ENVIRONMENTAL EXPERTISE FROM THE GROUND UP

Decommissioning & Exit Strategies for Active and Passive Vapor Intrusion Mitigation Systems

Thomas R. Szocinski, CEP

AEHS West Coast Conference

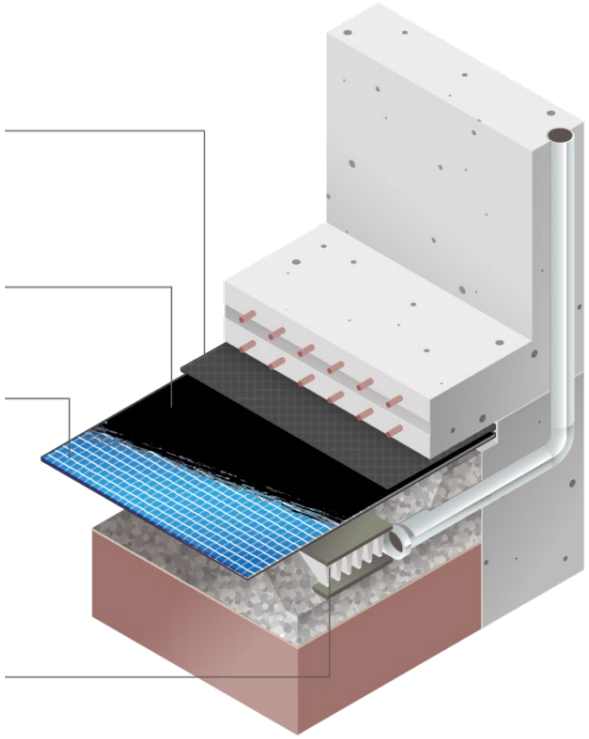
Methane as VI - Discussion

1. Passive and Active VIMS
2. Initial Design and OM&M Considerations
3. Exit Strategies and Objectives
4. Case Study #1 – Methane Mitigation System
5. Case Study #2 – Passive VIMS
6. VIMS Guidance Review
7. Questions

Passive and Active VIMS

- Passive or active vapor mitigation systems when designed should all take into consideration an “exit strategy or decommissioning” of the system when it is no longer needed/required
- When designing a mitigation system these concepts and data should be considered:

1) Contaminant level or Pressure data to reduce monitoring or reduce system use
    1) Sub-slab vapor data
    2) Indoor vapor data
    3) Pressure monitoring
2) Contaminant level to decommission mitigation system
3) Other lines of evidence that may indicate ongoing monitoring is no longer warranted



Initial Design and OM&M

Initial design and OM&M considerations can include:

- Size and quantify of blowers for active systems
- Type of vapor barrier (if used)
- Number of test ports both sub-slab and vent risers
- Inclusion of “trigger” levels for contaminant and pressure to reduce monitoring and/or system operations

CLEAN VAPOR™
THE VAPOR INTRUSION MITIGATION COMPANY

40 YEAR ANNIVERSARY

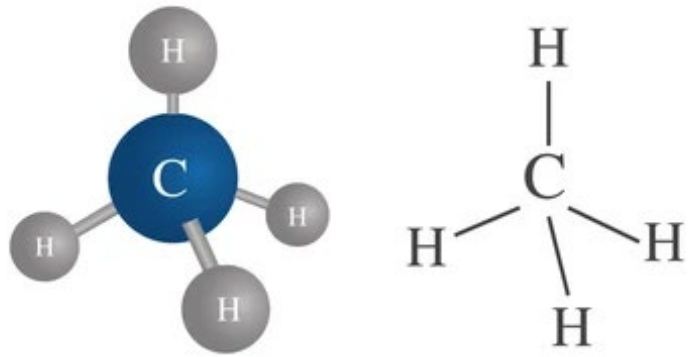
GES

Exit Strategies and Objectives

- Identifying your exit strategies early on in critical when designing a VIMS that will eventually be able to “cycle down”
- Also, objectives need to be clear and concise of what “triggers” or “targets” are your objectives built around. For example:
- Objective #1 Reduction of ongoing system monitoring for an active system
  - What will you target?
- Objective #2 Transition an active system to passive
  - What thresholds, levels, etc. needed?

Case Study #1 – Methane Mitigation System

- **Site:** 1,000,000 square foot warehouse
- **Conditions:** high levels of methane within sub-surface near and below building foundation
- **Source:** Abandoned oil well(s) near and on the property
- **Location:** Central US
- **Mitigation:** Active Methane Mitigation and Methane Sensors
  - 9 Active blowers
  - Sub-slab venting across building
  - Methane vapor barrier
  - Active methane sensors in both sub-slab and indoor air



CH_4 Methane

Case Study #1 – Methane Mitigation System

Contingency and Exit Strategies:

Methane levels below 10% LEL in ALL sub-slab monitoring points beneath the building
And zero levels within the building = Reduce active mitigation by turning 1/3 of the blowers off.

