TerraStryke® **Remediation Products LLC**
P.O. Box 254
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www.TerraStryke.com

Project Highlights

- **ERD**ENHANCED™ biostimulated existing site biogeochemistry in the presence of residual source mass.
- **ERD**ENHANCED™ amended wells averaged **>95.9% REDUCTION** in total [cVOC] contaminants.
- **ERD**ENHANCED™ expedited mass destruction with average **>98.5% REDUCTION** in P:D Ratio.
- **ERD**ENHANCED™ created safe and *sustainable* reducing conditions and complete biotransformation.

ERDENHANCED™
Cost-Effective
Long-Term Compliance
Low-Impact
Safe
Cost-Effective

TerraStryke® ERDENHANCED™

PRS Based Proof-of-Concept Evaluation
Residual DNAPL Source Zone Remediation Part I

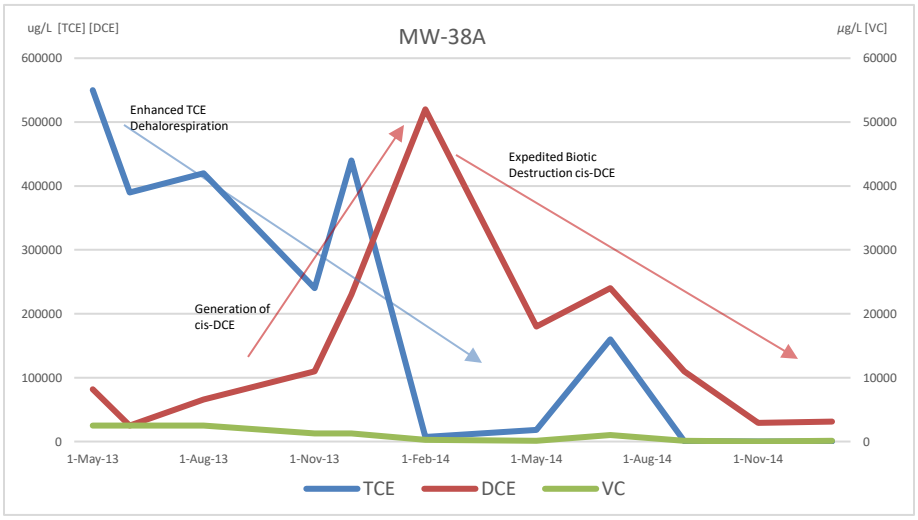
Using Simple Additive Delivery Approach; Ohio Manufacturing Facility

TerraStryke® Products LLC develop and distribute biostimulation additives proven to cost-effectively maximize the performance of your bioremediation project; expediting contaminant destruction, eliminating rebound, to realize long-term compliance with minimal impact and ***less cost***. Our patented biostimulation additives adjust site biogeochemistry (subsurface ecosystem) to sustainably support the *complete* and cost-effective biotransformation of site cVOC contaminants.

SITE: Former industrial facility with Trichloroethylene (TCE) in groundwater at ≈30% solubility, indicating significant DNAPL. TCE is the 'parent' cVOC contaminant.

PROCESS: 20-months evaluation; three monitoring wells amended using additive filled Passive Release Sock (PRS) deployment units; fourth, a monitored control. PRS units are suspended in saturated casing volume of test well, remaining 6-8 weeks, then replaced periodically to maintain additive residency time. BioTraps® were deployed in each monitoring well; groundwater monitoring/sampling performed with each replacement. See the *TerraStryke*® Pilot Study Guidance Document for complete evaluation description.

RESULTS: 20-months post additive deployment, amended wells averaged **98.5%** reduction in parent-parent/daughter ratios with secondary lines of evidence to support additive enhanced reductive dechlorination. Observations include temporal increases in carbon, expedited alternative electron scavenging, and general increases in ethene concentrations at each amended well. At MW-38A, **>99.9%** reduction in parent [TCE] was realized.



- **>99.9%** reduction in TCE over 20-month evaluation period.
- **>94.8%** reduction in cis-DCE *after* **>538%** increase.
- Steady production/decline in VC/ethene throughout the evaluation period.
- **>98.1%** reduction in total cVOCs from peak dissolved phase contaminant bioavailability.
- **>99.4%** reduction in total cVOCs over the evaluation period.

