Overview of EPA TASC Program

Overview of NPL Superfund Sites with PCE Contamination

U.S. Environmental Protection Agency
Technical Assistance Services for Communities 2010

Scope of Presentation

1. TASC background information
2. Background on PCE
3. NPL Superfund sites with PCE contamination
4. PCE contamination cleanup approaches
5. Examples: Cities in Region 6 with NPL Superfund sites addressing PCE ground water contamination
6. Resources for more information

TASC Program Services

TASC provides independent educational and technical assistance to communities dealing with environmental problems. Depending upon community needs, TASC services may include:

Information Assistance
Increasing community understanding about technical issues by developing and disseminating information.

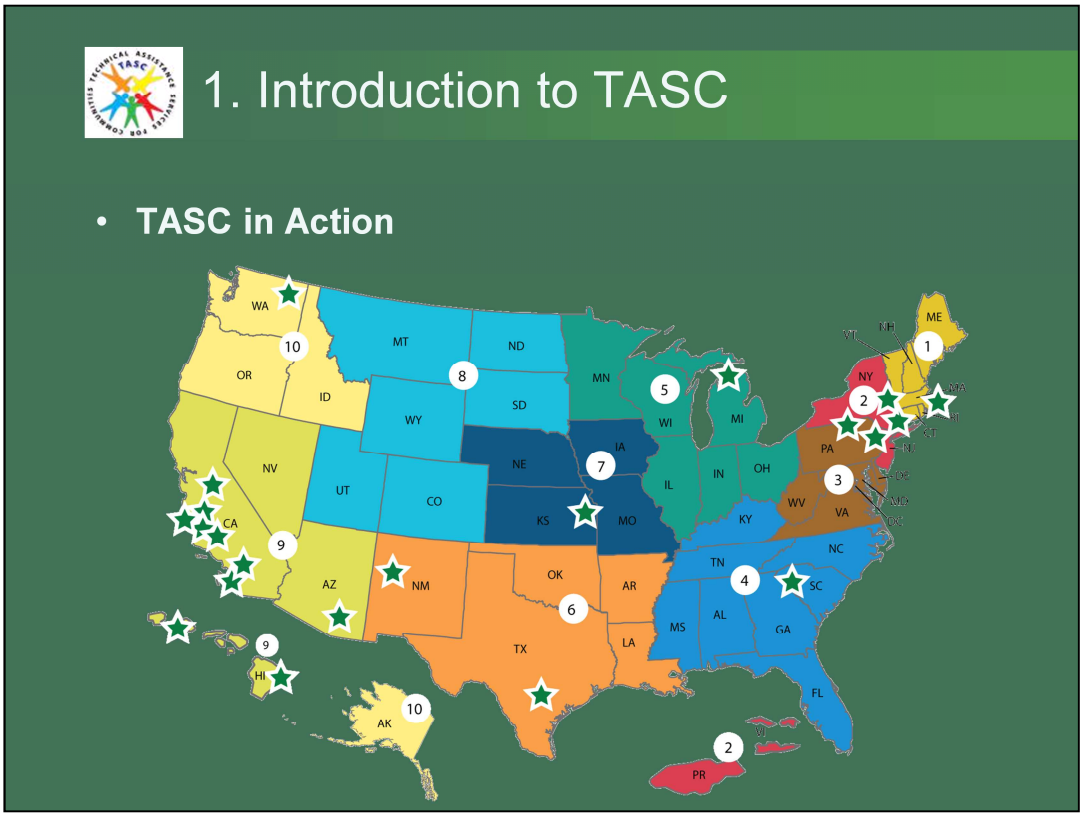
Community Education
Delivering community training workshops, symposiums, or conferences related to environmental problems.

Technical Expertise
Providing independent, non-advocacy consultation and assistance services to enable communities to engage in environmental planning and decision-making processes.

Technical Assistance Needs Evaluation & Plan Development
Working with community members to assess their technical assistance needs.

Superfund Job Training Initiative (SuperJTI)
Providing SuperJTI job training in communities affected by nearby Superfund sites.

