

# *Bottled Water Purification*

## *VSEP is used to treat RO Reject*



New Logic developed the VSEP vibratory membrane system to be able to handle difficult wastewater streams that exceed the limits of conventional Spiral RO membrane modules. By doing this, membranes can be considered for applications thought previously to not be possible. The open channel flow and the vibratory shear created by the resonant frequency allows for filtration of wastewater high in suspended solids, biological materials, and solutions near saturation that would scale a spiral membrane module. One of the best uses of VSEP is to filter the reject from other membrane systems. VSEP can be used to extend the use of RO membranes to increase the yield of treated water and reduce the volume of reject brine that is left over. RO groundwater desalination is an application where people have struggled with the use of membranes for a long time. One problem with inland desalination is the disposal of the salty reject that is left over. New Logic has now perfected a process for efficiently filtering spiral RO reject leaving a very small volume to dispose of. Because of this, more options are available for reject disposal including evaporation for complete Zero-Liquid discharge.

### **Case Study Background**

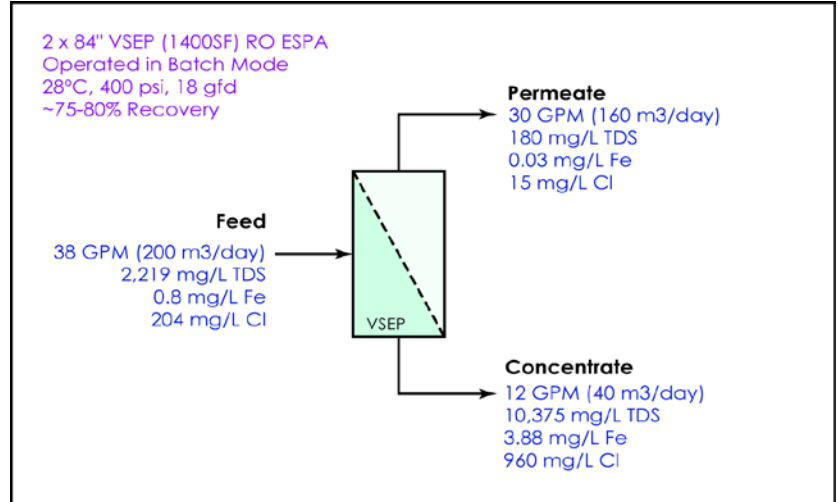
Arwa Mineral Water Company is a pioneering mineral water company in the Republic of Yemen. It was established in 1978 and produces a specialty bottle mineral water that has won many awards. Before locating the bottling facility, a number of geological studies were implemented on regions in the country with the participation of international companies who specialize in mineral water quality. Finally, the Shamlan area of Yemen was chosen as the most appropriate location for the best available groundwater source.

The company has been awarded the European Great prize for water quality a couple of times. One was from Madrid in 1988, the other from Geneva in 1998. Shamlan is surrounded by the mountains of Wadi-Daher with plenty of plantation farms in the surrounding area.

During construction of the plant, the company installed a conventional RO spiral system provided by Veolia Metito and were using this equipment to make the fine bottled water that they sell. Yemen is a very arid country and even groundwater is in short supply. Since the RO spiral system that was installed was producing a fairly low yield of the groundwater collected, a solution was sought for increasing the yield and recovering water from the spent reject.

## Process Description

A full-scale VSEP system was installed at this site using two 84" VSEP modules. The VSEP operates at about 80% recovery meaning that 80% is filtered and sent to feed the spiral RO system and 20% is left as concentrate that is disposed of. As a result, the overall yield of the water purification process using membranes increased from 60% to 92%. Periodic chemical cleaning is done automatically using an acidic cleaner followed by an alkaline surfactant cleaner.



The VSEP system with the RO membrane is producing 42,000 gallons per day (160 m3/day) of additional treated water that would have been disposed of. This reduced the amount of water that needed to be extracted from the groundwater wells.

## Separation Quality



RO can reject multi-valent ions, suspended solids, biological materials, hardness, bacteria, and Viruses. RO is capable of removing all types of dissolved solids.

The VSEP system in this case was able to reject about 95% of the heavy metals and 90% of the Chlorides. In this case, the treated water from VSEP was blended with the well water feeding the RO spiral system. However, this water can also be blended with the spiral RO permeate. Often minerals are added back at this point for proper flavor characteristics.

Because the location of this project was so arid, very few sources of good clean water are available. The wells used for water production generated brackish water that by itself would not be desirable to drink.

The final concentrate from the VSEP had a very dark yellow color from all the dissolved solids that were concentrated and actually crystallized during filtration, yet the VSEP filtrate was clear and low in TDS.

## Summary

Many bottled water companies are implementing water conservation in the name of Sustainability. The addition of a VSEP system to a water purification process will reduce the amount of incoming water that is needed since the yield of treated water is higher. In addition, there is less reject to dispose of, so the wastewater discharge is reduced as well. Less water in and less water out for the same amount of production

The VSEP system is certified and approved for drinking water and uses materials and construction methods that are compatible with this purpose. The VSEP system is also compact and automated requiring little operator involvement.

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