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Article

PFAS: How Industry is Using Technology to Leave a Cleaner Legacy

Where would modern life be without the innovations of industry? As the engine of economic growth and technology, we rely on industry for everything from food packaging to artificial intelligence.

Behind industrial processes is a critical partnership with water — for cooling, cleaning, processing, and transport. That connection makes industry a crucial player in safeguarding this vital resource.

But this partnership comes with responsibility, especially as new challenges emerge. According to a new report by the Waterkeeper Alliance, per- and polyfluoroalkyl (PFAS) chemicals have been detected in 98% of the waterways tested across 19 states in the United States. A key upstream source of PFAS contamination is industrial activity, which can affect groundwater, surface water, stormwater, and wastewater.

Industrial companies that step up now — to identify, quantify, and remediate PFAS discharge — can be the ones shaping the standards others will follow.

INDUSTRY RISES TO THE PFAS CHALLENGE

At inception, PFAS were a technological breakthrough, giving us improved firefighting ability and new, cutting-edge products in the home and elsewhere. Now, newer technology must step in to remediate the environmental contamination that has occurred as a result of their use.

PFAS compounds are complex; even in water that has similar PFAS profiles and co-contaminants, the organic load might be very different. In addition, there are short-chain and precursor PFAS that are largely not detectable using current EPA methods.

This was the situation recently facing a large chemicals company, which had a high waste stream flow containing both short- and long-chain PFAS. The water also contained salts, metals, and other organics, some in high concentrations — a difficult matrix to deal with. Furthermore, the effluent treatment objectives were very low.

Montrose identified and quantified the key contaminants and devised a remediation plan that included the design and assembly of one of the largest PFAS treatment systems ever built globally.

"We often take a crawl, walk, run" approach explains Dave Kempisty, Vice President, Technology at Montrose Environmental Group. "First, we use our lab and forensic teams to analyze industrial wastewater for the PFAS of interest to detect both legacy PFAS and emerging compounds like GenX, down to the lowest detection levels, as well as co-contaminants.

"Simultaneously, we're testing the treatment technology at the bench-level. We'll then move to a pilot scale on the premises under field conditions to test out the treatment technology. This can be short in duration or in place for several months to understand seasonal variation and process fluctuations. We are continually refining and optimizing during this period, too. Then we set up and run the full and final treatment solution on site."

TECHNOLOGY POWERS THE SOLUTION

In this case, Montrose implemented its innovative SORBIX™ RePURE technology, a proprietary ion exchange technology with regenerable resin. This solution that produces significantly less waste, uses a lot fewer filtration media, has a smaller footprint, is arguably safer for workers, and uses less energy.

For PFAS removal, the treatment passes impacted water through ion exchange media particularly selective to the PFAS molecules, thus removing them from the water. Montrose further developed the technology, enabling the regeneration and reuse of the ion exchange beads through distillation and SuperLoading™. Crucially, the technology tackles both long- and short-chain PFAS.

"It's an example where we've leveraged technology and worked with the client to understand their exact need," explains Dave. "We have an offering that is unmatched in the industry. It's worked so well that we are now installing it at three of this client's facilities.

"The client has achieved its aggressive PFAS reduction goals ahead of schedule with our technology and is well-positioned to meet even more ambitious reduction goals in the future."

DELIVERING MEASURABLE RESULTS

Part of the remediation process involves being able to prove to regulators that the technology has worked, as JP Verheul, Technical Solutions Team Lead explains:

"We took one of our newer methods and modified it, then validated it to test for these ultra-short chains. The client could then demonstrate that they were effectively removing these ultra-short chain PFAS that were a concern both to the discharger and to the regulator."

Regulation is an ever-shifting landscape, and the EPA is increasingly looking to identify and regulate upstream sources of PFAS entering municipal treatment plants, such as groundwater, surface water, stormwater, and wastewater, all areas where targeted monitoring and remediation can make a measurable difference. This regulatory pressure affects different industries in unique ways, requiring tailored solutions.

Tackling legacy PFAS contamination is not the only challenge. The fast-growing semiconductor industry is currently powering the leaps in artificial intelligence, but to date, its manufacture still requires the use of PFAS.

"We've done a bit of exploration into specific industries that rely on PFAS as part of their manufacturing process," says Dave.

"We're understanding their treatment objectives as well as future environmental needs. Our service needs to be pro-environment but also supportive of economics; we need to be 'pro-solution', so it works for industry and the environment."

Industry has a pivotal choice to make. Continue reacting to regulatory pressure and public scrutiny, or take control of the narrative by leading on PFAS treatment and transparency. As Montrose's approach shows, the tools exist to do more than comply. They allow industrial companies to innovate, reduce liability, and shape what environmental responsibility looks like for the decade ahead.

Companies that respond decisively will help set the future direction of the sector — balancing innovation with accountability.