

## Project Highlights

- **ERDENHANCED™** stimulates the existing biogeochemistry to address dissolved-phase and residual source mass organically.
- **ERDENHANCED™** amended wells averaged **>96.9% REDUCTION** in total [cVOC] contaminants after 2-years.
- **ERDENHANCED™** expedited mass destruction with average **>99% reduction** in P:D Ratio.
- **ERDENHANCED™** creates safe and *decades of sustainable* reducing conditions to allow and realize complete biotransformation.



Before 2014



After 2019

**ERDENHANCED™**

**Cost-Effective**

**Long-Term Compliance**

**Low-Impact**

**Cost-Effective**

## TerraStryke® ERDENHANCED™ In-Situ Proof-of-Concept & Pilot Study Former Dry Cleaner: 451 Guelph Line, Burlington, Ontario Canada Chlorinated Ethene DNAPL Source Zone

**Introduction:** TerraStryke® Products LLC (TerraStryke®) develop/distribute biostimulation additives proven to cost-effectively enhance the destruction of organic contaminants, safely and completely, with minimal equipment or adverse site impacts. **ERDENHANCED™** leverages untapped biogeochemical principles to facilitate the destruction of organic halides such as tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (1,1,1-TCA), carbon tetrachloride (CT), chlorobenzenes (CBs), and their toxic daughter products simply by enhancing native microbial communities.

**Summary:** The Site, a former suburban dry cleaner, is the end unit of a strip-mall. Obtained through a bankruptcy, Owner wished to remediate subsurface soil/groundwater conditions to allow redevelopment/re-occupancy. Less than 4-years after a single **ERDENHANCED™** deployment event, moles of PCE *and* total [cVOCs] decreased **>99%↓**, the site has been redeveloped, occupied and realized a 200% increase in value; while saving the Owner 10-years and over \$500,000 in initial remediation costs.

**Results:** Based on results of a 2011 on-site Proof-of-Concept study, a voluntary biostimulation program was implemented by the Owner in 2014. Using a subslab infiltration gallery, a 12% additive slurry (4,224 pounds additive to equal parts water) was gravity fed to the subsurface, displacing <7% pore space volume within the amending zone. Baseline [PCE] averaged >15,000 ug/L with minimal daughter products present. 18-months after deployment, concentrations PCE and *all* daughter products decreased >99% within the amending plume and ≈45ft downgradient the amending gallery; with average reductions in the plume: >96% (PCE), >88% (TCE), >94% (cis-DCE), and 92% (VC).

**Conclusions:** At redevelopment, 4-years after the deployment of **ERDENHANCED™**:

- ✓ [PCE] within the amending plume decreased >99.9% in <4-years
- ✓ [cis-Dichloroethene] (cis-DCE) and vinyl chloride (VC) decreased ≈90%, concurrent with PCE degradation
- ✓ Remedial strategy shaved 10 years off original remediation strategy; allowing expedited redevelopment, occupancy and the realization of positive revenues for property Owner, City of Burlington and new store.
- ✓ No ambient air concerns recorded to date.
- ✓ **ERDENHANCED™** stimulated native microbial populations ability to expedite reductive dehalogenation of organic contaminants without stall and/or increases in toxic daughter products such as cis-DCE or VC.
- ✓ **ERDENHANCED™** allows for expedited redevelopment concurrent with organic destruction of Site contaminants, with minimal impact and maximum sustainability, a proven cost-effective remedial solution for the redevelopment of current, legacy and/or remote site locations.

**Process:**

**ERDENHANCED™** stimulates the native dehalogenator community and their environment to enhance the organic destruction of dissolved-phase and residual source organic-halide contaminant mass. Benefits include expedited solubilization of residual (sorbed mass, stringers, blebs) source mass and even nominally pooled product. By solubilizing source mass we increase the bioavailability of a given contaminant to the dehalogenator community effectively increasing the rate of source mass destruction.

Expedited solubilization is due to **ERDENHANCED™** ability to stimulate native bacteria's natural biosurfactant production. This production also assists in the development of protective biofilms which further enhance bacteria's ability to maximize their performance. Expedited solubilization, enhanced diss.phase destruction and sustainability all contribute to helping you achieve long-term remediation goals without rebound, without stall, without nuisance noise, odors and/or vapors often associated with competing additives. Our performance enhancing abilities extend the effective-residency time for treatment, optimizing metabolic efficiency of native microbes and, along with endogenous decay, provide conditions suitable for enhanced reductive dehalogenation long after **the additive is 'consumed'**. We are realizing, after a single deployment event, decades, yes decades of sustained reducing conditions.

All in all, the level of performance (contaminant mass destruction) and extended effective-residency times realized by **ERDENHANCED™** are at least 2-3X that of other carbon-based additives, effectively eliminating multiple deployments and/or supplemental treatment costs, making it ideal for any site including remote and legacy sites.



**To determine if ERDENHANCED™ can help reduce the environmental risk at your site, please contact us [sales@terrastryke.com](mailto:sales@terrastryke.com) to discuss our on-site, low-cost low-risk, product evaluation process.**