



Technology-Based Solutions For The Environment

Over 26,000 Projects in 26 Countries Worldwide

High Degree of Certainty Guaranteed

REGENESIS® provides a range of specialized remediation products and services which include treatment technology selection, application design, on-site services, data interpretation and performance reviews. Environmental consultants, engineers and remediation professionals like you trust REGENESIS to produce results knowing our expertise and industry knowledge has been proven time and again at the job site.

Science-Based Remediation Solutions

Our patented environmental remediation technologies are supported by the highest level of scientific research and are most often based on direct customer need, optimal technology performance and overall cost-effectiveness.





Trusted Turn-Key Solutions

We offer a diverse suite of technologies in the classes of enhanced bioremediation, *in situ* chemical oxidation, *in situ* chemical reduction, enhanced sorption and vapor intrusion mitigation. Clients choose REGENESIS Remediation Services (RRS) for implementation of *in situ* remedies to ensure guaranteed results. RRS is a dedicated partner, in providing a high level of certainty regarding site application, meeting remedial objectives and health and safety standards on the job site.

Success Across the Globe

REGENESIS products and services have been used on over 26,000 projects worldwide. With visibility on 1,000's of projects annually, REGENESIS has exposure to a wide spectrum of sites. Trust REGENESIS to be your remediation resource on your next project.

Research-Based Products and Services

REGENESIS consistently leads the industry, introducing new remediation technologies that deliver guaranteed results.



Research and Development

Our team of scientists are focused on developing ground-breaking remediation products offering certainty while saving time and money



Treatability Testing

Supporting projects in the lab to benefit performance in the field including SOD, TOD, and ISCO testing



On-Site Application

Turn-key application services provide one point of contact for skilled on-site application, resulting in minimized risk and guaranteed performance



Value-Added Remediation Services

Comprehensive suite of remediation technologies and solutions lead the industry with proven results



Research and Development

As a leader in remediation, REGENESIS Research and Development (R&D) continues to play an integral role in introducing ground-breaking technologies that shape the future of remediation solutions. From new idea, to proof of concept, and throughout field-testing and technology commercialization, our R&D process consistently introduces new products to the remediation market that reduce cost and time to project closure.

REGENESIS works with environmental professionals, who play a critical role in our R&D process. Environmental consultant clients provide valuable feedback on products being developed and assist in field testing for new technologies. The result is an alignment of scientific research and real-world testing to ensure a greater understanding of our product performance in the field and methods to improve results.

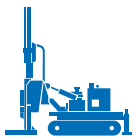


Treatability Testing

Our state-of-the-art REGENESIS laboratory offers an array of services to support soil and groundwater remediation projects. Staffed by experienced environmental chemists, scientists, and engineers, it is outfitted with the latest analytical instrumentation including: Gas Chromatography Mass Spectrometry (GCMS), liquid chromatography, UV-visible spectroscopy, aquifer simulation vessels, media columns and related test equipment.

Commercial Lab Services Include:

- ➔ Oxidant demand testing (SOD & TOD) for *in situ* chemical oxidation (ISCO) reagents. These parameters are useful inputs for ISCO site application designs.
- ➔ Treatability testing simulate the destruction of contaminants at the laboratory scale and is also used to validate technology to treat contaminated soil and groundwater at a particular site.



On-Site Application: Minimize Risk with Guaranteed Performance

The primary role of REGENESIS Remediation Services (RRS) is to ensure success while minimizing risks associated with managing soil and groundwater remediation projects.

RRS is staffed with a uniquely qualified team of engineers and scientists, who provide one point of contact dedicated to delivering specialized remediation planning, design, verification and application services to environmental consultants and engineers. Safety is paramount to our operations and an integral part of our services. By delivering exceptional service, backed by years of expert field knowledge, our team can guarantee certainty on the jobsite.

- ➔ One point of contact simplifies the process and allows for guaranteed performance
- ➔ State-of-the-art dosing and monitoring equipment verifies results
- ➔ High resolution site characterization delivers the best subsurface analyses possible



REGENESIS Value-Added Services

REGENESIS has a history of developing innovative remediation technologies that have been successfully applied worldwide. Spanning 26 countries and over 21,000 projects, our experience and geographic footprint, along with our services-based approach, allow our team to see more sites than any other remediation service provider in the industry. A broad range of technologies enables us to provide you with a true and fair assessment of what's required without a technology bias. From *in situ* chemical oxidation to vapor intrusion mitigation, we have a solution that will fit your site requirements. Our main focus remains locked on providing proven turn-key remediation designs, assuring reagent distribution and achieving your remediation objectives.

