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May 3, 2024

- PFAS -

"Forever Chemicals" 2024 Update

Source: Weston Solutions

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Overview

On April 10, 2024, The EPA issued its final limits for per- and polyfluoroalkyl substances (PFAS), the "forever chemicals," in drinking water, and shortly after, on April 19th, designated select PFAS compounds as hazardous substances. This will provide unique and timely investment opportunities for several select water treatment suppliers and publicly traded water utilities, and we take this occasion to revise and update our 2023 whitepaper "*PFAS- An Overview of the "Forever Chemicals."* We also note that we held a PFAS Symposium in September 2023 (See: "*Gabelli 2023 PFAS Symposium Reflections"*), and will be holding our second symposium on September 26, 2024.

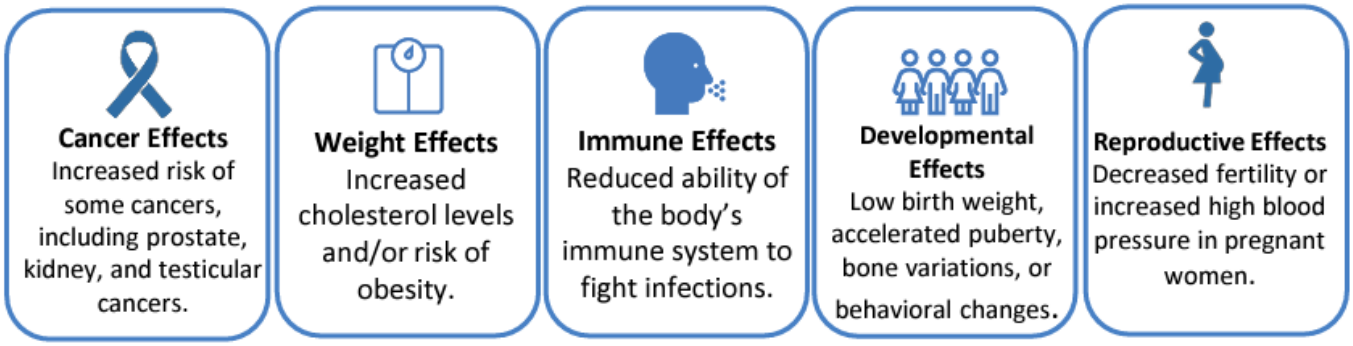
PFAS has become an increasingly significant environmental and public health concern due to their persistence and inability to naturally degrade. To meet the final EPA regulations of 4 parts per trillion (ppt) for Perfluorooctanoic acid, or PFOA, and perfluorooctane sulfonic acid, or PFOS, the two most common PFAS found in drinking water, the nation's water and wastewater utilities will require roughly $50 billion of capital investment over the next 3-5 years and an additional $1-2 billion of annual operating expense. The EPA also issued stringent limits on three other PFAS compounds, and limits on mixtures of compounds.

Enforcement of the regulation will lead to increased demand for treatment equipment and capacity restraints on the available engineers, contractors, and suppliers to build the required treatment. We expect the suppliers of the three most recognized effective treatment technologies (activated carbon, anion exchange, and membrane filtration) and suppliers of novel remediation technologies to be beneficiaries given the significant increase in demand. We also expect the nation's water utilities to benefit from the enhanced rate base growth and increased acquisition opportunities.

According to the EPA, PFAS are a group of nearly 15,000 environmentally persistent, man-made chemicals used in industrial and commercial applications including firefighting activities, grease resistance, water repellents, and non-stick cookware, among others. Currently there are over 600 PFAS compounds which are EPA-approved for sale or import into the United States. These molecules, with a chain of linked carbon and fluorine atoms, are valued for their high resistance to oil, water and heat. Due to their widespread use, PFAS are being found at low, ambient levels in the environment.

PFOA and PFOS are two of the PFAS often found in drinking water. They are legacy compounds, phased out or no longer manufactured in the U.S. and Europe, but they are still present in the environment. The presence of PFAS compounds in several water sources, including drinking water, is of increasing public concern due to their environmental persistence, and perceived health concerns. As per the National Center for Biotechnology Information, PFOAs are estimated to be detectable in the blood of more than 98% of the U.S. population. Research shows that they increase cholesterol level, affect the immune system, affect fertility and child development, and increase risks of certain cancers including prostate, kidney, and testicular cancers. As more research is being done on PFAS, it indicates that it can cause health risks even at very low levels, which is why regulations to reduce exposure have become a large focus for the EPA in the US and around the world.

