

# PROJECT PROFILE SERIES #62

## Reverse Osmosis System to Reclaim Wastewater

### The Facility

Pragati Power Corporation Limited, formerly Delhi Vidyut Board (DVB), was formed by the Government of National Capital Territory (NCT) of Delhi in 1997 for the purpose of generation and distribution of power to the entire area of NCT of Delhi.

To bridge the gap between demand and supply and to have reliable power supply to the capital city of Delhi, a 330 MW combined cycle Gas Turbine Power Project - Pragati Power Project (PPP) – was set up on a fast track basis. National Thermal Power Corporation (NTPC), the largest thermal power generating company of India, was the consultant for this project.

Raw water requirement in this plant is met through sewage treated water being drawn from various sources including a Sewage Treatment Plant. The demineralized water requirement for steam generation is met up through sewage treated water by treating it through Reverse Osmosis De-Mineralized Process (RODM).

### The Problem

The plant is located on the banks of River Yamuna, the main potable water source of the city. In view of huge water demand for the power plant, direct intake from the river was not feasible.



Due to paucity of water the PPP plant was designed to operate on treated sewage as feed water, thus conserving already scarce natural water resources. DVB, after exploring various options, selected Aquatech's RO System for water reclamation at the plant.

### The Solution

The Aquatech plant at PPP treats tertiary treated sewage and purifies it for boiler make up, which is very high purity water.

Aquatech designed and built a plant that made 2 x 1200 m<sup>3</sup>/day of BFW. This system consisted of: Cascade Aerator; Twin Bed Gravity Filters followed by Activated Carbon Filters with all the associated coagulant chemical dosing skids; Cartridge Filter outlet at SDI < 4; two pass Reverse Osmosis trains operating at 88% recovery in stage I and 90% recovery in stage II; followed by mixed bed Ion Exchange Unit.

Since start-up in 2003, the performance of the plant has been outstanding with no requirement of membrane replacement for over five years.

The high recovery of 88% is now considered to be an industry benchmark in producing BFW by tertiary effluent waste water reclamation.



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## FEED WATER DESIGN WATER ANALYSIS

### Parameters

Parameters	Input Range
Total Dissolved Solids	1,000 mg/l
Turbidity – NTU	20
Total hardness as CaCO <sub>3</sub>	402 mg/l
Total alkalinity as CaCO <sub>3</sub>	246 mg/l
Sodium	162 mg/l
Chloride	298 mg/l
Sulphate as SO <sub>4</sub>	77 mg/l
Nitrate as NO <sub>3</sub>	14.8 mg/l
Silica as SiO <sub>2</sub>	15 mg/l
Ammonical Nitrogen as N	1.4 mg/l
Phosphate as P	1.3 mg/l
Biological Oxygen Demand	20
Chemical Oxygen Demand	16
Iron – mg/l	0.3 mg/l
Fluoride	2.8 mg/l

### Design Parameters for RO Unit

Flow Rate per Train: 1200m<sup>3</sup>/d  
 Number of Trains: 2  
 Recovery: 88% - 1<sup>st</sup> Pass  
 90% - 2<sup>nd</sup> Pass

### Permeate Quality

TDS < 10

### DM W Water Quality

Conductivity: <0.1 MicroSiemens/cm  
 Silica: < 0.01 ppm  
 pH: 6.8 – 7.2

## PROCESS FLOW DIAGRAM

