The CHRONICLE

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TRANSPORTATION EDITION

Solving the PFAS Water Treatment Riddle

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Design of water treatment systems typically start with a set of criteria that form the basis of design. These include a set of assumptions and performance standards used to determine a conceptual design that balances the needs of short-term and long-term considerations and costs.

Treatment of per- and polyfluoroalkyl substances (PFAS) in drinking water, groundwater and surface water has created unique challenges due to evolving scientific understanding and uncertainty regarding the environmental and human health risks, which drive treatment standards. Decision paths have become unclear due to these uncertainties, as well as sometimes volatile public perception.

More than ever risk management and non-engineering considerations are influencing decisions regarding the design of PFAS treatment systems. Additional uncertainty is associated with whether the federal government will list PFAS as a hazardous substance. The managing and disposing of spent IX and GAC could significantly impact capital and operating costs should this change occur.

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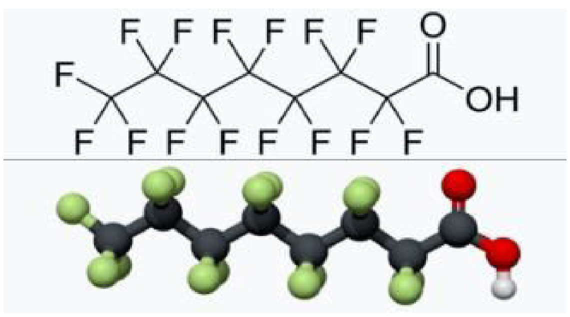

Solving the PFAS Water Treatment Riddle...

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Design engineers will now have to address several challenges to determine treatment options:

Challenge 1 - which PFAS? Reportedly there are over 5,000 PFAS. 1,200 PFAS historically and 602 currently have been used in the US. USEPA provided a Health Advisory Standard for two PFAS; PFOA and PFOS. New Jersey has regulations for three PFAS: PFOS, PFOA, and PFNA. More PFAS compounds are likely to be regulated by USEPA and/or States. The design can change based upon which PFAS are required to be treated.

Challenge 2 - which Media? New Jersey's three water body classifications are: Drinking Water; Groundwater; and Surface Water. One PFAS known as PFNA has an established Maximum Contaminant Level of 13 ppt for Drinking Water and Groundwater. PFOA and PFOS both have interim Groundwater limits of 10 ppt, but no Drinking Water standard. New Jersey has no current PFAS Surface Water standards.

Challenge 3 - how Clean? Here we enter into the realm of risk management and a little guess work based on understanding the regulatory "trade winds". Some communities are taking the guess work out of the decision and demanding the most conservative non-detection route. If future science shows higher concentrations are acceptable then long-term operations costs should decrease. However, this approach usually results in higher capital costs.

Ion exchange (IX) resins and granular activated carbon (GAC) are the predominant treatment technologies currently being used either in single-use or regenerative versions. IX and GAC are both adsorption technologies. Naturally occurring compounds and co-contaminants can compete for capacity of GAC and IX resins. Understanding raw water chemistry is critical in evaluating which approach is best and if any pre-treatment steps are necessary. In addition, GAC and IX are not mutually exclusive, and all IX resins and GAC are not equal. Some systems are using GAC as a sacrificial pre-step to remove high levels of total organic carbon and the IX as the primary removal step for the PFAS. Blending of multiple raw water sources with different PFAS concentrations is also an acceptable practice that can be integrated into the overall treatment design.

GPM, a Montrose Environmental company, utilizes bench- and pilot-scale testing as part of the treatment design process to develop accurate scale-up projections and cost estimates. However, critical water systems moving directly to full-scale system may be necessary. Addressing drinking water PFAS contamination is difficult and still evolving. Water suppliers should retain engineers with both water supply experience and deep PFAS technical/regulatory knowledge to ensure that a safe and cost-effective solution is achieved for their system.