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# Gabelli 2nd PFAS Symposium September 26, 2024 Reflections

*Source: FDA, Company logos, Gabelli Funds*

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***-Please Refer To Important Disclosures On The Last Page Of This Report-***

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## Gabelli Funds' 2nd PFAS Symposium

Our team hosted our 2nd PFAS Symposium on September 26, 2024. Its focus was on the impacts of "forever chemicals," recently confirmed regulations, and the potential solutions addressing the environmental and human health concerns. A total of eleven companies participated including specialty minerals and materials companies, engineering firms, water utilities, and waste companies. In addition, we heard from representatives from the EPA and the National Association of Water Companies (NAWC).

Lieutenant Colonel Tony Bancroft, USMCR joined GAMCO in 2009 as a research analyst covering companies in the aerospace sectors and environmental services, focusing on suppliers to the commercial, military and regional aircraft industry and waste services. He hosts two annual conferences for the firm: the Aerospace & Defense Conference, and the Environmental Services Symposium. Tony graduated from the United States Naval Academy with a B.S. in Systems Engineering and an M.B.A. in Finance and Economics from Columbia Business School. Previously, Tony served in the United States Marine Corps as an F/A-18 pilot.

Rosemarie J. Morbelli, CFA, is a Senior Vice President and research analyst at Gabelli Funds. She initially joined Gabelli & Company, Inc.'s institutional brokerage business in 2011, assuming research coverage of the specialty chemical industry.

Rosemarie spent nearly 30 years with Ingalls & Snyder, becoming a Limited Partner in 1994. While at I&S, she was named "Best on the Street" and the "Best of the Boutique and Regionals" by Institutional Investor. Following earlier nominations, she was recognized as the #1 Stock Picker in Thompson Reuter's 2019 StarMine Analyst Awards. Rosemarie has served as the President and Treasurer of the Chemical Specialists Group and is a graduate of the University of Grenoble, France with a bachelor's degree in Natural Sciences. She is a CFA Charterholder.

Wayne C. Pinsent, CFA, is Director of Research and analyst covering specialty chemicals and real estate, with a focus on lithium and agriculture. Since joining the firm in 2008 he has held various investment and management positions, including Director of Research of the firm's affiliated sell side brokerage. Previously he was a financial writer and has been published in Investopedia, Forbes, Yahoo Finance, among others.

Wayne holds a BA in economics from New York University and is a CFA Charterholder.

Rebecca Stern joined the firm in 2022 and contributes to its sustainability efforts. Prior to that, she was a fellow at the Harvard Kennedy School and an employee of GAMCO in mutual funds from 2012-2015. Rebecca's undergraduate degree is from Yale University in environmental studies and political science. She holds a PhD from Harvard University in environmental engineering.

Timothy Winter, CFA, is a portfolio manager of The Gabelli Utilities Fund, The Gabelli Utilities Trust and The Gabelli Global Utility & Income Trust and a research analyst covering the utilities industry. He joined the firm in 2009 and has over 25 years of industry experience. Previously he served over 15 years as a research analyst covering utilities at AG Edwards as well as Jesup & Lamont and SM Research.

Tim has received numerous awards and recognition for his work in the industry. He was a three-time All-Star Wall Street Journal winner and five-time ranked number one Electric Utility Team by Institutional Investor. In 2018 he received Thomson Reuter's US Analyst Award and was ranked the number one stock picker in the electric utility sector and water utility sector and number two in the gas utility sector.

Tim holds a BA in economics from Rollins College, an MBA in finance from Notre Dame, and is a CFA Charterholder.

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## Introduction

As concerns have grown over PFAS and their perceived health and environmental issues, on September 26, 2024, we hosted our second PFAS Symposium at the Harvard Club in New York. The focus was on existing technologies and the potential for future ones in remediating these "forever chemicals." The name is due to the strong bond between the chain of carbon atoms and one atom of fluorine which does not degrade easily in the environment.

## Origins of the "Forever Chemicals"

The compounds were invented in the late 1930s as the main ingredient in non-stick and waterproofing coatings. They were first manufactured by 3M and initially used to protect military equipment from the elements. Industrial usage began in the 1940s when DuPont introduced them as Teflon for non-stick cookware. Their development increased in the late 1960s after a deadly fire aboard a US Navy, Aircraft Carrier, killed more than 100 individuals.

**Exhibit 1**


*Source: Google images, Gabelli Funds*

PFAS became widely used in products such as fire-fighting foams, a key area of EPA's current focus due to their extensive use at military bases, airports, and firefighting activities. In addition to firefighting foams, their oil-stain resistance and water-proofing properties have resulted in widespread use. They are in water resistant textiles, stain resistant furniture and carpets, as well as in paints and cosmetics, among other consumer applications. They are also found in packaging used by fast food restaurants, as well as in sandwich wraps, pizza boxes, and other packaging for greasy food.

## Possible Sources of Contamination

Firefighting foams, in particular, seep into the ground and can eventually reach the water table. They can also be carried to surface water, such as rivers and lakes, by rain. In addition, most of the PFAS-containing items mentioned above eventually end up in landfills, from which they may leach into the ground and into the water table.

There are thousands of carbon-fluorine PFAS with different properties and applications; these depend on the number of carbon and fluorine atoms, as well as on the presence of additional components.

**Exhibit 2 – Possible Sources of Groundwater Contamination**


*Source: SCS Engineers*

**Perceived Health Issues**

While PFAS consist of a broad group of thousands of chemicals, a handful of them have been linked to health issues. Studies show that these chemicals have found their way into our environment, drinking water, food supply, and into our bodies. PFAS have been detected in the bloodstream of approximately 98% of all Americans tested. The chemicals can enter the food chain in various ways and, over time, gradually accumulate into our bodies.

The most common and dangerous compounds are PFOA and PFOS, which have been extensively studied, especially due to their presence in drinking water. They have been linked to health conditions including kidney and testicular cancers, a weakened immune system, thyroid disease, high cholesterol, and low birth weight in babies, to name a few. Having found their way into the food supply via crop products, dairy, and livestock, PFAS above acceptable levels have been detected in cows' milk, animal feed, and cereals, among other categories.

The amount of contamination is extensive, persistent, and toxic at a very low level. In 2006, the industry agreed to phase out C8; first out of carpets, followed by paper, and more recently out of textiles. However, PFAS are still on hard surfaces and construction materials such as grout and fiberboard. While some have been replaced by shorter carbon chains, over the long-term, these new chemical compounds may present similar issues to those from the longer carbon chains.

Separately in July 2023, a study from the U.S. Geological Survey (USGS) captured headlines when it found that nearly one-half of the country's tap water may contain PFAS. In the study, 45% of samples tested found levels higher than the recently adopted limits of 4 parts per trillion. We note that, while the U.S. is taking steps related to the issues, this is a global problem and, while no other country has issued specific regulations to date, discussions are on-going.

**Regulations and Actions**

As concerns over their prevalence and associated potential health risks have grown, regulators have zoned in on the issue. On April 10, 2024, the EPA announced its national standards for PFAS in drinking water. The new regulation limits the two most common PFAS compounds, PFOA and PFOS, to just four parts per trillion (ppt). This is the lowest detectable level using current technology, which essentially requires the elimination of any trace of these compounds. In addition, the EPA announced limits for four other PFAS compounds or mixtures. While the final EPA ruling has been formalized, water providers and utilities will have until 2027 to establish PFAS testing and 2029 to comply with the new standards. Compliance will require them to update their systems by late 2027/early 2028. This, the first official government action on PFAS, was the main topic of the symposium, with the companies' presentations focused on their respective new technologies, each aiming to remove these chemicals from the environment.

**Exhibit 3- EPA National Drinking Water Standards**

| | Prior EPA Limits | Final Limits April 2024 |
|---|---|---|
| PFOA | None | 4.0 ppt |
| PFOS | " | 4.0 ppt |
| PFHxS | " | 10.0 ppt |
| PFNA | " | 10.0 ppt |
| HFPO-DA (commonly known as GenX Chemicals) | " | 10.0 ppt |
| Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS | " | 1.0 (unitless) Hazard Index |

*Source: EPA, Gabelli Funds*

In February 2023, the EPA proposed two regulations under the Resource Conservation and Recovery Act (RCRA); these were followed in April 2024 by the EPA designating PFOA and PFOS as hazardous materials under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Note that RCRA gives the EPA the authority to control hazardous waste from cradle to grave. CERCLA authorizes the President to respond to releases, or potential releases, of hazardous materials into the environment.

With PFAS designated as hazardous materials, any entity handling these chemicals could become liable for the recovery and remediation costs of any environmental releases. As a result, waste management companies will need

to take additional steps to avoid seepage from landfills and the subsequent contamination of ground water. In addition, companies incorporating PFAS in their products will need to employ services ensuring the proper internal controls and appropriate hazardous waste disposal. The EPA issued a separate CERCLA enforcement policy; it specifies that enforcement will focus on parties who significantly contributed to the release of PFAS chemicals into the environment, and not on passive receivers. Regardless, water utilities and the National Association of Water Companies (NAWC) remain concerned about the wording of the EPA's policy, and bipartisan legislation is being worked on to codify the policy stipulating that passive receivers will not be exposed to undue liability.

