2017
University of Kentucky Superfund Research Center
Research Translation Seminar

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Poly- and perfluoroalkyl substances (PFAS) in groundwater: An overview of chemistry, sources, fate/transport, and remediation

Featured Speaker
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Poly- and perfluoroalkyl substances (PFAS) have faced increased scrutiny by federal and state regulatory agencies, impacted populations, mainstream media, and social media. For example, the EPA recently issued lifetime health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) in drinking water of 0.7 µg/L. Some states have opted to regulate PFOS, PFOA, and additional PFAS in drinking water at similar or lower levels, emphasizing a need for a complete understanding of sources, fate/transport, and toxicology as well as effective tools for groundwater remediation. PFAS are compounds with unique chemistry that can include surfactant properties, resistance to degradation, and both hydro- and lipophobicity. As a result they have been used in a variety of consumer and industrial products including non-stick cookware, food paper packaging products, stain repellant sprays, and firefighting foams. These same properties also lead to the extreme recalcitrance of some PFAS in the environment. This recalcitrance coupled with widespread use has led to global low-level PFAS distribution, with more elevated concentrations in groundwater measured near some sources such as manufacturing facilities and fire training areas. Once released, fate and transport will be governed by processes such as sorption and precursor transformation and may be influenced by the presence of contaminant mixtures. To date, studies of conventional in situ methods such as chemical oxidation have found these approaches incapable of full destruction of the wide range of PFAS found in subsurface environments, so ex situ techniques may be more appropriate for addressing immediate remediation requirements. Studies of PFAS at the lab, bench, and field scale provide insights into the current state of science and biggest challenges still faced in understanding fate, transport, and remediation of this unique class of compounds.

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NIH National Institutes of Health