

# 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



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

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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



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## History

- Industrial activities commenced in 1940
- Environmental investigations started in 1980 due to 33  $\mu\text{g/l}$  TCA and 7  $\mu\text{g/l}$  TCE in water supply well
- PCE remediation conducted in 1984 (35 yds<sup>3</sup>)
- 20 AOCs identified in 2000
- 22 Additional AOCs identified in 2007
- SVE or SSD recommended in 2008



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## 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 ( $\mu\text{g}/\text{m}^3$ )



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## Regulatory History

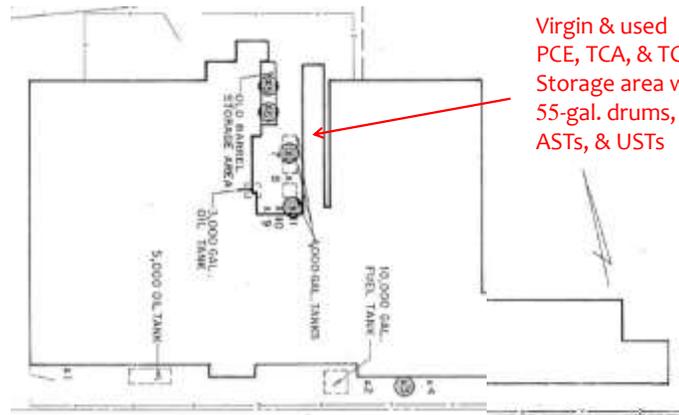
- Proposed 2007 sale anticipated entrance into the Property Transfer Program; however, the transaction was unsuccessful
- Entered the Voluntary Program in 2008; however, limited capital delayed progress
- Recent sale in 2013 resulted in entry into Property Transfer Program



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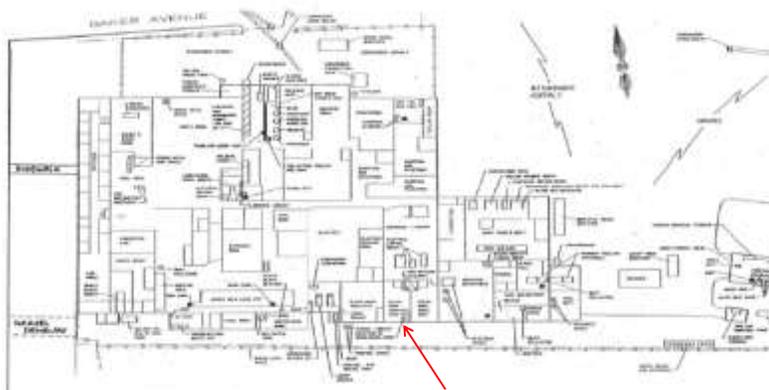
Virgin & used  
PCE, TCA, & TCE  
Storage area with  
55-gal. drums,  
ASTs, & USTs



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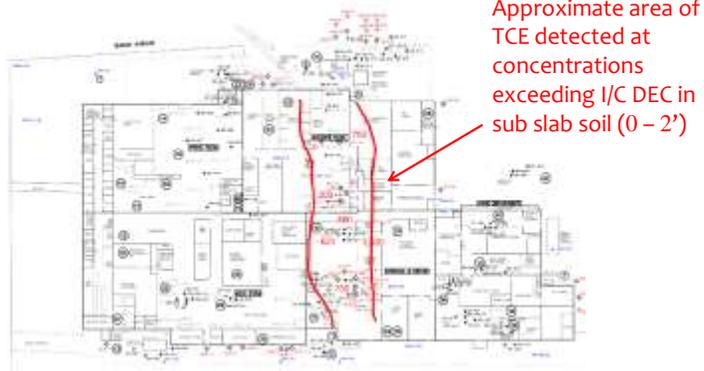
Degreaser Location



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## 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



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## Soil Vapor Sampling Mechanics

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



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## 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



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## 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



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## 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



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## 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



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## Indoor Air Investigation

### Analytical Results - 2/25/2014

- TCE concentrations:  $4.3 \mu\text{g}/\text{m}^3$  –  $22 \mu\text{g}/\text{m}^3$
- PCE concentrations:  $2.3 \mu\text{g}/\text{m}^3$  –  $12 \mu\text{g}/\text{m}^3$
- Concentrations of PCE & TCE **exceed** Connecticut Res VolC & I/C VolC Standards in CT RSRs



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## 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



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## Indoor Air Investigation

### Analytical Results - 3/26/2014

- TCE concentrations:  $1.6 \mu\text{g}/\text{m}^3$  –  $13 \mu\text{g}/\text{m}^3$
- PCE concentrations:  $0.99 \mu\text{g}/\text{m}^3$  –  $7.3 \mu\text{g}/\text{m}^3$
- 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  $8 \mu\text{g}/\text{m}^3$  at three locations



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## 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  $\mu\text{g}/\text{m}^3$



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## Concerns

- Indoor air in several locations above the Remediation Standard Regulations (RSRs) Target Indoor Air Concentration (TAC) of 5  $\mu\text{g}/\text{m}^3$  for TCE
- New toxicology information indicating short-term risk for fetal development (women of child-bearing age)



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## 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)



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## Guidance Development

- Consulted with Department of Public Health (DPH)
- Developed joint guidance to standardize the response in such conditions
- Guidance available on DEEP website at:  
[http://www.ct.gov/deep/cwp/view.asp?a=2715&q=560916&deepNav\\_GID=1626](http://www.ct.gov/deep/cwp/view.asp?a=2715&q=560916&deepNav_GID=1626)



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## Guidance Development Cont'd

- Guidance works within structure of the RSRs (TAC = 5  $\mu\text{g}/\text{m}^3$ )
  - Recommend reducing to 8  $\mu\text{g}/\text{m}^3$  for Industrial/Commercial as quickly as possible
  - Recommend reducing to 5  $\mu\text{g}/\text{m}^3$  for Residential as quickly as possible
    - Ideally it would be 2  $\mu\text{g}/\text{m}^3$ , but that would be below RSR requirements



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## 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



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## 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



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## 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



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## 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



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## 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-slab soil vapor concentrations scheduled for sampling and analysis in the future



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## 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



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## 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



Hydro-Geo-Chemical  
Environmental Consultants

Phil Warner

## Questions?

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

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



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