MATAMATA TERTIARY MEMBRANE PLANT UPGRADE

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ready for the resource revolution

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Outline

1. Introduction
2. Chemical Dosing upgrade
3. Membrane upgrade
4. Control upgrade
5. Conclusions

Introduction

Matamata-Piako District Council (MPDC)

- Purchased second-hand (5 years old) membranes in 2009.
- Membranes have exceeded life expectations >12 years
- In 2016 plant was at risk of not being able to meet capacity during peak wet weather events
- Plant was not designed by SUEZ and required a high level of manual intervention and operator presence on site.
- MPDC engage SUEZ for the membrane replacement and to improve membrane operation, fully automate the plant and upgrade the chemical dosing system.

Delivery Mode

- Council engaged SUEZ directly for supply and installation of the new membranes, engineering and management of local subcontractors.
- No design consultant
- Design was undertaken cooperatively between Council and SUEZ
- Equipment sourcing was split on a best for project basis.
- Use of local contractors ensured availability of long term maintenance services
- SUEZ provided expert engineering and project management services.

Objectives of Membrane Upgrade

- Reduce health and safety risks,
- Maintain compliance with consent conditions,
- Replace failing membrane modules,
- Increase plant automation,
- Achieve operational savings,
- Increase plant treatment capacity,
- Future proof the plant.

1. Chemical Dosing Upgrade

Old System:

- Chemical system very manual,
- Prone to frequent breakdowns,
- Undersized for upgrade,
- Unloading process manual,
- High operator attendance,
- No instrumentation to fault find.

New System:

- Increased storage capacity,
- Fully compliant with the NZ standards,
- Fully automated,
- Unloading externally to plant,
- Reduced health and safety risk

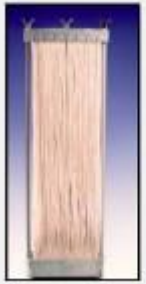
Chemical Dosing Upgrade

Description	Cost (NZD)
Yearly labor cost based on 7-day visits	163,531.00
Yearly labor cost based on 3-day visit	98,118.00
Yearly savings	65,413.00

Membrane Replacement

Advantages of the ZW500d membranes are:

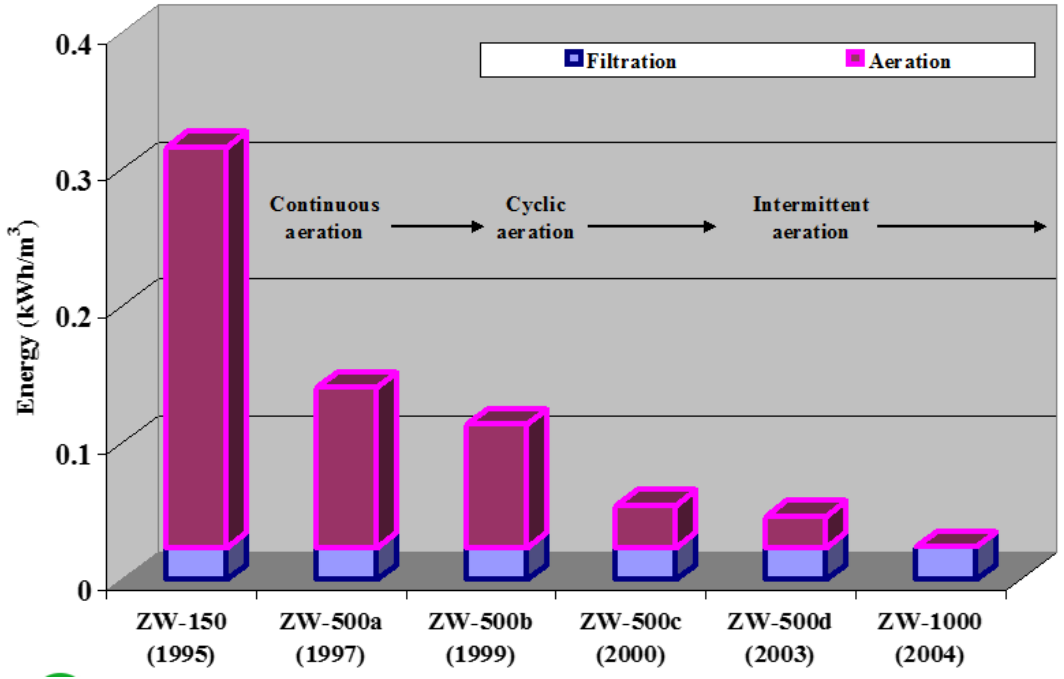
- Increased membrane area,
- Improved membrane chemistry,
- Minimal changes to existing plant,
- Higher operating fluxes,
- Better aeration technology,
- Easier module removal
- Easier Membrane repairs.

