



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

<http://www.bioaugmentatie.be>

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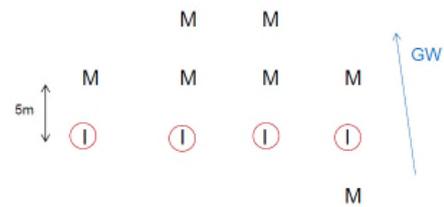
#### Small scale field test setup

After the successful push and pull tests (see newsletter 2), the feasibility of the technique needs to be tested on a larger scale. To do this, two small scale tests are conducted.

In total 7 monitoring wells and 4 injection wells are installed per small scale test. The distance between each well is approximately 5 m. The filter for the injection wells is 16-22 m-bgl, for the monitoring wells 18-20 m-bgl. A schematic overview of the small scale test is given in the figure right above.

As shown by the push and pull tests, glycerine is the best carbon source. Groundwater from the injection wells is extracted to add the substrate (glycerine) and is reinjected by means of a cubitainer under nitrogen head space. Since acidic groundwater conditions have a great influence on the speed of the dechlorination process, neutralization is required. This is done by adding bicarbonate.

The injection wells are injected bimonthly with 20 l glycerine and 25 kg bicarbonate.



#### Small scale test 1

##### Groundwater transfer from external site

As foreseen in the project one test is conducted with groundwater from a site with proven natural breakdown of CAH.

The TOC-content only augments after 3 to 4 injections of glycerine. Adding glycerine doesn't lead to a clear breakdown of PER and TCE to DCE as expected in 2 out of 4 injection wells. After adding the external groundwater (with appropriate bacteria) DCE is formed. After a while this DCE-concentration is dropping (together with PER and TCE) but without observing the formation of VC and/or ethane. Overall, the pollution is lower at the end of the test, but the (harmless) end products (ethane, ethane) are not observed.



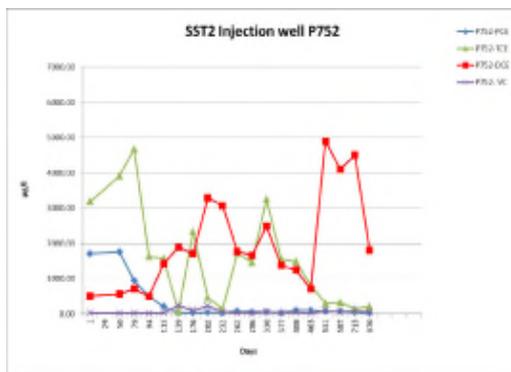
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## Small-scale pilot test with on-site groundwater transfer

Adding glycerine immediately leads to a breakdown of PCE and TCE with stagnation on DCE in the injection wells. This is in line with what was expected based on laboratory and push and pull tests. After adding the inoculum, further breakdown of PCE and TCE is present together with the formation of VC. 300 days after adding the inoculum, the formation of ethene is observed. For the monitoring wells little or no reaction is seen.

Regarding the injection wells the results are satisfying. PCE, TCE and DCE are being transformed in VC which then is transformed into ethane. The spreading of TOC is not observed and hence no reaction is seen in the first row of monitoring wells. Despite TOC is not spreading and there is no reaction in the first row, the two monitoring wells which are the furthest away show breakdown of PCE/TCE and formation of VC and methane.



## Full scale

The next step in the project is upgrading the small scale tests to full scale.

In a first phase 40 injection wells with filter from 16-22 m-bgl are installed with the associated piping to inject glycerine and bicarbonate.

First injections and monitoring are ongoing.



## More information?

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