REGENESIS®

# Stopping PFAS at The Source

## Focused PFAS Source Zone Treatment With SourceStop

SourceStop®

## Stopping PFAS at the Source

SourceStop® is a highly effective treatment for PFAS-contaminated soil and groundwater in source areas. It works by preventing the leaching of soil contamination and halting the migration of PFAS in groundwater, eliminating the risk to downgradient receptors.

Available in solid and liquid forms, SourceStop offers a highly adaptable solution that can be customized to accommodate a wide range of site conditions and application-specific needs. SourceStop is applied to the soil vadose zone, capillary fringe, and groundwater to immobilize PFAS at their original point of release.  SourceStop's unique formulation contains our patented colloidal activated carbon (CAC) technology, which achieves unsurpassed distribution in a targeted treatment zone by penetrating and permanently coating impacted soils in PFAS source zones.

SourceStop treatment can be combined with downgradient PlumeStop barriers to immediately halt the migration of PFAS plumes. Together, SourceStop and PlumeStop offer the world's first full-spectrum solution to remediate the PFAS source-plume system in soil and groundwater.

# Benefits

## Rapid Results

Immediately reduces PFAS leaching from source zone soils and contaminant influx into the groundwater plume, through superior distribution, penetration and sorption, using colloidal activated carbon technology.

## Long Lasting

Sustained treatment minimizes PFAS exposure risk over the long term.

## Low Cost

Remedies can be implemented at a fraction of the cost of alternatives like soil excavation and removal, resulting in dramatic project cost savings.

## Highly Flexible

Flexible approaches are employed to provide the most cost-effective solution tailored for each site. Materials are applied using a range of direct mixing or injection methods.

## Sustainable with No Hazardous Waste Streams Generated

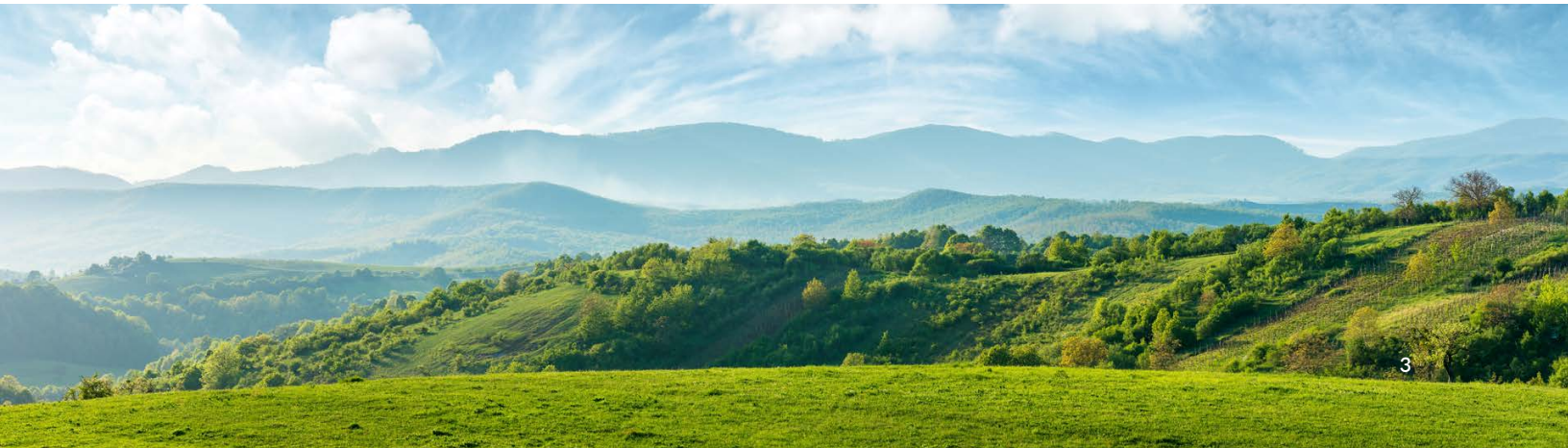
Treatments are sustainable, avoiding the generation of hazardous waste streams, energy consumption, and emissions.

