



Technology Presentation
NEIWPC (2016)
Presenter: Noel Shenoi
(www.calclean.com)



"We support our men and
women who have served
our country"



Overview

- I. Company Background
- II. Equipment and Services
- III. Technology
- IV. System Comparison
- V. System Advantages
- VI. Enhanced Remediation Techniques
- VII. Review of a Performance Based Contract (PBC)
- VIII. Case Study using a PBC
- IX. Question(s)/Comment(s)
- X. Closing





CalClean - Background

CalClean has a close working relationship with numerous consultants and contractors throughout the USA to assist with the assessment, cleanup, and case closure of your site(s). We help manage the remediation project from beginning to end.

All data is provided to consultant on a weekly basis.

CalClean is interested in Performance Based Contract (PBC) projects anywhere in the USA.

With truck-mounted and trailer-mounted extraction systems and water treatment systems located in numerous areas throughout the USA, we can mobilize anywhere.

We handle your money like it is our own. There are no hidden mark-ups. We get your site to closure much faster without the big capital investment.



CalClean's Fleet of High Vacuum Dual Phase Extraction
and Groundwater Treatment Systems



can mobilize anywhere!

With a Convenient Storage Location near your site!



States with stored equipment

AZ
CA
CO
FL
ID
MO
NC
NJ
OH
TX
UT
WA



Equipment





Large Fleet of Equipment ready to mobilize ANYWHERE!

Mobile Extraction Unit



Dimensions:
8 ft. Wide
(12 ft. When Onsite and Open)
35 ft. Length

Fleet of Mobile Trucks mounted with 450-CFM High Vacuum Systems and 25 hp Liquid Ring Pumps (LRP); and Fleet of Mobile Trailer mounted systems with 10-25 hp LRPs.

Water Treatment Trailer



Dimensions:
8 ft. Wide
16 ft. Length

Onsite Groundwater Treatment: Fleet of Mobile Trailers mounted with 20-GPM Carbon Systems

Chlorinated Solvent Unit



Dimensions:
8 ft. Wide
16 ft. Length

Fleet of 20-25 hp Chlorinated Solvent Systems (Carbon)



Able to Handle Various Constituents

- ❑ Petroleum Hydrocarbons
 - ▶ Gasoline
- ❑ Heavier Hydrocarbons
 - ▶ Diesel
 - ▶ Jet Fuel
- ❑ Chlorinated Solvents
 - ▶ PCE
 - ▶ TCE
- ❑ Heavy Oil (Bunker C)