In 2024, large settlements with former PFAS producers were finalized: DuPont (DD), and its spin-offs Chemours (CC) and Corteva (CTVA) settled with the US Water Systems for $1.2 billion, and 3M (MMM) agreed to a final settlement of $10.3 billion. Note that contamination outside the drinking water systems is excluded from the above settlements.

Large manufacturers stopped producing the long carbon chains (C8) PFAS; however, there are no official government bans, and they are still produced in India, China, and other countries. As a result, they find their way back to the US via imports of products made overseas, and end up into the environment when discarded.

**Market Size**

While the market size is currently a moving target, PFAS-related liabilities just for US drinking water are estimated to be between $120 billion and $175 billion, according to Milliman. The total and global liabilities will be significantly higher as Europe moves to regulate PFAS as well, and was pegged at $250 billion or more by several conference participants. This includes efforts to remediate, contain, and destroy the chemicals, as well as finding suitable substitutes to eliminate the use of these materials. The Infrastructure Bill has $10B set aside for PFAS, an amount not nearly enough to solve the major problems created by the existing contamination. While presenting at our First PFAS Symposium in September 2023, American Water Works estimated that it may require $1 billion of capital expenditure to install the necessary remediation system, followed by $50 million for annual maintenance expenses.

**Potential Solutions**

While we touched on several established technologies used for PFAS remediation in our updated May whitepaper, the Symposium featured a deep dive into both current and novel technologies for both remediation and destruction. They include: Activated Carbon, which adsorbs the pollutants from a stream of water going through an activated carbon column; Membrane Filtration, which uses either nanofiltration or reverse osmosis; and Ion Exchange, where a specialty resin filters out and holds onto the contaminants. Following the introduction of newer technologies at last year's Symposium, management provided an update on FLUORO-SORB and Supercritical Water Oxidation, among others. This year, we also heard from the EPA's Director of Policy and Special Projects (office of Water) and from the president of the NAWC.

**Summary**

The eleven participating companies introduced us to multiple perspectives and potential solutions for this growing environmental and health concern. We heard from Specialty Minerals and Remediation companies with new technologies and systems; Water Utilities with leading R&D activity focusing on the adoption of more stringent testing and filtration systems; and Waste companies whose focus is on capturing, containing, and remediating PFAS contaminants. We also heard updates on regulatory actions from the EPA and, from the president of NAWC, how the water industry is addressing the issue. The participating companies will see increased opportunities to leverage these technologies and expertise in the coming years as regulations are adopted and the impacts of PFAS are addressed. Overall, this very interesting and informative event focused on multiple solutions to tackle this important environmental issue.

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## Environmental Protection Agency — PFAS Symposium Highlights

### OVERVIEW

The U.S. Environmental Protection Agency's (EPA) Office of Water ensures drinking water is safe and is responsible for implementing the Safe Drinking Water Act. The Office of Water works with the ten EPA regional offices, other federal agencies, state and local governments, American Indian Tribes, the regulated community, organized professional and interest groups, landowners and managers, and the public-at-large. Through the PFAS Strategic Roadmap (2021-2024), the EPA has acted by advancing science and following the law to safeguard public health, protect the environment, and hold polluters accountable. The first-ever national drinking water standard for PFAS is a cornerstone of this approach. The EPA is also making unprecedented funding available to help ensure that all people have clean and safe water, including through the Bipartisan Infrastructure Law.

Our speaker was Zach Schafer, Director of Policy and Special Projects and Senior Advisor to EPA's Assistant Administrator for the Office of Water, Radhika Fox. Prior to joining the EPA, Zach served as the founding Chief Executive Officer and Executive Director of United for Infrastructure and Senior Policy Director for the Council on Competitiveness. He also worked on water and climate policy at the White House Council on Environmental Quality during the Obama Administration.

### Reason For Comment

The following are key takeaways from Zach at our 2nd PFAS Symposium.

Zach discussed the EPA's PFAS Roadmap established by the EPA Council on PFAS. The roadmap set out goals in addressing PFAS over the years 2021-2024 that included accelerating efforts on the State level and following the science. The three primary goals are to restrict entrance into the environment, remediate existing contamination, and research the health effects and science of PFAS. Notable achievements included two key regulatory actions in April 2024: (1) the establishment of nationwide drinking water standards, and (2) CERCLA hazardous designation for PFOA and PFOS.

Current research underway is focused on toxicity, exposure, migration of PFAS in the environment, the uptake of PFAS in crops, migration in different landscapes, and treating PFAS in groups or classes to address hundreds of these chemicals at a time. Zach described the EPA's focus on environmental justice and the implications of remediation on vulnerable communities, especially from incineration. Finally, he touched on the pertinent topic of funding considering the size of the PFAS problem. The Bipartisan Infrastructure Law provided $9 billion for States and Territories to address the drinking water affected by PFAS and other emerging contaminants, including testing and treatment. He noted that $1 B of that amount will help private well owners address their PFAS contamination. An additional $12 Billion is available for general drinking water improvements.

A key theme was that the PFAS problem involves multiple public and private actors; individuals and families are affected as well as government agencies. States, industry, and political leaderships are all involved in the policymaking process. In future regulatory actions, in addition to the EPA, other key players will include the DOD, DOT, FEMA, NOAA, NASA, FDA, and CDC. In fact, the DOD's collaboration includes a now-approved PFAS-free firefighting foam alternative that the military has already committed to using. Future regulatory landscape will include ELG plans, which are developed every two years. Over the next few years, other programs such as NIPTES, TSCA, RCRA, and CERCLA, will be involved in developing the needed regulatory changes.

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# National Association of Water Companies (NAWC) PFAS Symposium Highlights

## OVERVIEW

The NAWC represents private water utilities across the nation; it also includes state-regulated drinking water and wastewater utilities as well as members that participate in public-private partnerships. The 15 largest NAWC member companies collectively invest over $5 billion annually in water infrastructure and have significant expertise and resources.

Our speaker was Robert Powelson, NAWC President and CEO. Prior to joining NAWC, he served as a Federal Energy Regulatory Commissioner; Nominated by President Donald J. Trump in May 2017. He has also served as Chairman of the Pennsylvania Public Utility Commission (February 24, 2011-May 7, 2015), and with the Pennsylvania's Marcellus Shale Advisory Commission. He served as chairman of the NARUC Committee on Water and represented the Water Committee on NARUC's Task Force on Climate Policy.

## Reason For Comment

The following are key takeaways from our 2nd PFAS Symposium.

Three members participated (SJW, WTRG, and MSEX) in the symposium. An important investment thesis of the water utility sector is that the infrastructure investment will lead to EPS growth, but also that many smaller municipal systems will turn to the private sector to help meet their increasing capital needs, including those related to the stringent PFAS standards. NAWC members have an exceptional record of compliance with federal and state health and environmental regulations. As our nation's population continues to grow, increasing pressure is placed on our resources and communities need NAWC's leadership to help with policymaking, investing and providing safe clean drinking water.

As our keynote speaker, Mr. Powelson highlighted the big picture national problem: the US cannot sustain 51,145 drinking water systems in this country, particularly when 85% of that grid is municipally owned. The EPA's PFAS regulations should, in theory, shake out marginal systems that cannot comply with the rule, thereby benefiting NAWC companies. He discussed some recent water crisis, including Jackson, MS, which had twenty years of systemic problems.

The NAWC applauds the work of the bipartisan infrastructure bill, but notes that it is not enough. Rob is a firm believer that private capital can solve the water industry problem as policy makers in Washington neglect water investments until there is a crisis. The EPA's PFAS drinking water regulations require less than 4-parts per trillion; this aggressive standard should create a shakeout of winners with marginal non-compliance systems being acquired to become compliant.

The NAWC has not litigated the 4 ppt requirement like other water groups, and plans to invest, and comply. Qualified labs are, and will be, overburdened with running tests for both public and private systems. Mr. Powelson noted that many NAWC members have their own testing lab and can help.

In addition, the NAWC stipulates that polluters must be held accountable: Water utilities and customers cannot be held liable for cleaning up the mess that chemical companies created. The Big question is affordability! Some States, with revolving loan funds, can help with PFAS remediation. While the EPA has some latitude to provide legal protection regarding PFAS remediation, it may need congressional approval. Making customers and utilities pay for the clean-up would be a colossal failure in water equity and water utility regulation.

As Rob mentioned, the industry can be held liable for collecting water and disposal. However, this is a trillion-dollar problem and Congress is not going to do another bipartisan infrastructure bill. The NAWC and its member companies look to lead to solutions.

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# 374Water, Inc. (SCWO - $1.44 - NASDAQ) PFAS Symposium Highlights

| Year | EPS | P/E |
|---|---|---|
| 2024E | $(0.08) | NM |
| 2023A | (0.06) | " |
| 2022A | (0.04) | " |
| 2021A | (0.03) | " |

Dividend: None Current Return: Nil
Shares O/S: 132.7 million
52-Week Range: $2.09 – $0.83

*Source: Company filings, Thomson consensus estimates*

## COMPANY OVERVIEW

With headquarters in Durham, North Carolina, 374Water is a global cleantech technology provider which addresses environmental pollution challenges. It develops 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.

