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Our Vision – Healthy Kansans living in safe and sustainable environments

Hanover USDA Site

Public Availability Session
May 28, 2009 at 7:00 PM
Kloppenberg Senior Center
Hanover, Kansas

Our Vision – Healthy Kansans living in safe and sustainable environments

Introductions

KDHE

- Beth Finzer, Project Manager
- Chris Carey, USDA Team Leader/Vapor Intrusion Point of Contact
- E. Jean Underwood, Chief, Site Remediation Unit
- Rick Bean, Chief, Remedial Section
- Ingrid Garrison, Environmental Health Officer
- Maggie Thompson, Director of Communications

USDA and Argonne

- Caroline Roe, U. S. Department of Agriculture
- Lorraine M. LaFreniere, Argonne National Laboratory
- Eugene Yan, Argonne National Laboratory
- Jim Hansen, Argonne National Laboratory

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Purpose

- Update the community on the status of the Hanover USDA Site investigation
- Obtain a better understanding of community concerns
- Share information regarding anticipated future activities

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Roles and Responsibilities

- **Commodity Credit Corporation of the United States Department of Agriculture (CCC/USDA)**
  - **Responsible for investigating and addressing contamination resulting from historical operations at Hanover**
- **Argonne National Laboratory (Argonne)**
  - **Contracted by CCC/USDA to provide environmental services (technical experts, field activities, report development, etc.)**
- **Kansas Department of Health and Environment (KDHE)**
  - **Responsible for oversight of investigation and cleanup conducted by CCC/USDA**
  - **Ensures protection of human health and the environment**

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Agenda

- KDHE process for contaminated sites
- CCC/USDA's opening remarks
- Background information
- Current site investigation and results
- Anticipated future actions
- Examples of remedial actions at other sites
- Community involvement
- Closing remarks – CCC/USDA and KDHE
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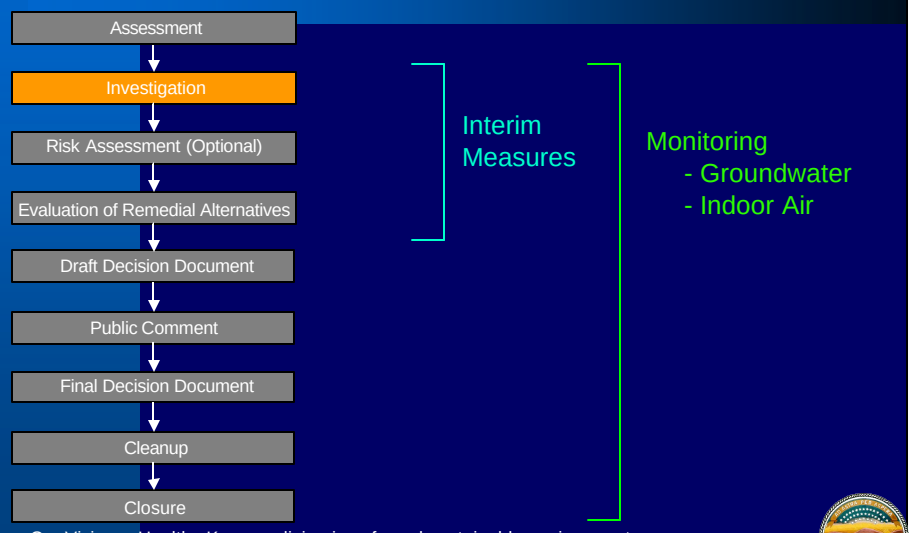
Generalized Process to Address a Contaminated Site



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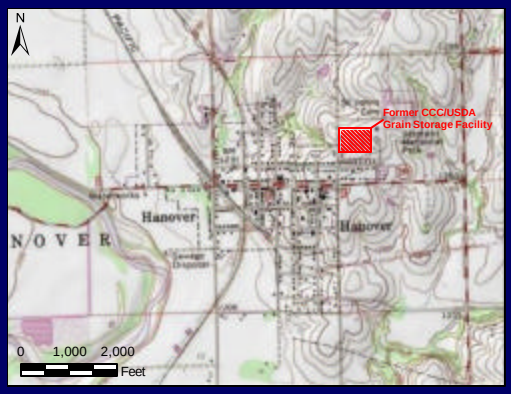
Background Information

- CCC/USDA operated a grain storage facility from 1950s to early 1970s
- Facility occupied 6.5 acres northeast of Hanover
- In 1957, there were 159 grain bins, expanded in 1969 to 223 grain bins
- In 1973, grain bins were removed and sold at auction
- Former facility developed into a residential area in the mid-1970s