TASC services are provided through a national EPA contract with E^2 Inc., an EPA contractor based in Charlottesville, Virginia. Technical assistance is provided by a dedicated team of Technical Assistance Specialists. Each EPA Region has a TASC coordinator. The EPA TASC coordinator for Region 6 is Donn Walters.

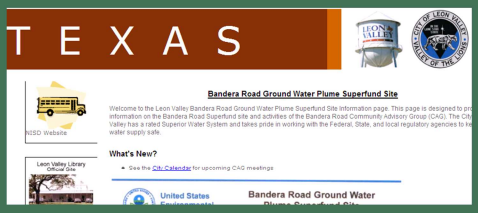


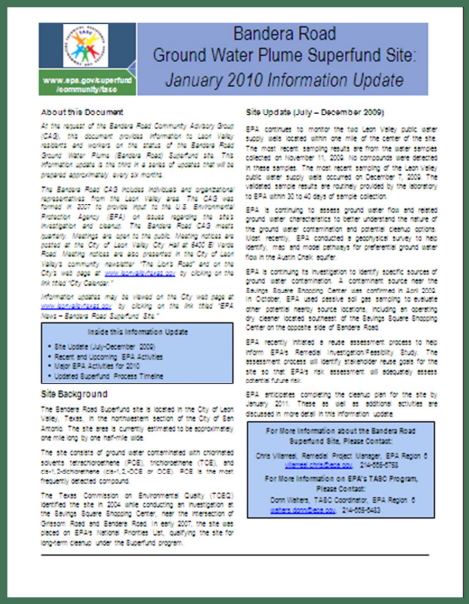
Examples of TASC Projects

Antelope Roofing Tar Site, Antelope, CA
Bandera Road Ground Water Plume, San Antonio, TX
BoRit Asbestos Tailings Pile, Ambler, PA
Brown and Bryant, Inc. Shafter Facility, Shafter, CA
Calumet Lubricants Refinery, Shreveport, LA
Chemical Commodities, Inc., Olathe, KS
Cleveland Tenants Organization, Cleveland, OH
Foster Wheeler, Mountain Top, PA
Homestake Mining Site, Grants, NM
Hudson River PCBs, Saratoga Springs, NY
Hunters Point Naval Shipyard, San Francisco, CA
Kettleman Hills Waste Management Facility, Kettleman City, CA
Lawrence Livermore National Laboratory, Tracy, CA
Little Traverse Bay, Petoskey, MI
Parker Street Waste Site, New Bedford, MA
Pepe`ekeo Biomass Power Plant, Pepe`ekeo, HI
Raymark Industries, Inc., Stratford, CT
ROMIC Environmental Technologies, East Palo Alto, CA
Santa Susana Field Lab, Simi Valley, CA
South Weymouth Naval Air Station, Abington, MA
SuperJTI at Savannah River Site, Aiken, SC
Tittabawassee River/Saginaw River/Saginaw Bay Cleanup, Bay City/Saginaw, MI
Tucson International Airport Area, Tucson, AZ
Upper Columbia River, Kettle Falls, WA
Various Region 4 Environmental Justice Communities, Atlanta, GA
Waianae Coast, Oahu, HI
Youth United for Community Action (YUCA), East Palo Alto, CA

1. Introduction to TASC

- **TASC in Action in Leon Valley**
  - Information Assistance
  - Community education
  - Technical expertise
  - Guidance through Superfund process





- Newsletters (English and Spanish)
- Technical document review
- Website support
- Other educational support

2. PCE Background

- Tetrachloroethene (PCE) - also known as tetrachloroethylene , perchloroethylene and PERC
- One of a range of chemical compounds known as chlorinated solvent (volatile organic compounds)
- Commonly used for textile production and dry cleaning
- Trace amounts can negatively impact large volumes of soil and ground water
- PCE properties can make it difficult to address ground water contaminated with PCE

2. PCE Background

- EPA's maximum permissible amount of PCE in drinking water (i.e., the Maximum Contaminant Level) is 5 micrograms per liter (µg/L)
- Ranked 33rd on the CERCLA (Superfund) 2007 Priority List of Hazardous Substances
  - Prioritization ranking based on a combination of substance's frequency, toxicity, and potential for human exposure at NPL sites
  - Not a list of "most toxic" substances

