# PETROFIX SUCCESSFULLY TREATS RESIDENTIAL FUEL OIL LEAK

## CASE STUDY:
## Regulatory Closure Achieved Following PetroFix Application to Treat Fuel Oil Spill

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## Overview

# PetroFix Reduces Heating Oil Constituents to Below Detectable Limits

PetroFix successfully remediated the fuel oil contaminant spill and the site achieved regulatory closure

After three quarters of sampling the contaminants are below groundwater exceedance levels and are within Method 1 standards for groundwater

Combined remedial approach included excavation and PetroFix injection

At a residential site in northwestern Massachusetts, 200 gallons of home heating fuel oil leaked due to a damaged fuel line. The heating oil percolated into the soil and affected the groundwater, located approximately 9.5 feet below ground surface (bgs). Initial excavation was advanced on the exterior and test borings were advanced through the concrete floor in the interior of the structure. Based on field screening, it appeared that the fuel affected a vertical column of soil approximately three feet in radius at the surface widening at depth to approximately ten feet in radius at the groundwater table. Granular material at the groundwater table was a pathway for some horizontal migration of the fuel oil along the groundwater table to the east. During the excavation, all impacted soil was removed and the area backfilled with stone and piping to form a leaching gallery. A vapor barrier and concrete slab were also installed. Assessments showed that the on site drinking water well was not impacted despite being located within 10 feet upgradient of the impacted area. However, the tenant was supplied with bottled water as a contingency.

After the excavation, WjF GeoConsultants created a remedial plan for the impacted groundwater which employed PetroFix Activated Carbon to treat the remaining petroleum hydrocarbons. PetroFix is an affordable and effective technology which removes hydrocarbons from the dissolved phase and then stimulates hydrocarbon biodegradation by adding electron acceptors. In October 2018, WjF applied 800 lbs of PetroFix Remedial Solution. Following the application, WjF conducted three quarters of sampling which indicated that the contaminants were below groundwater exceedance levels and were within Method 1 Standards for groundwater. Following the third sampling event, the site received regulatory closure from the state.

## Background

# Uniquely Challenging Site Conditions

The site is currently a single-family residence and has been a residential site for approximately 30 years. In the 1930's the site was a tavern and also sold gasoline. It is believed that gas tanks were once located in front of the building and were subsequently removed. Sampling was conducted to determine if the contaminant release included gasoline but only virgin fuel oil was present. The fuel oil was released from a leaking sub-slab fuel line from an above ground storage tank located in the back exterior of the structure. The leak was discovered due to a loss of heat at the residence.

The fuel oil percolated into the soil and into the groundwater table. The building has a drinking water well located within the structure and an on-site subsurface disposal works. Assessments showed no impact to the drinking water. However, the tenant was supplied with bottled water as a contingency. The boiler room was emptied of its contents, which were being housed in a portable shelter located at the site. Temporary walls and poly sheeting were erected within the structure to mitigate migration of volatiles into the indoor air of the residence from the utility room during remediation.

The drinking water well was again sampled and trace levels of a fuel oil constituent were observed, namely naphthalene. However, the detections are significantly below drinking water and cleanup standards and was not indicated as present in any of the follow-up sampling events which occurred on a monthly basis.

> ***"Following three quarters of sampling, contaminants are below groundwater exceedance levels, are within Method 1 Standards for groundwater, and the site has achieved regulatory closure."***


