Full-Scale Treatment of PFAS-Impacted Wastewater Using Ozofractionation with Treatment Validation Using TOP Assay

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Background/Objectives. Loss of a concentrated aqueous film-forming foam resulted in PFAS impact to infrastructure and nearby surface water. The infrastructure included a domestic/industrial sewer system and a stormwater system which service numerous industrial facilities. The sewer and stormwater systems were subsequently isolated to prevent further impact to the environment. Approximately 6 million liters (ML) of wastewater and 6 ML of stormwater were collected and contained in tanks. The objective of the project was to treat collected water to a concentration of less than 0.25 µg/L Sum of PFASs (28 compounds) as measured by total oxidizable precursor (TOP) assay. The project is the first example of use of ozofractionation for PFASs and for performance to be validated using TOP assay.

Approach/Activities. The combination of high organic load and foam concentrate in the collected water created a complex treatment challenge. Arcadis and Evocra teamed to design and install an innovative ozofractionation treatment process. Ozofractionation utilizes ozone to create bubbles that separate and concentrate PFASs in an aqueous solution. The high surface area created by ozone micro-nano bubbles allowed effective removal of PFASs to the foam fraction. The ozone provided oxidation capacity to break down the organic load of the sewage. The process also efficiently handled and separated suspended solids. The primary waste generated from the process is a concentrated aqueous PFASs stream. The system was designed for a treatment capacity of 5,000 L/hr, and given the urgent nature of the application, a full-scale system was designed, installed and commissioned in four weeks.

Results/Lessons Learned. The Evocra ozofractionation process demonstrated the ability to treat high PFAS concentrations up to 4,000 µg/L as well as handle the high organic load and other co contaminants of the mixture of raw domestic and industrial sewage. A reduction of greater than 99.9% as measured by sum of PFASs (28), TOP assay, was routinely achieved. The system reliably removed long-chain and short-chain PFAS down below 2 µg/L. To reach the final treatment objective, a membrane filtration system was installed to reduce concentrations reliably below 0.25 µg/L TOP assay.