



## **TCE Vapor Intrusion Case Study**

**NEWMOA  
April/May 2015**

Robin Mongeon, P.E.  
New Hampshire Department of Environmental Services

1

## **TCE Vapor Intrusion Case Study**

- Site Overview
- Two short term evaluations
  - TO-15 lab analysis vs. portable GC/MS analysis
  - Indoor air purifier effectiveness
- Main laboratory building
- On-site day care

## TCE VI Case Study

### Site Overview

- 30 acre research facility
- Located adjacent to the Connecticut River
- TCE use 1960-1987
  - Storage: UST and AST
    - Documented spills/leaks
  - Use: secondary refrigerant
- Depth to GW 100 to 120 ft
- Primary source of VI: significant high strength vadose zone source



## TCE VI Case Study

### Short term study to compare TO-15 to portable Hapsite GC/MS

- 24 day study
  - First 5 days generally low pressure atmospheric conditions
  - Remainder of study associated with high pressure
- Collected 8 hour Summa canister samples for TO-15 analysis
- Collected 8-hour Bottle-Vac samples for Hapsite analysis
- Study indicates Hapsite results are bias high compared to TO-15 at low concentrations

## TCE VI Case Study



Source: [www.austinair.com](http://www.austinair.com)

### HealthMate™ 450 Portable Indoor Air Treatment Unit

- Size of shop vac
- Standard 120 v outlet
- 15 lbs of carbon
- Effective up to 1500 ft<sup>2</sup>
- 3 speed fan
  - 250 cfm
  - 125 cfm
  - 47 cfm

## TCE VI Case Study

### HealthMate™ 450 Portable Indoor Air Treatment Unit Assessment

Range of TCE levels prior to assessment*	TCE Baseline 8-hour	TCE after 12 Hours of filtration 8-hour	% Reductions
13 - 210	16	9.1	46%
18 - 61	27	3.6	87%
2.2 - 9.1	2.4	1.4	42%

Concentrations are in  $\mu\text{g}/\text{m}^3$

\*Elevated levels were associated with tropical depression Irene

7

## TCE VI Case Study

### Main Laboratory Building

- Very complex building
  - Built in phases
  - Different slab/basement elevations
  - Cold rooms
  - Historic TCE secondary coolant lines
  - Complex system of utilities, roof drains, foundation drains
- Initial sub-slab and indoor air results
  - Very high sub-slab soil gas  $> 1,000,000 \mu\text{g}/\text{m}^3$
  - Indoor air  $>$  TCE action level of  $8.8 \mu\text{g}/\text{m}^3$

## TCE VI Case Study

### Addressing TCE Short Term Risk at Main Lab

- Exposure point concentrations
  - Hapsite portable GC/MS
  - 8-hour bottle vac samples
  - Data sets grouped by area of building
    - 95% UCL of the mean using USEPA's ProUCL software
    - 2 to 3 week rolling average



## TCE VI Case Study

### Hapsite portable GC/MS Rapid assessment Advantages

- Ability to analyze grab or time integrated samples
- Quick turnaround time
  - Able to identify problem areas quickly
  - Good for sleuthing
- Low detection limits
- Bias high at low levels near action level
  - Conservative data

## TCE VI Case Study

### Hapsite portable GC/MS Rapid assessment Disadvantages

- Expensive to purchase and operate
- Can be frustrating
  - Chasing transient background sources
- Can have down time
- Bias high at low levels near action level
  - Can lead to over representing risk

