REGENESIS®

High-Mass Petroleum Hydrocarbons Treated to Achieve Closure

PersulfOx® Used to Reduce Toluene Below Target Levels, Closing Decades-Old Release

Highlights

Site Type:
Electrical Service Company

Project Driver:
Underground storage tank (UST) release with chemical concentrations above site-specific cleanup goals

Contaminants:
Petroleum hydrocarbons, including more than 100,000 micrograms per liter (µg/L) of toluene

Treatment:
In situ chemical oxidation (ISCO)

Technologies:
PersulfOx

Geology:
Low-permeability silt and clay

Summary

Following years of remediation, which included aggressive fluid vapor recovery efforts, the final selection and successful application of PersulfOx® effectively reduced high concentrations of toluene in groundwater below the site cleanup goal at an electrical service company upstate of South Carolina The remediation achieved the site target cleanup objectives and received regulatory closure for the decades-old release incident.

Project Background and Objectives

A former electric service company upstate of South Carolina reported a release during a UST removal completed at the site in 1988. Aggressive fluid vapor recovery (AFVR) events were completed from 2004 to 2008 and from 2019 to 2020 to address the release, along with groundwater monitoring. Despite these efforts, high concentrations of petroleum hydrocarbons (PHC) remained. Toluene was the most abundant groundwater contaminant and the regulatory driver, with concentrations averaging more than 100,000 micrograms per liter (µg/L) in the source zone.

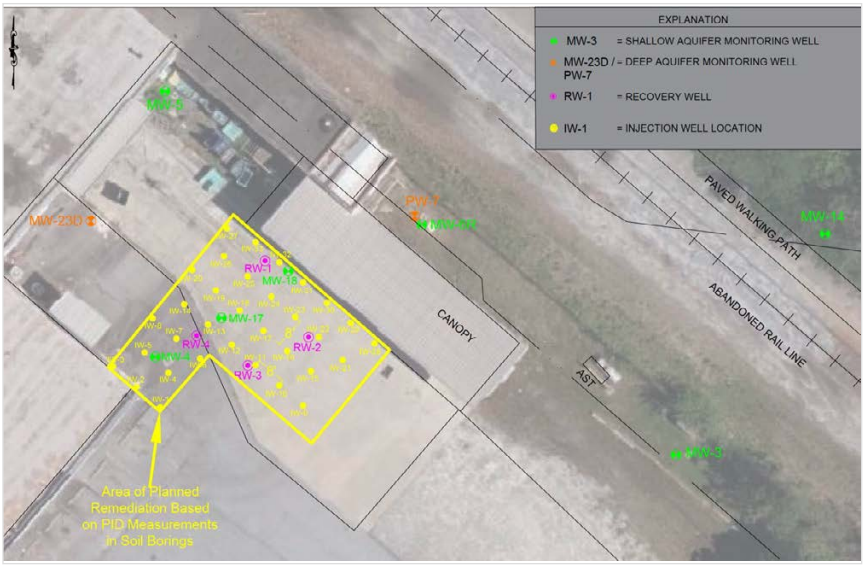
Environmental Consultants (EnviroSouth, Inc.) proposed the PersulfOx ISCO technology to remediate the PHC plume. The remedial goal was to reduce the toluene concentration below a site-specific target level (SSTL) equal to its solubility limit of 26,540 µg/L.

Remediation

To achieve this goal, EnviroSouth, working with REGENESIS® technical design support, injected PersulfOx during three treatment rounds sequenced approximately two months apart. PersulfOx was injected through a network of temporary injection points in a grid array. The injection points were offset for each application to ensure complete coverage within the target treatment zones.