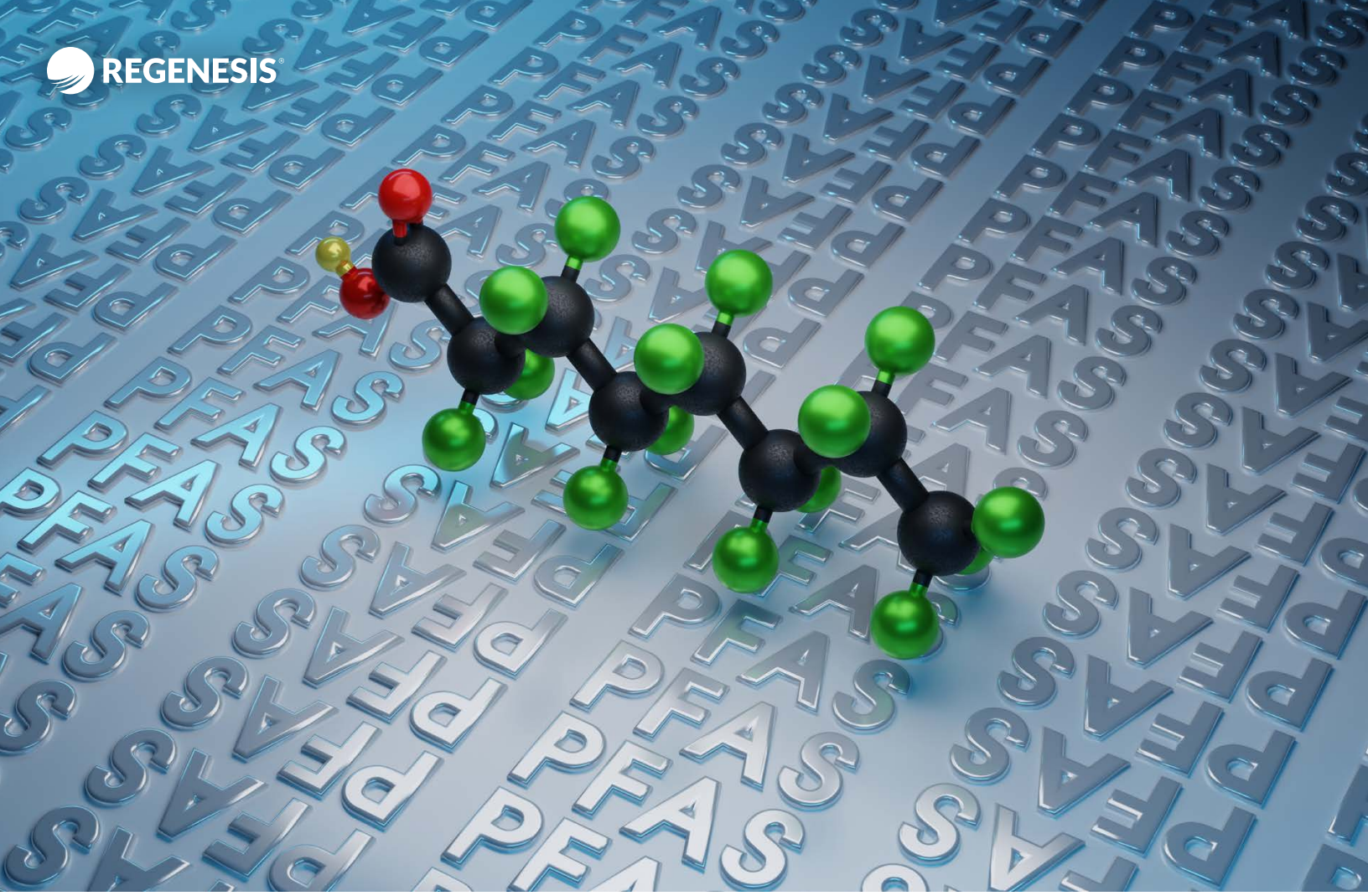
## Combining with PlumeStop Plume Treatments offers Full Spectrum, Permanent Risk-Reduction Solution

In many cases, a single treatment program can permanently immobilize PFAS and reduce exposure risk and liabilities.

