PetroFix Achieves UST Site Closure at NAAS Edenton

Innovative Application at Former NAAS Edenton Mitigates Long-Standing Petroleum Contamination

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Highlights

Site Type:
Former Military Defense Site (FUDS)

Project Driver:
Long-term petroleum contamination affecting groundwater quality and posing risk to environmental and public health

Contaminants:
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), and other petroleum hydrocarbons

Treatment:
Sorption-enhanced bioremediation

Technologies:
PetroFix

Geology:
Coastal aquifer system with sandy, clay, and silt compositions

Summary

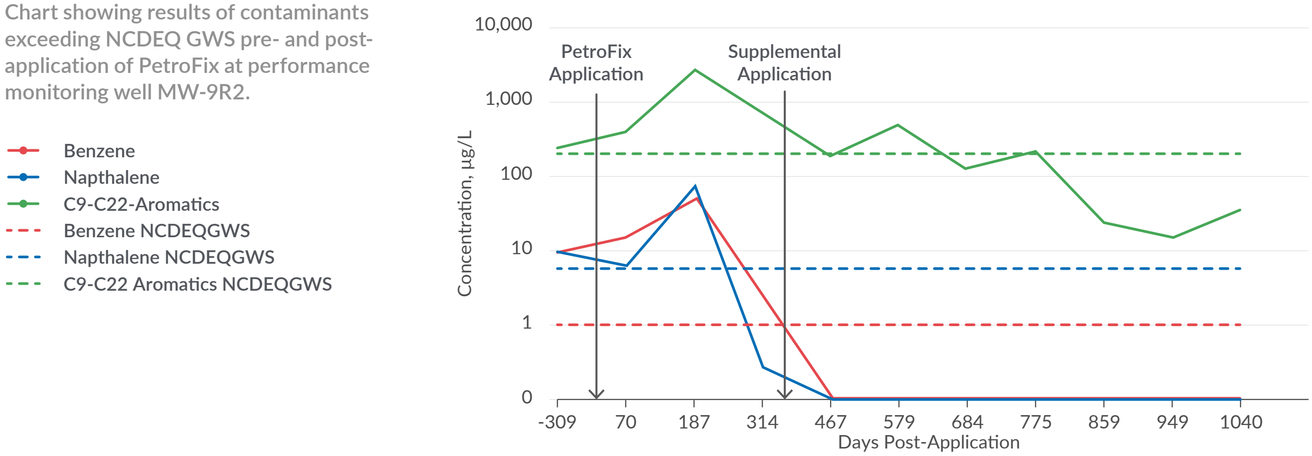
At the Naval Auxiliary Air Station Edenton, extensive historical use and subsequent contamination from military fuel operations necessitated robust remedial actions. After decades of conventional treatments and a monitored natural attenuation (MNA) approach, the application of PetroFix® supplemented with electron acceptors significantly enhanced MNA, effectively mitigating benzene and other petroleum hydrocarbons to below regulatory thresholds, culminating in a No Further Action status for the site.