The company offers AirSCWO systems, a waste stream treatment system based on supercritical water oxidation technology used to treat various hazardous and non-hazardous waste streams. It serves multiple end-markets including agricultural, defense, food and beverage, oil & gas, chemicals, pharmaceutical, waste management and remediation, as well as municipal markets.

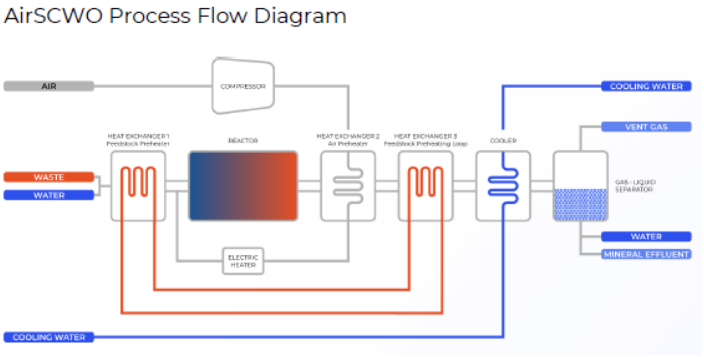
## Reason For Comment

The following are key takeaways from 374Water's Chief Administrative Officer and Chief of Staff Deborah Cooper at our Second PFAS Symposium:

- Ms. Cooper, who joined 374Water in April 2024, will serve as a catalyst for change as the company enters the commercialization stage of its technology. Deborah brings expertise as an integration leader, in addition to which she has held senior operational roles across several companies. At 374, she will focus on business operations and strategic planning to enhance the company's ability to scale operations in the near term.

- The company's system AirSCWO stands for SuperCritical Water Oxidation, which requires water to be heated at 374 degrees Celsius (hence the name) at which point, under substantial pressure, it converts waste into energy, minerals, and water. Harnessing the power of SCWO, AirSCOW destroys PFAS and is 100% thermally self-sufficient, according to the company. Under immense pressure and heat, the water becomes an even better solvent as it allows nearly anything to dissolve in it and, in the case of PFAS, it eliminates recalcitrant waste without creating waste by-products by neutralizing the fluorine atom.

**Exhibit 1 – 374Water SuperCritical Water Oxidation**




*Source: 374Water*

- Ms. Cooper indicated that, while the global market opportunity could amount to $250B, at present the firm is focusing on the US. The current pipeline is around $1.6B, with $490M on the municipal side, $900M from federal and prime contractors, and $290M from the industrial and corporate side.

- With successful trials under way, the Board believes that the company is ready to commercialize its systems. Hoping to commercialize in 12-to-16 months, they will need to raise additional capital. Following a period when the burn rate may double, they expect to be cash flow positive by 2027.

- The AirSCWO technology is different from other SCWOs as it uses air instead of oxygen. Any PFAS is destroyed and fully mineralized in the 40-foot industry-leading unit. Compatible with other technologies, it just needs a pumpable liquid without too much abrasive material, which would allow it to process sludge from landfills on site.

- Prospective clients include Orange County and other water utilities as they will need to reduce PFAS to below the four parts per trillion limits in drinking water. In addition, companies such as pharmaceuticals and petrochemicals, as well as the military, could use the system to address their disposal needs. Last year, at our First PFAS Symposium management projected that PFAS could become a multi-billion-dollar segment within the massive waste management industry. The company believes that its mobile system is scalable and is looking into different container sizes in order to best meet customers' needs.

**Exhibit 2 – 374Water Product Offering**


*Source: 374Water*

**Capitalization ($ in millions)**

| | |
|---|---|
| Balance Sheet as of: | 6/30/2024 |
| Shares Outstanding | 132.7 |
| Market Price | **$1.44** |
| Market Value | 191.1 |
| Plus: Debt | - |
| Minus: Cash | (5.1) |
| Net Cash | (5.1) |
| **Total Capitalization** | **$186.0** |

**374Water Inc.**
**Price Performance**


*Source: reuters.com*

**374Water Inc.**

($ Millions - Percent Change)

| **FYE 3/31** | **2022** | **2023** | **2024E** | **2025P** |
|---|---|---|---|---|
| Revenue | $ 3.0 | $ 0.7 | $ 0.4 | $ 26.3 |
| % Growth | | nm | -46.2% | nm |
| EBITDA | $ (4.7) | $ (8.6) | $ (9.4) | $ (7.6) |
| % Margin | nm | nm | nm | nm |
| EPS | $ (0.04) | $ (0.06) | $ (0.08) | $ (0.06) |
| % Growth | | nm | | |
| EBITDA Mulitple | N/A | N/A | N/A | N/A |
| P/E Multiple | N/A | N/A | N/A | N/A |

*Source: Public data and Thomson One consensus estimates*

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# Arq, Inc. (ARQ - $5.28 - NASDAQ)

# PFAS Symposium Reflections

| Year | EPS | P/E | |
|---|---|---|---|
| 2025P | $0.28 | 18.9x | Dividend: None Current Return: Nil |
| 2024E | (0.12) | NM | Shares O/S: 42.0 million |
| 2023A | (0.42) | " | 52-Week Range: $8.26 – $1.60 |
| 2022A | (0.48) | " | |

*Source: Company filings, Thomson consensus estimates*

## COMPANY OVERVIEW

Arq, Inc. (formerly Advanced Emissions Solutions, Inc. - ADES), headquartered in Greenwood Village, CO, is principally engaged in the sale of consumable air and water treatment options, including activated carbon (AC) and chemical technologies. The company sells consumable products, which utilize activated carbon and chemical-based technologies to coal-fired utilities, industrials, water treatment plants, and other facilities within multiple end-markets. Its primary products are comprised of AC, which is produced from a variety of carbonaceous raw materials; they include both powdered activated carbon (PAC) and granular activated carbon (GAC). The company rebranded as Arq, Inc., with the ticker ARQ on the Nasdaq on February 1, 2024. It is focused on transforming itself from an industrial manufacturing company serving declining industries to an environmental technology company serving growth markets including water remediation of materials such as PFAS.

**Reason For Comment:**

The following are key takeaways from CEO Bob Rasmus and CTO Joe Wong who presented at our 2nd PFAS Symposium. We discussed topics such as Arq's transformation, regulation for water remediation, and the company's expansion plans.

- **Transformation Into Arq**: Legacy Advanced Emissions had historically focused on powdered activated carbon (PAC) products serving markets in secular decline; primarily scrubbing mercury emissions from coal-fired power plants. The company shifted its strategy in early 2023 with the acquisition of Arq, which significantly increased its capabilities in GAC for water treatment and energy transition, thereby targeting the higher growth end-markets of water remediation and purification, further boosted by recently announced PFAS regulations. This is key to the company's ambition to rebrand itself as it evolves into an environmental technology company. Arq's technology will also facilitate a raw material shift from lignite coal as feedstock to bituminous coal waste, giving the company a more favorable environmental profile.

- **Vertically Integrated:** Contributing to its low-cost profile is the fact that Arq is entirely vertically integrated due to the combination of its ownership of Five Forks, a lignite mine which supplies the primary raw material for powder activated carbon, and its Corbin, KY, facility which supplies the waste-derived bituminous feedstock for granular activated carbon. The company also owns and operates the Red River plant: it is the largest, most automated, and environmentally friendly activated carbon plant in North America. With around $30M of net cash pro forma for its recent secondary offering, and steps to improve its legacy PAC business, which has turned cash flow positive, management has ambitious capex plans to grow and transform its asset base towards water treatment solutions.

- **Advantaged Position:** The GAC market is growing and, despite the reduction in available manufacturing capacity due to the decommissioning of plants, there is limited ability to add new capacity due to the significant capex requirements and constrained domestic feedstock. Arq is in an advantaged position as it benefits from the lower costs resulting from its vertical integration.

- **Expansions and Capital Position:** After twice increasing the needed CapEx level for its Red River Phase 1 expansion, Arq has learned lessons it will apply for future phases. In addition, the company conducted a secondary offering of 5.5 million shares (incl the greenshoe) a week before the Symposium, raising ~$28 million in gross proceeds. Management stated that the equity raise was more favorable than the oenerous terms of financing with debt. Arq is now on a better footing with banks for non-equity financing should it be needed for expansions in the future. In addition, cash flow will be generated by its PAC business and the start up of GAC shipments (expected in Q1).

