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In-situ regeneration of carbon based injectants with endemic biofilms

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Background Statement: Activated carbon (AC) has long been used to remove organic impurities from liquids and air. Generally, in the environmental field, we store AC inside vessels and then pump groundwater or air, contaminated with volatile organics, through the carbon vessel. This process injects AC into the contaminated mass itself to remediate the contaminants *in-situ*. AC has an affinity for organic chemicals, such as petroleum hydrocarbons, and organic chemicals will physically bond (absorb) to the micropores of the AC through Van der Waals forces. Once the chemicals are adsorbed to the carbon's surface, the process generally can be reversed only by heating the carbon to very high temperatures, by use of a solvent, or through microbial processes. AC has been found to remain stable under extreme environmental conditions for long periods of time. The purpose of this study is to evaluate methods to stimulate biofilm formation to regenerate *in-situ* AC.

Methodology: Laboratory contaminated soil columns are injected with AC and various additives to stimulate biofilm formation throughout the AC. Each different soil type was then evaluated for types of microorganisms forming the biofilm and their effectiveness in regenerating the AC.

Findings: Different soil types produced the same basic biofilms composed of the same four basic organisms predominating with various subcultures specific to the area and soil type. All biofilms could regenerate the AC *in-situ*.

Conclusion: Biofilms can be formed *in-situ* within the AC area and in the process of biofilm formation the AC is regenerated for continuous remediation *in-situ*. Cost implications are significant for this remedial tool.

Biography

Dennis Owens is the president and senior chemist/microbiologist at Sustainable Water Technology. He has worked in the environmental remedial field since 1985 developing and commercializing remediation technologies for various companies in Canada and the United States.

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