



Rapid Groundwater Remediation and Timely Project Execution Keeps Large Chicago Brownfield Redevelopment on Track



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Site Description/Past Land Uses/Project Background

The site is located north of the McCormick Place Convention Center and consists of two tracts of land, each comprising of between 2 and 3 acres, separated by South Prairie Avenue. Past uses of the Site included a gasoline station, manufacturing, a plating operation, and a printing facility.

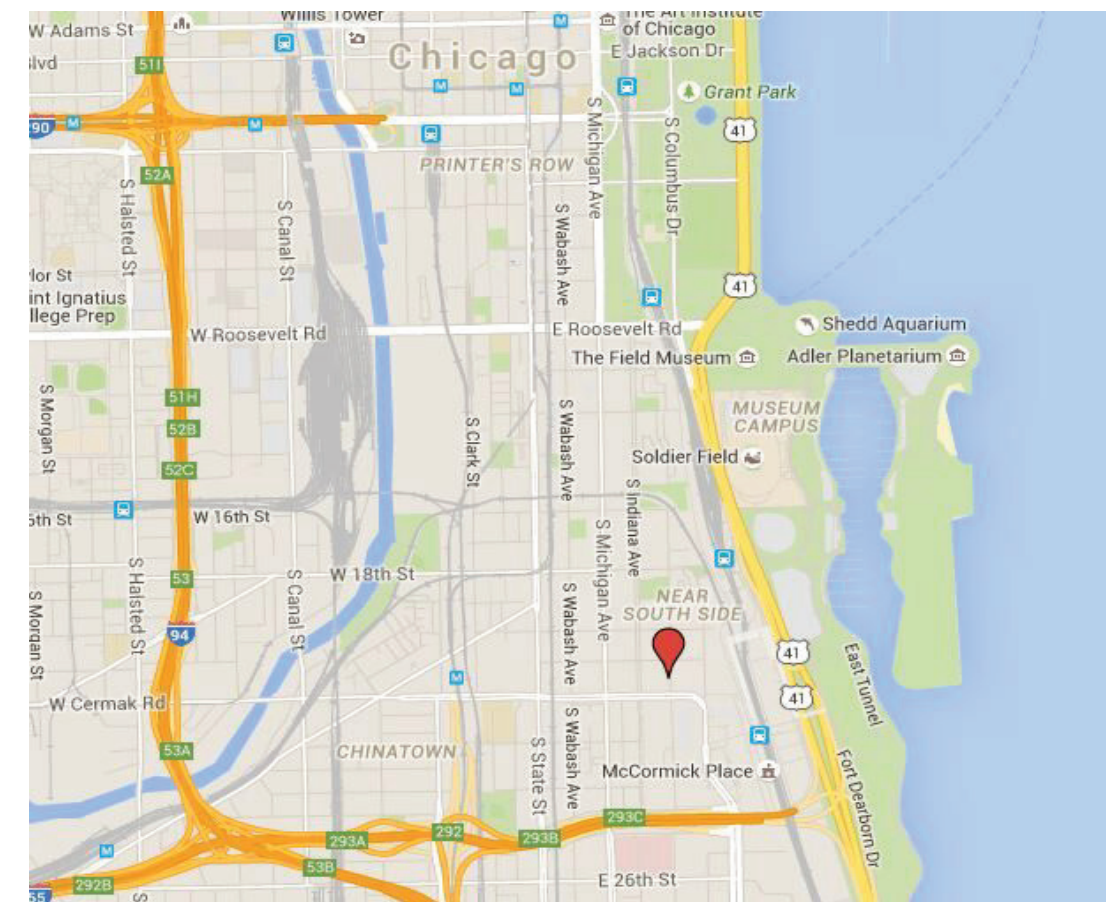
This Brownfield site is being redeveloped for the planned future use as a high-rise hotel tower and multi-purpose arena used for conventions and sporting events. The project is part of a larger effort by the Metropolitan Pier and Exposition Authority (MPEA) and the City of Chicago for South Loop, Motor Row, and Prairie Neighborhoods making McCormick Place a more attractive destination.