Value-Added Services Include:

- ➔ Fair and true remediation solution assessments
- ➔ Treatment technology selection
- ➔ Application design
- ➔ On-site services
- ➔ Regulatory support
- ➔ Data interpretation
- ➔ Performance reviews

Our Solutions

Colloidal Activated Carbon

- 95% contaminant reduction within 60 days
- Rapid reduction to MCLs within 90 days
- Effective on Per- and Polyfluoroalkyl Substances (PFAS), hydrocarbons, halogenated compounds and a wide variety of Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs)

Zero Valent Iron

- Micron-scale, zero-valent iron suspended in a colloidal solution allows for easy handling and application on-site
- Outperforms commodity iron 30-40 times
- Creates an anoxic and highly reductive environment

Enhanced Bioremediation

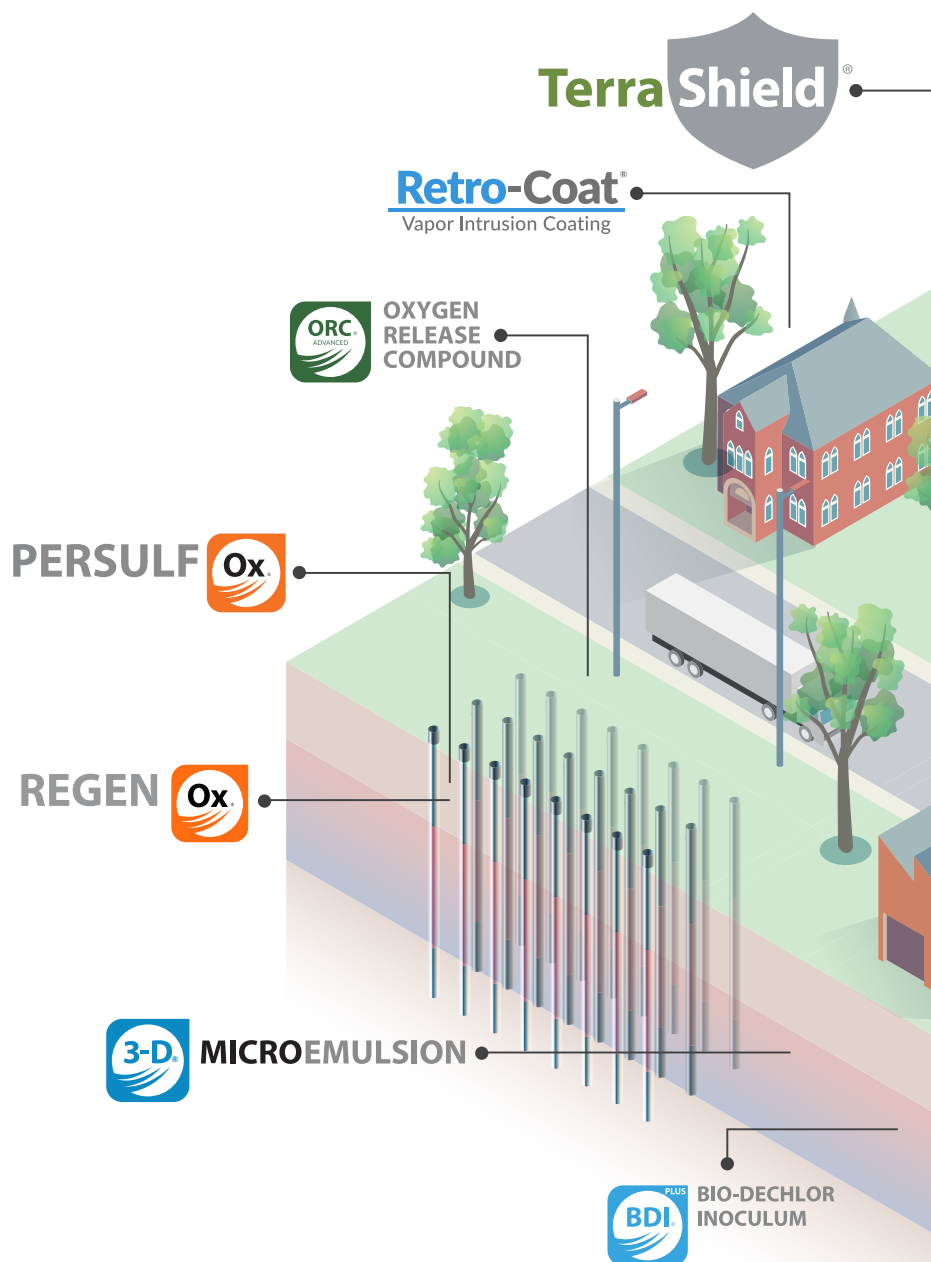
- Used to stimulate the natural degradation of contaminants *in situ*
- Cost-effective way of achieving low groundwater standards over time