2007 CERCLA Priority List of Hazardous Substances

2007 RANK	SUBSTANCE NAME	TOTAL POINTS	2005 RANK	CAS #
1	ARSENIC	1672.58	1	007440-38-2
2	LEAD	1534.07	2	007439-92-1
3	MERCURY	1504.69	3	007439-97-6
4	VINYL CHLORIDE	1387.75	4	000075-01-4
5	POLYCHLORINATED BIPHENYLS	1365.78	5	001336-36-3
6	BENZENE	1355.96	6	000071-43-2
7	CADMIUM	1324.22	8	007440-43-9
8	POLYCYCLIC AROMATIC HYDROCARBONS	1316.98	7	130498-29-2
9	BENZO(A)PYRENE	1312.45	9	000050-32-8
10	BENZO(B)FLUORANTHENE	1266.55	10	000205-99-2
31	TOXAPHENE	1086.65	30	008001-35-2
32	HEXACHLOROCYCLOHEXANE, GAMMA-	1081.53	32	000058-89-9
33	TETRACHLOROETHYLENE	1080.43	31	000127-18-4

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) requires ATSDR (Agency for Toxic Substances and Disease Registry) and the EPA to prepare a list, in order of priority, of substances that are most commonly found at facilities on the National Priorities List (NPL) and which are determined to pose the most significant potential threat to human health due to their known or suspected toxicity and potential for human exposure at these NPL sites. CERCLA also requires this list to be revised periodically to reflect additional information on hazardous substances.

It should be noted that this priority list is not a list of "most toxic" substances, but rather a prioritization of substances based on a combination of their frequency, toxicity, and potential for human exposure at NPL sites. (from ATSDR, CERCLA Priority List of Hazardous Substances, http://www.atsdr.cdc.gov/cercla/)

For more information:

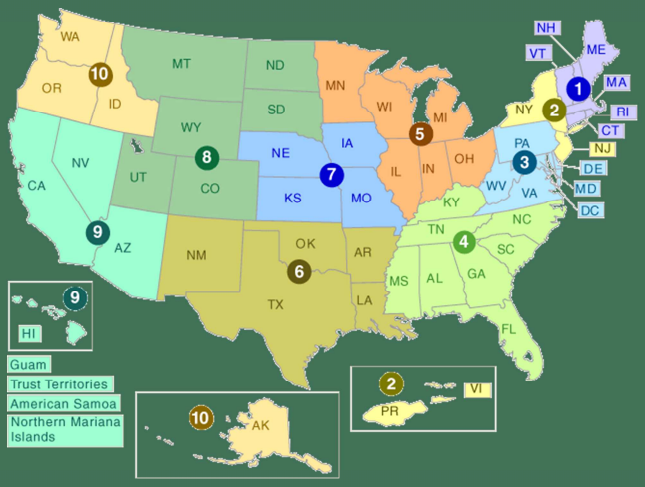
http://www.epa.gov/superfund/health/contaminants/index.htm

3. NPL Sites with PCE Contamination

- Superfund National Priorities List (NPL) sites
  - Sites qualifying for long-term cleanup under the national Superfund program
  - Approximately 1,600 NPL sites in the U.S. active or deleted
  - A 1997 review indicated PCE was present at approximately half of all NPL sites

3. NPL Sites with PCE Contamination

- NPL Sites where PCE is a contaminant of concern



483 (30%) current and deleted NPL sites estimated to have ground water and/or soil PCE contamination

427 (27%) current and deleted NPL sites estimated to have ground water PCE contamination

EPA Region 2 (NY, NJ) estimated to have the most PCE NPL sites (91)

EPA Region 8 (CO, MT, ND, SD, UT, WY) estimated to have the fewest (13)

EPA Region 6 (AR, LA, NM, OK, TX) estimated to have the second fewest (19)

