REGENESIS®

PlumeStop & S-MicroZVI Barrier Reduces Chlorinated VOCs by 95% in 1 Month

Summary

PlumeStop® Liquid Activated Carbon and S-MicroZVI® were injected during the ongoing construction of a residential building complex. Despite spatial limitations to complete the work, the injection was successfully carried out, quickly reducing the concentrations of chlorinated volatile organic compounds (CVOCs) by 95% and removing the potential risk for vapour intrusion of CVOCs into the residential complex.

Case History

Project Site Details

Site Type
Residential construction property

Project Driver
Site Redevelopment

Contamination
CVOC concentrations in micrograms per litre (µg/L)*

tetrachloroethene (PCE)	3 µg/L
trichloroethene (TCE)	6 µg/L
cis-1,2-dichloroethene (cis-DCE)	6 µg/L
vinyl chloride (VC)	27 µg/L

*Maximum baseline concentrations of M75 and M82

Impact
CVOC Plume approaching new residential buildings

Geology
Sand

At an ongoing residential development in Southwest Sweden, low CVOC levels in the groundwater required a remedial solution to protect the newly constructed buildings against vapour intrusion. RGS Nordic (now: Sortera) asked REGENESIS for an *in situ* remediation solution.

The source area for the chlorinated solvents was beneath an existing building, where there were plans to remediate this at a future date. In the meantime, the current remedial goal was to prevent the CVOCs from migrating toward the new buildings. The CVOC plume was advecting through a water-bearing sand layer at 2 to 5 meters (m) below the ground level (BGL).

Major earthworks such as sheet piling, excavation, and groundwater pumping were ongoing as part of the construction project, and the remedy to mitigate potential CVOC vapour intrusion had to be closely synchronized with these works. Due to utilities and other structures, there was limited space to complete the remediation work, posing an additional challenge.

Remediation

Application Details

Treatment Approach
In Situ Chemical Reduction with PlumeStop in a permeable reactive barrier (PRB)

Technologies
PlumeStop, S-MicroZVI Barrier

Barrier Length	31 m
Vertical Treatment Interval	2 to 5 m
Injection Points	42
Injection Volume	32,000 L

Results
Reduction of CVOCs by 95%

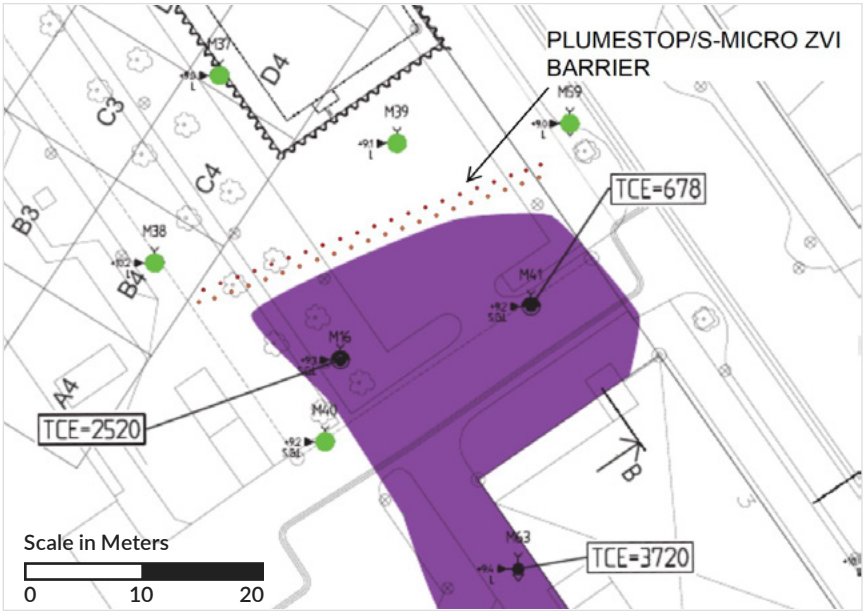
The *in situ* treatment consisted of injecting PlumeStop and S-MicroZVI as a permeable reactive barrier (PRB) at the leading edge of the CVOC plume. S-MicroZVI is a colloidal, sulfidated zero-valent iron that quickly and efficiently transforms chlorinated solvent contaminants into non-toxic degradation products via chemical reduction (i.e., abiotic) pathways. S-MicroZVI also lowers the oxidation-reduction potential in the treatment zone, facilitating natural CVOC biodegradation. PlumeStop is a colloidal activated carbon material that attaches to the aquifer matrix after injection, creating a vast adsorption surface that immobilizes the CVOCs. Together, these products slow the rate of CVOC movement by orders of magnitude to allow for their complete transformation into non-toxic end products within the barrier's limited confines.

