Connecticut Case Study: Addressing Short-term TCE Risk Industrial/Commercial Setting

April 13, 2015
Philip E. Warner, P.G. LSP, LEP
NEWMOA TCE Vapor Intrusion Workshop

Hydro-Geo-Chemical Environmental Consultants

Connecticut Department of Energy and Environmental Protection
Environmental Setting

- Site located on thick sand & gravel deposits
- Collapsed proximal fluvial or deltaic deposits
- Depth to groundwater ~ 28 feet
- Bedrock encountered ~ 102’ to 121’
- Generally level ground with steep slope near southern property boundary
- Large river located on eastern property boundary

History

- Industrial activities commenced in 1940
- Environmental investigations started in 1980 due to 33 µg/l TCA and 7 µg/l TCE in water supply well
- PCE remediation conducted in 1984 (35 yds³)
- 20 AOCs identified in 2000
- 22 Additional AOCs identified in 2007
- SVE or SSD recommended in 2008
Definitions

- Connecticut Remediation Standards (RSRs) – Connecticut General Statutes (CGS) Sections 22a-133k-1 - 3
- Residential and Industrial/Commercial Volatilization Criteria (Res VolC and I/C VolC)
- Property Transfer Program – Property Transfer Act CGS Section 22a-134
- Voluntary Remediation Program - CGS Section 22a-133x or y
- Target Indoor Air Concentrations (TAC)
- Parts per billion vapor (ppbv) or micrograms per cubic meter ($\mu g/m^3$)

Regulatory History

- Proposed 2007 sale anticipated entrance into the Property Transfer Program; however, the transaction was unsuccessful
- Entered the Voluntary Program in 2008; however, limited capital delayed progress
- Recent sale in 2013 resulted in entry into Property Transfer Program
ACME Manufacturing

Virgin & used PCE, TCA, & TCE Storage area with 55-gal. drums, ASTs, & USTs

Degreaser Location
Soil Vapor Investigation

- Investigation at four AOCs
- Six permanent soil vapor points installed
- Points set at ~ 1-foot into subsurface soil
- VP-16, VP-17, VP-21-1, VP-21-2, VP-32-1, & VP-32-2

- Initial soil vapor sampling conducted August 16, 2013
- Summa Canisters w/ 4-hour regulator
Soil Vapor Sampling Mechanics

- Summa Canister
- Containment structure
- Tracer constituent (isopropyl alcohol)
- Field notebook
- Clock/Timer
- Tools, cap w/tubing
Soil Vapor Investigation - continued

Analytical Results - 8/13/2013

- TCE concentrations: 16 ppbv – 5,200 ppbv
- PCE concentrations: 29 ppbv – 1,600 ppbv
- Concentrations did not exceed Res VolC & I/C VolC default numeric standards in CT RSRs
- Concentrations of PCE & TCE exceed Proposed Res VolC & I/C VolC Standards in CT RSRs

Soil Vapor Investigation - continued

- Soil vapor investigation during heating season
- VP-16, VP-17, VP-21-1, VP-21-2, VP-32-1, & VP-32-2
- Second round of soil vapor sampling conducted February 25, 2014
- Summa Canisters w/ 4-hour regulator
Soil Vapor Investigation - continued

Analytical Results - 2/25/2014

• TCE concentrations: 13 ppbv – 2,700 ppbv
• PCE concentrations: 22 ppbv – 3,000 ppbv
• Concentrations did not exceed Res VolC & I/C VolC default numeric standards in CT RSRs
• Concentrations of PCE & TCE exceed Proposed Res VolC & I/C VolC Standards in CT RSRs

Indoor Air Investigation

• Investigation at four AOCs
• Locations adjacent to soil vapor points
• IA-16, IA-17, IA-21 (near VP-21-1), & IA-32 (near VP-32-1)

• Initial indoor air sampling conducted February 25, 2014
• Summa Canisters w/4-hour regulator
Indoor Air Investigation

Analytical Results - 2/25/2014

- TCE concentrations: 4.3 µg/m³ – 22 µg/m³
- PCE concentrations: 2.3 µg/m³ – 12 µg/m³

- Concentrations of PCE & TCE exceed Connecticut Res VolC & I/C VolC Standards in CT RSRs
Indoor Air Investigation