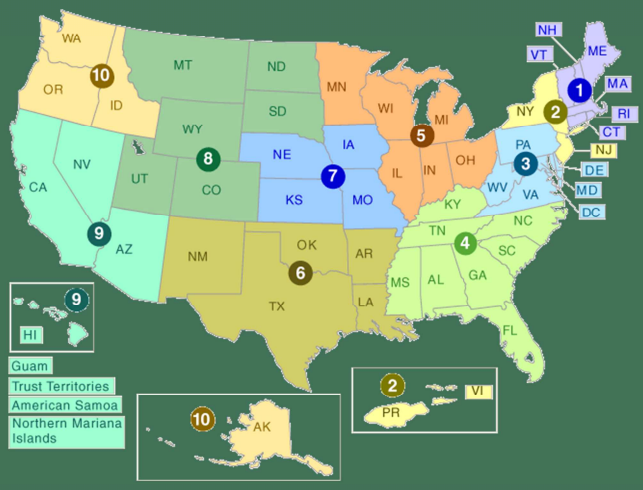
EPA Regions 6, 7, 8, and 10 all estimated to each have under 25 PCE NPL sites

Note: All figures are derived using EPA's Superfund Information Systems database available here: http://cfpub.epa.gov/supercpad/cursites/srchsites.cfm

Since information is incomplete for some sites, figures should not be considered final.

3. NPL Sites with PCE Contamination

- PCE NPL sites in EPA Region 6
  - LA (3)
  - NM (7)
  - OK (3)
  - TX (6)



3. NPL Sites with PCE Contamination

- PCE NPL sites in Texas
  - Pantex Plant (USDOE) / northeast of Amarillo
  - Longhorn Army Ammunition Plan / Harrison County
  - Jones Road Ground Water Plume / northwest of Houston
  - Bandera Road Ground Water Plume / Leon Valley
  - Motco, Inc. / near Galveston
    - Not ground water
  - Malone Service Co – Swan Lake Plant / Texas City
    - Not ground water

3. NPL Sites with PCE Contamination

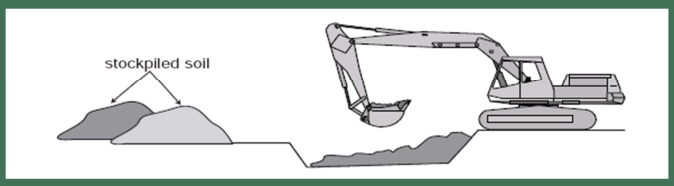
Ground Water PCE NPL Sites in Region 6: Key Numbers	
Average year listed on the final NPL	1995 (15 sites)
Average year reaching construction complete	2004 (9 sites)
Average number of years between final NPL listing and construction complete status	12 years (9 sites)
Number of deleted sites (2)	-Gulf Coast Vacuum Services (LA) -Old Inger Oil Refinery (LA)

Note: All figures are derived using EPA's Superfund Information Systems database available here: http://cfpub.epa.gov/supercpad/cursites/srchsites.cfm

Since information is incomplete for some sites, figures should not be considered final.

4. PCE Soil Cleanup: Approaches

- Major Types
  - **Excavation and Removal**
    - Excavation of contaminated soil and removal off-site



http://www.epa.gov/tio/download/citizens/excavation.pdf

  - **Soil Vapor Extraction**
    - Use of a vacuum to pull vapors from soil

Excavation is digging up polluted soil so it can be cleaned or disposed of properly in a landfill. The soil is excavated using construction equipment, like backhoes or bulldozers. The polluted soil may be cleaned up onsite or taken elsewhere for this purpose (See A Citizen's Guide to Thermal Desorption [EPA 542-F-01-003], and A Citizen's Guide to Soil Washing [EPA 542-F-01-008]). The soil may also may be disposed of in a regulated landfill. If the soil is cleaned, it may be returned to the holes it came from. This is called backfilling. The area may also be backfilled with clean soil from another location. (from EPA Citizen's Guides to Cleanup Methods, http://www.epa.gov/superfund/remedytech/pubitech.htm#citguide)

