Deltares

Enabling Delta Life

BioSealing

a self-searching microbial sealing process

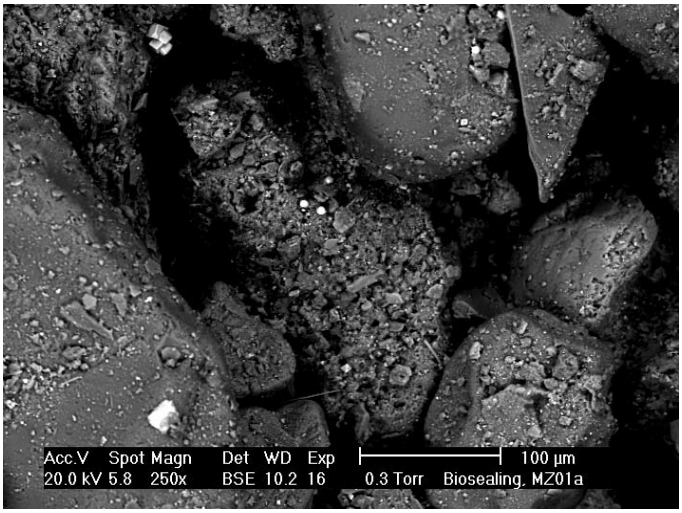
BioSealing

BioSealing offers a new perspective on repairing groundwater leakages. Bacteria that naturally occur in the soil form the basis for this self-searching, sustainable and durable method. Its simple technology makes BioSealing suitable for a wide range of applications. BioSealing is one of the processes which is developed within the SmartSoils® concept of Deltares.

Leakages in water retaining constructions or in natural impervious layers are a major problem for constructional and environmental applications. Leakages can cause higher drainage costs, damage to the surroundings because of settlements, saltwater intrusion, risk of piping, loss of water from reservoirs, and migration of (toxic) contaminants. Often, the identification of the location of the leak is complicated, the accessibility of the leak is poor and the costs of repair are high. Traditional methods to repair the leak *in situ* such as injection of grouts or chemical compounds are often expensive and have negative impact on health and environment. In addition, a large amount of these compounds has to be injected into the subsurface to reduce the overall permeability, because often the exact location of the leak is not known. It is desirable to solve these problems durably and sustainably. Therefore, Deltares has developed a self-locating sealing technology: BioSealing.

Innovative clogging

The main advantage of BioSealing is that the exact location of the leak does not need to be identified on beforehand; only converging ground water flow towards the leak is a requirement. In BioSealing, a nutrient-rich mixture is injected near the location of the leak. As the injected nutrients mix with the ground water, they are automatically transported towards the leak, resulting in an increase of bacterial activity near the leak location. A combination of biological, chemical and physical phenomena causes the clogging: chemical reactions induced by bacteria cause weathering of particles, simultaneously a biofilm is formed around the leak and captures the particles in the biofilm.



Captured clay particle

Proven Technology

Both laboratory and field tests have shown that BioSealing can successfully seal leakages in water retaining civil constructions like sheet pile walls. For all cases sealing was achieved within six weeks.

The different applications where BioSealing already has been applied:

- Pilot test at the Maasvlakte (NL) (2004): sealing artificial leakages in sea-containers
- Aqueduct Haarlemmermeer ring canal (NL) (2005): sealing leakages in natural clay and peat layers.
- Hydropower dam Greifenstein (Austria) (2008/2009): reducing seepage through a dam
- Haarlemmermeer polder (NL) (2009): reducing salt water seepage

Application in rock sealing

In addition to being used for blocking pores in the soil, the method is also suitable for sealing cracks and fissures in rocks and rocky materials, as was shown by Canadian scientists. Both national and international research is conducted to develop new applications for BioSealing.

Leak Management

Deltares has a good reputation in the management of leakages and leak detection methodology. We can offer you our expertise in solving your leakage problems (whether it is BioSealing or more traditional methods), and rest assured we can assist you during the whole trajectory: from leak detection and problem definition, to emergency measures and on site monitoring.

For further information please contact Deltares by
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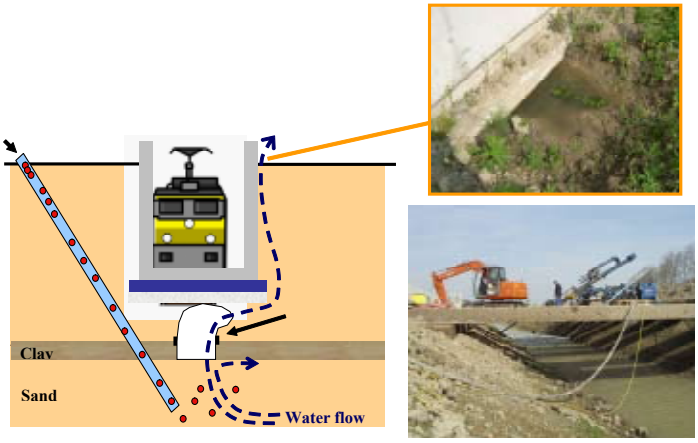

Pilot Aqueduct Haarlemmermeer ring canal

Installation injectionpoints in hydropower dam Greifenstein

Haarlemmermeer Aqueduct

Deltares
Innovative solutions for water and subsurface issues

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