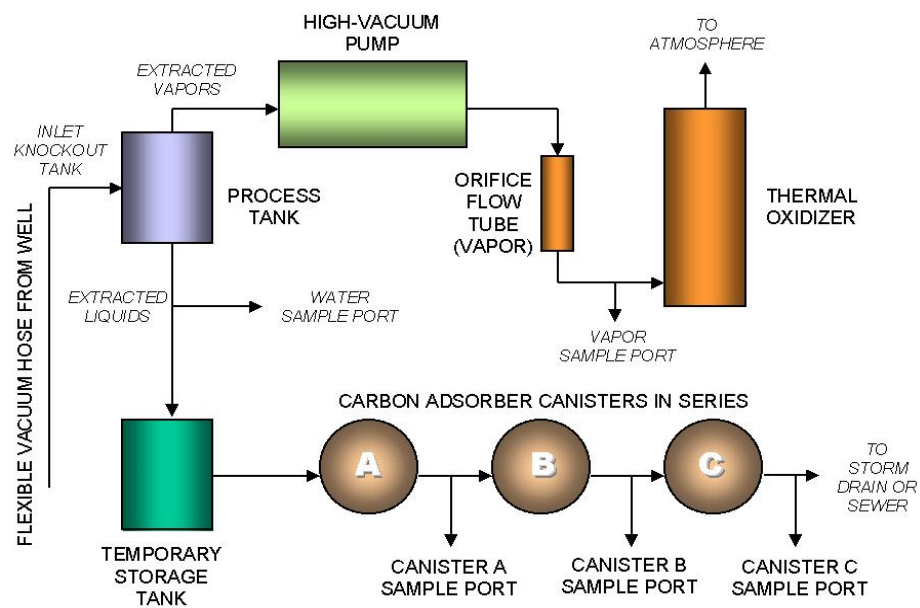




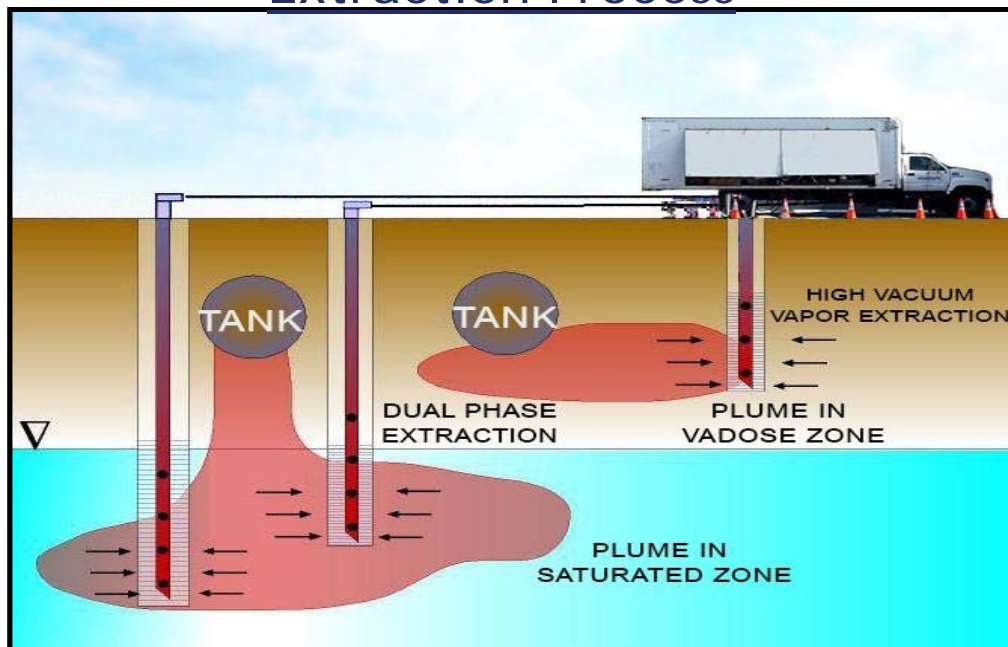
Technology



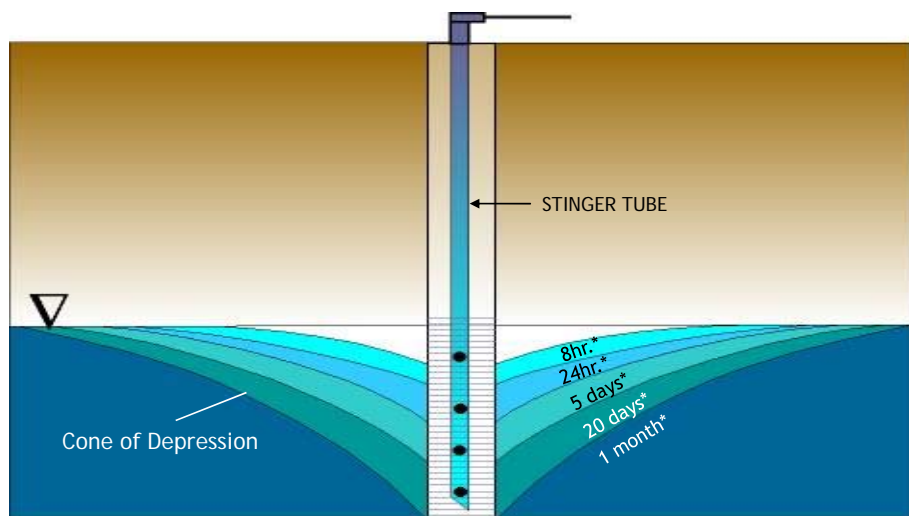
Flow Diagram



Extraction Process



Vapor and Groundwater Extraction



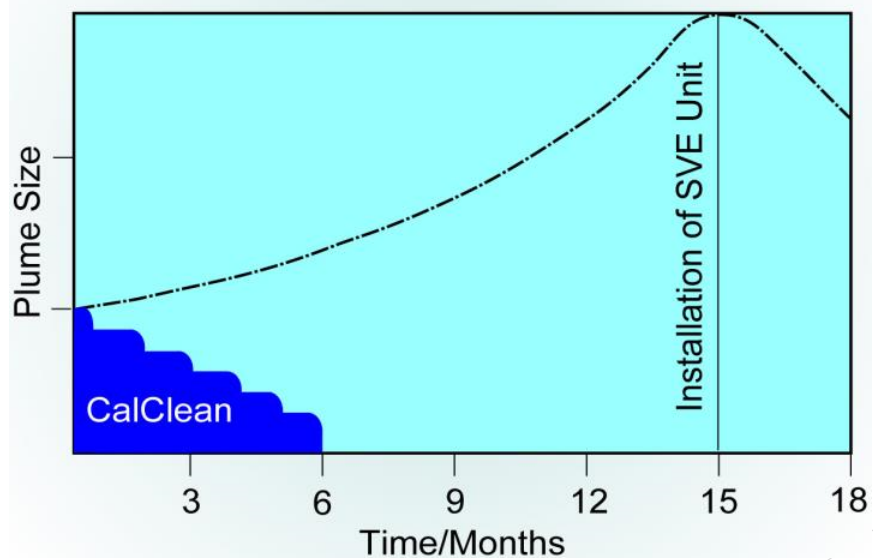
* TIMING FOR ILLUSTRATIVE PURPOSES ONLY
(Longer Events usually increase Cone of Depression and expose more saturated zone for vapor extraction)



System Comparison



**Comparison of Plume Size vs.
Time for CalClean and Fixed Based SVE**





CalClean HVDPE	Standard S.V.E.	Pump & Treat
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Truck-Mounted Mobile Systems	Fixed Based Systems (Few Mobile Systems)	Fixed Based Systems (Few Mobile Systems)
High Capacity 450 CFM Systems Can Extract 5-50 GPM Water	Typical System is 250 CFM But Cannot Extract Water	Typical System is 2-20 GPM But Cannot Extract Vapors
Can Extract & Destroy up to 130 pounds of Hydrocarbons per hour	Typical System can Destroy up to 40 pounds per hour of hydrocarbons	Cannot Destroy Hydrocarbon Vapors
Can Extract up to 29" Hg (394" H ₂ O) i.e.. Large Radius of Influence, Less Extraction Wells Required for Site	Typically Extracts up to 10" Hg (136" H ₂ O) i.e.. Smaller Radius of Influence, More Wells Required, Greater Costs	Not Applicable For Vapors
Extract Vapor & Groundwater	Extract Vapor Only	Extract Groundwater Only
Can Lower Groundwater Table to Address Vadose, Capillary Fringe & Saturated Zones	Cannot Extract Groundwater	Can Only Remove Groundwater, No Vapor