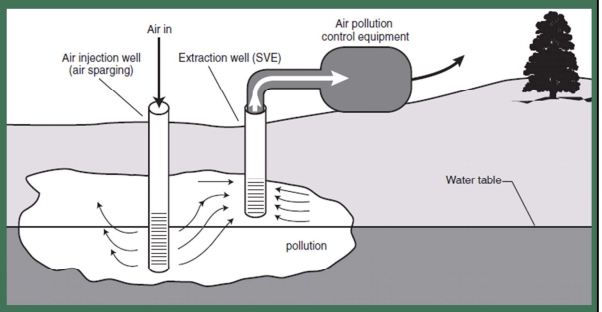
Soil vapor extraction - or SVE removes harmful chemicals, in the form of vapors, from the soil above the water table. Vapors are the gases that form when chemicals evaporate. The vapors are extracted (removed) from the ground by applying a vacuum to pull the vapors out. Certain chemicals—like solvents and fuel—evaporate easily. SVE and air sparging work best on these types of chemicals. SVE and air sparging are often used at the same time to clean up both soil and groundwater. (from EPA Citizen's Guides to Cleanup Methods, http://www.epa.gov/superfund/remedytech/pubitech.htm#citguide)

4. PCE Ground Water Cleanup: Approaches

- Major Types
  - **In Situ Treatment**
    - Treatment of ground water in the aquifer
  - **Pump-and-Treat**
    - Treatment of ground water above ground
  - **Monitored Natural Attenuation**
    - Use of natural processes to treat ground water
  - **Other**
    - Non-treatment remedies

4. PCE Ground Water Cleanup: Approaches

- **In Situ Treatment** - treatment of ground water in the aquifer
  - Air Sparging
  - Bioremediation
  - Chemical Treatment
  - Thermal Treatment



http://www.epa.gov/tio/download/citizens/citsve.pdf

Air Sparging - uses air to help remove harmful vapors from polluted soil and groundwater below the water table. When air is pumped underground, the chemicals evaporate faster, which makes them easier to remove. Like Soil Vapor Extraction, a vacuum then extracts the vapors. Certain chemicals—like solvents and fuel—evaporate easily. SVE and air sparging work best on these types of chemicals. (from EPA Citizen's Guides to Cleanup Methods, http://www.epa.gov/superfund/remedytech/pubitech.htm#citguide)

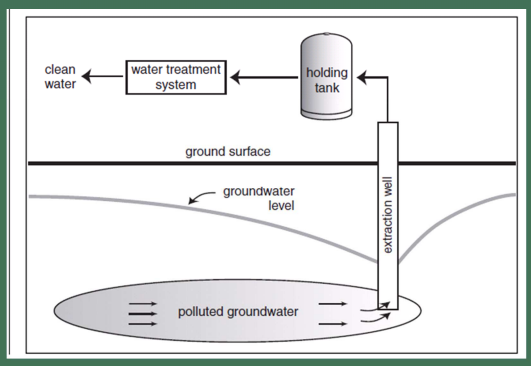
Bioremediation - allows natural processes to clean up harmful chemicals in the environment. Microscopic "bugs" or microbes that live in soil and groundwater like to eat certain harmful chemicals, such as those found in gasoline and oil spills. When microbes completely digest these chemicals, they change them into water and harmless gases such as carbon dioxide…In order for microbes to clean up harmful chemicals, the right temperature, nutrients (fertilizers), and amount of oxygen must be present in the soil and groundwater. These conditions allow the microbes to grow and multiply—and eat more chemicals. When conditions are not right, microbes grow too slowly or die. Or they can create more harmful chemicals. If conditions are not right at a site, EPA works to improve them. One way they improve conditions is to pump air, nutrients, or other substances (such as molasses) underground. Sometimes microbes are added if enough aren't already there. (from EPA Citizen's Guides to Cleanup Methods, http://www.epa.gov/superfund/remedytech/pubitech.htm#citguide)

Chemical Treatment – is the use of chemicals to treat ground water. One example of this is chemical oxidation which uses chemicals called oxidants to destroy pollution in soil and groundwater. Oxidants help change harmful chemicals into harmless ones, like water and carbon dioxide. Chemical oxidation can destroy many types of chemicals like fuels, solvents, and pesticides. (from EPA Citizen's Guides to Cleanup Methods, http://www.epa.gov/superfund/remedytech/pubitech.htm#citguide)

Thermal treatment – is a way to move or mobilize harmful chemicals through soil and groundwater by heating them. The heated chemicals move through the soil and groundwater toward underground wells where they are collected and piped to the ground surface. There the chemicals can be treated above ground by one of the many cleanup methods available. There are a number of approaches used for thermal treatment.

