

## Start-up desalination plant Tunisia.



4 lines

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January 2006

## Commissioning, Start-up & Operations RO Tunisia.

In the period December 19<sup>th</sup> 2005 till January 20<sup>th</sup> 2006, Michael A. Doude van Troostwijk (1963) of Waterdokter.nl was involved in the Commissioning, Start-up and Operation of a big new desalination line in Gabes. Gabes is a big industrial city, about 400 km south of Tunis.



### Parties

Sonede, Principal, is the national drinking water company of Tunisia. (Societe Nationale D' Exploitation et de Distribution des Eaux)  
[www.sonede.com.tn](http://www.sonede.com.tn)

Christ, Contractor, realised the line. [www.christ.nl](http://www.christ.nl)

Waterdokter.nl was the sole representative of Christ during this important period. Waterdokter.nl takes good care of expensive equipment and is an all-round technology expert. A quick and thorough problem analysis enables Michiel A. Doude van Troostwijk to arrange things for a principal quickly. Motto is: "To get things done".

Waterdokter.nl wants to thank as well Christ as Sonede for the pleasant and professional cooperation.

Waterdokter.nl was impressed to see how Sonede gained experience in desalination over the last 10 years. According to Sonede, a combination of involved operators and good equipment make this installation the best performing desalination plant in the country!! Many times Sonede expressed their confidence in Christ.

### Process description.

Source is brackish ground water of approximately 3500 $\mu$ S/cm. Water flows naturally due to a pressure of 6-10 bars at a temperature of 70°C to the surface. Source is about 40 km west of Gabes. First step is cooling in a big once through forced draft cooling tower to 30°C (picture). After cooling, a large part is used in industry. Under gravity feed, water enters the desalination plant. Till 1995 this cooled water was drinking water as well.

In 1995 the Dutch Government financed the construction of the first three desalination lines of 480m<sup>3</sup>/h each. Pre-treatment consists of aeration, rapid sand filtration, pre-coat filter, fibre filtration.

In 2005 Christ won, under heavy competition, the contract for the construction of the fourth line, without Dutch support. Total capacity is 33.000m<sup>3</sup> day.

The RO's have two stages. New in this design is, besides even more efficient membranes, a frequency controlled pre-pressure pump and interstage booster pump. This results in a 30% higher energy efficiency and improved water quality compared to the existing lines.

After Commissioning and Start-up Waterdokter.nl has operated this new line excessively. Waterdokter.nl also made a proposal to further optimize the existing pre-treatment. This complementary operational experience is implemented in the control settings. During operations, experiences coming from existing pre-treatment, the new design, PLC control and start-up of line number 4, all come together. After some fine tuning, line number 4 operates better than contractual agreed. Christ stays another two months to train operators and fully implement all proposals regarding optimization of for instance pre-treatment.



**"Chott El Fejj" cooling tower**



**The 4<sup>th</sup> line with interstage booster pump**

## Striking events at a start-up

### *Plant Trip*

During the first few start-ups of the new line, the whole production plant tripped for an unknown reason. No burnt rubber smell, nothing broken, only a complete power seizure. Investigation showed that the existing PLC back-up battery system had a 30mA ground fault interrupter. If it went, it seized all power. Due to the introduction of frequency controlled pumps this needed some adjustment. Pumps like this have a higher ground fault and need 300mA. Happily the interrupter was adjustable: problem solved.



Frequency controller

### *Lost items...*

During start-up of pre-coat filter, air vent did not want to close anymore. Dismantling this valve showed a piece of foam of 25 x 25 cm. According to Sonede's personnel this was probably a piece of a mattress used by the sub-contractor's personnel.



Dismantling PVC pipe under valve



Piece of a foam mattress

### *Transport of dangerous chemicals*

95% Sulphuric acid is used for pH correction. Storage and dosing facilities of Sonede are ok. Personnel has good safety equipment. As the picture shows, especially transport is organized different compared to The Netherlands. Acid is packed in a old tank which is mounted on a normal sand truck. Tank is sealed by customs for every transport. Each transport is also accompanied by customs.

Sonede wants to end this situation. One has limited influence on the transport and wants to prevent future accidents. Sonede now investigates which anti-scalant can be used without sulphuric acid.



**95% sulphuric acid supply by sand truck**

Extra pictures:



**5000V High Pressure Pump**



**Opened test membrane**



**Cleaning analysers**



**Sun rise from hotel room**

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