

After six years of intense work it can be stated that, at the end of 2015, the project has reached a crucial phase.

The groundwater contamination with CAH (chlorinated aliphatic hydrocarbons) at the site of Punch Metals shows some particularities that necessitate a new approach:

- The size: about 500.000 m<sup>3</sup> contaminated groundwater, length contaminated zone: 1 km; this makes traditional remediation technologies too expensive
- The local conditions of the groundwater: low pH and no dechlorinating bacteria present in sufficient quantities
- Injection of only an organic substrate to stimulate indigenous bacteria induced partial dechlorination.



Contour of CAH

To make the remediation of this site possible, the cost of the bioaugmentation technology has to be reduced by:

- Selecting more suitable micro-organisms
- Selecting a cost efficient organic substrate
- achieving on site microbial growth to distribute injected bacteria across the entire plume
- for this a microbial transfer method from one injection well to another (under strict anaerobic conditions) has to be engineered.

At the end of 2015 the following project goals were achieved or conclusions made:

- 2 suitable microbial cultures were selected and grown up in a fermenter ( in total 200 l )
- These cultures were tested in the field on a small scale, they both induced complete dechlorination in the field
- Glycerol proved to be a better substrate than Nutrolase (protamylase)
- Without the addition of inoculum the breakdown of PCE stopped at the formation of DCE, but when the inoculum is added the reaction goes further into ethane (harmless)
- The transfer system under nitrogen atmosphere has been realised and has been used successfully in the field (picture below).



At this stage groundwater is being circulated from wells that have been bio-augmented to other wells in the full scale demonstration area which comprises 53 injection wells in total.