4. PCE Ground Water Cleanup: Approaches

- **Pump-and-Treat** - treatment of ground water above ground
  - Air stripping
  - Chemical treatment



http://www.epa.gov/tio/download/citizens/pump_and_treat.pdf

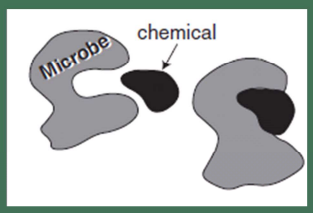
Air stripping – is the process of forcing air through polluted groundwater or surface water to remove harmful chemicals. The air causes the chemicals to change from a liquid to a gas (evaporate). The gas is then collected and cleaned. Air stripping is commonly used to treat groundwater as part of a pump and treat remedy. (from EPA Citizen's Guides to Cleanup Methods, http://www.epa.gov/superfund/remedytech/pubitech.htm#citguide)

Chemical Treatment – is the use of chemicals to treat ground water.

VOCs including PCE have frequently been treated using Pump-and-Treat remedies. (from EPA's Treatment Technologies for Site Cleanup: Annual Status Report (Twelfth Edition), http://www.clu-in.org/download/remed/asr/12/asr12_full_document.pdf)

4. PCE Ground Water Cleanup: Approaches

- **Monitored Natural Attenuation** - use of natural processes to treat ground water
  - No human intervention
  - Natural processes could include
    - » *Biodegradation*
    - » *Dilution*
    - » *Other*



http://www.epa.gov/tio/download/citizens/mna.pdf

Monitored Natural Attenuation - Natural attenuation relies on natural processes to clean up or attenuate pollution in soil and groundwater. Natural attenuation occurs at most polluted sites. However, the right conditions must exist underground to clean sites properly. If not, cleanup will not be quick enough or complete enough. Scientists monitor or test these conditions to make sure natural attenuation is working. This is called monitored natural attenuation or MNA. (from EPA Citizen's Guides to Cleanup Methods, http://www.epa.gov/superfund/remedytech/pubitech.htm#citguide)

Natural Attenuation through Biodegradation - Tiny bugs or microbes that live in soil and groundwater use some chemicals for food. When they completely digest the chemicals, they can change them into water and harmless gases. (from EPA Citizen's Guides to Cleanup Methods, http://www.epa.gov/superfund/remedytech/pubitech.htm#citguide)

Natural Attenuation through Dilution - As pollution moves through soil and groundwater, it can mix with clean water. This reduces or dilutes the pollution. (from EPA Citizen's Guides to Cleanup Methods, http://www.epa.gov/superfund/remedytech/pubitech.htm#citguide)

4. PCE Ground Water Cleanup: Approaches

- **Other** – non-treatment remedies
  - Ground water monitoring
  - Institutional controls
    - » *Restrictive covenants*
    - » *Zoning regulations*
  - Water supply remedies
  - Engineering controls

http://www.epa.gov/swertio1/tsp/download/2009_november_meeting/tuesday/3_ross.pdf

Ground water monitoring may be done to ensure that PCE contaminated ground water does not impair a public water supply.

Institutional controls are non-engineered instruments such as administrative and/or legal controls that minimize the potential for human exposure to contamination by limiting land or resource use (from EPA's Institutional Controls: A Site Manager's Guide, http://www.epa.gov/superfund/policy/ic/guide/guide.pdf)

Water supply remedies may involve extending public water service to households not previously on public water.

Engineering controls may involve using wells to restrict or limit movement of contaminated ground water.

5. Examples: R6 Cities with PCE NPL Sites

Site	North Railroad Avenue Plume
City/State	Española (northern NM)
Issue	Contaminated ground water in central business district
Final NPL	1999
GW Remedy includes…	In-Situ Bioremediation
Status	Ground water cleanup on-going
More information	http://www.epa.gov/earth1r6/6sf/pdffiles/0604299.pdf

The North Railroad Avenue Plume is located in Espanola, Rio Arriba County, New Mexico, within the exterior boundary of the Santa Clara Indian Reservation. The Santa Clara Pueblo is located one mile south of the site. The site consists of a contaminated ground water plume extending approximately 58 acres in elliptical shape ¾ miles south of 113 North Railroad Avenue. The contamination originated at a dry cleaning operation.

