

Innovative Combined Remedies Approach Using Liquid Activated Carbon (LAC) and Calcium Oxyhydroxide Applied to Benzene Plume Reaches Non-Detect Within 30 Days

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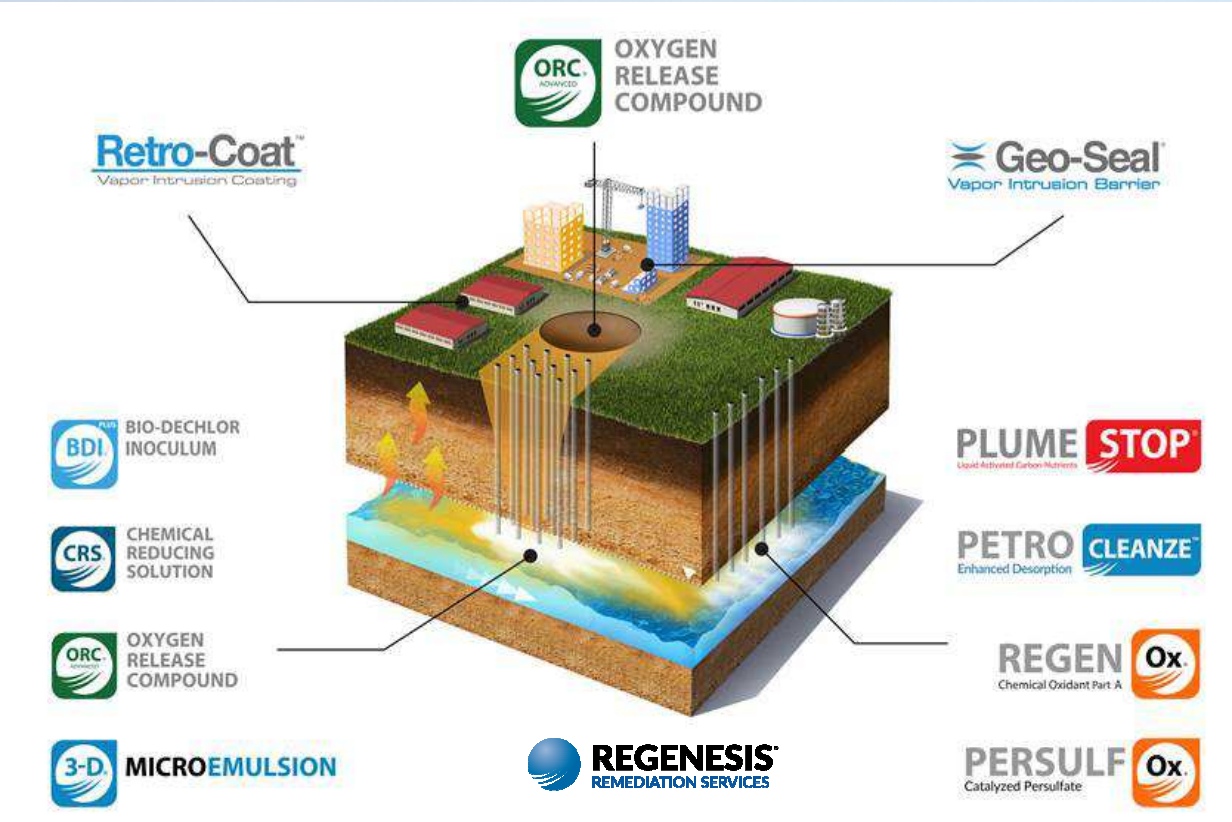
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Outline

- Background
- Technology Descriptions
- Technology Modes of Action
- Case Studies



