Draft Vapor Intrusion Guidance Document Rollout

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Welcome!

What we will cover:

• History
• Changes
• Structure
• Highlights
• Discuss the rollout process
Development of the Guidance

Op Memo 4 – Attachment 4

• 2006 – Internal workgroup

• 2008 – External peer review
  ▪ Public rollout and comment period
    • Over 100 firms requested copies
    • 90 day comment period
    • 10 responses
Issues Identified in 2008

- Biodegradation of petroleum hydrocarbons
- Number of samples
  - frequency
  - duration
- Methods and questions about sampling
- Time it takes to make decisions
- Wanted more information
Addressing the Issues

- Sought stakeholder involvement
  - *Learned from their experiences*
  - *Wanted soil gas*
- State funded sites
- Science
- Guidance vs. requirements
### Stakeholders Involvement

- AMEC E & I, Inc.
- American Petroleum Institute (API)
- AKT Peerless Environmental & Energy Services
- AMS, Inc.
- ARCADIS U.S., Inc.
- ATC Associates Inc.
- Atlantic Richfield Company
- AQR ColorTec
- CETCO Lining Technologies
- Chrysler Group LLC
- Conestoga-Rovers & Associates (CRA)
- Cox-Colvin & Associates, Inc.
- Environmental Resources Management (ERM)
- Entech Instruments, Inc.
- Severstal North America, Inc.
- Fibertec Environmental Services
- Ford Motor Company
- Global Remediation Technologies, Inc. (GRT)
- Hamp, Mathews & Associates (HMA)
- Hartman Environmental Geoscience
- H&P Mobile Geochemistry, Inc
- Land Science Technologies
- MHE Products
- Michigan State Housing Development Authority (MSHDA)
- URS Corporation
- RAM Group of Gannett Fleming,
- Shell Global Solutions
- Soil and Materials Engineers, Inc
- TTL Associates, Inc.
- Weston Solutions, Inc.
- W. L. Gore & Associates, Inc
Why so long?

- Breaking the mold – worked with other companies timelines and availability
- Science for VI was moving fast
- Looked for solutions
- Identifying a more flexible format
- Additional stakeholder input processes
Office of Regulatory Reinvention

- Released January 2012
- Recommendation R-2
  - Allow the use of a conceptual site model
  - Allow data collection and evaluation processes consistent with the needs of business transactions
  - Other recommendations dealt with screening values and criteria
Collaborative Stakeholder Initiative

- Identified VI as a key issue
- Development of a set of recommendations
  - Development of guidance documents
  - VI Criteria for soil, soil gas, and water

VI Peer Review Draft
May/ June 2012
Things are moving!

BIG CHANGES AHEAD!

[Image of traffic sign, construction cones, and a hard hat with a plant sprouting from soil.]
General Summary of Changes

- Changes in the format
- Provides SOPs for examples
- Alternate procedures
- Review checklists
Key Considerations for the Regulated Community

• Optional
• Alternate approaches can be proposed
• Guidance document is not a statutory requirement
# Terms for Screening Values

<table>
<thead>
<tr>
<th>Sampling Location</th>
<th>Appropriate Vapor Intrusion Screening Value (SV\textsubscript{vi})</th>
<th>Immediate Response Activity Screening Levels (IRASLs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil sample</td>
<td>Soil concentration that identified a source of vapors (S\textsubscript{vi})</td>
<td>- - - -</td>
</tr>
<tr>
<td>Air within the interior space of a building derived from VI sources</td>
<td>Acceptable indoor air value for VI (IA\textsubscript{vi})</td>
<td>Indoor air values for consideration of an acute exposure for VI (AI\textsubscript{A\textsubscript{vi}})</td>
</tr>
<tr>
<td>Soil gas collected from the subsurface</td>
<td>Soil gas concentrations for VI (SG\textsubscript{vi})</td>
<td>Soil gas concentrations for consideration of an acute exposure for VI (ASG\textsubscript{vi})</td>
</tr>
<tr>
<td>Sub-slab soil gas from beneath a building slab</td>
<td>Soil gas concentrations collecting less than five feet bgs or lowest point of a structure (SG\textsubscript{vi-SS})</td>
<td>ASG\textsubscript{vi} – see description above</td>
</tr>
<tr>
<td>Groundwater in contact with a structure</td>
<td>Groundwater concentrations when water is in contact or entering a structure for VI (GW\textsubscript{vi-ump})</td>
<td>Groundwater concentrations for consideration of an acute exposure when water is in contact or entering a structure for VI (AGW\textsubscript{vi-ump})</td>
</tr>
<tr>
<td>Groundwater beneath, but not in direct contact with a structure</td>
<td>Groundwater concentrations for VI (GW\textsubscript{vi})</td>
<td>Groundwater concentrations for consideration of an acute exposure for VI (AGW\textsubscript{vi})</td>
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5.0 Step 3: Building-Specific Investigation
6.0 Step 4: Response Actions
7.0 References
Appendices

A – Generalized Flowcharts for the Evaluation of the Vapor Intrusion Pathway
B – Supplemental Guidance Information
C – Checklists for Evaluating Compliance with Part 201
D – Vapor Intrusion Screening Values
E – Soil Gas Compounds Screening List
F – MDEQ’s Standard Operating Procedures
G – Laboratory Quality Assurance and Quality Control for Vapor Intrusion Data
H – Model for a Declaration of a Restrictive Covenant
I – Rule 290, Permit to Install Exemption
Overview of Investigating VI

