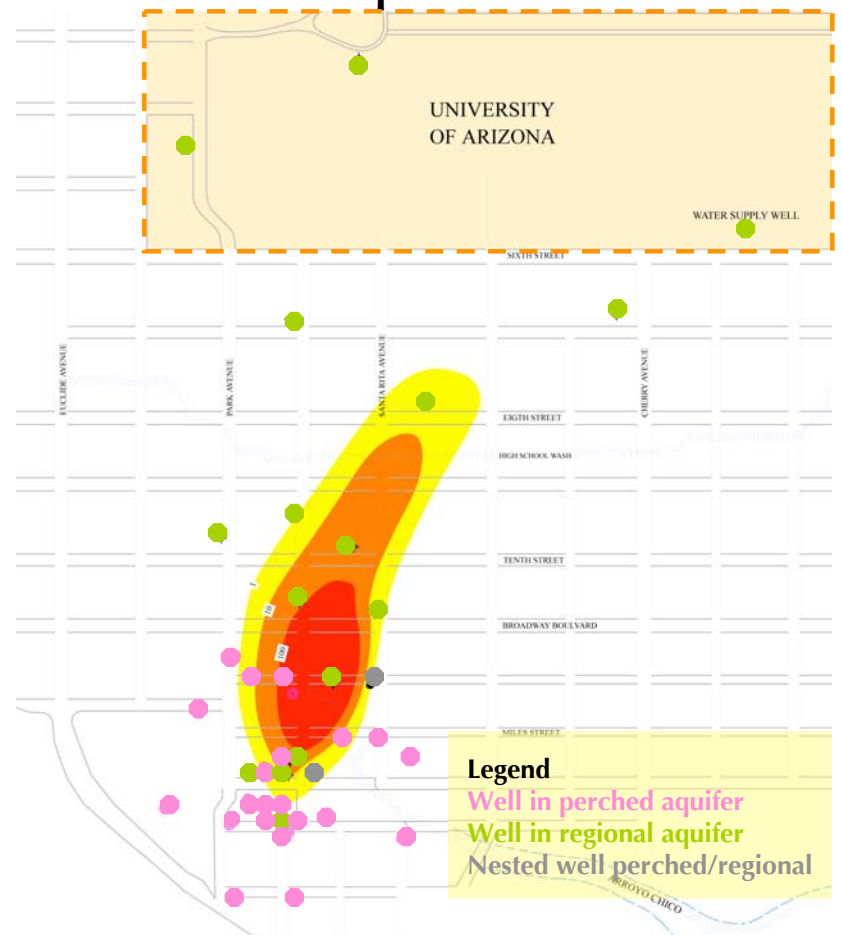


Assessing the Feasibility of Monitored Natural Attenuation for Remediation of Chlorinated-Solvent Contaminated Groundwater

Park-Euclid State Superfund Site

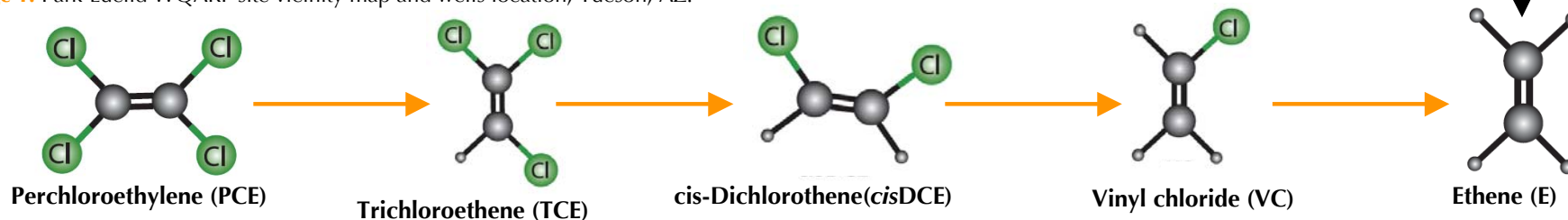


Project Description

Monitored Natural Attenuation (MNA) has recently gained great interest as a low-cost remediation approach for chlorinated-solvent contaminated sites. In order to enhance the viability and effectiveness of MNA for remediation of these sites in Arizona and throughout the U.S., one's "tool box" needs to expand. Polymerase Chain Reaction (PCR) based – DNA screening and Compound Specific Isotope (CSI) Analysis of the groundwater are characterization tools that can dramatically increase one's understanding and success when utilizing MNA. In addition, to the traditional site assessment techniques, PCR-based-DNA screening and CSI Analysis can provide evidence of active biodegradation processes; essential for the successful implementation of MNA.

Sampling and analysis of groundwater at the site (please refer to site map) revealed the presence of ethene, the ultimate degradation product of PCE.

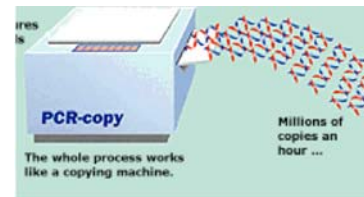
Image 1. Park-Euclid WQARF site vicinity map and wells location, Tucson, AZ.



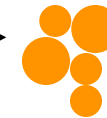
Results

1) PCR-based-DNA screening

PCR-based-DNA screening, where DNA molecules were mass-produced from selected samples collected from the site, confirmed that *Dehalococoides*, a primary bacteria responsible for the conversion of PCE and TCE and other products are present in some locations at the site.



Concept: Martin EK, Svenska Dagbladet



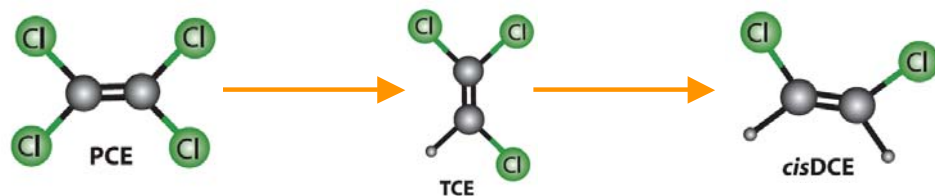
***Dehalococoides* is present
at the Park-Euclid State
Superfund site.**

2) CSI Analysis method

The CSI Analysis method indicated that biotransformation of PCE is occurring at the site. This methodology provided a direct indication of the effects of degradation on TCE and PCE, as well as a novel independent means to quantify the extent of degradation and estimate degradation rates.

3) Microcosm studies

Rapid biodegradation of PCE to DCE



was shown when conducting multiple sets of microcosm studies using groundwater and associated microorganisms from the site.

Conclusion

The results of all of the multiple components of the study are consistent, supporting that biotransformation of PCE is occurring at the Park/Euclid site. Thus, this site appears to be an excellent “living laboratory” of natural attenuation of chlorinated solvents under conditions representative of subsurface environments typical to Arizona. Additional study using the information generated from this project would further enhance our understanding of the applicability and utility of monitored natural attenuation as an effective method for remediation of chlorinated-solvent contaminated sites in Arizona.

For further information, please contact:

Mark Brusseau
Department of Soil, Water and Environmental Science
Department of Hydrology and Water Resources
FCS Building 312
Mail To: PO Box 210038 Tucson, AZ 85721-0038
Phone: 520-621-3244
FAX: 520-621-1647
Email: brusseau@Ag.arizona.edu