Exhibit 1 – PFAS Potential Risks

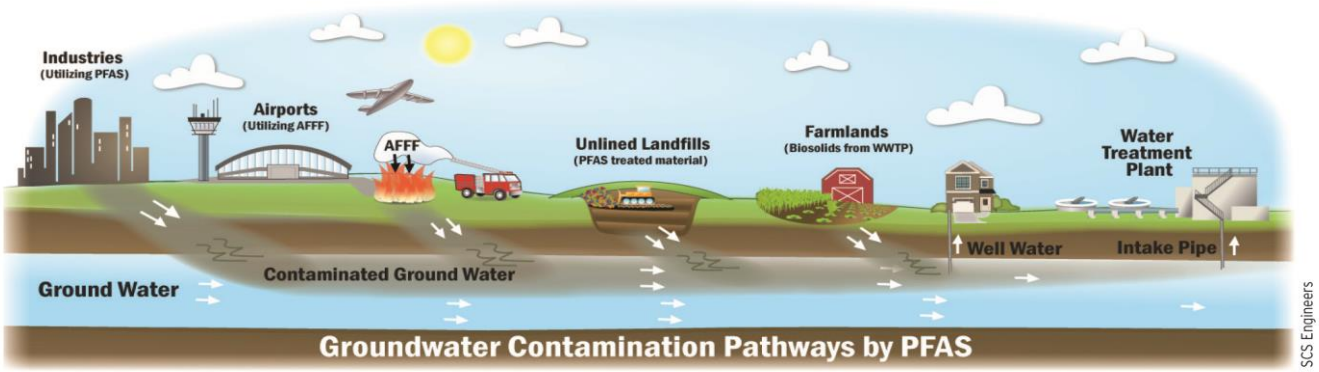


Source: EPA

Routes of Contamination

PFAS contaminates groundwater through various pathways such as industrial discharges, firefighting foams, landfills and waste sites, farmlands, and accidental spills (Exhibit 2). Most PFAS concentration is found in the environment around military bases, firefighting training locations, commercial airports, and former manufacturing facilities where they seeped into the local water supplies. The above occurs due to leakage, irresponsible disposition of waste, products dumped into rivers, and/or their presence in firefighting foams, which either seep into the ground, or are carried to surface water by rain.

Exhibit 2 **PFAS Groundwater Contamination Pathways**



Source: Bluetoad.com

Uses of PFAS and their Derivatives

The first PFAS were invented in the 1930s as the main ingredients in nonstick and waterproof coatings according to the Interstate Technology & Regulatory Council; they were initially used to protect military equipment from damage by the environment. The development of these chemicals increased in the late 1960s after a deadly fire aboard a US Navy aircraft carrier, the USS Forrestal in 1967. Soon after the accident, manufacturers and scientists developed PFAS-containing aqueous film-forming foam (AFFF); a mixture that rapidly extinguishes fires and is highly effective against petroleum fires and other flammable-liquid fires when mixed with water. PFAS-containing AFFFs was subsequently installed on military and civilian ships, airplanes, and airports.

The compounds have wide-ranging applications and are highly utilized due to their ability to repel oil and water. They are found in many products such as the following, among others:

- Teflon non-stick cookware
- Carpeting as stain-resistant
- Upholstery
- Leather
- Paints
- Paper & packaging (food packaging such as pizza boxes)
- Apparel/textiles (weather repellent; waterproof clothing)
- Floor wax
- Firefighting foams
- Sealants
- Chrome plating/electronics manufacturing/oil recovery

Exhibit 3 **Where are PFAS Found?**

Source: EPA

Regulations

On April 10, 2024, the EPA issued its long-awaited national standard for PFAS in drinking water. The final regulation (originally proposed in March 2023) established 4 parts per trillion (ppt) as the legally enforceable level for PFOA and PFOS. Notably, 4 ppt is the lowest level that current technology can detect. In addition, it outlined limits of 10 ppt for Perfluorohexane Sulfonic Acid (PFHxS), Perfluorononanoic acid (PFNA), and Hexafluoropropylene oxide-dimer acid (HFPO-DA, commonly known as GenX chemicals), and limits of 1.0 (unitless) hazardous index for mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS. The hazard index is a calculation based on the amount of each compound detected weighted by its associated risk factor. Following this final ruling, water utilities in the US will have three years to implement testing/detection measures (April 2027), and two years following these initial steps to implement remediation/treatment equipment if they are out of compliance with the limits (April 2029).