CalClean HVDPE	Standard S.V.E.	Pump & Treat
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Can Mobilize to a Site within Hours of a Call. Can Attack Source Immediately	Typically Takes 9-15 Months To Install System - Allows Plume Size To Increase	Typically Takes 6-15 Months to Install System - Allows Plume Size to Increase
Can Startup at a Site Quickly	Takes Many Months Before Startup	Takes Many Months Before Startup
Can pull offsite when Concentrations Drop off To Allow for Rebound	Cannot pull off-site since fixed	Cannot pull off-site since fixed
Can Adjust Number of Days of Operation to Maximize Recovery	Cannot Adjust Days of operation	Cannot Adjust Days of operation
Constant On-site Monitoring of Influent Vapor Concentrations	No On-site Monitoring of Influent Vapor Concentrations	Not Applicable
Occupies Space At Station "Only" During On-site Operation	Occupies Full-Time Space on Small Station Property	Occupies Full-time Space on Small Station Property
Low Noise Operation (Great for Residential Areas)	High Noise Systems (Complaints from Neighbors)	Low Noise



CalClean HVDPE	Standard S.V.E.	Pump & Treat
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System Manned To Adjust Stinger Depths to Maximize Recovery	System Unmanned, Cannot Adjust Depths in Extraction Wells	System Unmanned, Cannot Adjust Depths In Extraction Wells
No Capital Cost Outlay	High Capital Cost	High Capital Cost
Closures Can Be attained Earlier (possibly in less than 1 year)	Closures Typically Take 3 to 10 Years	Closures Typically Take 5 to 30 Years
No Trenching Needed	Trenching Required	Trenching Required
No Shutdown Of Station	Shutdown Station for 2 - 4 Weeks - Loss of earnings	Shutdown Station for 2 - 4 Weeks - Loss of earnings
No Long Time Commitment Needed For Use At A Site	Long Term Commitment is Needed	Long Term Commitment is Needed
No Cost Of Decommissioning	High Cost Of Decommissioning And Loss Of Value Of System	High Cost Of Decommissioning And Loss Of Value Of System
No Weekly O&M Cost(s)	Highly Weekly O&M Cost(s)	High Weekly O&M Cost(s)
Faster Closures = Quicker Release of Liability	Slower Closures = Long Time Liability	Slower Closures = Long Term Liability



System Advantages





System Advantages

- ❑ Most Cost Effective (Lowest \$ / lb. Hydrocarbon Removed)
- ❑ No Capital Or Maintenance Cost Outlays
- ❑ Can Mobilize Quickly and Make Adjustments On The Fly
- ❑ No Shutdown Of Operations Do To Installation Of Trenching
- ❑ Low Noise For 24-Hour Operations In Neighborhoods
- ❑ Occupies Less Space at Station
- ❑ High Capacity Equipment (CFM and GPM)
- ❑ Can extract from depths of >270 feet
- ❑ Various Locations Permits Already Obtained
- ❑ 100% Guaranteed Up Time
- ❑ Quality Technical Expertise And Supervision
- ❑ Mobile Fleet Of Truck And Trailer Mounted Extraction Systems
- ❑ Faster Clean-up = Quicker Release Of Long Term Liability





Enhanced Remediation Techniques





HVDPE Enhancements

- ❑ Use Air Sparging to enhance HVDPE
- ❑ Use HVDPE to remove diesel free product
- ❑ Introduce Surfactants to assist with diesel cleanups
- ❑ Clean up contaminated groundwater sites quickly with high vacuum systems
- ❑ New extraction and injection well design for HVDPE operations
- ❑ Use periodic extractions (w/interruptible pricing) to address interim rebound





Examples of HVDPE w/Air Sparging

<u>Location</u>	<u>Concentration w/o Air Sparging</u>	<u>Concentration w/Air Sparging</u>
Gardena	600 ppmv	10,000 ppmv
Diamond Tire	500 ppmv	11,000 ppmv
Glen Avon	200 ppmv	6,000 ppmv



