

The Faure direct water reuse scheme: another global benchmark

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COMMENT



While putting tother this issue of *MechChem Africa* I learned from Louis Koen of Zutari about the Faure New Water Scheme (FNWS), which was initiated by the City of Cape Town immediately after the Day Zero scare in 2018. For Southern Africa, this scheme is set to become a second global benchmark in the direct treatment and reuse of domestic wastewater to supply a city's drinking water.

The first? The WINGOC (Windhoek Goreangab Operating Company) plant, which has now been processing wastewater – for the people of Windhoek to drink – for over 50 years.

The original Goreangab drinking water reclamation plant was able to treat 4.3-million litres of water per day, which was 10% of Windhoek's potable water demand. In 2002, though, the New Goreangab reuse plant was completed, and included an upgraded purification process that can produce 21-million litres of high purity potable water every day, meeting 25% of the water needs in Windhoek. This plant is globally recognised as the pioneer of direct water reuse technology.

In its 50 year history, while having provided clean drinking water to more than 300 000 residents of Windhoek, neither the new WINGOC plant nor its predecessor have ever been responsible for any negative health issues as a result of the wastewater resource or the failure of its treatment processes. This is perhaps because of the sensitive nature of using domestic wastewater, which demands vigilant monitoring of the water quality before it can be re-introduced into potable water reticulation systems.

As a temporary emergency intervention in response to the severe drought, The City of Cape Town operated a modern demonstration reuse plant from the Zandvliet WWTP from mid-2019 to the end of May 2021. While the water was never introduced into the potable water distribution network – the dam levels supplying the City of Cape Town recovered before the emergency plant was commissioned – it was repurposed into a demonstration plant to validate water quality results and ensure that direct wastewater treatment really does produce water that is safe to drink. The strictest available standards for purified wastewater were used in the assessments, including international standards prescribed by the WHO, the US, EPA and others.

As a result of this research, along with years of rigorous economic and environmental studies, technical research and planning, the Faure scheme has been designed based on the newest purification technologies, sophisticated online monitoring and control systems, and best-practice operating protocols. The design has been peer reviewed by international water reuse experts and follows the

Validation and Hazard Analysis and Critical Control Points (HACCP) approach used by the food and beverage industry.

A five step treatment process has been adopted:

- Ozonation uses the strong oxidising properties of ozone to destroy any disease-causing pathogens/germs and break down complex organic substances into simple biodegradable organic substances, which are consumed in the BAC filtration process of Step 2.
- Biologically Activated Carbon (BAC) Filtration removes particles and biodegradable organic substances.
- Granular Activated Carbon (GAC) Filtration removes non-biodegradable micro-organic substances through adsorption.
- Ultrafiltration removes particles, pollutants and pathogens/germs that are smaller than 10 µm (1 000 times thinner than the width of a human hair).
- An Advanced Oxidation Process with ultraviolet lamps combines light and chemical energy to break down any remaining organic chains to their molecular building blocks – CO₂ and water.

The FNWS plant's 100 million litres per day of potable water will initially be blended with raw water from dams, with a maximum ratio of 20% reuse water to 80% dam water. The blended water will then pass through the conventional treatment processes of the existing Faure Water Treatment Plant, before being stored in the Faure Reservoir ready to be widely distributed across Cape Town.

Water reuse is one of the most cost-effective new water resource options. According to the City of Cape Town's 'Water Reuse for Cape Town' booklet, direct reuse is estimated to cost about 60% of a typical desalination plant or a groundwater plant from the Cape Flats aquifer – and set up costs are only slightly more than the cost of groundwater from the Table Mountain Group aquifer. It also has less environmental impact than desalination and other surface water options.

Wastewater, particularly in coastal areas such as Cape Town, is often discharged directly into the ocean. In the light of global warming, we cannot continue to rely on the natural water cycle to clean that water and bring it back to us as rain.

Like the water we get via our natural water resources, direct reuse water must be appropriately treated to make it 100% safe to drink. This technology is long proven though, as well as being very cost effective, less energy intensive and more environmentally friendly than other options such as seawater desalination.



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