Exhibit 4 **EPA Issues Final Limits for PFAS in Drinking Water**

	Current EPA Limits	Proposed Limits 3/29/23	Final Limits 4/10/24
PFOA	None	4.0 ppt	4.0 ppt
PFOS	None	4.0 ppt	4.0 ppt
PFHxS	None	1.0 (unitless) Hazard Index	10.0 ppt
PFNA	None	1.0 (unitless) Hazard Index	10.0 ppt
HFPO-DA (commonly known as GenX Chemicals)	None	1.0 (unitless) Hazard Index*	10.0 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	None	None	1.0 (unitless) Hazard Index

* The Hazard Index is a tool used to evaluate potential health risks from exposure to chemical mixtures

Source: EPA, Gabelli Funds

Also in focus is the EPA's designation of PFAS as hazardous materials under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and under the Resource Conservation and Recovery Act (RCRA). CERCLA authorizes the President to respond to releases or potential releases of hazardous materials into the environment, and RCRA gives the EPA the authority to control hazardous waste from cradle to grave.

In February 2024, the EPA proposed rules to designate 9 PFAS compounds as hazardous wastes under RCRA, which if adopted, would automatically classify them as hazardous substances under CERCLA. On April 19th, the EPA officially designated PFOA and PFOS as hazardous substances, meaning any entity that handles the materials will become liable for the recovery and remediation costs of potential environmental releases. This will require additional actions from waste management companies to avoid seepage from landfills and the subsequent contamination of ground water, and from any user of PFAS materials to employ services for hazardous waste and internal controls.

How Much Will it Cost?
The American Water Works Associations (AWWA) estimates that the national cost to install treatment facilities and processes to remove PFOA and PFOS to EPA's proposed levels exceeds $47 billion, will be approximately $35 billion above the amount required to meet current state established PFAS limits (Black & Veatch study). Furthermore, it will require more than $700 million annually for operations and maintenance costs to test and monitor for compliance; this is $500 million more than the amount required to meet current state-established PFAS limits. These dollar values are significantly higher than the EPA's estimates. The cost of compliance (capital and operating costs) will be very specific to each system and is likely to be significant in the most affected areas of the country. At our September 2023 PFAS Symposium, AECOM estimated the PFAS market to amount to $250+ billion of liability.

- **American Water Works (AWK)**, the nation's largest publicly-traded water utility, initially estimates over $1 billion of capital investment to install additional treatment facilities over a 3 to 5-year period and $50 million of annual operating expenses related to testing and treatment. The company believes that more than 100 of its existing drinking water treatment facilities will need to be upgraded to provide PFAS removal capability. AWK's operating utilities in most of its states are currently plaintiffs in the Multi-District Litigation against multiple PFAS manufacturers and believe that the ultimate responsibility for the cleanup of these contaminants should fall to those who created the problem.

- **SJW Corp (SJW)** SJW Group plans to invest more than $1.6 billion ($332 million in 2024) in capital over the next five years to build and maintain its water and wastewater operations, which includes $230 million to install PFAS treatment. SJW expects to comply with regulations and is a party to multiple class action lawsuits with PFAS manufacturers.

- **Essential Utilities (WTRG**) WTRG's 2024-2028 capital program totals $7.2 billion, which includes $450 million for PFAS compliance. In 2020, WTRG set internal target of 13 parts per trillion for multiple PFAS chemicals compared to EPA health advisory level of 70 parts per trillion. In 2021, the company completed a state-of-the-art environmental laboratory, to test for PFAS chemicals in PA, and advanced a litigation strategy to force the polluters to pay the cleanup costs. WTRG expects to complete mitigation by 2027.

How to Fund Capital and Ongoing Operating Expense?
We expect the nation's water utilities to fund the capital and operating expense through a combination of federal and state money, lawsuit settlements, and increases in customers' rates. The National Association of Water Companies (NAWC) advocates that the EPA and other policy makers hold polluters accountable, exempt all water and wastewater systems from PFAS financial liability, ensure compliance by all water utilities – whether privately or municipally owned - and allow access by all to federal and state funding. Without a legal settlement, the significant cost of complying with that regulation would be borne entirely by customers. Further, we expect that states and state public utility commissions (PUCs) will treat these expenditures for regulated utilities as federally mandated requirements that are recoverable in customer rates through expedited means.