## Backed by PlumeShield Warranty Program

REGENESIS PFAS source zone remedies can be combined with PlumeStop permeable reactive barriers to cut off the plume and provide rapid offsite risk removal. Treatment performance warranty options are available through the PlumeShield warranty program.






# Background

## Efficient Remediation of the Source-Plume System Eliminates Exposure Risk

**57,000+**

Estimated number of PFAS contaminated sites in the US

It is estimated that 57,000 PFAS-contaminated sites exist in the US alone with tens of thousands more throughout the world, each containing a source area where the contaminants were originally released into the environment. These source areas contain high concentrations of PFAS in the shallow soils which often migrate vertically into groundwater, contributing to the development of groundwater plumes.

Due to PFAS' persistence, mobility, and parts-per-trillion clean-up levels, these soil source areas can lead to the development of large PFAS groundwater plumes and sustain them for many decades, leading to impacts on public and private water systems, surface waters, and other receptors. Effectively remediating these source areas must address the entire vertical column where PFAS may be distributed, including the soil vadose zone, capillary fringe, and groundwater.

## Mitigating PFAS Source Zones is Key to Minimizing PFAS Exposure Risk

PFAS has been used in manufacturing and firefighting efforts for decades, resulting in potentially hundreds of thousands of PFAS release areas worldwide, where high levels of PAS in soil and groundwater reside as long-term sources of groundwater contamination. These source areas include aqueous film-forming foams (i.e., AFFF) fire training sites, PFAS bulk chemical spill locations, Class B Firefighting System testing pads, oil and gas development sites, and metal-fume-suppression stations, to name a few.

When left untreated, they can lead to extensive and persistent PFAS-contaminated groundwater plumes, posing unacceptable risks to human health and the environment.

PFAS' persistence and mobility allow them to travel far and wide in groundwater, resulting in plumes extending over long distances (i.e., miles/ kilometers) and persisting over long timeframes (i.e., decades) if left untreated. Where possible, identifying PFAS source areas and quickly remediating them is essential for mitigating and effectively reducing long-term PFAS exposure risks and liabilities.


# PFAS Source Zone Remedial Applications

## Flexible Treatment Options Tailored for Each Site

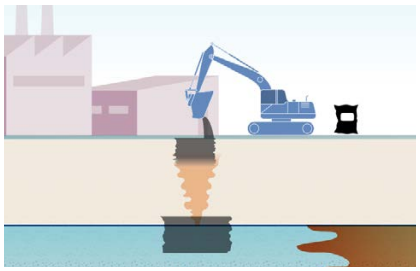
SourceStop is available in solid and liquid forms to allow specific engineered remedies appropriate to impacted soil and groundwater media within the source area. Due to this application flexibility, SourceStop allows a targeted and holistic approach to the different media of concern within a PFAS source zone, accommodating the different elements of a PFAS plume risk mitigation strategy.

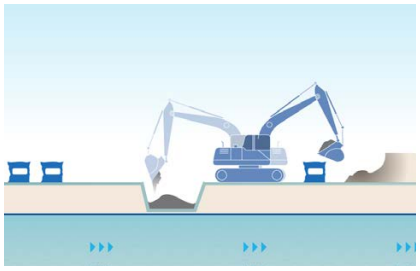
SourceStop liquid and solid formats can be used independently, in combination, or with downgradient plume treatment to provide a complete, integrated, low-cost, zero-waste solution for PFAS sites.