The contaminants of concern detected in the ground water are tetrachloroethylene (PCE), trichloroethylene, cis-1, 2-dichloroethylene, and trans-1, 2-dichloroethylene. PCE is the contaminant most widespread and found in the highest concentrations. The population of Espanola is 8,389 people. The Santa Clara Pueblo has a population of 2,400 people.

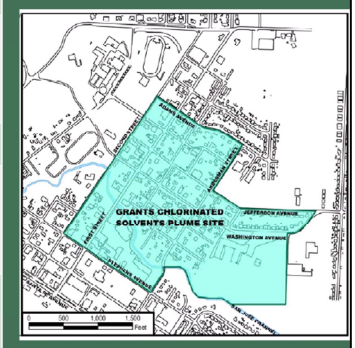
The Record of Decision was signed on September 27, 2001. The major components of the Selected Remedy include solvent flushing for the DNAPL (dense non-aqueous phase liquid) component of the ground water contamination and in-situ biological treatment for the dissolved contamination. EPA signed an Explanation of Significant Differences to the Record of Decision on March 7, 2008, and received concurrence and letters of support from the State of New Mexico, the Santa Clara Pueblo and the City of Espanola.

Based on the highly successful results received during the Field Test Plan, emulsified vegetable oil will be used to remediate the PCE plume and DNAPL contaminant. The Explanation of Significant Differences report identifies emulsified vegetable oil, combined with infused hydrogen gas at the source of the plume makes an excellent substitute for the originally planned SEAR (surfactant-enhanced aquifer remediation) treatment. Based on new information obtained during remedy implementation EPA and NMED determined SEAR treatment was not the best option for remediation the DNAPL and source area of the plume. For more information, please see the ESD report or Fact Sheets mailed to the community at large.

(from EPA fact sheet, http://www.epa.gov/earth1r6/6sf/pdffiles/0604299.pdf)

5. Examples: R6 Cities with PCE NPL Sites

Site	Grants Chlorinated Solvents Plume Site
City/State	Grants (northwestern NM)
Issue	Contaminated ground water underlying residential and commercial facilities within the city
Final NPL	2004
GW Remedy includes…	In-situ thermal treatment and chemical dechlorination through bioremediation
Status	Nearly all remedial construction work completed by March 2010
More information	http://www.epa.gov/earth1r6/6sf/pdffiles/0605144.pdf



The Grants Chlorinated Solvents Plume (GCSP) Site is located in the City of Grants, Cibola County, New Mexico. The GCSP Site is located in a mixed commercial and residential area. The approximate area of ground water contamination at the GCSP Site is 20 acres. Dry cleaning operations have been historically performed at multiple facilities within the GCSP Site. One dry cleaning facility remains active. Major remedy components include, for example…

1. Indoor Air: Vapor Mitigation: The EPA will install vapor intrusion mitigation systems at 14 residences that are located directly above the ground water plume where concentrations of trichloroethene (TCE) or tetrachloroethene (PCE) in ground water exceed 1,000 µg/L and other locations where indoor air concentrations exceed a one in 100,000 (1x10-5) risk level. …

2. Source Area: Thermal Treatment: Thermal treatment will be implemented at the source areas through heater probes/electrode vapor extraction wells with the central onsite treatment facility located at the source area property. Site-specific bench- and/or pilot–scale testing will be performed prior to Remedial Design (RD).

3. Shallow Plume Core and Hot Spot: In-Situ Chemical Oxidation (ISCO) with Follow-On Enhanced Reductive Dechlorination (ERD)…

4. Shallow Ground Water Plume Periphery: ERD Bio-Barrier ERD involves injecting carbon amendments (vegetable oil) into the aquifer periodically to support the growth of in-situ bacteria capable of treating the chlorinated solvents.

5. Deeper Ground Water Plume: ERD Bio-Barrier: ERD involves injecting carbon amendments (vegetable oil) into the aquifer periodically to support the growth of in-situ bacteria capable of treating the chlorinated solvents.