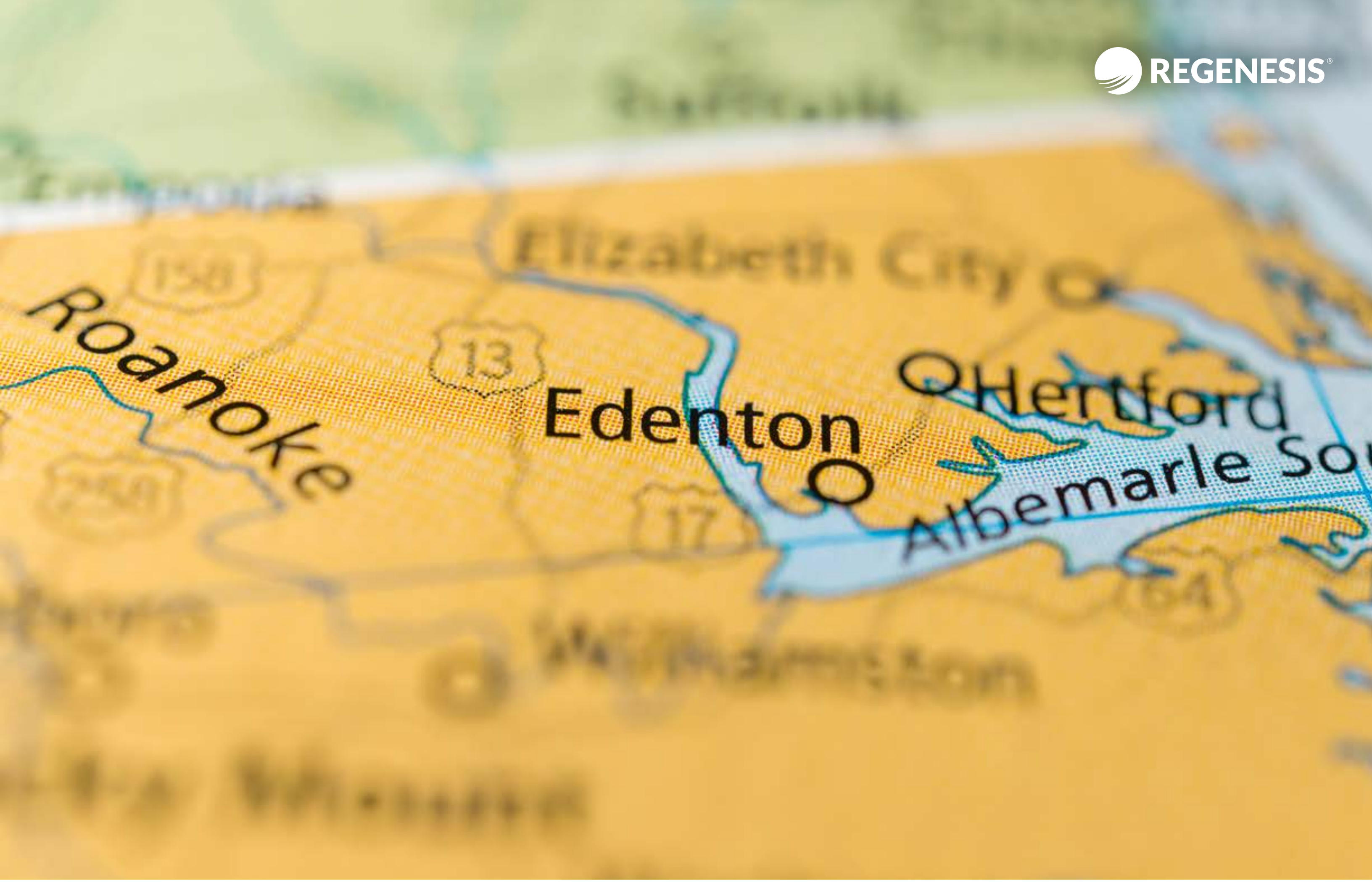
Results

- **NCDEQ issued a No Further Action Status for the site.**

MW-09R2 Performance Data

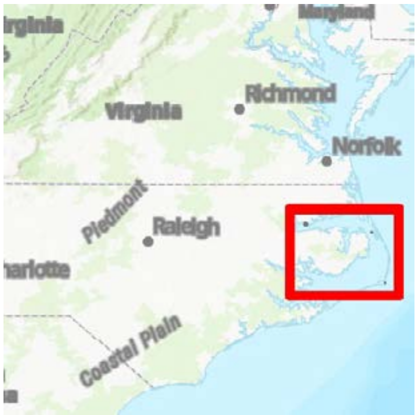
Chart showing results of contaminants exceeding NCDEQ GWS pre- and post-application of PetroFix at performance monitoring well MW-9R2.





Background and Site Challenges

Historical Use



NAAS Edenton Location Map

Initially constructed during World War II, the Naval Auxiliary Air Station Edenton served as a pivotal military fuel storage and distribution hub. Spanning over 3,108 acres, the facility included vast storage capacities with both underground and aboveground tanks designed to support naval operations. This site played a critical role in military logistics until it was decommissioned and the property was transferred to the town of Edenton, the state of North Carolina, and private individuals in 1958.

