



## Highlights

### ERDENHANCED™ cVOC BIOSTIMULATION

*safe, sustainable, effective*

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

### ERDENHANCED™ Superior Kinetics

complete biotransformation faster

### ERDENHANCED™ Sustainable

extended effect-residency times of over 7-10 years reducing conditions

### ERDENHANCED™ Biostimulates

native microbial populations to leverage the momentum Mother Nature provides

### ERDENHANCED™ is Cost-effective

lowering overall remediation costs

Call TerraStryke® NOW to realize

*safe, sustainable, and effective*  
cVOC destruction!!

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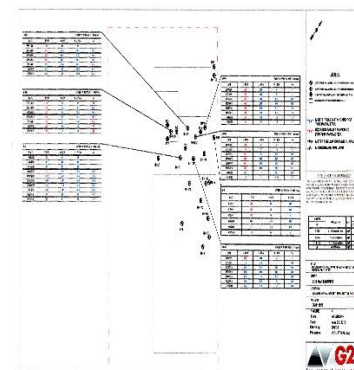
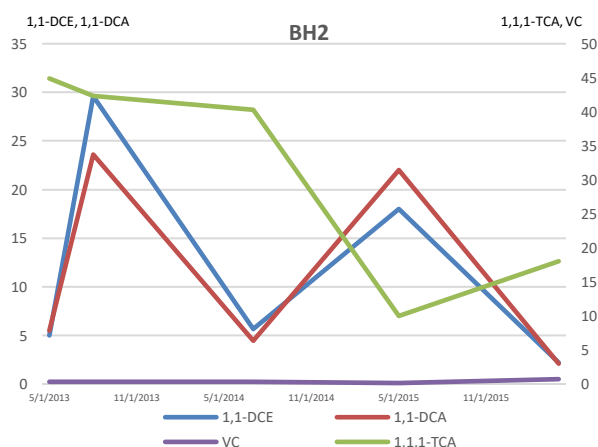
## TerraStryke® ERDENHANCED™ Chlorinated Alkane and Alkene Remediation by Biostimulation Former Manufacturing Facility, Burlington, Ontario Canada

TerraStryke® Remediation Products, LLC (TerraStryke®) develop biostimulation additives to enhance native dehalorespiring microbial populations and cost-effectively realize safe, sustainable, complete destruction of chlorinated volatile organic alkane/alkene compounds (cVOCs).

**BACKGROUND:** Former machine service facility. Documented cVOCs in groundwater. Owner desires *sustainable* solution and therefore allowed limited treatability evaluation to determine efficacy of ERDENHANCED™. Primary COCs 1,1,1-TCA, 1,2-DCA, and 1,1,-DCE. Treatment zone ≈250M<sup>3</sup> inclusive of five injection nodes each generating ≈5ft AOI.

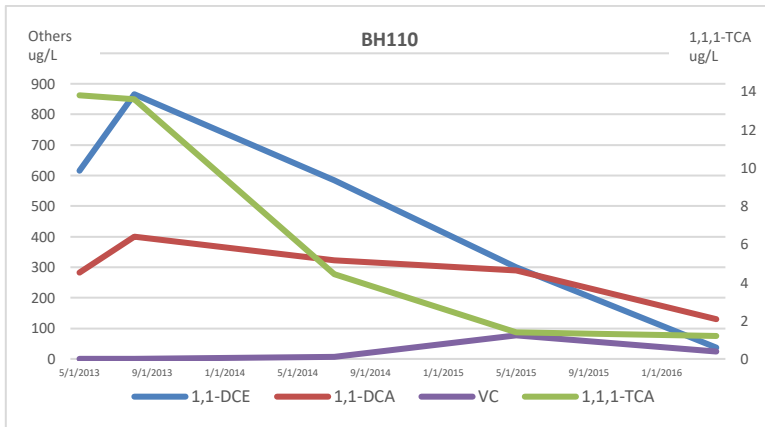
**BASELINE:** Total cVOCs ranged from 97.5 (BH-102) to 911.5 µg/L (BH-110). 40L of ERDENHANCED™ slurry passively deployed via gravity in May and June 2013 (165 pounds additive w/ 150 gallons water) or; <10 gallons slurry per well (*substantially under dosed*). Subsurface 'tight' red silty-sand with assumed 25% effective porosity. Residual source mass in saturated soils within treatment zone. Groundwater sampled over 3+ year period.

**RESULTS:** Slurry injected passively in May 2013; 4-years later, within the TZ: 1,1-DCE decreased up to **99%**; 1,1-DCA decreased up to **95%**, and 1,1,1-TCA decreased up to **98%**. Specifically, average reductions within the TZ for 1,1-DCE = 95.5%; 1,1-DCA = 72.5% and 1,1,1-TCA = 87.0%. Enhanced solubilization of residual mass (NAPL) observed in 3 of 4 TZ monitoring locations, microbial populations increased in tested locations BH110 and BH111 with all biomarkers necessary for complete cVOC biotransformation also recorded.