The 2021 Infrastructure and Jobs Act made $10 billion available to help municipal utilities address emerging contaminants, but the amount is insignificant relative to the huge capital necessary to address the nation's capital needs. The NAWC is calling on Congress and the EPA to enact laws and regulations to ensure that those who manufactured and used PFAS chemicals are responsible for funding cleanup and treatment and protect water and wastewater customers from having to fund further cleanup efforts

Forever Chemicals' Manufacturers Settlements
On June 2, 2023, it was announced that DuPont (DD) and spin-offs Chemours (CC) and Corteva (CTVA) reached a comprehensive settlement in principle of $1.185 billion to resolve PFAS claims with respect to U.S. water systems over the contamination of drinking water supplies. Under the agreement, Chemours will pay $592 million, DuPont around $400 million, and Corteva $193 million to resolve the claims related to public water systems that serve the vast majority of the U.S. population and would cover an estimated 88% of water utilities. The settlement received final approval in February 2024.

There are also smaller natural resource lawsuits from individual state claims that the companies have been settling, including a $110 million settlement from the three companies with the State of Ohio in November 2023.

On April 30, 2023, 3M (MMM) received preliminary approval for a $10.3 billion in a settlement for its part in the manufacture of PFAS impacted U.S. water systems. This settlement received final approval in March for 3M to pay $10.3 billion over 13 years, with a cap of $12.5 billion if additional significant contamination is found.

The $11.5 billion combined water systems settlements would cover roughly 15 years of the projected costs of complying with EPA's proposed drinking water regulation, which the EPA estimates would cost utilities $772 million annually. However, as noted, cost estimates by the utility industry are substantially higher. NAWC believes this is a step in the right direction, and it will continue to monitor the ongoing discussions around PFAS. Concerns over the disproportionate impacts on smaller municipal water utilities in rural communities remain, and there are sure to be further legal challenges.

Rate Base Growth. A national PFAS standard enhances water IOUs long-term growth as it results in stronger rate base growth and will likely accelerate consolidation. We expect the higher environmentally-mandated capital needs to be recognized by state PUC's through constructive cost recovery of environmentally mandated capex. Some states (10) already have PFAS regulations and some water IOUs have established goals (i.e. WTRG already treats to 13 ppt) but none are as stringent as the 4 ppt rule. For reference, PA and NJ (two of AWK's largest jurisdictions) have MCL standards for PFOA/PFOS in the mid-teens ppt range.

Remediation and Treatment
There are currently three recognized effective treatment technologies for PFAS removal from contaminated water: activated carbon, ion exchange, and membrane filtration. Removal efficiency depends on the properties of the influent being treated but each of these treatment methods has demonstrated removal efficiencies of up to 99%.

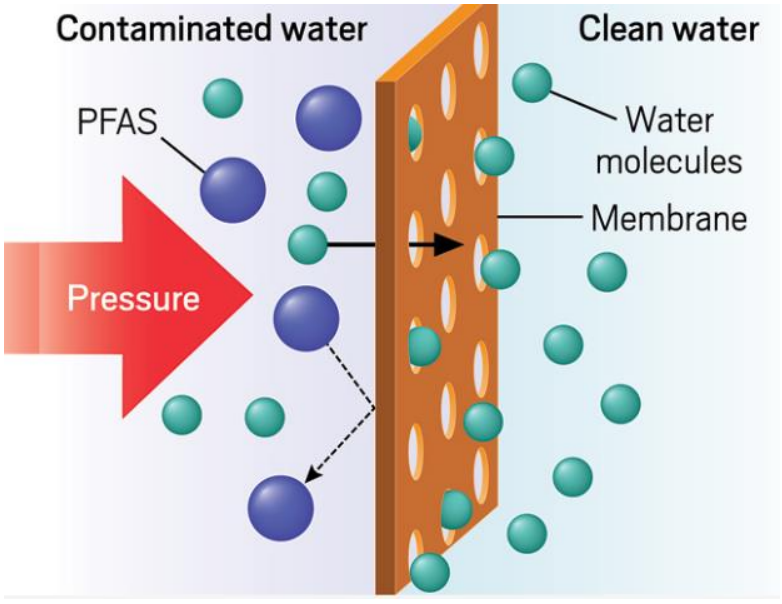
- **Activated carbon technologies** include both granular activated carbon (GAC) and powdered activated carbon (PAC). GAC and PAC rely on the adsorptive properties of the activated carbon media: contaminants are adsorbed into the pores and held onto the surface of the carbon. PAC is typically utilized in scenarios where contaminant removal must be implemented quickly. It is typically added in the rapid mix tanks of a water treatment plant or as a separate material to allow a contact period for adsorption during existing unit processes. The principal design factor for GAC reactor contactors is the empty bed contact time (EBCT), which is the residence time of the water in contact with the media. Typical GAC EBCT for PFAS treatment ranges from 10 to 20 minutes, depending on the targeted PFAS. EPA indicates that GAC filtration can remove 99% of PFOA and PFOS. The cost of GAC treatment can range from thousands to millions of dollars depending on the size of the treatment system, the flow rate of water, the concentration of PFAS, and the desired level of treatment. Costs include the purchase and replacement of GAC media, system installation, operation, and maintenance.

