Natural Attenuation of chromate in the Hyporheic Zone

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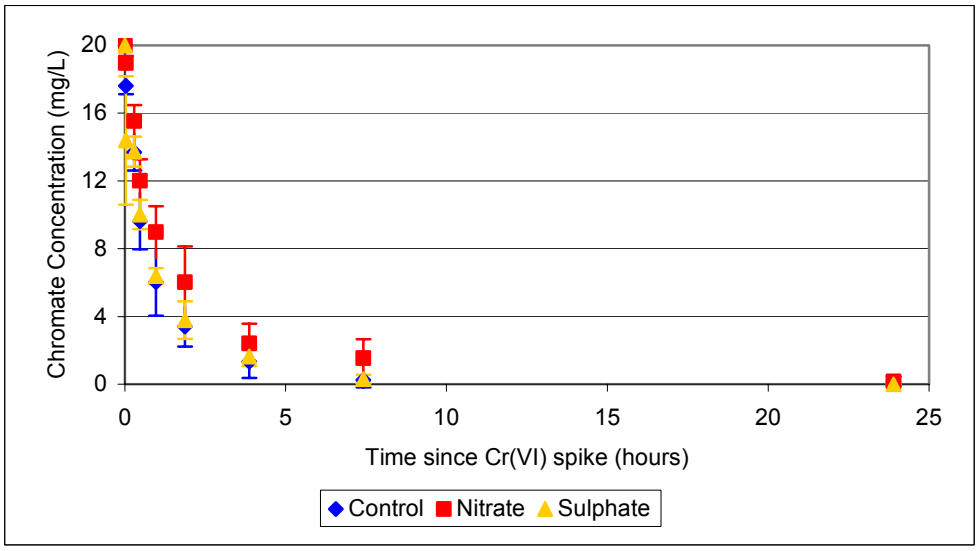
Discharge of groundwater, polluted by industrial activities, into surface water courses can have serious environmental impacts. However, it is possible that the groundwater is remediated, through natural attenuation, as it passes through the hyporheic zone (HZ) – the zone beneath & adjacent to a river in which groundwater & surface water mix. HZ sediments are relatively rich in organic carbon & microorganisms, compared with most aquifers & microbial transformations will probably affect the pollutant transport between an aquifer & the HZ. However, the nature of the microbial communities in the HZ, & their effect on redox-sensitive pollutants such as Cr(VI) is poorly understood. Cr(VI), widely used in industrial processes such as tanning, metallurgy & plating, is toxic & carcinogenic; in the environment it is soluble & mobile & so poses a significant environmental risk. The aim of this project is to determine the influence of microbes on the transport of Cr(VI) through the HZ. Elucidating its behaviour will provide an insight into the wider geochemical systems of the HZ, as well as resolving Cr-specific issues.We are currently investigating the mechanisms of Cr(VI) transformation by HZ microorganisms & their role in the biogeochemistry of Cr(VI), combining chemical analysis techniques, microbiology & geochemical modelling. This will lead to an assessment of the role of microbes in attenuating an important pollutant in the HZ & will also provide insights into the likely importance of the HZ for attenuating other pollutants, representing an important step towards quantifying the attenuation capacity of this zone.

Anerobic sampling of groundwater from the HZ of the River Tame



Removal of Cr(VI from solution in HZ sediments