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Controlling Microbiological Processes for In Situ Contaminant Treatment

-Groundwater remediation is the process that is used to treat groundwater by removing pollutants. There are different groundwater remediation methods, but they all have the same goal: clean polluted water. One method is bioremediation wherein a biological system is employed for removing environmental pollutants. In situ remediation of subsurface contaminant plumes via microbiological methods require the injection of microbial substrate. Injection of these substances increases the likelihood of rapid microbial growth near the injection site. This rapid growth produces bioclogging as the soil pores are filled with microbial biomass and microbial products. Bioclogging reduces the permeability, porosity, and overall treatment of subsurface contamination. The effects of bioclogging are especially pronounced in large diffuse groundwater plumes where contaminant concentrations are not present at sufficient levels to sustain metabolic growth thus necessitating the injection of microbial substrate. A method is needed that allows for greater overall contaminant treatment and reduces bioclogging near injection sites.

Researchers at Arizona State University and Haley & Aldrich, Inc. have developed a method for decreasing microbial biomass of in situ bioremediation systems. In order to avoid the systemic issue of bioclogging, this method employs a dose-dependent enzyme-specific inhibitor which allows for operational control in the subsurface, thus enhancing biodegradation effectiveness.

Potential Applications

- Groundwater remediation sites
- Other in situ bioremediation systems
- Can be used by remediation companies, environmental consultants, federal/state agencies, and other industry leaders

Benefits and Advantages

- Provides greater operational control over bioclogging with an enzyme-specific microbial inhibitor
- Effectively removes trichloroethene (TCE) contaminants
- Less environmentally intrusive, energy intensive, and cost prohibitive