Review of Performance Based Contracts





Review of Performance Based Contracts

- ❑ Reduces Overall Project Costs
- ❑ Quicker Cleanups (able to use multiple systems at the same time)
- ❑ Better For the Environment
 - ❑ Guaranteed Results
 - ❑ Cutting Edge Technology Used
- ❑ More States Moving Toward PBC/PFP
 - ❑ Lowers Administrative Costs
 - ❑ Florida has seen a 64% savings
 - ❑ Funds Easier to Control
- ❑ Risk Transferred to Contractor





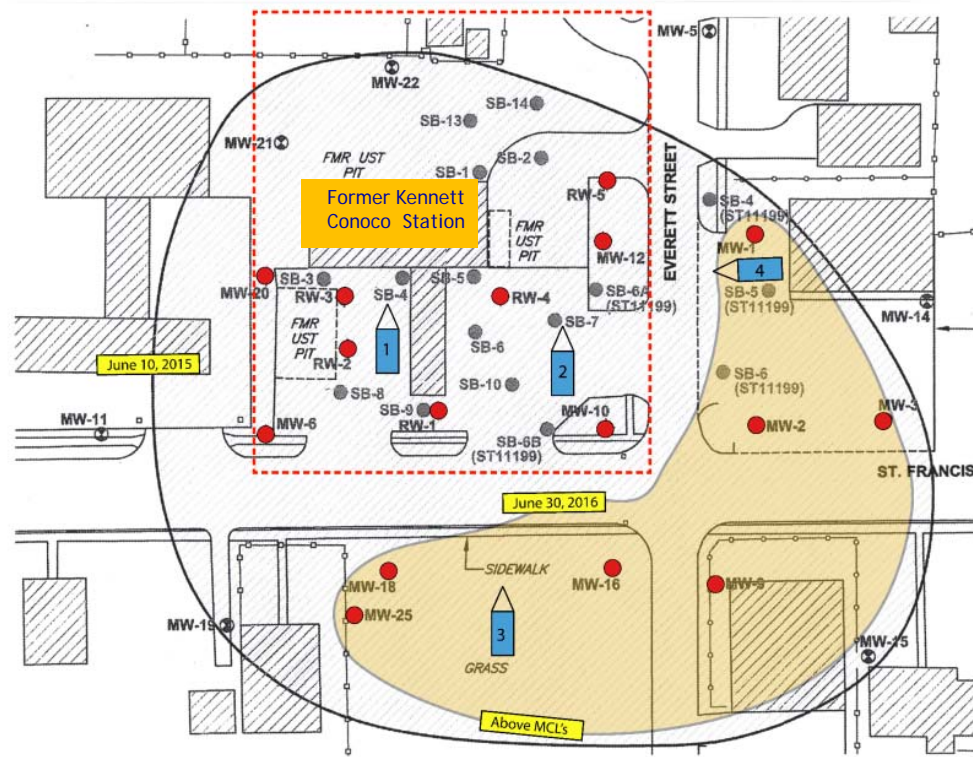
Case Study
using a
Performance Based Contract





Kennett Conoco, Missouri (PBC)

- ❑ LNAPL present up to >3 ft. in 18 wells onsite and offsite on 4 properties
- ❑ MTBE affected city drinking water wells ½ mile from site - wells are shut down
- ❑ Lithology consists of sand with some silt
- ❑ CalClean utilized 4 powerful HVDPE systems simultaneously to extract from multiple wells onsite and offsite
- ❑ LNAPL removed after ~4 months of operation
- ❑ 5 air sparge wells were added after LNAPL was removed, which increased mass removal rates
- ❑ 2.95 million gallons of groundwater was removed in ~12 months, reducing dissolved groundwater concentrations below DTLs/RBTLs for most wells
- ❑ Approximately 391,000 lbs. (~63,000 gallons) of vapor-phase gasoline was removed in ~12 months of operation (as of 6/30/16)

