A Novel Method converting Bentazone-contaminated Groundwater into Clean Drinking Water

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The safe and healthy Danish drinking water is threatened by pesticide contamination. Pesticides are found in 20 to 25 % of the drinking water abstraction wells (Thorling, et al., 2011) and previously 150 wells have been closed each year due to contamination (Brüsch, 2007). This has significant economic and environmental costs for Society in terms of identification of uncontaminated areas and installation of new wells, besides higher carbon dioxide footprint caused by deeper wells and longer transportation of water. Bentazone is the second most frequently found pesticide in the drinking water wells. In the last ten years the part of the Danish aquifer contaminated with Bentazone has increased to 5 % (Thorling, et al., 2011). It is a pesticide used in the agriculture thus it is spread in large areas making a diffuse contamination that cannot be controlled or removed at the source.

This project present a novel method for clean-up of pesticide contaminated chalk aquifers by natural microbial degradation enhanced by addition of oxygen. It is a solution for in-situ decontamination of the areas used for groundwater abstraction. Laboratory experiments are conducted mixing natural chalk and groundwater from locations around Copenhagen. It is investigated if bentazone is degraded by organisms naturally present in groundwater from bentazone contaminated aquifers. Furthermore it is examined if the removal rate is governed by the amount of oxygen present in the aquifer.

The enhanced remediation of bentazone-contaminated groundwater wells can be carried out simply by supplying the chalk aquifer with oxygen. The solution is economical, social and environmentally beneficial as:

- The present wells can be used for future abstraction of safe and clean drinking water.
- The method is based on natural occurring processes using no xenobiotic chemicals.
- The clean-up will improve the general state of the groundwater aquifer reducing the negative impacts from the use of pesticides.

Further work is ongoing to show that the oxygen concentration in an aquifer can be increased sustainably by intelligent pumping of the wells. The aim is to utilize naturally occurring oxygen infiltrated with rainwater. As an advantage the existing wells can be used in order to keep the costs low and save environmental resources.

Brüsch, W. (2007). Almene vandværkers boringskontrol af pesticider og nedbrydningsprodukter – *Arbejdsrapport fra Miljøstyrelsen Nr. 26*. Miljøstyrelsen

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