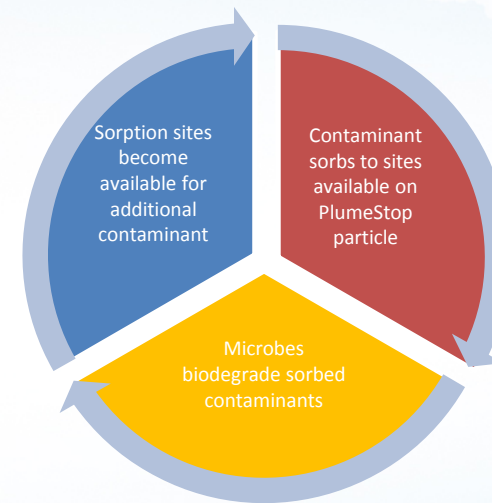
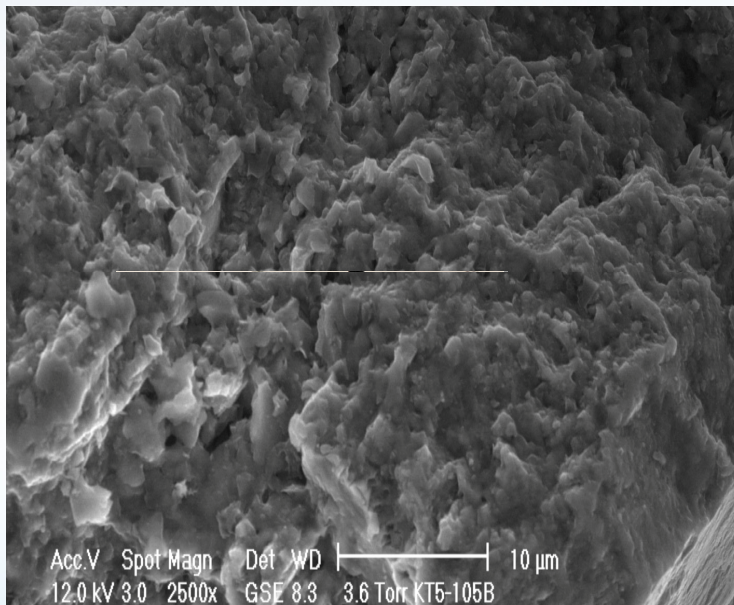


The Reagent – What it is

- A highly dispersive, injectable **sorbent** and **microbial growth matrix**
- Colloidal activated carbon (1 – 2 μm)
 - Size of a bacterium – suspends as ‘liquid’
 - Huge surface area – extremely fast sorption
- Proprietary anti-clumping / distribution supporting surface treatment
- **Core innovation**
 - Enables wide-area, low-pressure distribution through the soil matrix without clogging



PlumeStop Mode of Action



PlumeStop



Powdered Activated
Carbon

repeat



Contaminants Sorbed, Now What?

Primary Methods of Contaminant Destruction

- **Aerobic Treatment**
 - Electron Acceptor Addition, Sparging...
- **Anaerobic Treatment**
 - Slow release electron donors
 - Lactate, recirculation systems
- **Enhanced Monitored Natural Attenuation**

PLUME STOP
Liquid Activated Carbon

+

ORC
ANIONIC
OXYGEN
RELEASE
COMPOUND

PLUME STOP
Liquid Activated Carbon

+

HRC
HYDROGEN
RELEASE
COMPOUND

PLUME STOP
Liquid Activated Carbon



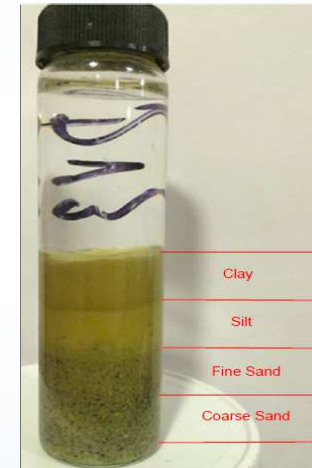
OXYGEN RELEASE COMPOUND

- Engineered oxygen release compound
- 17% by weight A.O.
- Controlled Released Technology
- Accelerates degradation rates 100x faster than natural degradation rate
- Typically last for 12 months

