PetroFIX Remediation Fluid

REGENESIS

PetroFix Applied to Active UST Basin, Quickly Meeting Cleanup Goals

Innovative Tank Basin Flooding Method Fully Treats Gasoline Contaminants At Active Gas Station Site

Minimal Site Dissruption

The UST System was active and fully operational at the time of application

Low Injection Pressures

PetroFix was injected into the wells at a controlled rate with minimal pressure – just 3 PSI on average

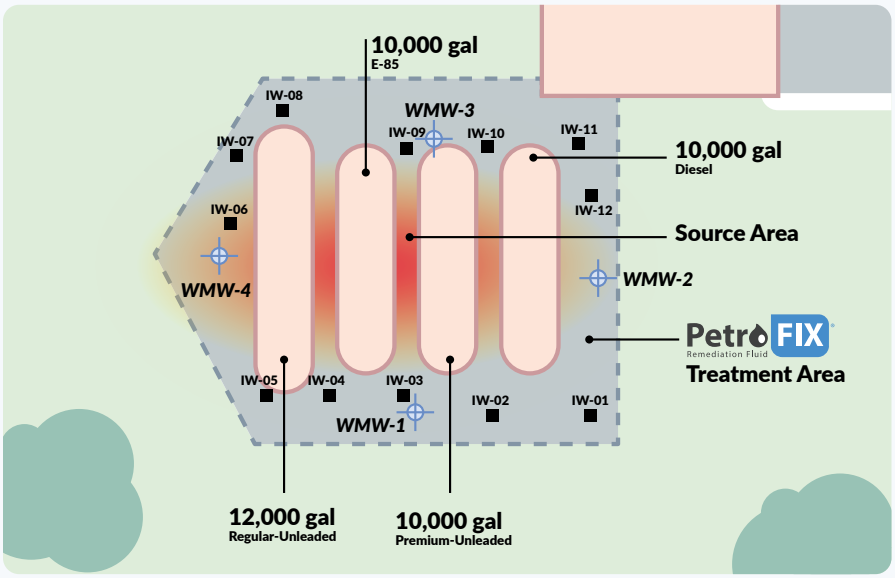
A Solution Compatible With Underground Storage Tanks

PetroFix is chemically compatible with the existing UST system on this site

Background

In May 2017, a suspected release was reported at an active gasoline station in Colorado when stained soils were discovered during the replacement of the underground storage tank (UST) spill buckets. Contamination associated with this release was later confirmed within and adjacent to the UST basin with benzene, ethylbenzene, xylenes, and MTBE concentrations in groundwater detected above the Tier 1 risk-based screening levels. As a result of these groundwater impacts, further corrective action was warranted.

The site and UST system where the release occurred is fully operational and groundwater contaminants were mostly contained within the active UST basin. However, some contaminants had migrated into the surrounding soils (predominantly clayey sand) and weathered bedrock (claystone). Consequently, a remediation approach was needed that would be minimally disruptive, chemically compatible with the active UST system, and highly effective.





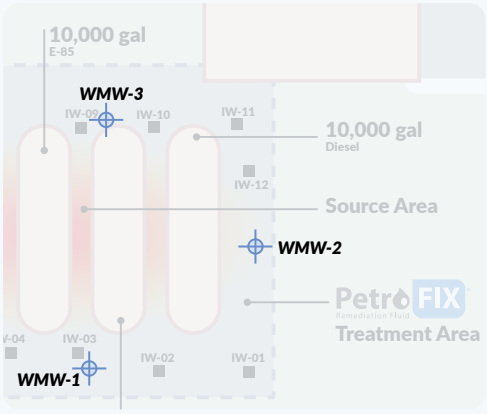
PetroFix Application Design

Total BTEX Concentrations:
Maximum of 6,557 µg/L
(WMW-3, March 2020)

Treatment Information:
Area: ~3,000 Square Feet
Injection Points: 12
Injection Interval: 2 to 4 ft bgs to safely downward percolate PetroFix into the tank basin cavity

Solution Applied: PetroFix and Electron Acceptor Blend

Quantity: 4,800 lbs/8,970 gal
(includes pilot and full-scale apps.)