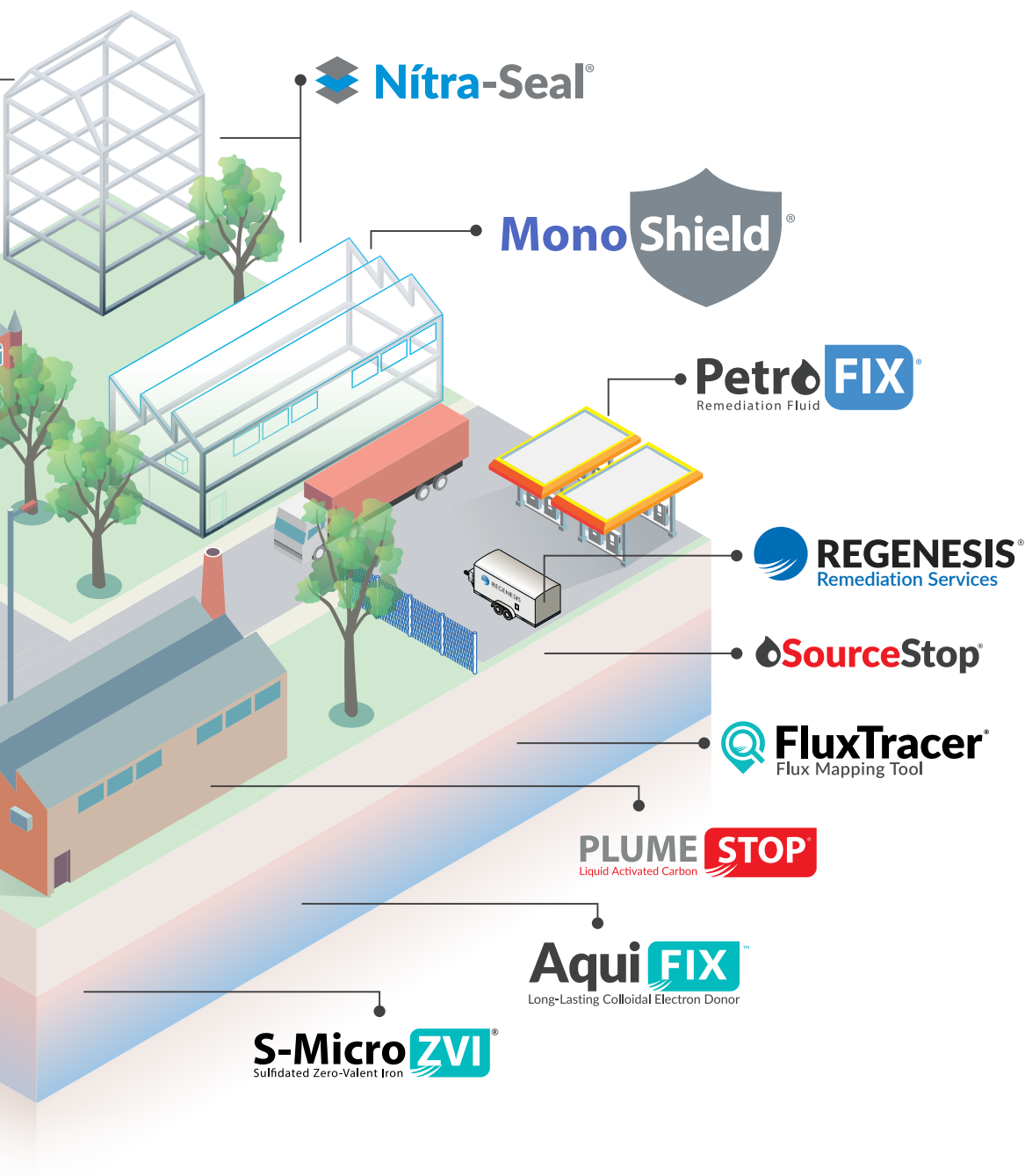
In Situ Chemical Oxidation/Reduction

- Cost-effective way to achieve rapid contaminant mass reduction in source areas

Vapor Intrusion Mitigation

- Solutions that protect people and invigorate renewal of contaminated properties





Aerobic Bioremediation

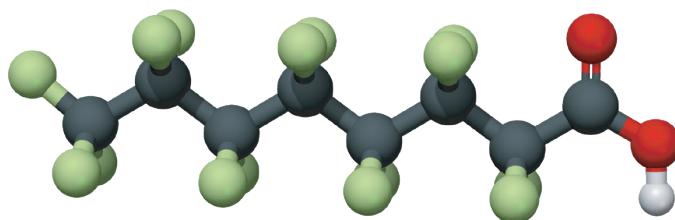
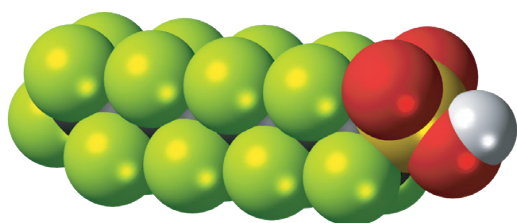
- Biological degradation microbes utilize oxygen to break down contaminants
- Treats moderate to low concentrations of petroleum hydrocarbons and other compounds including MTBE
- Treatment takes place over 6-12 months

Anaerobic Bioremediation

- Biological degradation microbes metabolize contaminants to survive and grow
- Treats high to low concentrations of chlorinated VOCs, pesticides, explosives, hexavalent chromium

Eliminating Risk of PFAS

PFOA and PFOS are the two most commonly encountered examples of Per- and Polyfluoroalkyl Substances (PFAS). PFOA and PFOS are abbreviations for the chemicals “perfluorooctanoic acid” (PFOA) and “perfluorooctanesulfonic acid” (PFOS).



PLUME STOP[®]

Liquid Activated Carbon

PlumeStop is a technology that utilizes activated carbon finely milled to the size of a red blood cell and suspended in a colloidal fluid to be injected under low pressure into the subsurface.

