TIM # 9 MEETING

AOC 65 Treatability Study
Camp Stanley Storage Activity
Boerne, TX

Meeting Agenda

- Discuss status of TO 0058 Scope of Work.
- Discuss general findings from SVE testing and recharge study
- Review CSSA comments and/or Report Content of final deliverables:
  - Interim SVE Treatability Test Report
  - AOC 65 O&M Assessment Report
  - Technology Evaluation Report
- Segue into how TO-58 leads to other TOs including TO-06.

Task 1 – Task Order Management

Remaining Activities

- 01010 – Management
  Period of performance 0.5 more months
  Clin modification adds 4.0 months
- 01020 – Status Reports
  2 or 4 more monthly status reports pending
  Clin modification
- 01030 – Karst Expert, 100% complete
- 01040 – Procurement, No new procurements;
- 01050 – Mod Proposals, 100% complete, although
  Mod4 planned to balance CLINs, extend POP

Task 2 – Meetings and Site Visits

Remaining Activities

- 02010 – Misc. Meetings, 100% complete
- 02020 – TIM/Technical Interchange Meetings
  *1 TIMs remain (TIM #10), **if needed***
- 02030 – Karst & Regulatory Support Meetings
  One regulatory support mtg planned &
  1 Karst support meetings available
  MOD4 TO DELETE BOTH FROM SOW
- 02040 – Public Meetings & Fact Sheets
  Public meeting held
  ***One** Fact Sheet remains.*
  Planned topic is cleanup at AOC-65.

Task 3 – Removal Actions Remaining Activities

- 03010 – Cleanup Plan Prep, 100% complete
- 03020 – Engineering Bid Pkg, 100% complete
- 03030 – Air Permitting Issues, 100% complete
- 03040 – Subslab Ventilation, 100% complete
- 03050 – Removal Action, 100% complete
- 03060 – Interim Measure Report, 100% complete
- 03070 – Subslab O&M Activities, 100% complete

Task 4 – Treatability Study Remaining Activities

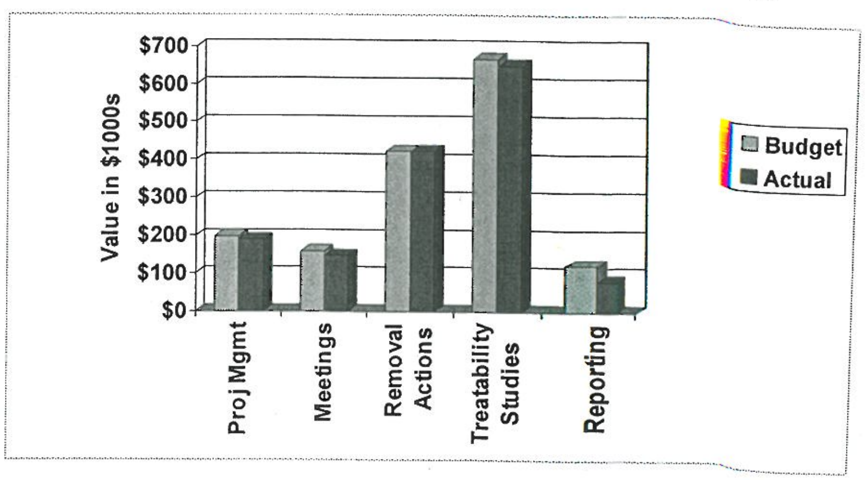
- 04010 – Surface Geophysical Testing, 100% complete
- 04020 – Treatability Test Plan, 100% complete
- 04030 – Groundwater Recharge Study, 97% complete
  Recharge study sampling under TO-58 complete, sample results from other TOs to be used in report, as appropriate.
- 04040 – SVE Study Activities, 100% complete
- 04050 – Miscellaneous Studies, 100% complete pending Mod4
  Placeholder for possible soil gas or groundwater tracer test. ***Descoped as part of Mod4***
- 04060 – SVE O&M Plan & Data Collection, 100% complete
- 04070 – SVE O&M Semi-annual Reporting, 50% complete
  Complete data compilation and begin report preparation.

Task 5 – Technology Evaluation & Reporting – Remaining Activities

- 05010 – Technology Evaluation, 100% complete
- 05020 – Geophysical Test Report, 100% complete
- 05030 – Interim SVE Test Report, 90% complete
  Submitted late August 2004
- 05040 – Technology Evaluation Report, 35% complete
  Complete report preparation, submit draft in October 2004)

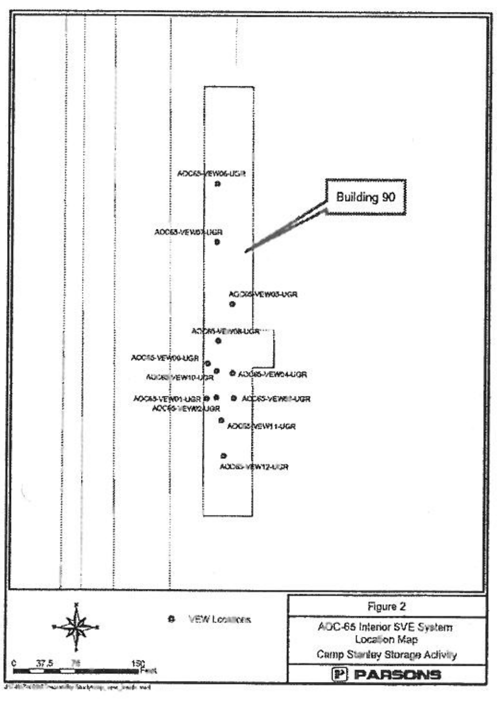
TO 0058 Budget Status by Task

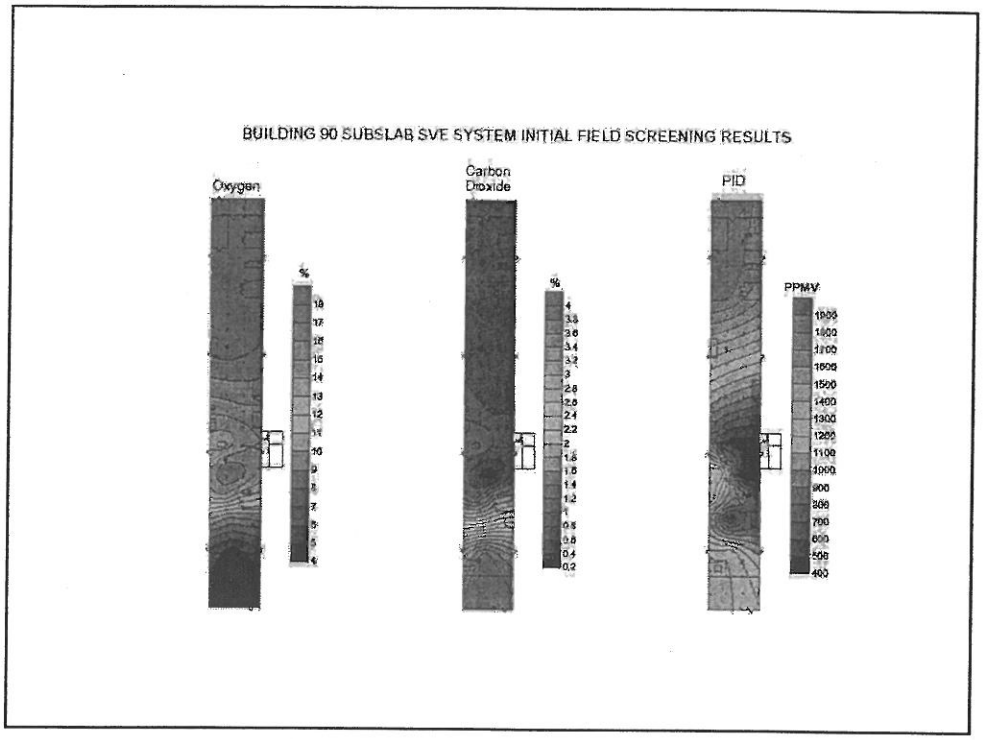
As of June 25, 2004 ***($62k remaining)***

