Treatment Train for Removing PFAS from High Concentration Stormwater

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Background/Objectives. Historic fire training activities using aqueous film forming foam (AFFF) have resulted in PFAS releases to soil and groundwater which has migrated to a county stormwater drainage system (SDS) via stormwater runoff and venting groundwater impacted with parts per billion (ppb) concentrations of PFAS. The SDS discharges to a municipal sanitary sewer and the effluent of the wastewater treatment plant (WWTP) discharges to a river which is considered a drinking water source. Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are the primary focus of regulatory concern; however, the state is developing criteria for other PFAS chemicals. Identification of PFAS impact in sediment and stormwater has become more common due to regulatory agency sampling requirements and permit renewal requiring PFAS analysis. Treating impacted stormwater presents significant challenges including prefiltration of biological load and suspended solids and the likelihood of high flow volumes from heavy storm events. This presentation is a case study of an ex-situ treatment system that captures stormwater from the SDS and utilizes a robust pre-treatment approach followed by ion exchange (IX) resin treatment before discharging back to the SDS.

Approach/Activities. Due to limited space on the facility, IX resin was selected as the PFAS removal technology due to its smaller footprint to handle higher flow rates. PFAS removal by IX resin is more sensitive to influent water quality than granular activated carbon and requires robust pre-treatment. The treatment train to handle the stormwater includes an 18,000-gallon weir tank to settle out solids, an automatic backflushing sand filter system, a bag filter assembly, and three media vessels containing single-use IX resin. The stormwater collection system includes installation of a sump in the SDS, submersible pumps, and piping. The entire system is winterized (including heated spaces, insulation, and piping heat tracing) to allow year-round operation. Performance monitoring includes monthly PFAS sample collection and quarterly sampling of scaling, TDS, TSS parameters to ensure compliant and reliable operation. The current system is designed to handle approximately 100-gallons per minute of stormwater, with plans to expand to accommodate treatment of larger storm events.

Results/Lessons Learned. The initial treatment analytical results will be shared and expounded upon. Lessons were learned from real-world IX treatment of stormwater as well as some unexpected lessons associated with implementation during a post-Covid world including.