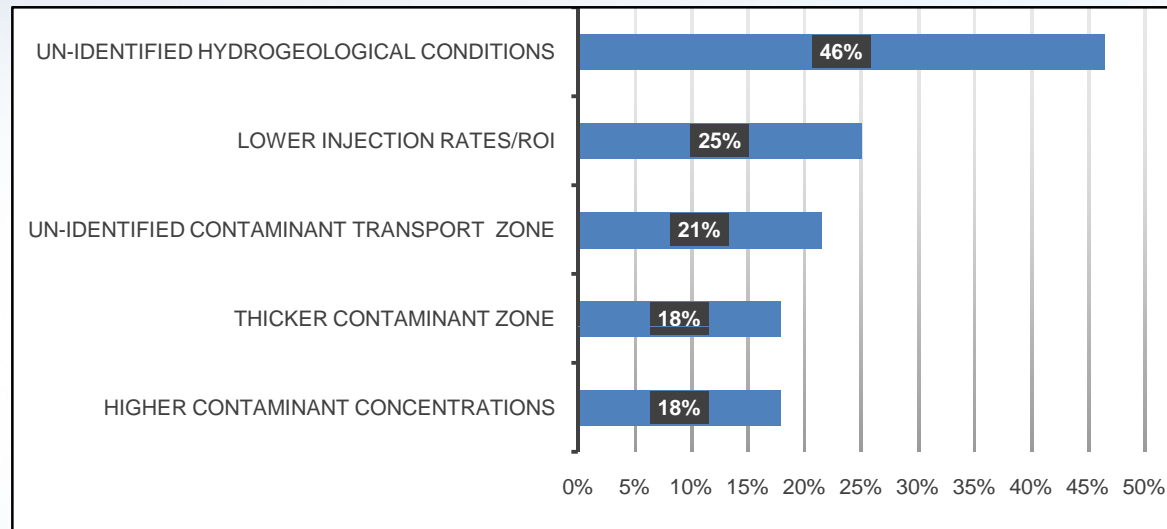


Design Verification Testing (DVT) – REGENESIS PlumeStop® Strategy of Success

- What is DVT?
 - A process of data collection and analysis to verify design assumptions of a site's chemical and geological conditions and the viability of *in situ* injection(s).
- Why is it necessary?
 - Site investigations typically focus on liability and risk assessment
- Focus on efficient reagent-contaminant contact
 - Field-verification of remedial design parameters and delivery rates
 - Identification of contaminant transport strata and distribution
 - Ensure accurate placement of reagents and maximum flux-interception



What is the Outcome?

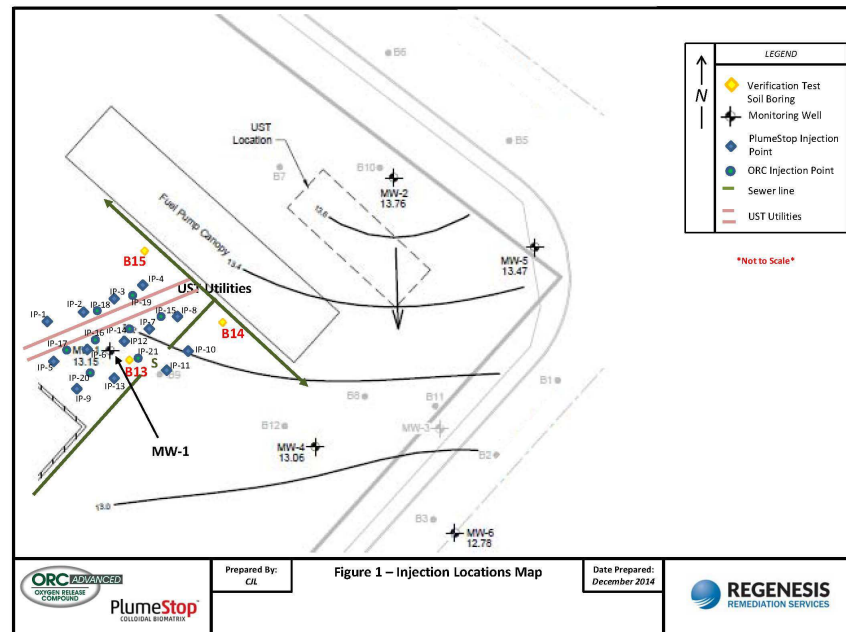


- 80% of tests to date have found unanticipated results (technical blind spots)
- $\frac{2}{3}$ of preliminary designs have been modified / refined
- 80% of design changes have been cost-neutral

