

Aria™ FAST

Self-contained water trailers provide rapid treatment options and flexible solutions to evolving water and wastewater needs

by Jan Bultiauw

Speed is critical in the water industry, regardless of whether providing water for human consumption or treating industrial wastewater. As such, facilities must be prepared to implement an immediate solution following high turbidity events, an unplanned plant shutdown or an emergency. Speed is also critical when facing the industry's current regulatory climate. As water quality and discharge regulations mount the growing need to protect the environment and preserve the world's limited freshwater resources.



Aria FAST unit mounted on trailer

Mobile water treatment technology

Born from the need to provide water where and when it is demanded, mobile water treatment technology has been validated time and again, particularly in emergency situations including the aftermath of severe hurricanes in the southwestern United States. The use of mobile water treatment units allowed industrial facilities and municipalities in the affected regions to maintain their ability to operate by treating high turbidity water caused by the storm surge.

With speed paramount, membrane-based mobile water units have become increasingly prevalent. These turnkey mobile water treatment solutions provide rapid, flexible solutions for the evolving needs of plant operators around the world.

Delivered in a self-sufficient container, on-demand water solutions allow water providers to quickly produce potable water or high

quality water for industrial processes or treat wastewater, even in emergency situations, to keep water, and business, flowing. The purpose of these mobile water solutions is to provide the water that customers need when and where they need it. Given the mobile functionality of these units, they are capable of being transported and quickly deployed, to provide a rapid solution for a variety of water and wastewater needs.

The evolution of water needs

As fully functioning containers do not require construction or other infrastructure investments to operate, they are perfectly suited for use in emergency situations. For example, mobile containers are suited for a range of natural disasters (like flooding or periods of heavy rain), or other unplanned plant shutdowns. These units can be operational in a matter of hours as they are capable of producing water as soon as they are on-line. Beyond unplanned, emergency deployments, rapid response is increasingly needed to meet ever-



Deployed Aria FAST unit in Wellsboro, US



Deployed Aria FAST units in Mount Isa, Australia



Deployed Aria FAST units in New Jersey, US



Impro FAST membrane filtration modules



Aria FAST on trailer

changing regulations and water quality requirements. With the regulatory landscape worldwide currently facing many unknowns, mobile water treatment units will become increasingly critical as plants need to quickly implement solutions in order to meet new legislation and water quality standards in the years to come.

Beyond unplanned shutdowns, regulatory needs and emergency deployments, mobile membrane filtration is increasingly being utilized for a variety of planned, short-term water needs. Such systems are good solutions in instances where a plant needs to refurbish equipment or take pieces down for scheduled maintenance.

Mobile units provide this level of flexibility as they can be rented for any time period whether the unit is needed for a week, month, quarter or a year. Additionally, mobile units provide value from a capacity planning perspective as they allow plants to rent a mobile membrane filtration system to meet seasonal demands.

As such, they afford plants the flexibility to meet their growing, and future, water capacity needs without the capital investment required to build an additional facility or expand upon an existing plant.

Capabilities of Pall Water's Aria™ FAST mobile filtration unit

Pall Water's signature mobile system is its Aria FAST modular low-pressure membrane unit which can be rapidly deployed to ensure the continuity of safe, reliable water production for communities and industries around the world.

Aria FAST provides reliable water quality under highly variable conditions including municipal water treatment, seawater reverse osmosis pretreatment, incoming water to industrial processes, water recycling and reuse and mining water. Capable of producing water within hours of arrival on site, Aria FAST units are perfectly suited for emergency situations in both municipal and industrial water applications.

Aria FAST mobile systems use robust membrane technology to transform discharge water, ground water, surface water or secondary effluent into water that is free from suspended solids and harmful bacteria.

While ideally suited for pre-planned maintenance shutdowns or emergencies, Aria FAST systems can also be implemented as permanent solutions. Modular assets are available for purchase or long-term lease to deliver high quality membrane filtration without the expense of costly civil works. Upon arrival, units can quickly be connected to local power, internet (for remote operation and monitoring) and raw water.

Aria FAST mobile water units can treat up to 1 million gallons per day (MGD), or 4MLD, of impaired water with typical recovery rates greater than 95%. Multiple units can be easily combined to increase output and controlled by a master control panel. Additionally, the units are designed as pretreatment for Impro FAST systems, an intelligent maximum performance reverse osmosis technology.

The Aria FAST mobile water treatment systems are specifically designed to produce water that meets today's stringent standards. The units use uniquely designed membrane filtration modules in a hollow fiber configuration to remove contaminants from all feed water sources.

Membrane filtration is a pressure driven process that uses a semipermeable (porous) membrane to separate undesirable particulate matter from water. In Aria FAST mobile systems, microfiltration or ultrafiltration membranes act much like a very fine sieve to retain particulate matter, while water and its soluble components pass through the membrane as filtrate, or filtered

water. The retained solids are concentrated in a waste stream that is discharged from the membrane system. The membranes, with their fine pore size and absolute seal, remove virtually all of the fine matter, such as silica, bacteria and parasite cysts.

During production, feed water enters the bottom of the module and is distributed uniformly to the outside of the fibers. Since it is under pressure, the water passes through the hollow fiber membranes, and filtered water exits through the top of the module. Under normal conditions, all of the feed water flows through the membranes and exits as filtered water.

Depending on the feed quality, a small amount of the feed water may be circulated past the outside of the hollow fibers. This flow prevents the accumulation of foulants and debris on the surface of the membrane and helps to evenly distribute flow through the membrane fibers.

Meeting time-sensitive water quality regulations

Faced with meeting stringent water quality requirements, a large European power plant was in need of identifying a reliable and more abundant source of water to feed its existing demineralization unit. As the plant's original water supply, conventionally treated groundwater, could no longer provide a stable and high quality treated water source, it had to quickly implement a solution in order to meet the impending water quality regulations and avoid plant shutdown.

Due to the short supply of water, the resolution was made to utilize water from the adjacent river La Meuse. To provide stable, high quality treated water, the source water, characterized as having variable organic load and suspended solids due to seasonal variation, ultimately chose to implement two mobile integrated membrane systems consisting of low pressure membranes and one reverse osmosis unit.

The systems were provided in containers to minimize installation time and infrastructure costs. The original units were supplied in a short time to meet the need and keep the power plant on-line. Pall Corporation worked closely with the local operator since 2013, to provide the Aria FAST membrane systems as a long-term rental solution for a yearly average flow to produce at 130m³/h.

Ultimately, the membrane system produced a reliable source of water and exceeded requirements of the pre-existing demineralization plant without interrupting productivity. In 2016, after three years of long-term rental, the operator decided to purchase the units. In addition, the operator invested in Aria™ CARE, which extends the Pall service team to the site for annual maintenance and process optimization of the mobile units.

Still in operation, the fully integrated membrane systems are used for treatment of biological and organic control and the removal of all particulate matter from the river water. The speedy deployment of this membrane solution, which was operational within two months of delivery, saved the power plant from a potential costly shutdown procedure. The nature of these mobile, containerized units allowed for a fast deployment and significantly minimizing installation time along with infrastructure costs.

Providing a flexible, rapid solution to water woes

Despite the scenario, mobile water treatment provides operators with quick and flexible solutions capable of meeting the evolving needs of the water and wastewater industry. As wastewater and environmental discharge regulations tighten across the globe, operators and facilities in every industry are turning to self-contained solutions as they face new challenges surrounding water treatment that require a reliable, rapid solution.

This paper was prepared by Jan Bultiauw, Manager Applications Engineering with Pall Water.



Pall Water membrane filtration modules