SourceStop Solid


SourceStop Liquid

## SourceStop Solid Formula for Immobilizing PFAS in The Soil Vadose Zone



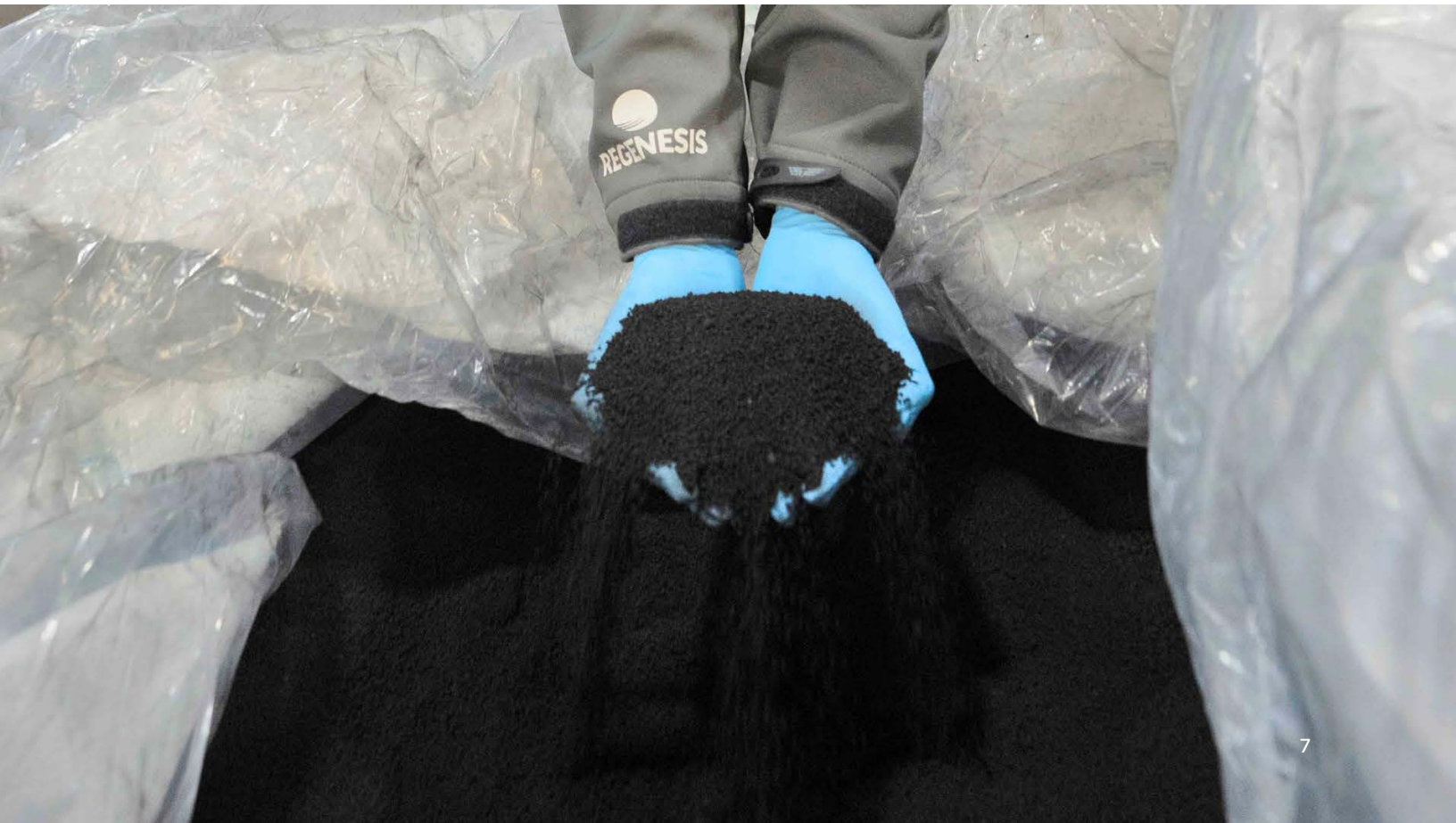


SourceStop Solid formula can be applied at the source area using various application techniques, including hydraulic rotary mixing tools, surface discing/ rototilling, and excavate-mix-and-replace methods.

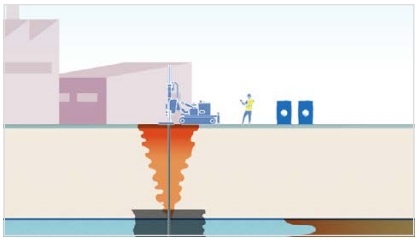
The SourceStop solid formula contains a composite aggregate material of the CAC technology and powdered activated carbon. The conglomerated particles are approximately 0.5-2mm in size and can be mechanically broadcast and distributed into soils with conventional yellow-iron-type equipment. The solid format generates minimal dust during the physical mixing process, making it safe and easy to handle and preventing nuisance dust issues.