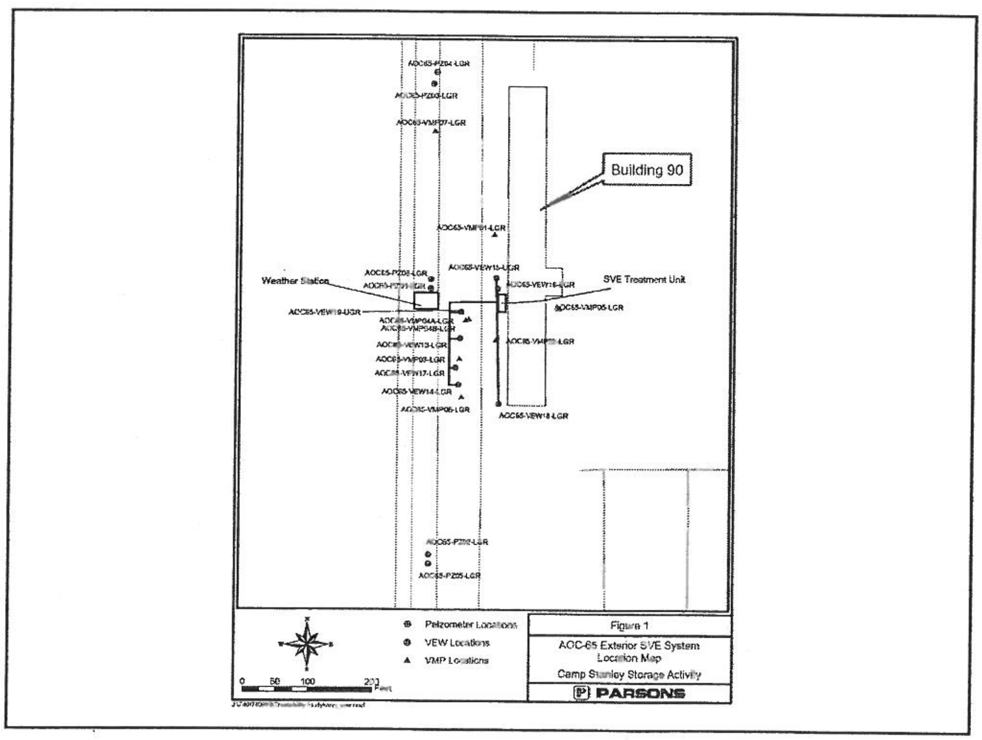


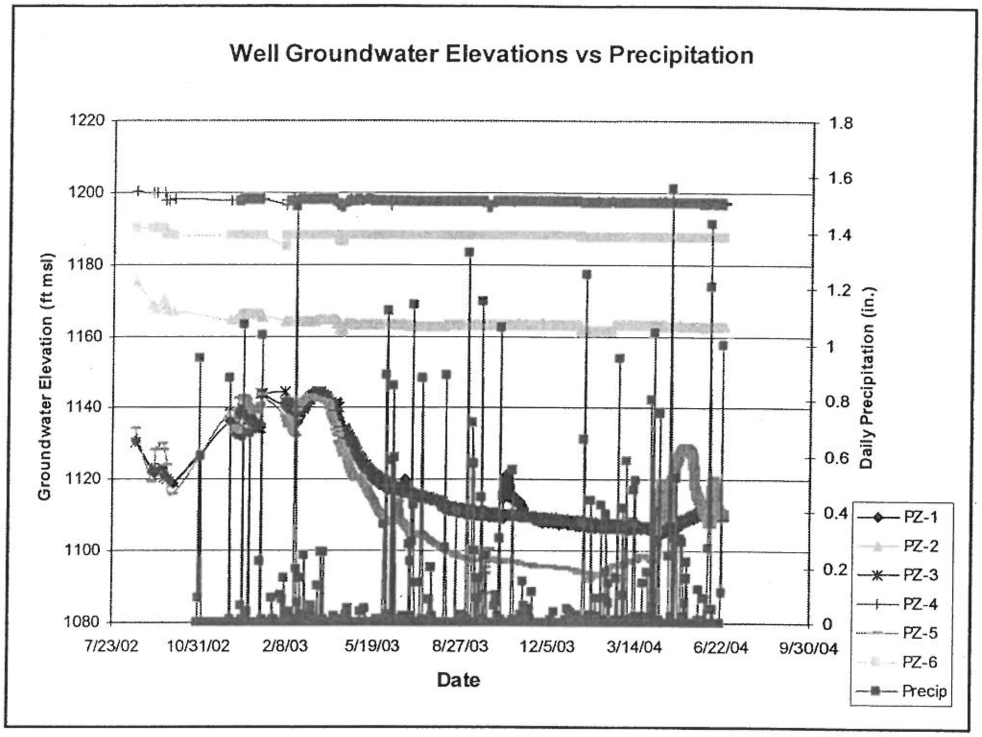
Findings from SVE Testing

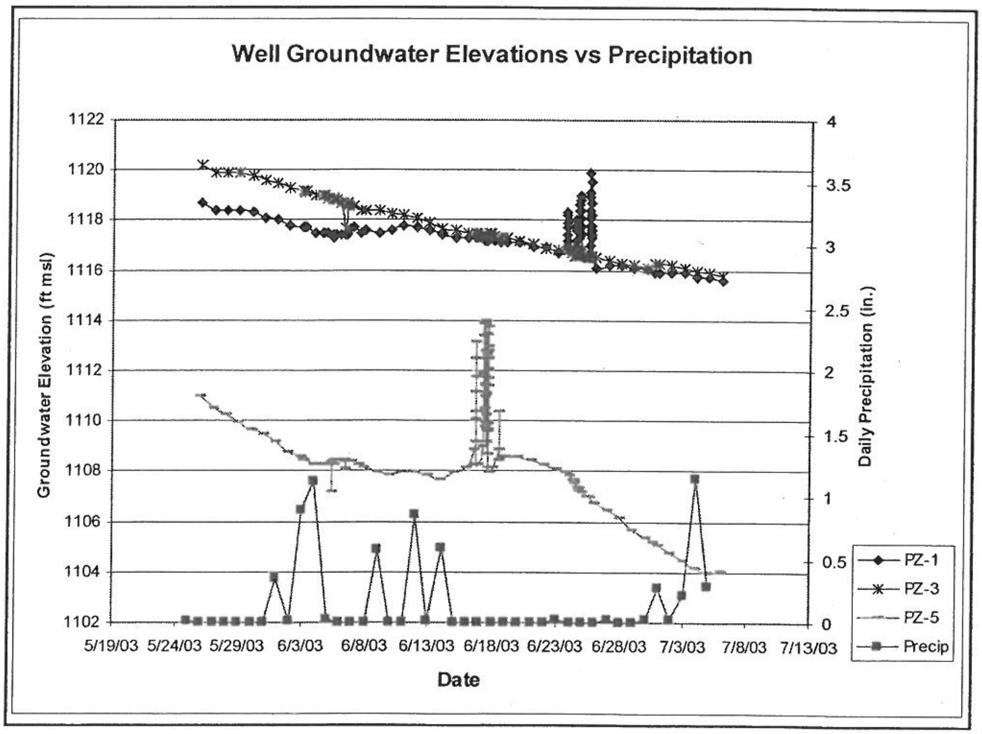
- Bldg 90 SVE: 12 shallow VEWs/VMPs
- AOC-65 SVE: 7 VEWs and 7 multi-depth VMPs

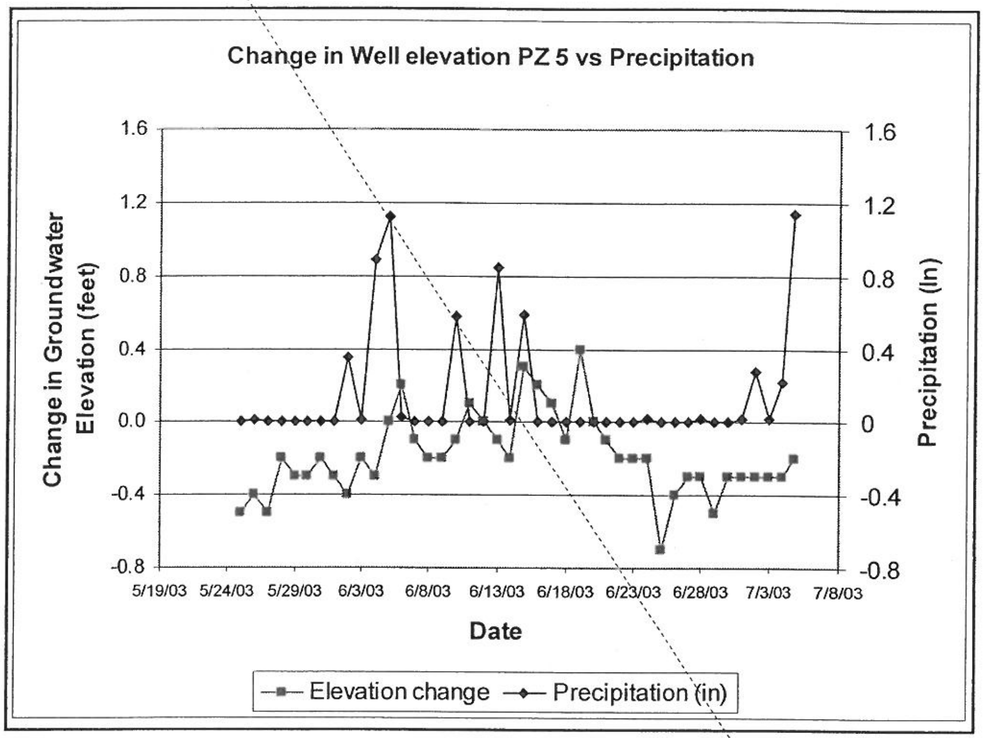


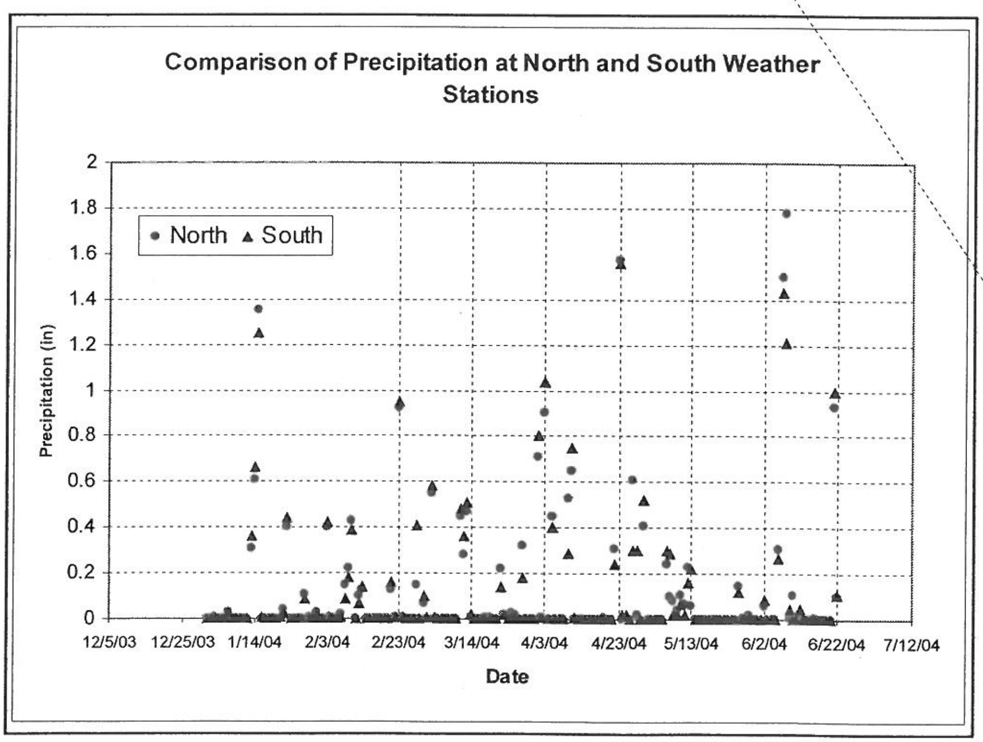

BUILDING 90 SUBSLAB SVE SYSTEM INITIAL FIELD SCREENING RESULTS
Oxygen
Carbon Dioxide
PID
%
%
PPMV