**Capitalization ($ in millions)**

| | |
|---|---|
| Balance Sheet as of: | 6/30/2024 * |
| Shares Outstanding | 42.0 |
| Market Price | **$5.28** |
| Market Value | 221.7 |
| Plus: Debt | 20.4 |
| Minus: Cash | (51.5) |
| Net Cash | (31.1) |
| **Total Capitalization** | **$190.6** |

**Arq, Inc.**
**Price Performance**


*Source: reuters.com*

**Arq, Inc.**

($ Millions - Percent Change)

| **Year** | **2022** | **2023** | **2024E** | **2025P** |
|---|---|---|---|---|
| Revenue | $ 103.0 | $ 99.2 | $ 102.7 | $ 144.1 |
| % Growth | | -3.7% | 3.5% | 40.3% |
| EBITDA | $ 1.3 | $ (2.6) | $ 4.9 | $ 24.0 |
| % Margin | nm | nm | 4.8% | 16.7% |
| EPS | $ (0.48) | $ (0.42) | $ (0.12) | $ 0.28 |
| % Growth | | nm | nm | nm |
| EBITDA Mulitple | 150.1x | N/A | 38.9x | 7.9x |
| P/E Multiple | N/A | N/A | N/A | 18.9x |

*Source: Public data and Thomson One consensus estimates*

**Pro Forma for 9/20/24 secondary common stock offering of 5.5mm shares at $5.25 per share. Assumes issuance of 15% greenshoe.*

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October 10, 2024

# Axine Water Technologies (Private) PFAS Symposium Highlights

## COMPANY OVERVIEW

Axine Water Technologies, based in Vancouver, BC, Canada, is a privately held leader in electrochemical oxidation technology for industrial wastewater treatment. Its mission is to establish a new industry standard for the cost-effective destruction of PFAS, pharmaceuticals, solvents, and other persistent organic contaminants. Axine's electraCLEAR™ electrochemical oxidation process is a solution for the complete destruction of challenging organic compounds in industrial water and wastewater treatment. electraCLEAR utilizes multiple different catalysts and electrode materials simultaneously within a single reactor. This design maximizes treatment performance, energy efficiency, and electrode lifespan. Supported by a suite of online instrumentation, Axine employs a patented machine-learning/artificial intelligence (ML/AI) algorithm for real-time monitoring and optimization of system performance and operating costs. Its fully automated process offers complete destruction of both long- and short-chain PFAS compounds with no waste or by-products, and seamless integration into existing treatment systems. Systems are available as fully containerized solutions for quick installation at any site or as modular skid-mounted units, seamlessly integrated into existing treatment processes or customer facilities. Axine's Treatment-as-a-Service (TAAS) program accompanies each solution, covering all operations, routine service, maintenance, and reporting.

## Reason For Comment

The following are key takeaways from President and Chief Executive Officer Mark Ralph at our 2nd PFAS Symposium:

- Axine's electraCLEAR™ technology is an electro oxidation process which breaks down PFOA and PFOS through electrochemical oxidation for complete PFAS destruction with no production of solid or liquid waste. There are 57 different patents protecting Axine IP worldwide.

- Axine is a leader in electrochemical oxidation. The company's first units treated pharmaceuticals but there is now a shift to units being deployed for PFAS in the US. Axine offers guaranteed treatment to customers and will further treat the wastewater if it is not up to the required standards. It operates under two business models: 1) Treatment as a service, where Axine owns the full system and offers service and maintenance; and 2) Hybrid, where the customer owns the plant with Axine performing maintenance and responding to any breakdown in the system.

- Axine expects to grow rapidly as the market expands. The company is generating revenues of around CAD $1.5M, currently with four customers; it is looking to raise additional funds to finance the expansion needed to increase revenues to CAD $20M. Customer contracts generally cover a five-year span and are sticky. Two customers have already renewed their contracts, wanting the certainty of a stable cost structure.

- As with many of the Symposium participants, Axine is seeking partnerships, specifically around the need to monitor concentration levels and real time detection of PFAS. Real time monitoring of PFAS does not currently exist. There are exploratory options under way but no comprehensive solution yet. If Axine can incorporate real time monitoring in its systems, it would know exactly when the process is done. There is a true demand to have concentration and destruction done at once and to be able to achieve it via one single system.

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October 10, 2024

**BioLargo, Inc. (BLGO- $0.24 - OTC)** **PFAS Symposium Reflections**

| Year | EPS | P/E |
|---|---|---|
| 2025P | $0.00 | NM |
| 2024E | (0.01) | " |
| 2023A | (0.02) | " |
| 2022A | (0.02) | " |

Dividend: None Current Return: Nil
Shares O/S: 283.2 million
52-Week Range: $0.45 – $0.16

*Source: Company filings, Thomson consensus estimates*

## COMPANY OVERVIEW

Incorporated in 1991, BioLargo, Inc is based in Westminster, California. The company invents, develops, and commercializes various platform technologies. These technologies solve challenging environmental problems including water contamination by per - and polyfluoroalkyl substances (PFAS), advanced water and wastewater treatment.

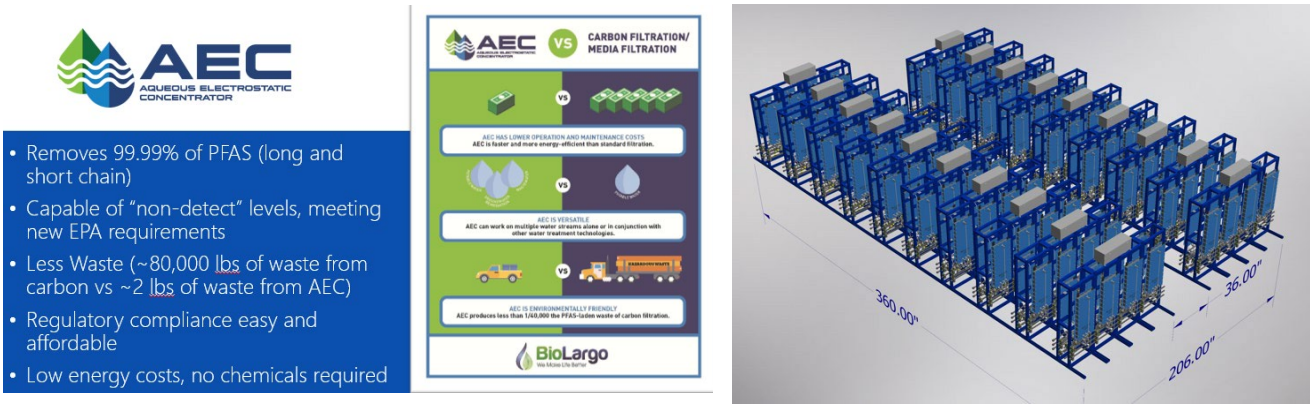
In addition, the company's technologies focus on controlling industrial odor and volatile organic compounds, air quality, infection, and other environmental remediation needs. BioLargo provides full-service environmental engineering services.

**Reason For Comment:**

The following are key takeaways from Sally Gutierrez, BioLargo's Director, and Dr. Cynthia Phillips, Advisors at our 2nd PFAS Symposium.:

- BioLargo is a microcap company which invents, develops, and commercializes various platform technologies with a focus on challenging environmental problems, including water contamination by PFAS and other remediation needs.
- We heard from Sally Gutierrez, Director, who was the former senior executive for the EPA. Ms. Gutierrez assists the company in achieving the expanded adoption of its innovative technologies in the water industry by helping navigate the rapidly changing regulatory environment surrounding newer issues in water treatment such as PFAS contamination.
- The company predominantly focuses on producing less waste than the competition. It has developed an Aqueous Electrostatic Concentrator (AEC) system. Tests show the effectiveness of the system, which uses a small electrical charge to trap PFAS molecules in a membrane.
- AEC is made of membranes designed to last one year; the systems have a comparable footprint to carbon, a lower operating cost (but the initial capital expenditures are higher), and they produce less waste in the form of only the saturated membranes. Deployed on a trailer, the system, which operates on a large industrial site in Illinois, works for the treatment of drinking water, groundwater, and wastewater.

**Exhibit 1** **BioLargo AEC System and Modular and Scalable Ability**

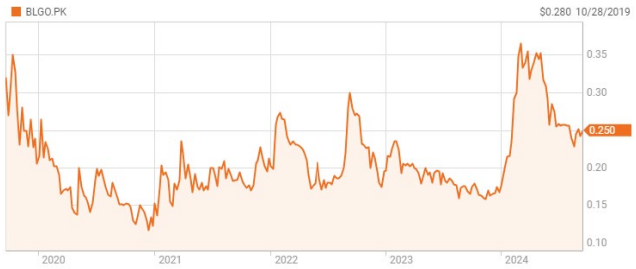



*Source: BioLargo*

**Capitalization ($ in millions)**

| | |
|---|---|
| Balance Sheet as of | 6/30/2024 |
| Shares Outstanding | 300.6 |
| Market Price | **$0.24** |
| Market Value | 72.1 |
| Plus: Debt | 0.3 |
| Minus: Cash & Equivalents | (3.6) |
| Net Cash | (3.3) |
| **Total Capitalization** | **$68.8** |

**BioLargo, Inc.**
**Price Performance**




*Source: reuters.com*

**BioLargo, Inc.**

($ Millions - Percent Change)

| Year | | **2022** | | **2023** | | **2024E** | | **2025P** |
|---|---|---|---|---|---|---|---|---|
| Revenue | $ | 5.9 | $ | 12.2 | $ | 19.6 | $ | 23.5 |
| % Growth | | | | 108.0% | | 60.3% | | 19.8% |
| EBITDA | $ | (5.4) | $ | (4.5) | $ | (0.5) | $ | 1.8 |
| % Margin | | nm | | nm | | nm | | 7.7% |
| EPS | $ | (0.02) | $ | (0.02) | $ | (0.01) | $ | - |
| % Growth | | | | nm | | nm | | nm |
| EBITDA Mulitple | | N/A | | N/A | | N/A | | N/A |
| P/E Multiple | | N/A | | N/A | | N/A | | N/A |

*Source: Public data and Thomson One consensus estimates*

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October 10, 2024

# EcoBolt Water Systems (Private) — PFAS Symposium Highlights

## COMPANY OVERVIEW

EcoBolt Water Systems is a state-of-the-art water treatment technology aiming to combat the full spectrum of waterborne contaminants. It is committed to working with municipalities, the military, and fire departments for the removal, remediation, and destruction of harmful contaminants including PFAS chemicals, as well as other hazardous substances threatening our environment, water, and health.

