



Innovative design of the UF and SWRO Limassol desalination plant in Cyprus

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ABSTRACT

The Water Development Department of Cyprus has awarded to a consortium of two companies: Netcom (Cyprus) and Mekorot Development Enterprise Ltd (Israel), a BOT project for the design, build operate and maintain of a 40,000 m³/d SWRO plant. The plant will have the intake and water product delivery infrastructure already in place so as to be able to increase production to 60,000 m³/d within a short notice from the client. The consortium, namely MN Limassol Water Co, has some tough criteria to meet such as product water: (a) TDS less than 600 ppm, (b) Boron less than 05 ppm, (c) Turbidity less than 1NTU, and (d) Alkalinity not less than 30 ppm HCO₃ as well as the tender stipulated high energy costs of 10 €/kWh. The tender specifications, high energy cost as well as the increased costs of materials and supplies due to the developed world crisis took place due to signing the contract back in 2009; and the current plant construction and operation phase has shaped the design of the plant with innovative and unique features. Furthermore, the Limassol desalination plant will be the largest SWRO—ultra filtration and reverse osmosis (RO) plant in Europe meeting the challenges of EU Desalination and Environmental standards. The above are described in this paper. The paper further describes a comprehensive model developed by Mekorot, optimizing the energy required for the first RO pass in relation to downstream second RO pass and ion exchange processes for different types/suppliers of first pass membranes. The model was tested for the whole expected operating range of seawater temperatures as well as seasonal variations. The scenarios investigated using the comprehensive model has resulted in choosing the optimum RO first pass membrane giving the lower total water cost of the produced water.

Keywords: First-second RO pass; Ion exchange; Optimization model; UF pretreatment; Resin

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