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# Bioremediation of Contaminated Aquifers: Current Status and Future Challenges

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ABSTRACT

Recent field studies have shown that various microbial populations naturally present in groundwater aquifers have the ability to degrade anthropogenic chemicals such as petroleum compounds and chlorinated solvents. These observations have lead to the development of different types of bioremediation technologies for cleaning contaminated aquifers.

Deployment of bioremediation systems at a field-scale includes two distinct design approaches: the passive bioremediation approach and the active bioremediation approach. The passive approach is now also known as the natural attenuation or monitored natural attenuation (MNA) approach. The natural attenuation approach is a passive long-term management strategy, which relies on the natural assimilative capacity of the system to control contaminant migration rates and support site remediation goals. The active bioremediation approach, on the other hand, is an accelerated cleanup strategy which is usually accomplished by enhancing the activities of an indigenous or a non-indigenous microbial population within the contaminated region. In the first section of this presentation we will briefly review the design details of various bioremediation technologies. In the second section we will focus on the monitored natural attenuation technology and illustrate the use of various analytical and numerical tools (e.g., USEPA decision support tool BIOCHLOR and the USDOE's numerical model RT3D) for managing field-scale natural attenuation systems. Details of a field application which was developed based on the PCE/TCE natural attenuation data collected from the Dover Air Force Base Area-6 site will be discussed. Limitation of the current technologies and some future research opportunities will also be discussed.

of the co-authors of USEPA's bioremediation screening tool BIOCHLOR.
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