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Case study about drinking water production
in a South African mining area

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Treatment of difficult water to drinking water quality – a secure and energy-efficient process

Application and system design

Acid mine drainage can appear in areas of coal or core mines. The conditioning of such water is challenging but necessary due to its ecological impact. In areas prone to water shortages it is beneficial to convert this water to potable water quality. In a South African mining area this is not only done successfully in terms of water quality, but also a very energy-efficient manner using ultra-low-pressure Lewabrane® RO B400 ULP ASD elements.

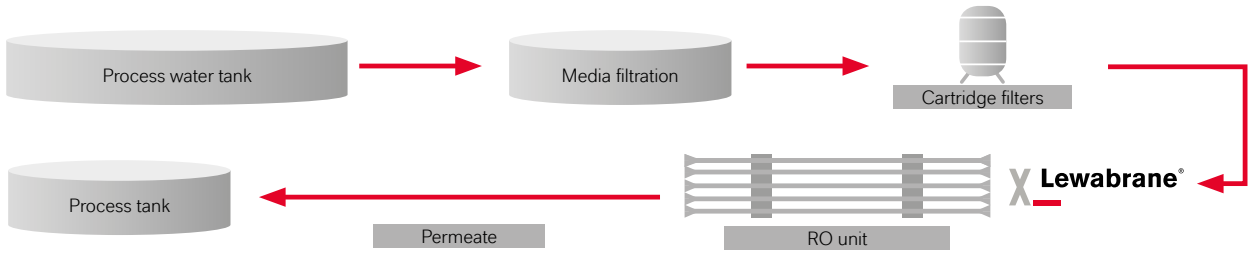
The reverse osmosis (RO) plant was developed and designed by Watercare Mining. Watercare Mining is one of the leading suppliers in the field of water treatment in southern Africa, with their core competencies in the planning, engineering, and realization of complex plants for the treatment of drinking water, process water, as well as wastewater.

At a glance

Application	Potable water
Location	South Africa
Product	Lewabrane® RO B400 ULP ASD
Number of elements	144
Production capacity	2,280 m^3/day
Water type	Acid mine drainage after artificial groundwater recharge
Installation	August 2018

As a kind of natural pretreatment the water passes through the ground and is pumped to the surface for further treatment in the water treatment plant. The water treatment plant consists of a glass media filtration and 1 µm cartridge filters in front of the reverse osmosis process. Additionally, a scale inhibitor and non-oxidizing biocides are used to prevent inorganics and biological fouling of the membrane. The RO plant itself has two stages with twelve vessels in stage one and six in stage two. Each vessel contains eight B400 ULP ASD elements. The recovery rate of the RO process is 72%. The feedwater has an average conductivity of around 2,600 µS/cm. The cleaned water, with a conductivity of < 100 µS/cm, is used locally as potable water after some remineralization.

Lewabrane®

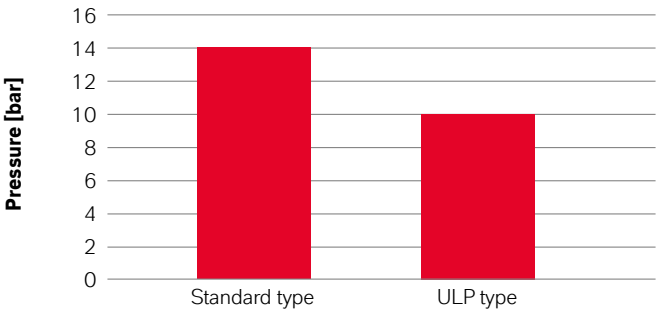


Membrane performance

As the feed water is complex, monthly cleaning is necessary under acidic and caustic conditions. During the observed period, the performance of the membrane could be restored after the cleaning. Using a standard brackish water membrane before, the water conductivity was the same magnitude but the pressure after startup was 30% higher. Therefore, significant energy savings could be achieved without losses in permeate quality. Additionally, the feed flow could be increased from 112 m^3/h to 135 m^3/h keeping the same recovery rate without any problems.

Conclusion

Lewabrane® B400 ULP ASD was specially developed for drinking water and wastewater treatment where a high rejection of organics and a good rejection of salts is required. The results confirm that this ultra-low-pressure membrane is suitable for treating difficult water to drinking water quality. Compared to a standard brackish water membrane, 30% lower pressure is needed, which leads to lower energy consumption. Even by increasing the plant capacity the desired water quality could be achieved.



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10749-EN | 07/2019