## Timeline

# PetroFix Provides a Cost-Effective Approach to Treat Heating Oil Constituents to Below Detectable Limits

### October 2018

WjF applied PetroFix Activated Carbon

### October 2018

Post-injection groundwater sampling

### January 2019

Post-injection groundwater sampling

### April 2019

Post-injection groundwater sampling

### June 2019

Site achieves regulatory closure

## Treatment

# Successful Application of PetroFix Results in Site Reaching Regulatory Closure

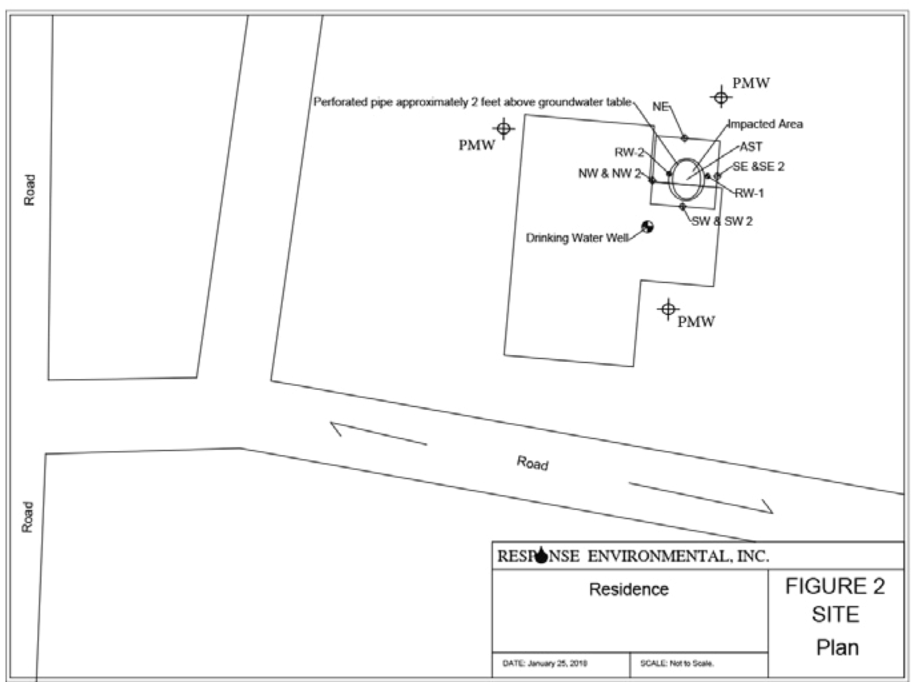
## Treatment Process

**800** Pounds of PetroFix

**720** Gallons of Water

In October 2018 WjF applied PetroFix Activated Carbon. The solution consisted of 82 gallons (800 lbs) of PetroFix and 720 gallons of water. This was applied via two previously installed application ports identified as RW-1 and RW-2. Each of the application ports are connected to a loop of 4-inch diameter perforated piping that were previously set in a bed of crushed stone during the November 2017 backfilling activities. The ports are located at depths of approximately seven feet and nine feet below surface grade. WjF applied the PetroFix solution in 50 gallon batches, alternating between the two application ports. They initially pumped 25-30 gallons of the solution under a low-flow rate into each application port and then shut off the pump to allow the remainder of the solution to gravity feed into the application port.

*Site plan depicting locations of application ports, drinking water well, and extent of impacted area*

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## Technology Used

# PetroFix Remediation Fluid

PetroFix Remediation Fluid is a concentrated, water-based, activated carbon suspension specifically designed to remediate petroleum spills and provide immediate results for gas station and UST sites. Safe, fast, effective, and easy-to-apply, PetroFix is designed to first remove hydrocarbons from the dissolved phase by adsorbing them onto activated carbon particles and then stimulating hydrocarbon biodegradation by adding electron acceptors. PetroFix offers an *in situ* remediation approach designed specifically for sites where PHC levels are above regulatory standards for complete remediation at the lowest total cost-to-closure. This safe and effective technology is paired with the PetroFix Design Assistant, an online design tool that enables users to individually tailor their site designs and self-apply PetroFix.

