Voluntary Cleanup Program Proposed Remediation Goals for Vapor Intrusion

What is the Nebraska VCP?

- **Established by the Remedial Action Plan Monitoring Act passed by the Nebraska Legislature in 1995, amended in 2004 and 2008**
- **Fee-based cleanup program for all entities interested in voluntarily cleaning up contaminated properties**

What is the Nebraska VCP?

- An alternative to traditional federal cleanup programs
- Facilitates the redevelopment and reuse of brownfield sites
- Provides State determination of "no further action" upon successful completion of cleanup activities, and protection from federal enforcement per NDEQ-EPA agreement

What is the Nebraska VCP?

- **Cleanup decisions based on risk, future land use, and groundwater use**
- **Provides chemical-specific Remediation Goals (RGs) for specific exposure pathways (inhalation, ingestion, and dermal) and land use categories (residential and industrial)**
  - **Also provide an RG for soil migration to groundwater**

VCP Guidance Document

- First published in 2006
- Updated in 2008 to reflect lower entry fees
- Current update expected to be finalized fall 2011
  - Updated toxicological information
    - Significant changes include 1,1-DCA and arsenic
  - More of a focus on vapor intrusion

What is Vapor Intrusion (VI)?

- **The migration of volatile chemicals from the subsurface into overlying buildings (with or w/o a basement) (USEPA 2002)**
- **Vapors can originate from soil contamination, NAPL, or dissolved groundwater contamination**

Current VI Guidance Documents

- **OSWER Draft Guidance for Evaluating the Vapor Intrusion Threat to Indoor Air Pathway from Groundwater and Soils (USEPA Draft Guidance) (2002)**
  - **Currently EPA is accepting comments until May 14, 2011**
  - **EPA plans to issue final guidance on Nov. 30, 2012**

Current VI Guidance

- DoD Vapor Intrusion Handbook (2009)
- ITRC Guidance (2007)
- Various States guidance documents

Current VCP Approach to VI

- **Currently VCP guidance document references USEPA Draft Guidance**
- **Does not include any RGs for VI**
- **Does not include any guidance on sampling procedures for VI**

Future VCP Approach to VI

- RGs for soil gas and groundwater that are protective of indoor air
- No prescriptive soil gas or subslab locations, or requirement for indoor air sampling
- Assessment of petroleum VI would still be assessed by PR Section under the RBCA program

Proposed Approach to Develop VI RGs

- **VI may be a concern if:**
  - **Volatile COPCs are identified at the site**
  - **Volatile COPCs are located 100’ bgs or less**
  - **Volatile COPCs are within 100’ horizontally of future or existing buildings**

Proposed Approach to Develop VI RGs

- **Consistent with current RG exposure factors**
  - **Residential: 1E-06 Cancer, 0.25 Hazard Quotient (HQ) for individual chemicals**
  - **Industrial: 1E-05 Cancer, 1 HQ**
- **Includes "risk-based" indoor air concentrations, not RGs**

Proposed Approach to Develop VI RGs

- **RGs were developed using EPA's 2004 model**
- **The model:**
  - **Provides estimated attenuation coefficient that relates the vapor conc. in indoor air to vapor conc. at the source**
  - **Assumes infinite or nondiminishing source**
  - **Is based on chemical properties of the contaminant, soil properties, building properties, and appropriate exposure assumptions**

Proposed Approach to Develop VI RGs

- **Soil gas and groundwater RGs for two soil types and two land use scenarios**
  - **Sand and silt**
  - **Residential and industrial**
- **Conservative depth to groundwater; 180 centimeters (cm) (or approximately 6 feet) applied from the bottom of the structure, slab on grade or basement**
  - **Soil gas sample should be collected from same depth**

Proposed Approach to Develop VI RGs

- **Soil gas samples collected directly beneath a slab or basement floor should not be compared to soil gas RGs**
  - **Sub-slab values should be compared to risk-based indoor air concentrations with appropriate attenuation factor**
    - **0.002 for residential**
    - **0.001 for industrial**

Proposed Approach to Develop VI RGs

- Guidance does not allow the use of soil data to evaluate vapor intrusion (only use soil gas or groundwater data)
- Guidance does not contain any inhalation values using route-to-route extrapolation methods, therefore of the approximately 112 volatile compounds 29 don't have a VI RGs
  - If a volatile chemical is present either a Tier 3 assessment should be performed, or propose an RG based on EPA guidance with an inhalation toxicity value to be reviewed and approved by NDEQ

Example VCP VI RGs

Compound Name	CAS	Soil Gas Remediation Goal (µg/m^3)			
		Residential, Sandy Soil	Residential, Silty Soil	Industrial, Sandy Soil	Industrial, Silty Soil
Tetrachloroethylene (PCE)	127184	184	238	40,441	48,006
Trichloroethylene (TCE)	79016	543	703	119,300	141,617

Compound Name	CAS	Groundwater Remediation Goal (µg/L)			
		Residential, Sandy Soil	Residential, Silty Soil	Industrial, Sandy Soil	Industrial, Silty Soil
Tetrachloroethylene (PCE)	127184	2	29	79	1,200
Trichloroethylene (TCE)	79016	9	127	363	5,338

What if a value exceeds a groundwater RG, do I need to collect soil gas?

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