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Recommendations

- ❑ Conduct **30-day long** term event(s) instead of 3-day events (cost of one 30-day event is same as six 3-day events!)
- ❑ Get sewer **permit** for discharge of treated groundwater
- ❑ **Occasional** vac truck use will prolong projects and potentially allow plume(s) to migrate further
- ❑ CalClean and consultant to meet and **work together**
- ❑ Aggressive Cleanup using **interruptible** pricing program to keep costs low
- ❑ **Remedial well design/location** is critical to effective cleanups around source area(s), add one or more air sparge wells near source area
- ❑ Use **appropriate consultants** along with CalClean to maximize effectiveness
- ❑ Conduct **30-day** events to take sites to closure
- ❑ Obtain Sewer Discharge **Permits** vs. **costly** Offsite Transportation and Disposal



CalClean's Report Card

In Sixteen (16) Years

Over 500 CASE CLOSURES* and Counting

- * With most closures coming in CA and FL, some of the hardest states to get even one closure



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End of Presentation to
NEIWPCC (2016)

Thank you





Case Summaries





Pacific Palisades, California

Former Dry Cleaner Facility

- ❑ A soil gas sample contained up to 2,700 $\mu\text{g/L}$ PCE
- ❑ The highest dissolved phase concentration of PCE was 625 $\mu\text{g/L}$
- ❑ Soil beneath the site consist of silty sand and silt interbedded with sand and gravel
- ❑ Unconfined groundwater is present at a depth of 90 to 95 feet below grade
- ❑ CalClean initiated SVE activities in August 2015 using two 300 cfm liquid-ring blower and 6x 1,000 lb vapor carbon vessels
- ❑ Over the initial 4 months of HVSVE, CalClean removed 1,025 lbs of PCE
- ❑ SVE activities are still ongoing and are anticipated to last 6-12 more months in order to achieve case closure levels

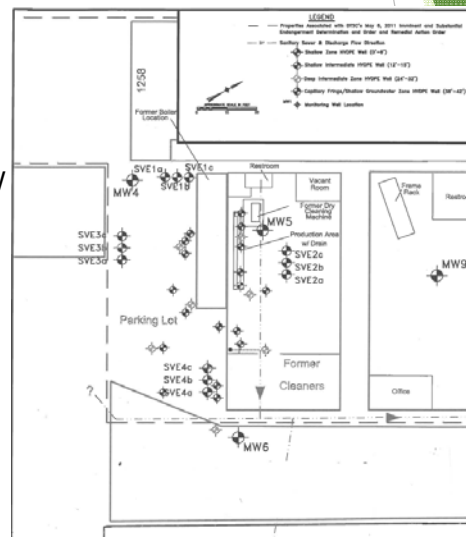




Menlo Park, California

Former Dry Cleaner Facility

- ❑ A soil gas sample at 5 ft bgs indicated that PCE was present at 2,900 $\mu\text{g/L}$
- ❑ Site is underlain by fine-grained horizons of silt and clay with interbedded layers of sands and groundwater was from 9.6-11.4 ft bgs
- ❑ CalClean utilized a system with a 300 cfm liquid-ring blower & 2x 1,000 lb carbon vessels
- ❑ Over 30 days, CalClean removed 28 lbs of PCE
- ❑ Total influent concentrations decreased to 0.36 $\mu\text{g/L}$
- ❑ Soil vapor sample results showed that PCE did not present a vapor intrusion risk
- ❑ **Site submitted for case closure**





Active Dry Cleaner Facility

- ☐ A soil gas sample at 5 ft bgs indicated that PCE was present at 3,600 µg/L
- ☐ Site consists of a mixture of silty clay and sandy clay in the upper vadose zone
- ☐ CalClean utilized a system with a 300 cfm liquid-ring blower & 3x 1,000 lb carbon vessels
- ☐ Over approximately 5 months, CalClean removed 60 lbs of PCE
- ☐ Rebound testing indicated that concentrations decreased to 1.36 µg/L
- ☐ Soil vapor sample results showed that PCE did not present a vapor intrusion risk
- ☒ **Site received case closure**

