



Integrated Cooling Water Solutions

Wastewater Reclamation Contributes to Preserve Water Resources Down Under



AT A GLANCE

LOCATION

Brisbane, Australia

Plant Construction

The Wynnum Advanced Water Reclamation Plant upgrade to produce Class A+ recycled water for industrial processes.

System Key Facts

- The water reclamation plant receives feed water from the upgraded wastewater treatment plant.
- The treatment process uses a DOW FILMTEC™ RO Membrane, which provides an optimized design and materials of construction to create a durable, high rejection and high productivity element to purify waters with biological and organic fouling tendencies.
- The reverse osmosis (RO) element combines the best features of fouling resistance and durability, with the cleanability of an optimized feed spacer, to improve cleaning effectiveness.

Performance

- Produces 4,500 m³/d of high industrial grade Class A+ recycled water daily from municipal sewage.
- Good permeate quality is stable—all measured permeate quality parameters, including ammonia, combined nitrite and nitrate, and ortho phosphorus, remain consistently low.
- Improved regional water usage.
- Reliable system integrity and performance.

Time in Operation

Since March 2008



The Wynnum Advanced Water Reclamation Plant in Brisbane, Australia produces 4,500 m³/d Class A+ recycled water daily for industrial process water from municipal sewage using DOW FILMTEC™ BW30-400/34i-FR Membranes.

A Fragile Ecosystem

The Wynnum Advanced Wastewater treatment plant is located south of the Brisbane River junction to the sea in Moreton Bay. Abundant wildlife live in and around Moreton Bay, which is like a lagoon because a series of off-shore barrier islands restrict the flow of oceanic water.

In 2008, as part of the area's sustainability efforts, an advanced wastewater treatment plant was built to produce Class A+ recycled water for industrial processes. The plant operates with DOW FILMTEC™ BW30-400/34i-FR Elements, which were selected for their high performance and low lifecycle cost. DOW FILMTEC Membranes provide an optimized design and materials of construction to create a durable, high rejection and high productivity element to purify water with biological and organic fouling tendencies. The reverse osmosis (RO) element combines the best features of fouling resistance and durability, with the cleanability of an optimized feed spacer, to improve cleaning effectiveness.

With enabling reuse of wastewater in a high-value application, DOW FILMTEC™ technology contributes to the preservation of fresh water to sustain people and wildlife living in a fragile ecosystem.



Plant Description

The wastewater treatment process is presented in Figure 1. The water reclamation plant receives feed water from the upgraded wastewater treatment plant. Table 1 details the average feed water quality. The effluent water is chloraminated (2-3 mg/L) (Cl_2) and then directed to the balance tank, where it goes through 0.5 μm Amiad screens and two microfiltration units – the SDI of the MF filtrate is less than three 100% of the time. The pH is corrected with H_2SO_4 , and then the water moves through MF filtrate tanks, and an antiscalant dose before being fed to RO units. The RO system consists of two identical units of 16:8 configurations and each pressure vessel houses seven elements. In total, 336 pieces of BW30-400/34i-FR membranes are installed. The units recover 75% with a total design capacity of 5.3 ML/d. From there, the RO permeate is sent to the degassing tower, breakpoint chlorinated and then stored.

Parameter	Unit	RO Feed
Temperature	°C	25 (19.5-30.8)
pH	—	7.2
Alkalinity	mg/L	135
Aluminum	mg/L	0.03
Ammonia N	mg/L	1.39
Calcium	mg/L	33.4
Chloride	mg/L	322
Fluoride	mg/L	0.15
Iron	mg/L	0.04
Magnesium	mg/L	24.4
Manganese	mg/L	0.05
Nitrite + Nitrate-N	mg/L	1.14
Ortho Phosphorus	mg/L	1.58
Potassium	mg/L	18.6
Silica	mg/L	16.6
Sodium	mg/L	241
Sulfate	mg/L	120
Feed Conductivity	($\mu\text{S}/\text{Cm}$)	833 (378-1421)