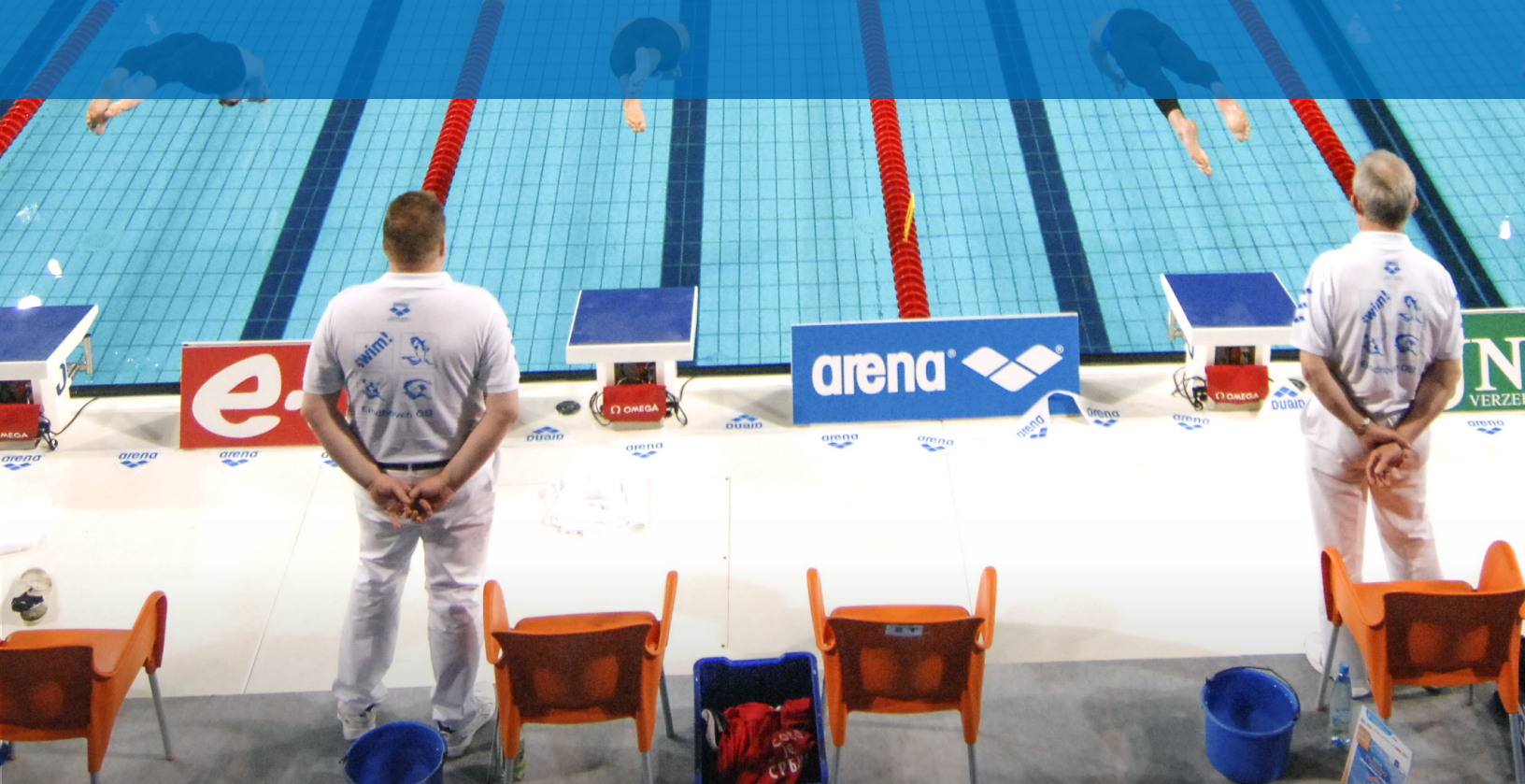
Once there, PlumeStop converts contaminated aquifers into purifying filters, trapping contaminants and allowing groundwater to flow undisturbed.

PFAS are an extremely difficult class of contaminants to manage because the EPA regulatory guidelines for PFOS and PFOA compounds are low, currently set at 70 parts per trillion, which is comparable to 3 small drops in an Olympic-sized swimming pool. In addition, PFAS compounds are a large, diverse groups of chemicals used in many industrial and household products, and are extremely stable in the environment, thus adding to the complexity of testing and treating these contaminants.

REGENESIS developed a new colloidal activated carbon technology called PlumeStop. This technology utilizes activated carbon finely milled to $>2\mu\text{m}$ (the size of a red blood cell) and suspended in a colloidal fluid to be injected under low pressure into the subsurface. The carbon particles disperse and diffuse, and then adhere to the surface of soil particles, converting contaminated aquifers into purifying filters. The PFAS contamination present in the groundwater is tightly adsorbed onto the PlumeStop in the subsurface, removing it from the groundwater and eliminating the downgradient risk to the region.



70 parts per trillion = 3 drops in
an olympic size swimming pool



First Demonstrated *In Situ* Treatment Solution for PFOA/PFOS at Former Industrial Site



Challenge:

In addition to requiring treatment for petroleum hydrocarbons, this site was also impacted by perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and other PFAS contaminants. The remediation goal was to treat the contamination *in situ* and to limit further contaminant migration.

Solution:



Results:

A single application of PlumeStop resulted in a significant reduction of petroleum hydrocarbon contamination concentrations to below standards for over 18 months since injection. Modeling indicates that the PlumeStop application event should keep the PFAS contained within the source area for upwards of 100 years.

