TerraStryke® **Remediation Products LLC**
P.O. Box 254
Andover, NH 03216

www.TerraStryke.com

Highlights

ERDENHANCED™

safe, sustainable, effective

- Faster Destruction
- Expedited Solubilization
- Increased Bioavailability
- Greater Longevity
- *Complete* Biotransformation

TerraStryke® ERDENHANCED™

cVOC Saturated Soils and Groundwater Contamination Technology Manufacturer Biostimulation Alone Treatability Evaluation Using ERDENHANCED™

Site: Technology manufacturer operating where past use adversely impacted saturated soil/groundwater bearing units with chlorinated volatile organics (cVOCs). Baseline concentrations Trichloroethylene (TCE) <10 ug/L in source zone and total cVOCs <1,000 ug/L, the majority being cis-Dichloroethylene with P:PD Ratio ≈70%.

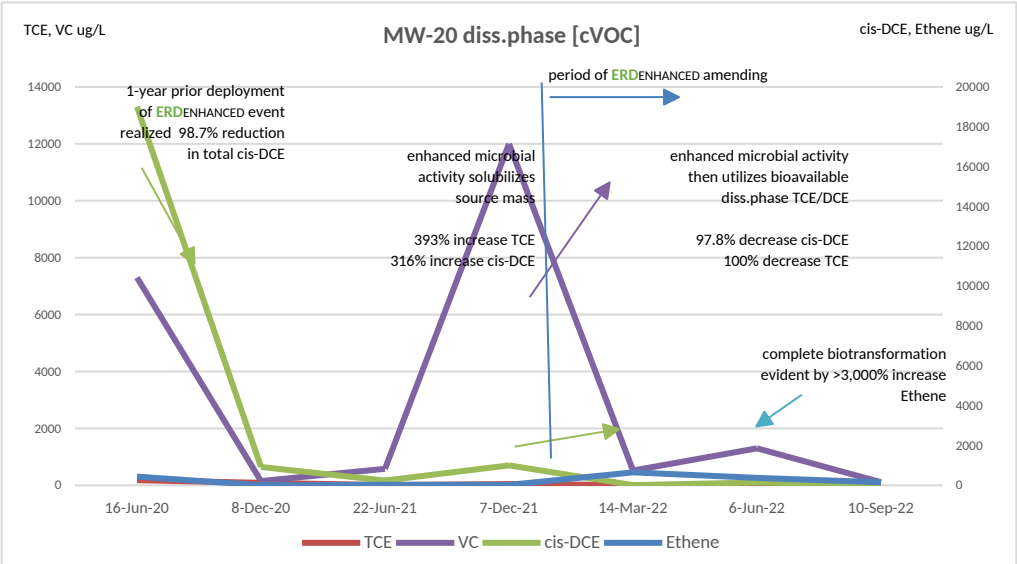
Goal: Treatability study to determine efficacy of biostimulation alone to expedite and support complete biotransformation of Site cVOCs by indigenous dehalorespiring bacteria to Ethene. In essence, restore the microbial ecosystem (treatment zone) to support microbial communication, growth, and performance through development of additive enhanced biofilm.

Process: 2,079 pounds biostimulant **ERD**ENHANCED™ deployed to subsurface in October 2021 via four deployment nodes equidistant MW-20 located proximate source zone contaminants. DPTused to deploy additive-slurry in 40ft x 40ft treatment zone with 15ft vertical impact.

Monitoring: Groundwater monitored and sampled for analytical testing at MW-20 and two downgradient wells; MW-19, 30ft downgradient and MW-4, 60ft downgradient amended zone.

Results: Immediately post deployment dissolved-phase concentrations of the parent TCE at MW-20 increased 393% due to enhanced microbial liberation of sorbed contaminant mass to the dissolved-phase. As the TCE is dehalorespired (utilized) it is biotransformed to the daughter cVOC cis-DCE; seen as, a 316% increase in cis-DCE. From DCE it transforms to VC then Ethene.

Within this restored ecosystem indigenous microbes rapidly utilize available electrons on the cVOCs. As cis-DCE is utilized we realize a 97.8% decrease in same. Concurrently, we realize >99% reduction in VC as Ethene increases >3,000% confirming *complete* biotransformation.