The groundwater contamination consist of a large chlorinated volatile organic compound (cVOC) plume with multiple sources that are co-mingled. Total cVOCs in groundwater were greater than 7,000 micrograms per liter (µg/L) with Trichloroethylene (TCE) being the primary constituent. The site geology consist of Lacustrine (lake deposits) geology-sand fining to silt and clay with depth.

Groundwater remediation objectives for this project was to achieve the Metropolitan Water Reclamation District of Chicago's (MWRD) waste water discharge limits of 242 µg/L for TCE and 567 µg/L for total VOCs.

The MPEA's goals for the project was to be a good neighbor and steward of the environment while remediating the soil and groundwater contamination, reducing vapor instruction risk, protecting construction worker health and safety, and obtaining regulatory closure via the Illinois Environmental Protection Agency (IEPA) Site Remediation Program (SRP).

Additionally, Apex Companies, LLC. (Apex) the prime environmental consultant for the project, pursued an *in situ* solution to decrease the projected construction cost while completing the work during the harsh Chicago winter months of December and January to meet the spring construction schedule.



Project location map



Project site during injection activities



Project site during injection activities

Description of Remediation Approach and Technology Applied

Apex Companies, LLC. (Apex) contracted Regenesis Remediation Services (RRS) to treat the chlorinated solvent impacted groundwater through an *in situ* application of a new technology platform: PlumeStop® Liquid Activated Carbon™ (PlumeStop®). The goal of the strategy was to rapidly reduce the dissolved phase contamination in days to weeks and expedite contaminant biodegradation while providing a long-term means of addressing contaminant mass flux migrating from untreated areas.

PlumeStop is comprised of very fine particles of activated carbon (1-2µm) suspended in water through the use of organic polymer dispersion chemistry. These features allow PlumeStop to travel through even the smallest soil pore throats during application without clogging and with the use of low pumping pressures. Once applied, PlumeStop begins to coat the surface of the soil forming a sorbent matrix where both an immediate reduction of dissolved phase contaminants and rapid biological destruction of contaminants are realized. The PlumeStop formulation used for this site included a soluble electron donor and bioaugmentation substrate to facilitate biologically-mediated destruction of the sorbed contaminants.

RRS applied approximately 70,000 gallons of PlumeStop solution through 138 direct-push injection points into four target treatment zones (TTZ) between December 1st, 2014 and January 22nd, 2015 for a total of only 19 on-site work days. The surface treatment area was approximately 14,000 square feet with a vertical thickness from 10 to 22 feet below grade. Real-time PlumeStop solution distribution monitoring occurred during the application by evaluating field water quality measurements and water levels in on-site monitoring wells.

Post Remediation Brownfield Discussion

Contaminant concentrations have been reduced to below the remedial objectives by the first month and maintained over time through PlumeStop's sorptive capacity and enhanced biodegradation. The IEPA SRP deliverables are in-process for closure submission.

The *in situ* remediation of groundwater allowed MPEA to be a good neighbor and steward of the environment while pushing remediation costs down and facilitating timely regulatory closure. The PlumeStop technology was key for the MPEA to avoid more costly remediation techniques such as excavation of site soils or a groundwater pump and filtration treatment system.

The high-profile project was complicated by severe winter weather and a tight construction schedule. The Apex/RRS Team was able to achieve the client's goals on-time and deliver a development ready site which allowed the MPEA to start construction on their schedule. The redevelopment activities are on-going for both properties.