### Key Benefits:

- Affordable and reliable
- Applied under low pressure
- Tailored site design
- Simple online design assistant

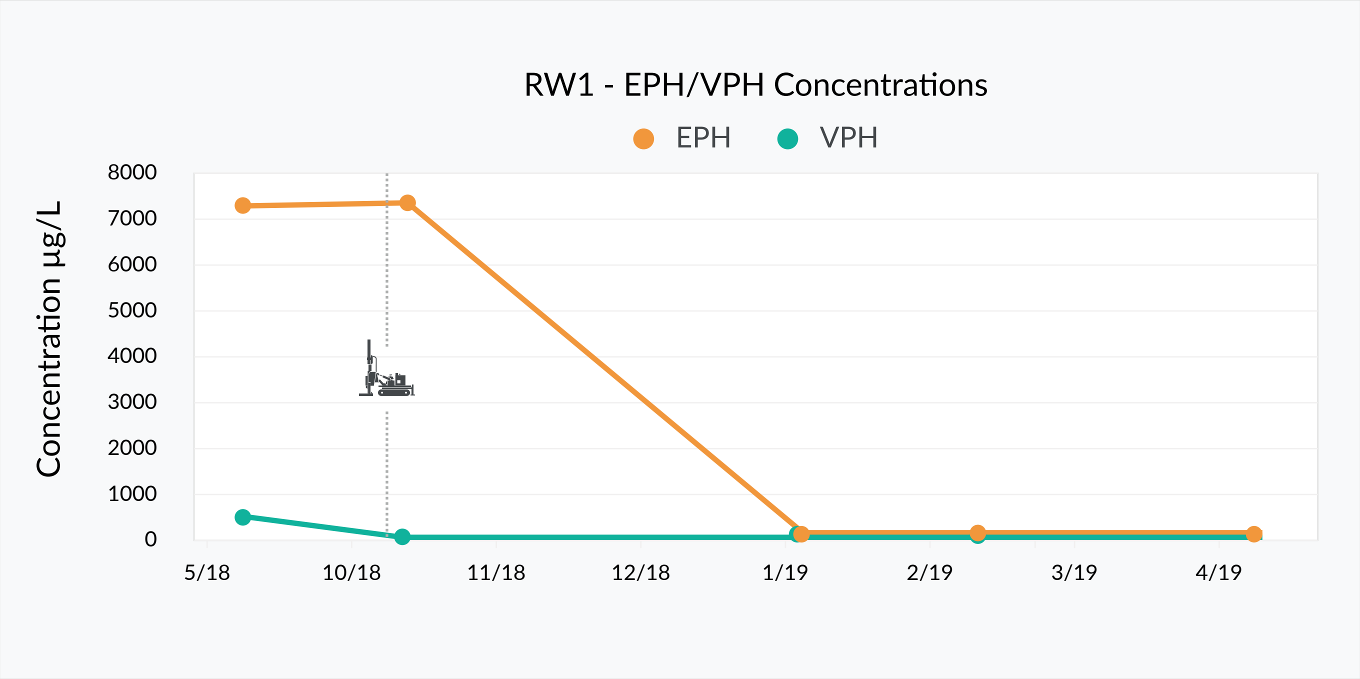

## Results

# Following Three Rounds of Quarterly Sampling, Site Achieves Regulatory Closure

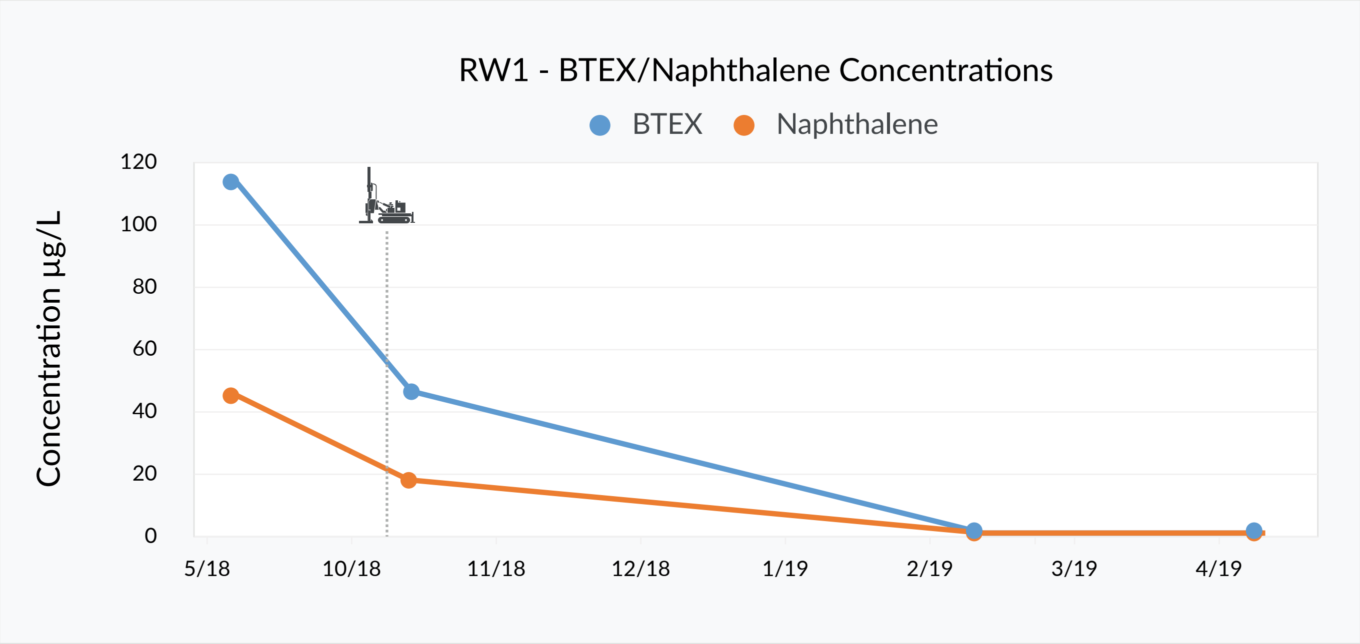
Following the injection, WjF has conducted three rounds of post-injection quarterly sampling. The groundwater was sampled using low-flow sampling techniques pre-injection in July of 2018 and post-injection in October, 2018, January 2019, and April 2019.

The results of the October 2018 groundwater sampling indicated that elevated levels of fuel oil constituents were still present; however, during the sampling event a significant amount of suspended solids were observed in the groundwater due to the remedial additives. Therefore, select wells were resampled, filtered to remove these solids, and submitted for analysis of dissolved fractions.

Subsequent laboratory analysis results indicate that contaminants of concern have been reduced to below detection limits and Method 1 standards at the site for three quarters following the application of PetroFix. As a result, the site achieved closure following the third sampling event.




*Graph indicates reduction of extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH) to below detection limits following the application of PetroFix*




*Graph indicates Oct. 2018 sampling event and subsequent reduction of BTEX and Naphthalene to below detection limits by Jan. 2019 and have remained below detection limits through three quarters*

## The Consultant

# About WjF GeoConsultants, Inc.

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WjF GeoConsultants, Inc. is a locally owned and operated small business and offers environmental consulting and site development services to its clients throughout Massachusetts, from the Berkshires to Cape Cod and the Islands. Their clients include homeowners, developers, environmental consultants, general contractors, attorneys, realtors, lending institutions, municipalities, and commercial businesses. WjF provides practical solutions at competitive prices to meet the needs of a diverse group of clients.

