

INDUSTRIAL DRYCLEANER WOES, VERNON, CALIFORNIA

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BACKGROUND

A fire at a former industrial dry cleaning operation in the 1960s resulted in a large volume (hundreds of gallons) release of perchloroethylene (PCE) into subsurface soils. However, environmental impacts were not identified until 1998, when the City of Vernon embarked on a public works improvement project on the adjacent street. As a result of this initial discovery, the former industrial dry cleaners was determined to be the source of PCE identified in soils and soil gas beneath a present-day distribution warehouse operation located in the City of Vernon, which is situated in the central portion of the Los Angeles Coastal Plain.

ENVIRONMENTAL IMPACTS

Due to the presence of highly permeable soils in this area, and length of time elapsed since the release, the subsurface PCE vapor plume has migrated over an area encompassing more than five acres. Although the release occurred in the 1960s, the analytical data do not show the presence of any significant daughter products indicating that no anaerobic biodegradation has occurred. The vertical extent of PCE-impacted soils has been identified to a maximum depth of 50 to 60 feet below ground surface. There is no data to suggest that groundwater at an approximate depth of 200 feet below ground surface has been impacted from this site.

REMEDIAL EFFORTS

Following numerous vadose zone site assessments by others, SCS developed and implemented a Remedial Action Plan under the oversight of the City of Vernon Department of Health and Environmental Control (DHEC). Pilot vapor extraction wells were installed and tested to confirm the feasibility and design parameters for a full-scale vapor extraction system (VES). A full scale system consisting of seven vapor extraction wells, three vapor monitoring wells, a 300 cubic feet per minute extraction/treatment system with a caustic scrubber to treat the acidic off-gases of the VES was designed, permitted, constructed and implemented beneath the client facility, neighboring properties, and surrounding streets. Vernon DHEC has not established site soil/soil vapor target cleanup concentrations. Requirements for site closure will be negotiated after asymptotic concentrations have been achieved with the VES.

PCE Mass Recovery

The full-scale VES system became operational in January 2002 with initial PCE mass recovery of two pounds per hour. During the first year (2002) of VES operation, the VES recovered more than 1,600 pounds (or 120 gallons) of PCE. In 2003, over 900 pounds of PCE were recovered. As of February 2004, an additional 800+ pounds of PCE were recovered for a total of almost 3,400 pounds (about 260 gallons) of PCE have been recovered from impacted areas.

PCE concentrations in recovered vapors have decreased approximately one order of magnitude after two years of remediation, from approximately 4,000 ug/L to 400 ug/L. As of September 2004, the VES was recovering and treating an average of approximately 3.75 pounds (or 0.28 gallons) per day of PCE. PCE vapor concentrations in extraction/monitoring wells in shallow soils and at the perimeter of the plume have shown significant declines, for example, from concentrations greater than 1,000 ug/L to about 10 ug/L of PCE. However, wells completed in the "hot spot" or source area, until January 2004, still contained PCE concentrations as high as 4,000 ug/L. Lab data from August 2004 shows a maximum PCE concentration of less than 700 ug/L in the "hot spot."

SUMMARY

This site has presented formidable challenges in site assessment, evaluation of off-site impacts, and implementation of remedial efforts. Considering site lithology/areal extent of the vapor plume, implementation of a VES was deemed the most appropriate remedial option for site cleanup. Regulatory closure is anticipated in 2005.

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GRA - November 10, 2004

SCS ENGINEERS

Environmental Consultants and Contractors

Industrial Drycleaner Woes

- Cause – Fire in the Early 1960s
- PCE Identified by City During Due Diligence
- Site Characterization Completed by Others
- Lead Agency - Vernon Department of Health and Environmental Control
- SCS Initial Scope
 - Proposition 65 Indoor Air Quality Assessment
 - Remedial Action Workplan

Proposition 65 Assessment

- Two 8-Hour SUMMA Cannisters
 - Indoors - Warehouse
 - Outside - Roof
- TO-14 Analysis

Proposition 65 Assessment - Results -

● Outdoor Sample

- 0.60 ppbv PCE
- = 0.004145 $\mu\text{g/L}$
- = 4.145 $\mu\text{g/m}^3$

● Indoor Sample

- 27.2 ppbv PCE
- = 0.1879 $\mu\text{g/L}$
- = 187.9 $\mu\text{g/m}^3$

Proposition 65 Assessment

- PCE in Indoor Air is 45X that of Outdoor Air
- Comparisons
 - Project Site Indoor Air - 27.2 ppbv
 - Downtown LA Air - 0.177 ppbv
 - ACGIH 8-hour TWA - 25,000 ppbv

Proposition 65 Assessment

- No Significant Risk Level = $14 \mu\text{g}/\text{Day}$
- Light Activity Worker
 - 8 m^3 of air per 8-hour shift
- $14 \mu\text{g}$ of PCE in 8 m^3 of Air = 0.236 ppbv
- 27.2 ppbv Indoors vs “No Significant Risk” level of 0.2362 ppbv

Proposition 65 Assessment

● Conclusions

- Proposition 65 Warning Necessary
- Slab Attenuation Factor of $\sim 10^4$
 - $\sim 2,000$ $\mu\text{g/L}$ at 5 feet vs 0.1879 $\mu\text{g/L}$ in Indoor Air