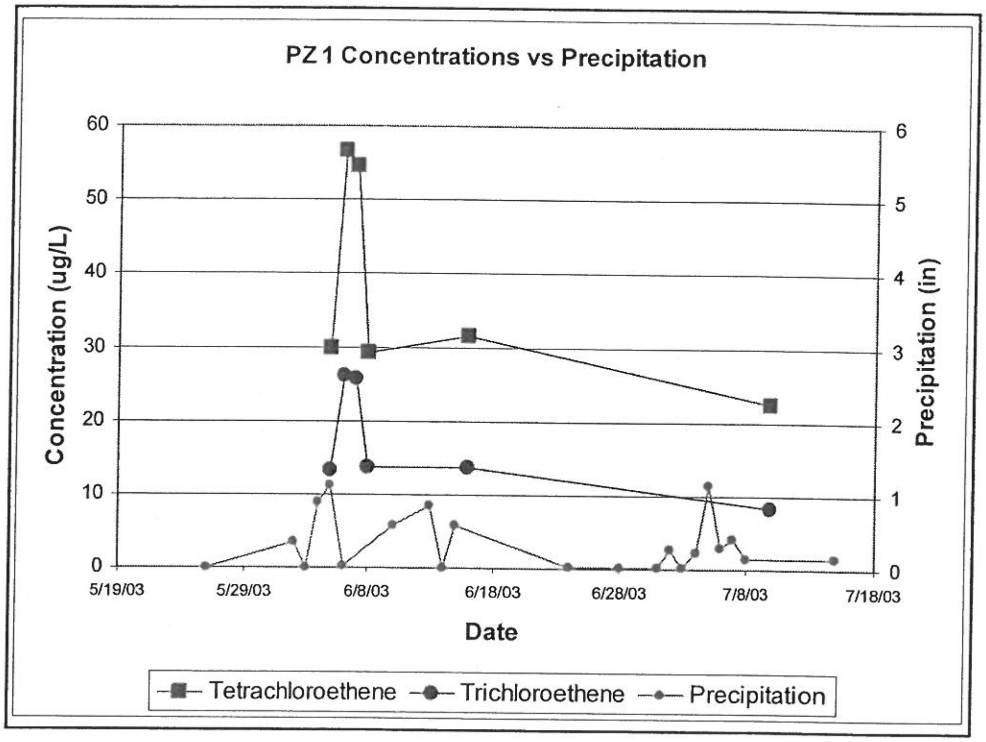

Building 90
Weather Station
SVE Treatment Unit
AOC65-VMP07-LGR
AOC65-VEW18-LGR
AOC65-PZ05-LGR
Pelzometer Locations
VEW Locations
VMP Locations
0 50 100 200 Feet
Figure 1
AOC-65 Exterior SVE System Location Map
Camp Stanley Storage Activity
PARSONS

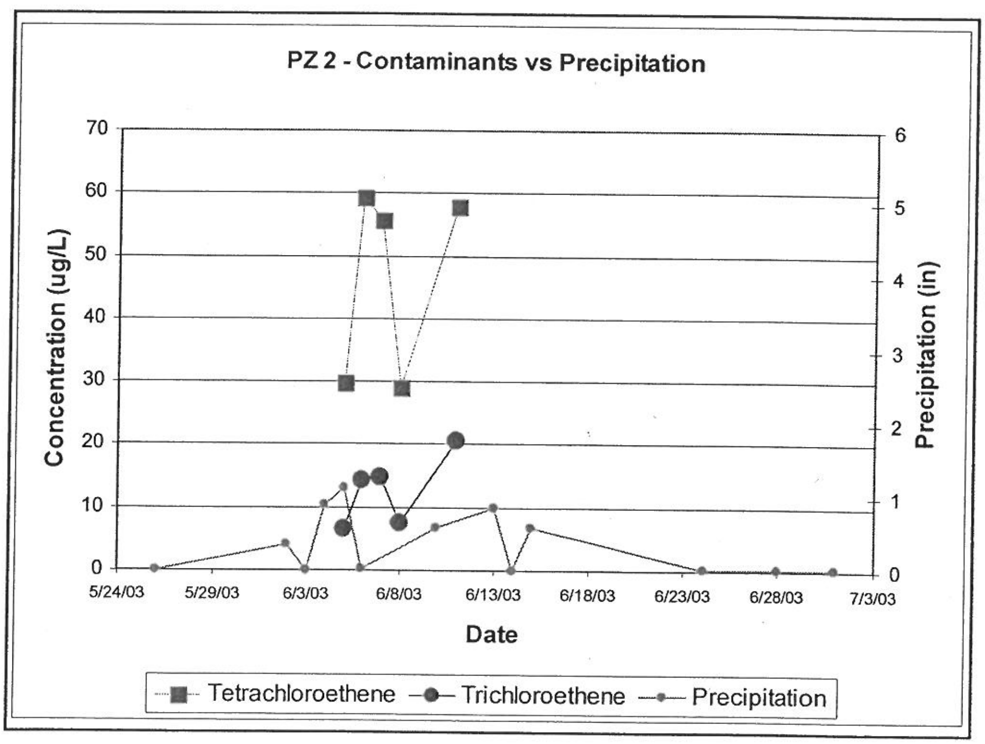

Well Groundwater Elevations vs Precipitation
Groundwater Elevation (ft msl)
Daily Precipitation (in.)
Date
7/23/02
10/31/02
2/8/03
5/19/03
8/27/03
12/5/03
3/14/04
6/22/04
9/30/04
PZ-1
PZ-2
PZ-3
PZ-4
PZ-5
PZ-6
Precip

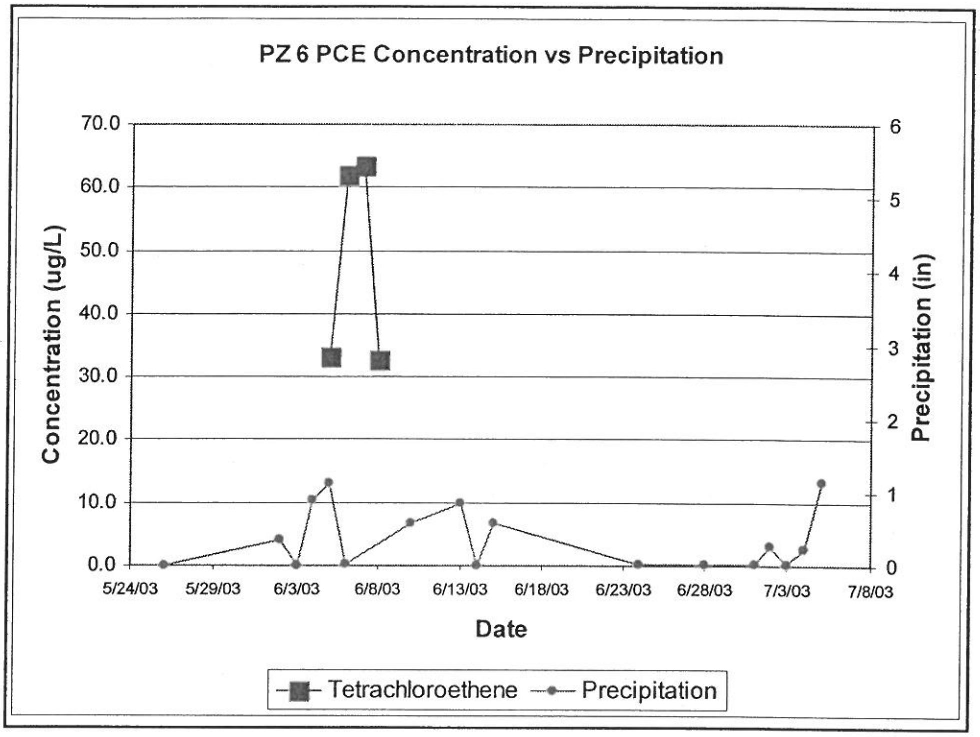

Well Groundwater Elevations vs Precipitation
Groundwater Elevation (ft msl)
Daily Precipitation (in.)
Date
5/19/03
5/24/03
5/29/03
6/3/03
6/8/03
6/13/03
6/18/03
6/23/03
6/28/03
7/3/03
7/8/03
7/13/03
PZ-1
PZ-3
PZ-5
Precip

