REGENESIS®

Convention Center Complex Redevelopment Accelerated by Rapid Groundwater Remediation

PlumeStop Drives Remediation Success at McCormick Place, North America's Largest Convention Center Complex

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Highlights

Site Type
Commercial - Conference Center

Project Driver
Site redevelopment

Contaminants
Chlorinated solvents, mostly TCE, with concentrations >6,000 µg/L

Treatment
Sorption-enhanced reductive dechlorination

Technologies:
PlumeStop, HRC, BDI Plus

Geology
Sand, fining downward to lacustrine clays

Summary

A brownfield site was a key part of the McCormick Place Convention Center expansion, but prior to construction starting, the site required significant groundwater remediation to address contamination from a large chlorinated volatile organic compound (cVOC) plume. A plan was developed to quickly remediate total CVOC concentrations exceeding 7,000 micrograms per liter (µg/L), while providing long-term treatment. The solution involved using a patented micron-scale colloidal activated carbon technology, commercially known as PlumeStop® (PlumeStop).

The technical design incorporated Hydrogen Release Compound (HRC®), Bio-Dechlor INOCULUM Plus® (BDI Plus), and PlumeStop strategically applied to treat the plume before the site's redevelopment into a high-rise hotel tower and multipurpose arena. Once the remedial application was completed, it successfully met groundwater quality objectives, earned regulatory site closure, and allowed the project to stay on schedule despite harsh midwestern winter conditions. This project stands as one of the earliest success stories for PlumeStop. The site received no further action status from the Illinois Environmental Protection Agency (IEPA) in 16 months.

Results

- **The site received no further action status from the Illinois Environmental Protection Agency (IEPA) in 16 months**

Background

Architect rendering of multi-purpose arena and high-rise hotel shown in light blue north of the existing McCormick Center at the bottom of the page.

The brownfield site, now part of the expanded McCormick Place Convention Center, was redeveloped into a high-rise hotel tower and a multi-purpose arena. The site was part of a broader redevelopment project spearheaded by the Metropolitan Pier and Exposition Authority (MPEA) and the City of Chicago to transform the area into an attractive destination for conventions and sporting events

The site's long operational history included manufacturing, plating operations, and printing facilities, contributing to a commingled chlorinated solvent plume from multiple sources. Total chlorinated solvent concentrations exceeded 7,000 µg/L with TCE as the main contaminant and lesser concentrations of perchloroethene (PCE).

Site Cleanup Objectives

The groundwater remediation objectives set for this project were based on the Metropolitan Water Reclamation District of Chicago's (MWRD) wastewater discharge limits, specifically:

- TCE: 242 µg/L
- PCE: 225 µg/L
- Total Volatile Organic Compounds (VOCs): 567 µg/L

By achieving these standards, the MPEA could demonstrate proactive environmental stewardship and seek regulatory closure through the Illinois Environmental Protection Agency (IEPA) Site Remediation Program (SRP).

Remediation Approach

To meet the remedial objectives, Apex Companies, LLC (Apex), the prime environmental consultant, sought an *in situ* solution to rapidly achieve the site goals. Given the aggressive construction schedule, the application needed to take place during the harsh Chicago winter months.

PlumeStop was selected for its ability to quickly reduce dissolved-phase contaminants—typically within weeks—while supporting efficient biodegradation. Upon application, PlumeStop coats aquifer solids, creating a broad, sorptive surface area (i.e., a biomatrix) that facilitates the microbial transformation of chlorinated solvents into non-toxic compounds, such as ethene and carbon dioxide. HRC, a controlled-release electron donor, and BDI Plus, a microbial consortium containing *Dehalococcoides sp.*, were applied to the PlumeStop-treated zones to enhance the biologically-mediated degradation of sorbed contaminants.

This dual-action approach was designed to provide both immediate results and a long-term solution for addressing residual contaminant mass flux migrating from untreated areas. As contaminants on the PlumeStop-coated matrix are degraded into non-toxic, non-sorptive end products, the sorptive surface area regenerates, allowing for the treatment of newly in-fluxing contaminants.

