DELIVERING THE LARGEST SEAWATER DESALINATION PLANT OF ITS KIND IN THE HORN OF AFRICA

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On August 19th, 2003, His Excellency President Omar Al Bashir, President of the Republic of Sudan inaugurated the 20,000 m3/d Seawater Desalination Plant executed by EBD Group in the City of Port Sudan, Sudan. The plant is the first of its kind in Sudan and was executed using the latest technologies available in the field of seawater desalination. The project was executed on Design-Build Turn-Key basis including all necessary Civil and Electro-Mechanical works as well as Power Generation Units.

Design Criteria and Construction Challenges

The design called for desalination of 45,000 parts per million (PPM) total dissolved solids (TDS) Red Sea Water to high drinking water standards of less than 500 ppm TDS. This was achieved at a product water recovery rate of 35% (Ratio of R.O. Permeate to plant feed flow).

The scope of work included the Design, Engineering, Manufacturing, Supply, Execution and Commissioning of the plant, while incorporating the latest in Desalination Technology. Included in the scope are: a seawater intake system comprised of beach wells, complete pre-treatment plant followed by High Pressure Pumps with Variable Frequency Drives, Energy Recovery Turbines, R.O. trains comprising Seawater Membranes & Pressure Vessels, High Alloy Duplex Stainless Steel high pressure Manifolds, Instrumentation, Flushing & Cleaning Systems, Post treatment systems as well as Motor Control Center and fully Automated Monitoring & Control Station, based on the latest in MMI Technology.

The Construction works covered the completion of a wide network of Beach Wells connected to a large Raw Water Reservoir; various Building Structures for the Equipment, Power Generation Units and Auxiliary Facilities, as well as Product Water Storage Facilities and Brine Discharge Structures. Harsh conditions had to be overcome during execution of the project, ranging from lack of suitable building materials in the local market, to soil conditions, where soft clay existed in one part of the project and extremely hard rock was encountered in another part, as well as a very high water table which, along with the high temperature and humidity levels, presented a very aggressive environment for the structures to be constructed and necessitated the use of special building materials

Instrumentation and Controls

A significant attribute of today's Port Sudan Plant is being a totally computerized plant minimizing operator input during operation. The plant incorporates state of the art process controls and data gathering systems. It is 100% automatically controlled at all times; complete with a series of the latest safety alarms; emergency controls and emergency shut-down capability at the heart of the control system. In the event of an emergency, the system will go through an automatic flushing cycle followed by a complete shutdown. Once the emergency condition has subsided the system can be easily re-started. A highly sophisticated data gathering system continuously provides information and analysis on all system data.

Process and Equipment

The plant, which takes water from specially designed beach wells, is equipped with the latest in Seawater composite membrane elements housed in FRP pressure vessels. The design called for independent trains operating at pressure less than 1000 psi. Chemical pre-treatment consists of Sulfuric Acid, Antiscalant, Sodium Metabisulphite, Hypo-chlorite and Polymer Solutions.

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