Figure 1 PersulfOx Injection Grid

Graphic depicting locations of PersulfOx injection points



Application Details	
Treatment Area Extent	2,000 square feet
Vertical Injection Interval	23 to 39 feet below ground surface
Injection Points	33 (per application)
Injection Method	Hydraulic percussion (direct push)-installed injection tooling
PersulfOx Quantity Injected	50,030 pounds
Total Solution Volume Injected	34,000 gallons
Treatment Goal	Reduce toluene concentrations below the 26,540 µg/L SSTL

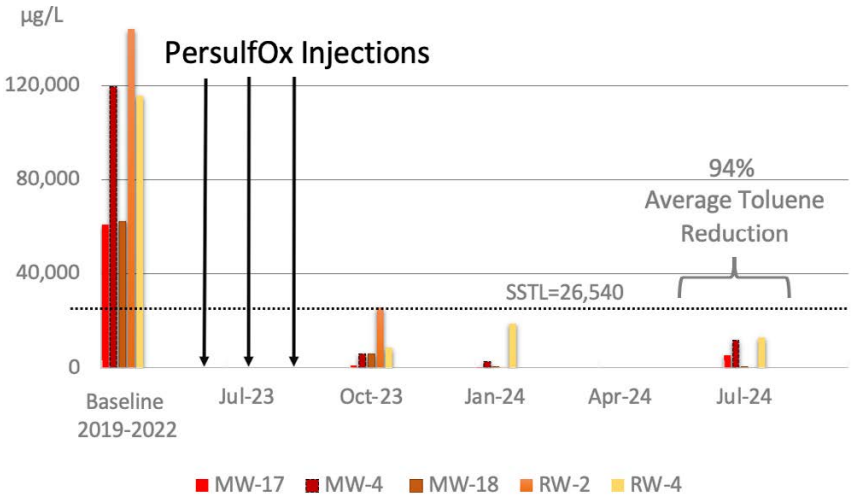
Results

Following the PersulfOx injections, the baseline average toluene concentration was reduced by an average of 94% and below the toluene SSTL in all five performance monitoring wells. The remaining PHC contaminants were similarly reduced.

Figure 2

Toluene in PersulfOx Treatment Zone

Chart showing toluene concentrations in the treatment zone before and after PersulfOx injection. Baseline concentrations are averaged over four monitoring events from 2019 to 2022.