Legacy of Contamination

Following its decommissioning, an Inventory Project Report conducted in January 1992 under the Formerly Used Defense Sites (FUDS) program identified potential environmental hazards linked to past Department of Defense activities. The contaminant impacts stemmed primarily from the extensive fuel storage and handling operations, which left behind contaminants including petroleum hydrocarbons and other hazardous substances.

Early Remediation Efforts

Initial remediation efforts focused on the removal of the residual fuel, pipelines, 10 aboveground storage tanks (ASTs), and three underground storage tanks (USTs) between January 1995 and April 1997. Over 7,500 tons of petroleum-contaminated soil were removed and transported for offsite disposal or treated through landfarming at a nearby municipal airport. These early efforts also included the installation of monitoring wells and a comprehensive site assessment to gauge the extent of contamination.

Ongoing Challenges and Transition to Advanced Colloidal Remediation Technology

Despite these efforts, subsequent assessments revealed persistent contamination in soil and groundwater, necessitating continued management under the FUDS program through 2019. Various contaminants, such as benzene and naphthalene, continued to exceed North Carolina Department of Environmental Quality (NCDEQ), Groundwater Standards (GWS), highlighting the need for a more robust and innovative remediation strategy to address the residual contamination.

PetroFix, an advanced colloidal activated carbon technology that facilitates sorption-enhanced bioremediation had proven effective at reducing these contaminants at numerous similarly impacted sites, offering a promising solution to remediate the site and achieve regulatory closure.

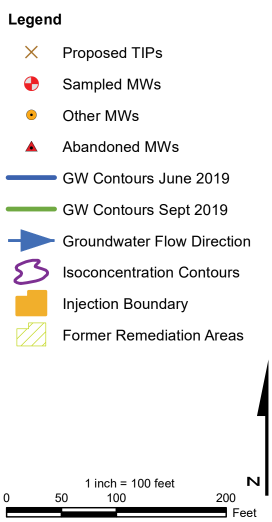
PetroFix Application

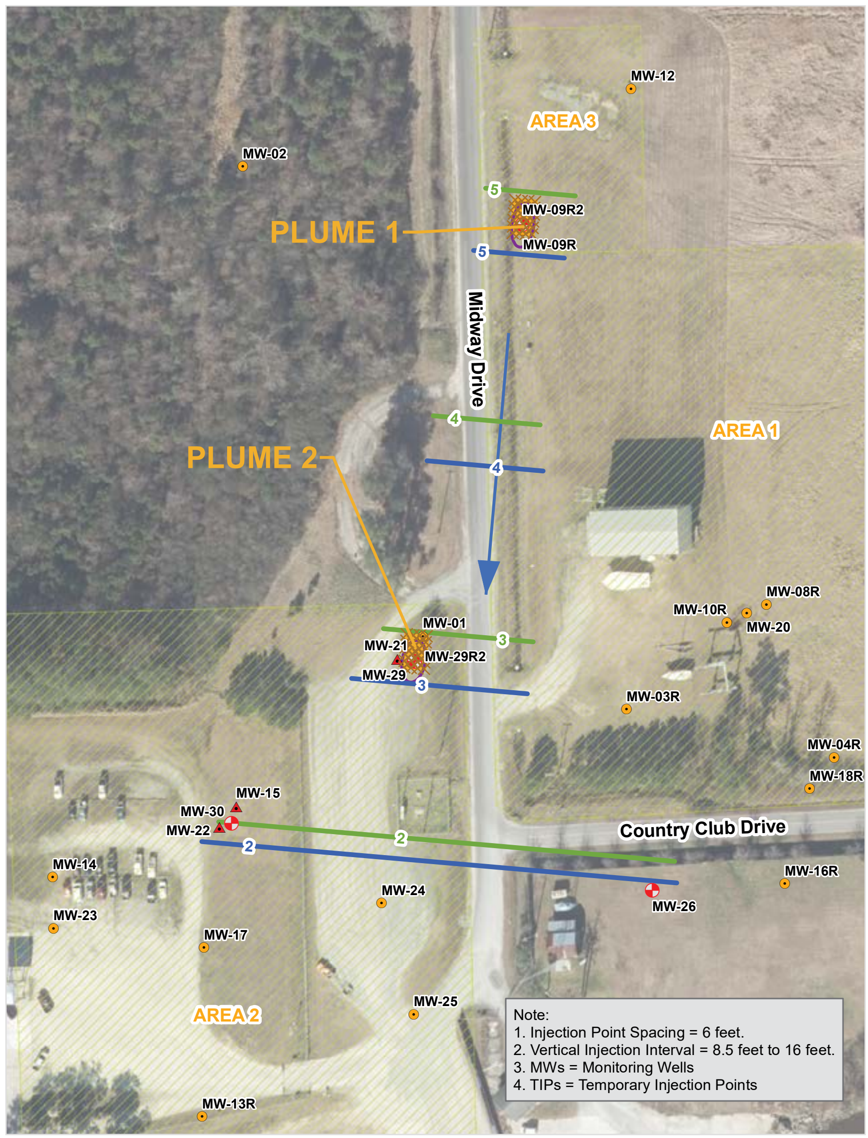
Initial Injection and Challenges Encountered