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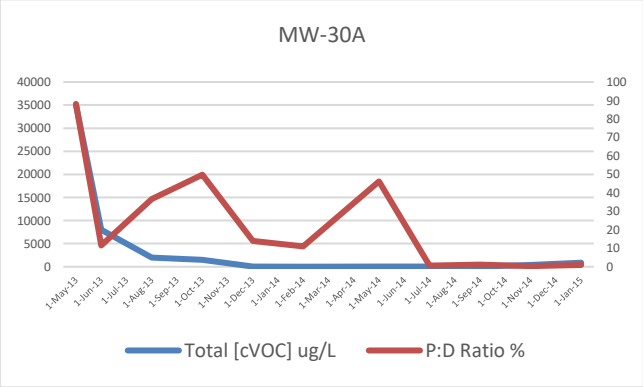
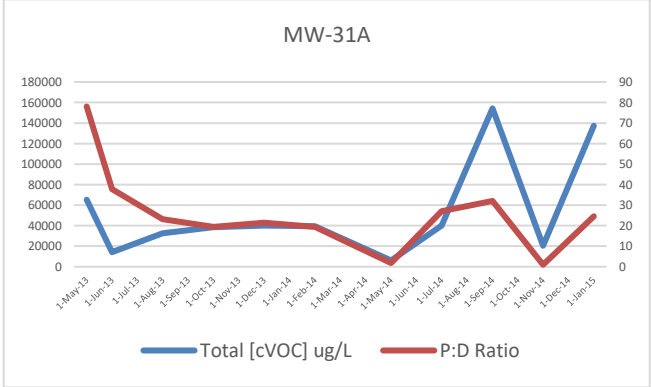
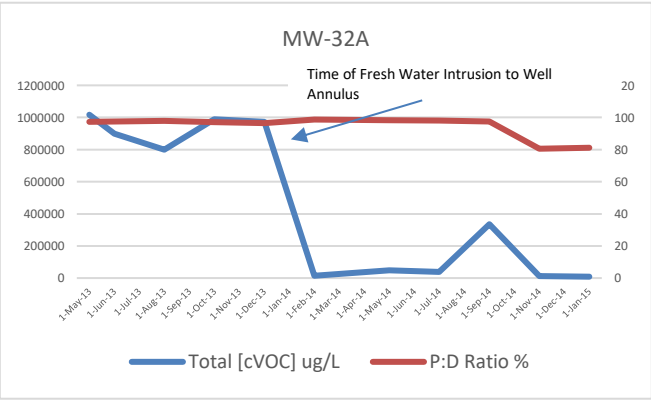
BioTrap® samplers were deployed in all wells with demonstrated increases in *Dehalocccoides* populations with three positive biomarkers recorded: tceA, bvcA and vcrA, at *each* amended location. The non-amended well tested "ND" for *Dehalococcoides*, negative for referenced biomarkers. The following graphs plot total concentrations of cVOCs vs. changes in Parent:Parent/Daughter Ratio (P:PD), dividing moles of TCE by the sum of moles of TCE, DCE, VC, and ethene recorded.



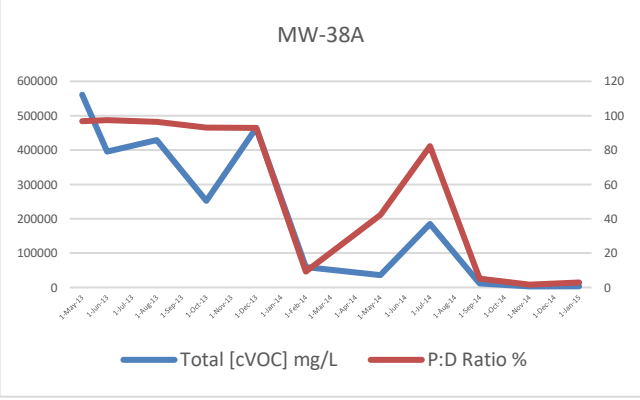
- **≈100%** decrease in total cVOCs months 9-10
- **>97.6%** decrease in total cVOCs by evaluation end
- **>98.9%** decrease in P:D Molar Ratio
- General increases in ethene



- **>90%** decrease in total cVOCs after year 1
- Enhanced **solubilization** month 14-16 **(>2,400% increase)**
- **>96.8%** decrease total cVOCs 2-months later
- **>97.6%** decrease in total cVOCs by evaluation end
- **>98.8%** decrease in P:D Ratio month 18



- Non-amended Control Well
- **<1.0%** decrease P:D Ratio at month 7
- ≈ **4.3%** decrease in total cVOCs
- Influx of surface water due to Spring thaw flooding



- Up-gradient to non-amended Control Well MW-32A
- **<99.3%** decrease total cVOCs by evaluation end
- **>90%** decrease P:D Ratio month-9; then >782% increase
- **>98.4%** decrease in total cVOCs from peak bioavailability

Two separate injection programs have since been performed at the Site: 2016 at location outside PRS evaluation influence; 2017 at former Control MW-32A. Each evaluation realizing performance like those referenced herein. Please visit our website to read more about cost-effective and *complete* chlorinated remediation success at Bridgeport Former Manufacturing Facility.