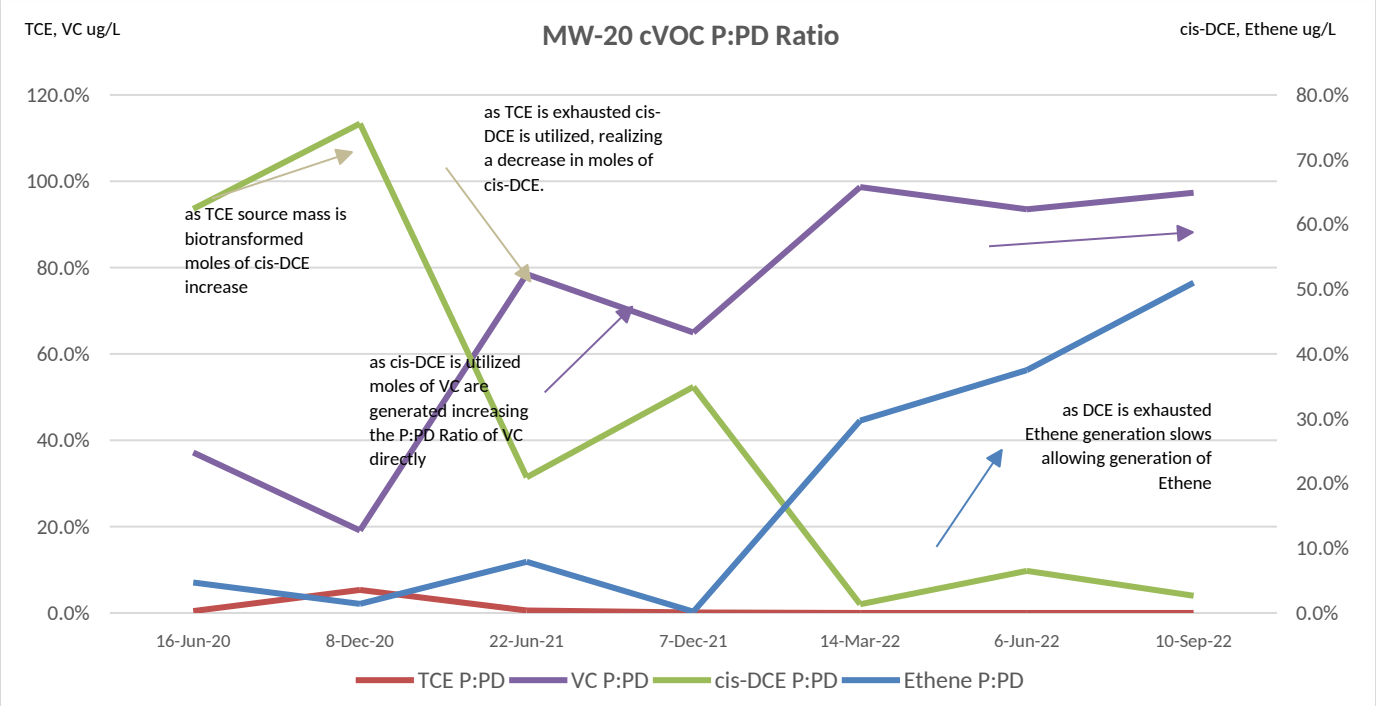
TerraStryke® Products LLC (*TerraStryke*®) develop/distribute biostimulation additives proven to maximize the performance of in-situ remediation by simply enhancing native microbial populations and the ecosystem in which they survive to cost-effectively realize *complete*

TerraStryke® **Remediation Products LLC**
P.O. Box 254
Andover, NH 03216

www.TerraStryke.com

chlorinated alkane and alkene contaminant destruction.

To further demonstrate the deployment of ERDenhanced we plot the P:PD Ratios of the cVOC contaminants monitored from performance well MW-20. The table below are the values calculated and plotted. Biotransformation is a process, a series of steps requiring the utilization of the highest energy source (parent TCE) prior to the use of a lower source (cis-DCE, VC).



The graph above and table below clearly demonstrate the conversion of cis-DCE through VC to Ethene. As cis-DCE steadily decreases (fewer molecules) VC steadily increases due to its being generated. As cis-DCE is generally exhausted (March 2022) the presence of Ethene molecules becomes dominant. This dominance is reflected by the values in the table below. The percent of Ethene steadily rises post deployment as the percent of cis-DCE steadily decreases. VC values are asymptotic during this period as it is being generated (cis-DCE dehalorespiration) and utilized (Ethene generation). The only explanation for these changes in molecular percentages is enhanced biotransformation by the biostimulated indigenous microbial populations.

TCE P:PD	DCE P:PD	VC P:PD	Ethene P:PD
0.4%	59.5%	35.4%	4.7%
5.3%	74.5%	18.8%	1.4%
0.5%	19.3%	72.3%	7.9%
0.1%	34.8%	64.8%	0.2%
0.0%	0.9%	69.3%	29.7%
0.0%	4.1%	58.5%	37.5%
0.0%	1.3%	47.7%	51.0%