Mitigation Strategies Focused on Indoor Air Protection from Chlorinated Compounds and Associated Conceptual Site Model Changes Affected by Active Sub-Slab Depressurization

RemTech 2018 SYMPOSIUM:

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## **PROJECT TEAM**

#### • Global Remediation Technologies, Inc.

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  - Senior Project Manager, Design Engineer
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  - Field VI Lead Vapor Pin/Indoor Air Sampling
- R. Raetz
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- Michigan Department of Environmental Quality
  - Remediation & Redevelopment Division





### **PRESENTATION TOPICS**

- Presentation Focus & Site Use History
- PCE Soil/GW Investigation Activities
- Vapor Pin Installation/Sampling, Indoor Air Testing
- Media Specific VIA Interim Action Screening Levels
- Pre-Mitigation PCE Vapor Foot Print
- Vapor Mitigation Response Measures
- PCE Vapor Footprint Active Mitigation
- Discuss SSD System Mitigation Duration/Integration Assessment

### Vapor Intrusion Pathway Complexities



# Physical Properties of Tetrachloroethylene (PCE)

#### **Physical Properties of Tetrachloroethylene**

Molecular Weight: Boiling Point: Melting Point: Vapor Pressure: Vapor Density: Density/Specific Gravity: Log Octanol/Water Partition Coefficient: Conversion Factor: 165.85 121 °C at 760 mm Hg -22 °C 18.47 mm Hg at 25 °C 5.7 (air = 1) 1.6230 at 20/4 °C 3.40 1 ppb =  $6.78 \ \mu g/m^3$ 

(HSDB, 1995; Merck, 1989; Sax, 1989; U.S. EPA, 1994a)

### SITE USE HISTORY

- Site Use History:
  - Commercial Dry Cleaner (1964 1978),
  - Grocery Store & Data Center (1978 2008+/-)
  - Church (2010 +/- to Present)

### STREET VIEW OF SITE



### PLAN VIEW OF SITE



## Floor Plan – Family Fare 1978



# **Building Plan Detail**





### INTERIOR LAYOUT OF BUILDING



### **Groundwater Flow - North**



### SITE IMPACT HISTORY

- Commercial Dry Cleaner (1964 1978)
  - Historical Releases: The northern portion (Unit 1) of the building was used as a commercial dry cleaner.
  - Dry cleaning solvents were historically utilized and stored in 55-gallon drums on the Property.
- BEA conducted 2010 by Cornerstone Apostolic T.
  - Samples were collected @ NE corner of building exterior
    - Two soil samples collected at 7 ft bgs exceeded DWPC for PCE
    - One GW sample collected @ 8 ft bgs exceeded DWPC for PCE

INDOOR AIR TESTING, VAPOR PIN INSTALLATION/SAMPLING

- MDEQ became involved due to BEA data showing PCE in soil and GW above vapor intrusion screening levels
- Sub-slab vapor samples collected by DEQ in April 2017
  - PCE was found at concentrations exceeding the DHHS Media-Specific Volatilization to Indoor Air Interim Action Screening Levels by an order of magnitude







## INITIAL SAMPLE RESULTS COMPARED TO SCREENING LEVELS, NO SITE SPECIFIC C.

FACILITY/SITE CONT	AMINANT INF	ORMATION	Click here for link to Unit conversion instructions.			
Chemical	Media	Concentration Screenin Detected Level		Unit	Sample location relative to the nearest receptor	Sample Date
PCE	Soil	460	52.4	ug/kg	Less than 10 feet from the building	5/24/2010
PCE	Ground Water	130	58	ug/l	Less than 10 feet from the building	5/24/2010
PCE	Sub Slab Vapor	89,000	1,400	ug/m3	Under building	4/25/2017
TCE	Sub Slab Vapor	45	70	ug/m3	Under building	4/25/2017

## MS-VIA INTERIM ACTION SCREENING LEVELS FOR PCE – DHHS\*

INDOOR AIR (ug/m3)					SOIL VAPOR (ug/m3)				
RES		NONRES			RES		NONRES		
RIASL	TSRIASL	RIASL	RIASL12	TSRIASL12	RIASL	TS RIASL	RIASL	RIASL12	TSRIASL12
41	41	41	82	82	1,400	1,400	1,400	2,700	2,700

- RIASL = Recommended Interim Action Screening Level
- TS RIASL = Time-Sensitive Recommended Interim Action Screening Level
- RIASL12 = Nonresidential Recommended Interim Action Screening Levels appropriate for exposures less than 12 hours
- TSRIASL12 = Time-Sensitive Recommended Interim Action Screening Levels appropriate for exposures less than 12 hours, *for structures that were not formerly residential houses*.
- NONRES = RIASL based on a former residential structure that is now nonresidential use that has an unoccupied basement.
- DHHS State Department of Health & Human Services

## PCE Soil Gas April 2017



# **SSD Mitigation Systems - GRT**

- Design Pilot Test Plan
- Perform Field Pilot Testing
- Design SSD Mitigation System(s) Install Plan
- Install SSD Systems
- Conduct Performance Testing
  - Vacuum ROI
  - Indoor Air Sampling
  - Soil Gas Sampling
- Operations/Maintenance



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## General CSM of Soil/GW PCE



## **CSM – Pre SSD Mitigation**













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### **Obar GBR76 UD**



## PCE S.G. @ Six Months Active SSD



### PCE Soil Gas April 2017 – Pre SSD



### PCE S.G. @ Six Months Active SSD



# S.S. Vacuum @ Six Month Ops.



## PCE S.G. @ Nine Months Active SSD



## CSM – Pre SSD, Sump Locations



Depth (BGS) 

### PCE S.G. @ Nine Months Active SSD



## PCE S.G.@SSD T=0, 6, 9 Months



### Vacuum Area < 0.02 Inches H20



# Mitigation/Remediation Goals

- Eliminate Need to Run SSD in Perpetuity
- Develop VIA Exposure Risk Mitigation Plans that Integrate Remedial Strategies
  - Collect/Evaluate Post-Active SSD Indoor Air, Soil Gas Data and Stack Testing Data
  - Use Soil Gas Results to Assess Engagement of a Shut Down Period
  - Other?

### **Mitigation/Remediation Integration**



# **THANK YOU & QUESTIONS** Contact Info. Richard@GRTUSA.com **Global Remediation Technologies Inc.** 1102 Cass St. Traverse City, MI 48684 USA



