



Project Highlights

- **ERDENHANCED™** biostimulates existing site biogeochemistry to support subsurface ecosystem and microbial development.
- **ERDENHANCED™** amended wells averaged **≈96% REDUCTION** in total [cVOC] contaminants in <2-years.
- **ERDENHANCED™** expedited mass destruction with average **>98% REDUCTION** in parent [TCE] at all 4 former PRS testing locations.
- **ERDENHANCED™** created safe and sustainable reducing conditions for native microbials to adapt and collectively establish in-situ biotic 'machine'.

ERDENHANCED™ is

- ✓ Sustainable
- ✓ Cost-Effective
- ✓ Safe with Minimal Site Impacts
- ✓ Organically destroy DNAPL
- ✓ Enhancing Microbial Adaptation



TerraStryke® ERDENHANCED™

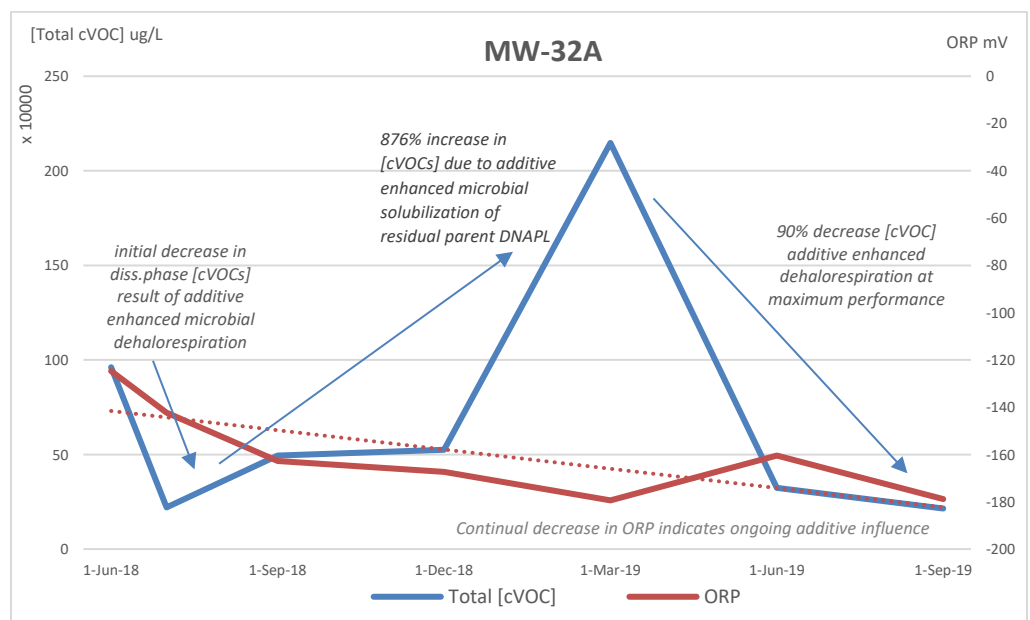
Treatability Study; Residual DNAPL Source Zone Remediation – Part III Using Simple Additive Delivery Approach; Ohio Manufacturing Facility

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

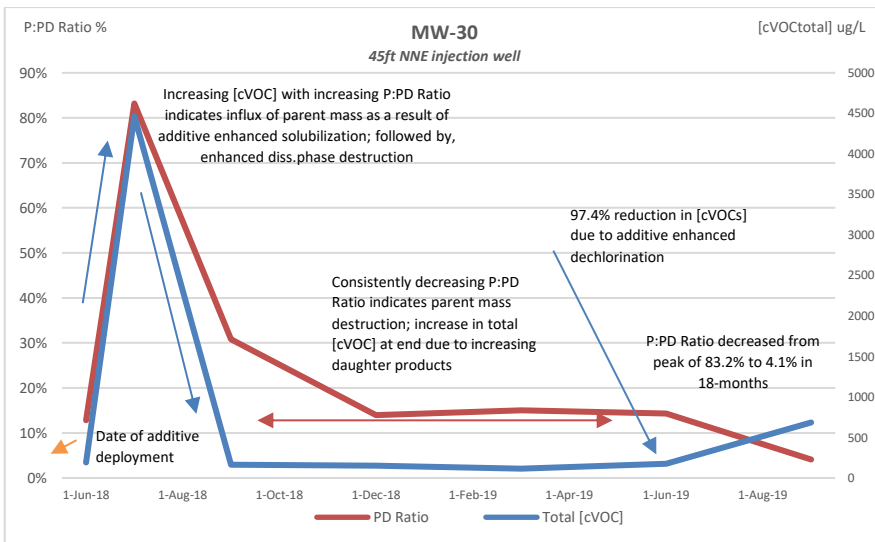
SITE: Former industrial facility with Trichloroethylene (TCE) in groundwater at ≈30% solubility, indicating significant DNAPL. TCE is the 'parent' cVOC contaminant.