The initial application of PetroFix occurred in August 2020, involving 33 injection points distributed over two gridded areas, totaling approximately 3,000 square feet. The objective was to administer the remedial solution uniformly across the contaminated zones to maximize its effectiveness in adsorbing and biodegrading the petroleum hydrocarbons present.

Figure 1 Treatment Areas

Site map showing the two plumes (i.e., treatment areas)

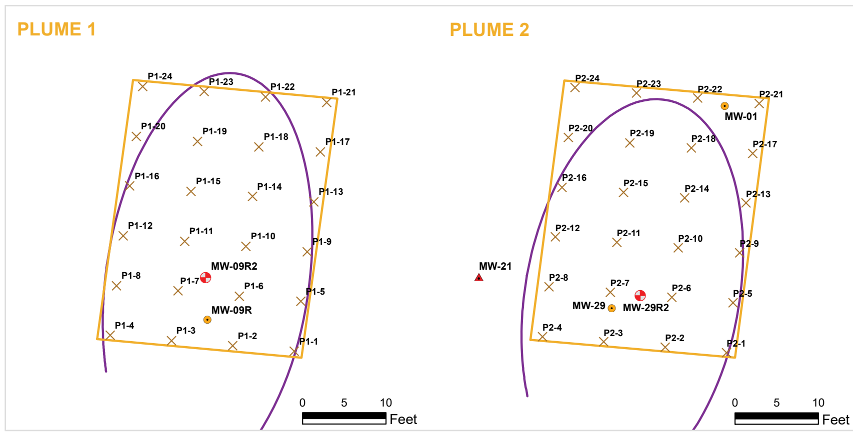




During the injection process, the field team encountered issues with the injectant 'daylighting'—surfacing prematurely at the storm ditch next to monitoring well MW-9R2 and several other points. This phenomenon was initially considered an indicator of refusal, leading to the premature cessation of injections at those locations. As a result, the intended volume of PetroFix was not fully administered within the MW-9R2 plume area, impacting the overall distribution and effectiveness of the treatment.

Figure 2 — Planned Injection Point Locations

Planned initial injection point locations. Several upgradient points at MW-9R2 were not completed due to surfacing.



Following the injections, three groundwater sampling events were conducted. The data from these events indicated that while overall groundwater contaminant levels decreased across the site, contaminants still exceeded the GWS at MW-9R2. Conversely, no contaminants exceeded the GWQ at MW-29R2 for all three events.