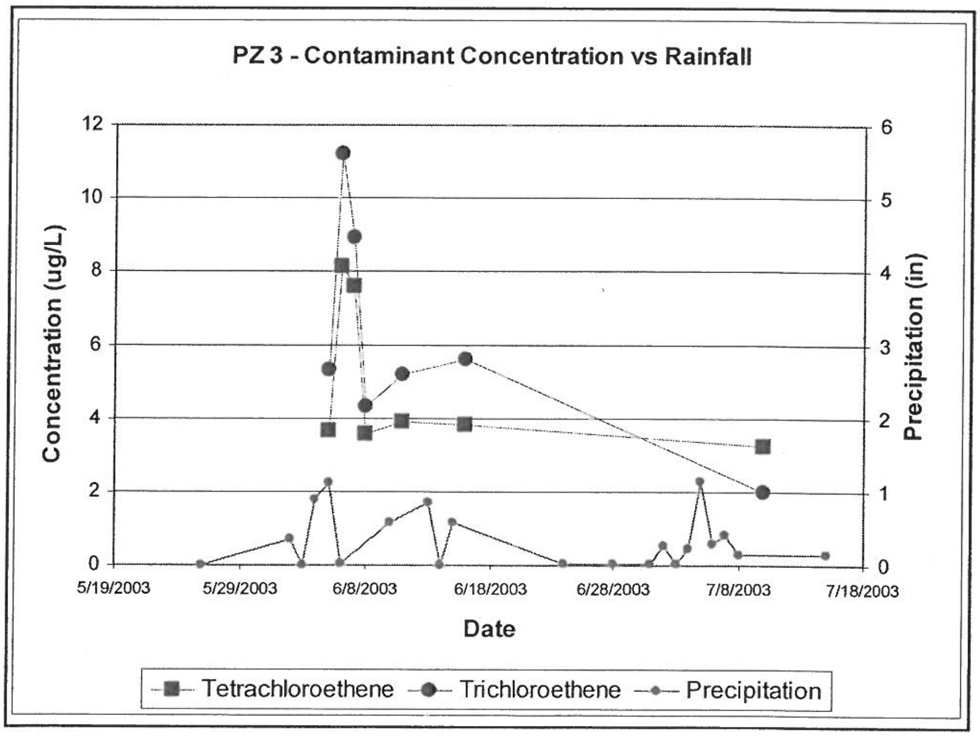

Change in Well elevation PZ 5 vs Precipitation
1.6
1.2
0.8
0.4
0.0
-0.4
-0.8
0
Change in Groundwater Elevation (feet)
Precipitation (in)
5/19/03 5/24/03 5/29/03 6/3/03 6/8/03 6/13/03 6/18/03 6/23/03 6/28/03 7/3/03 7/8/03
Date
Elevation change
Precipitation (in)

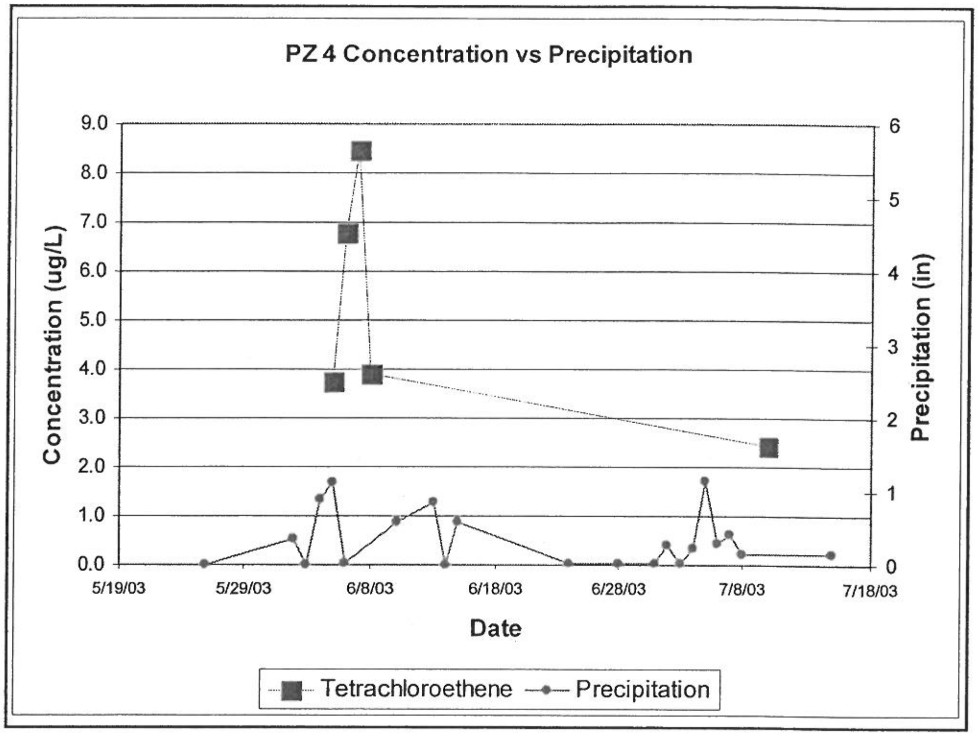

Comparison of Precipitation at North and South Weather Stations
North
South
Precipitation (in)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
12/5/03 12/25/03 1/14/04 2/3/04 2/23/04 3/14/04 4/3/04 4/23/04 5/13/04 6/2/04 6/22/04 7/12/04
Date

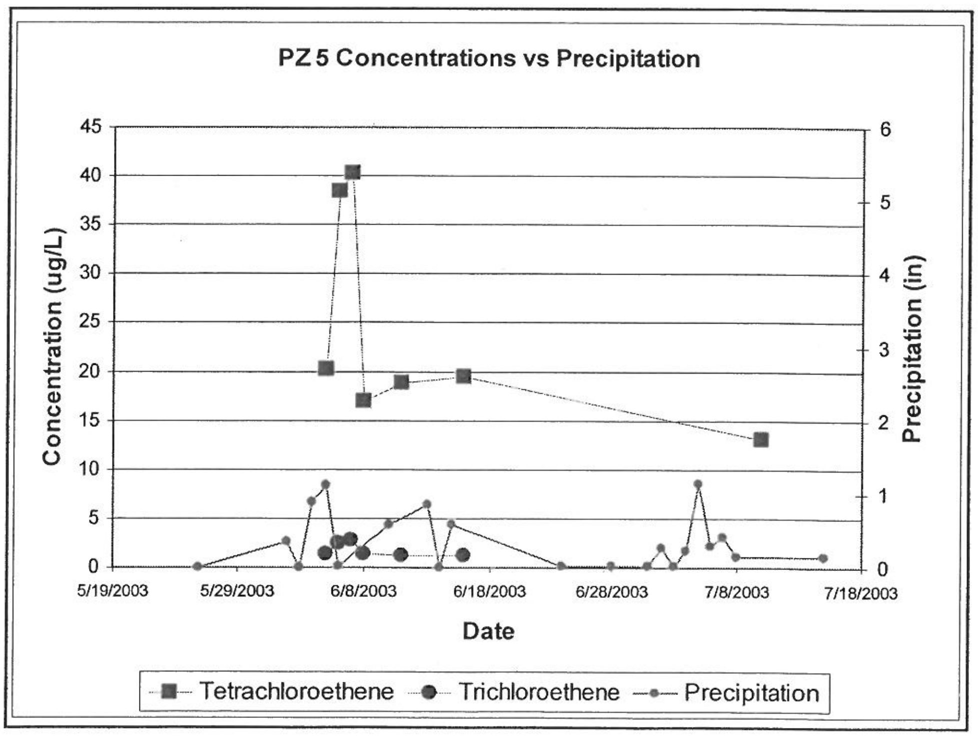

PZ 1 Concentrations vs Precipitation
Concentration (ug/L)
Precipitation (in)
Date
5/19/03
5/29/03
6/8/03
6/18/03
6/28/03
7/8/03
7/18/03
Tetrachloroethene
Trichloroethene
Precipitation

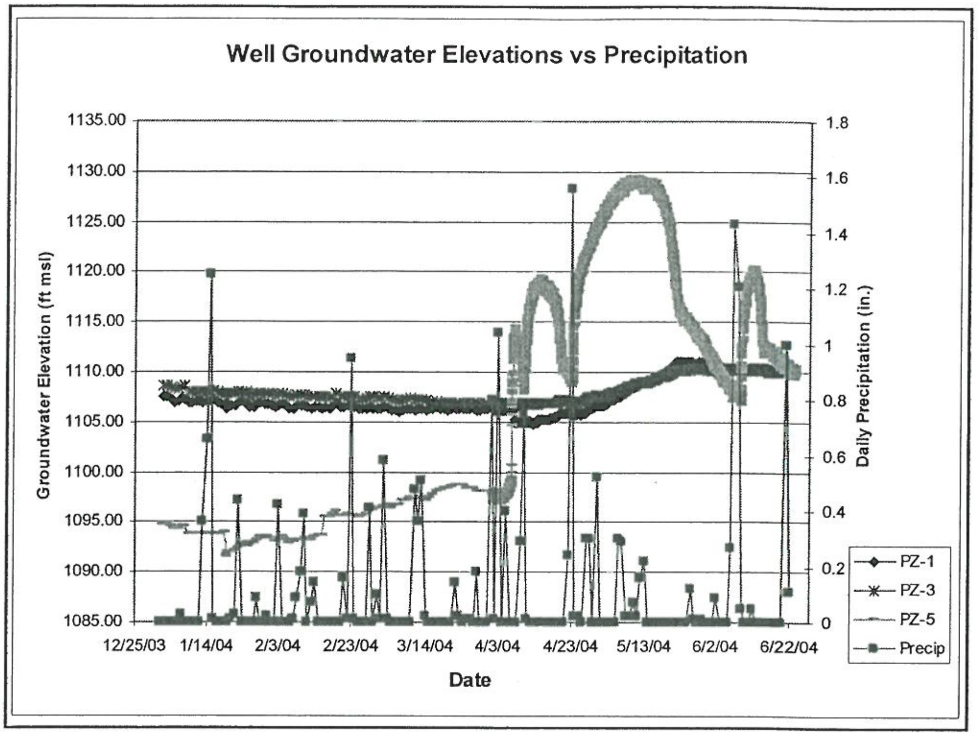

PZ 2 - Contaminants vs Precipitation
Concentration (ug/L)
Precipitation (in)
Date
5/24/03
5/29/03
6/3/03
6/8/03
6/13/03
6/18/03
6/23/03
6/28/03
7/3/03
Tetrachloroethene
Trichloroethene
Precipitation