Approximately 32,000 L of the colloidal PlumeStop and S-MicroZVI amendments were co-injected to form the PRB. The baseline CVOC concentrations at the time of application were between 15 and 40 µg/L in the area.

Figure 1

PlumeStop/S-MicroZVI PRB

The PlumeStop and S-MicroZVI PRB is shown in plan view near the leading edge of the CVOC plume.



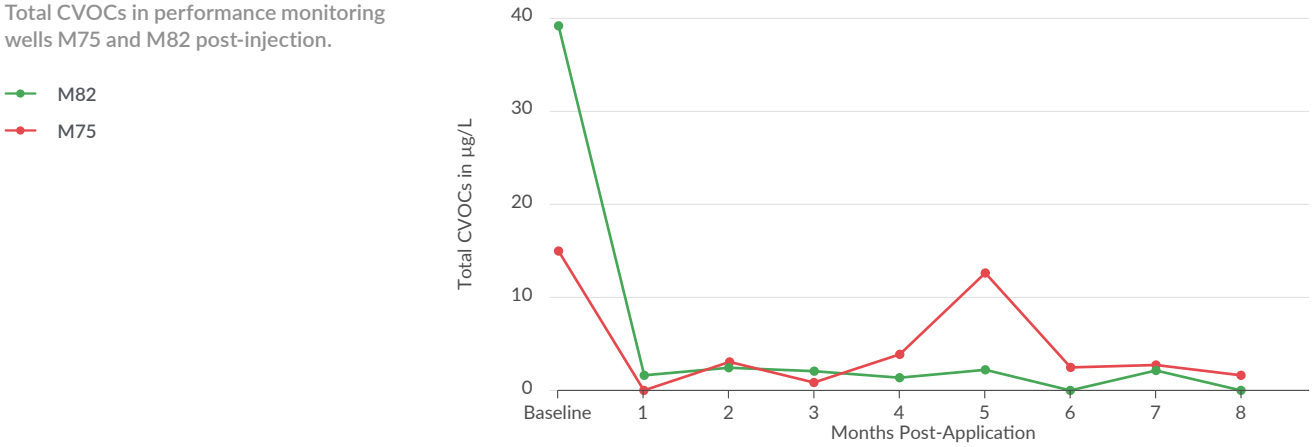
Results

After applying PlumeStop and S-MicroZVI, CVOC concentrations were reduced by approximately 95% within weeks of injection. The CVOC concentrations have been further reduced to near or below the detection limits in the barrier's two performance assessment wells (i.e., M82 and M75) through eight months of monitoring.

Figure 2

Total CVOCs (µg/L)

Total CVOCs in performance monitoring wells M75 and M82 post-injection.