The company's patented electro-oxidation technology has been tested and validated by a Fortune 500 company. The chemical-free, enhanced Acqua Pulsar process is "the most effective and eco-friendly technology available today". The modular and mobile treatment system can be scalable depending on the size of the remediation project.

### Reason For Comment

The following are key takeaways from Chief Executive Officer and co-founder, John Tavlarios at our 2nd PFAS Symposium:

- The core technology was developed by the parent company Acqua Pulsar. The EcoBolt System consists of electro oxidation which breaks down the PFAS molecules by passing contaminated water through an array of specially coated electrodes; customized software activates the reactor. The patented technology has been tested and validated by a Fortune 500 company.

- The system, which currently can treat up to 100 gallons/day, has tested distilled water contaminated with PFAS to eliminate distortion. "Laboratory testing has shown up to 90% destruction of PFAS in the water source without the production of hazardous byproducts that accumulate the land, water, and air."

- According to management 1) the technology can treat both high and low Total Dissolved Solids (TDS); 2) it is versatile and can handle various water conditions, but not heavy sludge, which would affect the electrodes' efficiency; and 3) the "patented electro-oxidation technology is proven to destroy PFAS in addition to ammonia, nitrates, pesticides, arsenic, endocrine disruptors, and other contaminants."

**Exhibit 1 – EcoBolt Pilot Example**


*Source: EcoBolt*

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October 10, 2024

## Essential Utilities (WTRG - $38.60 - NYSE) — PFAS Symposium Highlights

| Year | EPS | P/E |
|---|---|---|
| 2025P | $2.12 | 18.2x |
| 2024E | 2.04 | 18.9 |
| 2023A | 1.86 | 20.8 |
| 2022A | 1.77 | 21.8 |

Dividend: $1.30 Current Return: 3.4%
Shares O/S: 273.7 million
52-Week Range: $70.43 - $51.17
Book value (6/30/2024): $22.50

*Source: Company filings, Thomson consensus estimates*

### COMPANY OVERVIEW

Essential Utilities, formerly Aqua America (Bryn Mawr, PA) is the second-largest publicly traded water utility in the US, serving about three million people in Pennsylvania (518,100 customers; $4.4 billion of rate base), Ohio (164,000 customers; $521 million of rate base), Illinois (94,000 customers; $529 million rate base), Texas (95,000 customers; $451 million rate base), New Jersey (63,000 customers; $259 million rate base), North Carolina (109,000 customers; $363 million), Indiana (32,000 customers; $130 million rate base), and Virginia (36,000 customers; $116 million rate base). In 2020, WTRG acquired Peoples Gas for $4.275 billion ($1.3 billion of assumed debt) from SteelRiver Infrastructure Partners. Based in Pittsburgh, PA, Peoples is the fifth-largest stand-alone gas utility with 743,000 customers in PA (703,000 customers; $3.3 billion rate base), KY (41,000 customers; $192 million rate base).

### Reason For Comment

The following are key takeaways from President of Aqua, Colleen Arnold, at our 2nd PFAS Symposium.

- The company outlined its PFAS compliance program and expressed confidence that it would meet the EPA's compliance schedule. On April 10, 2024, the EPA finalized a rule that sets maximum contaminant levels (MCLs) for six PFAS compounds in drinking water. The rule includes limits of 4 nanograms per liter (ppt) for PFOA and PFOS, and new limits for four other compounds. Water systems must comply with monitoring and reporting requirements by 2027, and with the MCL by 2029. The company plans to use its own labs for monitoring the chemicals' level and implement activated carbon treatment for its larger systems and water supply sources. Selected smaller systems will likely use other technologies, including a patent pending modulated approach.

- We expect that additional investments will be needed to enhance rate base growth and earn PUC authorized returns. In addition, WTRG noted that many municipal systems would faces challenges meeting the aggressive EPA standards and timeline, which could create privatization opportunities and accelerate consolidation.

- In 2024, WTRG expects $1.3-1.4 billion in regulated infrastructure investments and $7.2 billion over 2024-2028. The five-year capital program includes $450 million for PFAS compliance. More than 50% of the investment is allocated toward pipe replacement or upgrades in jurisdictions with surcharge eligible infrastructure programs (PA, IL, IN, OH, NJ, and NC).

- Management estimates that the regulated water customer base to grow 2-3% from acquisitions and organic customer growth while the gas utility customer base will be flat. The company expects to grow its water utility rate base by 8% per annum and its gas utility rate base by 10% per annum. S&P/Moody's issuer credit rating is A-/BBB+. WTRG expects to draw $250-300 million per year from its ATM program. Financially strong (A- credit ratings), WTRG plans to grow EPS through utility rate base investment and acquisitions of water utilities. The company recently sold a small WV gas utility and non-core energy assets.

**Capitalization ($ in millions)**

| | |
|---|---|
| Balance Sheet as of | 6/30/2024 |
| Shares Outstanding | 273.7 |
| Market Price | **$38.60** |
| Market Value | 10,563.7 |
| Plus: Debt | 7,185.0 |
| Minus: Cash & Equivalents | (18.8) |
| Net Debt | 7,166.1 |
| **Total Capitalization** | **$17,729.8** |

**Essential Utilities**
**Price Performance**


*Source: reuters.com*

**Essential Utilities**

($ Millions - Percent Change)

| Year | 2022 | 2023 | 2024E | 2025P |
|---|---|---|---|---|
| Revenue | $ 2,290.0 | $ 2,050.0 | $ 2,140.0 | $ 2,350.0 |
| % Growth | | -10.5% | 4.4% | 9.8% |
| EBITDA | $ 986.5 | $ 1,041.9 | $ 1,160.0 | $ 1,320.0 |
| % Margin | 43.1% | 50.8% | 54.2% | 56.2% |
| EPS | $ 1.77 | $ 1.86 | $ 2.04 | $ 2.12 |
| % Growth | | 5.1% | 9.7% | 3.9% |
| EBITDA Mulitple | 18.0x | 17.0x | 15.3x | 13.4x |
| P/E Multiple | 21.8x | 20.8x | 18.9x | 18.2x |

*Source: Public data and Thomson One consensus estimates*

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October 10, 2024

**Middlesex Water (MSEX- $63.12 - NYSE)** **PFAS Symposium Highlights**

| Year | EPS | P/E |
|---|---|---|
| 2025P | $2.34 | 27.0x |
| 2024E | 2.23 | 28.3 |
| 2023A | 1.76 | 35.9 |
| 2022A | 2.39 | 26.4 |

Dividend: $1.30 Current Return: 2.1%
Shares O/S: 273.5 million
52-Week Range: $73.47 - $45.42
Book Value (6/30/2024): $24.28

*Source: Company filings, Thomson consensus estimates*

**COMPANY OVERVIEW**

Based in Iselin, NJ, MSEX is one of the nation's larger water utilities providing regulated service in New Jersey and Delaware. Middlesex Water Company serves 60,000 customers in and around Middlesex County, NJ. Tidewater, together with its wholly owned subsidiary, Southern Shores, serve 59,000 retail customers in DE. MSEX also has several contracts to provide water and wastewater to municipalities in NJ and DE. Effective March 1, 2024, Nadine Leslie was appointed President and CEO of MSEX replacing long-time CEO Dennis Doll (Now Chairman). She previously served as Chief Executive Officer of SUEZ North America from 2019 to 2022. Effective June 24, 2024, Mohammed G. Zerhouni was named Chief Financial Officer and Treasurer following a comprehensive search for a successor to retiring Bruce O'Connor.

**Reason For Comment**

The following are key takeaways from G. Christian Andreasen, VP of Engineering from our 2nd PFAS Symposium. He discussed its compliance program and expressed confidence in Middlesex Water ability to meet with the EPA's compliance schedule.