Drycleaner Woes

● Site Characteristics

- PCE Vapor Plume of > 5 Acres
- Sand to 40 ft bgs, Clayey Silt at 40 to 60 ft
- Vertical Extent of PCE to 50 feet
- PCE Concentrations as High as 58,000 $\mu\text{g/L}$
- No Significant Degradation Products After 40 Years
- Groundwater at 200+ feet

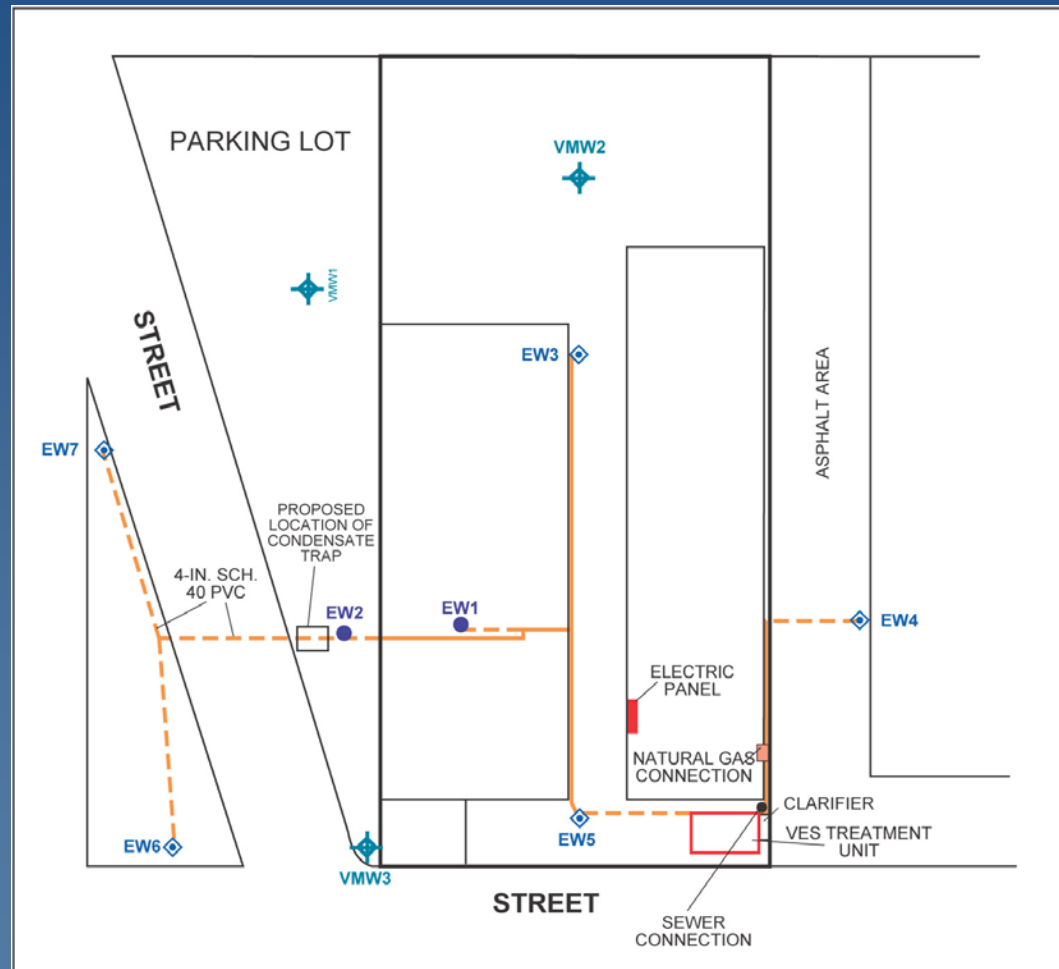
Drycleaner Woes

- Vapor Extraction System
 - 300 scfm Oxidizer and Associated Scrubber
 - 7 Nested Vapor Extraction Wells
 - Shallow Screen – 10 to 25 or 15 to 30 ft bgs
 - Deep Screen – 35 to 50 ft bgs
 - 3 Vapor Monitoring Wells – Screened 20 to 30 ft bgs

Drycleaner Woes

- Operational Parameters
 - Radius of Influence – >100 feet
 - Well Field Extraction Flow Rate – 100 to 200 scfm
 - System Vacuum – 35 iw
 - Vapor Concentrations at Inlet
 - Startup (January 2002) – 4,000 µg/L
 - Recently (August 2004) – 400 µg/L
 - PCE Recovery Rate
 - Startup – 2 lb/hour
 - Recently – 0.17 lb/hour