Design and Verification

The remediation design targeted four target treatment zones (TTZs) to reduce the contaminant concentrations below the remediation objectives. These TTZs were designed to encompass the source areas where chlorinated solvents were originally released while also providing permeable reactive barriers to treat any migrating residual contaminants in the downgradient plume.

The application was designed to extend vertically across saturated sandy soils overlying a lacustrine clay. Prior to the application, design verification was completed to confirm the depth of this clay unit in the TTZs and to assess the solvent concentrations relative to depth in the soil column.

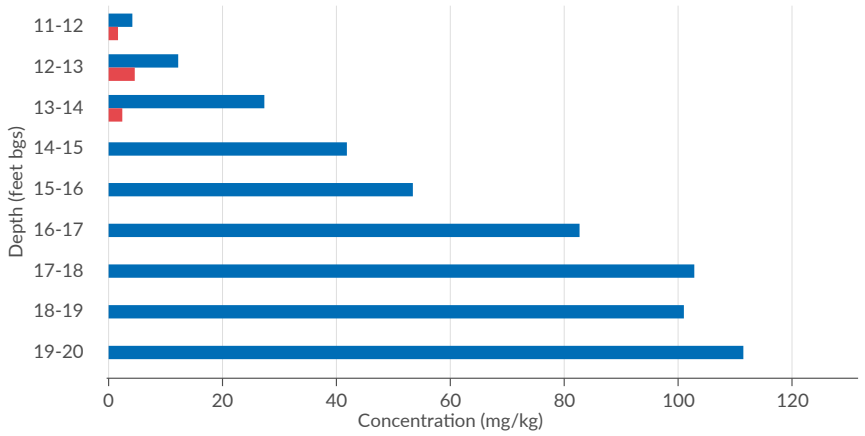
Results from this effort showed that TCE concentrations increased with depth until fully within the clay unit in the main TTZ (source area). This information was used to inform the application and amendment dosing strategy.

Figure 1 Target Treatment Zones

PlumeStop bioremediation target treatment zones (TTZs).

Figure 2 Soil Core RVD-3A: Concentration vs. Depth

Soil core collected from Main TTZ showing TCE concentrations increasing with depth to the top of the clay unit at 20 feet bgs.