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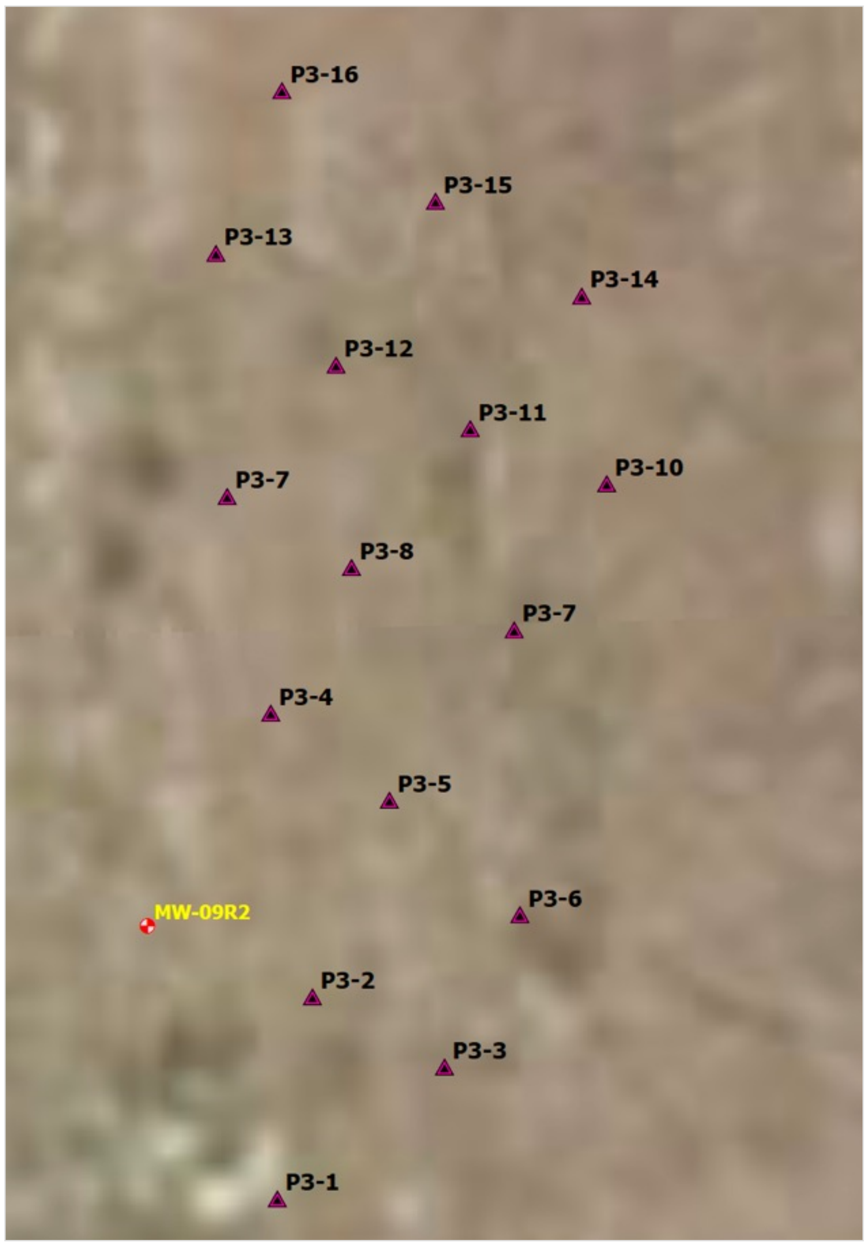
Supplemental Injection

Given the exceedances at MW-9R2, additional PetroFix injections were recommended to further address and mitigate the contamination in this area. An expanded treatment zone encompassing approximately 1,000 square feet around MW-9R2 was proposed and implemented in August 2021 to ensure comprehensive coverage and effectiveness of the remedial actions. Injection methods were modified to allow all the prescribed PetroFix volume to be injected.

Figure 3 Supplemental Injection Locations

Supplemental injection point locations at MW-9R2 plume



Results and Conclusion

No Further Action

Following the supplemental injection at MW-09R2, quarterly groundwater samples were collected demonstrating that concentrations for all contaminants of concern had been reduced below the NCDEQ GWS at MW-09R2. At MW-29R2, benzene, the only remaining contaminant of concern, remained below the stringent 1 microgram per liter NCDEQ GWS for over 18 months.

These results led the NCDEQ to issue a No Further Action Status for the site.

Figure 4 MW-09R2 Performance Data

Chart showing results of contaminants exceeding NCDEQ GWS pre- and post-application of PetroFix at performance monitoring well MW-9R2.