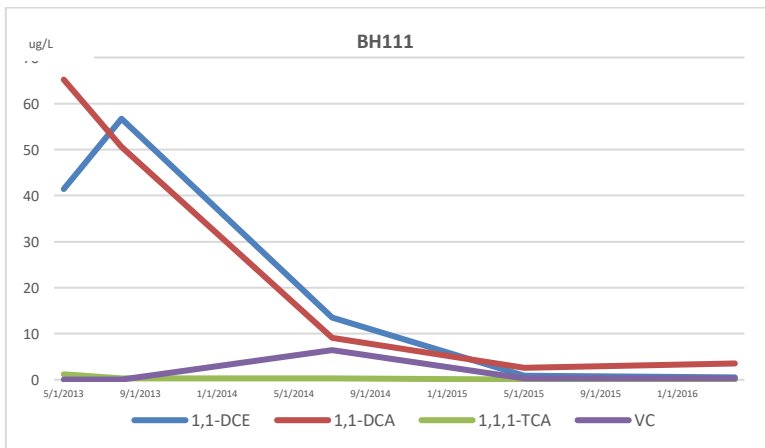
ERDENHANCED™ enhances treatment zone geochemistry, creating effect-residency times of >7-years after a single injection event. ERDENHANCED™ creates faster dehalorespiration kinetics, expedites residual mass (NAPL) solubilization, and eliminates rebound by leveraging the Momentum Mother Nature starts to enhance shared microbial behaviours. ERDENHANCED™ supports *complete* cVOC remediation with less-risk, less-cost, less impact.

The following graphs display data obtained from groundwater monitoring of wells located within, upgradient, and downgradient of the TZ by G2S Environmental Consulting, Inc. of Mississauga Ontario. Each plot demonstrates **ERDENHANCED™** superior performance, sustainable effect-residency times, and ability to realize *cost-effective* cVOC destruction.



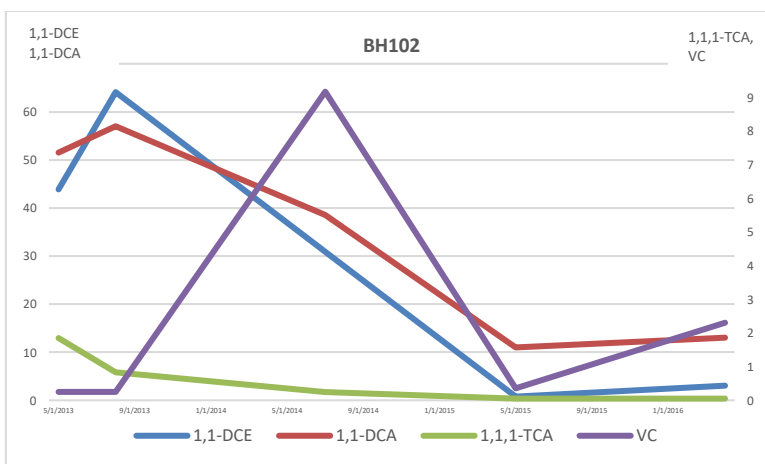
BH110 located central to injection wells IN1, IN2, IN3

- ✓ **84.9%** overall decrease in total cVOCs *after* initial increase of 40.5% due to additive enhanced solubilization of saturated soil NAPL
- ✓ **94.8%** decrease in 1,1-DCE
- ✓ **62.0%** decrease in 1,1-DCA
- ✓ **99.6%** decrease in 1,1,1-TCA
- ✓ Vinyl chloride increase after ND, followed by 67.5% decrease from peak, trending down



BH111 ≈5m downgradient of IN5, and ≈3-4m upgradient of IN3/IN4. Located proximate to center of treatment zone.

- ✓ **95.9%** overall decrease in total cVOCs *after*
- ✓ Prolonged increase in total cVOCs and 37% increase in 1,1-DCE due to additive enhanced solubilization
- ✓ **99.9%** decrease in 1,1-DCE
- ✓ **94.6%** decrease in 1,1-DCA
- ✓ **95.8%** decrease in 1,1,1-TCA
- ✓ **94.9%** decrease in VC after initial increase



BH102 located within TZ, ≈3-4m downgradient of IN5

- ✓ **90.0%** overall decrease in total cVOCs *after*
- ✓ Solubilization of residual source mass (25.3% increase) resulting from additive enhanced co-solvent effect
- ✓ **92.9%** decrease in 1,1-DCE *after* 493.2% increase
- ✓ **74.8%** decrease in 1,1-DCA *after* 331.4% increase
- ✓ **97.3%** decrease in 1,1,1-TCA
- ✓ **74.9%** decrease in VC after 3 order-of-magnitude-increase in July 2014
- ✓ Geochemical metrics not recorded at any sample locations throughout the evaluation period