- On April 10, 2024, the EPA announced that the agency had finalized a rule which sets maximum contaminant levels (MCLs) for six PFAS compounds in drinking water. The rule includes limits of 4 nanograms per liter (ppt) for PFOA and PFOS, and new limits for four other compounds. Water systems must comply with monitoring and reporting requirements by April 2027, and with the MCL by 2029. Middlesex Water successfully treats PFAS using primarily granular activated carbon, while Tidewater has been performing voluntary sampling of all its 175 wells for several years and has installed ion exchange resin for PFAS treatment at four locations.

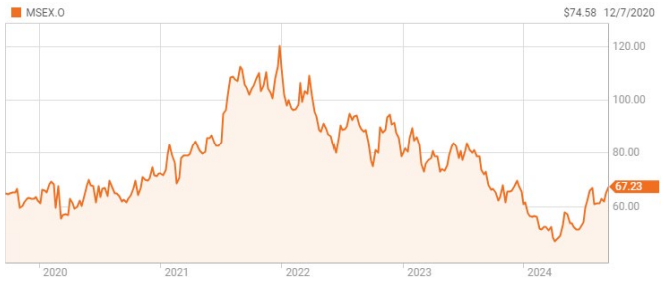
- In August 2023, Middlesex and 3M Company (3M) reached a settlement agreement to resolve the claim that 3M introduced PFAS into the MSEX water supply used by its Park Avenue Wellfield Treatment Plant. In July 2023, MSEX received $64 million in proceeds, which was used to mitigate customer rates and reimburse the company for the previously incurred costs related to the construction of the Park Avenue Plant PFAS treatment's upgrades, including depreciation and carrying costs.

- We expect that the additional investment will enhance rate base growth and earn PUC authorized returns. In addition, we expect that many municipal systems will faces challenges meeting the aggressive EPA standards and timeline; this factor could create privatization opportunities and accelerate consolidation.

**Capitalization ($ in millions)**

| | |
|---|---|
| Balance Sheet as of: | 6/30/2024 |
| Shares Outstanding | 17.8 |
| Market Price | **$63.12** |
| Market Value | 1,125.4 |
| Plus: Debt | 436.2 |
| Minus: Cash | (8.0) |
| Net Debt | 428.2 |
| **Total Capitalization** | **$1,553.6** |

**Middlesex Water Company**
**Price Performance**




*Source: reuters.com*

**Middlesex Water Company**

($ Millions - Percent Change)

| **Year** | **2022** | **2023** | **2024E** | **2025P** |
|---|---|---|---|---|
| Revenue | $ 162.4 | $ 166.3 | $ 185.2 | $ 198.4 |
| % Growth | | 2.4% | 11.4% | 7.1% |
| EBITDA | $ 80.5 | $ 75.2 | $ 85.1 | $ 90.3 |
| % Margin | *49.6%* | *45.2%* | *46.0%* | *45.5%* |
| EPS | $ 2.39 | $ 1.76 | $ 2.23 | $ 2.34 |
| % Growth | | -26.4% | 26.7% | 4.9% |
| EBITDA Mulitple | 19.3x | 20.7x | 18.3x | 17.2x |
| P/E Multiple | 26.4x | 35.9x | 28.3x | 27.0x |

*Source: Public data and Thomson One consensus estimates*

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October 10, 2024

# Minerals Technologies Inc. (MTX - $75.87 - NYSE) PFAS Symposium Highlights

| Year | EPS | P/E |
|---|---|---|
| 2025P | $6.95 | 10.9x |
| 2024E | 6.12 | 12.6 |
| 2023A | 5.21 | 14.6 |
| 2022A | 4.88 | 15.5 |

Dividend: $0.40 Current Return: 0.5%
Shares O/S: 32.4 million
52-Week Range: $90.29 – $48.61

*Source: Company filings, Thomson consensus estimates*

## COMPANY OVERVIEW

Based in New York City, Minerals Technologies (MTI) is a resource and technology company focusing on minerals-based products and related systems. Having realigned its businesses in early 2023, it now operates in two segments:

Consumer & Specialties (53% of total) consists of Household & Personal Care with mineral-to-market products serving pet care, personal care, and fabric care, as well as edible oil and renewable fuel purification. The Specialty Additives category serves paper, packaging, sealants & additives, ceramics, plastics, and food & pharmaceutical end-markets.

Engineered Solutions (47%) consists of High Temperature Technologies providing specially formulated blends and technologies to the foundry and steelmaking industries. The Environmental & Infrastructure segment offers waterproofing, water purification, remediation, and other fluid management technologies to industrial markets.

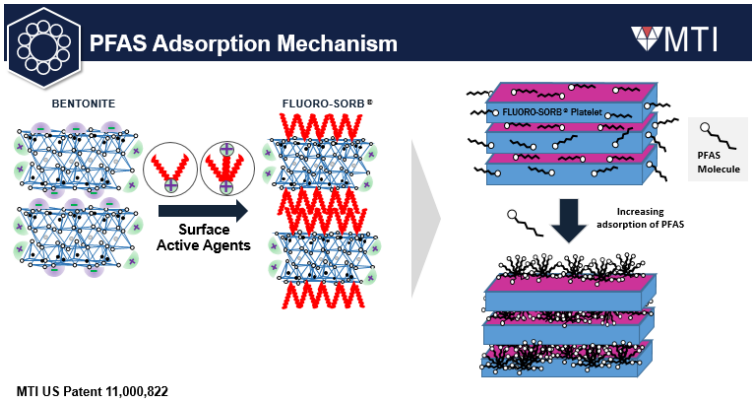
Minerals Technologies is expected to earn ~$6.05 per share on $2.1 billion of revenue and $412 million of Adj. EBITDA in 2024.

## Reason For Comment

The following are the key takeaways from Michael Kozak, VP, Environmental Products, Dr. Michael Donovan, Director of R&D, CETCO, and Carry Shadrix, Global Director Water, Wastewater, and Remediation, the company's R&D team who presented at our PFAS Symposium for the second year.

- Members of Minerals Technologies' R&D team shared the progress achieved, and the increased interest in PFAS removal following EPA regulations, in the company's newest technology: FLUORO-SORB which removes the chemicals from landfills, drinking water, and wastewater.
- Minerals Technologies is a resource and technology company focusing on minerals-based products and systems. The company believes that FLUORO-SORB could be an off-the-shelf solution to a wide variety of PFAS contamination, especially given the recent drinking water regulations and government grants likely to be major tailwinds. While FLUORO-SORB could be a $1 billion annual market for the company, the timing depends on compliance, currently required by 2029.
- FLUORO-SORB is made from sodium bentonite, commonly used in drilling and cat litter. Sourced from the company's mines in South Dakota and Wyoming, it is extremely absorbent with a high surface area to volume. As most types of PFAS carry a negative charge, MTX alters the surface of the material to give it a positive charge, thereby attracting the chemicals' molecules. The thin FLUORO-SORB plates can expand as much as 5-10 times their initial thickness as PFAS gets stuck between them. Longer lasting than others, the material appears to outperform activated carbon and ion exchange; its price is slightly above that of carbon and like that of the more expensive ion exchange systems. In some applications, a FLUORO-SORB -impregnated textile fabric can cover affected areas thereby preventing the chemicals from leaking out.