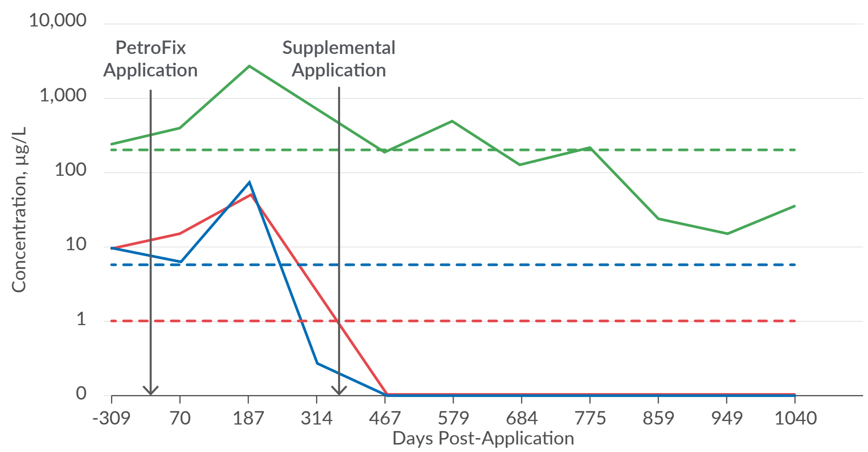
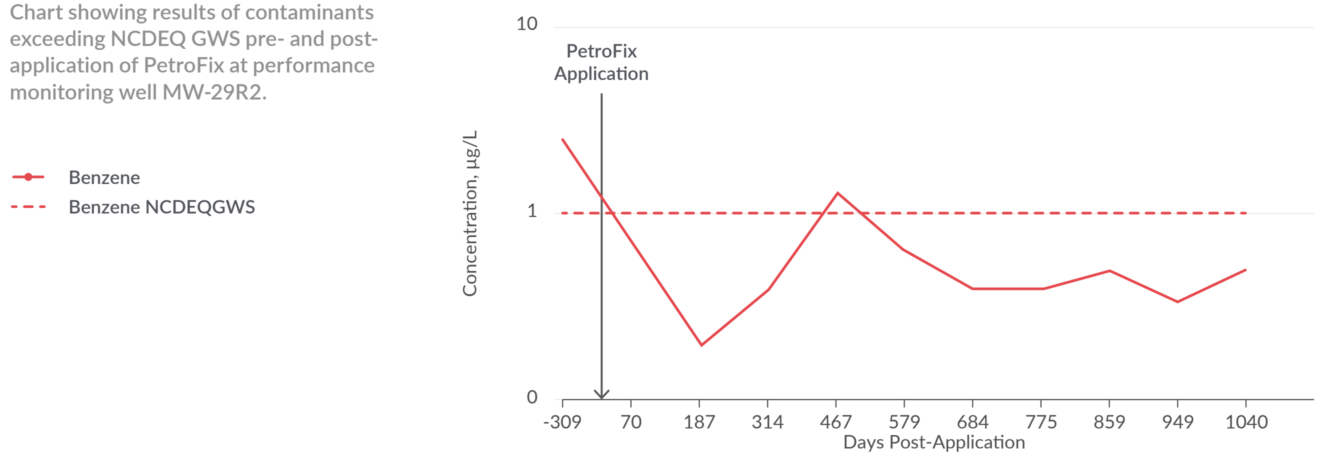
