Partners

Coordination:

LVM NV (Tessenderlo, Belgium) is part of Tessenderlo Group and produces monovinylchloride (MVC), a raw material used for the production of polyvinylchloride (PVC). LVM employs 200 people (Jules Houtmeyers, Tom Claes).

Partners:

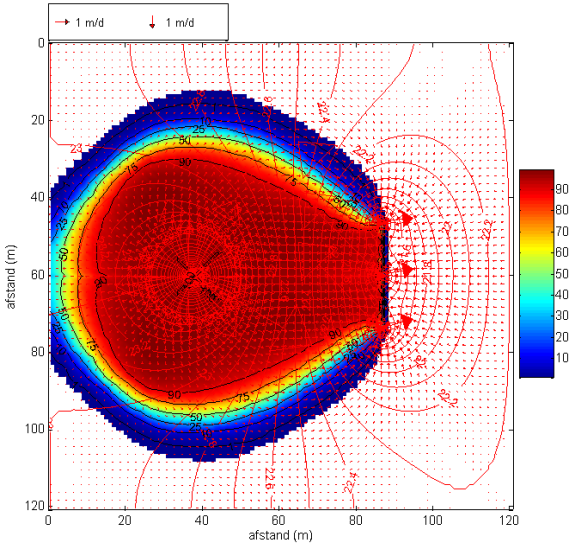
RSK Benelux bvba & ESA bvba (Willebroek, Belgium) are part of the RSK Group. RSK Benelux and ESA are specialized in providing innovative solutions for complex soil and groundwater problems. RSK Benelux and ESA employ 32 people (Lars Van Passel, Ine Arits).

AVECOM NV (Gent, Belgium) is a spin-off of the Ghent University. Avecom has expertise in research, development and tailor-made solutions for specific problems in microbial waste water treatment and soil remediation. Avecom employs 10 people. (Harmien Verstraete, Rik Daneels)

TESSENDERLO CHEMIE (Tessenderlo, Belgium) is part of Tessenderlo Group, a diversified, international group active in many areas of the chemical industry, plastics converting, gelatine, pharma and natural derivates and employing 8.317 people (Jules Houtmeyers, Tom Claes)

LVM-BIOcells is a project realized with the contribution of the LIFE financial instrument of the European Community (agreement number LIFE08 ENV/B/000046). The project has started on the first of January 2010. The expected end date is 31/12/2014.

EU – LIFE Project



Using hydrogeobiocells (HGBcells) for the in-situ biological treatment of CAH contaminated groundwater in areas with low hydraulic gradients (LVM-BIOcells)

http://www.lvm-biocells.be

Description

This LIFE+ project focuses on a cost-efficient, energy efficient and environmental advantageous innovative remediation technology that can be the solution for in situ remediation systems in areas with very slow groundwater velocities and large CAH contaminations that are difficult and very expensive to remediate with traditional remediation techniques.

At the LVM site the groundwater is contaminated with chlorinated aliphatic hydrocarbons (CAHs). These compounds are very difficult to remediate because of their physical and chemical characteristics. In most cases traditional remediation techniques are often inadequate, time-consuming and expensive.

Anaerobic dechlorination by soil organisms is a promising remediation approach for CAH contamination, if conditions are favourable or can be engineered to become favourable. The University of Ghent has carried out research which resulted in the isolation of '*Desulfitobacterium dichloroelimans* strain DCA-1'. This unique bacterial strain can biodegrade 12DCA to ethene without the formation of toxic intermediate products. Based on this bacterium, Avecom developed a multispecies dechlorinating culture that degrades 12DCA as well as other CAHs.

In order to be successful, in situ remediation techniques always require sufficient groundwater velocities. At the LVM site, groundwater velocities are very slow. The University of Ghent has developed a technique of hydrogeobiocells (HGBcells), which increases the groundwater flow velocity by a specific pumping and injection scheme and where no treatment of the contaminated groundwater is necessary.

Project Organization

The project will be carried out in different phases. In a first phase, the first HGBcell will be installed and operated in an area with CAH concentrations which allow the use of biostimulation (addition of carbon source). Next, the results of the first HGBcell will be used to calibrate the existing groundwater model. The calibrated groundwater model will then be used to adjust (if necessary) the dimension of the HGBcell and to determine locations for the other HGBcells. Consequently, HGBcells using biostimulation will be installed in deeper groundwater layers and in other areas with comparable CAH concentrations.

Together with the upscaling of the first HGBcell, the growth of the dechlorinating bacterial culture will be scaled up. This will be followed by the installation and operation of an HGBcell using bioaugmentation (addition of carbon source and bacteria) in an area where higher CAH concentrations are present.

Parallel with the third phase, the development of an anaerobic bioreactor will be initiated for the growth of the bacterial population on a large scale at the site of LVM. These bacteria will be used for the further application of bioaugmentation.

Monitoring of demonstration and dissemination of knowledge will be carried out during the entire project.

Demonstration

This project's objective is to demonstrate the applicability of an innovative, cost-efficient and energy-efficient remediation technique for groundwater contaminated with CAHs for a site characterized by low natural groundwater flow velocities.

The main targets of the project are:

1. To demonstrate the applicability of HGBcells using biostimulation and bioaugmentation for the remediation of a CAH groundwater contamination in areas where groundwater velocity is very low due to low hydraulic gradients;
2. To demonstrate the successful upscaling of the production of the dechlorinating microbial culture to be used in the HGBcell for bioaugmentation;
3. To demonstrate the cost and energy efficiency of the remediation technique (HGBcell) for the remediation of CAH contaminated groundwater;
4. To demonstrate the applicability of the groundwater model that was developed.
5. To share the acquired knowledge.

In addition to the demonstrative character of the project we will try to develop an anaerobic bioreactor for the growth of bacteria on large scale at the LVM-site. For this bioreactor, the same bacterial population as the one for the HGBcells will be used. This action is an opportunity for further development of the possibilities of bioremediation.