Innovative PetroFix Beta-Test at Petroleum Bulk Storage Site Cleans up PHCs



Challenge:

At a former petroleum bulk storage facility, groundwater was contaminated with dissolved-phase petroleum caused by leaking storage tanks. A beta test of PetroFix was chosen as the treatment because PetroFix is designed specifically for sites where PHC levels are above regulatory standards and provides complete remediation at the lowest total cost to closure.

Solution:



Results:

At one month post injection, the results show that the petroleum VOCs and gasoline-range organics were essentially eliminated from the groundwater and remain so at 3 months post injection. Additionally, the nitrate and sulfate injected with PetroFix created a more favorable environment for anaerobic petroleum degraders. These promising results indicate PetroFix to be a viable remedial option for a full-scale PetroFix application.

Former Michigan Industrial Site Treated Using a Combined-Remedy Approach



Challenge:

A former plating facility in Southwest Michigan released CVOCs into the groundwater resulting in a ¼-mile-long contaminant plume. The plume extended beneath a residential neighborhood and discharged into the Paw Paw River. A successful pilot test of 3DME led the Michigan Department of Environmental Quality (MDEQ) to proceed with a full-scale application.

Solution:



Results:

A multi-stage groundwater remedy was implemented to address the groundwater CVOC plume. The design allowed for the mobility and persistence of 3DME to be harnessed by utilizing the natural groundwater gradient in a fast-moving aquifer. PlumeStop was used as a final polishing treatment to address the residual low levels of CVOCs not treated with 3DME. After the combined remedy treatment, the CVOC plume had been eliminated.

Closure Achieved with Cost-Effective Vapor Intrusion Solution



Challenge:

CVOC's migrated from a nearby dry cleaning operation and caused harmful vapor intrusion at a Renton, Washington property. Concentrations of tetrachloroethylene (PCE) and carbon tetrachloride exceeded the regulatory levels of indoor air quality within the 7,300-square-foot space.

Solution:

Retro-Coat®
Vapor Intrusion Coating

Results:

RetroCoat Vapor Intrusion Coating System was chosen as the solution to the harmful vapor intrusion and was able to be completed at nearly one-third of the cost less than other remedial approaches. Indoor air quality results indicate that installation of the Retro-Coat Vapor Intrusion coating system mitigated the VOCs that had migrated into the property.

Soil Mixing and ISCO Approach Achieves Arizona DEQ Closure Levels



Challenge:

Active underground storage tank case with the Arizona Department of Environmental Quality (ADEQ) needed to meet ADEQ closure levels quickly to seek risk-based closure as part of property transaction.

Solution:

REGEN 

PERSULF 

Results:

Soil mixing and ISCO approach achieved ADEQ closure levels on time while saving \$500,000 versus an electrical resistance heating approach. The solution included the combined remedy of soil mixing with RegenOx and ISCO with PersulfOx. Significant reductions have been observed in both the source area and at the core plume for benzene and ethylbenzene.

Large Dilute BTEX Plume Successfully Treated to Meet Concentration Milestones



Challenge:

The environmental consulting firm, Advanced Environmental Technologies LLC (AET) was chosen by the FDEP to design an alternative, combined remedy approach employing PlumeStop, RegenOx, and ORC Advanced to sorb, degrade, and destroy the existing petroleum contaminant plume.

Solution:



Results:

The combined remedy approach was chosen as the most technically-feasible and cost-effective strategy in a competitive bid scenario. The treatment began with a RegenOx injection. 45 days later, a combined injection of PlumeStop and ORC Advanced was applied. The combination of these technologies has proven to successfully reduce contaminant levels to date.

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

REGENESIS is the global leader in the research, development, and commercialization of environmental technologies. We specialize in scientifically proven products and services for the treatment of a wide range of environmental challenges.

The result is a unique combination of innovative products and expert based services ensuring a high degree of certainty when it comes to meeting remediation objectives.

