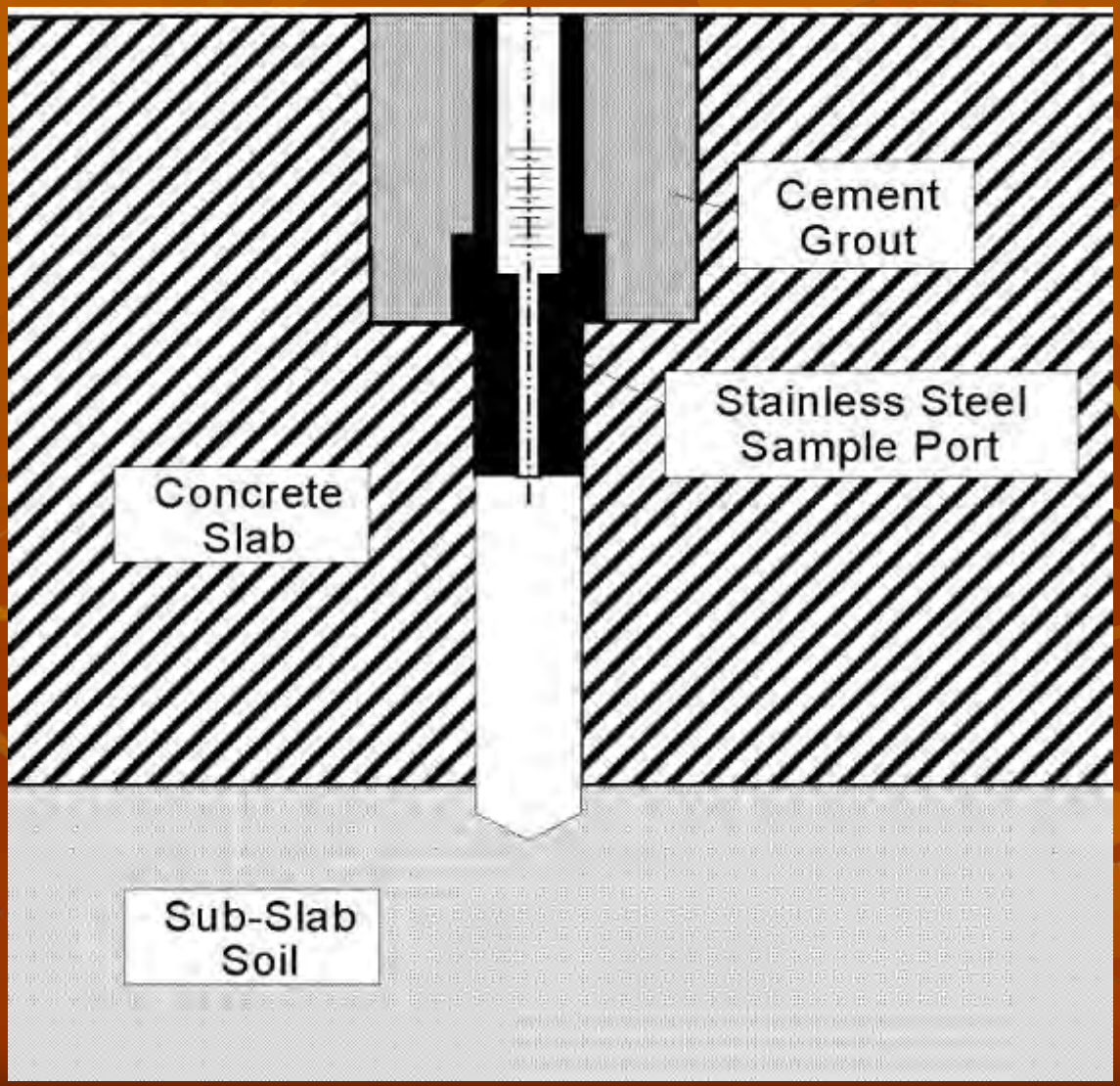
Refresher in VI Sampling

1) Drill Sample Location

2) Clean Sample Location

3) Install and Seal Port Installation

Typical Sample Port Installation X-section



4) Leak Detection

- On-site detection using a helium shroud.

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- In the field used a rag soaked with a know compound such as isopropyl alcohol which is later verified by lab analysis.

5) Leak testing at sample port

6) Collect Sample

Other Common Issues That needed to be Considered

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Sub-Slab Sampling Sites

1st Attempt with Temporary Samplers

- A teflon tube is installed through the concrete and sealed.
- Vapors are drawn through the tube.
- Sounds reasonable… Right?

Oh No! What Went Wrong?