PROCESS: July 2017 treatability study performed within 2012 PRS evaluation zone. Injection well MW-32A (former Control). Three monitoring wells nearby, seven downgradient, all sampled during evaluation process. Injected 2,200-gallons 12% additive slurry, displacing 7.4% pore space volume within estimated 16,000c.f zone. Groundwater monitoring/sampling performed quarterly through November 2019. See TerraStryke® Pilot Study Guidance Document for complete list of analytical metrics.

RESULTS: Since July 2017 MW-32A realized **93.3%** reduction in [TCE] and 80.1% reduction in [cVOC_{total}]. The Parent-parent/daughter ratio (P:PD) decreased by 76.1% with a 72% reduction in total moles cVOCs. Secondary lines of evidence documented to support additive enhanced reductive dechlorination; including, temporal increases in carbon, expedited alternative electron scavenging, and general increases in generation of ethene. The plot below demonstrates additive influence on ORP and subsequent solubilization/destruction of site cVOC contaminants.



BioTrap® samplers were deployed in the injection well prior to and after deployment to demonstrate additive influence on native microbial populations in the treatability zone. MW-32A (former PRS Control well) baseline values indicated minimal presence of *Dehalococcoides* ($<5.00 \times 10^1$) and/or the three biomarkers (tceA, bvcA and vcrA); all of which were recorded in nearby MW-38A, previously amended in 2012 using PRS deployment units. November 2019 data indicates a 3 order-magnitude increases in each biomarker at both MW-38A and MW-32A since the 2017 injection. The following graphs plot changes in [cVOC^s] vs. P:PD Ratio from monitoring well MW-30A and individual [cVOC^s] over time at MW-31A.



MW-30A 18-month Performance Review

99.0% ↓ decrease [TCE]

87.0% ↓ overall decrease [cVOC_{total}];
97.4% ↓ reduction from peak

83.2% ↓ decrease Parent:Parent Daughter Ratio (P:PD Ratio)

Continuous Production [Ethene]

Single Deployment Event
Residual Mass Present and Solubilizing
Early, then October '18 thru June '19
Downgradient from Injection Well

MW-31A 18-month Performance Review

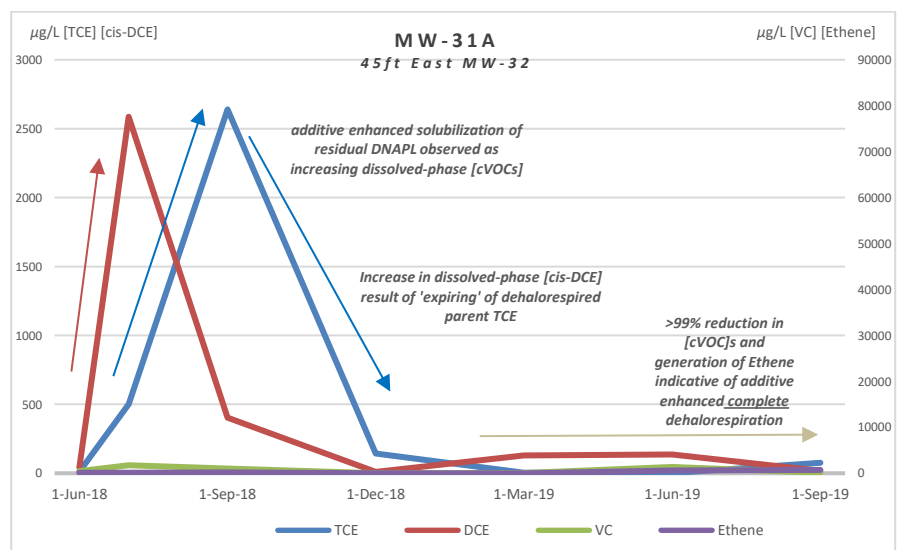
>99.99% ↓ decrease [TCE]

99.3% ↓ decrease [cVOC_{total}]

99.6% ↓ reduction Parent:Parent Daughter Ratio (P:PD Ratio)

Continuous production [Ethene]

Single Deployment Event
Complete Biotransformation
Sustainability
DNAPL Destruction



Results show single injection event produced influence >100ft downgradient MW-32A (76.1% reduction [TCE] MW-29) Minimal additive based carbon present yet sustainable and complete biotransformation within biostimulated ecosystem. Visit our website to read more about how you can realize cost-effective and complete chlorinated remediation success.