# About William J. Fabbri

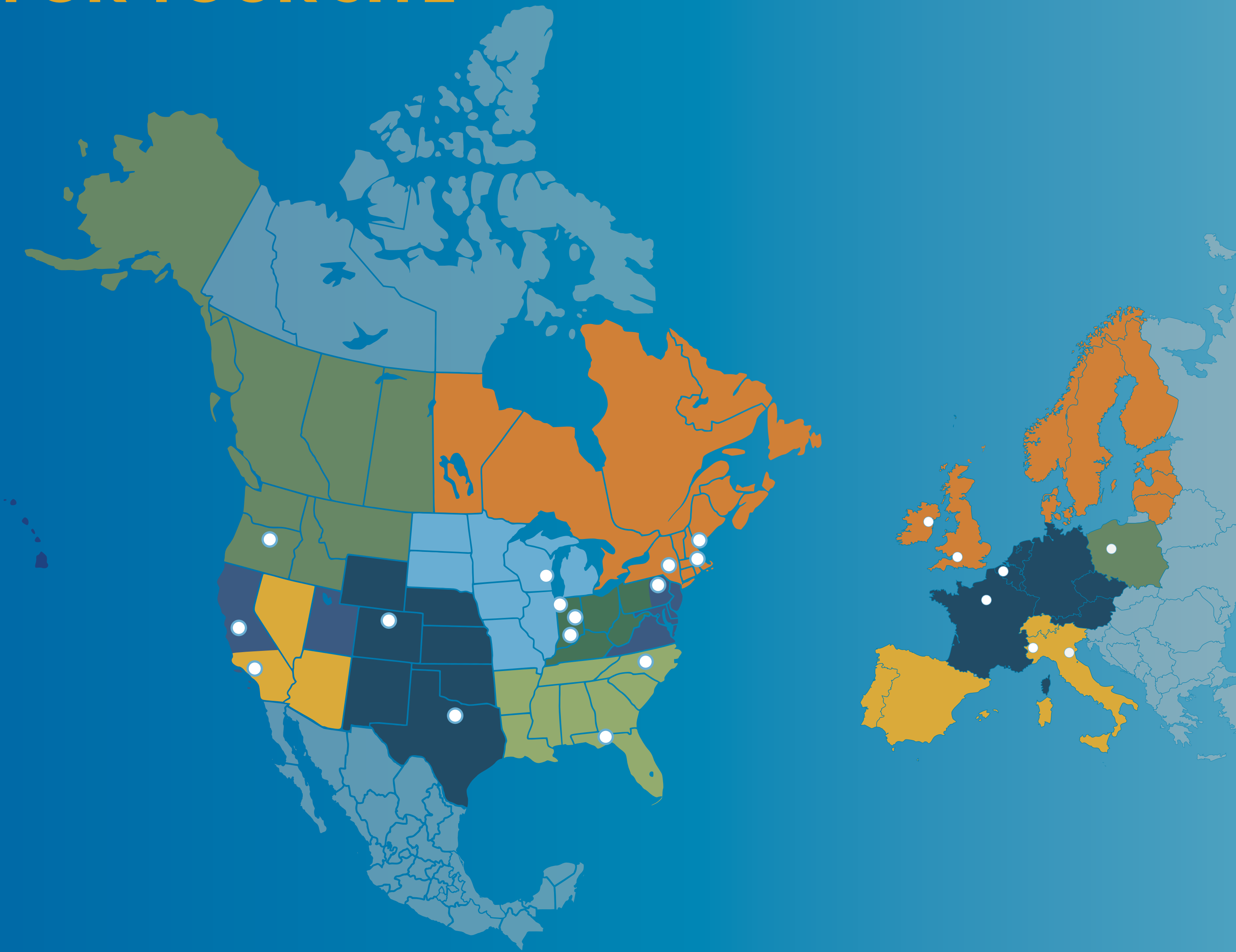
***William J. Fabbri, President***
***WjF GeoConsultants, Inc.***

Mr. Fabbri is a Licensed Site Professional (LSP) / Principal Hydrogeologist and President of WjF GeoConsultants, Inc. (WjF) in Wilbraham, Massachusetts. As LSP, Mr. Fabbri is responsible for technical and regulatory oversight (LSP-of-Record) for environmental assessments and remedial investigations at disposal sites that include commercial, industrial and residential properties throughout Massachusetts.

Mr. Fabbri has more than 30 years of experience in the environmental field conducting and providing oversight of comprehensive hydrogeologic studies, contaminant assessments, and soil and groundwater remedial actions throughout New England and New Jersey. His technical expertise includes characterization of subsurface contaminant migration, aquifer test analysis and evaluation, developing cost-effective remedial strategies and solutions that will lead to regulatory closure, and conducting inspections at Massachusetts Landfills.

# WE'RE READY TO HELP YOU

## FIND THE RIGHT SOLUTION FOR YOUR SITE

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