

# Project Profile

## Aquatech Installs the First Wastewater Recovery Plant in Middle East

### The Facility

Water throughout Kuwait and the Middle East are valuable natural resources. Water shortage is a problem in many Persian Gulf countries. Equate Petrochemical Company is Kuwait's first internationally joint venture company in the petrochemical sector that decided to become the pioneers to explore the possibility of recycling treated wastewater for the internal use in process requirements.

Equate Petrochemical Ltd. is the single operator of a fully integrated world-scale manufacturing facility for ethylene, polyethylene and ethylene glycol and their by-products which is marketed throughout Middle East, Asia, Africa & Europe.

### Project Overview

The plant is located in water scarce Kuwait and being the first wastewater recovery plant there was no established data for the offered ultrafiltration/reverse osmosis system. Also, there were heavy fluctuations in turbidity levels varying from 6 NTU to 25 NTU and COD levels varying from 40 ppm to almost 140 ppm.



### Scope of Service

The objective of this project, which is a part of Equate's Green Initiative, is to recycle treated wastewater for the internal use in process requirements and to recover and recycle ETP water to the maximum extent possible.

Aquatech designed a scheme to achieve maximum recovery of good water from a wastewater stream of 880 GPM (200 m<sup>3</sup>/hr). The performance of the scheme with respect to the quantity and quality of the treated recovered water was demonstrated by pilot studies conducted by Aquatech on the actual effluent at the Equate site. Aquatech's complete system offers:

- More than 80% recoveries across Seawater Reverse Osmosis (SWRO)
- More than 90% recoveries across Brackish Water Reverse Osmosis (BWRO)
- More than 80 % recovery overall

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## Design Water Analysis

Constituent/ Parameter	Unit	Design Basis	Expected Outlet Quality
Flow	m <sup>3</sup> /hr	200	160
pH		6.5-8.5	6.5-8.5
BOD	mg/l	30	<1
COD	mg/l	200	<3
Oil/Grease	mg/l	10	0
TSS	mg/l	10	0
TDS	mg/l	5000	65
Phosphate	mg/l	2	0
Ammonia	mg/l	5.5	<1
Nitrate NO <sub>3</sub>	mg/l	30	<5
TKN	mg/l	5	0
Total Nitrogen	mg/l	35	<6
Total Recoverable Phenol	mg/l	1	Traces
Fluorides	mg/l	2	<0.02
Sulfides	mg/l	0.5	Traces
Chlorine	mg/l	0.5	0.5
Dissolved Oxygen	mg/l	>2	n/a
Turbidity		50	Traces

Constituent/ Parameter	Unit	Design Basis	Expected Outlet Quality
Aluminum	mg/l	5	0
Arsenic	mg/l	0.1	0
Barium	mg/l	0.1	0
Boron	mg/l	0.75	<0.3
Beryllium	mg/l	0.1	0
Cyanides	mg/l	0.1	0
Cadmium	mg/l	0.01	0
Chromium	mg/l	0.2	0
Nickel	mg/l	0.2	0
Mercury	mg/l	0.001	0
Cobalt	mg/l	0.2	0
Iron	mg/l	5	0.1
Antimony	mg/l	1	0
Copper	mg/l	0.2	0
Manganese	mg/l	0.2	0
Zinc	mg/l	2	0
Lead	mg/l	0.5	0
Lithium	mg/l	2.5	Traces
Molybdenum	mg/l	0.01	0
Vanadium	mg/l	0.1	0
Silver	mg/l	0.1	0
All Herbicides	mg/l	0.2	Traces

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## Process Flow Diagram

