 **SCHOOL OF PUBLIC HEALTH**
UNIVERSITY AT ALBANY State University of New York

**Evaluating Soil Vapor Intrusion
in New York State**

October 18, 2007

Guest Speaker

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Bureau of Environmental Exposure
Investigation**

October 18, 2007

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- School of Public Health, University at Albany
- NYS Department of Health
- NYS Community Health Partnership

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- NYS Association of County Health Officials
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Evaluations

Please visit
www.t2b2.org
to fill out your evaluation and post test.

**Nursing Contact Hours, CME, CHES
are available.**

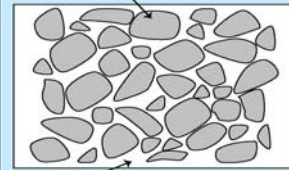
Thank you!

Soil Vapor Intrusion

- Provide an overview of what soil vapor intrusion is and why it is a concern
- Discuss New York State's approach to addressing this issue

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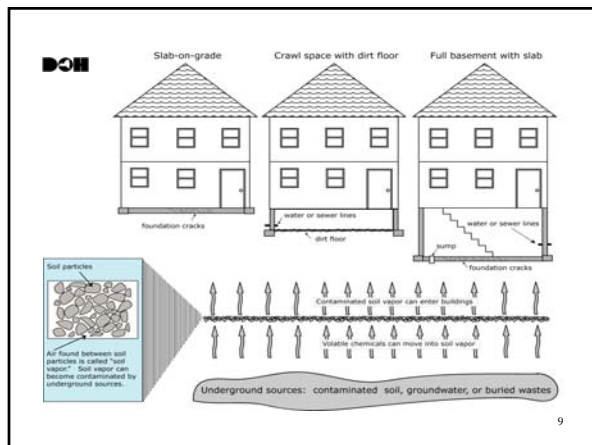
Soil particles



Air found between soil particles is called "soil vapor." Soil vapor can become contaminated by underground sources.

DOH

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Vapor Intrusion Exposure Pathway

An exposure pathway is the process by which an individual is exposed to contaminants that originate from some source of contamination.

- Source of contamination
- Environmental media and transport mechanisms
- Point of exposure
- Route of exposure
- Receptor population

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Volatile Organic Compounds (VOCs) — Examples

- Commercial solvents, degreasers, etc.
trichloroethene (TCE)
1,1,1-trichloroethane (1,1,1-TCA)
tetrachloroethene (PCE)
- Gasoline
benzene, toluene, ethylbenzene, xylenes

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Health Effects Associated with VOCs

- Short-term exposure to high levels of some VOCs can cause headaches, dizziness, light-headedness, drowsiness, nausea and eye, ear, throat irritation.
- In laboratory animals, long-term exposure to high levels of some VOCs has caused certain types of cancer and affected the liver, kidney and nervous system.

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Likelihood of Health Effects

If no exposure, no health effects.

- Exposure does not necessarily mean that health effects will occur.
- Depends upon many factors including
 - Length and frequency of exposure
 - Amount of exposure (dose)
 - Toxicity of the volatile chemical
 - Individual's sensitivity to the chemical

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Other Sources of VOCs in Indoor Air

- Household products
- Attached or underground garages
- Occupant activities
- Indoor emissions
- Off-gassing materials
- Outdoor air

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Reducing Exposures Associated with Indoor Sources of VOCs

- Properly dispose of unneeded products containing VOCs.
- Buy products in amounts that are used quickly or choose products that contain less or no VOCs.
- Use products containing VOCs in well-ventilated areas or outdoors.
- If you must store products containing VOCs, do so in tightly-sealed, original containers in a secure and well-ventilated area or (if possible) in an area where people do not spend much time

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Why Vapor Intrusion is an Issue

- Vapor intrusion is not a new phenomenon
- Our understanding of the process is evolving
 - Many old assumptions are not valid
 - Sampling equipment and protocols are improved
 - More precise analytical methods are available

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Historic Assumptions – Examples

- Need extremely high concentrations in groundwater or soil for there to be a potential for effects on indoor air quality.
- Soil vapor conditions near a building are representative of conditions beneath the building.
- The ratio of levels in soil vapor to indoor air (attenuation factor) are typically 1,000 : 1 or greater.

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NYSDOH & NYSDEC Activities

- Investigation of sites
- Developed an aggressive approach
- Held training sessions
- Produce reference materials
 - Policy and guidance
 - Fact sheets
 - Website on soil vapor intrusion
 - Guidance document

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Investigation Overview

- Site-by-site basis
 - Each site is unique
 - Phased iterative approach
- Extent
 - Soil vapor contaminated?
 - If so, nature and extent? Source(s)?
 - Current and potential exposures?
 - Actions needed?

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Investigation Overview (con't.)

- Types of samples collected include
 - Groundwater
 - Soil
 - Soil vapor
 - Air — homes and other buildings

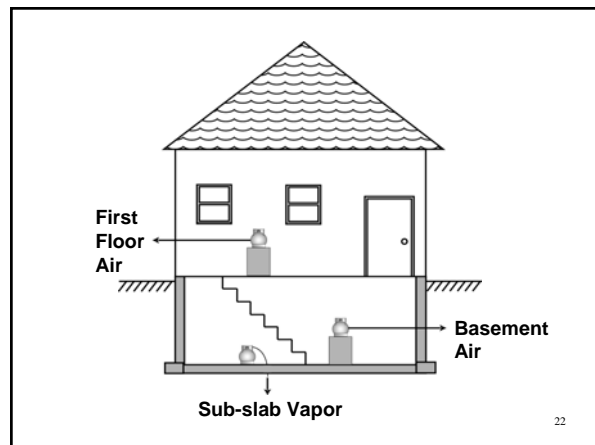
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Structure Sampling Overview

- Indoor air samples collected
 - Basement and lowest-level living space
- Sub-slab vapor samples collected
- Outdoor air samples collected
- Building questionnaire and product inventory completed

We expect to find VOCs in the air samples.