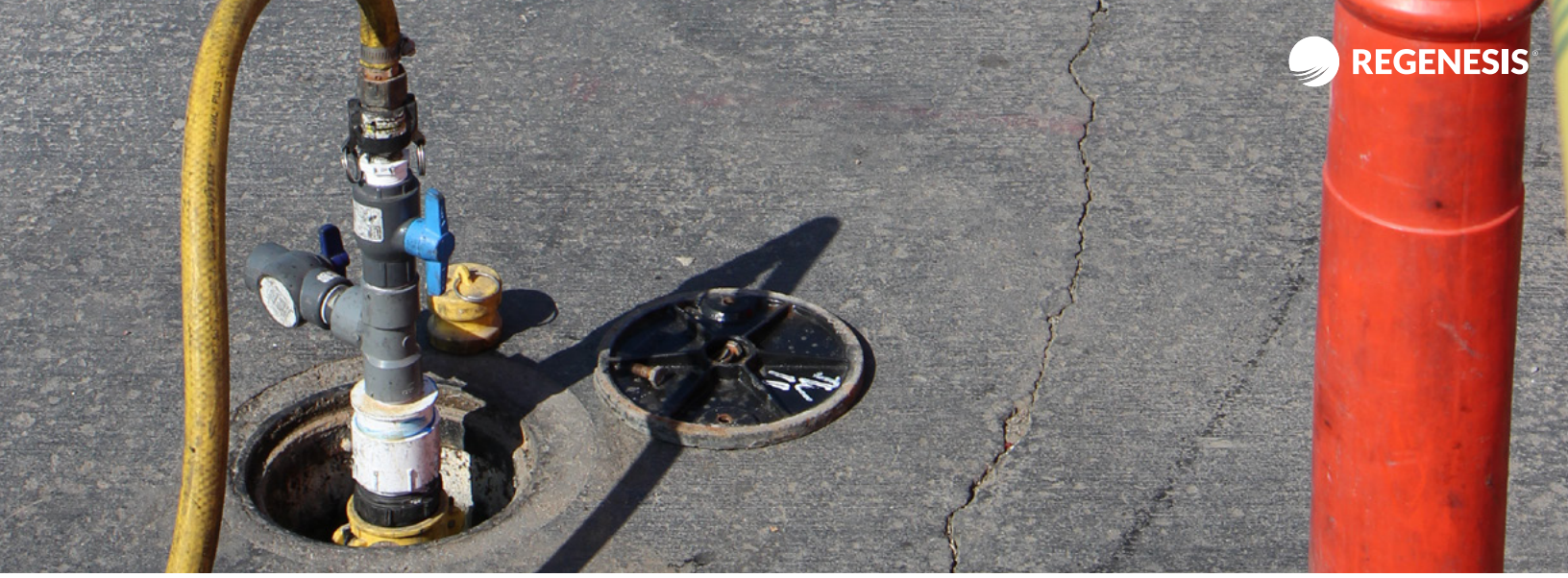


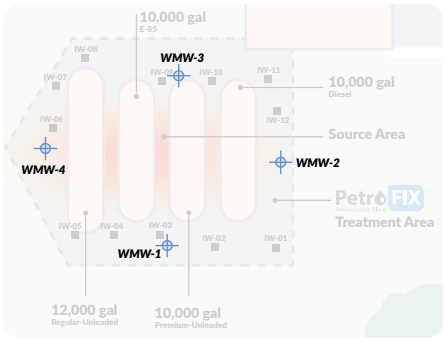
During the application, PetroFix was observed in groundwater monitoring wells WMW-1, WMW-2, and WMW-3, indicating lateral and vertical distribution was achieved.

Treatment

After considering multiple options, CGRS, a leading environmental consulting firm, developed and implemented an innovative, low-risk, and highly cost-effective treatment program utilizing PetroFix® to address the groundwater contamination *in situ*. Two-inch diameter, hand-dug, PetroFix vadose injection wells (12 total) were installed in and around the UST basin, screened at an approximate depth of 2 to 4 feet below ground surface. PetroFix was applied to these wells to flood the vadose zone, allowing the material to percolate down to the water table and mix within the tank basin cavity and surrounding soils.

CGRS contracted Vista GeoScience (Vista) to complete the injection work, starting with a pilot test to assess the approach's efficacy and followed by a full-scale application. The pilot test was conducted in July 2020 with 400 lb (4,252 gallons) of PetroFix injectate mixture applied into the 12 injection wells. PetroFix distribution was observed in multiple wells within and adjacent to the tank basin and the pilot test was deemed a success. Completion of the full-scale application quickly followed in September 2020 with the injection of 4,400 pounds (4,716 gallons) of PetroFix and electron acceptor blend mixture.





Monitoring well locations

Results

Samples were collected from the adjacent groundwater monitoring wells approximately six months after the PetroFix injection. The analytical results have shown a near 100 percent reduction in benzene, toluene, ethylbenzene, xylenes (BTEX), and methyl tert-butyl ether (MTBE), and a 94 percent reduction of total volatile petroleum hydrocarbons (TVPH). Based on these results and following the completion of quarterly monitoring, the site is on track to possibly receive closure in 2022.

The low-cost, easy-to-apply, and minimally disruptive PetroFix injection approach completed at this site serves as a model for treating other impacted, active UST basins. By employing this approach, PetroFix prevents petroleum hydrocarbon migration away from the basin, reducing environmental risk and minimizing liability over the long term.