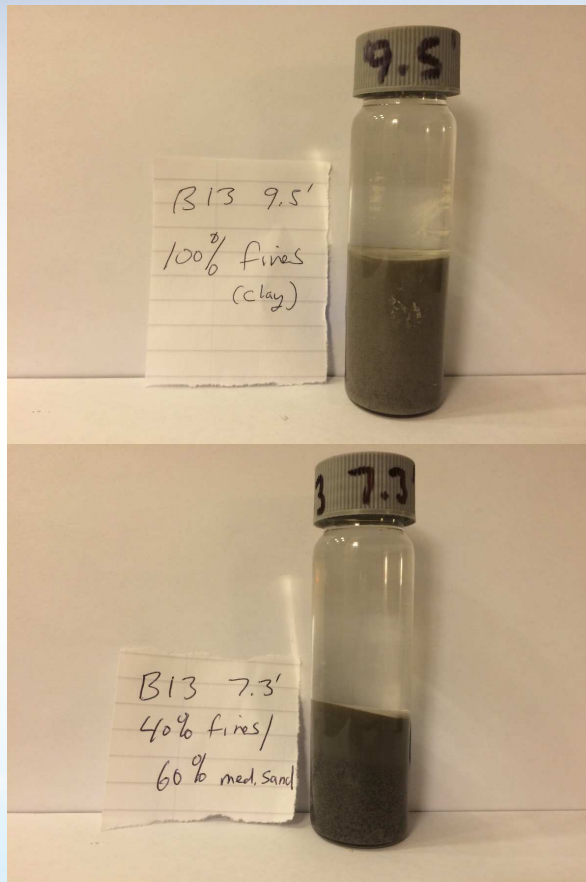


Field Performance – Case Studies

Active Gas Station in Southwestern Washington

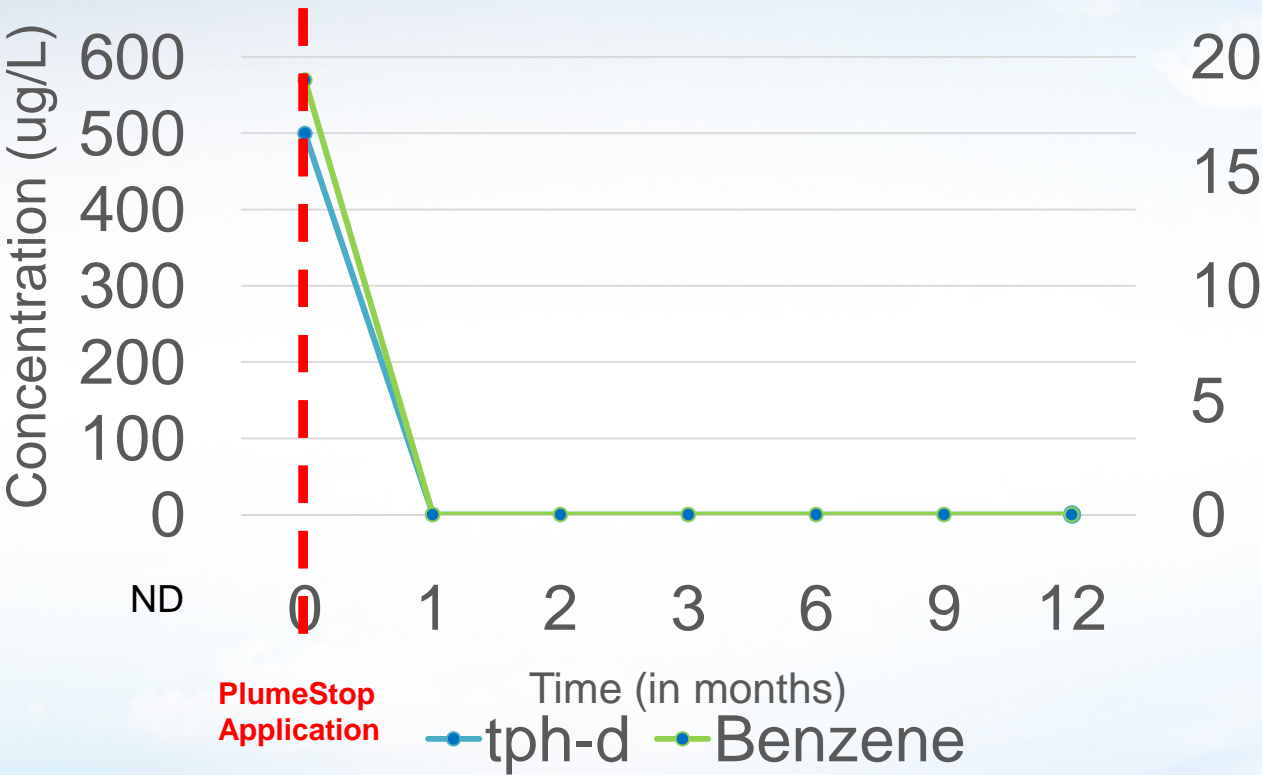


Design Verification Testing (DVT)