Exhibit 5 **Granular Activated Carbon Treatment**

Source: Calgon Carbon

- **Membrane filtration** treatment of PFAS can be accomplished using either nanofiltration and/or reverse osmosis (RO) membranes. The process of membrane filtration involves passing pressurizing influent in contact with membranes with small pores. The semi-permeable membrane is only permeable to water molecules, so PFAS will be restricted and concentrated in the reject stream. The treatment flow rate of the process is limited by the pressure and level of dissolved solids. In contrast to GAC/PAC and IX, membrane filtration has demonstrated PFOA and PFOS removals of greater than 99%. Removal of other PFAS varied from 84% up to 99% removal but was typically above 98%. Reverse osmosis uses energy to push water through a membrane with tiny pores. The membrane stops many contaminants while allowing water to pass through. Reverse osmosis is more practical as a point-of-use treatment option (not at point-of-entry). These systems are effective for PFAS removal, but they tend to be more expensive to operate compared to other treatment methods. Costs depend on the system size, water flow rate, and PFAS concentration. Capital costs for RO systems can range from tens of thousands to hundreds of thousands of dollars, and ongoing expenses include energy, membrane replacement, and maintenance.

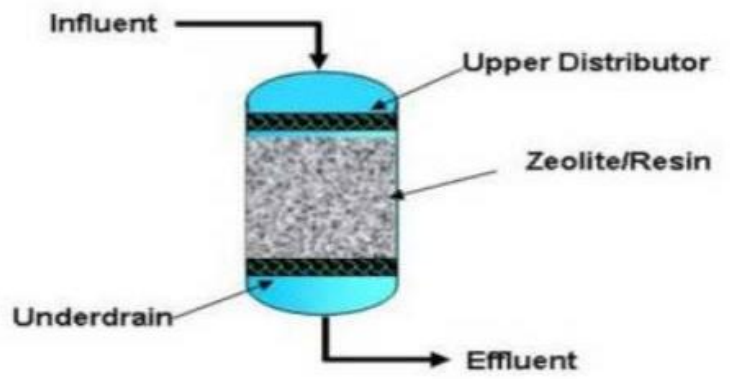
Exhibit 6 **Membrane Filtration Diagram**



Source: Quench

- **Anion exchange**, typically called ion exchange, or IX, operates in the following manner: negatively charged ions in the water are exchanged with negatively charged ions on the resin surface – typically chloride. Like GAC treatment, the IX process must be designed based on EBCT. The typical IX EBCT for PFAS treatment ranges from 2 to 5 minutes. As the IX media removes PFAS, the media's negative ions will eventually be exhausted and will need to be regenerated or replaced after safe disposal of the exhausted media. Costs can range from tens of thousands to hundreds of thousands of dollars. Additionally, expenses for resin replacement, operation, and maintenance should be considered.