Product Name	ZW 145	ZW 150	ZW 500a	ZW 500c	ZW 500d
					

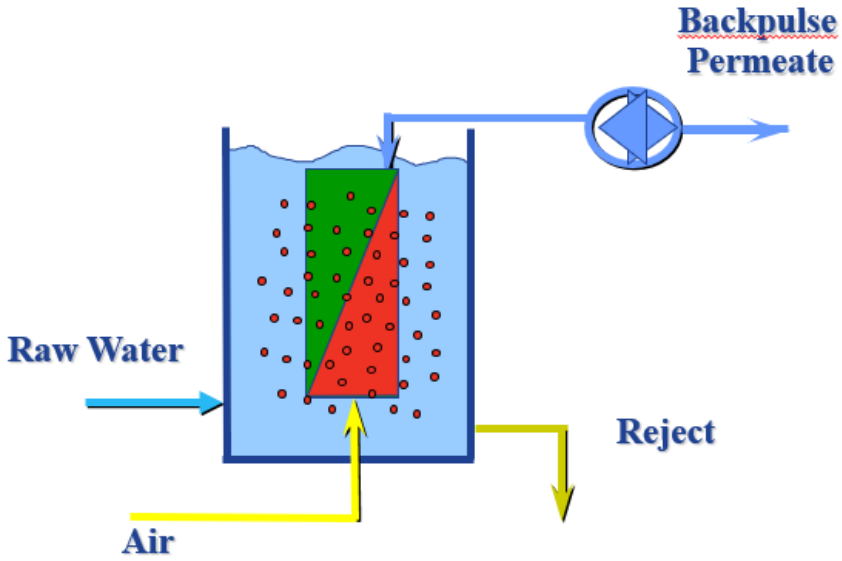
Pre- and Post Membrane Upgrade Configuration

Description	Pre-upgrade	Post-upgrade
No. Trains	4	4
No. of Cassettes per Train	3	3
Membrane Type	ZW500c 26M cassettes	ZW500D 20M cassettes
Total numbers of installed modules per Cassette	26/26	20/20
Surface area per module (m^2)	23.2	40.8
Total membrane Area per plant (m^2)	1,809	2,448
Membrane Chemistry	PVDF-1 (SMC)	PVDF-2 (CP5)
Primary Op. Mode	Feed and Bleed	Deposition
Aeration mode	Continuous	During backwash only
Plant Capacity	2500 m3/d	6000 m3/d

Aeration Energy Reduction over Membrane Evolution



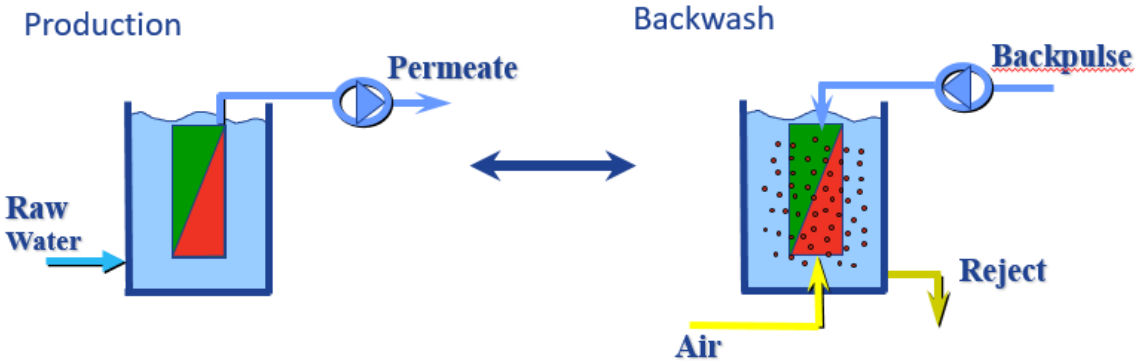
Controls and Operational Upgrade



Existing plant:

- "Feed and Bleed" mode.
- Continuous aeration.

Deposition Mode



- Aeration only during Backwash
- Significant aeration energy reduction
- Most cost-effective operation mode.
- Requires fast tank drains and refills to minimize downtime.

Controls and Operational Upgrade

Problem:

- Existing plant infrastructure too expensive to upgrade and not practical to shutdown plant.
- Without fast drains difficult to operate the plant at peak capacity.

Solution:

- Flexible modes of operation with ability to operate in Deposition mode during average flow conditions and switch over to Feed and Bleed mode during peak period.
- Plant operates in Deposition mode for about 95% of the year and only switches to feed and bleed mode during peak flow events.

Controls and Operational Upgrade

Outcomes:

- Improve plant operation
- Decrease power consumption
- automated demand forecasting
- Improve trending and troubleshooting capability.

3. Conclusion

- Upgrade doubled the plant capacity,
- Reduced power consumption,
- Operational labor time savings
- More reliable and higher performing plant
- Eliminating environmental discharge risk to the nearby creek.
- Costs offset for the membrane replacement within nine to ten years.
- Successful Delivery mode with collaboration between Council and SUEZ.

Questions ?