When the SourceStop solid particles come in contact with water, they dissolve to release the colloidal activated carbon. This process enhances the distribution through improved contact, further coating the soil with a thin activated carbon layer and minimizing application time. Due to the tiny particle size, the colloidal activated carbon will penetrate low-permeability soils not already influenced by the physical distribution process.

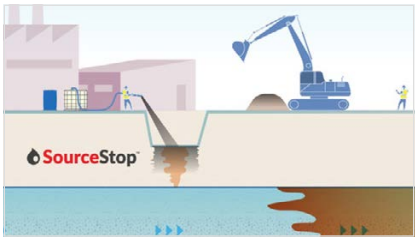
When mixed into PFAS-impacted source soils, whether in the subsurface or a stockpile, SourceStop will rapidly reduce leachability, resulting in the sequestration of PFAS contamination. The discharge of PFAS into the groundwater is prevented, allowing attenuation of the downgradient plume. Using SourceStop allows the impacted soil to be managed in place and retained on-site, avoiding costly transportation and disposal.



## SourceStop Liquid Formula for Treating the Capillary Fringe, Source Area Groundwater, and Other PFAS-Leaching Scenarios



SourceStop Liquid formula applied to the capillary fringe and groundwater at the source area using direct-push injection methods.




SourceStop Liquid formula is applied to soils at the base of an excavation as a horizontal barrier layer to prevent PFAS leaching.

SourceStop liquid is composed of fine particles of colloidal activated carbon, 1 to 2 microns in size, suspended in water. The tiny particle size and liquid makeup allow SourceStop to penetrate and evenly coat the target soil particles with a thin layer of activated carbon, to which PFAS is rapidly adsorbed.

SourceStop Liquid is engineered to target the capillary fringe and groundwater within source areas. Direct injection of SourceStop Liquid into the capillary fringe will coat the soils within this zone with the SourceStop particles. Any PFAS contaminant mass will, in turn, sorb to the SourceStop, preventing further discharge into the groundwater. When injected directly into a contaminated aquifer or water-bearing zone beneath a source area, SourceStop will distribute and permanently coat the aquifer matrix (e.g. sand and silt grains, fracture surfaces, etc). Once in place, the SourceStop particles adsorb PFAS contamination, removing it from the dissolved phase, thereby eliminating further PFAS mass flux within the aquifer zone.

Other uses of SourceStop liquid include spray applications onto surfaces to create horizontal permeable barriers when preparing soil stockpile areas, excavation bases, or service runs to minimize the further spread of PFAS contamination and prevent cross-contamination of backfill.

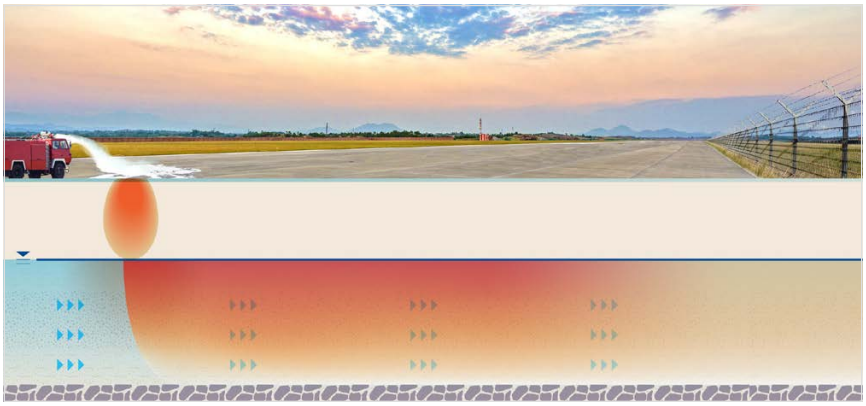
# Combined Treatment Offers a Full-Spectrum and Permanent PFAS Risk Reduction Solution

SourceStop and PlumeStop together cover the entire spectrum of contaminated soil and groundwater media across the whole plume system from the source to the leading edge, offering a broad range of PFAS remediation solutions to fit almost any site-specific scenario.

