Potential strategies for supressing bacteriogenic sulphide reduction

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Bacteriogenic sulphate reduction (BSR) is a process mediated by sulphur reducing bacteria (SRB). It is common in anoxic aquatic environments, including: freshwater and marine basins, soil, groundwater, and even petroleum reservoirs. The production of dissolved sulphide and/or free H_2S gas associated with BSR can have a detrimental impact on soil and shallow groundwater quality, since those products enhance corrosion and could be toxic to environmental receptors. BSR involves the reduction of dissolved sulphate (SO_4), which is utilized by SRB as an alternative electron acceptor during the oxidation of labile organic matter, such as sewage effluent or hydrocarbons. The comparatively high average temperature of soil and shallow groudwater in Saudi Arabia enhances the rates of sulphide production, and augments the negative impacts of BSR. It may be suppressed and/or or eliminated by targeting specific microbially mediated processes, and/or substrates that favor/maintain BSR. A detailed study — of the water chemistry and the microbiology of the sulphate reducing bacteria associated with BSR — is therefore essential to the development of potential remediation strategies.

This presentation will focus on the latest results and implications of a study of the redox conditions, terminal electron acceptor contents and ratios, and the $\varepsilon^{34}S_{\text{sulphate-sulphide}}$ of waters from BSR impacted sites. It will also discuss the scope of a microbiological study, needed for the development of an effective BSR supressing strategy/technology.