Baker's Corner Sampling Results



Case Study

Filling Station – BTEX Residues



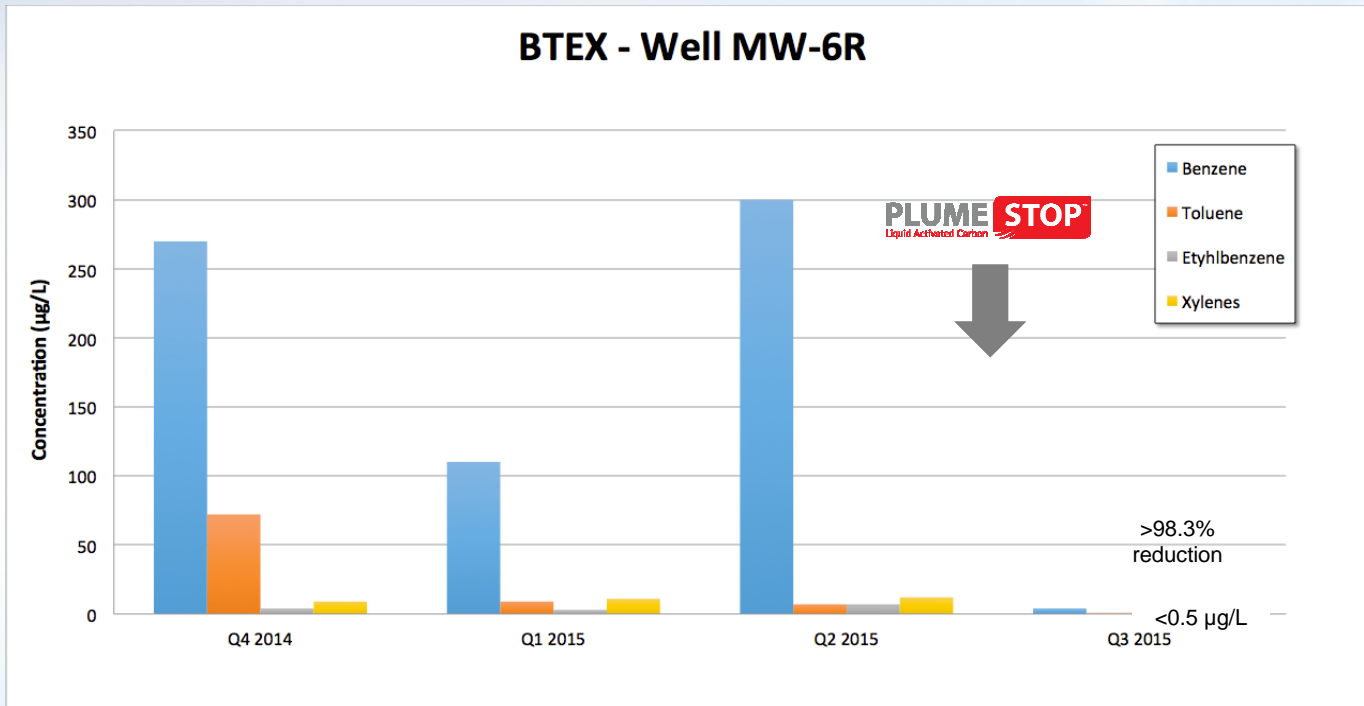
Pennsylvania

PlumeStop - Filling Station

- Former Filling Station
- BTEX residues
- Tight formation
- 9' – 15' below grade
- Clay with Sand (ca. 3.53×10^{-7} cm/sec)
- Seepage Velocity Zero
- PlumeStop and ORC Advanced



BTEX - Well MW-6R





How fast does it work?

Generally > 80% reduction within 90 days at 90% of sites.

How long does it last?

Indefinitely if biochemistry favorable.

Is biodegradation occurring?

Multiple lines of evidence in the lab and in the field indicate complete biodegradation.



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