Facility and VES



Extraction Wells and ROI





Drycleaner Woes

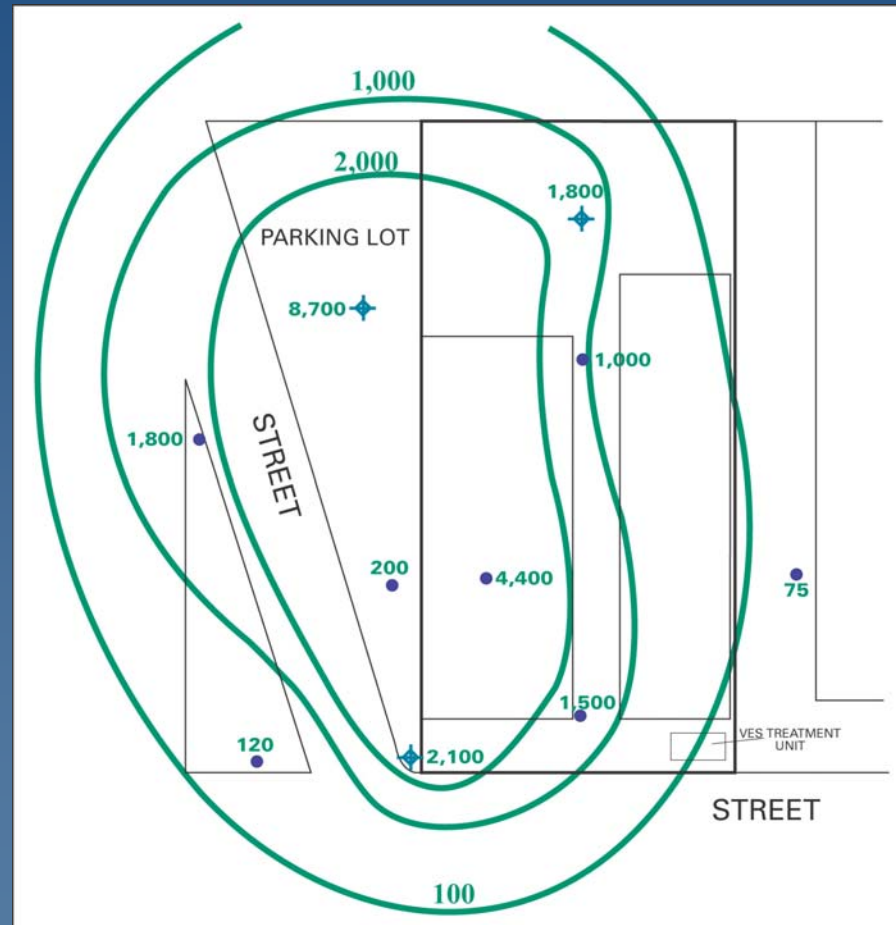
Well ID	EPA Method 8260B			
	January 4, 2002	June 18, 2003	January 13, 2004	August 18, 2004
	PCE			
	micrograms per liter			
EW1-S	4,400	56	8.6	15
EW1-D	4,600	1,600	780	260
EW2-S	200	85	59	63
EW2-D	320	8,600	3,600	670
EW3-S	1,000	7.7	5.7	3.2
EW3-D	790	480	270	290
EW4-S	75	2.2	1.2	2.5
EW4-D	84	23	3.7	38
EW5-S	1,500	2.6	1.7	1.6
EW5-D	1,300	160	58	195
EW6-S	120	16	17	22
EW6-D	110	1,200	740	360
EW7-S	1,800	39	16	18
EW7-D	6,900	910	630	69
VMW-1	8,700	37	<1	6.8
VMW-2	1,800	10	11	<1
VMW-3	2,100	8	<1	<1

Notes:

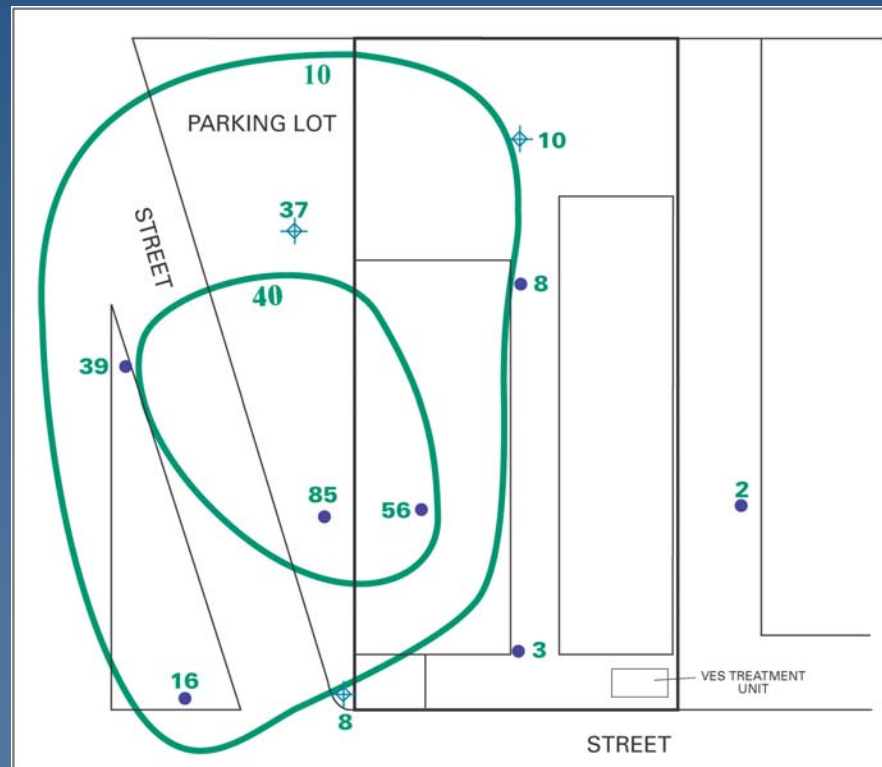
S = shallow zone

D = deep zone

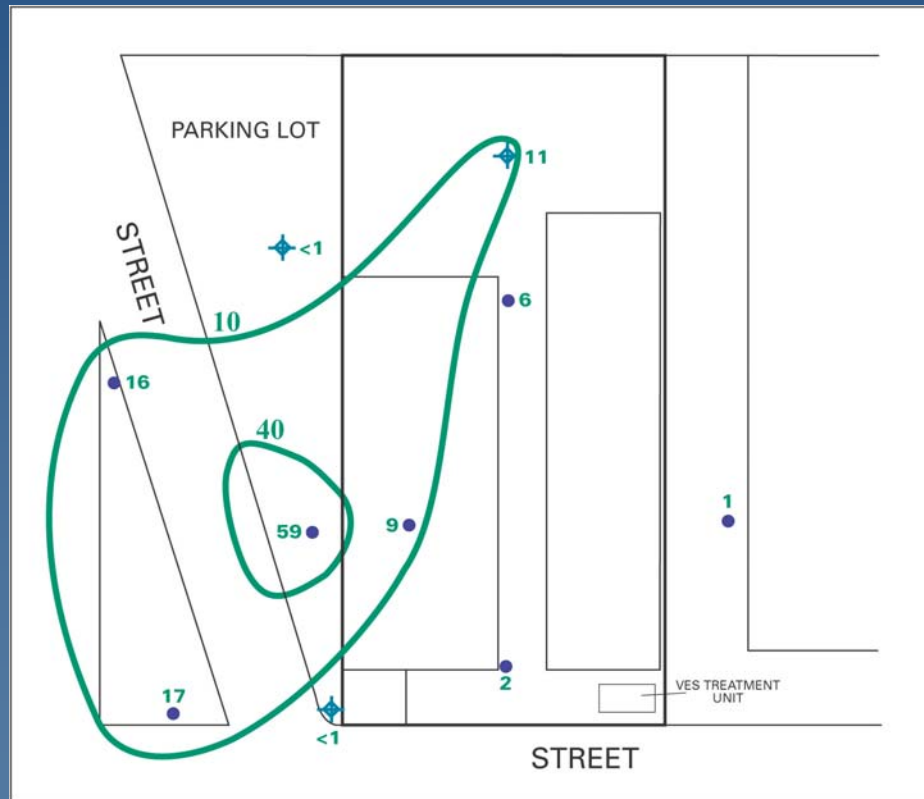
Shallow PCE - January 2002



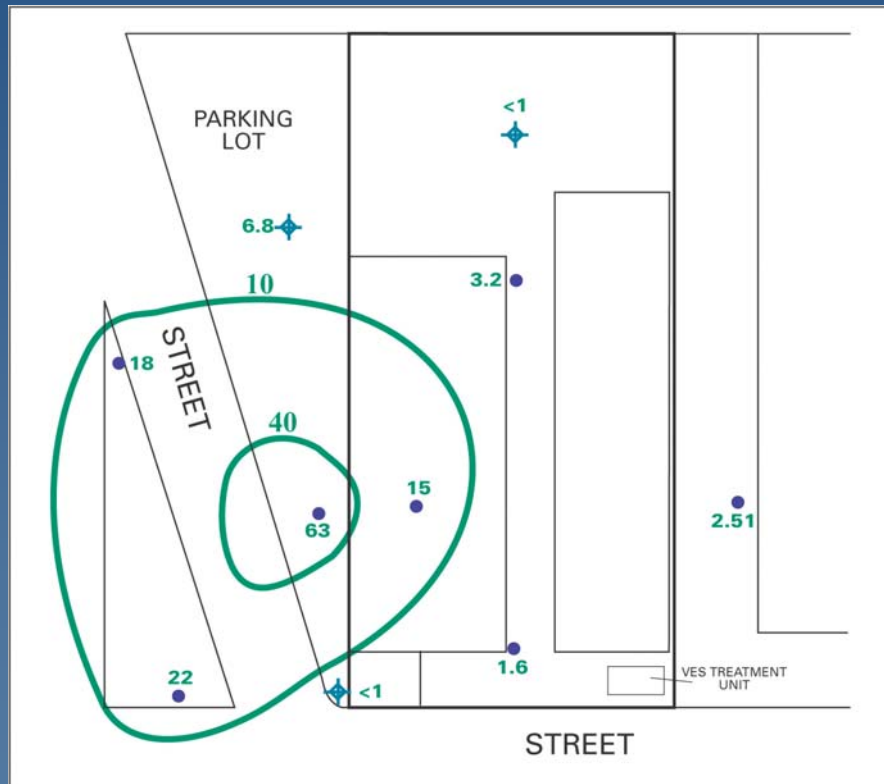
Shallow PCE - June 2003



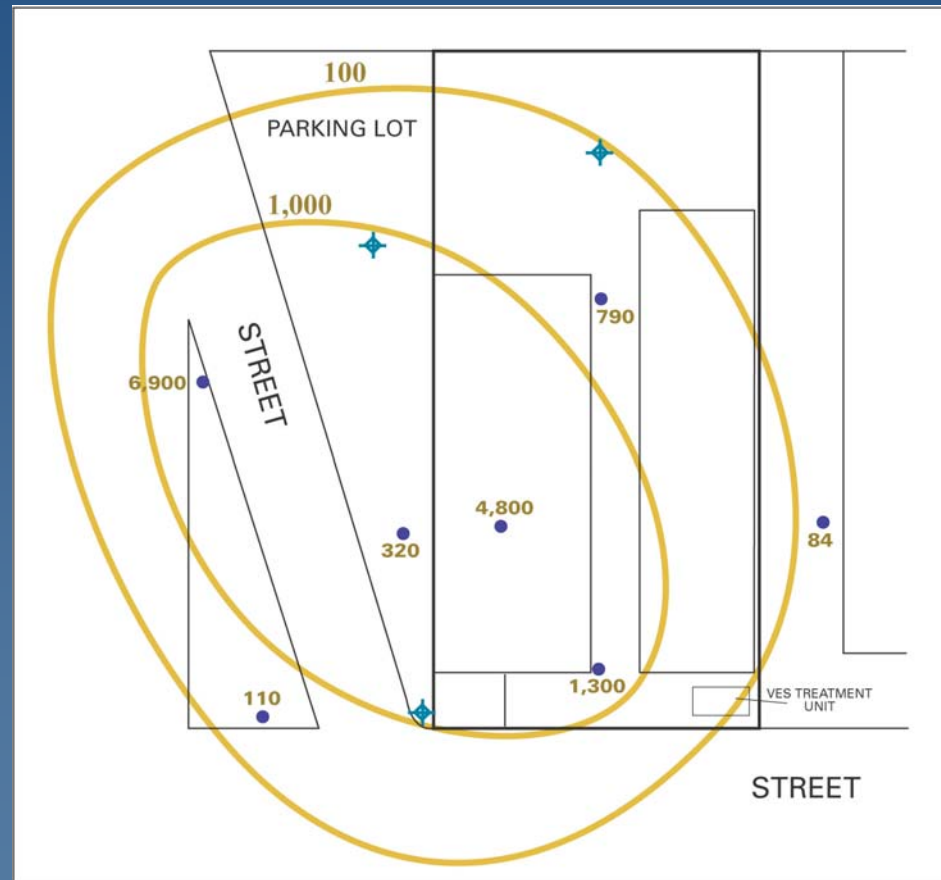
