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Microbial Community Analysis of Sulfolane Contaminated Groundwater, Treatment Systems, and Biodegradation Incubations

Sulfolane, an industrial solvent used to de-acidify natural gas and selectively remove lighter aromatics from petroleum, has a high affinity for water and is found in aquifers surrounding sites where it has been improperly handled. Recently, a sulfolane plume located in North Pole, Alaska was identified as being the largest groundwater contaminant plume in the state; spanning roughly 5.5 by 3.2 km and affecting hundreds of residential wells. Drinking water toxicology studies have found sulfolane to affect liver, kidney, and marrow functions in laboratory animals. My previous experiments revealed that microorganisms indigenous to the contaminated aquifer are capable of biodegrading sulfolane, however the identity of these organisms and their prevalence throughout the aquifer have not yet been elucidated. I have sequenced the 16s amplicon in substrate from the end of these biodegradation incubations and will compare the microbial community to parallel control incubations to identify potential degraders. We also have 16s amplicon data from an air-sparging treatment system which injects oxygen into the aquifer, granular activated carbon filtration systems which sorb the contaminant out of drinking water, and 150+ groundwater monitoring wells throughout the plume. Microbial community comparisons will be made between treatment systems and to biodegradation study data and environmental variables in an attempt to identify trends in microbial community composition and drivers of variability.