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Data Evaluation Overview

- Decision-making
 - Whole picture approach
 - Multiple lines of evidence
- Individual results for a specific building are not reviewed in isolation

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Data Evaluation Overview

- Additional factors considered when evaluating results...
 - Nature and extent of contamination in all media
 - Factors affecting vapor migration & intrusion
 - Completed or proposed remedial actions
 - Sources of volatile chemicals
 - Levels of volatile chemicals often found in air
 - Applicable standards, criteria and guidance values
 - Current and future land uses

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Possible Actions Recommended

- No further action
- Resampling
- Monitoring (sampling on a recurring basis)
- Mitigation

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Tools: Decision Matrices

- Provide recommendations for actions
- 2 matrices; 7 compounds assigned
- Considerations:
 - Health risks
 - NYSDOH's air guidelines
 - Levels of volatile chemicals commonly found in air
 - Analytical capabilities
 - Attenuation factors

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Soil Vapor / Indoor Air Matrix 1

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mg/m ³)	INDOOR AIR CONCENTRATION of COMPOUND (mg/m ³)			
	< 0.25	0.25 to < 1	1 to < 5.0	5.0 and above
< 5	1. No further action	2. Take reasonable and practical actions to identify source(s) and reduce exposures	3. Take reasonable and practical actions to identify source(s) and reduce exposures	4. Take reasonable and practical actions to identify source(s) and reduce exposures
5 to < 50	5. No further action	6. MONITOR	7. MONITOR	8. MITIGATE
50 to < 250	9. MONITOR	10. MONITOR / MITIGATE	11. MITIGATE	12. MITIGATE
250 and above	13. MITIGATE	14. MITIGATE	15. MITIGATE	16. MITIGATE

Trichloroethene (TCE)
Vinyl Chloride (VC)
Carbon Tetrachloride (CT)

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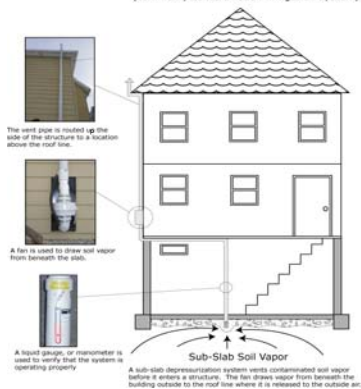
Soil Vapor / Indoor Air Matrix 2

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mg/m ³)	INDOOR AIR CONCENTRATION of COMPOUND (mg/m ³)			
	< 3	3 to < 30	30 to < 100	100 and above
< 100	1. No further action	2. Take reasonable and practical actions to identify source(s) and reduce exposures	3. Take reasonable and practical actions to identify source(s) and reduce exposures	4. Take reasonable and practical actions to identify source(s) and reduce exposures
100 to < 1,000	5. MONITOR	6. MONITOR / MITIGATE	7. MITIGATE	8. MITIGATE
1,000 and above	9. MITIGATE	10. MITIGATE	11. MITIGATE	12. MITIGATE

Tetrachloroethene (PCE)
1,1,1-Trichloroethane (1,1,1-TCA)
1,1-Dichloroethene (DCE)
cis-1,2-Dichloroethene (*c*-1,2-DCE)

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Sub-Slab Depressurization System (commonly called a radon mitigation system)



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Community Outreach

- May be going into people's homes, workplace, etc. and evaluating the air they breathe
- Essential component of each step of the process
- Approach will be tailored to specifics of the site, community characteristics, and regulatory program

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Types of Outreach Activities

- Project staff contact sheets
- Fact sheets
- Public gatherings
- Door-to-door visits
- Telephone calls

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Types of Outreach Activities (con't.)

- Letters transmitting results
- Mitigation information
- Repositories
- Medical community outreach

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NYS's Approach Differs from Others

- No groundwater or soil screening values
- No default attenuation factors
- No use of modeling as the sole assessment
- No prescribed distance criteria

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NYS's Approach Differs... (con't.)

- Emphasis on sub-slab vapor and indoor air data
- Consider both potential and current exposures

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Resources

NYSDOH's SVI Web Site

www.health.state.ny.us/environmental/indoors/vapor_intrusion/

(Google: NYS DOH, soil vapor intrusion)

Krista Anders

1-800-458-1158 ext. 27860

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NYS's October 2006 Releases

Final Guidance — NYSDOH

health.state.ny.us/environmental/indoors/vapor_intrusion/

Final TCE Criteria Document — NYSDOH

health.state.ny.us/environmental/chemicals/trichloroethene/index.htm

Soil Vapor Intrusion Policy (DER-13) NYSDEC

dec.ny.gov/docs/remediation_hudson_pdf/der13.pdf

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November 15, 2007

Human Health Effects of Lead

David Carpenter, MD

**Director, Institute for Health and the
Environment, University at Albany,
School of Public Health**

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