Conclusion

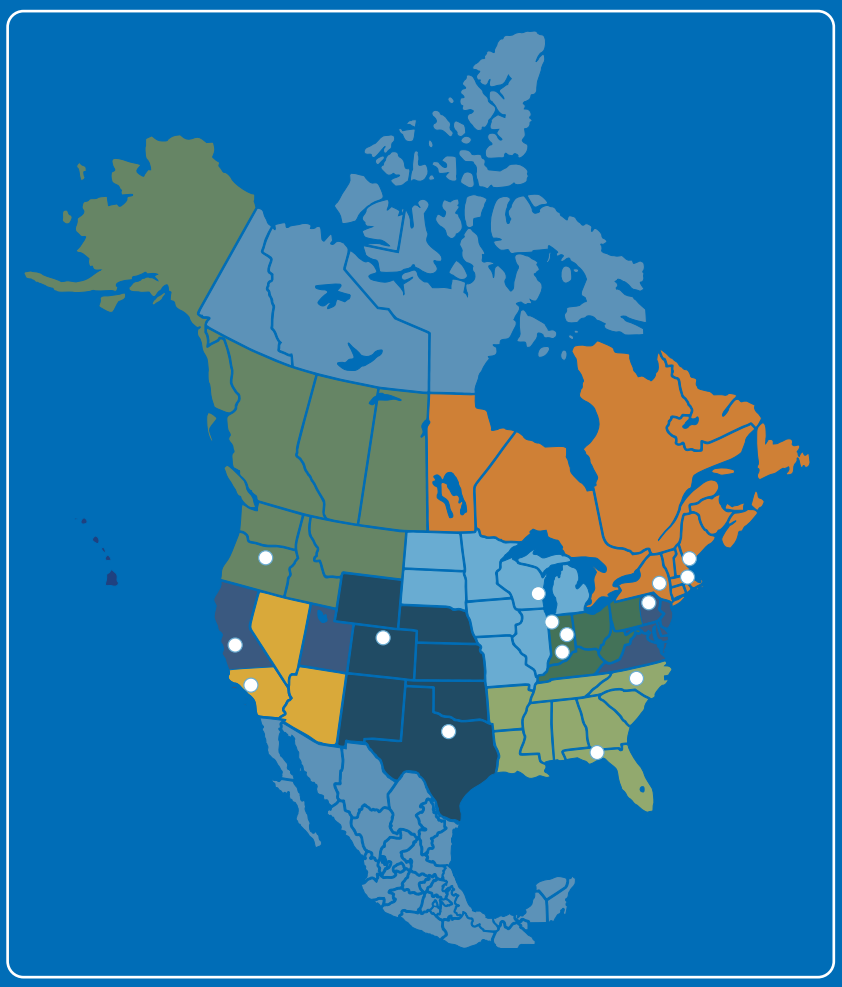
Project Reference:

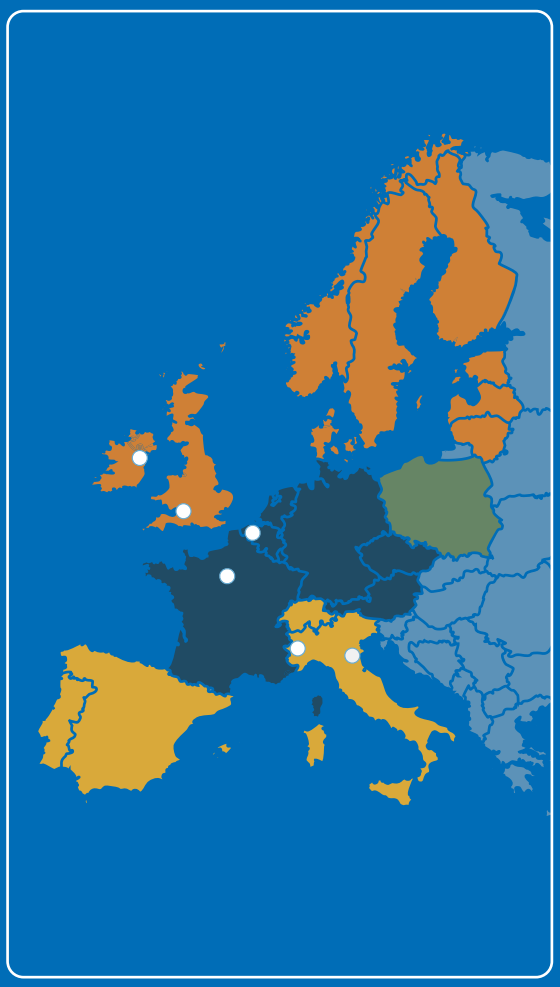
Helena Nord
Remediation Expert
Sheeba Environmental Engineering
helena@sheeba.eu

The colloidal PlumeStop and S MicroZVI amendments have rapidly reduced CVOC concentrations to below or near the detection levels at the PRB location. As a result, the treatment has effectively stopped the CVOC plume's movement toward the new residential buildings, drastically reducing the potential vapour intrusion risk. This *in situ* remediation solution also demonstrates an effective strategy for existing development projects and other areas with limited accessibility.

REGENESIS®

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





Global Headquarters

1011 Calle Sombra
San Clemente, CA 92673 USA

Ph: (949) 366-8000
Fax: (949) 366-8090

Europe

Bath, United Kingdom
Ph: +44 (0) 1225 61 81 61

Dublin, Ireland
Ph: +353 (0) 9059 663

Torino, Italia
Ph: +39 338 8717925

Ieper, België
Ph: +32 (0) 57 35 97 28

Visit www.REGENESIS.com to learn more.

REGENESIS®

www.REGENESIS.com