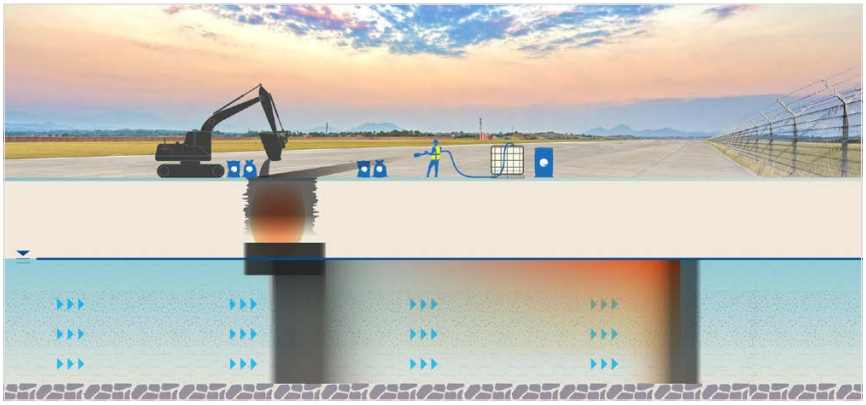
| | |
|---|---|
| Media Treated | Vadose soils, capillary fringe, and groundwater |
| Plume Areas Treated | Source area, plume body, downgradient plume edge |
| Application Methods Used | Injections points/wells, direct mixing, spray-applied barriers, recovery trenches, etc. |

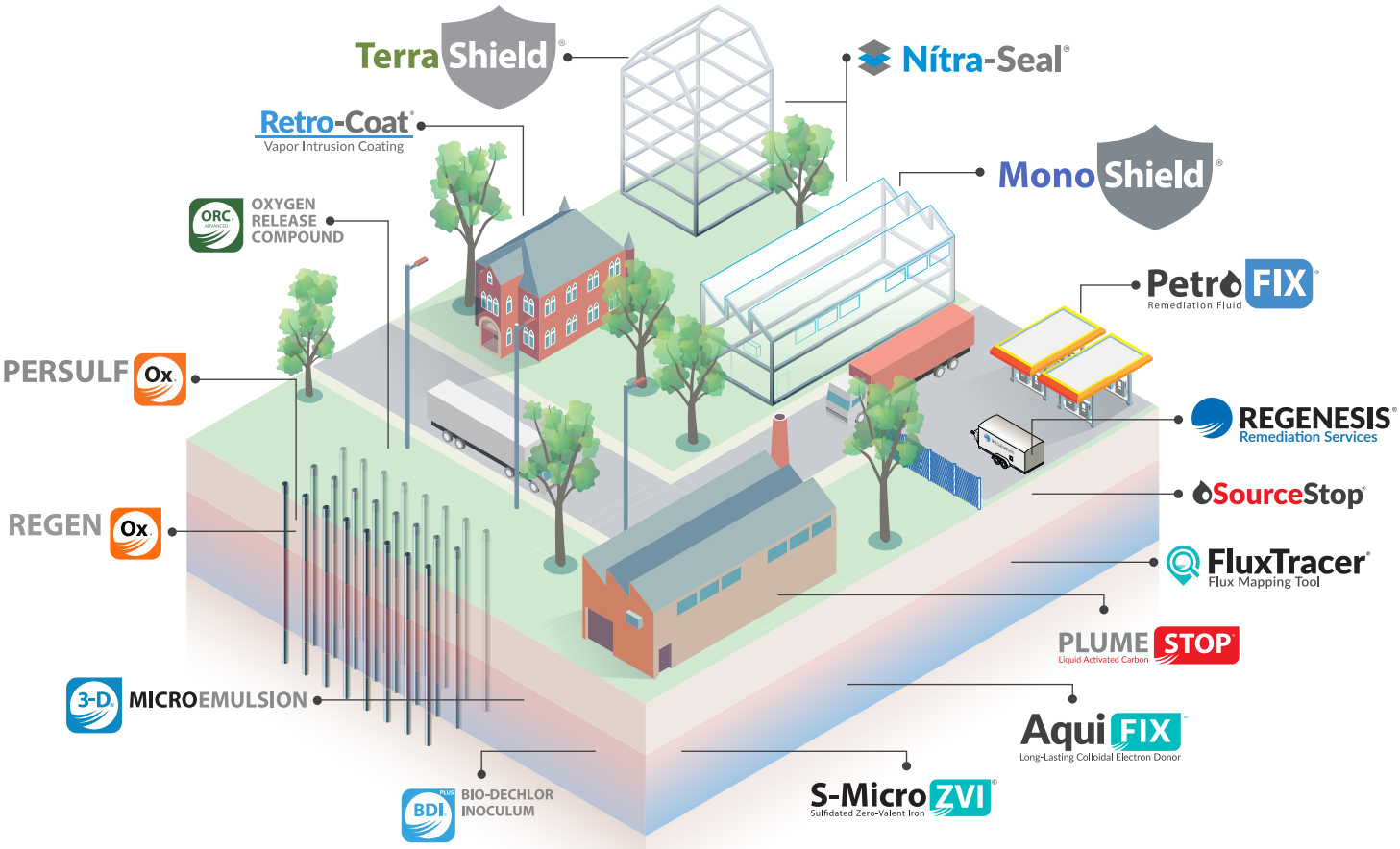
Combining these technologies for remediating a source-plume system offers a low-cost, zero-waste, low-carbon footprint remediation solution for PFAS sites.