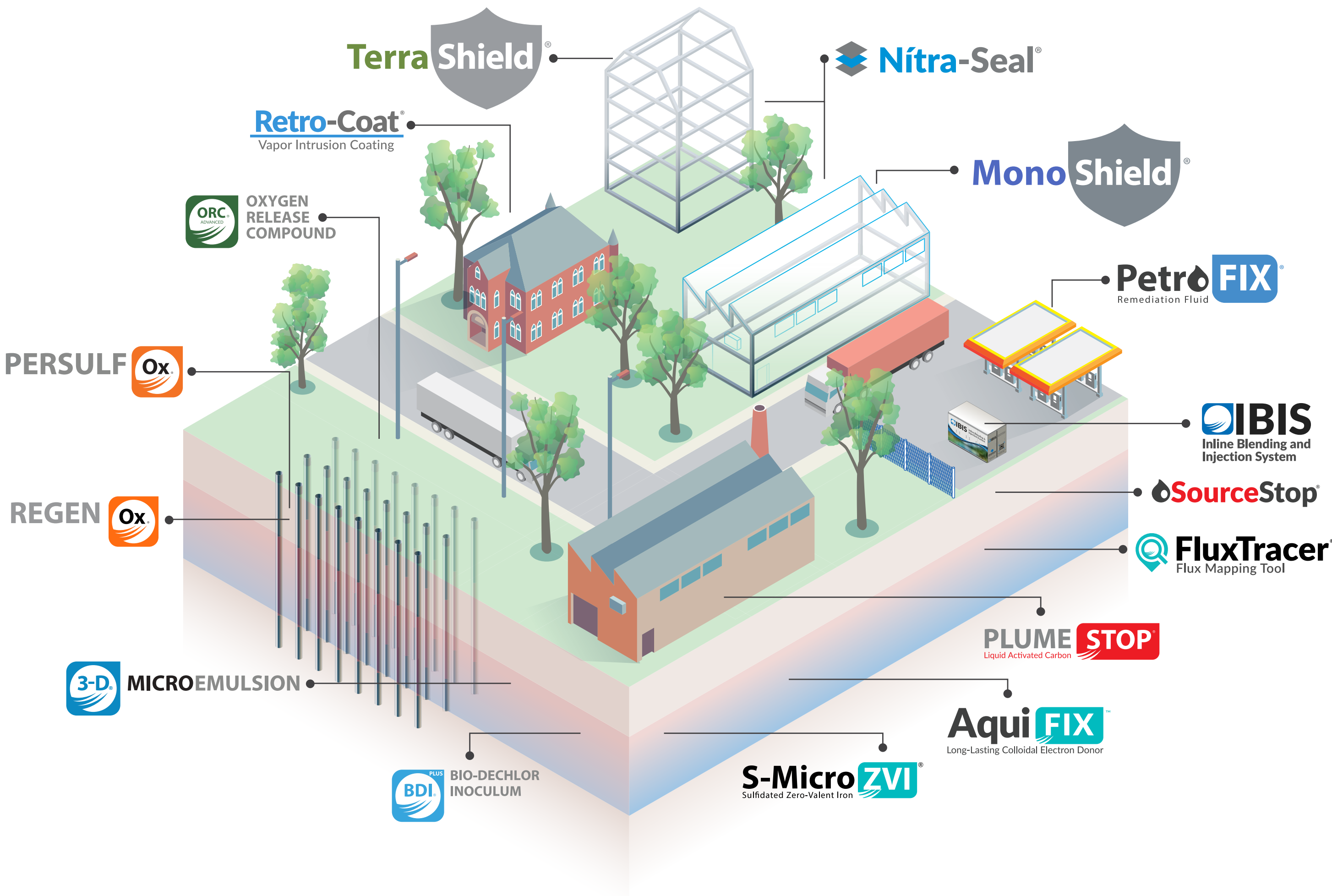