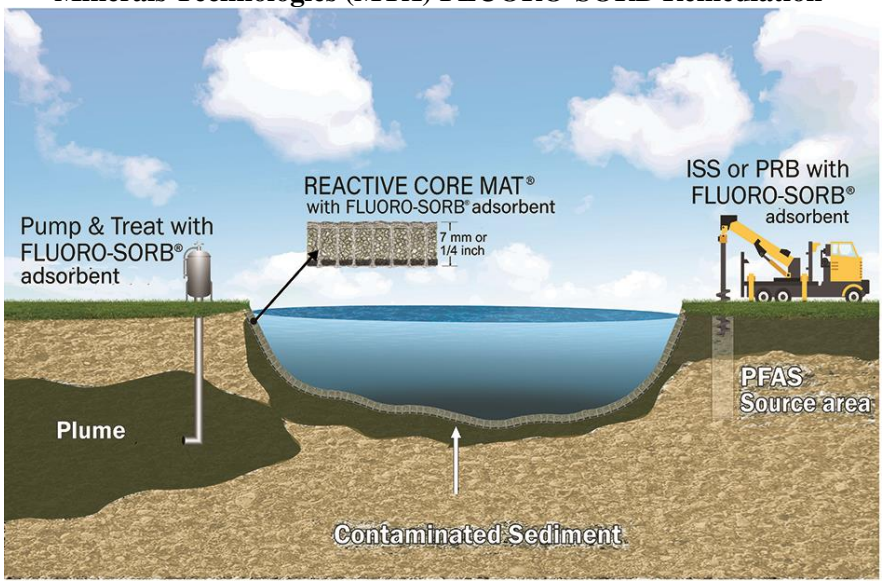
Exhibit 7 **Anion Exchange Diagram**



Source: GZ Industrial Supplies

- **FLUORO-SORB®** – A novel technology is being introduced by CETCO, a division of Minerals Technologies (MTX). Like the process for activated carbon technologies, but using a proprietary NSF-certified material, FLUORO-SORB®, Minerals Technologies believes its product is 3-4x more effective and more economical than activated carbon. Based on groundwater studies and vetted by research universities, FLUORO-SORB® can be used in existing filtration systems for both drinking and ground water, and with empty bed contact time as low as three minutes. In addition, it can be used as a permeable reactive barrier for groundwater and source control, for in-situ stabilization and solidification, and as a sediment cap for soil/sediment remediation. Furthermore, CETCO is planning to manufacture filtration systems and field test them with utility and waste companies.

Exhibit 8 **Minerals Technologies (MTX) FLUORO-SORB Remediation**



Source: Minerals Technologies

- **Supercritical Water Oxidation (SCWO)** – SCWO is a destruction technology that can treat PFAS containing water, waste, and other liquid materials including landfill leachate and AFFFs. At high temperatures (>374 °C), a level at which water is considered supercritical, organic solubility is increased and the oxidation processes are accelerated. This method has been previously used to destroy other hazardous substances in water. According to the EPA, tests done have shown a greater than 99% reduction in PFAS using this destruction method.

Companies which would benefit by offering PFAS remediation services include:

- **374Water Inc. (SCWO-$1.21):** $160mm market cap. 374Water is a global cleantech technology provider which addresses environmental pollution challenges. As noted by its ticker and name, it developed AirSCWO, a waste stream treatment system based on supercritical water oxidation technology. 374Water, Inc. transforms wet wastes, including sewage sludge, biosolids, food waste, hazardous and non-hazardous waste, and forever chemicals, into recoverable resources in the United States.

- **AECOM (ACM-$92.70):** $12.8Bn market cap. AECOM is an infrastructure consulting company providing professional engineering and design for construction projects. The company is focused on PFAS remediation solutions for projects. While it developed its own proprietary DE-FLUORO, PFAS destruction technology, which uses electrochemical oxidization to break up the molecules, it will install the best solution available based on specific sites and requirements.

- **Arq, Inc. (ARQ-$7.20):** $240mm market cap. Arq, Inc. is principally engaged in the sale of consumable activated carbon (AC) for air and water treatment. Through the acquisition and rebranding to Arq, the company is focused on transforming its business from Powdered AC to Granular AC for water remediation of materials such as PFAS.

- **BioLargo (BLGO-$0.33):** $97mm market cap. BioLargo is a cleantech and life sciences innovator that develops platform technologies including its Aqueous Electrostatic Concentrator, a novel technology for PFAS remediation, which uses less material and results in less waste than activated carbon.

- **Clean Harbors, Inc. (CLH-$194.16):** $10.6Bn market cap. Clean Harbors is a leading provider of environmental, energy, and industrial services. They offer PFAS remediation services, including soil and groundwater treatment.

- **Ecolab (ECL-$220.38):** $63.0Bn market cap. Ecolab is a world leader in cleaning and hygiene solutions. The company acquired Purolite in 2021 which has designed and developed a specialty ion exchange resin with dual removal mechanisms of ion exchange and adsorption technology for maximum uptake of PFAS.

