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U.S. EPA "State of VI Science" Workshop 2022

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Engaging Communities in Vapor Intrusion Programs

Redfield Site Case History

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- Post-WWII residential community
- Middle class neighborhood
- Most owner-occupied
- Largely English-speaking

Results of Initial Access Attempts for Testing & Mitigation

- First 8 homes
 - One refusal



> DCE A.L. 0.49 μg/m³

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- After one year (180 homes)
 - Seven refusals (96% access)



Results of Initial Access Attempts for Testing & Mitigation

- First 8 homes
 - One refusal
- After one year (180 homes)
 - Seven refusals (96% access)
- After plume fully delineated (780 homes)
 - 31 refusals (96% access)



Why were we so successful at gaining initial access?

- 1. The right people
- 2. Transparency
- 3. Detailed explanations
- 4. Face to face contacts
- 5. Multiple access attempts



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6. Community-wide communications

Redfield Site

Environmental Fact Sheet Updated July 2011

The Site

The former Redfield site is located at 5800 E. Jewell Ave. in Denver, Colorado, on approximately 11 acres. It includes a building where binoculars and scopes for rifles were manufactured by various entities using the Redfield name from 1967 to 1998. Brown Retail operated at the site for five years, from 1979 to 1984. In 1984, Brown Retail sold the business and operations to Redfield Rifle Scopes, Inc., (RRSI), which operated the site from 1984 to 1998. RRSI is no longer in business. Today, Brown Retail owns the property and, since 2000, leases the building to CAPCO Tile and Stone, a wholesaler and retailer of stone and tile. No manufacturing is conducted at the site.

Environmental Investigation and Response

Environmental investigations associated with the sale of the property indicated that a degreaser used in the manufacturing facility to remove oil and grease from manufactured parts was a source of cleaning solvents detected in the groundwater below the site. Groundwater in the area travels towards the north and then to the northwest. As a result of these findings, in May 1998, the Colorado Department of Public Health and Environment (CDPHE) issued a Compliance Order formally requiring a site investigation and remediation activities. Since this time, Brown Retail has been working to:

 Prevent the flow of affected groundwater into the adjacent neighborhood;

- Clean up the groundwater;
- Test area houses and buildings for the presence of indoor air vapors that rose up from the affected groundwater;
- Install indoor air mitigation systems where necessary to prevent vapors from entering a house or building.

EnviroGroup Limited, a Denver-based environmental engineering firm, conducts the testing and manages all Redfield site-related remediation activities for Brown Retail.

Chemical Descriptions

Several chemical substances have been found in varying quantities and locations in the groundwater under the site and surrounding areas. Where these substances have been found, they vary in quantity from trace amounts (at or near what can be detected) to levels of about 1 part per million. The primary contaminants CDPHE has focused on related to the Redifield site are 1,1-Dichlorothene (1,1-DCE) and Trichloroethene (TCE). These are part of a family of chemicals known as "volatile organic compounds."The term volatile refers to the ease in which they evaporate in air.

- 1,1 Dichloroethene (1,1-DCE). This compound can be formed in groundwater as a breakdown product of the solvents 1,1,1 Trichloroethane (TCA),TCE and Perchloroethylene (PCE).
- Trichloroethene (TCE). TCE is a solvent that commonly was used in the past for cleaning manufactured and machined parts, and in common household products such as pesticides, glues and adhesives. TCE continues to be used as an industrial cleaner in the automotive and metals industries, and still may be found in household products such as cleaning fluids for rugs, paint removers and cleaning solvents.

Businesses to the south and west of the Redfield site include a gas station, dry cleaner and the Colorado Department of Transportation regional headquarters. All these businesses used volatile organic compounds as well.

Health Effects

Since Denver Water supplies residential water in this neighborhood, there is no impact to drinking water. The most likely way people could be exposed to these compounds is by breathing vapors that have moved from the groundwater, up through the soil, and into

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Redfield Site



Access Attempts for Follow-on Monitoring & Inspections

Access results in 2019

- Annual testing of select homes & inspection of mitigation systems
- 96 of 231 residents did not respond to access requests (58.5% success rate)
 - 3 phone calls, note on door, certified letter
- Community "program fatigue" over time
- Self-reporting of system malfunctions becomes more important
- Continued community awareness and access to information also becomes more important



Application of Redfield Experience to the "Soil-Gas-Safe" Community Concept

- Homeowner participation in OM&M is intrinsic to maintaining a SGSC
 - e.g., providing continued access for testing/inspections and reporting mitigation system problems when they occur between visits
- "Program fatigue" and reduced participation during long-term OM&M inhibits maintaining a SGSC
- Finding ways to maintain homeowner involvement during the OM&M phase could help maintain a SGSC, potentially by:
 - Evolving communications to encourage continued participation
 - Engaging community organizations and volunteers to champion SGSC efforts
 - Use of ITS through education and technical support