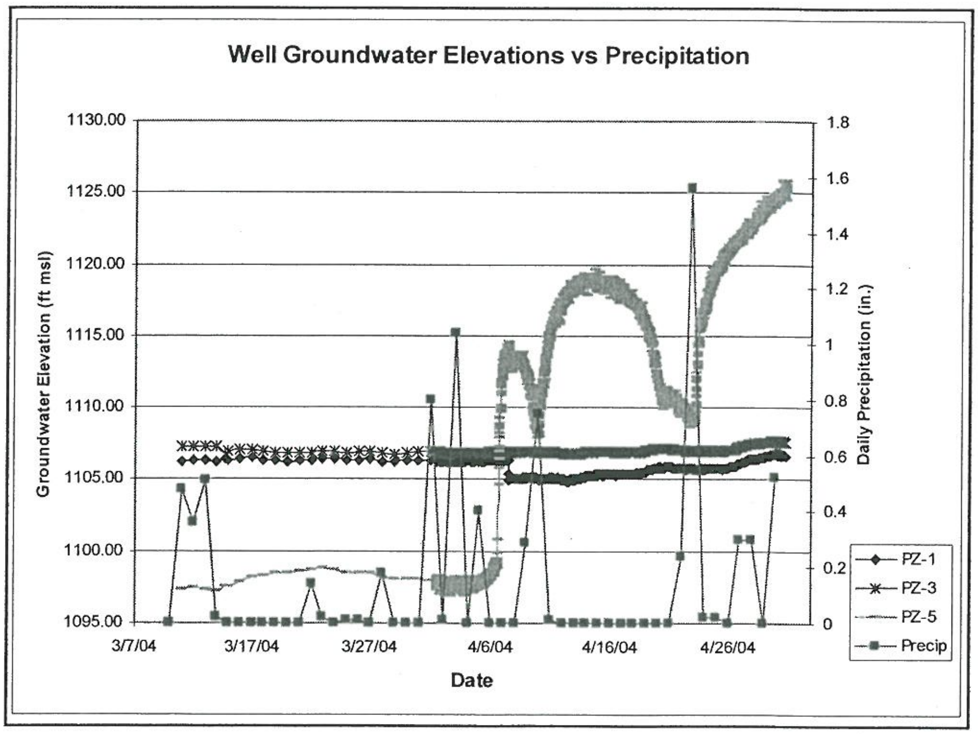

PZ 6 PCE Concentration vs Precipitation
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Concentration (ug/L)
6
5
4
3
2
1
0
Precipitation (in)
5/24/03
5/29/03
6/3/03
6/8/03
6/13/03
6/18/03
6/23/03
6/28/03
7/3/03
7/8/03
Date
Tetrachloroethene
Precipitation

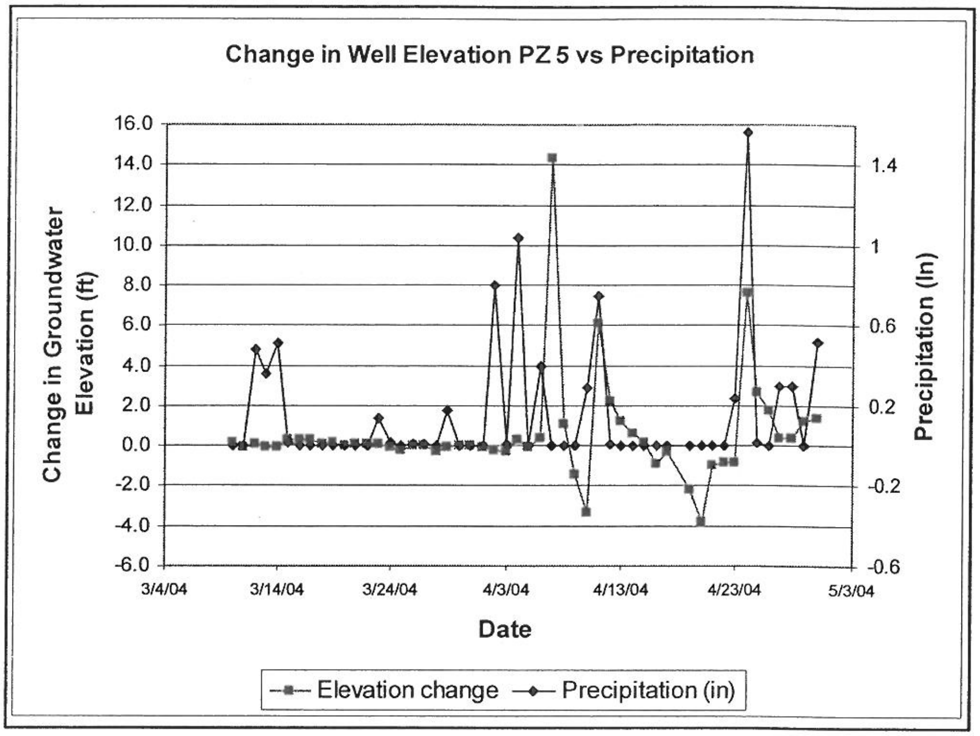

PZ 3 - Contaminant Concentration vs Rainfall
12
10
8
6
4
2
0
Concentration (ug/L)
6
5
4
3
2
1
0
Precipitation (in)
5/19/2003
5/29/2003
6/8/2003
6/18/2003
6/28/2003
7/8/2003
7/18/2003
Date
Tetrachloroethene
Trichloroethene
Precipitation


PZ 4 Concentration vs Precipitation
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Concentration (ug/L)
6
5
4
3
2
1
0
Precipitation (in)
5/19/03
5/29/03
6/8/03
6/18/03
6/28/03
7/8/03
7/18/03
Date
Tetrachloroethene
Precipitation

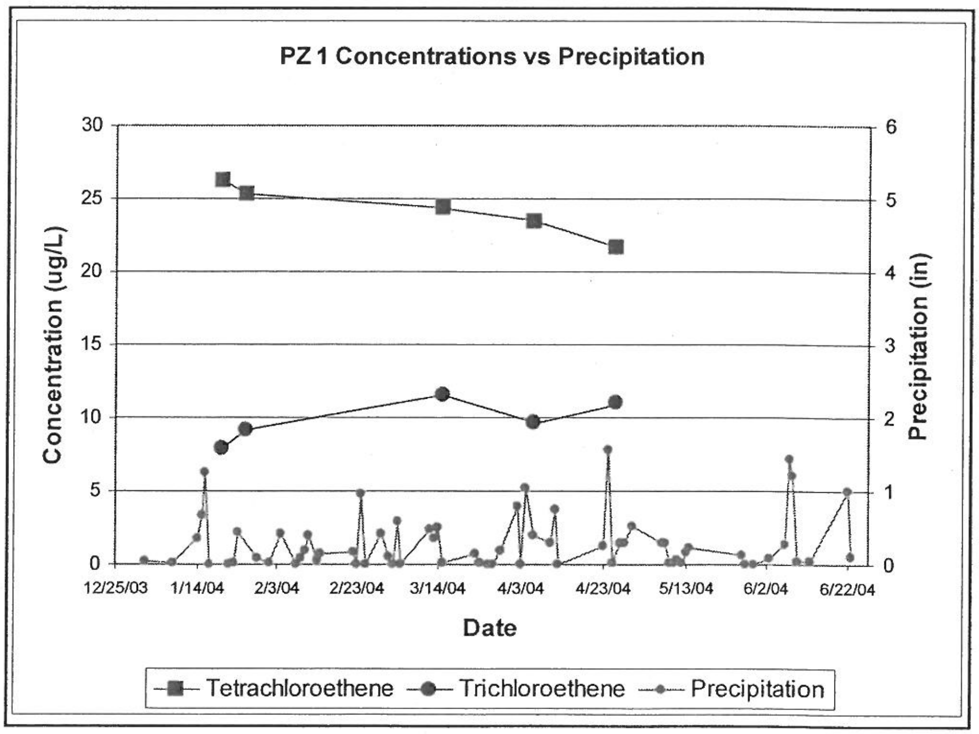

PZ 5 Concentrations vs Precipitation
45
40
35
30
25
20
15
10
5
0
Concentration (ug/L)
6
5
4
3
2
1
0
Precipitation (in)
5/19/2003
5/29/2003
6/8/2003
6/18/2003
6/28/2003
7/8/2003
7/18/2003
Date
Tetrachloroethene
Trichloroethene
Precipitation