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Site History

- 1998 – Carbon tetrachloride (CT) detected in two private wells, chloroform detected in one well
- 1998 - Additional private well sampling and soil sampling conducted
- 2006 - CT and chloroform again detected in private wells
- 2007- Indoor air samples and soil samples collected - CT and chloroform detected
- 2007 - KDHE requests that CCC/USDA conduct a full site investigation
- January 2009 - Site investigation initiated

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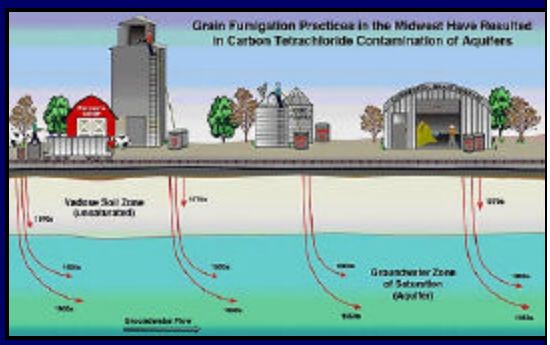
Carbon Tetrachloride

- **Used as a grain fumigant until mid 1980s**
- **Evaporates quickly**
- **Does not dissolve easily into water**
- **Only a small amount sticks to soils**
- **Can degrade to chloroform**



Source: Argonne National Laboratory, Water cleanup is for the birds, June 10, 2005. Retrieved May 22,2009, from http://www.anl.gov/Media_Center/News/2005/ER05 0610.html

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Health Effects of Carbon Tetrachloride Exposure

- **Exposure to high amounts can cause damage to liver, kidneys, and nervous system**
- **US EPA has determined that CT is a probable human carcinogen**

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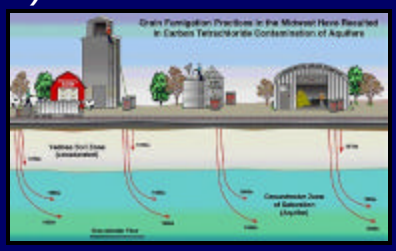
Media Commonly Evaluated

- Groundwater
- Soil (surface and/or sub-surface)
- Air (indoor/ambient)
- Biota
- Surface water
- Sediments



Source: Argonne National Laboratory, Water cleanup is for the birds, June 10, 2005. Retrieved May 22,2009, from http://www.anl.g ov/Media_Center/News/2005/ER050610.html

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Common Exposure Pathways

- **Ingestion** – Are people drinking contaminated water? Are people eating contaminated soil?
- **Dermal (Direct) Contact** – Are people coming in skin contact with contaminated soil? Are people coming in skin contact with contaminated water?
- **Inhalation** – Are people breathing contaminated air?

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Other Factors

- Levels of contaminants present
- Length of time an individual is exposed to the contamination
- Complete versus incomplete exposure pathways

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2009 Site Investigation

- **Started in January 2009**
- **Initially focused on the former facility and expanded based on investigation results**
- **Soil and groundwater**
  - **25 soil sample locations**
  - **Over 45 groundwater sample locations**
- **Vapor Intrusion**
  - **52 properties evaluated**

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Evaluating the results

- **KDHE Risk-Based Standards For Kansas (RSK) Manual 4th Version** Describes the process for establishing cleanup goals for soil, groundwater and indoor air that are protective of human health and the environment
  - Establishes KDHE RSK Tier 2 Levels
- **Agency for Toxic Substances and Disease Registry (ATSDR)**
  - Minimal Risk Levels (MRLs) are an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects. MRLs are not intended to define cleanup or action levels
  - The MRLs in this presentation are for chronic inhalation exposure

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Soil Sample Results

Chemical	Highest Level Detected at Site	KDHE Tier 2 Levels	
		Soil Pathway	Soil to Groundwater Protection Pathway
Carbon Tetrachloride	35 µg/kg	2,500 µg/kg	200 µg/kg
Chloroform	44 µg/kg	3,900 µg/kg	960 µg/kg

** Units are in micrograms per kilograms (µg/kg)*

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Groundwater Sample Results

Chemical	Highest Level Detected at Site	KDHE Tier 2 Level Groundwater Pathway
Carbon Tetrachloride	617 µg/L	5 µg/L
Chloroform	18 µg/L	80 µg/L