+ Monitoring active methane sensors to identify if rebound happens
++ If methane rebounds, return all active blowers to operation
-- If methane does not rebound, continue for three months until reducing active blowers further
+++ Following three months reduce an additional 1/3 blowers and repeat cycle

Case Study #1 – Methane Mitigation System

Results:

1st Action
Methane levels remained below 10% LEL in all sub-slab monitoring points. Scope was reduced 1/3 And another 1/3 three months following. Leaving 3 of the original 9 blowers in operation.

2nd Action
Three months following again the remaining three blowers were turned off. Leaving only a passive Venting system with fresh air influx, a vapor barrier and an active methane sensor system in operation.

3rd Action
Methane rebounded and the three active blowers were activated and remain active with methane levels Remaining below 10%.

Case Study #2 – Passive VIMS

- **Site:** 250,000 square foot medical supply warehouse
- **Conditions:** elevated chlorinated and petroleum VOCs
- **Source:** Multiple sources (railroad, auto repair, former dry cleaner)
- **Location:** Midwest US
- **Mitigation:** Passive Vapor Mitigation
  - 15 Passive Vent Risers and Sections
  - Sub-slab venting across building
  - Chemically compatible vapor barrier
  - Sub-slab and vent riser test ports

40 YEAR ANNIVERSARY

GES

Case Study #2 – Passive VIMS

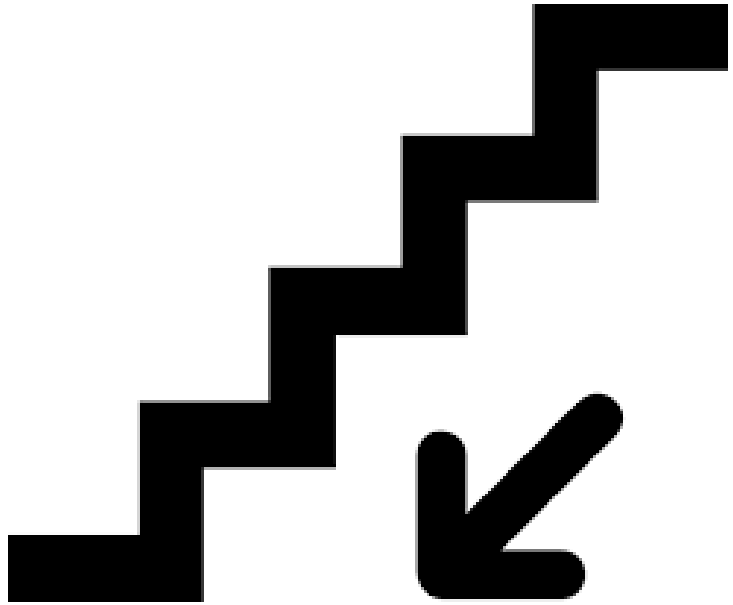
Contingency and Exit Strategies:

- VOCs below residential action levels in ALL sub-slab monitoring points beneath the building
- And within the building = Reduce passive monitoring of the mitigation from quarterly to semi-annually.
  - + Collect sub-slab samples at six months to identify if rebound happens
  - ++ If VOCs above Residential action levels observed return to semi-annual sampling
  - -- If VOCs remained below Residential action levels, move to annual sampling
  - --- If two continuous annual sampling events VOCs are observed below Residential action levels move to discontinuing sampling and leave passive system in place

Case Study #2 – Passive VIMS

Results:

1st Action
VOC concentrations below Residential action levels. Reduced monitoring to semi-annual.



2nd Action
VOC concentrations remained below Residential action levels. Reduced monitoring to annual

3rd and Final Action
VOC concentrations remained below Residential action levels.
Discontinued monitoring and
Left passive VIMS in place. System removal was not cost effective and also can assist in continued
Reduction of Radon.

VIMS Guidance Review

Exit Strategy within Regulatory Guidances

- Many states do not have much or any details on exit strategies or decommissioning of a vapor mitigation system. However, ITRC is currently in the process of updating their VI guidance and it will include a full section on exit strategies, objectives, etc. as discussed within this presentation today.

- Determining local and state recommendations/requirements for VIMS is critical when designing, implementing, operating and determining the full “life cycle” of the system.

THANK YOU

QUESTIONS AND ANSWERS SESSION

Thomas Szocinski
Principal Scientist – Vapor Intrusion Subject Matter

tszocinski@gesonline.com

40 YEAR ANNIVERSARY

GES