Well Groundwater Elevations vs Precipitation
Groundwater Elevation (ft msl)
1135.00
1130.00
1125.00
1120.00
1115.00
1110.00
1105.00
1100.00
1095.00
1090.00
1085.00
Daily Precipitation (in.)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
12/25/03
1/14/04
2/3/04
2/23/04
3/14/04
4/3/04
4/23/04
5/13/04
6/2/04
6/22/04
Date
PZ-1
PZ-3
PZ-5
Precip

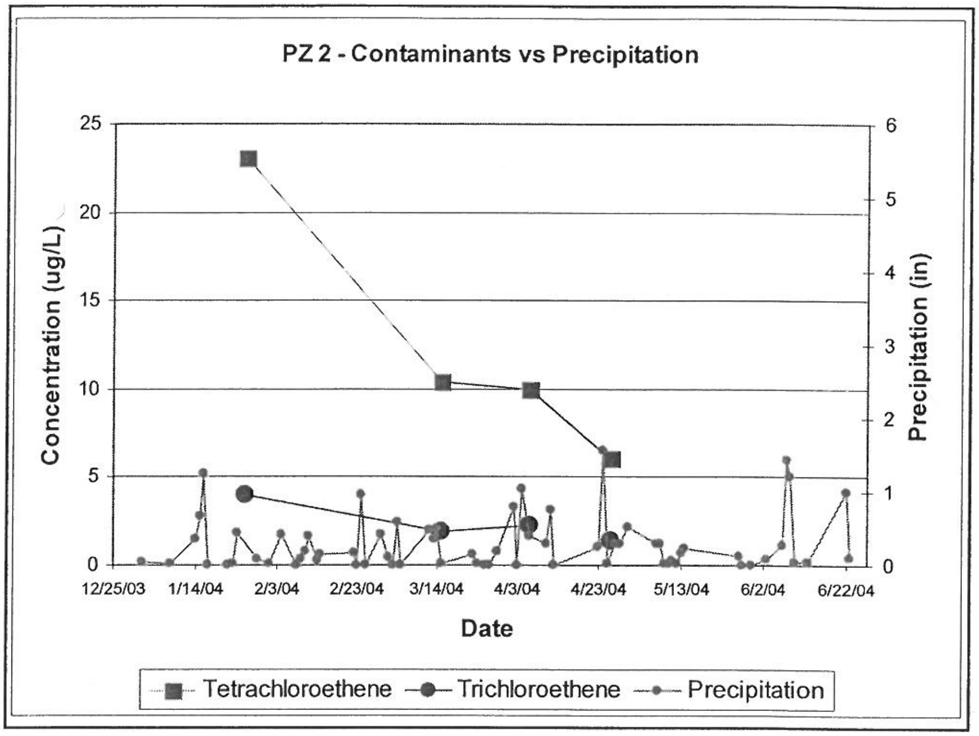

Well Groundwater Elevations vs Precipitation
Groundwater Elevation (ft msl)
1130.00
1125.00
1120.00
1115.00
1110.00
1105.00
1100.00
1095.00
Daily Precipitation (in.)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
3/7/04
3/17/04
3/27/04
4/6/04
4/16/04
4/26/04
Date
PZ-1
PZ-3
PZ-5
Precip

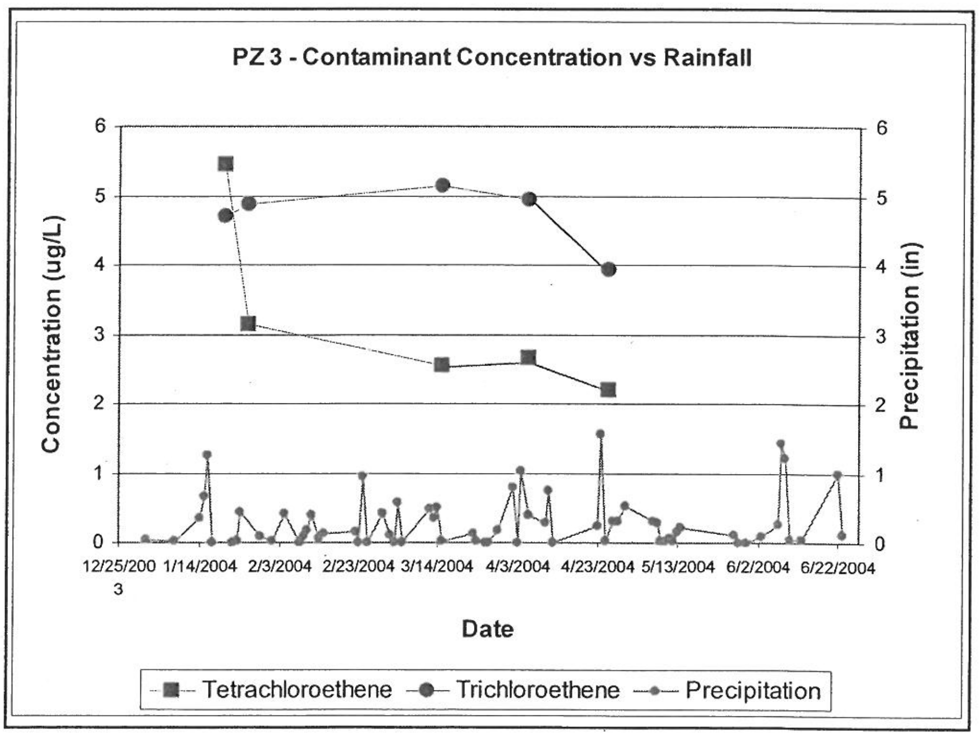


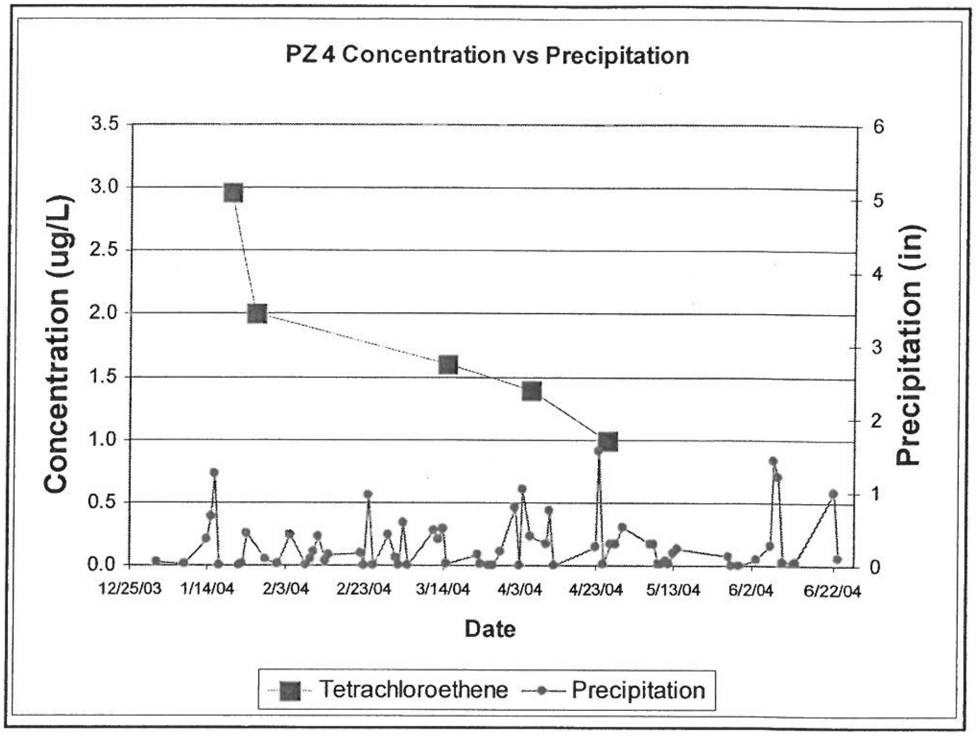
Change in Well Elevation PZ 5 vs Precipitation
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
Change in Groundwater Elevation (ft)
1.4
1
0.6
0.2
-0.2
-0.6
Precipitation (In)
3/4/04
3/14/04
3/24/04
4/3/04
4/13/04
4/23/04
5/3/04
Date
Elevation change
Precipitation (in)

