CASE STUDY

A Domestic Bore Water Treatment Process For A Plant Rejuvenation: A Reverse Osmosis Application

AT A GLANCE

Challenges

To implement a reverse osmosis application for a domestic bore water treatment process. The plant had not been performing well and will require a membrane change out.

PROJECT OVERVIEW

All Purpose Pumps was approached to audit a domestic bore water reverse osmosis application located in the western suburbs of Melbourne. The plant had not been performing well and were showing signs of –

- Short membrane life
- Poor rejection and recovery
- Requirement for a membrane change out

The plant in question is a small, common design brackish water reverse osmosis process built by a local supplier in about 2016.

The system comprises independent bore control, backwashing media filter, cartridge filters, antiscalant dosing and a 4 x 4040 BW membrane RO system. Feedwater salinity is approximately 4000-mg/L TDS so significant but not daunting. The client has had irregular and less than perfect support in the past resulting in a degree of a lack of confidence in the process overall.

SOLUTION AND RESULTS

All Purpose Pumps has over 30 years of membrane and separation application experience, specifically with hollow core and flat sheet membranes and all the supporting apparatus. The plant was audited by the APP water treatment team and found to have several typical design and process faults –

- Media filter backwash was incorrectly set up and was causing a significant impact on the efficiency of the backwash cycle. So much so that initially, the media filter DP was more than 160-kPa.
- The antiscalant dosing was set up incorrectly resulting in intermittent and incorrect operation of the dosing pump.
- This led to the RO membranes being scaled to the point where permeate flow was negligible and salt rejection was around 50%. This scaling had led to scale forming on various pieces of apparatus as well – for example, all concentrate flow lines including the VA flow meters.
- The owner was at the point of discontinuing the plant and shutting it down permanently due to the lack of return with this process over the cost of Mains water and it was not economically sustainable.

MORE INFORMATION

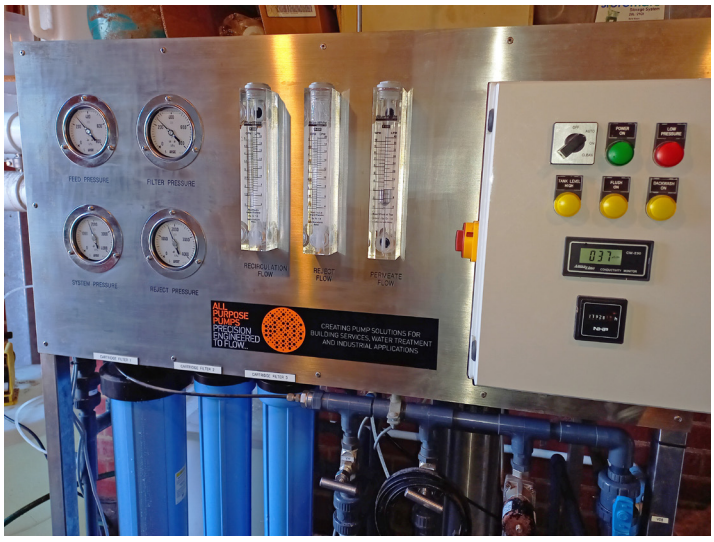
All Purpose Pumps have a long history of designing, maintaining and troubleshooting bore water separation processes throughout the region.

The problems identified in this instance were not complex, but insidious and, over a long interval, led to the situation that we ascertained.

Our team generated a report for the owner, explaining each aspect of the process, including the shortcomings and the rectification of these issues.

This was achieved through –

- Pre-treatment backwash is no longer compromised by the RO cycles. Media filter backwash cycle is now effective and has no tangible impact on the RO performance in the form of poor backwash performance and media filter DP is now 20-kPa.
- Antiscalent dosing was rectified with the correct setting and tuning of the dosing pump, two long term minor leaks leading to partial cavitation of the dosing pump were also rectified. Dosing is now consistent in delivery.
- Membranes were replaced as they were scaled beyond recovery.



RESULTS AFTER IMPLEMENTATION

- Salt rejection - **>99%**
- System recovery – set at **65%**
- System operating pressure reduced by **25%**

The plant is now running smoothly, consistently and reliably.

Routine servicing including effective membrane cleaning and antiscalant calibration shall ensure a long serviceable life.

IN CONCLUSION

The overall result of the bore water reverse osmosis application is successful and is operating at an outstanding level. As expected, it is reasonable for membranes in such an application to last up to 10 years or more with proper maintenance and care.

Our water treatment team have delivered a rejuvenated plant and process whilst following this up with a dedicated custom-designed service regime that will maximise membrane life and plant operating efficiency.

Contact our experienced team if your membrane separation process needs detailed auditing, process hydraulic balancing and any other tuning aspect.