Bio-Electrochemical Systems to Monitor Biodegradation around Groundwater Plumes

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This study introduces a straightforward and cost-effective Bio-Electrochemical System (BES) design that can be easily retrofitted into a borehole. The design uses standard bailers and Granular Activated Carbon (GAC) to create electrodes. These electrodes are connected across redox environments in nested boreholes. The electrodes were installed in pre-existing boreholes surrounding a groundwater plume at a gasworks site. The BES at the plume fringe had the highest electrical response and showed variations in the bacterial and archaeal taxa between the anode and cathode electrodes. The other BES configurations in the plume center and uncontaminated groundwater showed little to no electrical response, suggesting minimal microbial activity. This approach enables rapid decision-making to effectively monitor degradation at groundwater plumes.