TerraStryke® Products LLC
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Highlights

ERDENHANCED™ cVOC BIOSTIMULATION

safe, sustainable, effective

- Faster Kinetics
- Expedited Solubilization
- Increased Bioavailability
- Greater Longevity
- Complete Biotransformation

ERDENHANCED™ *Superior Performance* realizing complete biotransformation faster

ERDENHANCED™ *Sustainable* extended effect-residency times and longer reducing conditions

ERDENHANCED™ *Biostimulates* native microbial populations, expedites residual source mass solubilization, and dissolved-phase contaminant destruction

ERDENHANCED™ *Cost-effective* lowering overall remediation impacts and costs

Call *TerraStryke® to realize* safe, sustainable, and effective cVOC destruction*!!*

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TerraStryke® ERDENHANCED™

Deep Aquifer cVOC Groundwater Remediation Evaluation Process

Using Simple Additive Delivery Approach; NASA, Stennis Space Center Area D

TerraStryke® Products LLC (***TerraStryke®***) develop/distribute biostimulation additives proven to maximize the performance of in-situ remediation by simply enhancing native microbial populations and the ecosystem in which they survive to cost-effectively realize *complete* chlorinated hydrocarbon contaminant destruction.

Background: NASA Stennis Space Center, Passive Release Sock (PRS) Pilot Study. Evaluated additive efficacy under actual biogeochemical conditions. Past Site use impacted several groundwater bearing units with Trichloroethylene (TCE). PRS pilot implemented at Area D, amending well MW06-12, screened within the 3rd and deepest TCE impacted water bearing unit. Lab based microcosm evaluation also performed.

Process: MW06-12 amended with **ERDENHANCED™** filled PRS units suspended in screened well interval. PRS units replaced 5-times over 14-month study creating ≈3ft AOI. Groundwater monitoring, sampling, analytical testing completed each replacement event. Additive efficacy determined by comparing performance data to baseline.

Results:

No Vinyl chloride recorded throughout evaluation

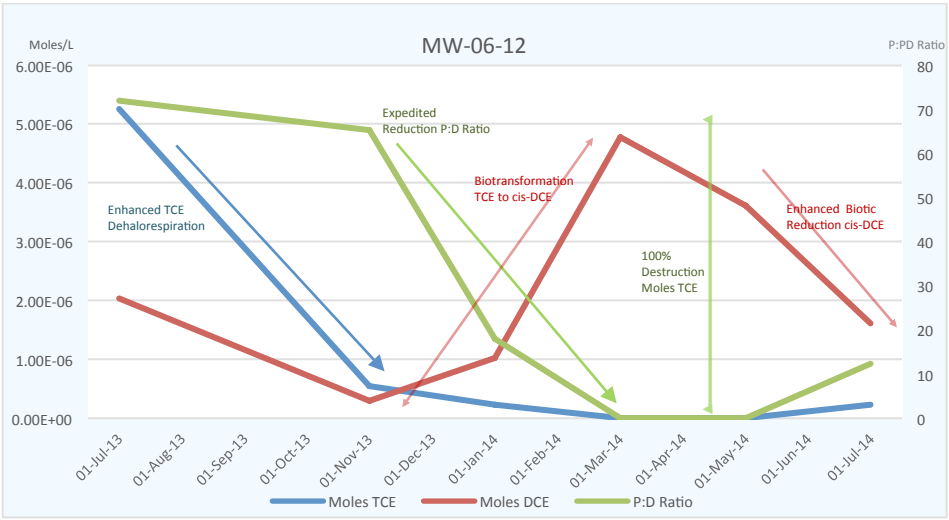
Secondary geochemistry provides evidence supportive of biotic dechlorination

>99.99%$_{REDUCTION}$ dissolved-phase concentrations TCE within 7-months deployment;

>95.7%$_{REDUCTION}$ moles TCE

>82.7%$_{REDUCTION}$ moles total-cVOC^{s}, and

>82.7%$_{REDUCTION}$ in P:PD Ratio.



