Science, Technology & Research Institute of Delaware: STRIDE

Remediation of soil and water contaminated with Poly- and PerFluoroAlkyl Substances (PFAS)

The Problem: The widespread use of PFASs since the 1950's has led to the detection of these substances in a variety of environments including soil, surface and waste water, landfill leachates, wildlife, plants, and even humans. These synthetic compounds are very persistent and are found at low levels in the environment and in the blood of the general US population, are expected to remain in people for a long time, and have been found to cause developmental and other adverse effects in laboratory animals.

Due to these concerns, the U.S. EPA has issued health advisory levels in drinking water of 70 ppt for two PFAS compounds out of more than 3000 compounds that have been manufactured. However, it is anticipated that as toxicology studies on these other PFASs are completed, additional health advisories and regulations will be established regarding allowable PFAS concentrations not only in drinking water, but also in wastewater treatment plant effluents, landfill leachates, soils, sediments, and sludges. Regulatory pressure is increasing with different states issuing their own health advisories. The California Division of Drinking Water established a notification level of 14 parts per trillion for perfluorooctanoic acid (PFOA) and 13 parts per trillion perfluorooctanesulfonic acid (PFOS). The New Jersey Department of Environmental Protection has also set similar drinking water standards.This regulatory pressure, combined with increasing reports of PFAS in wells and consumer awareness of hazards of chemical exposure, are driving the need for economically viable and effective solutions.

The Challenge: The biggest deficiency for treating PFASs is the lack of treatment options. An effective treatment needs to 1) target any and all of the potentially thousands of different PFAS compounds that could be in an environment, 2) treat PFASs in a variety of very different environments, (e.g. drinking water, ground- and surface water, soil, landfill leachate, etc.), 3) completely destroy the PFAS compounds instead of just concentrating them, and 4) be reasonably inexpensive and easy to operate. Currently, the only available technologies are sorption or filtration which transfer PFAS out of the environmental matrix, but result in a secondary waste that must then be treated. Additionally, these technologies can only be applied ex-situ, or outside of the contaminated soil/water matrix, meaning that water must be pumped out of the ground and treated before being returned to the ground. Sorption and filtration treatments are not applicable to in situ, or in-the-ground, treatments.

How STRIDE can help:

STRIDE is developing a BioElectrochemical System (BES) that can be used for in-situ remediation with the aim of achieving significant cost savings. The system is expected to be self-sustaining as the only required inputs to the system are microbes, electricity, carbon dioxide, and proprietary mineral nutrients.

Contact us to learn more at research@stride2future.org