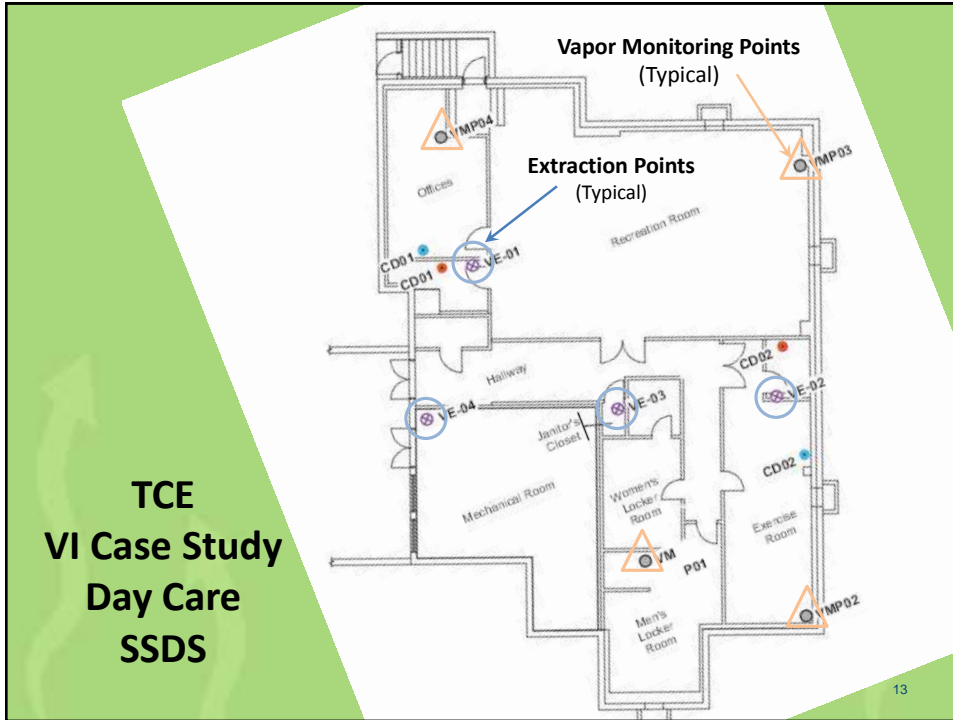
11

## TCE VI Case Study

### On-Site Day Care Center

- Prior to mitigation
  - up to 11,000  $\mu\text{g}/\text{m}^3$  in sub-slab
  - up to 140  $\mu\text{g}/\text{m}^3$  first floor
  - up to 7.2  $\mu\text{g}/\text{m}^3$  second floor occupied by children

12



**TCE  
VI Case Study**

**Day Care SSDS Effectiveness**

Location	Maximum TCE Concentration before Mitigation	Maximum TCE Concentration after Mitigation	% Reductions
Sub-Slab	11,000	1.7	>99.9%
First floor	140	0.27	>99.9%
Second floor	7.2	0.86	99.9%

Concentrations are in  $\mu\text{g}/\text{m}^3$

14

## **TCE VI Case Study Summary**

### **Main Laboratory Building**

- Rapid assessment using on-site portable GC/MS
  - EPC's (2-3 week rolling average)
  - Sleuthing
- Indoor air treatment
  - Over 250 indoor air purification units deployed
- Sub-slab depressurization system installed

### **Day Care**

- Sub-slab depressurization system
  - 99.9% reductions

## **TCE VI Case Study Summary**

### **Continuing Efforts in Main Lab**

- Address additional sources/routes of entry
  - Historic TCE refrigerant piping
  - Foundation drains
  - Roof drains
  - Foundation walls
  - Ambient air
- Assess continued use of air purification units
- Demonstrate SSDS effectiveness



## Final Thoughts

### TCE Short Term Risk

- Timely and responsive communication needed
- Be prepared to act once you get the data
- Above action levels?
  - What does this mean to me?
  - What will be done?
  - When will it be done?



## Final Thoughts

### TCE Short Term Risk

Rapid response actions may be appropriate

- Building pressurization
  - Is it possible?
- Temporary relocation
  - To where?
- Telecommute
  - Really?
- Carbon air purification
  - Noisy
  - Disruptive



# QUESTIONS

**Robin Mongeon, P.E.**  
**New Hampshire Department of Environmental Services**  
**Hazardous Waste Remediation Bureau**  
**603-271-7378**  
**[Robin.Mongeon@des.nh.gov](mailto:Robin.Mongeon@des.nh.gov)**