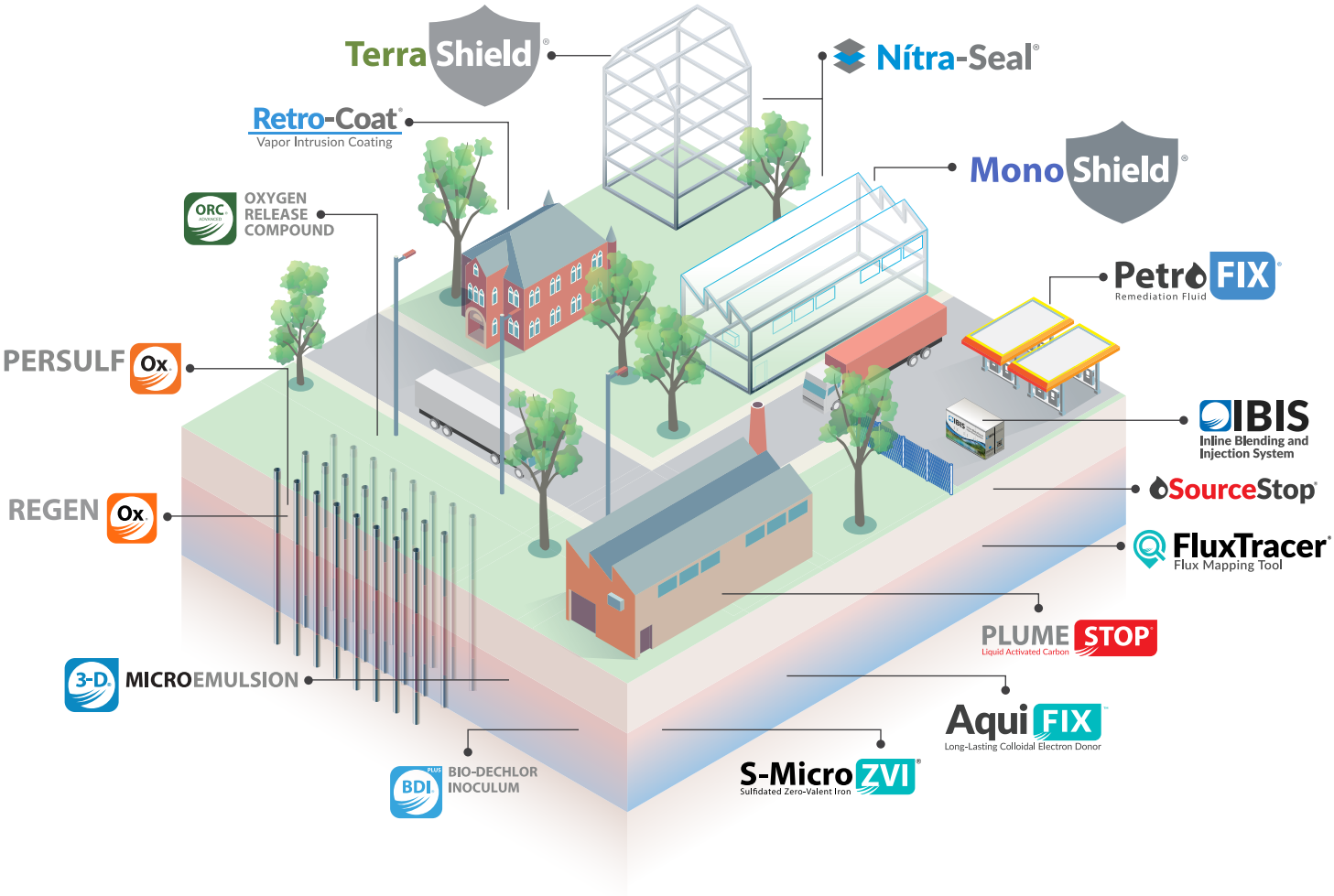
Conclusion

Groundwater monitoring has demonstrated that toluene remains below its SSTL following the injection of PersulfOx. No other PHC contaminants exceed an SSTL. Based on these results, the South Carolina Department of Environmental Services (SCDES) does not require further remediation, closing a decades-old UST release incident.

ENVIROSOUTH Environmental Consultants

> "Under a new site rehabilitation program (Targeted Scope Corrective Action) within the South Carolina Department of Environmental Services (SCDES) Underground Storage Tank (UST) Division, *in situ* chemical oxidation (ISCO) was issued funding by the State Underground Petroleum Environmental Response Bank (SUPERB) for select sites in early 2023.
>
> EnviroSouth, Inc. was the contractor of choice for a high petroleum mass site which was unresponsive to conventional AFVR and natural attenuation in the source area. EnviroSouth partnered with REGENESIS to develop a tailored ISCO approach to treat the source area using PersulfOx. After treatment, concentrations of key constituents of concern (such as toluene) were reduced by approximately 90% within two months. Concentrations continued to reduce during the monitoring period without evidence of rebound. The legacy petroleum site achieved regulatory closure within two years following the successful implementation of the remedial strategy developed by EnviroSouth, Inc. and REGENESIS."

— Will Lyons, P.G.
UST Coordinator and Senior Hydrogeologist



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.

