

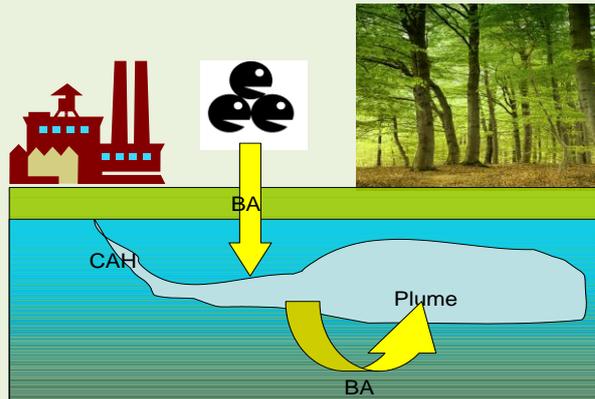


Full scale bioaugmentation for cost-efficient remediation of a large groundwater contamination with CAH

<http://www.bioaugmentatie.be>

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Motivation for the project

Groundwater contaminations with chlorinated aliphatic hydrocarbons (CAH) are very difficult and expensive to remediate with traditional remediation technologies. The Punch Metals site at Hamont-Achel is characterized by a large CAH groundwater contamination that has migrated 1km off-site, underneath a forest and has reached a depth of 50m. Punch Metals wants to remediate the off-site groundwater contamination in a cost efficient and environmentally sound way keeping the impact on the ecosystem low.

The conditions for engineered bioremediation are not optimal: injection of an organic substrate induced only partial dechlorination of PCE to DCE. By introducing specialized bacteria in the groundwater ('bioaugmentation'), full dechlorination may be induced.

The main objective is to demonstrate that bioaugmentation (BA) can be achieved for a large scale plume in a cost efficient way.

Project set-up

The remediation will be realized by adding microbial cultures, pre-grown in laboratory bioreactors, to the groundwater. This will enhance microbial populations in the contaminated groundwater, which will result in improved contaminant clean-up and reduced remediation time and costs. The bacteria will be spread across the plume by a new transfer methodology that will be developed.

There are 7 different actions :

- Obtaining permits and authorizations of the competent authorities;
- Selection and cultivation of appropriate microbial inocula for use on the site;
- Site preparation and small scale demonstration;
- Development of a microbial transfer methodology;
- Full scale implementation and demonstration;
- Monitoring of the full scale demonstration;
- Dissemination of the acquired knowledge



Microbial culture selection

Five microbial cultures, derived from different sites, and two organic substrates have been screened with a laboratory microcosm test. This has demonstrated complete dechlorination with bio-augmentation in the presence of the substrates *Nutrolase* (a residue from potatoe processing) and glycerol. The tests confirmed the need for bio-augmentation.

Based on their growth rates and dechlorination capabilities, two cultures were selected as being the most suitable for application in the field tests. They will be grown up on a larger scale in a fermenter.



Anoxic glove chamber
to test strictly anaerobic microbial cultures

Site preparation for containment

Before the start of bioaugmentation in the field, a containment system is installed to stop the off-site migration of the contamination and to cut off the influx of contaminants from the source area into the plume area where bioaugmentation will occur.

The site preparation includes the following:

- Installation of 3 extraction wells to a depth of 50 m-bgl at the downstream border of the contaminated area;
- Installation of 2 extraction wells to a depth of 35 m-mbg between the factory site and the forest;
- Excavation of an infiltration canal in the forest;
- Installation and operation of a groundwater treatment installation;
- Piping and electricity works to transport the extracted groundwater from the extraction wells to the groundwater treatment installation and to the infiltration canal.

More information?

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