REGENESIS®

PetroFix Reduces BTEX and TPH by >99%

In situ treatment reduces petroleum hydrocarbon concentrations within 5 months at an active gas station in Brazil

Project Site:
Active gas station in São Bernardo do Campo, São Paulo, Brazil

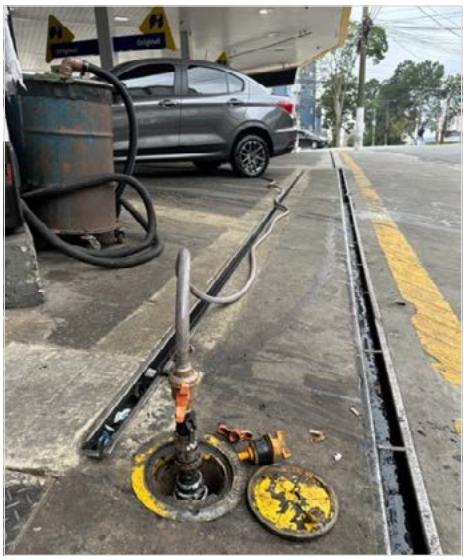
Geology:
Eluvial soil

Contaminants of Concern:
Benzene up to 2,458 µg/L, toluene up to 3,735 µg/L, ethylbenzene up to 1,107 µg/L, o-xylene up to 2,444 µg/L, and m-xylene up to 6,607 µg/L. Fractioned aliphatic TPH was detected up to 596 µg/L, and fractioned aromatic TPH was detected up to 16,350 µg/L.

Remedial Challenge:
Petroleum hydrocarbon impacts in groundwater at a small, active gas station where treatment needed to be completed with minimal disruption to site operations, traffic, and pedestrian movement

Remedial Approach:
In situ application of PetroFix® through injection wells

Results:
Within five months, benzene was reduced by 99.7%, toluene by 99.9%, ethylbenzene by 99.3%, total xylenes by 99.8%, fractioned aliphatic TPH by 99.3%, and fractioned aromatic TPH by 99.8%



Application of PetroFix through an injection well

Overview

An active gas station in São Bernardo do Campo, São Paulo, Brazil, had a long history of dissolved petroleum hydrocarbons in groundwater, including BTEX compounds and fractioned aliphatic and aromatic TPH. Previous remediation efforts, including multiphase extraction and chemical oxidation, reduced contaminant mass but did not fully achieve applicable regulatory limits or adequately address residual groundwater impacts associated with matrix back-diffusion.

To address these conditions, Aquífero Serviços de Remediação™ Ltda., under the direction of Kopf Servicos Ambientais, implemented a focused in situ treatment program using PetroFix® colloidal activated carbon, with added electron acceptors.

The remedial approach was selected to provide short-term dissolved-phase concentration reduction through sorption while supporting longer-term biodegradation of petroleum hydrocarbons within the treatment zone.

Remedial Design and Implementation

The treatment program targeted petroleum hydrocarbon impacts in groundwater within an approximately 20 m^3 plume. The subsurface geology consisted of eluvial soil, and the injection design was developed to promote reagent distribution across the target treatment volume while minimizing disruption to the active site.

Approximately 180 kg of PetroFix were mixed with approximately 1,380 L of potable water and applied through three injection wells. PetroFix's flowable formulation allowed the reagent to be applied under low-pressure conditions, with injection pressures maintained at or below 10 psi.

PetroFix was selected to support both short- and long-term treatment objectives. Its application increases the sorptive capacity of the aquifer matrix, immediately reducing dissolved-phase petroleum hydrocarbon concentrations and limiting contaminant mobility. The electron acceptor blend was applied to support biodegradation of petroleum hydrocarbons within the treated zone.

Site Challenges

The project was completed at a small, active gas station, requiring careful coordination around traffic flow, pedestrian access, and continued station operations. The limited treatment area and constrained site layout required a focused injection approach that could be completed efficiently while maintaining safe access around the work area.

A key technical challenge was achieving effective distribution of PetroFix within the target treatment zone to address contaminant mass associated with matrix back-diffusion, supporting both immediate concentration reduction and longer-term treatment performance.

Results

Post-injection groundwater monitoring completed five months after treatment showed substantial reductions in BTEX and TPH concentrations. Benzene concentrations were reduced by 99.7%, toluene by 99.9%, ethylbenzene by 99.3%, and total xylenes by 99.8%. Fractioned aliphatic TPH concentrations were reduced by 99.3%, while fractioned aromatic TPH concentrations were reduced by 99.8%. These results indicate that PetroFix achieved rapid and substantial reduction of petroleum hydrocarbon concentrations in groundwater, supporting both short- and long-term remedial objectives. The application was completed in one day and executed within the estimated budget and schedule.

Significance

This project demonstrates PetroFix's utility as a compact, flexible in situ treatment approach for petroleum hydrocarbon impacts in constrained, active service station settings. Using only three injection wells, the treatment was completed in one day and achieved greater than 99% reductions in BTEX and fractionated TPH within five months, while minimizing disruption to ongoing site operations.

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