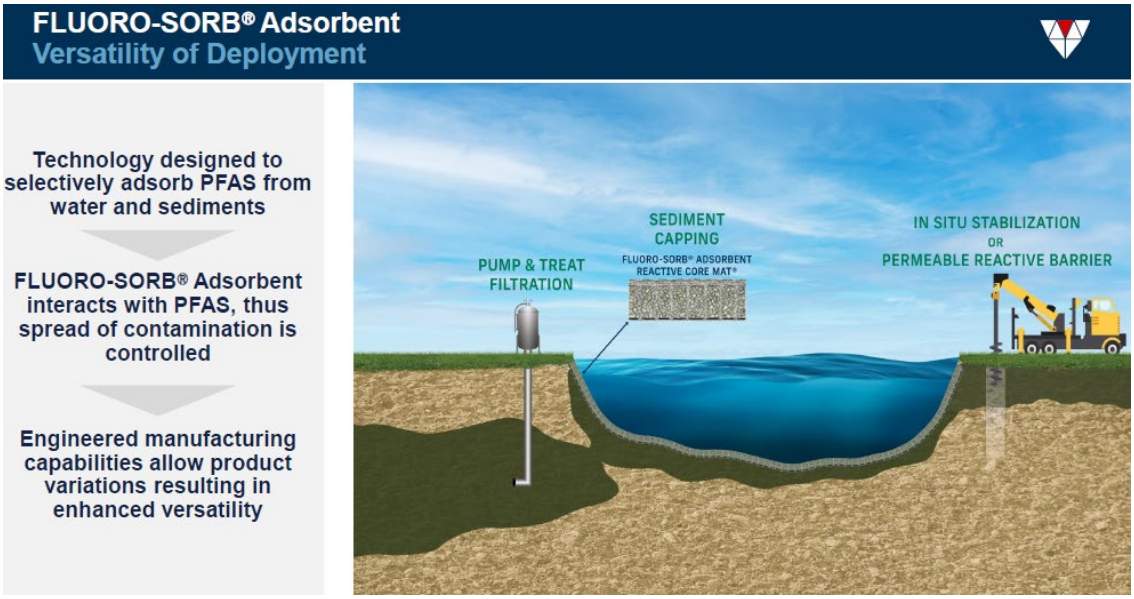
**Exhibit 1 – FLUORO-SORB Technology**




*Source: Minerals Technologies*

- Approximately 3,900-6,300 sites in the U.S. with PFAS contamination are affected by the recent EPA limits of four parts/trillion in drinking water. At present, there are more than 300 global drinking water, 120+ landfills, and 35+ wastewater projects in the company's pipeline. Bentonite has the unique capability to be used for versatile applications: subsurface injection, sediment capping wastewater filtration, soil remediation (by mixing it with the soil), and surface water gravity filtration.
- FLUORO-SORB can act as a standalone solution in certain systems and can also be used as a component in more complex systems. As a pre-treatment it would extend the life of activated carbon beds already used by water utilities; it could also specifically isolate PFAS from waste, thereby improving incinerators' efficiencies by burning less extra material.
- Minerals Technologies' significant mineral resources, and ownership of the mineral rights to the clay, will allow it to meet the anticipated strong demand following the impact from regulations, public perception, and litigations. With existing manufacturing capabilities to supply the material through 2026, capacity can easily be doubled with minimal capital expenditures. As a patented product, combined with world-class mineral reserves, FLUORO-SORB offers customers a cheaper overall solution, compared with activated carbon, as it requires a smaller infrastructure, lower capital and lower operating costs (removal only needs two minute of water contact vs 10-20 with activated carbon).
- With multiple projects already operational, positive results, and an affordable price, we believe that FLUORO-SORB has a strong future and should contribute to the company's overall results.

**Exhibit 2 – FLUORO-SORB Capabilities**




*Source: Minerals Technologies*

**Capitalization ($ in millions)**

| | |
|---|---|
| Balance Sheet as of | 6/30/2024 |
| Shares Outstanding | 32.4 |
| Market Price | **$75.87** |
| Market Value | 2,458.2 |
| Plus: Debt | 991.4 |
| Minus: Cash & Equivalents | (316.4) |
| Net Debt | 675.0 |
| **Total Capitalization** | **$3,133.2** |

**Minerals Technologies Inc.**
**Price Performance**


*Source: reuters.com*

**Minerals Technologies Inc.**

($ Millions - Percent Change)

| Year | 2022 | 2023 | 2024E | 2025P |
|---|---|---|---|---|
| Revenue | $ 2,125.6 | $ 2,169.8 | $ 2,150.0 | $ 2,270.0 |
| % Growth | | 2.1% | -0.9% | 5.6% |
| EBITDA | $ 346.7 | $ 373.8 | $ 410.7 | $ 439.1 |
| % Margin | 16.3% | 17.2% | 19.1% | 19.3% |
| EPS | $ 4.88 | $ 5.21 | $ 6.12 | $ 6.95 |
| % Growth | | 6.8% | 17.5% | 13.6% |
| EBITDA Mulitple | 9.0x | 8.4x | 7.6x | 7.1x |
| P/E Multiple | 15.5x | 14.6x | 12.4x | 10.9x |

*Source: Public data and Thomson One consensus estimates*

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October 10, 2024

**PermaFix Environmental Services (PESI- $13.33- NYSE)** **PFAS Symposium Reflections**

| Year | EPS | P/E |
|---|---|---|
| 2025P | $0.04 | NM |
| 2024E | (0.63) | " |
| 2023A | 0.04 | " |
| 2022A | (0.29) | " |

Dividend: None Current Return: Nil
Shares O/S: 15.8 million
52-Week Range: $14.17 – $6.51

*Source: Company filings, Thomson consensus estimates*

## COMPANY OVERVIEW

Headquartered in Atlanta, Georgia, Perma-Fix Environmental Services, Inc., through its subsidiaries, operates as an environmental and technology know-how company in the United States via its Treatment and Services Segments. The Treatment segment offers nuclear, low-level radioactive, mixed waste, hazardous and non-hazardous waste treatment, and processing and disposal services through treatment and storage facilities. This segment is also involved in the research and development activities to identify, develop, and implement waste processing techniques for problematic waste streams. The Services Segment provides technical services, including professional radiological measurement and site survey of government and commercial installations; health physics services; integrated occupational safety and health services; and consulting, engineering, project and waste management, environmental, decontamination and decommissioning (D&D) field, technical and management personnel and services; and waste management services. This segment also offers nuclear services, including D&D of government and commercial facilities, including engineering, technology applications, specialty services, logistics, transportation, processing, and disposal; and license termination support, such as project management, planning, characterization, waste stream identification and delineation, remediation/demolition, compliance demonstration, final status survey, reporting, transportation, disposal and emergency response. In addition, it maintains, services, maintains, calibrates, and sources health physics, IH and customized nuclear, environmental, and occupational safety and health instruments. The company provides its services to research institutions, commercial companies, public utilities, and governmental agencies through direct sales to customers or through intermediaries.

**Reason For Comment**

The following are key takeaways Executive Vice President, Dr. Louis Centofanti, at our 2nd PFAS Symposium.

- The company's client base includes government entities, and in particular, the Department of Energy and Department of Defense. PESI focuses on treating waste that has no home and is currently figuring out how to destroy the calcium fluorine bonds for PFAS.

- Its PFAS destruction technology uses a Hydrolytic Process that works in water, in ambient conditions and destroys anything it is exposed to. All the ingredients are environmentally benign. Unique features of Perma-FAS PFAS solution are: 1. Environmentally friendly, 2. Energy efficient, 3. Economical, 4. Versatile, 5. Liability-reduction.

- The company focuses on areas such as Liquids (works on leachate), Filter media, Soils, and Bio-Solids, where it can compete effectively. PermaFix believes it can compete economically with landfills, incinerators, and other polluting processes.

- Until soil stabilization is in place, there is a danger of digging it up and having to do it all again in the future. Permafix is hoping to expand and install the unit in 3-4 other facilities. PESI can bring radioactive waste or PFAS to their facilities. First full scale to be operational will be in Gainesville, FL

- AFFF Liquids represent a huge opportunity for PermaFix. It is an ideal condition for the company's process, given the water stream with large volumes, and PESI is working with generators and clients. The first unit is an experimental unit which will destroy PFAS in the reactor, then separate the water and calcium fluoride. The important questions are as follows: where can the water and the calcium fluoride resulting from the process be sent? And what is an acceptable level of PFAS?

- PESI has a batch process. It is simple to measure what is in the reactants and the economics are comparable to what is normally seen in the recycling process. Recycling the reactants is a key part of the process.

**Capitalization ($ in millions)**

| | |
|---|---|
| Balance Sheet as of | 6/30/2024 |
| Shares Outstanding | 15.8 |
| Market Price | **$13.33** |
| Market Value | 210.6 |
| Plus: Debt | 2.2 |
| Minus: Cash & Equivalents | (18.1) |
| Net Cash | (15.9) |
| **Total Capitalization** | **$194.7** |

**PermaFix Environmental Services**
**Price Performance**


*Source: reuters.com*

**PermaFix Environmental Services**

($ Millions - Percent Change)

| Year | 2022 | 2023 | 204E | 2025P |
|---|---|---|---|---|
| Revenue | $ 70.6 | $ 89.7 | $ 65.7 | $ 100.2 |
| % Growth | | 27.1% | -26.8% | 52.5% |
| EBITDA | $ (3.3) | $ 3.3 | $ (10.1) | $ 3.4 |
| % Margin | nm | 3.7% | nm | 3.4% |
| EPS | $ (0.29) | $ 0.04 | $ (0.63) | $ 0.04 |
| % Growth | | nm | nm | nm |
| EBITDA Mulitple | nm | 58.8x | (19.3x) | 57.3x |
| P/E Multiple | nm | 333.3x | (21.2x) | 333.3x |

*Source: Public data and Thomson One consensus estimates*

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**REGENESIS (Private)** **PFAS Symposium Highlights**

## COMPANY OVERVIEW

Regenesis is a privately held company based in San Clemente, California, that specializes in innovative environmental remediation solutions for a wide range of contaminants, including PFAS, petroleum hydrocarbons, chlorinated solvents, and metals. The company's flagship product is PlumeStop®, a colloidal suspension of activated carbon particles that can rapidly and effectively immobilize PFAS in groundwater and soil, preventing further migration and enhancing natural attenuation.

**Reason For Comment**

The following are the key takeaways from Alana Miller, East Region Manager, from our 2nd PFAS Symposium.

Alana has ten years of experience in the environmental industry; she has a Bachelor of Science in Civil and Environmental Engineering from Princeton University. Her experience includes work in environmental consulting, pollution liability insurance, and
remediation design. In her role she oversees a team of technical experts, delivering industry-leading remediation solutions for sites dealing with contaminated soil and groundwater.