**Aqueous film-fighting foams (AFFF)** containing PFAS are sprayed onto an airport runway, causing a PFAS plume to develop in groundwater.



**SourceStop is applied into the soils, capillary fringe and groundwater** beneath the release source and PlumeStop is injected near the leading plume edge to cut off further PFAS migration in groundwater. The combined system can be effective solution to permanently mitigate the risk of PFAS exposure to downgradient receptors.






# About REGENESIS

At REGENESIS we value innovation, technology, expertise and people which together form the unique framework we operate in as an organization. We see innovation and technology as inseparably linked with one being born out of the other.

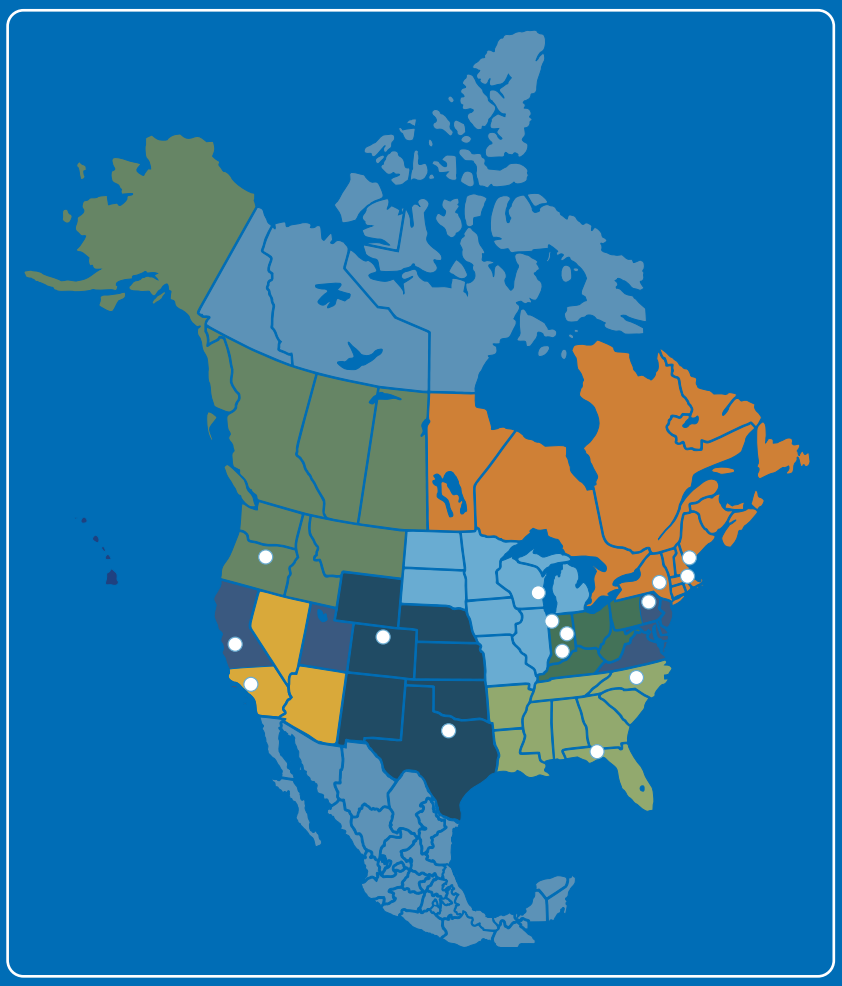
Inherently, innovation imparts new and better ways of thinking and doing. For us, this means delivering expert environmental solutions in the form of the most advanced and effective technologies and services available today.

