



Formerly Used Defense Site

Bio-Trap® Sampler

Summary

Media:	Groundwater
Study Type:	NA
Technology:	Accumulation
Peer Reviewed:	Yes
Publication Date:	August 2019

Study Description

The study site is a formerly used defense site in Independence Hill, Virginia, with chlorinated solvents plume in groundwater within saprolite with weathered and competent bedrock zones. There is greater than 10,000 µg/L of trichloroethene (TCE) in the weathered zone near source area.

The feasibility study included two rounds of biological testing to determine if in situ enhanced bioremediation (ISEB) was a viable remedial alternative. The first round included standard Bio-Trap samplers installed in 14 monitoring wells. The second round included a control (monitored natural attenuation (MNA)) unit and baited Bio-Trap samplers with a biostimulation unit (sodium lactate electron donor) and a bioaugmentation unit (live microorganisms with sodium lactate electron donor), with a pH buffer added as well.

Remedial Phase

The remedial phase feasibility/treatability study was done to determine viability of ISEB as a remedial alternative.

Outcome

Standard Bio-Trap samplers did not measure detectable levels of *Dehalococcoides* spp. (DHC) or DHC functional genes (*tceA*, *bvcA*, or *vcrA*), potentially due to low pH (3–5) during the sampling event. Baited Bio-Trap samplers detected high levels of DHC in all three units, attributable to addition of pH buffer, electron donor, and/or cultured microorganisms. DHC levels in baited samplers were above recommended effective rate of reductive dechlorination of 104 cells/bead of DHC (Lu et al. 2006). The study also found detectable levels of *tceA* gene and *vcrA* genes, indicating the presence of the enzyme responsible for reductive dechlorination of TCE to cis-DCE and from cis-DCE and VC to ethene. Results support the ISEB remedial alternative.

Case Study Source

A-Zone Environmental, LLC, and Hana Engineers and Consultants, LLC. Final Feasibility Study, Manassas Air Force Communication Facility, Independent Hill, Virginia. August 2019. Prepared for United States Army Corps of Engineers, Baltimore District and Norfolk District.

References

A-Zone Environmental, LLC, and Hana Engineers and Consultants, LLC. Final Feasibility Study, Manassas Air Force Communication Facility, Independent Hill, Virginia. August 2019. Prepared for United States Army Corps of Engineers, Baltimore District and Norfolk District.



A-Zone Environmental Services, LLC. Final Supplemental Site Characterization Report, Former Manassas Air Force Communication Facility, Independent Hill, Virginia. April 2018. Prepared for United States Army Corps of Engineers, Baltimore District and Norfolk District.

Lu, X., J.T. Wilson, and D.H. Kampbell. 2006. Relationship between *Dehalococcoides* DNA in groundwater and rates of reductive dechlorination at field scale. *Water Research* 40(16): 3131-3140.