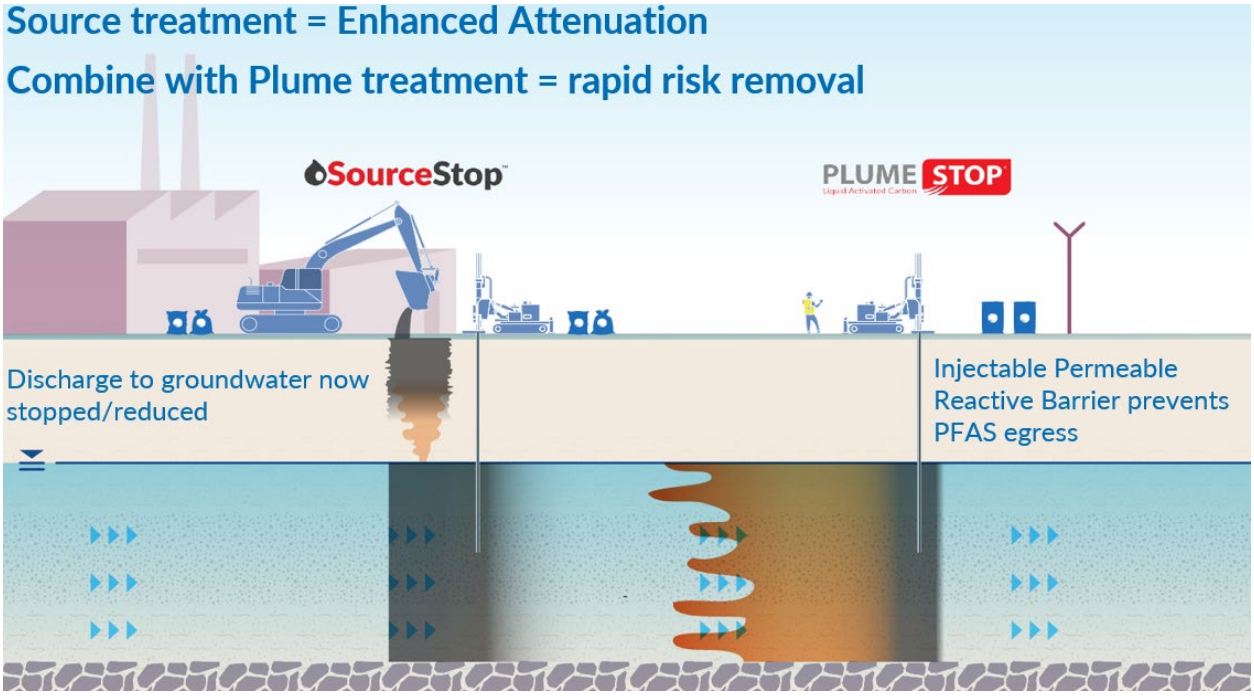
Alana focused her discussion on the practical and technological aspects of remediation of contaminated properties themselves. While the company has been using a variety of remediation approaches for contaminants over the last 30 years, including bioremediation, chemical oxidants and chemical reductants, over the last few years they have focused on the PFAS space. With over 24 patents in the field of groundwater remediation, the company focuses on turnkey approaches to new remediation technologies.

The colloidal activated carbon (CAC) used for in-situ PFAS sorption technologies, is produced by milling carbon down to one-to-two microns in size (the size of a red blood cell), injected into the subsurface, turning the soils themselves into a filter. CAC can remove PFAS faster than granulated activated carbon (GAC) as it coats the entire soil carbon more effectively than powdered activated carbon (PAC). The CAC solution by Regenesis has been used in over 55 applications globally, with 154 in development (design and review).

Two of the technologies using CAC include SourceStop, which is activated carbon that can be mixed into the subsurface using backhoes, and PlumeStop, which is a permeable reactive barrier that can be installed at the boundary of contamination to prevent egress downgradient or trespassing of contaminants across properties. PlumeStop can be applied under low-pressure injections, reducing the costs and challenges associated with conventional pump and treat systems. Key locations seeking remediation from Regenesis include regional airports, military bases, industrial and manufacturing facilities, fire training facilities, and landfill sites.

In addition to the improved effectiveness of CAC, the remediation approach of Regenesis offers energetic and economic advantages. PlumeStop is 2.5-2.8 times less expensive than ex-situ pump and treat (P&T) options and boasts a 40-70x smaller carbon footprint than P&T. The activated carbon used by Regenesis is derived from coconut shells and manufactured in the USA, reducing source material security concerns and adding to the company's sustainability metrics as well as ensuring a renewable source.

**Exhibit 1 – Regenesis PFAS Remediation Options**




*Source: Regenesis*

Finally, the PFAS being left in the subsurface has adhered to the CAC particles; as a result, the costs, energy, and liability associated with PFAS waste disposal, as seen in other remediation approaches, is nonexistent. In fact, the PFAS may reside in the sub-surface for over 30 years. Modeling software helps Regenesis keep tabs on the effectiveness of the PFAS being locked up within the soil materials. Estimates from the company show that any leaching is negligible due to dilution. Natural attenuation models help design the activated carbon system to ensure longevity.

Alana shared the company management's sentiment regarding the urgency of PFAS remediation, pointing out that there is a wide variety of positions: some companies are in a waiting period until regulations become more concrete, while others are aware of it and want to get ahead of the issue. Across all companies, it is clear this is a global issue and one that requires a focus on addressing the key sources of PFAS contamination.

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## SJW Group (SJW - $56.61 - NYSE) — PFAS Symposium Highlights

| Year | EPS | P/E |
|---|---|---|
| 2025P | $2.95 | 19.2x |
| 2024E | 2.75 | 20.6 |
| 2023A | 2.68 | 21.1 |
| 2022A | 2.43 | 23.3 |

Dividend: $1.60 Current Return: 2.8%
Shares O/S: 31.9 million
52-Week Range: $70.43 - $51.17
Book value (6/30/2024): $38.81

*Source: Company filings, Thomson consensus estimates*

## COMPANY OVERVIEW

SJW Group (San Jose, CA) is a holding company for San Jose Water Company (SJWC), a water utility with 232,000 connections (one million people) in metropolitan San Jose, CA; SJWTX, Inc. a water utility with 28,000 connections (80,000 people) in the growing region between San Antonio and Austin, TX; SJW Land Company owns undeveloped land and operates commercial buildings in TN. In 2019, SJW acquired Connecticut Water Service (CTWS) for $1.1 billion adding more than 141,000 customers in CT and ME. In 2023, CA represented 53% of earnings, CT 33%, Maine 5%, TX 8%.

**Reason For Comment**

The following are key takeaways from Andrew Walters, CFO, and David Peeling, VP of Engineering from our 2nd PFAS Symposium.

- The company outlined its PFAS compliance program and expressed confidence that it would meet the EPA's compliance schedule. On April 10, 2024, the EPA finalized a rule that sets maximum contaminant levels (MCLs) for six PFAS compounds in drinking water. The rule includes limits of 4 nanograms per liter (ppt) for PFOA and PFOS, and new limits for four other compounds. Water systems must comply with monitoring and reporting requirements by 2027, and with the MCL by 2029.

- SJW plans to outsource its monitoring and detection, and it will implement activated carbon treatment for its larger systems and water supply sources; selected smaller systems will likely use other technologies. SJW's plans to invest $1.6 billion ($332 million in 2024) in capital over the next five years to build and maintain its water and wastewater operations, including $230 million to install PFAS treatment. SJW's CA and CT systems are affected and expect to comply with regulations; they are a party to multiple class-action lawsuits with PFAS manufacturers.

- SJW's S&P Credit rating is A-, but the common equity ratio is a low 41.7% compared to historical averages of 55%. We expect the additional investment to enhance rate base growth and earn PUC authorized returns. In addition, we expect that municipal systems will face substantial challenges in meeting the aggressive EPA standards and timeline, which could create privatization opportunities and accelerated consolidation.

**Capitalization ($ in millions)**

| Balance Sheet as of | 6/30/2024 |
|---|---|
| Shares Outstanding | 32.7 |
| Market Price | **$56.61** |
| Market Value | 1,849.4 |
| Plus: Debt | 1,776.1 |
| Minus: Cash & Equivalents | 22.8 |
| Net Debt | 1,798.9 |
| **Total Capitalization** | **$3,648.4** |

**SJW Group**
**Price Performance**


*Source: reuters.com*

**SJW Group**

($ Millions - Percent Change)

| Year | 2022 | 2023 | 2024E | 2025P |
|---|---|---|---|---|
| Revenue | $ 620.7 | $ 670.4 | $ 706.2 | $ 738.3 |
| % Growth | | 8.0% | 5.3% | 4.5% |
| EBITDA | $ 237.4 | $ 255.3 | $ 288.9 | $ 313.7 |
| % Margin | 38.3% | 38.1% | 40.9% | 42.5% |
| EPS | $ 2.43 | $ 2.68 | $ 2.75 | $ 2.95 |
| % Growth | | 10.3% | 2.6% | 7.3% |
| EBITDA Mulitple | 15.4x | 14.3x | 12.6x | 11.6x |
| P/E Multiple | 23.3x | 21.1x | 20.6x | 19.2x |

*Source: Public data and Thomson One consensus estimates*

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