Application

Injection Application Details

Technologies Applied	
PlumeStop	54,400 lbs
HRC	7,410 lbs
BDI Plus	81 L

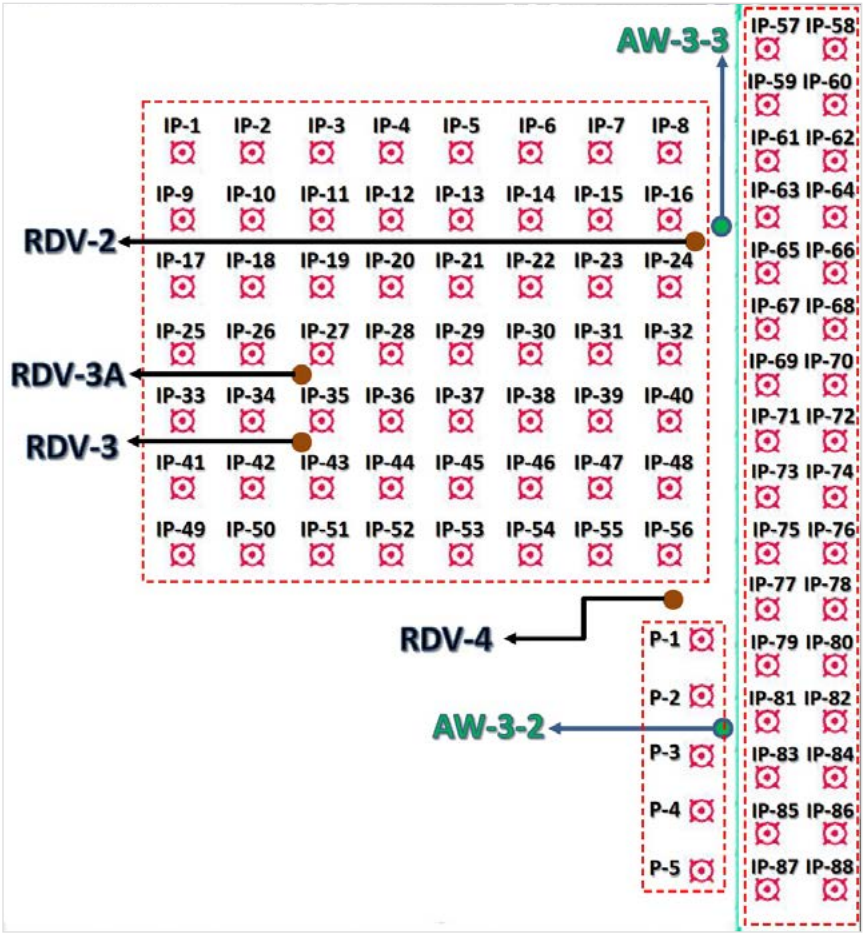
Total Volume Applied	70,430 gallons (approximate)
Injection Points	138
Injection Interval	10 to 22 feet depth

REGENESIS Remediation Services (RRS) completed the application over 19 onsite workdays during December 2014 and January 2015, injecting over 70,000 gallons of PlumeStop solution through 138 direct-push injection points into the TTZs. The total surface treatment area covered approximately 14,000 square feet, with a vertical thickness ranging from 10 to 22 feet below grade. Five additional injection points were added to the application from the original design due to a smaller vertical thickness required in one of the TTZs.

Real-time PlumeStop distribution was monitored during the application by evaluating field water quality measurements and water levels in onsite monitoring wells. This allowed for the precise tracking of the solution's effectiveness and ensured that the technology was applied uniformly across the treatment zones. Observed application pressures were low--generally below 30 pounds per square inch at most locations--with flow rates typically between 3 and 6 gallons per minute.

Figure 3 Main and West TTZs

Main and West TTZs showing injection points. The green dots are performance monitoring wells.



Results

The application of PlumeStop at McCormick Place resulted in rapid and significant reductions in chlorinated volatile organic compounds (cVOCs), with concentrations decreasing by over 80% within the first month. Following the initial reduction, biological degradation continued, with concentrations further decreasing.

Observed biogeochemical shifts, such as decreased dissolved oxygen and increased dissolved iron and manganese occurred as expected. DHC and reductive dehalogenase genes observed post-application further confirmed ongoing biological treatment. Overall, the PlumeStop application successfully reduced contaminant concentrations below the remediation objectives, maintaining these reductions through the monitoring period.

These results paved the way for the formal recording of a No Further Remediation (NFR) determination through the IEPA's Site Remediation Program within 16 months.

Figure 4

PCE and TCE Performance Data AW-3-2

PCE and TCE concentrations at monitoring well AW-3-2 before and after PlumeStop application.