Shallow PCE - January 2004



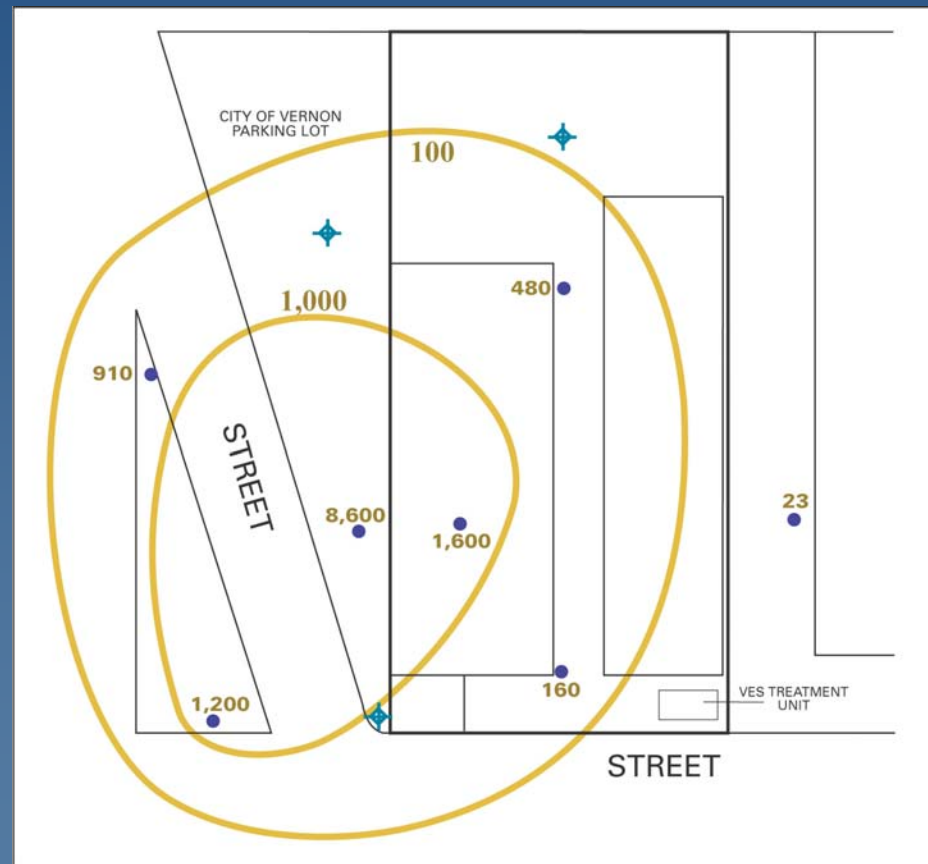
Shallow PCE - August 2004



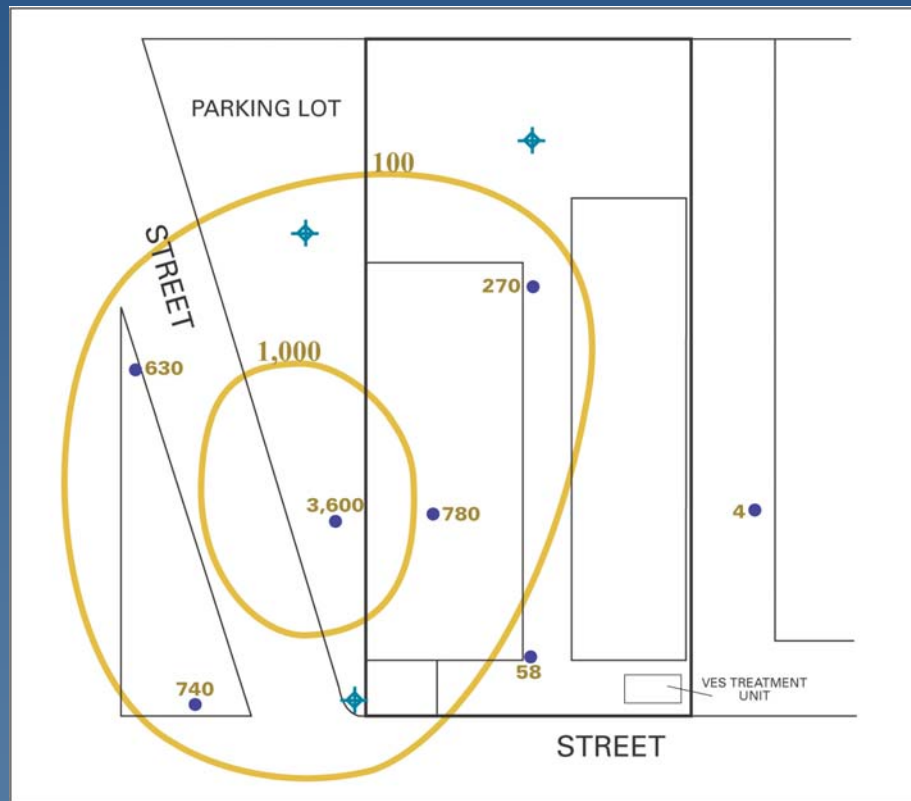
Deep PCE - January 2002



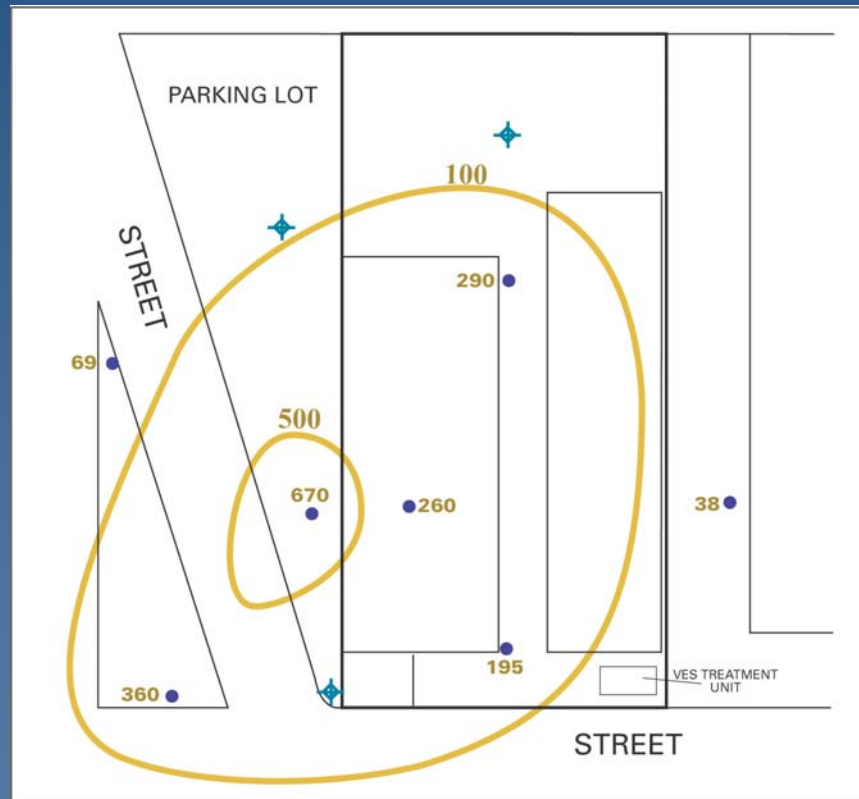
Deep PCE - June 2003



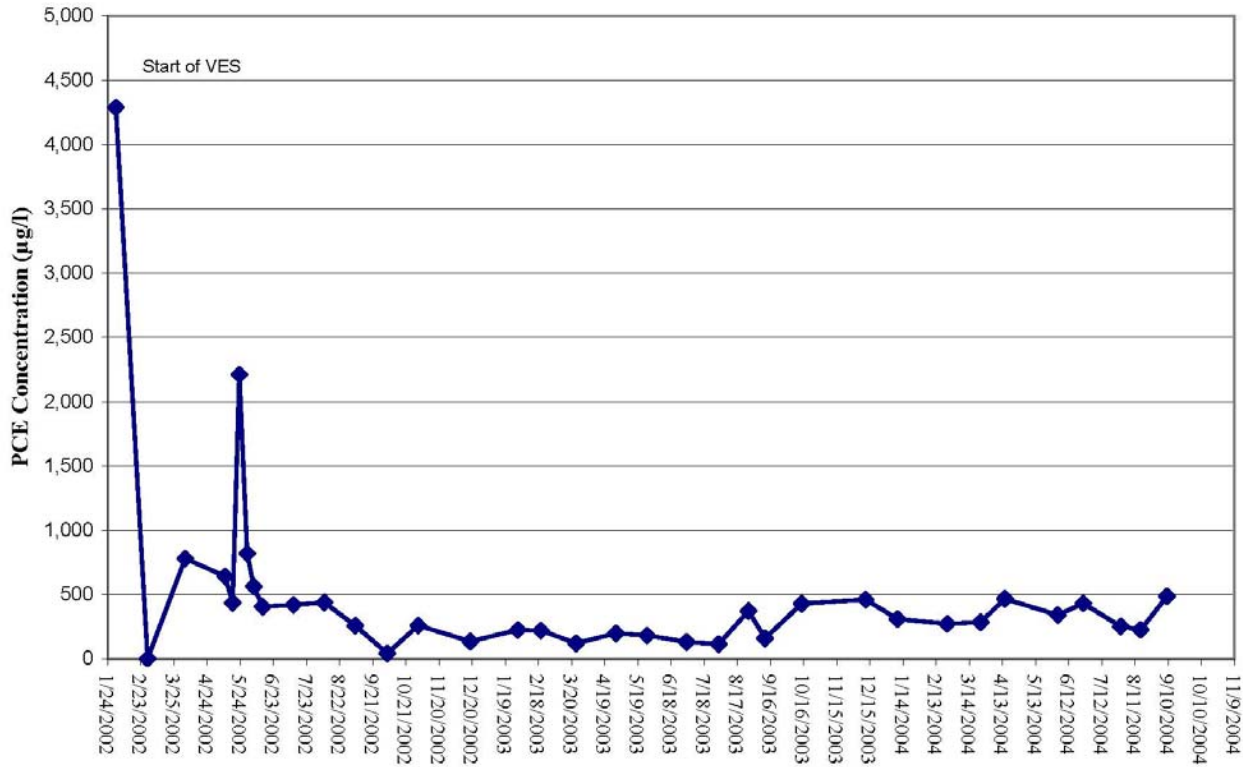