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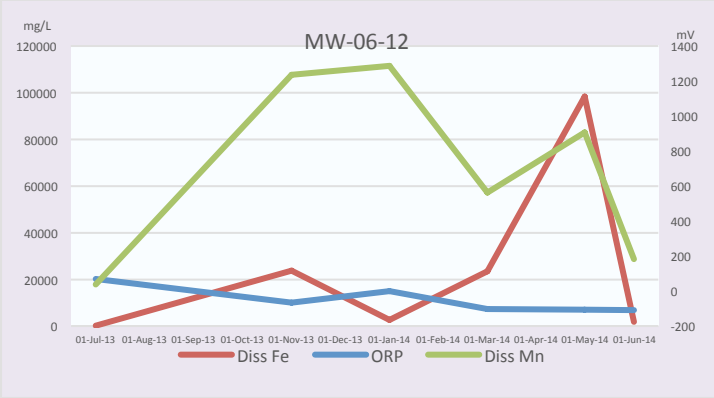
ERDENHANCED™ is a patented Carbon based additive leveraging site biogeochemical conditions to realize sustainable and complete biotransformation of chlorinated volatile organics (cVOC^s) representing a low-impact, cost effective solution to groundwater remediation.

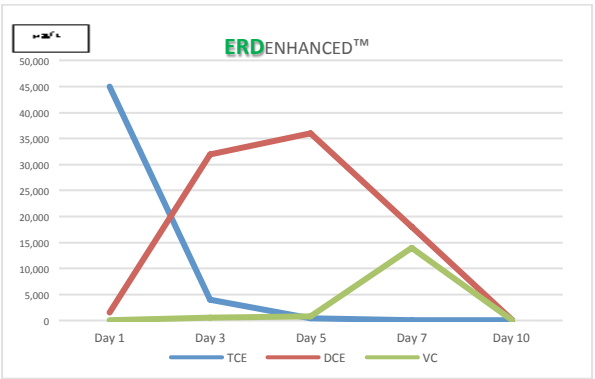
Secondary Lines of supportive evidence are plotted in the following graph:



- **98.3% decrease** dissolved Iron after 4-fold increase
- **85.7%** decrease dissolved manganese after > 3,000% increase
- 30,000% increase sulfate by month 6; complete ***depletion*** by end of evaluation period
- Sustained decrease in ORP
- General increases methane

Changes in treatment zone geochemistry provide secondary supportive evidence of additive enhanced reductive dechlorination by native microbial populations

Microcosm Study: Independent lab-based microcosm study was performed by CB&I Environmental & Infrastructure; purpose to compare efficacy of **ERD**ENHANCED™ to Lactate as sole electron donor to enhance reductive dechlorination. Microcosms used Site groundwater spiked with 45,000 µg/L TCE and consortium of *Dehalococcoides* (SDC-9) at initial concentration of 1 x 10^7 cells/mL. Electron donors each added at 1.35 g/L. Killed Control/treatment microcosm with no additive established for comparison purposes. The following graphs plot the results.

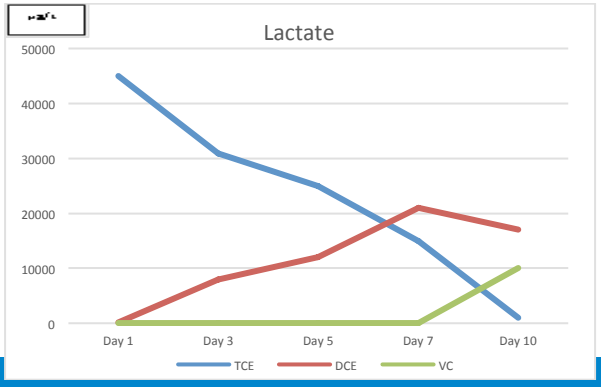


ERDENHANCED™ amended microcosm realized superior performance:

✓ >99.9%REDUCTION TCE by day 5
✓ >99.7%REDUCTION CIS-DCE by day 10 after >2,300% increase
✓ >99.9%REDUCTION [VC] at day 7 after *Four* Order-Magnitude Increase

ERDENHANCED™ amended microcosm demonstrated superior performance with complete biotransformation of cVOC contaminants.

Safe, Sustainable, Effective cVOC destruction!



Lactate amended microcosm:

- Required twice the time to biotransform same parent [TCE]
- Attained < 20% reduction in [cis-DCE] after lesser daughter production
- [VC] continuing to increase at the end of the evaluation after 3-fold increase