- **Kuraray Co. (3405-TO- JPY1,700):** $3.9Bn market cap. Following its purchase of Calgon Carbon in 2018, it provides activated carbon and other technologies for water and air purification as well as PFAS removal.

- **Kurita Water Industries Ltd (6370-TO- JPY5,950):** $4.7Bn market cap. Kurita is a global water treatment company providing various solutions for water and wastewater treatment, including PFAS removal technologies.

- **Minerals Technologies (MTX-$71.12):** $2.3Bn market cap. MTX is a vertically integrated specialty minerals company. Through its CETCO subsidiary, it developed and launched FLUORO-SORB® adsorbent in 2019, a proprietary, NSF-certified product. Based on multiple tests, it has been found to be more effective than activated carbon, and can be used as both a pre- or post-treatment media for PFAS remediation, or in combination with GAC systems.

- **Perma-Fix Environmental Services (PESI-$11.20)** $153mm market cap. PESI is an environmental technology company that provides treatment solutions and services. It has a proprietary PFAS solution for complete destruction of the fluorocarbon chain with a non-incineration, chemical-based process.

- **Tetra Tech, Inc. (TTEK-$190.31):** $10.2Bn market cap. Tetra Tech is a consulting and engineering company that provides environmental services, including PFAS remediation solutions.

- **Veolia Environnent S.A. (VIE-FR- €27.65):** $20.1Bn market cap. Veolia is a multinational company which specializes in environmental services and solutions. They offer various technologies and services for water treatment, including PFAS remediation.

- **Xylem (XYL-$128.00):** $30.9Bn market cap. Xylem, primarily via its recent acquisition of Evoqua, offers various PFAS remediation equipment and services.

PFAS Detection

Following are several existing methods used for detection of PFAS in water:

- **Laboratory analysis:** The most common method of PFAS detection involves collecting water samples and sending them to a laboratory for testing. The laboratory may use analytical techniques such as liquid chromatography-mass spectrometry (LC-MS) or gas chromatography-mass spectrometry (GC-MS) to measure the levels of PFAS in the water. This is generally the most expensive method, with costs ranging from several hundred to thousands of dollars per sample, depending on the laboratory and the analytical techniques used. The cost can increase if more extensive testing is required, such as a larger number of samples or identifying a wider range of PFAS compounds.

- **Field test kits**: These are portable kits which can be used to detect PFAS in the field, without the need for laboratory analysis. They use colorimetric or fluorescence-based assays to detect the presence of PFAS in the water. These are generally less expensive than laboratory analysis, with costs ranging from a few hundred to a few thousand dollars per kit, depending on the manufacturer and the specific kit. Field test kits are also more cost-effective when testing for a small number of samples or in situations where real-time results are needed.

- **Passive samplers**: These are devices which can be placed in water bodies where they collect water samples over a period of time. They work by allowing water to pass through a material that can absorb PFAS, which can then be analyzed in a laboratory. The cost of passive samplers varies depending on the type of sampler and the manufacturer. Some passive samplers are relatively inexpensive, with costs ranging from a few hundred to a few thousand dollars per unit. However, the cost increases if more extensive testing is required, such as for a larger number of samplers or for longer sampling periods.

- **Online sensors**: These are real-time monitoring systems that can detect the presence of PFAS in water as it flows through a system. They use a variety of detection techniques, such as fluorescence or electrochemical sensors, to provide continuous monitoring of water quality. The cost of online sensors varies depending on the type of sensor and the manufacturer. Some sensors are relatively inexpensive, with costs ranging from a few hundred to a few thousand dollars per unit. However, the cost can increase if more extensive monitoring is required, such as for a larger water system or for multiple monitoring locations.

Overall, laboratory analysis is the most reliable method of PFAS detection, but field test kits, passive samplers, and online sensors can provide useful information for monitoring PFAS contamination in water sources. There are several companies offering PFAS testing services, a few of note include:

- **Agilent Technologies (A):** Agilent Technologies offers analytical instruments and software for PFAS testing, including LC-MS and GC-MS systems. They also provide training and support services for PFAS analysis.

- **Agiltech SA (AGIL):** Agiltech is a Swiss company which offers laboratory analysis for PFAS in water, soil, and other environmental samples using LC-MS/MS and GC-MS/MS techniques.