** Units are in micrograms per liter (µg/L)*

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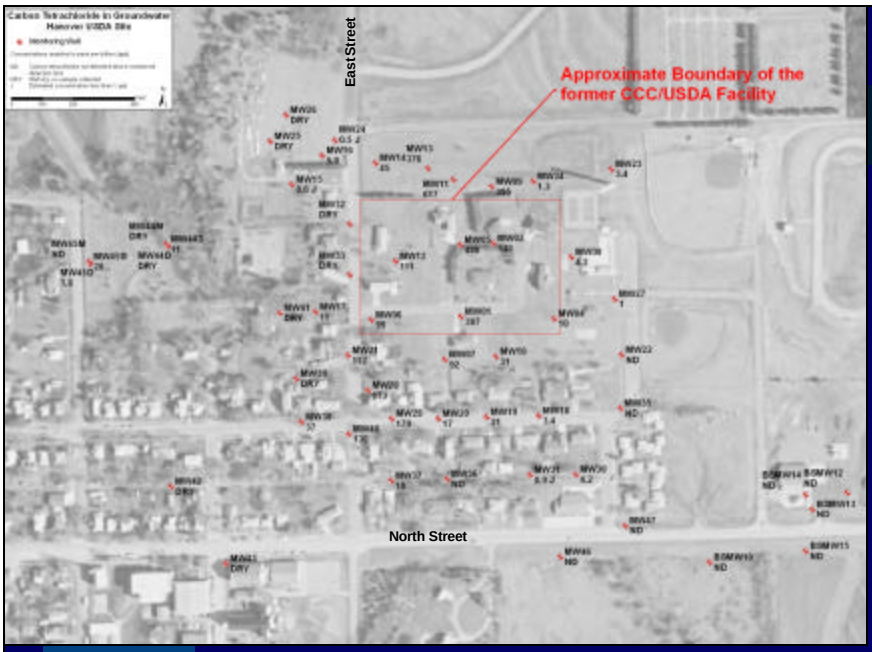

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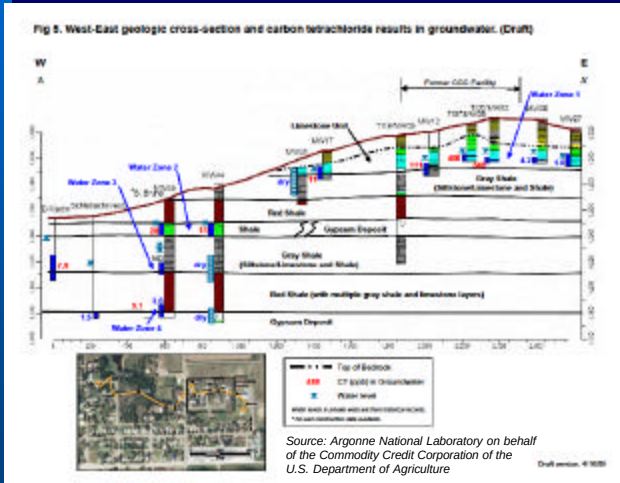
Site Geology



Source: Argonne National Laboratory on behalf of the Commodity Credit Corporation of the U.S. Department of Agriculture

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Completing the Soil and Groundwater Investigation

- Continue evaluation of existing data and identify any data gaps
- Conduct additional sampling and testing
- Prepare an investigation report summarizing the data

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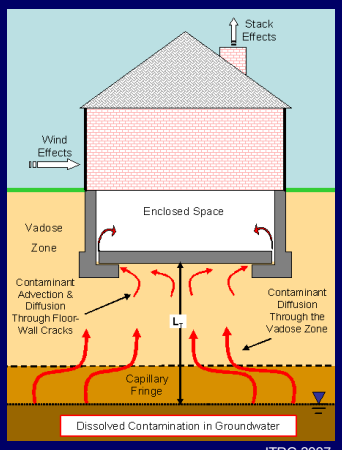
Vapor Intrusion

- Migration of volatile chemicals from the sub-surface into overlying structures



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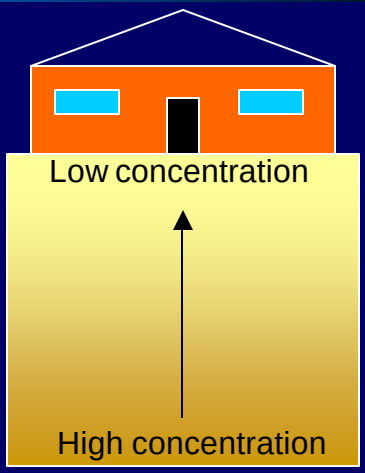
Vapor Intrusion Process

Process-Diffusion

- Slow process
- Gradient
- Advection and diffusion take place near the foundation



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Vapor Intrusion in Hanover

- Shallow groundwater (<40 feet below ground)
- Residential development (with basements) at and near the former CCC/USDA facility
- Carbon tetrachloride and chloroform are volatile compounds