(from EPA Record of Decision, http://www.epa.gov/earth1r6/6sf/newmexico/grants/nm_grants_rod.pdf)

5. Examples: R6 Cities with PCE NPL Sites

Site	Griggs & Walnut Ground Water Plume Site
City/State	Las Cruces (southern central NM)
Issue	Contaminated ground water underlying large, mixed use portion of city
Final NPL	2001
GW Remedy includes…	Extraction well network to contain and treat the plume, air stripping at central treatment facility
Status	Remedial design completion scheduled for fall 2010
More information	http://www.epa.gov/region6/6sf/pdffiles/0605116.pdf http://www.epa.gov/region6/6sf/newmexico/griggs/nm_griggs_rod.pdf

The Griggs and Walnut Ground Water Plume Superfund Site is located in the City of Las Cruces (CLC), Doña Ana County (County), New Mexico. The County is located in the south central part of the state and borders Mexico and Texas at its southern boundary.

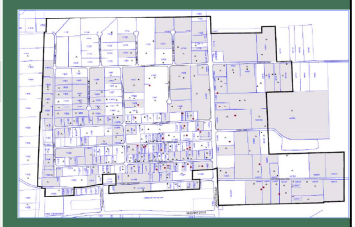
The Site is a ground water contaminant plume approximately 1.8 miles by one-half miles in size. The Site is defined by soil vapor samples and ground water samples found to be contaminated with primarily perchloroethylene (PCE, also known as tetrachloroethene or tetrachloroethylene).

The Selected Remedy provides treatment by conveying extracted ground water to a central treatment facility to meet the PCE MCL before it is distributed to consumers. The remedy will most likely require modifications to existing CLC supply wells and an additional extraction well. The remedy will also most likely include targeted pumping in the most contaminated areas of the aquifer, based on the results of modeled performance . The model results indicated targeted pumping will provide the most expeditious time frame for reaching the RAOs (remedial action objectives) as compared to performing a more traditional pump and treat remedy.

(from the EPA Record of Decision, http://www.epa.gov/region6/6sf/newmexico/griggs/nm_griggs_rod.pdf)

5. Examples: R6 Cities with PCE NPL Sites

Site	Jones Road Ground Water Plume Site
City/State	Northwest of Houston, TX
Issue	Contaminated ground water underlying active residential neighborhood and commercial district
Final NPL	2003
Key activity…	Installation of a waterline along with residential and commercial service connections completed in November 2008.
Status	Record of Decision scheduled for later 2010
More information	http://www.epa.gov/earth1r6/6sf/pdffiles/0605460.pdf



Ground water at the Jones Road site is contaminated with tetrachloroethylene (PCE) from the former Bell Dry Cleaners at 11600 Jones Road and other potential sources. In January 2003, the plume was documented to extend from the southern end of Echo Spring Lane to Tower Oaks Boulevard and from Timber Hollow to the eastern side of Jones Road.

Installation of the waterline along with residential and commercial service connections was completed in November 2008. A total of 144 service connections were done.

A Record of Decision is pending completion of the Remedial Investigation and Feasibility Study and issuance of the Proposed Plan for public comment.

(from the EPA Fact Sheet http://www.epa.gov/earth1r6/6sf/pdffiles/0605460.pdf)

6. For More Information

- City of Leon Valley - Bandera Road Ground Water Plume Superfund Site Page
  - http://www.leonvalleytexas.gov/EPA.htm
- Information on Current and Deleted Superfund NPL Sites
  - http://cfpub.epa.gov/supercpad/cursites/srchsites.cfm
- Information on Superfund Sites in Region 6
  - http://www.epa.gov/region6/6sf/6sf.htm
- Information on PCE
  - http://www.epa.gov/superfund/health/contaminants/index.htm
  - http://www.atsdr.cdc.gov/cercla/
  - http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=264&tid=48
- Information on Superfund NPL Site Cleanup Trends
  - http://www.clu-in.org/download/remed/asr/12/asr12_full_document.pdf
- Information on Dry Cleaner Remediation Cleanup Trends
  - http://www.drycleancoalition.org/download/site_profile_paper.pdf
- Information on EPA's Technical Assistance for Communities Program
  - http://www.epa.gov/superfund/community/tasc/index.htm

Contact Information

TASC appreciates your feedback

Please contact Eric Marsh at emarsh@e2inc.com (512-505-8151) to provide comments about this presentation