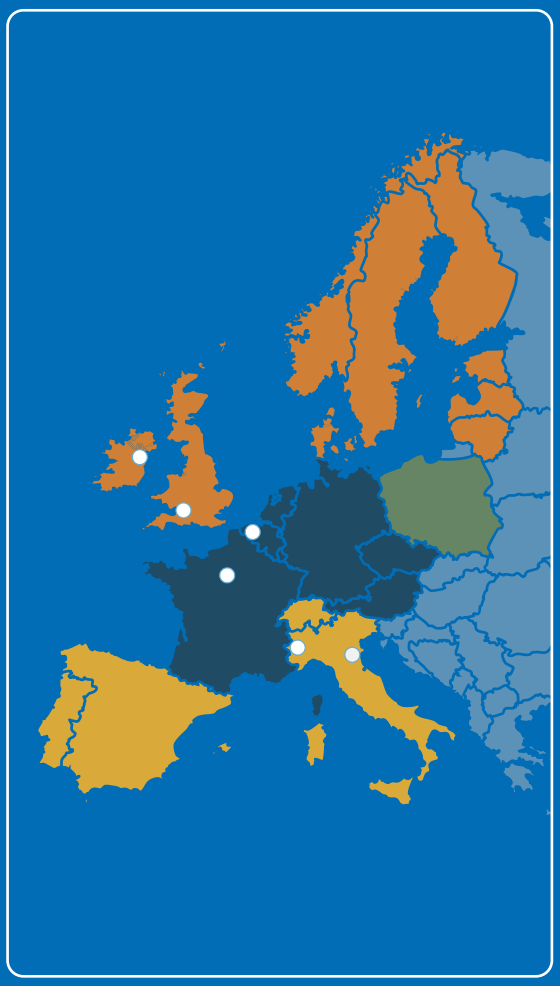
We value expertise, both our customers' and our own. We find that when our experienced staff collaborates directly with customers on complex problems, there is a high potential for success including savings in time, resources and cost.

At REGENESIS we are driven by a strong sense of responsibility to the people charged with managing the complex environmental problems we encounter and to the people involved in developing and implementing our technology-based solutions. We are committed to investing in lasting relationships by taking time to understand the people we work with and their circumstances. We believe this is a key factor in achieving successful project outcomes.

We believe that by acting under this set of values, we can work with our customers to achieve a cleaner, healthier, and more prosperous world.

# We're Ready to Help You Find the Right Solution for Your Site






## Global Headquarters

1011 Calle Sombra
San Clemente, CA 92673 USA

Ph: (949) 366-8000
Fax: (949) 366-8090

## Europe

Bath, United Kingdom
Ph: +44 (0) 1225 61 81 61

Dublin, Ireland
Ph: +353 (0) 9059 663

Torino, Italia
Ph: +39 338 8717925

Ieper, België
Ph: +32 (0) 57 35 97 28

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www.REGENESIS.com