



**Project Highlights**  
**ERDENHANCED™**

**COST-EFFECTIVE cVOC REMEDIATION**

- **ERDENHANCED™** biostimulates existing treatment zone biogeochemistry to enhance native dehalorespiring bacteria
- **ERDENHANCED™** enhances and nourishes native microbial populations
- **ERDENHANCED™** expedites the scavenging of alternative electron acceptors to attain methanogenic conditions faster, and keeping them longer
- **ERDENHANCED™** is *sustainable* maintaining enhanced reductive dechlorination for >10-years after a single deployment event
- **ERDENHANCED™** expedites solubilization of residual source mass increasing smear zone contaminant bioavailability
- **ERDENHANCED™** defends against rebound to uphold the realization of long-term site compliance cost-effectively and with minimal impact

PRS Evaluation Results include:

- ✓ **99.6%** REDUCTION [PCE]
- ✓ **95.8%** REDUCTION [TCE]
- ✓ **81.1%** REDUCTION [cis-1,2-DCE]
- ✓ **99.5%** REDUCTION [cVOCs<sub>total</sub>]
- ✓ VC "ND" throughout study

**TerraStryke® ERDENHANCED™ cVOC REMEDIATION STRATEGY EVALUATION**

**PRS Deployment Units: Simple Additive Delivery Approach**

**Former Textile Manufacturing Facility, Hamilton, Ontario Canada**

TerraStryke® Remediation Products LLC (TerraStryke®) develop and distribute biostimulation additives proven to enhance native dehalorespiring populations to cost-effectively realize the destruction of chlorinated volatile organic compounds (cVOCs) *sustainably and completely*. **ERDENHANCED™**:

Consistently achieves 3-orders of magnitude reductions in cVOC constituents

Realizes extended effect-residency times >7-years after one deployment event!

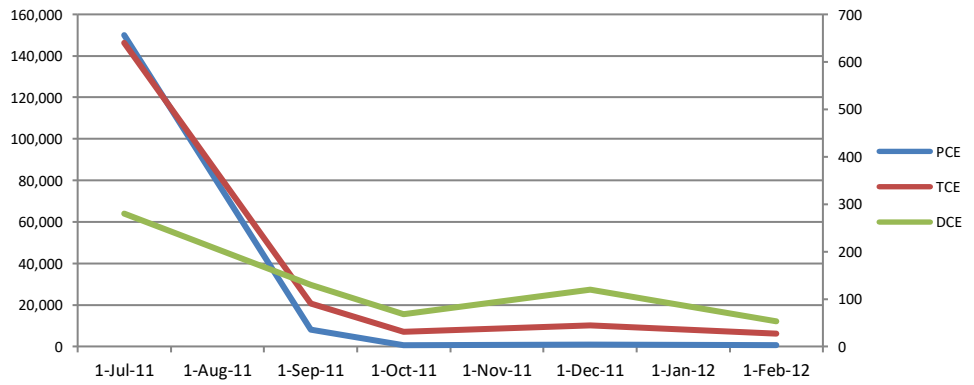
No 'cis-stall', No Vinyl chloride buildup, No above-ground support equipment.

**ERDENHANCED™** is a patented additive which sustainably leverages site biogeochemical conditions; enhancing *complete* cVOC destruction for 7-10 years after a single amending event *and* eliminating rebound by expediting residual source mass non-aqueous phase liquid (NAPL) solubilization.

**Background:** Former textile mill with continuous operations from early 1800's through 1960's. Past use of the solvent Tetrachloroethylene (PCE) adversely impacted Site groundwater with PCE, and daughter cVOCs Trichloroethylene (TCE) and cis-1,2-Dichloroethylene (cis-1,2-DCE), documented in 2010 above Ontario Ministry of Environment (MOE) Table 3 SCS standards.

**Baseline:** PCE detected at 43,000 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) in saturated soils proximate to MW-9 and source zone contaminants. TCE and cis-1,2-DCE were detected at 1.4  $\mu\text{g}/\text{kg}$  and 0.5  $\mu\text{g}/\text{kg}$ , respectively. PCE concentrations in groundwater at MW-9 were 120,000 micrograms per Liter ( $\mu\text{g}/\text{L}$ ), with TCE and cis-1,2-DCE concentrations of 700  $\mu\text{g}/\text{L}$  and 560  $\mu\text{g}/\text{L}$ , respectively.

**Results:** **ERDENHANCED™** amended groundwater realized **>98% reduction** in PCE; **>95% reduction** in TCE; and, **>80% reduction** in cis-1,2-DCE, with no rebound and/or detectable concentrations of vinyl chloride (VC). The graph below plots data generated over a 7-month evaluation period at monitoring well MW-9.



Concentrations in above graph reported in micrograms per Liter ( $\mu\text{g}/\text{L}$ ); PCE, TCE on left axis, cis-1,2-DCE on right.

**Summary:** TerraStryke® ERDENHANCED™ realized >99% reductions in total cVOCs in amended groundwater sampled from the limited MW-9 treatment zone. These results again demonstrate that the additive is a sustainable, cost-effective strategy for the *in-situ* remediation of cVOC contaminants. Table One summarizes data generated during the 7-month evaluation timeframe.

TABLE ONE

DATE	MW-9 cVOC Concentrations (µg/L)			
	PCE	TCE	cis-1,2 DCE	Total [cVOC]
July 21, 2011 (Baseline)	150,000	640	280	150,920
ERDenhanced Amendment Deployment				
Sept. 12, 2011	8,000	90	130	8,220
Oct. 26, 2011	600	31	68	699
Dec. 19, 2011	800	44	120	964
Feb. 1, 2012	630	27	53	710
<b>% Change</b>	<b>99.6%</b>	<b>95.8%</b>	<b>81.1%</b>	<b>99.5%</b>

**Methods:** Evaluation performed using additive filled Passive Release Sock (PRS) deployment units. The PRS units are suspended within the screened interval of the test well(s) to passively amend a limited treatment zone of ≈3-5ft (AOI). This evaluation included five (5) PRS replacement events over a 7-month period with baseline and performance groundwater monitoring, sampling, and analytical testing completed during each event. Additive efficacy was determined by comparing performance data results to baseline. This method represents a low-cost, low-risk evaluation process that is performed under actual biogeochemical field conditions.

PRS based Pilot evaluations typically require 6-9 months and involve 4-6 replacement events to realize completion. Each represents a low-cost/low-risk treatability study, performed under actual biogeochemical conditions, thereby demonstrating to stakeholders the additive efficacy prior to committing to a long-term remediation strategy.

TerraStryke® will provide the necessary amount of additive filled PRS units **at no cost** other than shipping; assuming, agreements are made prior to initiation that all data shall be shared, all data is available for publication and/or presentation, and if agreed upon that performance milestones are achieved, that the full-scale remediation of Site contaminants shall be pursued based on estimated quantities established using site data provided to TerraStryke® prior to the implementation of the pilot evaluation. As always, concerns associated with confidentiality will be strictly observed.