Table 1. Feed Water Analysis

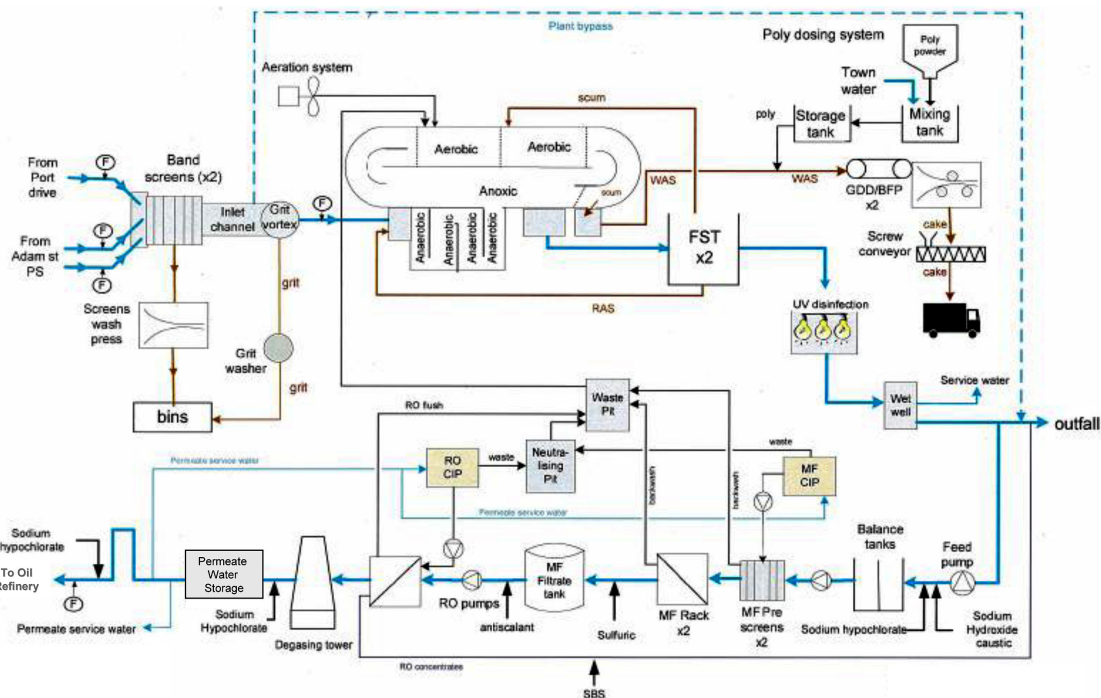


Figure 1. Process flow diagram of the reclamation plant

Plant Performance

For the first six months, the plant used SBS after chloramination to avoid oxidation of the membranes. However, a periodical differential pressure increase – most likely due to biofouling – occurred. When the plant discontinued SBS dosing in October 2008, the differential pressure stabilized and the flow slightly increased. This increase can be attributed to the stable performance of the DOW FILMTEC™ BW30-400/34i-FR Elements, which effectively combat the high fouling potential of waste water.

Furthermore, the good permeate quality is stable, and the salt passage consistently is maintained between 0.8 and 1.9%.

In addition to controlling overall salt rejection, wastewater treatment and reclamation plants often measure other quality parameters for product water, including ammonia, combined nitrite and nitrate, and ortho phosphorus. Figure 5 shows the Wynnum plant permeate quality in terms of the ammonia, combined nitrite and nitrate, as well as ortho phosphorus concentration (ppm) over time – all parameters remain consistently low, meeting the stringent quality requirements of an industrial application. The step change observed in the ammonia concentration is due to the discontinuation of dechlorination with SBS upstream RO.

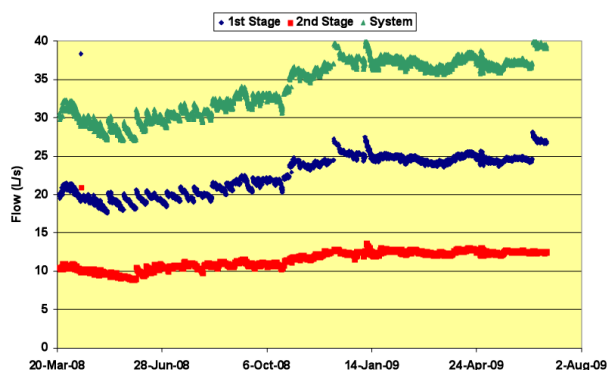


Figure 2. Normalized Permeate Flow

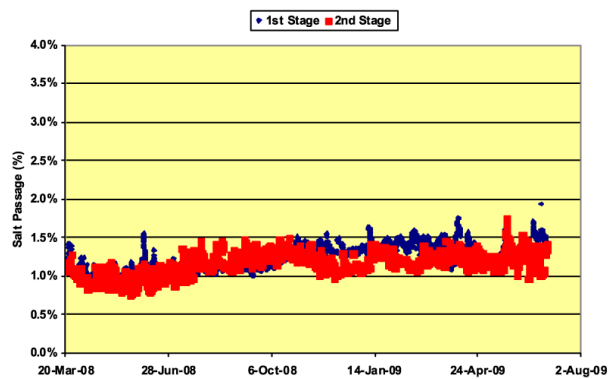


Figure 4. Normalized Salt Passage

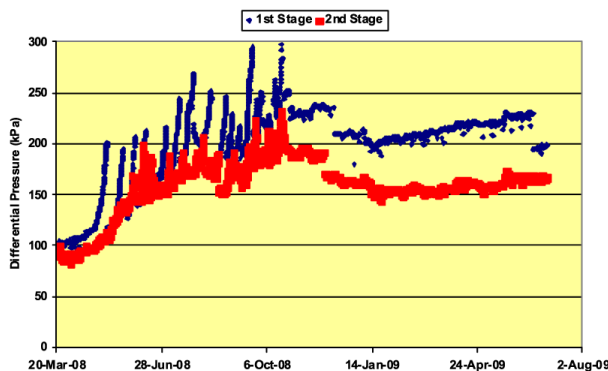


Figure 3. Differential Pressure

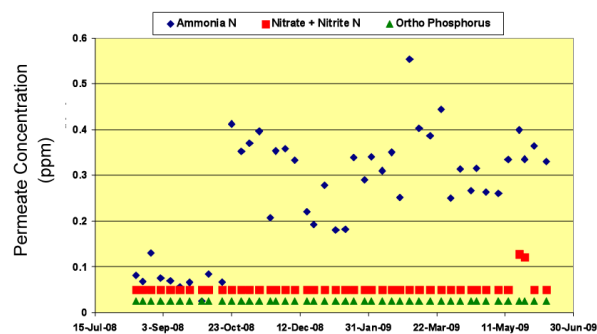


Figure 5. Permeate Quality

Conclusion

Since the wastewater treatment plant upgrade and installation of DOW FILMTEC™ BW30-400/34i-FR Membranes, the Wynnum Advanced Water Reclamation Plant in Brisbane is producing 4,500 m³/d of high industrial grade Class A+ recycled water daily from municipal sewage. This purification system preserves invaluable water resources for people and wildlife, helping sustain the fragile ecosystem in southern Australia.

From energy companies to oil refineries to industrial manufacturers worldwide, Dow's expertise in cooling water treatment is helping companies save money, prevent problems, and manage their water resources.

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