Problems with Sealing Temporary Sample Ports

- Sealing material is usually some sort of pliable material such as modeling clay, play do, bees wax, etc.
- Sealing material doesn't actually bond to the tube.
- Small gaps can form when tubing is moved/wiggled.

Leak Testing on the Temporary Sample Ports

- DERP Site
  - Helium testing conducted
  - Leakage detected
  - Could not resolve leak problem
- VPLE Site
  - Isopropyl alcohol used to verify seal
  - Sample results contained isopropyl alcohol and other weird compounds

VPLE Sub-slab results

	VP-1 (ug/m^3)	VP-2 (ug/m^3)
Analyte		
Acetone	3,100	180
Benzene	-	9.3
2-Butanone	200	-
Carbon DiSulfide	-	41
1,4 Dichlorobenzene	-	6.3
2-Propanol	160,000	89
Tetrachloroethene	250	1,700
Toluene	97	14
1,1,1-Trichloroethane	-	17

Lesson from using temporary sample ports

- An adequate seal could not be achieved using temporary sample ports.
- The lab data was not usable (bad data).
- Site had to be re-sampled.
- Extra costs were incurred because of additional site visits.
- On-site leak testing is a good tool for avoiding bad data.

Return trip to sample the sites

- Helium leak testing done at both sites.
- VPLE site used a home-made permanent sample port and sealed it with bees wax.
- DERP site used a commercially-made sample port and sealed it with concrete.
- And …….

Oh No! What Went Wrong? AGAIN!

- Permanent sample ports are supposed to be fool-proof …. RIGHT?
- Both sites had leak problems on at least one permanent sample port.

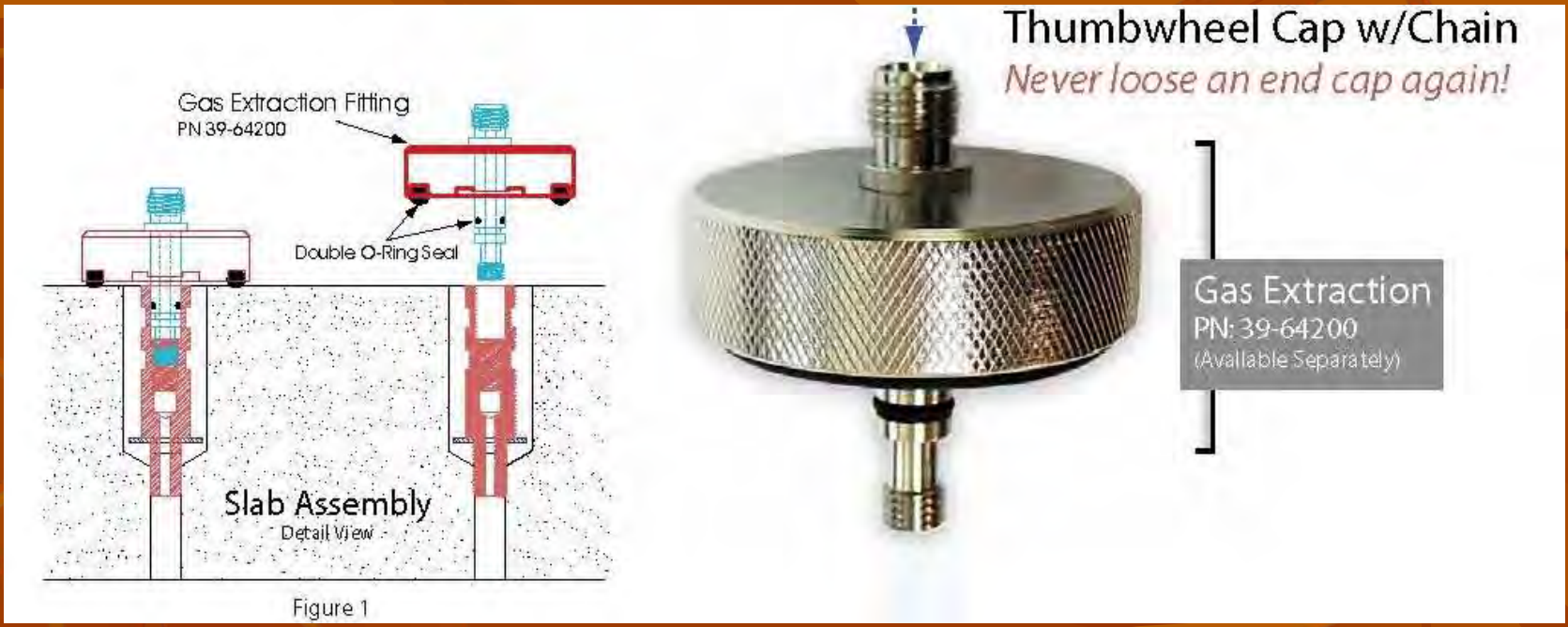
There were a number of issues at the DERP site during the second sampling event

- The ambient air registered about 10 units with the helium meter.
- The Teflon tubing registered a couple hundred units with the helium meter.
- Leak testing at the first sampling point detected helium at tens of thousands of meter units.
- Leak testing at the other sampling locations detected helium at equipment background readings.

