VAPOR INTRUSION

RISK ASSESSMENT CONSIDERATIONS

(or…..WWSD??)

Dawn Ioven
U.S. EPA – Region III
13 January 2009
National Forum on Vapor Intrusion

Betty Ann Quinn
2 April 2009
Corrective Action Conference

ROMEO
Good Dog

MOLLY
Bad Dog

INDIANA

The Best Dog !

PURPOSE OF BASELINE RISK ASSESSMENT (BLRA)

- Characterize current *and* potential future risks to human health and the environment
- Determine the need for remedial action
- Aid stakeholders in understanding potential site-related risks
- Satisfy Federal regulations requiring the assessment of risk at Superfund sites

COMMON LAND-USE SCENARIOS

- Must consider current *and* future land-use
- Residential
- Occupational
  - Commercial
  - Industrial
- Recreational
- Other
  - Agricultural
  - Trespassing
  - Maintenance (Landscaping)

COMMON EXPOSURE PATHWAYS

- Surface soil
- Subsurface soil
- Ground water
- Air
- Surface water
- Sediment

COMMON EXPOSURE ROUTES

- Ingestion
  - Soil
  - Ground water
  - Surface water
  - Sediment
- Dermal contact
  - Soil
  - Ground water (bathing)
  - Surface water
  - Sediment
- Inhalation
  - Soil (outdoor vapors, airborne particulate, vapor intrusion)
  - Ground water (showering, vapor intrusion)
  - Air

CONSIDERATIONS FOR ASSESSING VAPOR INTRUSION RISKS

- Modeling vs. empirical data
  - Johnson & Ettinger (J&E) Model
  - Ground water data
  - Subslab soil gas data
  - Indoor air data
- Current vs. future land-use

J&E Model

- Predicts indoor air concentrations based on subsurface soil or ground water levels
- U.S. EPA recommends use of site-specific model input parameters
- Can not be used as a single line of evidence to eliminate site
- Can not be used if site conditions don't meet model assumptions: preferential flow paths (fractures, utility lines), shallow water table, etc.

EMPIRICAL DATA

- Ground water
  - Water concentrations at top of water table are potential source of vapor partitioning
- Subslab soil gas
  - Collect from space immediately under slab or basement
  - Variation in attenuation factors
- Indoor air
  - Truest measure of exposure
  - Must eliminate background sources (paints, solvents, gasoline, etc.)
- Outdoor air
  - Could identify external sources of air contamination

CURRENT VS. FUTURE LAND-USE

- U.S. EPA mandated by law to consider future land-use in BLRA
- Potential for vapor intrusion highly dependent on building structure
- Models only address a given set of assumptions
- Best bet for future scenario:
  - If subsurface VOCs present, incorporate vapor intrusion mitigation system in new construction

RULES OF THUMB

- Consider vapor intrusion threat when:
  - Structures are within 100 feet (laterally or vertically) of subsurface VOC source
  - Ground water VOC concentrations > MCLs*
- Proactive mitigation generally warranted if subslab soil gas concentration > 1000 times target indoor air level*
- Use multiple lines of evidence for decision-making
- Empirical data is always preferred over modeling
- Must consider future land-use

* Can vary based on site-specific considerations.

The End