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FRG SHOWS CAPABILITY OF PFAS REMOVAL

ASX Announcement

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This technical update provides details of the evaluation of the FRG conducted by Osmoflo in partnership with Purifloh Limited ("Purifloh", "PO3" or "Company"). The work was conducted at Osmoflo's advanced R&D facility, "The Edge", located in Burton, South Australia.

Osmoflo, the largest Australian-headquartered global desalination and water recycling company and a fully owned subsidiary of Hitachi Zosen Corporation, of Japan, has provided an evaluation of the Purifloh water treatment system based on extensive validation testing conducted over 11 months.

Preliminary results are successful as measured by Osmoflo wishing to enter into a formal engagement for future development and commercial exploitation. Following the success in the validation testing, pilot testing and co-development of products and technologies in key water treatment sectors are being planned.

The combination of radicals produced by Purifloh's Free Radical Generator (FRG) creates an Advanced Oxidation Process (AOP) environment in water and acts as a powerful water treatment method to destroy all microbial and chemical contaminants in the water.

The inherent low energy needs of the FRG technology (less than 0.2 kW-hr per 1 cu m of treated water in the prototypes used) substantially reduce the carbon footprint of water treatment at virtually no added cost.

Purifloh's FRG has achieved chemical breakdown of 98% of per- and poly- fluoroalkyl substances (PFAS of 'forever' chemicals) well-known, abundant water contaminants which are notoriously difficult to destroy and tend to accumulate in human bodies.

Mr Vigneswaran Appia, the Senior Technical Manager of Purifloh Australia, has been developing water treatment solutions for Purifloh since 2013. He said today that:

"The FRG is a very unique device in water treatment. Low energy, residue-free advanced oxidation process is key to removing contaminants from water that could be used anywhere – from strict water quality requirements in pharmaceutical plants to drinking and even wastewater. The test results confirm FRG's capability and, with Osmoflo's help, we can commercialise the water treatment sector of the FRG technology faster."

According to Neil Palmer, Osmoflo's Chief Technical Officer in Australia:

"PurifloH FRG technology has proven itself to be an effective advanced oxidation process that has low specific energy consumption, is chemical free and leaves no harmful by-products.

Its ability to break down PFAS is very impressive and presents exciting opportunities that we are keen to explore further. Osmoflo seeks to forge a formal partnership with PurifloH to explore PFAS and other water treatment avenues into the future.

Osmoflo is particularly interested in continuing research with PurifloH in the following areas:

- 1. Applications involving TOC removal, where coagulation, conventional treatment or membrane filtration are unviable or expensive.*
- 2. Potential for PurifloH treatment followed by passage through a fixed bed reactor (eg media filtration) to optimise removal of organics.*
- 3. Applications involving removal of PFAS. With preliminary evaluation out of the way and a good understanding of the system's capabilities and strengths, Osmoflo intends to proceed with a co-development process that will involve pilot evaluation, market identification, product development and deployment over the next 2 years."*

Background

In February 2022, as noted in the Quarterly Report lodged on 1 February 2022 and after several months of delays due to COVID restrictions, a prototype PurifloH treatment system was installed at Osmoflo's facility.

The preliminary objectives were to explore PurifloH suitability in pre-treatment of water destined for Reverse Osmosis ("RO") to help delay or prevent membrane bio-fouling as well as in applications involving chemical or biological treatment of water/wastewater (ASX announcement 10/06/2021).

Following is a brief explanation of broad test parameters:

In RO or membrane-based filtration, bio-fouling is a persistent and frequent problem that occurs whenever the target water includes organic or microbial contaminants.

Prevention of bio-fouling would be a significant advantage to operation of all RO systems.

1. Biological Contaminants

Biological contaminants that may be present in water range from protein molecules to protozoan parasites including cryptosporidium. When it comes to membrane bio-fouling, bacteria are the usual suspects and may be aerobic or anaerobic.

2. Chemical and Biological Oxygen Demand

Chemical Oxygen Demand (COD) is a measurement of oxidisable contaminants present in the water, gauged on the basis of the quantity of oxygen that may be required to completely oxidise the contaminants. Biological Oxygen Demand (BOD) is usually a fraction of the COD and accounts for bio-degradable contaminants in the total chemical contamination.

3. Total Organic Carbon

Total Organic Carbon (TOC) is an indication of the amount of organic contamination present in water. It is relevant in the context of membrane bio-fouling because it represents the concentration of nutrients that may be available to microbes for growth and multiplication.

4. Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)

US EPA (<https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas>) warns that exposure to PFAS is linked to cancers, weakened immune systems among children, weight gain, and a wide range of other health problems and present one of the greatest challenges in water preparation for pharmaceutical and food industries. Whilst the Australian Drinking Water Guidelines establish PFAS limit of 0.007 mg/L, it is widely acknowledged that there are no safe levels of PFAS and any exposure to PFAS should be avoided. To-date no financially feasible process exists that could effectively reduce/prevent exposure to consumers to PFAS through drinking water and food from commercial agriculture. They have been recognised as a health hazard for both people and animals and are notoriously difficult to address, as they are persistent and not bio-degradable.

Evaluation Results

Following extensive testing, the evaluation of the technology is as follows:

- The combination of Free Radicals created by the PurifLOH device is universally competent at removing microbial and organic chemical contaminants. It removes >99.99% of the microbial population and also reduces
- - Chemical Oxygen Demand
 - Total Organic Carbon
 - Colour
 - Odour
 - Biological Oxygen Demand

to varying degrees depending on the duration of treatment. Further testing in tackling these contaminants is ongoing.

The power consumption of the device for water treatment was found to be exceptionally low (<0.2 KW hr per cu m of water) when considering the level of treatment achieved.

- In the test period, maintenance was needed only once and even though the device was unfamiliar to the maintenance personnel, it was found to be a simple and fast process, potentially demonstrating the low operational expenses involved.

- The high rate of removal of TOC makes it very suitable in conditions where clean removal without by-products is important. Osmoflo is interested in applications involving TOC removal, where membrane filtration is unviable or expensive and where minimal production of by-products is important.
- Osmoflo is keen to explore the effectiveness of the device in the treatment of RO reject/brine.
- Osmoflo also tested the PurifLOH system for effectiveness against PFAS, which are notorious man-made contaminants affecting water systems, and found that the device was able to achieve a 98% reduction in PFAS concentration. Osmoflo is interested in continuing to explore this aspect.

PFAS Removal – Significance

PFAS are key compounds present in various everyday products such as non-stick utensils and industries such as aerospace and construction. They are also commonly used in fire-fighting. PFAS do not degrade easily and can accumulate in human and animal bodies. These compounds get concentrated in groundwater, landfill sites and industrial sites. Exposure to PFAS has been linked to several human and animal health conditions leading to urgent action from world governments - <https://www.pfas.gov.au/>

PFAS Removal - Global Market Scope

With major markets being cities and governments, industry effluents, landfill leachate, wastewater treatment plants, the total annual expenditure on PFAS treatment systems is set to scale to USD\$1.1 billion by 2030. Most states in the USA are committed to spending hundreds of millions of dollars to PFAS remediation and treatment – Biden administration has committed USD\$10 billion (<https://www.bluefieldresearch.com/ns/us6-15-billion-pfas-remediation-forecast-underpinned-by-changing-regulatory-environment/>).

Activated Carbon and Ion exchange remain the current solutions for PFAS removal but lead to highly toxic waste in water, landfills, or in the air post incineration. The problem is rapidly spreading and is being detected in more and more environments, making it harder to control. Oxidation of the contamination in water is faced with the problem of large-scale chemical consumption and high treatment costs.

PurifLOH's key breakthrough is the ability of the FRG technology to provide an AOP on its own, without the use of chemical consumables. AOP is usually achieved by mixing ozone/UV with high levels of hydrogen peroxide in wastewater treatment. However, the FRG can create the characteristic and highly oxidative hydroxyl radicals from the ambient moisture and oxygen in the air. FRG's cold plasma generation is inherently energy efficient and can achieve effective water treatment at a fraction of the cost required by other technologies such as UV and ozone generators.

PurifLOH believes that the FRG's effectiveness at removal of PFAS chemicals and the low operational expenses involved in achieving this effectiveness makes it uniquely suitable to address this market, especially so by partnering with Osmoflo to concentrate the chemicals via RO before destruction with the FRG.

Next Steps

Planning and discussions have started as per Osmoflo's intentions and the companies are drafting suitable terms of agreement and planning pilot installations that will further establish the effectiveness and financial viability.

PFAS removal will be a key market for PurifloH in the coming years and the company will expand its efforts towards testing and product development in this market.

This ASX announcement was authorized and approved by the Chairman of Directors of PurifloH Limited.

End

For further information:

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