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Assessment of Vapor Intrusion

- Indoor air sampling
  - Samples collected within a structure
- Sub-slab sampling
  - Samples collected from beneath structure foundations
- Soil-gas sampling
  - Samples collected adjacent to structures
- Ambient (outdoor) air sampling
  - Samples collected outdoors at the same time as indoor air samples to help differentiate between outdoor air contamination and vapor intrusion

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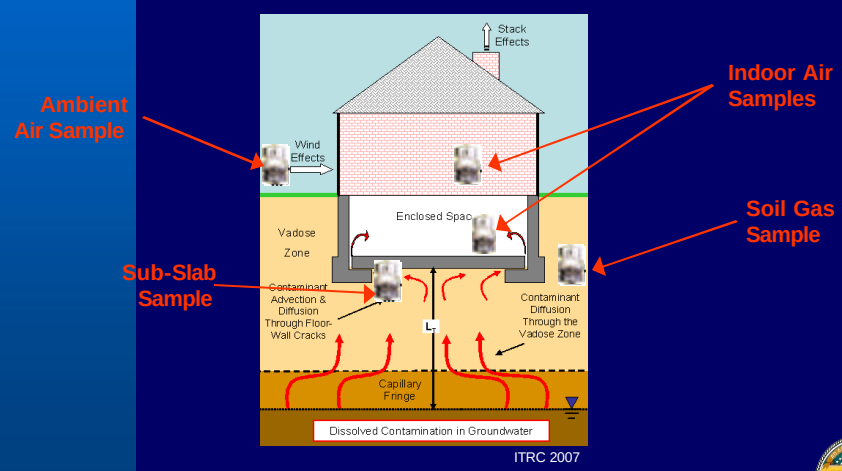
Sample Types



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Investigation Results to Date

	Highest Level Detected at Site	KDHE Tier 2 Level for Indoor Air	ATSDR Minimal Risk Levels
Carbon Tetrachloride	26 µg/m³	1.6 µg/m³	188.62 µg/m³
Chloroform	3.6 µg/m³*	1.058 µg/m³	97.6 µg/m³

**Chloroform detection likely not due to vapor intrusion*
** Units are in micrograms per cubic meter*

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What do these results mean?

- Concentrations detected exceed KDHE's Tier 2 Levels but not the ATSDR values
- Exposure to carbon tetrachloride at these levels does not pose an immediate health risk but may be harmful in the long term
- KDHE will work with CCC/USDA to address vapor intrusion issues on a property-specific basis

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Preliminary Vapor Intrusion Recommendations

- **Based on vapor intrusion assessment data, KDHE and CCC/USDA recommend the following actions:**
  - **Install mitigation systems to prevent vapor intrusion at several residences**
  - **Collect additional samples from 16 residences to determine if mitigation is needed**
  - **Additional action not required at 33 residences at this time**
- **Installation of mitigation systems and additional sampling planned later this summer**

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Vapor Intrusion Mitigation Systems

- **Mitigation systems are relatively inexpensive and easy to install**
- **Operation and maintenance requirements**
  - **Confirmation sampling**
  - **Performance monitoring**
- **Can be installed inside or outside of homes**

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Future Actions

Based on investigation findings, identify appropriate remedial alternatives to address risks posed by contamination through the Corrective Action Study process

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Generalized Process to Address a Contaminated Site

- Assessment
- Investigation
- Risk Assessment (Optional)
- Evaluation of Remedial Alternatives
- Draft Decision Document
- Public Comment
- Final Decision Document
- Cleanup
- Closure

Interim Measures

Monitoring
- Groundwater
- Indoor Air

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Basis for Remedy Selection

Threshold Criteria

- Protects Human Health and the Environment
- Meets Regulatory Requirements

Balancing Criteria

- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility or Volume Through Treatment
- Short-Term Effectiveness
- Implementability
- Cost

Modifying Criteria

- Community Acceptance

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Corrective Action Decision

- Based on the investigation findings and the Corrective Action Study, KDHE will prepare a draft Corrective Action Decision which identifies KDHE's preferred remedial alternative for the Site
- The public will have an opportunity to comment on the draft CAD before the final CAD is issued by KDHE
- Once issued, CCC/USDA will implement the remedy described in the final CAD

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Next Steps

- Submit vapor mitigation work plan
- Install vapor mitigation systems and collect additional samples to evaluate vapor intrusion
- Complete investigation and submit investigation report
- Submit Corrective Action Study
- Prepare draft Corrective Action Decision

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Examples of Remedial Actions