Deep PCE - January 2004



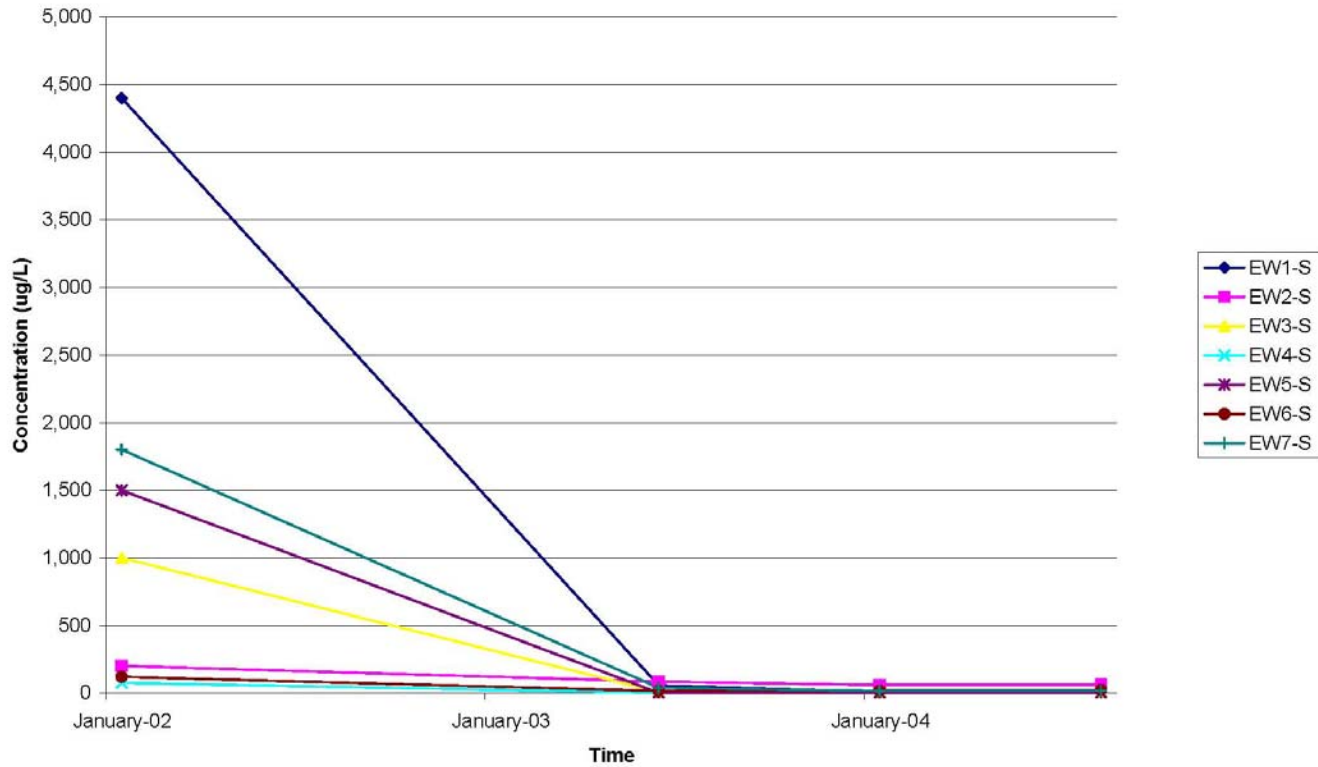
Deep PCE - August 2004



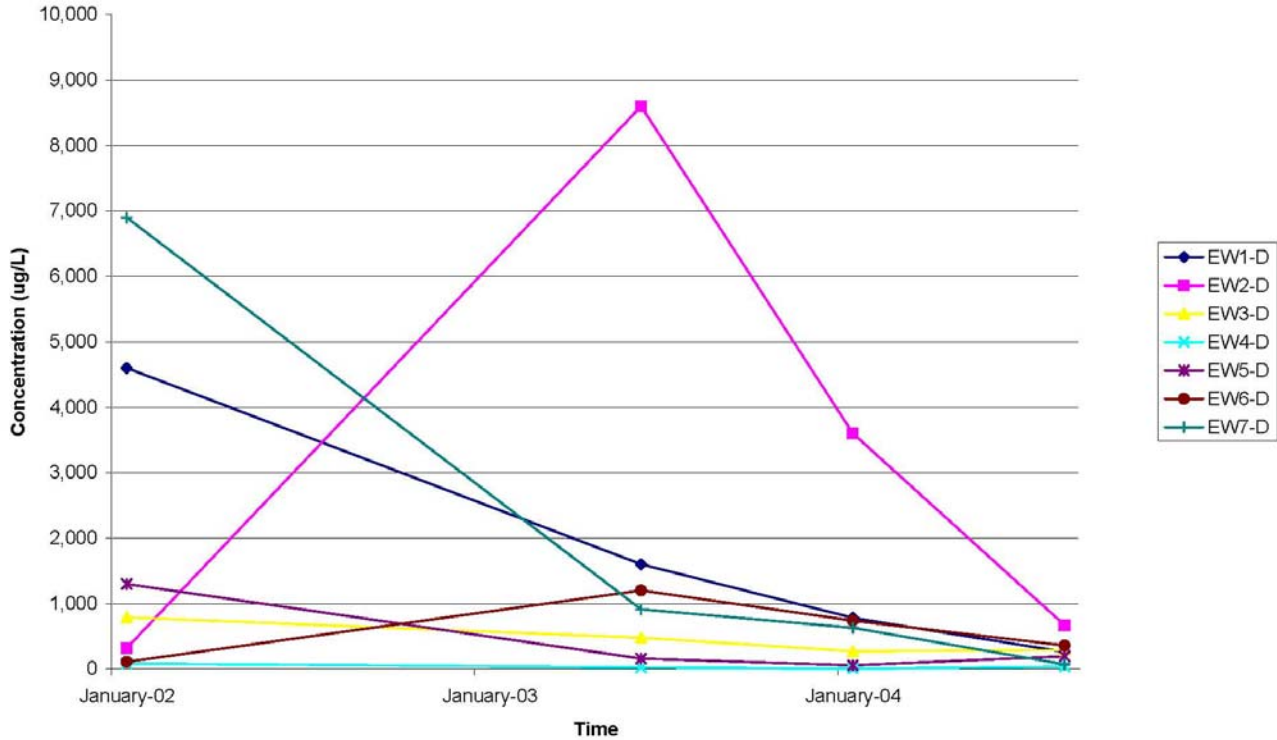
VES Inlet PCE Concentrations vs. Time



Shallow Zone Extraction Wells - PCE Concentrations vs. Time



Deep Zone Extraction Wells - PCE Concentrations vs. Time



Industrial Drycleaner Woes

● Summary

- 2.5 Years of Operation
- PCE Inlet – 4,000 to 400 $\mu\text{g/L}$
- Recovery Rate:
 - 2 to 0.17 lb/hour
 - Or 48 to 4 lb/day
 - Or 3.6 to 0.28 gal/day
- Total PCE Recovery – 3,400 lb or 250 gallons

Industrial Drycleaner Woes

- Summary (continued)
 - VES Purchase and Installation - ~\$120,000
 - Monthly O&M - ~\$8,000 to \$10,000
 - Expedited Remediation with Local Regulatory Agency Oversight
 - Regulatory Closure in 2005?