Get Started Today

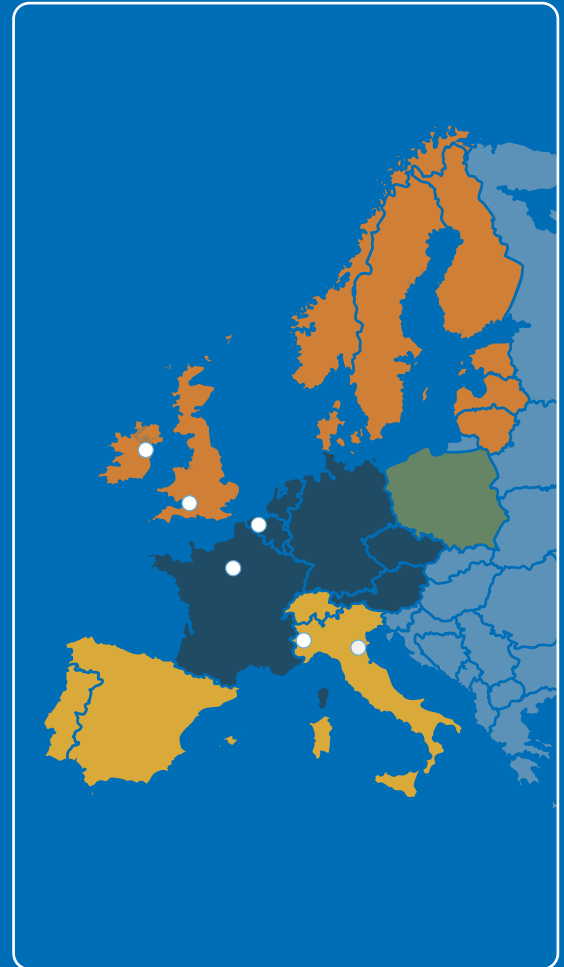
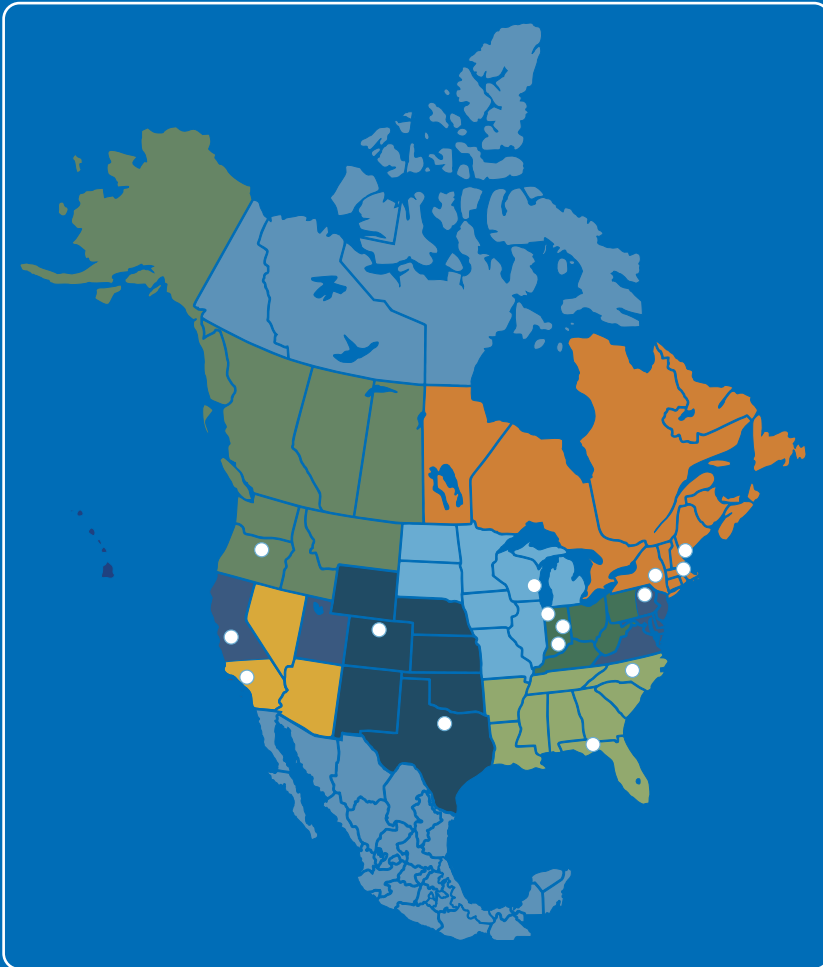
To get started, visit www.regenesis.com and click on Quick Start Solution.

One of our Technical Solutions Managers will review your project details and provide you with a customized remediation solution designed to achieve your goals.

Additional questions? Please call (949) 366-8000

Visit www.REGENESIS.com to learn more.





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