- Investigation at four AOCs
- Locations adjacent to soil vapor points
- IA-16, IA-17, IA-21 (near VP-21-1), & IA-32 (near VP-32-1)

- Second round indoor air sampling conducted March 26, 2014
- Summa Canisters w/ 4-hour regulator

Indoor Air Investigation

Analytical Results - 3/26/2014

- TCE concentrations: 1.6 µg/m³ – 13 µg/m³
- PCE concentrations: 0.99 µg/m³ – 7.3 µg/m³
- Concentrations of PCE & TCE exceed Connecticut Res VolC & I/C VolC Standards in CT RSRs
- Concentrations TCE exceed CT Department of Public Health Target Indoor Air Concentration (TAC) workplace standard of 8 µg/m³ at three locations
Reported Condition/Setting

- As already presented:
  - Industrial/Commercial (Manufacturing) Facility
  - TCE historically used (Not currently used)
  - TCE found in soils and soil gas beneath the building
  - Indoor air samples collected
    - Detected in several AOCs
    - Detections ranged from 1.6 to 13 µg/m³

Concerns

- Indoor air in several locations above the Remediation Standard Regulations (RSRs) Target Indoor Air Concentration (TAC) of 5 µg/m³ for TCE
- New toxicology information indicating short-term risk for fetal development (women of child-bearing age)
Concerns Cont’d

- Property Transfer Program (PTP) has milestone timeframes, specifically:
  - 2 years for investigation
  - 3 years to initiate remediation
  - 8 years to complete
- Concern is that this timeframe is too long for the short-term concerns (only appropriate for the long-term risks)

Guidance Development

- Consulted with Department of Public Health (DPH)
- Developed joint guidance to standardize the response in such conditions
Guidance Development Cont’d

• Guidance works within structure of the RSRs (TAC = 5 µg/m³)
  – Recommend reducing to 8 µg/m³ for Industrial/Commercial as quickly as possible
  – Recommend reducing to 5 µg/m³ for Residential as quickly as possible
    • Ideally it would be 2 µg/m³, but that would be below RSR requirements

Guidance Development Cont’d

• Since RSR Soil and Groundwater criteria are based on the TAC:
  – Recommend taking “accelerated response action” when 1.6x Industrial/Commercial criteria exceeded
  – Recommend taking “accelerated response action” whenever Residential criteria exceeded
Guidance Development Cont’d

• Second part of the guidance developed to document the various lines of evidence that has caused the short-term concerns

• Posted along with the main part of the guidance (same link) as support for the recommended actions in the guidance

Guidance Recommended Actions

• Installation of a sub-slab depressurization system to break pathway from the environment

• Since design/installation may take a certain amount of time, interim measures should be taken, such as:
  – Increased ventilation
  – Crack sealing
  – Other site-specific options
Case Study Recommendations

• Short-term:
  – Over the summer, open all possible windows
  – Ventilate affected area with additional fans
  – Temporarily relocate any women of child-bearing age
  – Additional sampling to confirm effectiveness of interim measures

• Long-term:
  – Install sub-slab system before heating season
  – Confirmation of system effectiveness

Current Status

• Soil Vapor Extraction system installed and operating as of December 2014 (six years after initial recommendation)
• Indoor air quality improved (below CTDPH Target Indoor Air Concentration level)
• Sub-slub soil vapor concentrations scheduled for sampling and analysis in the future
Case Study Results

• Short-term:
  – Actions taken over the short-term provided comfort level while the long-term actions were being implemented

• Long-term:
  – Sub-slab system installed and operational by early December (somewhat later than desired)
  – Subsequent sampling has confirmed effectiveness
  – System designed to perform some remediation for ultimate RSR compliance

CONCLUSIONS

• Delay of Sub-slab Depressurization or Soil Vapor Extraction system (~ six years) placed employees at risk with respect to indoor air quality
• Participation in Voluntary Program only effective if continuous progress is made and funds are allocated
• H & S Officer only applied OSHA Standards and was unaware of potential exposure risks to employees – especially women of child-bearing age
Questions?

Phil Warner, P.G., LSP, LEP
HGC Environmental Consultants
pwarner.hgc@att.net
(413) 537-3513

Carl Gruszczak, Jr.
DEEP Environmental Analyst
carl.gruszczak@ct.gov
(860) 424-3948