Results

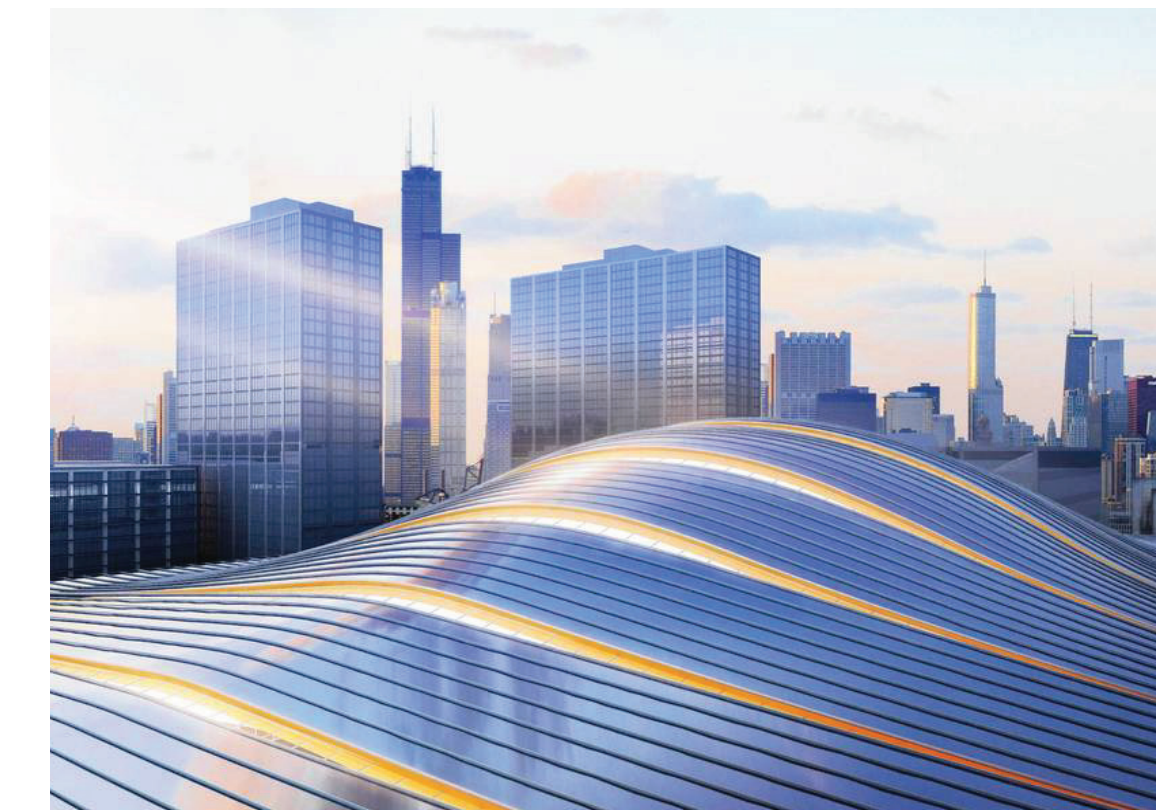
By the first monthly monitoring event, the performance wells met the remediation objective and maintained cVOC reductions throughout the monitoring period. The PlumeStop treatment has resulted in a quick, substantial (up to >96%) reductions in cVOC concentrations within the application area.

In monitoring well AW3-3, PCE was reduced from 490 µg/L to non-detect (100% reduction) and TCE was reduced from 1,600 µg/L to 28 µg/L (~98% reduction) following treatment. Monitoring well AW3-2 has observed TCE reductions of 98% and a total cVOC reduction of > 96% following treatment. Total cVOCs at all performance wells are below the remediation goals.

A marked increase in dehalococoides and reductive dehalogenase genes, tceA reductase vinyl chloride reductase was initially observed at this well as determined by QuantArray® analysis suggesting that bio-inoculation was successful. Biologically-mediated reductions of the low-level residual cVOCs that remain are expected to continue over the next 24 months as the soluble electron donor continues to provide a source of hydrogen for reductive dechlorination.



New construction on project site



Architect rendering of multipurpose arena



Architect rendering of multipurpose arena

Site Details

Site Type: Former industrial manufacturing plant
Contaminant of Concern: cVOCs, TCE
Remediation Approach: Sorption, Biodegradation, and Bioaugmentation
Soil Type: Silty Sand, Clay
Technology Used:

