

IN-SITU BIOREMEDIATION OF HIGH NITRATE CHALK AQUIFERS

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High nitrate concentrations have a major impact on the availability of groundwater for potable supplies. The costs of conventional surface treatment methods can be high and where possible, blending high and low sources is a preferred supply option in the UK. With increasing nitrate concentrations in groundwater, alternative, cost-effective and sustainable treatment technologies will be required to combat the problem in the foreseeable future. Enhancing the intrinsic denitrifying capacity of aquifer systems to reduce nitrate could therefore offer major technical, economic and environmental advantages over conventional treatment solutions or blending. This technology offers a sustainable approach to nitrate removal without the generation of waste streams. Successful laboratory-scale studies (undertaken by WRc plc and Imperial College London) have used flow through microcosms to develop data sets for the parameterisation of a biochemical transport model. The results of this study have been encouraging, and have successfully facilitated quantitative modelling of the denitrification process for the first time using British aquifer material. This paper presents a brief overview of the denitrification process (stimulated by addition of organic carbon), and outlines the transition from laboratory studies to the implementation of a pilot in-situ field trial currently being managed by WRc. The field trial, initiated in March 2002 aims to examine process optimization, and to assess the technical feasibility of in-situ nitrate bioremediation in Chalk groundwaters. As yet there are insufficient data to enable detailed interpretation, but initial indications are encouraging.