

Targeting Rendered Animal Co-Products to Transform Environmental Contaminants (2018-011)

Rendered animal co-products allows for increased contaminant transformation rates

Market Overview

Rendered animal co-products can be used as electron donors to stimulate microbial respiration of reducible environmental contaminants including the chlorinated solvent trichloroethylene (TCE) and the metal hexavalent chromium. This strategy allows for inexpensive treatment, and increased contaminant transformation rates. More than 100 million people are affected by environmental contaminants worldwide. Rendering animal co-products converts these high fat and protein wastes into stable, usable materials that can be utilized to remove contaminants from groundwater. Most of the current electron donor amendment technologies are based solely on soybean oil. These commodities are very expensive and are oftentimes ineffective in transforming contaminants because they utilize lipid-only electron donors. A Clemson University researcher has developed a technology that effectively increases the contaminant transformation rates by using rendered animal co-products that contain lipid plus protein. By using rendered animal co-products instead of lipid-only electron donors, the cost for bioremediation technology is significantly decreased and degradation rates are improved.

Technical Summary

The proposed bioremediation design incorporates rendered animal co-products that can be used in specific arrangements or "as is" to improve the rates of contaminant transformation. In addition to this, the use of rendering co-products including bone meal, free fatty acids, brown greases, yellow greases and poultry fat have been shown to increase the rates and extent of contaminant transformation. The proposed substrates created by rendered animal co-products act as electron donors and are added to contaminated aquifer material to stimulate the microbial degradation of contaminants including chlorinated solvents (e.g. TCE), metals, explosives, and agricultural chemicals.

Application

Bioremediation; environmental contaminants

Development Stage

Proof of Concept

Advantages

- Rendered animal co-products act as electron donors, stimulating microbial respiration of reducible environmental contaminants
- Animal co-products contain lipids plus protein, improving contaminant transformation rates
- Greatly reduces cost of bioremediation technology, providing a cost-effective way to transform contaminants
- Rendered co-product electron donor cost can be 10-20% of conventional electron donors

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Patent Pending	United States	62/690,573	NA	2018-011	Dr. Kevin Finneran

About the Inventors



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Dr. Kevin Finneran is an Associate Professor of Environmental Engineering and Earth Sciences and Microbiology at Clemson University. He obtained his Ph.D. in Microbiology from the University of Massachusetts at Amherst. Prior to joining Clemson, Dr. Finneran was an Assistant Professor at the University of Illinois at Urbana-Champaign (2004-2010). He also worked as an Environmental Microbiologist with GeoSyntec Incorporated (2001-2004). Dr. Finneran was named Kavli Fellow of the National Academy of Science in 2014; this award recognizes young faculty considered leaders in their respective field. His research focuses on anaerobic microbial ecology and the role microbial physiology plays in biodegradation, as well as combined biological-chemical reactions that increase the rate and extent of contaminant transformation. Dr. Finneran also owns and manages Finneran Environmental, LLC, which is a specialty remediation consulting firm.

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