Sample location that failed the leak test, again

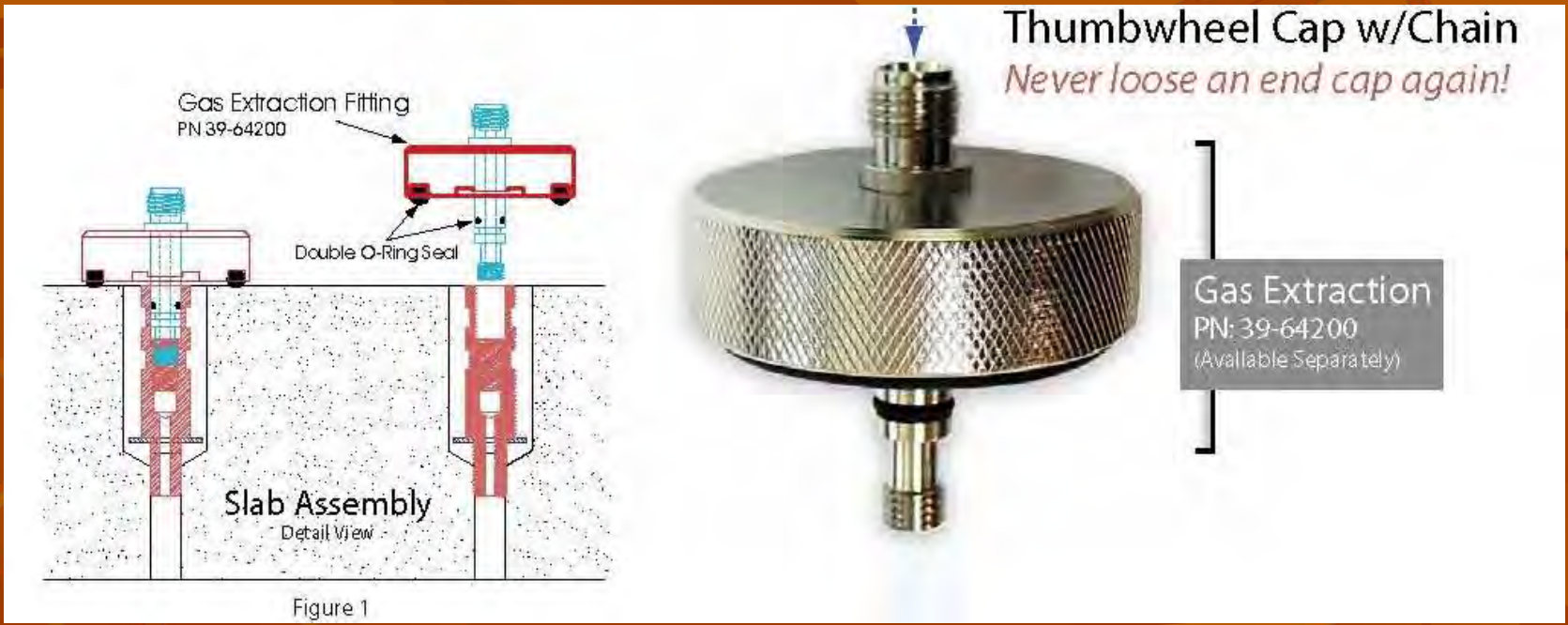
Assembled Sample Port

Installed Sample Port X-section



- Foot traffic may have jarred the sample port breaking the seal between the sample port and concrete

Sealing the thumbwheel to the floor solved the problem



Sample Port used at VPLE site

VPLE Sampling Setup

Helium Shroud Seal

VPLE Detected Compounds

- Dichlorodifluoromethane
- Chloromethane
- Trichlorofluoromethane
- Acetone
- Carbon Disulfide
- 1,1,2-Trichlorotrifluoromethane
- Vinyl Acetate
- MEK
- Toluene
- 2-Hexanone
- Tetrachloroethene
- Total Xylenes
- 4-Ethyltoluene
- 1,2,4-Trimethybenzene
- 1,4-Dichlorobenzene
- Benzene
- MIBK

Main Lessons Learned

- Temporary points are almost impossible to seal.
- Leak testing is needed on permanent points.
- Installation of sample port is critical to reliable data.
  - Choose locations that are not in major traffic areas.
  - Recess the sampling port into the slab
- The sample equipment can also give elevated readings.

Discussion