Public Health Concerns from Vapor Intrusion

St. Louis Park

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MDH Minnesota Department *of* Health

MDH's Mission

To protect, maintain and improve the health of all Minnesotans

What are Volatile Organic Compounds (VOCs)?

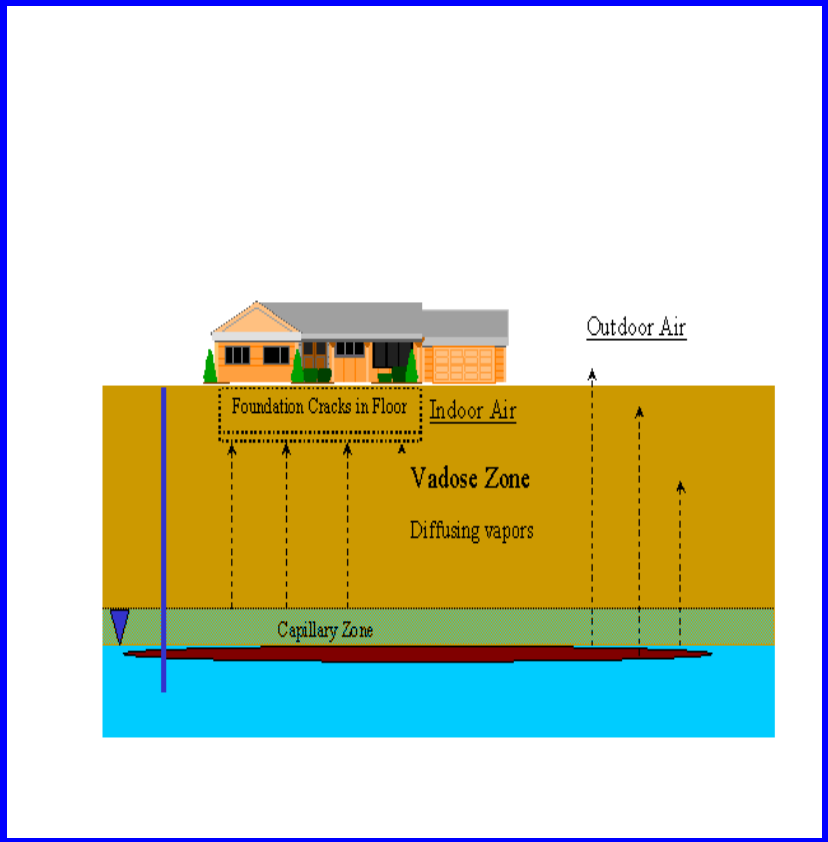
- Chemical solvents used for cleaning and degreasing
- Common in consumer products and frequently found at waste sites
- Easily evaporate from products, or soil and water if spilled or disposed of
- Petroleum products contain many VOCs
- Toxicity to people varies widely

Target VOCs: Highway 7 & Wooddale Ave Vapor Study

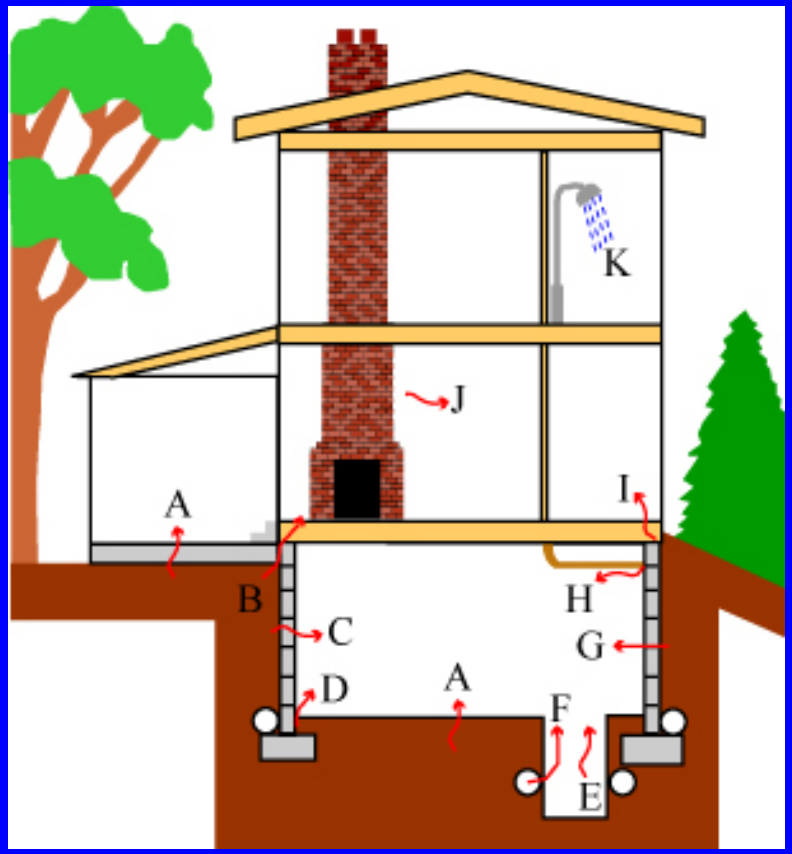
- Tetrachloroethylene (perchloroethylene, PCE)
- Trichloroethylene (TCE)
- Vinyl chloride
- cis and trans 1,2-dichloroethene
- 1,1-dichloroethane
- 1,1-dichloroethene
- 1,1,1-trichloroethane
- Benzene
- Napthalene and 2-methylnapthalene
- 1,2,4- and 1,3,5-trimethylbenzenes

EPA/MPCA vs MDH Roles

Outside: EPA/MPCA



Inside: MDH



Why is Vapor Intrusion a Possible Public Health Concern?

