

Eraring Power

Eraring Power Station consists of 4 x 660MW generators. In 1993, Eraring used approx 4.2ML/day of potable water from the regions potable supply. By 1999, 56.7% of this demand was provided from reclaimed water produced by the dual membrane (MF/RO) water reclamation plant. This percentage is expected to exceed 90% as increased quantities of secondary effluent become available.

Plant capacity was increased in Dec 1988 to capture the increasing quantity of effluent available (the plant was designed for modular capacity increases)

Reclaimed water is primarily used for Boiler makeup (via demin plant) and Auxiliary cooling.

In 1993/94 Hunter Water Corporation built the Dora Creek wastewater treatment plant to service the expanding sewerage system west of Lake Macquarie. Eraring is located close to the Dora Creek plant, so the potential for water reuse was good.

Pacific Power undertook an environmental assessment and cost benefit analysis with support from Hunter Water Corporation.

The results of the study showed potential operating cost savings of around \$700,000/annum in potable water consumption and production of demineralised water for the high-pressure boilers (reclaimed water has lower TDS potable water reducing chemical consumption in the IX demineraliser).

Additional benefits included:

- An economically practical option
- Water conservation
- Minimum disturbance to the environment.

This was also an opportunity to "bench mark" the best available technology for the reuse of secondary treated sewage.

In addition, the reclamation plant saved Hunter Water over \$5 million by:

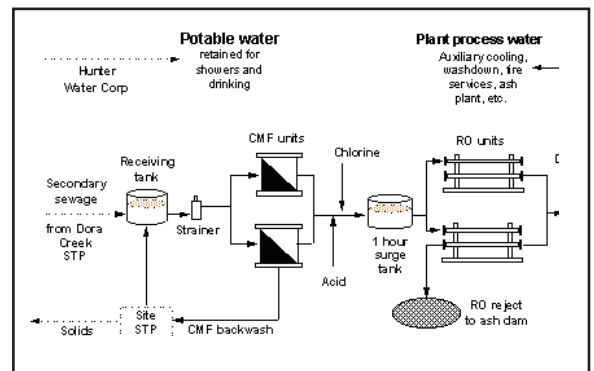
- delaying the construction of the 11.4km sewer link between Dora Creek and the ocean outfall by 15 years.
- Delaying augmentation of the existing potable water infrastructure.

While wastewater had been widely regarded as a potential water resource it had not been used widely in demanding applications. The Memcor® reuse technology featured at Eraring Power Station, demonstrates the potential to use this valuable resource in power and industrial facilities sited near municipal wastewater plants.

Process Design

Influent from Dora Creek Wastewater plant flows, under gravity from a 70ML elevated tank through a 500mm pipeline, to the suction of 3 x 100% centrifugal pumps. The pumps deliver the feedwater via a single in-line motorised self cleaning strainer to the three CMF units.

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| Application | Effluent Polishing/Reuse |
| Market | Power Generation |
| Country | Australia |
| Client | Pacific Power Corporation NSW |
| Capacity | 3.5 ML/day of feed (7.6 ML/day peak flow) |
| Influent Quality | NFR |



Each membrane unit comprises 90 filtration modules containing polypropylene hollow fibre membranes having an average pore size of 0.2µm. The membrane modules remove virtually all suspended solids, including faecal coliforms and giardia cysts, significantly reducing human virus.

MF pretreatment allows the RO membranes to be operated at 30% higher flux than allowed by traditional conventional lime coagulation/sedimentation/filtration pretreatment. Silt Density Index (SDI) of RO feed is less than 3.

Filtrate from the membrane units is dosed with sodium hypochlorite for control of biological growth. Sulphuric acid is also dosed to reduce pH and minimise hydrolysis of RO membranes. Microfiltered water is then dosed with antiscalant and passed through a 1µm disposable cartridge guard filter. The RO system comprises 2x50%, two stage trains in a 6:3 array, performing at 98% rejection. Salts and organics are rejected allowing only water to pass through. Treated water, is fed to the demin plant with the balance of the water used for non-potable water applications around the power plant.

The RO concentrate (reject or brine) passes to the station ash dam. Backwash from membrane plant is sent to Earing's onsite wastewater treatment facility and recycled back to the feed receiving tank.

Plant Specifications:

CMF:
3 x 90M10C (90 modules per array) CMF Membrane

RO:
6:3 array, 2 x 50% Trains - combined output 3.75 ML/day RO

Membrane Solutions

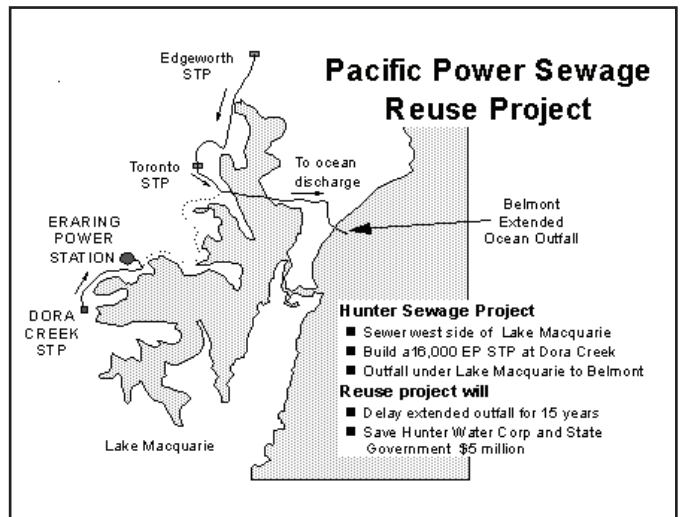
Memcor® membranes from Siemens Water Technologies represent the broadest range of low-pressure membrane filtration products -- submerged, pressurized, large capacity or small systems. They continue to be successfully employed in applications as diverse as wastewater reuse, potable water, RO pretreatment, high solids and sand filter retrofits.

Economics and Benefits

The total project cost was approx. \$4.5 million, including design, equipment supply, civil, electrical and mechanical work, plus equipment associated with transfer and pretreatment of wastewater to the facility. Performance since startup in 1994 has proven a payback of 6-7 years with potential savings of M\$1.2/annum. Other major benefits include conservation of the fragile environment and considerably reduced demand on the local water supply.

Summary

The innovative combination of membrane filtration and RO technology achieves near "boiler feed quality" and was a world first. The simplicity and reliability of Memcor® membranes, as an RO pretreatment, greatly enhances the economic viability of wastewater reuse. The plant at the Earing Power Station demonstrates the potential for water users and water authorities to achieve economic and environmental benefits.



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