Step 1: Screening Level Assessment

Step 2: Conducting a Soil Gas Investigation

Step 3: Building Specific Investigation

Step 4: Response Actions

No further investigation warranted

- Multiple decision point
- Additional options

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State of Michigan
Department of Environmental Quality

Slide # 16
Step 1: Screening Level Assessment

- Review existing site information or collect information necessary to develop initial CSM
- Evaluate for conditions that may warrant further investigation (establish receptor screening area)

Conditions that may warrant further evaluation:
- Ground water exceedance of $GW_{vi}$
- NAPL within critical distances
- Indoor Air exceedance of $IA_{vi}$
- Soil Gas exceedance of $SG_{vi}$
- Shallow soil gas exceedance of $SG_{vi,SS}$
- Wet basement or sump above $GW_{vi,sump}$
- Methane present that may cause an explosion hazard
- Soils above $S_{vi}$
- Other indications of VI (odor)

Step 2: Conducting a Soil Gas Investigation
- IRASLs exceeded?
  - YES: Evaluation identifies conditions for VI present?
  - NO: Evaluate building first?
    - YES: Immediate response required
    - NO: Sufficient data available?
      - YES: Proceed to Step 3: Building Specific Investigation
      - NO: Presumptive mitigation?
        - YES: Step 4: Response Actions
        - NO: No further investigation warranted

Step 3: Building Specific Investigation
- IRASLs exceeded?
  - YES: Evaluate building first?
  - NO: Presumptive mitigation?
    - YES: Step 4: Response Actions
    - NO: No further investigation warranted

Step 4: Response Actions
- Presumptive mitigation?
  - YES: Immediate response required
  - NO: No further investigation warranted
Step 2: Conducting a Soil Gas Investigation

Refine CSM (if necessary)

Sufficient data to establish receptor screening area?

Acquire additional data which may include groundwater and soil data

Perform soil gas investigation

IRASLs or other site specific levels exceeded?

Results exceed SGvi?

Sufficient data to rule out VI?

NO

YES

IS an immediate response appropriate?

Further refine site specific screening levels?

Results exceed new site specific screening levels?

Proceed to Step 4: Response Actions

Presumptively mitigate?

NO

YES

No further investigation warranted

Refine CSM (if necessary)

Collect additional data

Step 3: Building Specific Investigation

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Step 3: Building Specific Investigation

Refine CSM (if necessary)

Collect necessary data

IRASLs exceeded?

Results exceed new site specific screening levels?

Sufficient data to rule out VI?

No further investigation warranted

Refine site specific screening levels?

Proceed to Step 4: Response Actions

YES

NO

YES

NO

YES

NO

YES

NO

YES
Checklists

- Determining if the Generic Volatilization to Indoor Air Inhalation Criteria Apply
- Developing a Conceptual Site Model
- Reviewing
  - Soil Gas Sampling Protocols and Lab Data
  - Sub-Slab Sampling Protocols and Lab Data
  - Design of an Active Mitigation System
  - Design of a Passive Mitigation System
State SOPs

- Installation of a Soil Gas Probe/Vapor Monitoring Point
- Installation of a Sub-Slab Soil Gas Probe/Vapor Monitoring Point
- Sampling Utilizing USEPA Method TO-15 via a Bottle-Vac®
- Indoor Air Sampling
- Dynamic Flux Chamber Method
- Installation of a Vapor Pin™
Conceptual Site Model
Example of Multiple Properties
Another CSM
One more...
“New Stuff”

- Process for demonstrating mixing in large structures or buildings
  - "Big Building Model"
- Exclusion zone for petroleum hydrocarbons
  - One of the first in the nation
- Process for resolving potential ambient air issues
  - VSIC
Big Building Model (BBM)

- Alternative methodology for large nonresidential buildings to utilize multiple lines-of-evidence in demonstrating compliance with the volatilization to the indoor air exposure pathway
- Based on Eklund and Burrows (2009)
BBM Characteristics

- Large continuous open areas greater than 4,000 m$^2$ (43,000 ft$^2$)
- Ceiling heights greater than 5 m (16 ft)
- Slab-on-grade construction with thicknesses greater than 15 cm (6 inches)
- No dry wells, floor drains, sumps, or other building features are present that would provide a direct conduit to the subsurface are present
- When groundwater is present, concentrations are stable and/or decreasing
There are differences between PHCs and CHCs that influence whether and how vapors migrate into buildings.
PHC Bioattenuation

- CO₂
- O₂
- PHCs
- Depth
- Concentration

Surface

Aerobic Biodegradation Zone

Source Zone (anaerobic)
Assists in Categorizing Sites

- Biodegradation clearly occurs and there is therefore a low potential for VI
- Biodegradation clearly does not occur and the potential for VI must be evaluated
- A conclusion regarding biodegradation cannot be drawn without further evaluation
Additional Support

- DEQ Vapor Intrusion Specialists
  - Sampling
  - Site Specific Criteria
- VI TAPS Team
  - District Points of Contact
VI TAPS Team

- Made up with staff from each district
- Meets 1-2 times each month
- Assists in training district staff and the regulated community
- Speeds up the review process for VI issues
Feedback Opportunities

- Public comment period
  - Ends August 1, 2012
  - Reference Page and Section Numbers
  - Provide suggestions
Send Comments to:

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Questions?