



TPHENHANCED™

**PROVEN SAFE, COST-EFFECTIVE,
LOW-IMPACT GROUNDWATER
REMEDIATION STRATEGY**

*SAVE MONEY WHILE MINIMIZING
SITE IMPACTS*

**LEVERAGES SITE CONDITIONS TO
REALIZE CONTAMINANT DESTRUCTION**

**TPHENHANCED™ FACILITATES
NATIVE BACTERIA RESPIRATION**

✓ **EXPEDITE CONTAMINANT
BIOAVAILABILITY**

✓ **MINIMIZE FUTURE REBOUND
POTENTIAL AND LIABILITIES**

**TPHENHANCED™
Maximize Remediation
Performance Safely,
Effectively, At Minimal Cost**

**CALL TerraStryke® TODAY FOR
A COST-ESTIMATE NOW!!**

*Request our Guidance Document
and discuss our FREE on-site Pilot
Evaluation Today!!!*

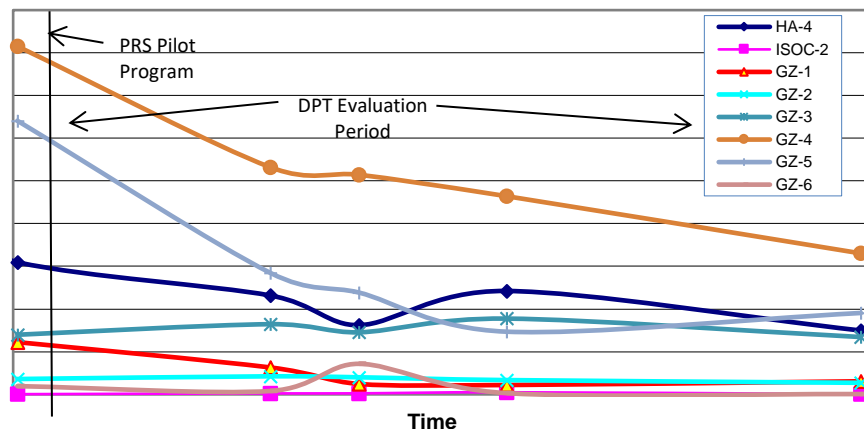
TerraStryke® TPHENHANCED™

Residual Source Mass Remediation Using Low-Impact Biostimulation Direct Push Injection Program; Fuel Oil Distribution Facility, NH

TerraStryke® Remediation Products, LLC (TerraStryke®) biostimulation additives are proven cost-effective, enhancing the destruction of dissolved phase and residual source contaminants, leveraging site geochemistry and native microbial populations while eliminating the costs, emissions, and liabilities associated with aboveground equipment.

BACKGROUND: Based on positive results of an on-site Passive Release Sock (PRS) evaluation, TPHENHANCED™ was chosen to biostimulate the degradation of dissolved-phase and residual source mass volatile organic compounds (VOCs) in a silty-clay water bearing unit. TPHENHANCED™ is a low-impact remediation strategy that allows uninterrupted site operations.

Total VOC Concentrations During 7-Month Pilot Test



RESULTS: Baseline VOC_{TOTAL} in treatment zone approached 16,300 ug/L and realized;

- 70% - 97% REDUCTION in [VOC_{TOTAL}]
- 70% - 98% REDUCTION in [BTEX_{TOTAL}]
- 70% - 98% REDUCTION in [Alkylbenzene]

PROCESS: Direct Push Technology deployed the additive with monitoring wells located in the treatment zone; including ISOC-2, where TPHENHANCED™ was first tested. Four rounds of post injection groundwater monitoring was performed in each of the eight wells.

TerraStryke® TPHENHANCED™ increased groundwater pH by ≈1 s.u. likely increasing microbial metabolic activity and overall additive performance; further demonstrating TPHENHANCED™ as a **green** and cost-effective strategy for the destruction of recalcitrant Petroleum Hydrocarbon contaminants in saturated soils and groundwater, under anaerobic conditions.

"Make Something Good Happen Today"

On-Site PRODUCT EVALUATION PROCESS

TerraStryke's low-cost, low-risk Passive Release Sock (PRS) Evaluation Program is designed to allow confirmation of additive efficacy under actual site biogeochemical conditions. The program eliminates the 'jar effect' inherent to bench-scale tests, providing end-users a representative, yet conservative, 'Go-No-Go' evaluation prior to committing to any full-scale remedy. The program confirms that a biotic pathway for contaminant degradation exists and provides assistance in determining future full-scale deployment needs.

DEPLOYMENT PROCEDURES

TerraStryke® PRS evaluations are performed *in-situ*, under actual site biogeochemical conditions, using PRS deployment units. Additive filled PRS units fit directly into 2-inch diameter groundwater monitoring well(s), and remain suspended, undisturbed, within the saturated screened interval. PRS units are replaced at predetermined intervals and groundwater monitoring and sample collection is completed to obtain performance data. Typically, 4-5 replacement events are required per evaluation.

LENGTH OF EVALUATION

TerraStryke® evaluation timeframes are specific to the contaminant of concern. For instance, heterotrophic bacteria that consume carbon are plentiful, while dehalorespiring bacteria are not. As such, a PRS evaluation using **TPHENHANCED™** to determine petroleum hydrocarbon compound (PHC) destruction requires between 8-12 weeks; whereas sites with chlorinated volatile organic compound (cVOC) contamination typically require 6-9 months for completion.

PERFORMANCE CRITERIA

A minimum 50% reduction Performance Criteria is established. Additive efficacy will be determined by comparing the results of performance sample analysis to the baseline conditions. *TerraStryke*® provides a Technical Memorandum that notes pertinent results of the evaluation; however, PRS evaluations are not scalable, and are not designed for full-scale use.

PILOT STUDY COSTS

TerraStryke® provides, **at no cost**, the necessary number of additive-filled PRS deployment units to complete an efficacy evaluation. All data generated during the evaluation is understood to be shared, with strict confidentiality maintained. Such data can be used by *TerraStryke*® for publication and/or presentation; and only with client approval, identify site location and/or individuals. The evaluation is a low-cost/low-risk treatability study which, under actual site biogeochemical conditions, provides stakeholders proof of amendment efficacy prior to full-scale commitment and without any long-term impact to the treatment zone geochemistry.

It is critical to any pilot evaluation that scheduled groundwater monitoring and sampling events be strictly adhered to and sample collection protocols be consistent using stated procedures. For PHC contaminated sites, replacement events must be completed every 6 to 10-days; whereas, cVOC contaminated sites require PRS replacement events at approximate six to eight-week intervals.

TESTING PARAMETERS

Accurate collection of field monitoring data and groundwater samples is critical to the completion of a successful Pilot Study. Please contact a *TerraStryke*® representative today to discuss the evaluation process, required testing parameters, and receive a copy of our Pilot Study Guidance Document. It is further recommended that performance monitoring and sample collection activities be performed and completed by dedicated Site personnel, using low-flow sampling techniques.