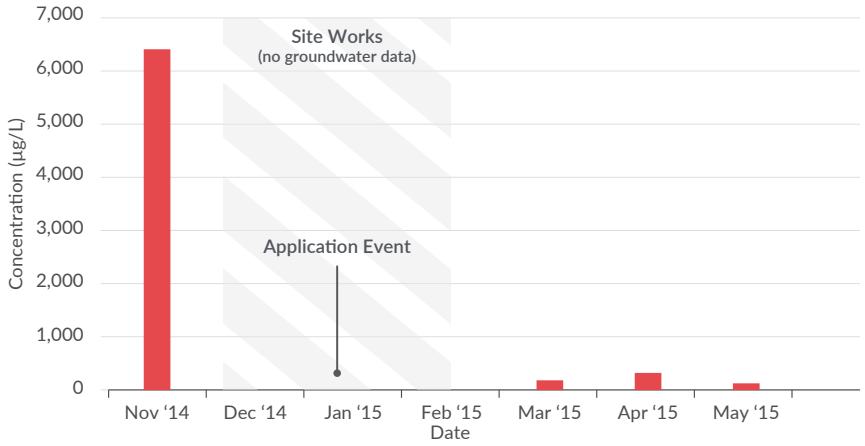
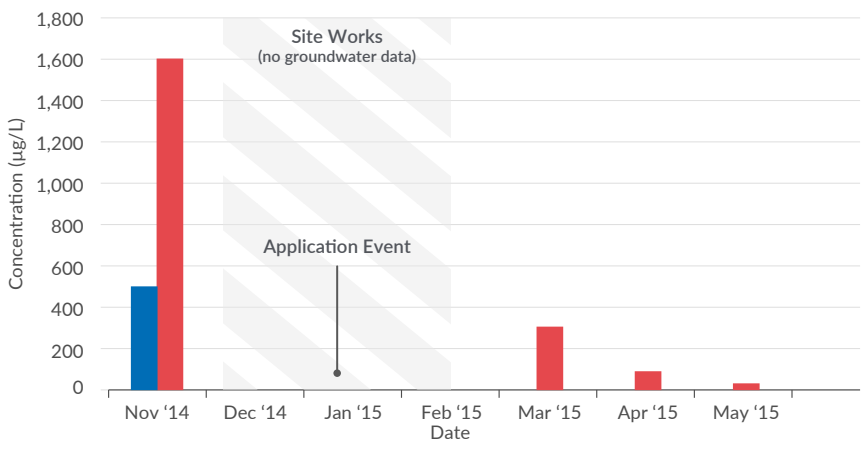


Figure 5

PCE and TCE Performance Data AW-3-3

PCE and TCE concentrations at monitoring well AW-3-3 before and after PlumeStop application.