- **Pump and treat contaminated groundwater**
- **Permeable reactive barriers**
- **Soil vapor extraction/air sparging**
- **Phytoremediation**

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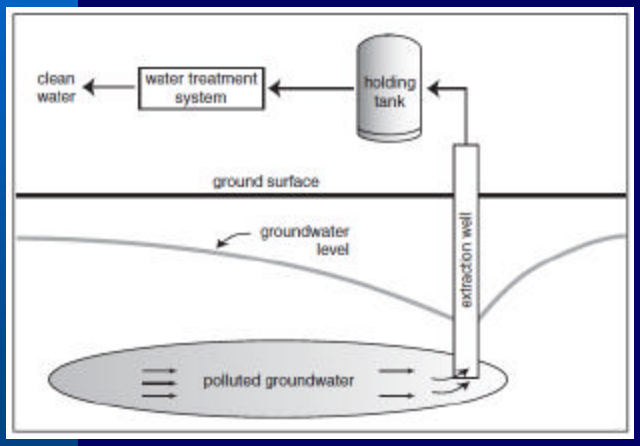
Pump and Treat



Source: United States Environmental Protection Agency, A Citizen's Guide to Pump and Treat, December 2001

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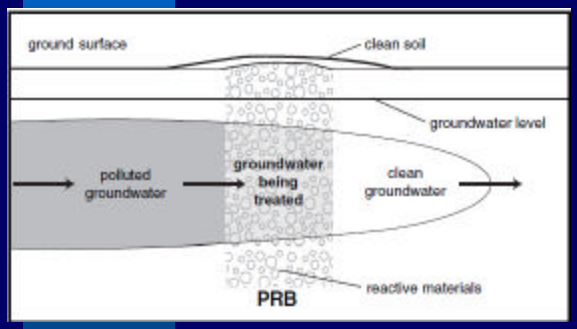
Permeable Reactive Barrier



Source: United States Environmental Protection Agency, A Citizen's Guide to Permeable Reactive Barriers. April 2001

Source: Adventus, **Permeable Reactive Barrier (PRB) Technology**. Retrieved on May 22, 2009 from http://www.adventusgroup.com/products/prb.shtml

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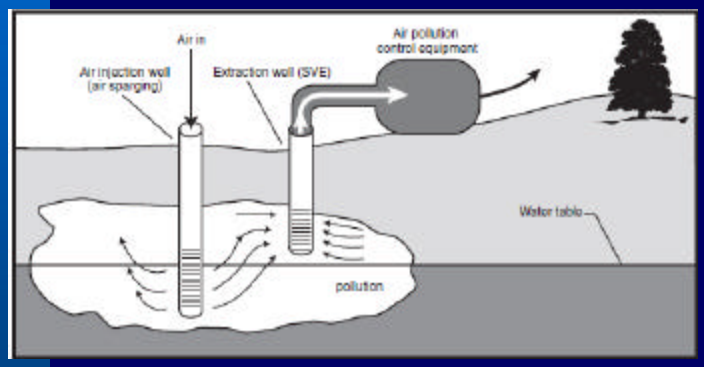
Soil Vapor Extraction/Air Sparging



Source: United States Environmental Protection Agency, A Citizen's Guide to Soil Vapor Extraction and Air Sparging, April 2001

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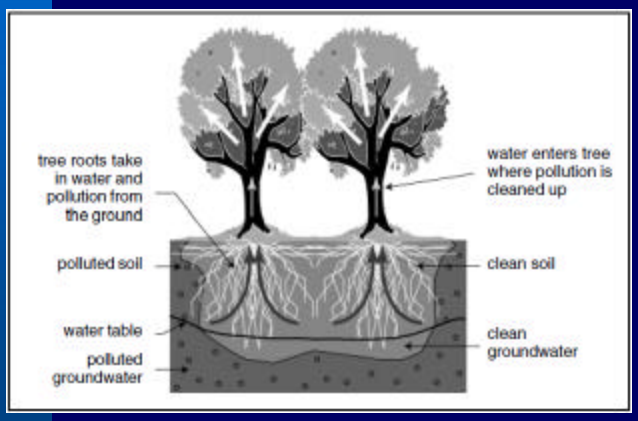
Phytoremediation



Source: United States Environmental Protection Agency, A Citizen's Guide to Phytoremediation, April 2001

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Community Involvement

- **KDHE met with the Hanover City Council on May 11, 2009**
- **May 2009 public availability session**
- **Individual meetings/conversations with residents**
- **Fact sheets**
- **Public meeting before issuance of final Corrective Action Decision**
- **Other actions as appropriate**

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