



Project Highlights

- **ERDENHANCED™ Pilot Study 49% Reduction in Parent-Daughter Molar Mass Ratio indicating Source Mass Destruction.**
- **ERDENHANCED™ Proven Cost-Effective *Green* Biostimulation Strategy**
- **ERDENHANCED™ Proven Cost-Effective *Sustainable* Biostimulation Strategy**
- **ERDENHANCED™ Pilot Evaluation sponsored by New Hampshire Department of Environmental Services (NHDES)**
- **ERDENHANCED™ Pilot Study Demonstrated Contaminant Reductions in 10-month period:**
 - >89.4% PCE
 - >98.2% TCE
 - >71.7% cis-DCE
- **ERDENHANCED™ Reduces Site Time, Operational Costs**
- **ERDENHANCED™ Provides Long-Term Complete cVOC Biotransformation**
- **ERDENHANCED™ Maximum Solubility Providing Multiple Deployment Options with Minimal Water Usage**



Dry Cleaner Facility DNAPL Source Zone

BioStryke® ERDENHANCED™ In-Situ Remediation Pilot Study

Concord, New Hampshire USA

BioStryke® Remediation Products, LLC, provide innovative and cost-effective amendment formulations designed to biostimulate treatment zone conditions and enhance the in-situ destruction of Site contaminants. BioStryke® ERDENHANCED™ leverages existing conditions facilitating passive-aggressive destruction of cVOC dissolved, sorbed, residual source mass; realizing complete biotransformation cost-effectively, minimizing interior ambient air concerns and overall environmental impacts. ERDENHANCED™ is proven effective in terms of both cost and performance working with Mother Nature, not against.

The Site is an active dry cleaner, located within the limits of a major New England town. Historical cVOC residual source mass and dissolved phase groundwater contamination has been the subject of several remedial strategies, both chemical and physical, to include ongoing pump-and-treat efforts providing downgradient plume containment. Site contaminants consist of the chlorinated volatile organic compounds (cVOC) tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene above New Hampshire Department of Environmental Services (NHDES) standards. In preparation for the establishment of a NHDES sponsored in-situ reductive dechlorination program a Pilot Study was implemented to evaluate the efficacy of ERDENHANCED™ under actual Site conditions. Within 6-months the Pilot Study realized:

- [PCE] decreased **>89.4% - 49%** Molar Mass Reduction
- [TCE] decreased **>98.2% - 43%** Molar Mass Reduction
- cis-DCE decreased **>71.7% - 23%** Molar Mass Reduction

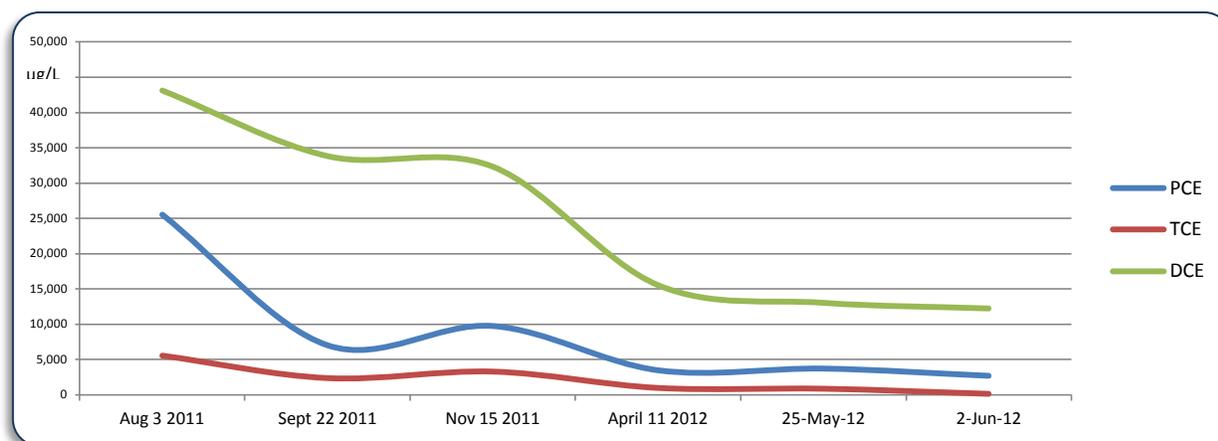
The NHDES sponsored Pilot Study demonstrated BioStryke® amendment ERDENHANCED™ a cost-effective strategy for passive-aggressive source zone cVOC contaminant destruction providing a low-cost low-risk process to evaluate amendment efficacy prior to full-scale remedial strategy commitment. Pilot Study groundwater was amended using Passive Release Sock (PRS) deployment units. Amendment filled PRS units fit within existing 2-inch groundwater monitoring well. PRS units remain suspended within the screened interval of the test well, undisturbed, passive-aggressively amending a vertical column with an area-of-influence (AOI) of < 3-ft. Groundwater sample/analytical testing events are performed at the start, and at regular intervals throughout the evaluation, to include replacement of PRS deployment units. PRS Pilot Study provides a low-cost, low-risk process for Owner(s), Regulators, and Practitioners to evaluate amendments ability prior to full-scale remedial commitment.

BioStryke® amendments are suitable for any type of deployment such as Direct Push Technology (DPT), infiltrations gallery, and direct application due to enhanced solubility, ease of handling, requiring less water and pore space displacement.

BioStryke® amendments maximize project margins while minimizing project impacts.

At the site, baseline source area total cVOC groundwater concentrations \approx 80,000 micrograms per Liter ($\mu\text{g/L}$) in monitoring well ECS-5, the well chosen for amendment deployment. As noted on the previous page, the AOI of the amended test well is very limited, resulting in no long-term impact to site geochemical conditions. As such, Pilot Study impacts are very short lived with groundwater conditions typically returning to baseline conditions in less time than it took to complete the evaluation. However, due to the proprietary components found in **ERDENHANCED™**, full-scale amendment is proven sustainable, maintaining enhanced reducing conditions within the treatment zone after a single full-scale deployment event.

BioStryke® ERDENHANCED™ facilitates both dissolved phase and residual source mass contaminant destruction by stimulating native microbial populations to scavenge competing terminal electron acceptors (TEAs) such as oxygen, nitrate, oxidized iron/manganese, and sulfate which typically limit cVOC dechlorination faster, more effectively; attaining methanogenesis where cVOC biotransformation can occur. The graph below summarizes the performance data ($\mu\text{g/L}$) collected during the herein described Pilot Study.



It is of great importance to note *prior* to full-scale deployment of **ERDENHANCED™** little reductions in parent or daughter product contaminant concentrations was observed indicating minimal biodegradation occurring. Subsequent to deployment of **ERDENHANCED™**, contaminant concentrations reduced dramatically, as did molar mass levels, and continued in a cost-effective and sustainable manner throughout the period of the evaluation.