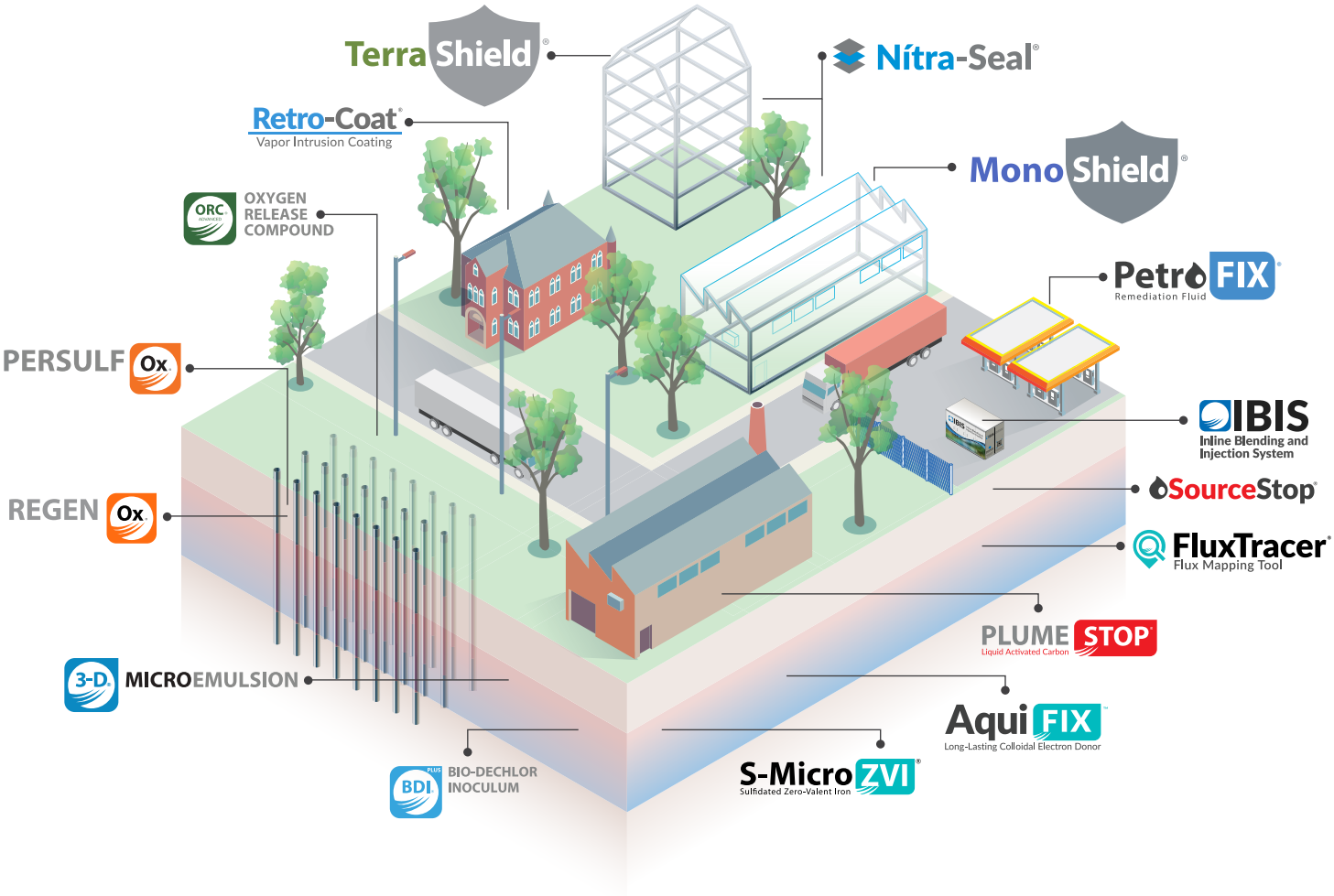


Conclusion

Following the PlumeStop application at McCormick Place, the project successfully met its objectives. Contaminant concentrations were quickly reduced below the remedial goals, leading to regulatory closure through Illinois' Site Remediation Program in 16 months.

The *in situ* bioremediation approach, enhanced by PlumeStop's rapid contaminant sorption not only met the regulatory requirements but also allowed the MPEA to be a responsible environmental steward while significantly reducing remediation costs. By using PlumeStop technology, MPEA was able to avoid more costly and disruptive remediation methods, such as soil excavation or groundwater pump-and-treat systems.

Despite the challenges posed by severe winter weather and a tight construction schedule, the team successfully achieved the client's goals, ensuring a development-ready site. This enabled MPEA to begin construction on schedule, culminating in the completion of the high-rise hotel and multi-purpose arena.



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.

