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IMS SWRO Kindasa — Two years of operational experience

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ABSTRACT

Kindasa Water Services (KWS) derived its name "Kindasa" from the first seawater desalination plant built in Jeddah in the early 19th century. KWS is a limited liability company January 2000. KWS owns and operates desalination plants for supply of water to various industries, compounds etc. Recently KWS has built and is operating sea water reverse osmosis (SWRO) desalination plant in Jeddah Islamic Port with Hydranautics's integrated membranes system (IMS®). KWS has selected hybrid pretreatment system consisting of conventional dual media filtration in conjunction with the latest state-of-the-art ultrafiltration (UF) process to produce stable RO feed water quality that remains unaffected by the seasonal changes of the seawater quality. KWS's SWRO plant is the largest IMS operating already for two years in very difficult water. A pretreatment system was successfully commissioned in June 2006, and reverse osmosis section was commissioned in August–September 2006. There are different views in desalination industry on the use of membrane pretreatment utilizing or upstream of seawater reverse osmosis systems. Up to date unbiased information about real long term operational experience is not available. On the contrary, there are quite a few papers presenting membrane pretreatment as a "magic solution" to reverse osmosis performance problems. Two years of successful operational experience of this large SWRO IMS® working in very difficult raw water conditions has shown that this technology is viable, but it has also shown that this technology still needs proper attention and tuning and can create disappointment on end-user's side if certain design aspects and operational aspects are not properly addressed at the early stage of operation. Information will be provided which shows that close cooperation between technology supplier and user can solve these operational issues. Kindasa SWRO IMS® is designed for product capacity of 25,500 m³/d at 95% availability. The present plant production is 26,840 m³/d. The seawater is treated by 8 ultrafiltration racks equipped with Hydranautics HydraCap 60 and downstream by seawater reverse osmosis trains equipped with Hydranautics SWC3 seawater reverse osmosis membranes operating at 50% recovery. Product water is further treated in partial second pass trains utilizing Hydranautics low energy ESPA 2 membranes. The paper presents long term experience, operational data as well as normalized data and discusses all aspects of the plant operation and performance in detail. The plant is a key reference for future development of SWRO plants for difficult waters in the Middle East area as well as for global view of SWRO desalination and serves as "model plant" to demonstrate viability of MF/UF as pretreatment upstream of SWRO.

Keywords: IMS; Ultrafiltration; Pretreatment; Seawater reverse osmosis; Performance

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