Before PetroFix Treatment March 2020

216 µg/L

Coloring indicates concentrations above Tier 1 Risk Based Screening Levels

TVPH value represents Total Volatile Petroleum Hydrocarbons as gasoline

Mon. Well	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	TVPH
WMW-1	216 µg/L	2 µg/L	2,150 µg/L	69 µg/L	112 µg/L	10,800 µg/L
WMW-2	15 µg/L	<1 µg/L	50 µg/L	10 µg/L	1 µg/L	820 µg/L
WMW-3	185 µg/L	770 µg/L	828 µg/L	4,770 µg/L	<5 µg/L	30,500 µg/L
WMW-4	6 µg/L	<1 µg/L	3 µg/L	2 µg/L	15 µg/L	990 µg/L

After PetroFix Treatment March 2021

Mon. Well	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	TVPH
WMW-1	<1 µg/L	<1 µg/L	18 µg/L	60 µg/L	<1 µg/L	700 µg/L
WMW-2	<1 µg/L	<1 µg/L	<1 µg/L	<1 µg/L	<1 µg/L	<500 µg/L
WMW-3	<1 µg/L	<1 µg/L	<1 µg/L	<1 µg/L	<1 µg/L	<500 µg/L
WMW-4	1 µg/L	<1 µg/L	<1 µg/L	<1 µg/L	1 µg/L	<500 µg/L

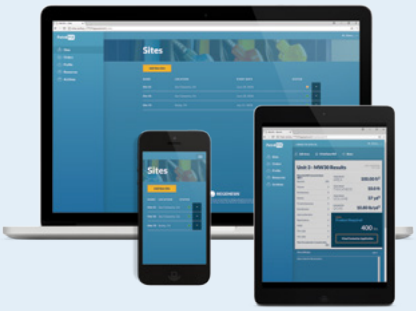
Key Benefits

PetroFix Remediation Fluid

- Fast, Safe, Affordable and Reliable Results
- Excellent Distribution Properties
- Simple Online Design Assistant and Full Customer Support

PetroFix Design Assistant: You Design

Use our Online Software to Generate an Estimate When you Need it.



Simple
Easy to Use

Flexible
Designs Tailored to Your Site

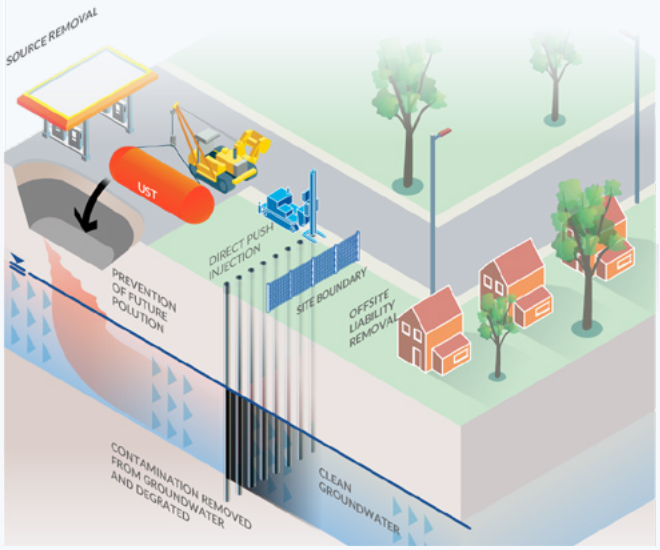
Fast
No Waiting for a Design

Technology

PetroFix® is a cost-effective solution for petroleum spills that equips environmental professionals with tools to take control of the remediation process. This technology works hand-in-hand with the PetroFix Design Assistant™, an online tool that enables users to design and apply individually-tailored remediation plans.

A Dual-Functioning, Activated Carbon Remedial Technology for Treating Petroleum Hydrocarbons

PetroFix has a dual function: it removes hydrocarbons from the dissolved phase by adsorbing them onto activated carbon particles then stimulates hydrocarbon biodegradation by adding electron acceptors. The environmentally-compatible formulation of micron-scale activated carbon (1-2 microns) is combined with both slow and quick-release inorganic electron acceptors. Practitioners can select between a sulfate and nitrate combination blend (recommended) or sulfate only for the additional electron acceptors required.



About the Consultant

CGRS began in 1987 as an environmental consulting company, providing industry- and regulatory-compliance expertise and services to owners and operators in the upstream and downstream petroleum industry. Over time they have diversified to meet the ever-changing customer needs by becoming experts in the markets of environmental services, liquid and CNG fueling, oil and gas, and water and wastewater. They are always on the lookout for the next opportunity to help clients succeed.

CGRS SOLUTIONS DELIVERED

Are You Planning a PetroFix Project? Visit www.PetroFix.com to Learn More.

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