

Vapor Intrusion: Determining the Risk of Exposure

Scott Herzog, CIH

OccuHealth, Inc.

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Proposed EPA VI Guidelines

- Tier 1 – Preliminary Screen
 - VOC's present ?
 - Near buildings ?
 - Immediate concern ?
- Tier 2 – Generic Screen
- Tier 3 – External Site-Specific Screen
- Tier 4 – Internal Site-Specific Assessment

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Every Situation Is Unique

When Is VI Evaluated Under MCP ?

- Presence of nearby occupied buildings
- When groundwater concs > GW-2 standards
- When VOC's present in soil.
- Presence of LNAPL and/or free product
- Soil gas above screening values
- MCP uses a tiered risk-based approach
 - Generic cleanup standards
 - Site specific standards with modeling
 - Site-specific risk assessment

When Does MCP Apply ?

- Primary residences, schools, day care centers, senior centers, hospitals.
 - Focuses on “at risk” segments of population
 - Exposure occurs over long period and may occur 24/7 (home).
- Does MCP apply to workplaces ?

Why Not OSHA Standards ?

- MCP believes OSHA PELs and ACGIH TLV's not appropriate for homes & schools.
 - Limits not protective enough
 - Doesn't protect most sensitive group
 - Doesn't consider lifetime exposure
- If in workplace using same chemicals ?
 - Compare to OSHA and MCP
- What about non-industrial (office) setting ?
 - Question of jurisdiction BUT
 - Method 3 Assessment still required under MCP

Steps to Determine IAQ Impact

- Compare GW contamination to GW2 standards.
 - GW data from same aquifer and close to impact building
 - Make certain soil gas data taken from soil gas tested.
- Compare indoor contaminants to GW and soil gas.
 - Can method detect contaminant ?
 - Check detection limits with laboratory

Steps to Determine IAQ Impact

- Compare IAQ data to compound-specific background concs
 - Comparison to *75%* percentile or higher recommended
 - Do not use outdoor background as indicator of indoor background
- Compare indoor air in different parts of the building.
- Check for indoor sources of chemicals under study.

How Do You Measure Risk ?

- Under MCP, 3 methods to determine the risk of harm of a release:
 - Compare measured concentrations to soil standards.
 - Compare measured concentrations to groundwater standards.
 - Perform health risk assessment.
 - There are no air standards in the MCP.

Groundwater 2 Standards

- GW-2 standards involve modeling from groundwater to soil gas and soil gas to indoor air.
- Based on LOWEST OF
 - 20% of Allowable Daily Exposure for Non-Cancer Effects (EPA RfC) OR
 - Excess lifetime cancer risk of 1 in 1 million OR
 - 50% Odor Recognition Level

Who Determines Risk

- Under the MCP, the LSP of record signs off
 - Team Approach – Will bring in
 - Risk Assessor (Data Interpretation)
 - Industrial Hygienist (Sampling Strategy)
- The Method 3 Human Health Risk Assessment is site-specific.
 - Used to Determine “No Significant Risk” or in some cases, “Imminent Hazard”

How Do You Measure ?

Modeling vs. Air Sampling

- Modeling
 - Inexpensive
 - Many models are “one size fits all”
 - Variability based on conditions
 - EPA validated one universal model. Concluded actual measurements within +/- one ORDER OF MAGNITUDE acceptable.

How Do You Measure ?

Air Sampling

- Expensive
- At least one duplicate round of sampling, sometimes more.
- Results affected by many factors
- Length of Sample – May range from hours to days to weeks.

When Do You Sample ?

- Most Conservative

- Late winter/spring
- Indoors $10^{\circ} >$ Outdoors
- Winds > 5 mph
- Wet Soil
- Closed Windows
- Fans Off

- Least Conservative

- Summer
- Indoor $<$ Outdoor
- Calm Winds
- Dry Soil
- Open Windows
- Fans On

How Often Do You Sample ?

- MADEP recommends at LEAST one repeat event.
- Frequency depends on toxicity (acute vs, chronic)

What Factors Affect Measurements ?

- Controllable Factors

- Other Sources in Home
- Season of Year
- Air Exchange Rate
- Features of building
- Depletion of Contaminant

- Uncontrollable Factors

- Temperature
- Pressure
- Wind Direction & Speed
- Rainfall, Water Table
- Location of Release
- Preferential Migration Pathways

Measuring Impact on Indoor Air

- Groundwater < Screening Levels AND
- Soil Gas < Screening Levels, THEN NO ACTION if no preferential migration pathways.
- Compare indoor air to subsurface
 - Present in both, likely site-related
 - In house only, then may be from house

What Actions Can Be Taken

- Identify all sources of chemicals
 - Remove chemicals stored & used
- Seal cracks, voids and migration pathways
- Cover sumps
- Adjust HVAC
- Pressurize house
- Subslab depressurization
- Vapor Barriers
- Groundwater treatment

Where To Get Info on Toxicity

- Integrated Risk Information System (IRIS)
 - Info updated monthly
 - Readily available on internet
- Health Effects Assessment Summary
 - Updated quarterly
 - Doesn't have same degree of data validation