Figure 5 MW-29R2 Performance Data

Chart showing results of contaminants exceeding NCDEQ GWS pre- and post-application of PetroFix at performance monitoring well MW-29R2.



This project exemplifies the successful adaptation of PetroFix in a complex post-military context, achieving environmental compliance and facilitating the safe repurposing of historically burdened FUDS and other similar sites. The strategic application of PetroFix, along with ongoing monitoring and adjustments, highlights the effectiveness of innovative remediation technologies in overcoming significant environmental challenges.



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.

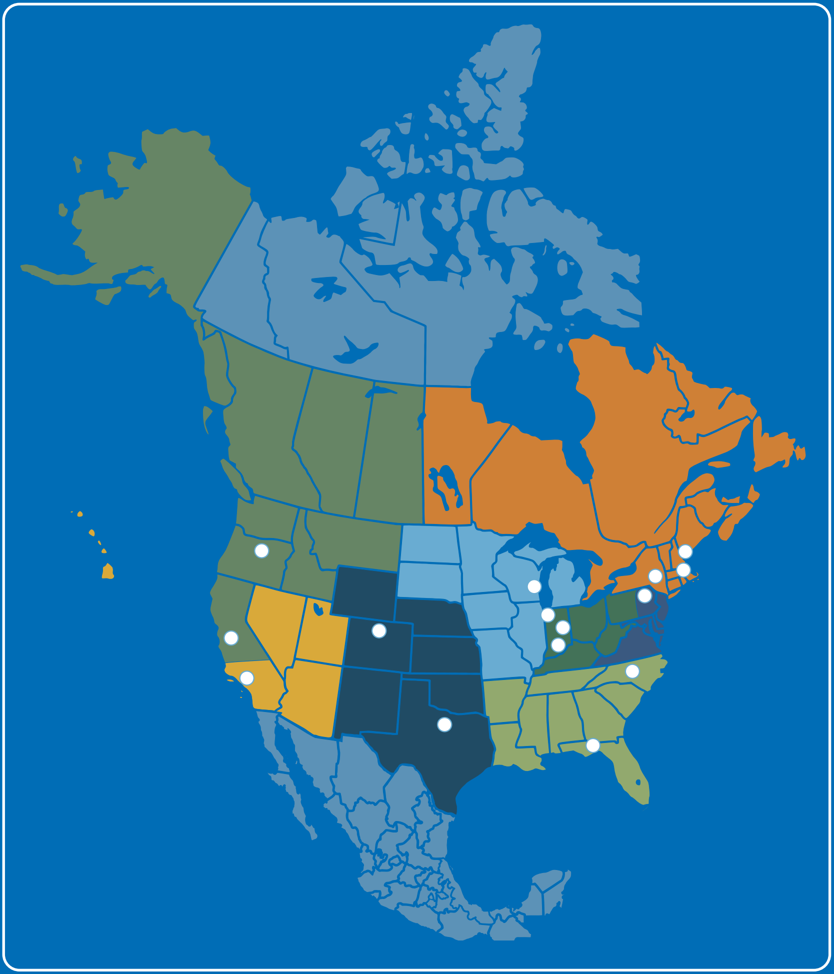
Inherently, innovation imparts new and better ways of thinking and doing. For us, this means delivering expert environmental solutions in the form of the most advanced and effective technologies and services available today.

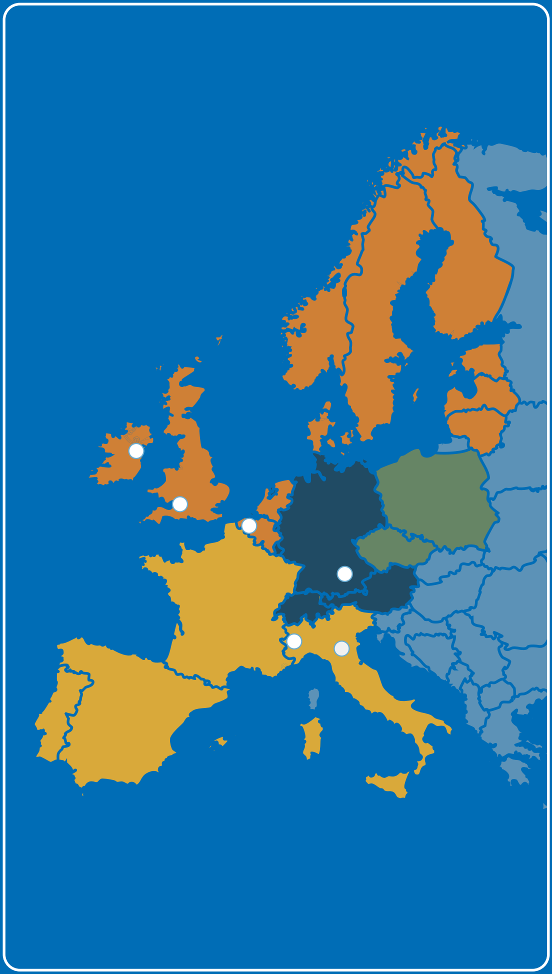
We value expertise, both our customers' and our own. We find that when our experienced staff collaborates directly with customers on complex problems, there is a high potential for success including savings in time, resources and cost.

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





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