

## Pearl GTL (Shell) Qatar

### The Client

Shell is a global group of energy and petrochemicals companies with around 93,000 employees in more than 90 countries and territories. Shell pursues innovative approach to ensure it is ready to help tackle the challenges of the new energy future.

The Pearl GTL project comprises the development of offshore upstream gas production facilities as well as an onshore GTL plant that will produce 140,000 barrels per day (bpd) of GTL products as well as 120,000 bpd of natural gas liquids (NGLs) and ethane.

### Client's Needs

Shell wanted a Zero Liquid Discharge, ZLD, facility, not only with respect to the GTL effluent water, but all other water streams had to stay inside the fence. In total 12 different water streams were to be treated, entering the Effluent Treatment Plant ETP at 8 different locations. 5 different recycled water qualities were required.

### Technologies and solutions

- Sweet and Sour CPI separators
- Oil tankage, water tankage
- Controlled Discharge Facility (8000m<sup>3</sup> basin with 3x 14m long Archimedean pumps)
- Heat exchangers
- Flocculation & Flotation Units
- Aerobic biological treatment (conventional) with circular settlers (conventional)
- Submerged Ultrafiltration
- 3 pass Reverse Osmosis
- Irrigation water treatment by UV
- Evaporation & Crystallisation of concentrated waste streams
- Cooling water blowdown treatment (Submerged Ultrafiltration & Reverse Osmosis)
- Mineral sludge dewatering with centrifuge
- Activated sludge dewatering with centrifuge

### Key Figures

2 trains for the main treatment line  
Various common facilities  
Total hydraulic capacity (ex internal recycles): 2200t/h  
Total hydraulic capacity AOC collection: 15,400t/h  
Total free oil in: 17t/d  
Total soluble COD in: 27 t/d  
Total solids in: 8 t/d  
Total wetcake out: 49 t/d



Recycled water spec: Cooling water

Recycled water spec: "Raw" water

Recycled water spec: Irrigation water

Parameters	Units	Design data
Flowrate	t/d	12369
Conductivity	µS/cm	75
COD	mg/l	30
Total N	mg/l	0.8
pH	pH u.	6 – 8

Parameters	Units	Design data
Flowrate	t/d	16000
Conductivity	µS/cm	3
COD	mg/l	3
pH	pH u.	6 – 8

Parameters	Units	Design data
Flowrate	t/d	1200
Conductivity	µS/cm	75
COD	mg/l	30
SAR index	-	<6
pH	pH u.	6 – 8

### Treatment steps