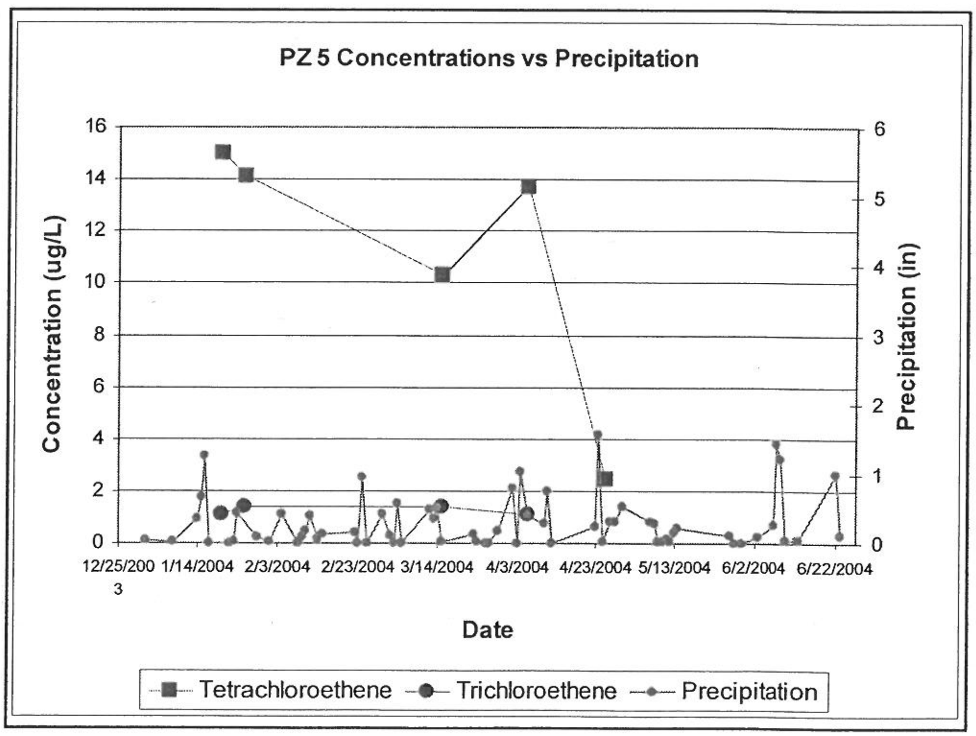


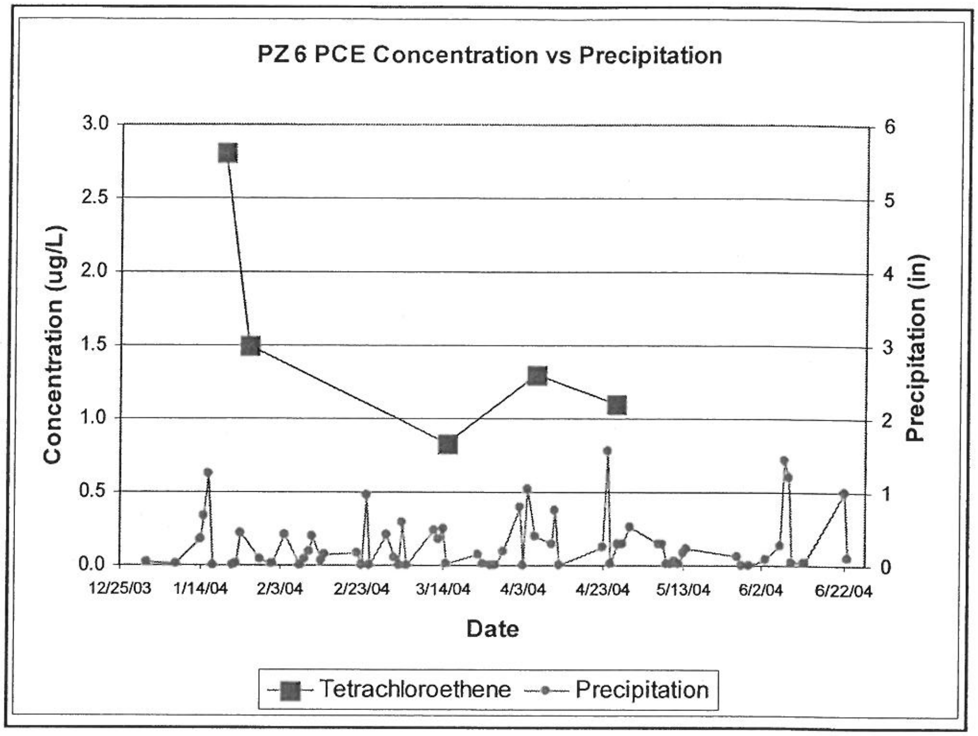
PZ 1 Concentrations vs Precipitation
30
25
20
15
10
5
0
Concentration (ug/L)
6
5
4
3
2
1
0
Precipitation (in)
12/25/03
1/14/04
2/3/04
2/23/04
3/14/04
4/3/04
4/23/04
5/13/04
6/2/04
6/22/04
Date
Tetrachloroethene
Trichloroethene
Precipitation

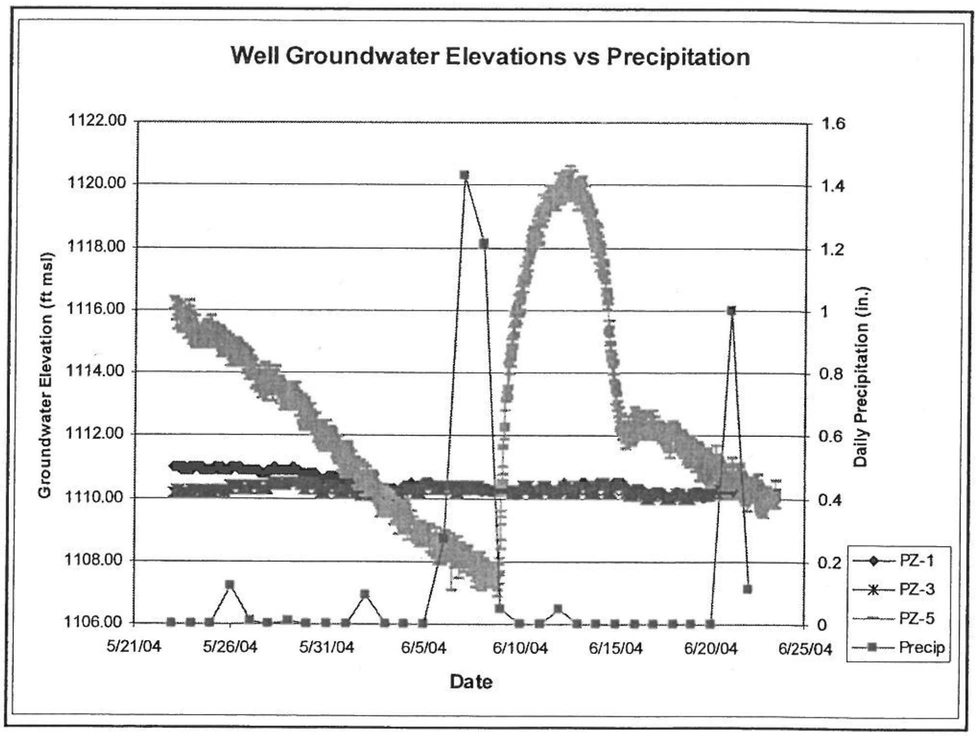

PZ 2 - Contaminants vs Precipitation
Concentration (ug/L)
Precipitation (in)
25
20
15
10
5
0
6
5
4
3
2
1
0
12/25/03 1/14/04 2/3/04 2/23/04 3/14/04 4/3/04 4/23/04 5/13/04 6/2/04 6/22/04
Date
Tetrachloroethene
Trichloroethene
Precipitation

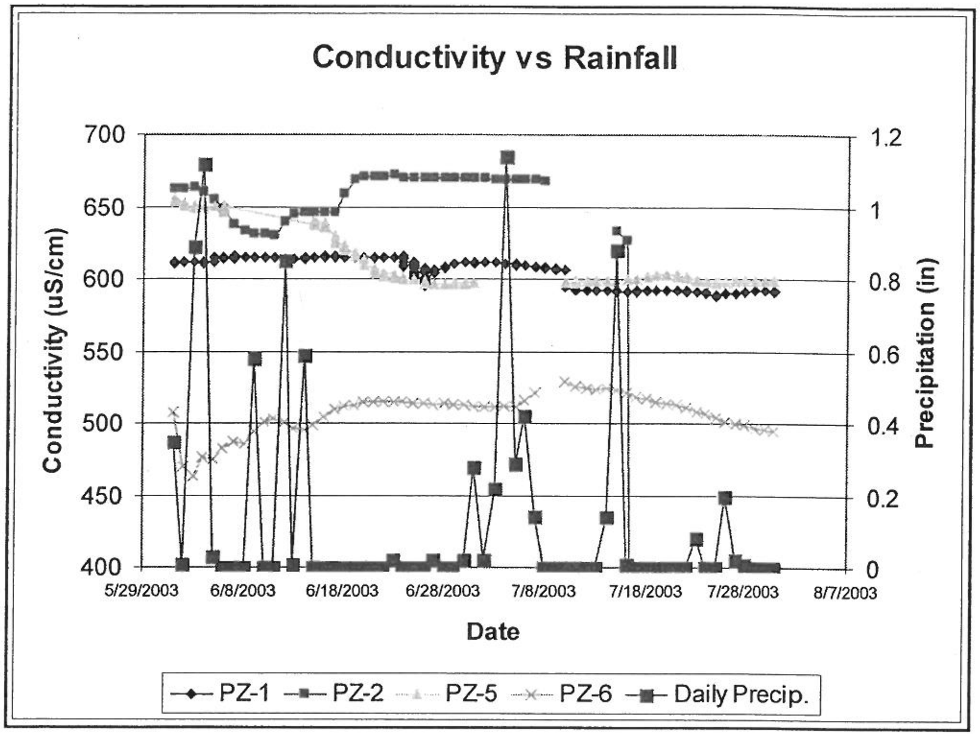

PZ 3 - Contaminant Concentration vs Rainfall
Concentration (ug/L)
Precipitation (in)
6
5
4
3
2
1
0
6
5
4
3
2
1
0
12/25/2003 1/14/2004 2/3/2004 2/23/2004 3/14/2004 4/3/2004 4/23/2004 5/13/2004 6/2/2004 6/22/2004
Date
Tetrachloroethene
Trichloroethene
Precipitation