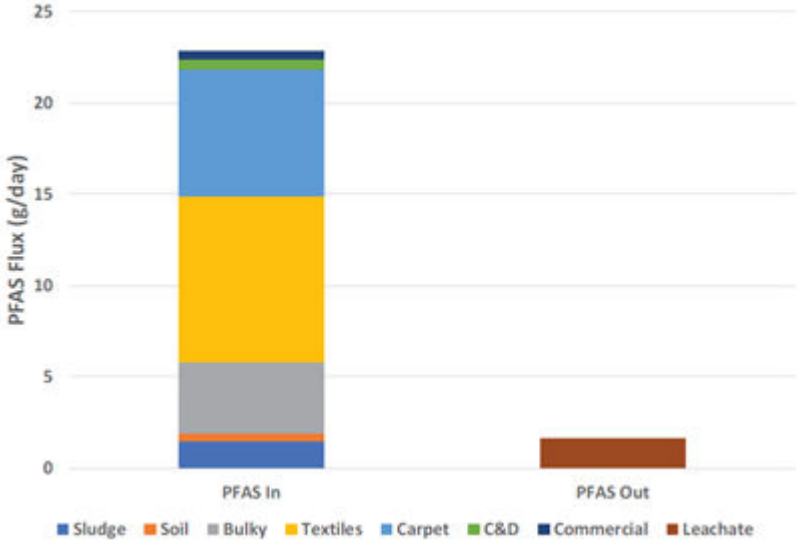
- **Bureau Veritas SA (BVI-FR):** Bureau Veritas is a French multinational company which offers testing, inspection, and certification services, including PFAS analysis of environmental samples.

- **Eurofins (EUFI-PA)**: Eurofins offers laboratory analysis for PFAS in water, soil, and other environmental samples using LC-MS/MS and GC-MS/MS techniques. They also offer field test kits for PFAS detection, as well as consulting services for PFAS remediation.
- **IDEXX Laboratories, Inc. (IDXX):** IDEXX Laboratories offers testing services for PFAS in water samples using LC-MS/MS techniques.
- **Merck (MRK):** Merck subsidiaries Sigma-Aldrich and MilliporeSigma offer analytical standards and reagents for PFAS analysis, including certified reference materials and quality control standards for LC-MS/MS and GC-MS/MS methods.
- **Thermo Fisher Scientific (TMO):** Thermo Fisher Scientific offers analytical instruments and software for PFAS testing, including LC-MS and GC-MS systems. They also provide laboratory analysis services for PFAS in water, soil, and other environmental samples.

Impact on Waste Management

Landfill operators have more tempered expectations following PFAS regulation. The hazardous waste operators' opportunity to benefit is in effect a risk for municipal solid waste landfill owners. According to the Sanborn, Head & Associates PFAS study, despite landfills being the primary avenue for PFAS contaminated leachate to escape into the water system, it is also the most effective retention method. Exhibit 7 breaks down the volume of PFAS from different waste types entering a landfill versus the amount of PFAS that ultimately leaves the landfill. According to conversations with landfill operators, approximately 99% of PFAS is trapped permanently in landfills. The treatment costs for the escaped leachate will flow through to the landfill customers.

Exhibit 9 **Estimated PFAS Mass Flux In and Out of Landfills**



Source: Sanborn, Head & Associates, Casella Waste Systems

Heritage Crystal Clean is partnering with the Battelle Memorial Institute to develop a PFAS treating technology that will be installed at landfills. The equipment will concentrate and remove PFAS from leachate. The landfill operator will have to pay Heritage Crystal Clean for every gallon of leachate that is treated. The approximate price will be $1/gallon; based on an estimated 16.1 billion total gallons in the United States, this represents a $16.1 billion total addressable market. The PFAS problem is not going away since there is growing litigation from plaintiffs and significant monetary incentive to see these claims addressed. Once captured, the only current methods to deal with PFAS is to securely contain it in a landfill or destroy it through incineration.

Conclusion

PFAS is a growing focus as environmental and health concerns become better known as the result of these "forever chemicals" present in our environment and bodies. Given the recent EPA regulations for drinking water and designation of certain compounds as hazardous substances, with more potential regulations on the horizon, we expect to see water providers, utilities, and other industries move to comply. This should lead to the development and adoption of new testing and remediation systems not only for water providers, but also for the waste companies which are taking steps in order to comply with the new regulations. We remain focused on the impact from these regulations on both, the companies who contributed to the environmental issues and, importantly on the companies which will benefit from the regulations by providing solutions to this significant issue.

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