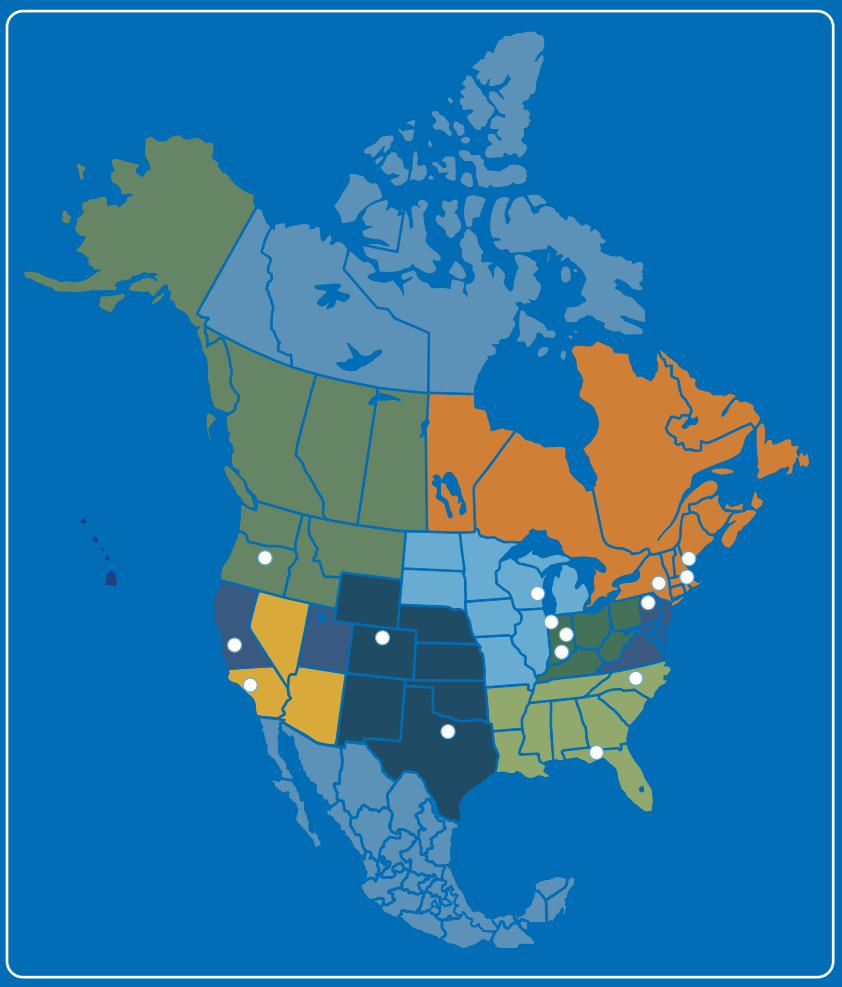
Inherently, innovation imparts new and better ways of thinking and doing. For us, this means delivering expert environmental solutions in the form of the most advanced and effective technologies and services available today.

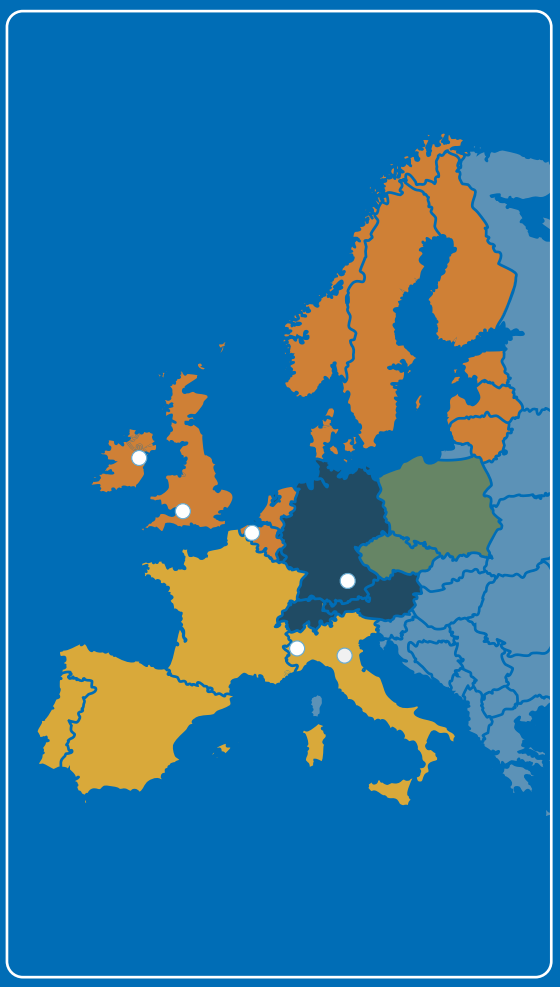
We value expertise, both our customers' and our own. We find that when our experienced staff collaborates directly with customers on complex problems, there is a high potential for success including savings in time, resources and cost.

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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