



## Project Highlights

- **Additive Deployment via Direct Push Technology (DPT)**
    - **Cost-Effective - Low Impact Saturated Soil and Groundwater Remediation**
  - **TPHENHANCED™** cost-effectively enhances hydrocarbon degrading heterotrophic bacteria
  - **TPHENHANCED™** provides an analogue to Oxygen to realize contaminant destruction under anaerobic conditions
  - **TPHENHANCED™** eliminates the costs and liabilities associated with above-ground support equipment typical to traditional in-situ bioremediation projects.
  - **TPHENHANCED™** enhances contaminant solubilization and bioavailability of residual source mass contaminants achieving long-term site compliance
- Safe, Green, Cost-Effective**  
**Contact TerraStryke® NOW!**  
**603.731.3159**

## TerraStryke® TPHENHANCED™

### Cost-Effective, Low-Impact Residual Groundwater Remediation Petroleum Fuel Oil Release; Philadelphia, Pennsylvania

TerraStryke® Products, LLC (TerraStryke®) develop and distribute biostimulation additives proven to cost-effectively enhance the destruction of dissolved phase and residual source mass contaminants by nourishing native microbial populations.

TerraStryke® TPHENHANCED™ enriches site geochemistry and heterotrophic bacteria to realize the destruction of petroleum hydrocarbon (PHC) contaminants under anaerobic conditions, thereby eliminating the costs and liabilities associated with above ground support equipment typical to traditional bioremediation technologies.

**SITE:** Manufacturing facility where after removal of an Underground Storage Tank (UST), and adversely impacted soils, residual PHC source mass was documented as light non-aqueous phase liquid (LNAPL). Physical recovery decreased LNAPL thickness from 1.3 ft to 0.18 ft over a 3-year period. The regulatory contaminant drivers included Naphthalene and 1,2,4-Trimethylbenzene (1,2,4-TMB). TPHENHANCED™ was deployed in 2010 via direct push injection in the vicinity of the former UST excavation. Within 6-months after additive deployment the following results were observed:

#### RESULTS:

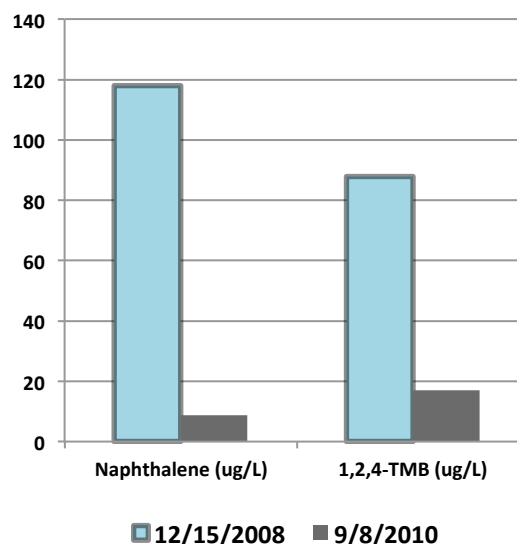
Concentrations of Naphthalene decreased by approximately **92%**

Concentrations of 1,2,4-TMB decreased by approximately **83%**

#### Specifically:

- Naphthalene decreased from 118 ug/L to 8.8 ug/L
- 1,2,4-TMB decreased from 97.7 ug/L to 17 ug/L

Post deployment of the biostimulation additive TPHENHANCED™ each of the above contaminants of concern and additionally Benzene and other PHC contaminants have remained within regulatory standards.





To evaluate our biostimulation products at a site under your management, please review the following, and then contact us to discuss utilizing biostimulation to realize cost-effective, low-impact residual source mass destruction.

### On-Site PRODUCT EVALUATION PROCESS

**TerraStryke®** provides a low-cost, low-risk pilot program to determine additive efficacy under actual site biogeochemical conditions. We eliminate the 'jar effect' and provide potential clients a representative, yet conservative, 'Go-No-Go' evaluation to confirm additive efficacy and assist in the confirmation of estimated additive loading requirements, while assisting stakeholders (Owners/Generators, Regulators, Consultants and Practitioners) a level of assurance to confidently proceed.

### DEPLOYMENT PROCEDURES

**TerraStryke®** Pilot Studies are performed *in-situ*, under actual site biogeochemical conditions, using Passive Release Sock (PRS) deployment units. Additive filled PRS units fit inside 2-inch groundwater monitoring well(s) and remain suspended in the screened interval proximate to a source zone. At scheduled intervals, PRS units are replaced and groundwater monitoring, sampling, and analytical testing is performed. Typically, four to five monitoring/replacement events are required per evaluation.

### LENGTH OF EVALUATION

**TerraStryke®** evaluations require specific time per the contaminant of concern; PHC compounds may require up to 6-9 weeks; whereas, chlorinated volatile organic compounds (cVOCs) typically require 6-9 months for completion. A minimum 50% reduction Performance Criteria is established. The comparison of performance data to baseline conditions will be the basis for determining efficacy. Upon the completion of each evaluation, **TerraStryke®** shall provide a Technical Memorandum discussing the pertinent results. PRS evaluations are not scalable and PRS deployment units are not designed for full-scale use.

### PILOT STUDY COSTS

**TerraStryke®** provides, ***at no cost***, the necessary amount of additive filled PRS deployment units to complete an efficacy evaluation. Data generated during the evaluation is understood to be shared and, if appropriate, available for use by **TerraStryke®** for publication and/or presentation with client approval. All concerns associated with confidentiality will be strictly observed. The evaluation represents a low-cost/low-risk treatability study under actual biogeochemical conditions, providing stakeholders proof of amendment efficacy prior to full-scale commitment, without a long-term impact to treatment zone geochemistry.

It is critical to a successful pilot evaluation that scheduled groundwater monitoring and sampling events be adhered to accurately. For PHC contaminated sites, these events must be completed every 6 to 10-days. For cVOC contaminated sites, PRS replacement and groundwater monitoring/sampling should be completed at approximately six to eight-week intervals. It is recommended that performance monitoring and sample collection activities be completed while PRS deployment units remain in the monitoring well(s), and that field activities are completed by the same personnel.