



TPHENHANCED™

**PROVEN
SAFE
COST-EFFECTIVE**

*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 Performance
Safely Minimize the Impact of
Remediation**

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

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

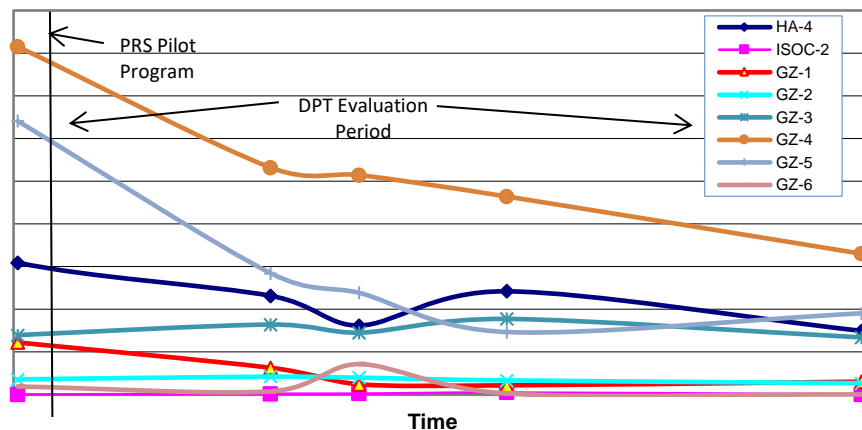
TerraStryke® TPHENHANCED™

**Residual Source Mass Remediation Using Low-Impact Biostimulation
Direct Push Injection Program
Fuel Oil Distribution Facility, New Hampshire**

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

BACKGROUND: Based on the results of an on-site Passive Release Sock (PRS) pilot study 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 cost-effective, low-impact strategy that allows uninterrupted site operations, eliminates above ground support equipment, ancillary costs and inherent liabilities.

Total VOC Concentrations During 7-Month Pilot Test



RESULTS: Baseline total VOCs in treatment zone approached 16,300 µg/L and realized;

- **70% - 97%** reduction in total VOCs;
- **70% - 98%** reduction in total BTEX;
- **70% - 98%** reduction in alkylbenzene.

PROCESS: Direct Push Technology (DPT) used to install 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 at each of the eight wells.



TerraStryke® Remediation Products LLC

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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 low-impact destruction of recalcitrant Petroleum Hydrocarbon contaminants in saturated soils and groundwater, under anaerobic conditions.

On-Site PRODUCT EVALUATION PROCESS

TerraStryke® low-cost, low-risk PRS Evaluation Program is designed to allow confirmation of additive efficacy under actual site biogeochemical conditions. The program eliminates the 'jar effect', 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 exists and provides some 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 below the water table, within the screened interval of the well. At scheduled intervals, PRS units are removed, replaced, and groundwater monitoring and sample collection is performed 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) impacts typically require 6-9 *months* for completion.

PERFORMANCE CRITERIA

A minimum 50% reduction Performance Criteria is established. The results of performance sample analyses are compared to "baseline" conditions to determine product efficacy. **TerraStryke®** provides a Technical Memorandum noting pertinent results of the evaluation and recommendations for full-scale treatment, if applicable.

PILOT STUDY COSTS

TerraStryke® provides these services **at no cost** to the client, with the exception of shipping costs for the number of additive-filled PRS deployment units to complete the evaluation. As such, 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 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 typically are performed every 10-14 days; whereas, at cVOC contaminated sites PRS replacement events occur at 6-8 week intervals.