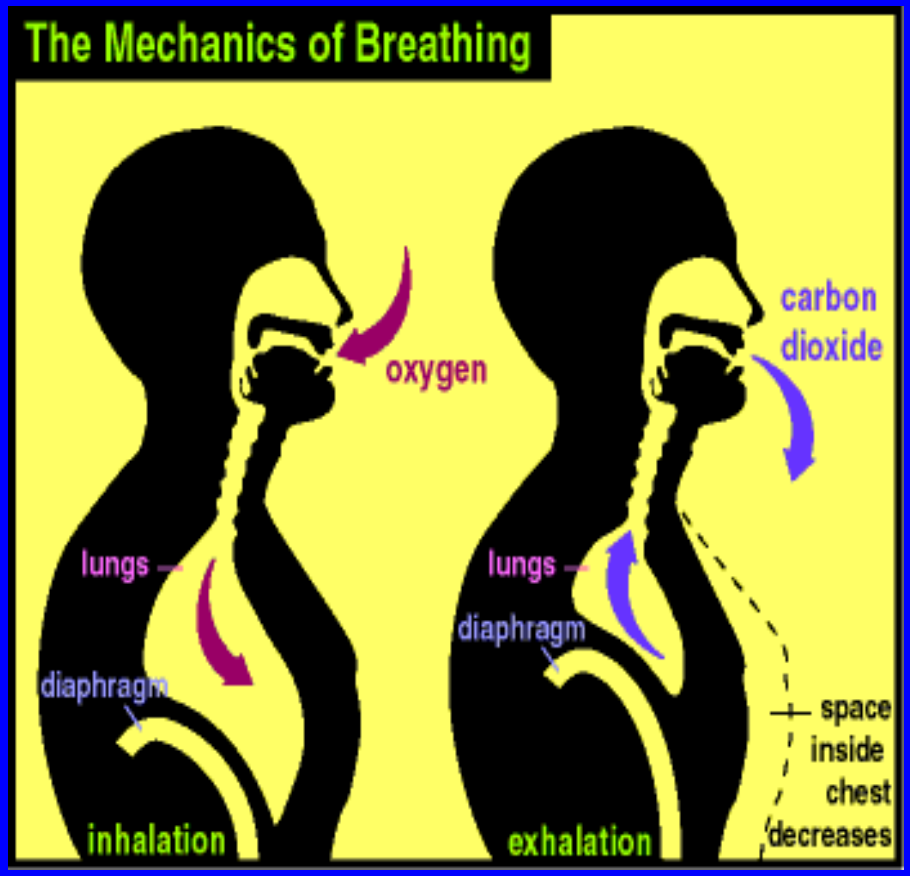
- Studies show people spend about 85 - 90% of their time indoors (even children).
- There has been a growing interest in indoor air quality.
- The science of indoor air assessment has grown tremendously in recent years.
- Radon gas awareness – real estate disclosure law; increased testing

Vapor Intrusion Health Risks

- Fire and explosion risks: buildup of methane gas, petroleum products.
  - *Very rare*.
- Acute health risks: short-term exposure resulting in headaches, nausea, eye and throat irritation, etc.
  - Rare, usually from workplace exposures.
- Chronic health risks: long-term exposure resulting in an increased risk of adverse effects in specific organ systems, birth defects, or cancer risk.
  - Also rare from environmental exposure.

Chronic Health Risks: Inhalation Toxicology

- Difficult to estimate how much is absorbed
- Behavior driven
- Large differences between individuals
- This results in criteria that can be much more variable and likely based on intended use



