PFAS Technologies and Methods for Characterizing PFAS Mass Flux at Groundwater Surface Water Interfaces

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The behavior of PFASs in the environment is very complex; for example, most PFAS compounds are resistant to biological degradation processes, sorb to sediment and microplastics, exhibit self-assembly behavior, partition into non-aqueous phase liquid (NAPL), and concentrate at air-water interfaces. Furthermore, many scenarios where PFASs are released to the environment are notably different and can be more complex than common release scenarios for other groundwater contaminants (e.g., petroleum hydrocarbons, chlorinated solvents, metals). At many sites, PFAS impacts occurred through the uncontrolled release of aqueous film forming foam (AFFF) from former or current fire training areas (FTAs). Other scenarios include the application of PFAS-impacted biosolids to agricultural fields, use of PFAS-containing ski wax at ski areas, and discharge of PFAS-containing industrial wastewater to surface waters. PFASs are also discharged to the atmosphere through stack emissions at industrial facilities, and a recent study has quantified total PFASs in the 10 to 1,000 ng/L range in rainwater at multiple locations across the United States. The combination of these factors results in complex contaminant distributions at sites, with transport across multiple media types (e.g., soil, groundwater, surface water, sediment), and more potentially completed exposure pathways. As a result, there are many sites where contaminant assessment and management of PFASs at the groundwater-surface water interface (GSI) will be necessary. This presentation will highlight specific examples where PFAS transport between groundwater and surface water is important and summarize current practices and developing techniques and technologies for characterizing and monitoring PFAS mass flux in groundwater and at GSIs.