Natural attenuation of gasoline hydrocarbons from residual sources containing ethanol

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Abstract Natural attenuation limits the length of dissolved plumes emanating from gasoline contaminated sites and is commonly applied as a remediation technique. As ethanol is often used as a gasoline additive, it can potentially impact the biodegradation of aromatic hydrocarbons from gasoline. Three gasoline residual sources with different ethanol fractions were placed in a pristine aquifer to evaluate the impact of ethanol in gasoline on hydrocarbon biodegradation. Numerical modelling was applied to compare dissolved plumes formed from each source. Biodegradation was found to be adequately represented by Monod-type kinetics, with oxygen being the main limiting factor. The greater overlap between the ethanol and hydrocarbon plumes in the high (95%) ethanol fraction caused a significant reduction in hydrocarbon biodegradation.

Key words ethanol; gasoline; natural attenuation; numerical modelling