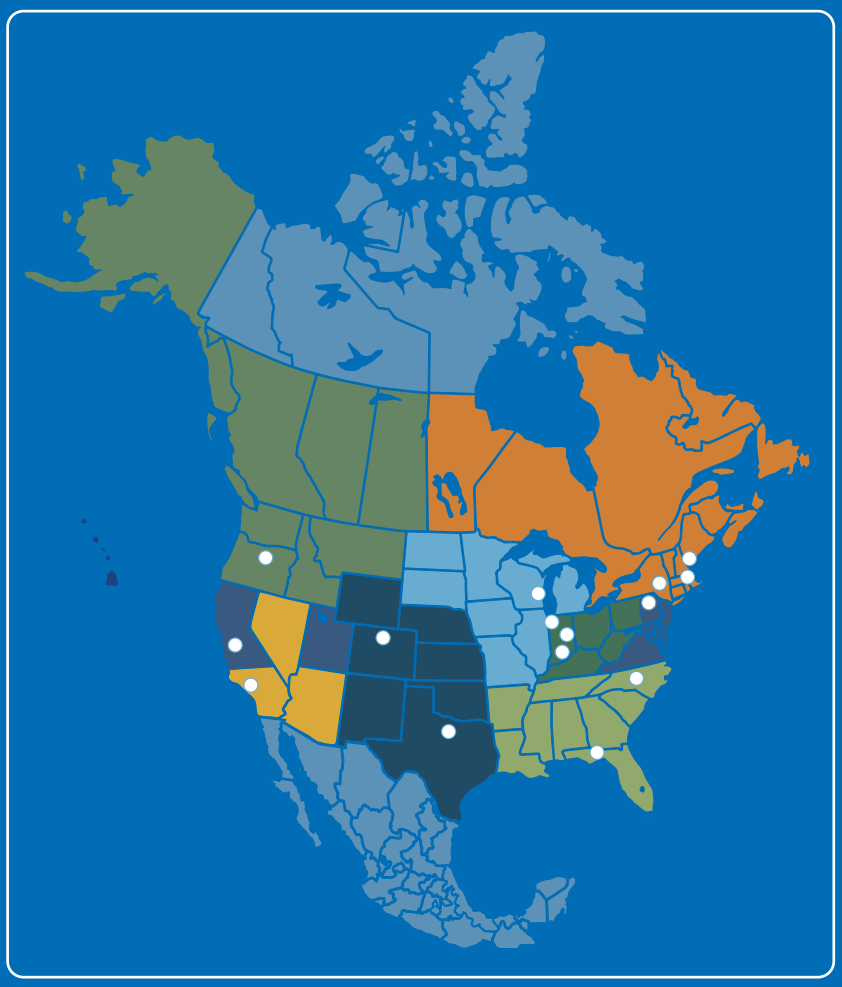
We value expertise, both our customers' and our own. We find that when our experienced staff collaborates directly with customers on complex problems, there is a high potential for success including savings in time, resources and cost.

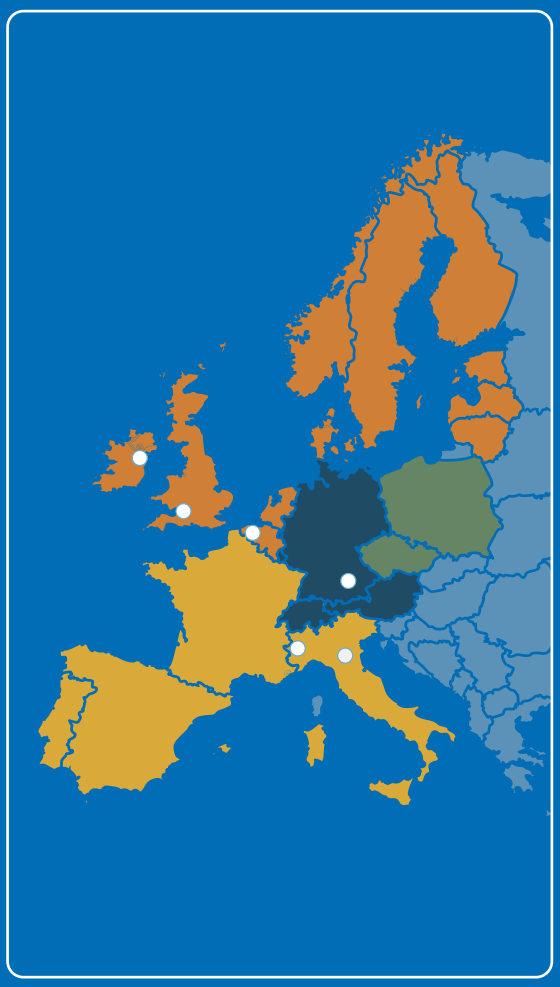
At REGENESIS we are driven by a strong sense of responsibility to the people charged with managing the complex environmental problems we encounter and to the people involved in developing and implementing our technology-based solutions. We are committed to investing in lasting relationships by taking 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.

REGENESIS®

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





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