Example: Tetrachloroethylene

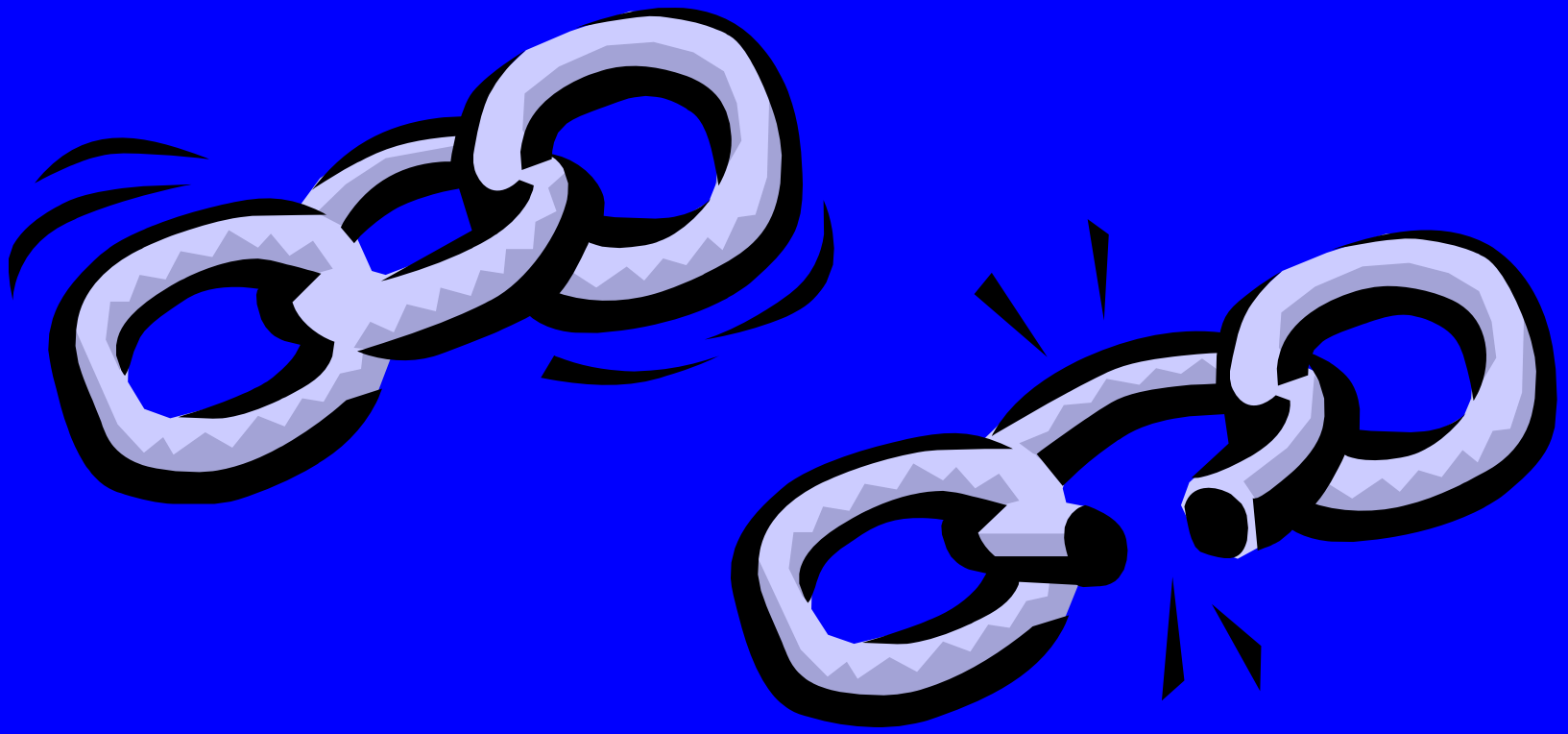
- MDH guidance: 2 µg/m^3 (based on cancer risk); 15 µg/m^3 (based on risk of non-cancer effects) (long-term exposure, general public)
- MDH Acute HRV: 20,000 µg/m^3 (short-term exposure, general public)
- MN OSHA PEL: 170,000 µg/m^3 (workplace exposure, acute effects)

What is the Process for Evaluating Vapor Intrusion?

- The process is geared towards eliminating vapor intrusion as an exposure pathway.
- Begins at the source (often groundwater), works towards potential receptors.
- If contaminants are not found (or are below health protective screening values), health risk is minimal and no further action may be needed.
- If vapor intrusion is occurring, remediation or mitigation can break the exposure pathway.

Exposure Pathway

Groundwater → Soil Vapor → Sub-slab Vapor → IA



Sub-Slab Vapor Sampling

- Typical first step to understand potential for vapor intrusion
- Simple and easy to do
- Results generated quickly

Indoor Air Sampling

- Use stainless steel (Summa) canisters that are under a vacuum
- Long-term (up to 24 hour) sample time
- Do's and don'ts: no smoking, don't use fireplace or candles, do keep windows closed
- Home chemicals need to be removed prior to testing to minimize interferences
- Very low detection limits

Trace Atmospheric Gas Analyzer (TAGA) Mobile Laboratory

"Background" Levels of VOCs

- Constant problem in assessing contaminants in indoor air
- VOCs found in numerous products and building materials
  - PCE in dry cleaned clothes
  - TCE in cleaners
  - Napthalene in petro products
- Also can be outdoor sources
- Building survey is an important tool to identify other sources

Before Collecting Indoor Air (IA) Samples, Remove Sources of Air Contamination

What if Vapor Intrusion is Found to be Occurring ?

- Screening values are very protective – even if exceeded the risk is still very low.
- Mitigation systems are inexpensive and easy to install.
- Mitigation systems are effective at reducing or preventing vapor intrusion – and also prevent infiltration of naturally occurring radon gas – the second leading cause of lung cancer in the U.S.

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http://www.health.state.mn.us/divs/eh/hazardous/index.html