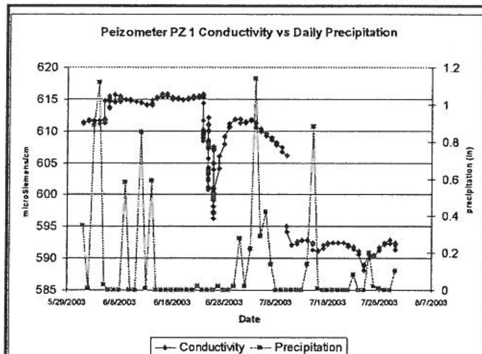

PZ 4 Concentration vs Precipitation
Concentration (ug/L)
Precipitation (in)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
6
5
4
3
2
1
0
12/25/03 1/14/04 2/3/04 2/23/04 3/14/04 4/3/04 4/23/04 5/13/04 6/2/04 6/22/04
Date
Tetrachloroethene
Precipitation

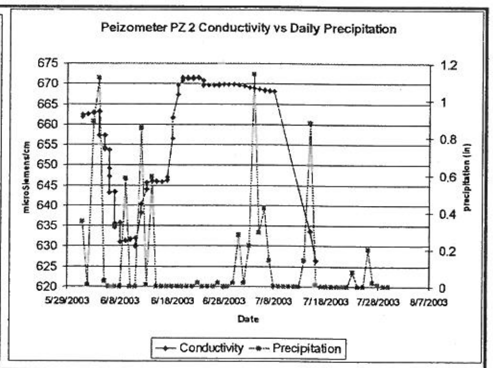

PZ 5 Concentrations vs Precipitation
Concentration (ug/L)
Precipitation (in)
16
14
12
10
8
6
4
2
0
6
5
4
3
2
1
0
12/25/2003 1/14/2004 2/3/2004 2/23/2004 3/14/2004 4/3/2004 4/23/2004 5/13/2004 6/2/2004 6/22/2004
Date
Tetrachloroethene
Trichloroethene
Precipitation

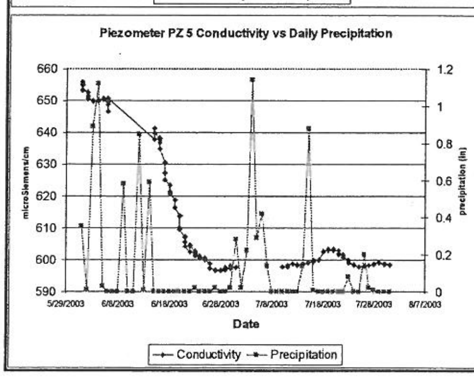

PZ 6 PCE Concentration vs Precipitation
Concentration (ug/L)
Precipitation (in)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
6
5
4
3
2
1
0
12/25/03
1/14/04
2/3/04
2/23/04
3/14/04
4/3/04
4/23/04
5/13/04
6/2/04
6/22/04
Date
Tetrachloroethene
Precipitation

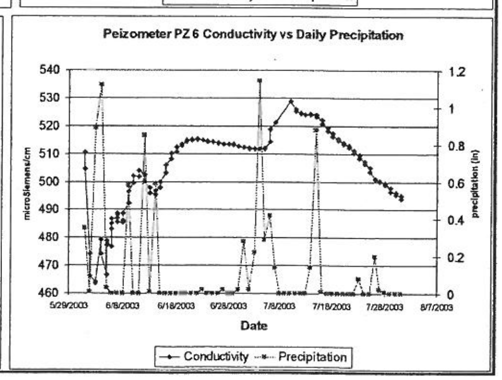

Well Groundwater Elevations vs Precipitation
Groundwater Elevation (ft msl)
Daily Precipitation (in.)
1122.00
1120.00
1118.00
1116.00
1114.00
1112.00
1110.00
1108.00
1106.00
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
5/21/04
5/26/04
5/31/04
6/5/04
6/10/04
6/15/04
6/20/04
6/25/04
Date
PZ-1
PZ-3
PZ-5
Precip


Conductivity vs Rainfall
Conductivity (uS/cm)
Precipitation (in)
Date
PZ-1
PZ-2
PZ-5
PZ-6
Daily Precip.
5/29/2003
6/8/2003
6/18/2003
6/28/2003
7/8/2003
7/18/2003
7/28/2003
8/7/2003


Peizometer PZ 1 Conductivity vs Daily Precipitation
Date
Conductivity
Precipitation


Peizometer PZ 2 Conductivity vs Daily Precipitation
Date
Conductivity
Precipitation


Piezometer PZ 5 Conductivity vs Daily Precipitation
Date
Conductivity
Precipitation


Peizometer PZ 6 Conductivity vs Daily Precipitation
Date
Conductivity
Precipitation

Vadose Zone Technologies			
Technology	**Description**	**Advantages**	**Disadvantages**
No Action	No invasive activities implemented. Long term monitoring (LTM) not required	- Lowest cost - Ease of implementation - Minimal disruptions to operations	- Closure not attained - Contaminants not removed from fractures - No reduction in VOCs migration to groundwater
Continued LTM and Well-Head Treatment	No changes are implemented to existing SVE system. Appropriate treatment is applied to wells that have contaminants levels above the MCL	- Procedures currently in place - Low cost - Addresses contamination in drinking water wells - Minimal added disruption to site	- No reduction in contaminant mass in the source zone - Existing SVE system has shown poor performance - Does not address contaminants in groundwater before they reach wells - No exit strategy (will continue for the foreseeable future)
Expanded Soil-Vapor Extraction	Expand and optimize the existing SVE system. Increase in power and number of extraction wells would improve removal of contaminants. Improve performance by moving SVE blower to a location west of drainage ditch	- Expansion of existing system less costly than entirely new approach - Relative ease of implementation - Most cost effective mass removal measure	- Additional investigation needed to better characterize source zone and fracture pattern - Existing SVE system has shown poor performance - Does not address contaminants in groundwater
Soil-Vapor Extraction with Hydrofracturing	Fracturing the subsurface materials in the area of the existing or expanded SVE to increase permeability and interconnection of existing fractures	- Fracturing may increase contaminants removal rate - Can address contaminants beneath existing structures	- Hydrofracturing may increase mobility of contaminants - Pockets of low permeability may remain between fractured zones and limit performance - Pilot study required to prove effectiveness and/or optimize design - Potential for damage to structures and utilities - Increase exposure risk

Enhanced Dual Phase Extraction	Install and operate a dual phase extraction system with enhancements to destroy, mobilize or increase dissolution of contaminants. Enhancements may include: steam, surfactants, cosolvents, water flooding and thermal heating	- Enhancements may increase contaminants removal rate - Can address contaminants beneath existing structures - Can address both vapor phase and dissolved phase	- High cost - Limited depth of effectiveness - High O&M/power requirements - DPE performance at site is not known - Complex geologic conditions may hinder effectiveness - Injection of enhancements may mobilize contained contaminants - Pilot study required to prove effectiveness and/or optimize design - Increased exposure risk
Organic Substrate Infiltration	Partitioning contaminants into solution where they can be biodegraded	- Biodegradation of NAPLs would reduce the total mass needed to extract - Reduction of treatment requirements - Can address contaminants beneath existing structures	- Better understanding of source zone and fracture patterns needed - Pockets of impermeability may limit solution efficacy - Injection of enhancements may mobilize contained contaminants
Dissolved Plume Technologies			
Technology	**Description**	**Advantages**	**Disadvantages**
No Action	No invasive activities implemented. Long term monitoring (LTM) not required	- Lowest cost - Ease of implementation - Minimal disruptions to operations	- Closure not attained - Contaminants not removed from fractures - Does not satisfy ARARs - Public not protected because deed restriction not required
Pump & Treat	Installation of extraction wells for removal of dissolved contaminants from the subsurface, and containment of contaminated groundwater to prevent migration. Treatment of extracted groundwater	- Relative low cost of installation and maintenance - Known and proven technology	- Better understanding of source zone and fracture patterns needed - Low permeability may hinder recovery of contaminants - High O&M requirements for groundwater treatment
Monitored Natural Attenuation	Allow natural biological, chemical, and physical processes to treat groundwater contaminants, and conducting ongoing monitoring to verify that these processes are effective	- Low cost of implementation - Ease of maintenance and monitoring	- Uncertainty on efficacy dependent on specific subsurface conditions - Very long time frame for complete remediation

Carbon Source Injection	Promote biodegradation of NAPL by injection of a dilute solution of carbon substrate (*e.g.*, lactate) into the contaminated groundwater zone	- Biodegradation of NAPLs would reduce the total mass needed to extract - Reduction of treatment requirements - Can address contaminants beneath existing structures	- Better understanding of source zone and fracture patterns needed - Pockets of impermeable zones may limit solution efficacy
Oxidation/Reduction	Chemical transformation of contaminants by injection of chemical agents into the contaminant plume, downgradient of the contamination source	- Biodegradation of NAPLs would reduce the total mass needed to extract - Reduction of treatment requirements - Can address contaminants beneath existing structures	- Better understanding of source zone and fracture patterns needed - Pockets of impermeable zone may limit solution efficacy
Reactive Barriers	Placement of reactive barriers (e.g., trenches filled with mulch and vegetable oil) to reduce contaminant concentration in downgradient wells to levels below MCL.	- Biodegradation of NAPLs would reduce the total mass needed to extract - Reduction of treatment requirements - Can address contaminants beneath existing structures	- Better understanding of source zone and fracture patterns needed - Pockets of impermeable zones may limit technology efficacy
ART Technology	A submersible pump is placed at the bottom of an extraction well to generate an effect similar to that of an air stripper. Soil vapors are extracted at the top of the well.	- Relative low cost of installation - Ease of maintenance and monitoring	- System performance at site is not known - Pockets of impermeable zones may limit technology efficacy