

## CASE STUDY

# CATOFIN Dehydrogenation Waste Water Treatment that pays for itself

**Customer:** SABIC Affiliate – IBN SINA

**Location:** Jubail Industrial City, KSA

**Process:** Utilities Section ETP



### APPLICATION:

**Water discharge from catalyst dehydrogenation of butane, isobutane to isobutene and iso-propylene**

#### OBJECTIVES OF THE TREATMENT:

- Point source treatment of wastewater to prevent system-wide contamination
- Meet Customer's discharge requirement for oil loading and BTEX
- Convert toxic waste byproduct from process to value based product

#### KEY METRICS:

Inlet conc.	Min (ppm)	Max (ppm)
Oil & Grease	1000	900,000
BTEX	20	220

- Target effluent concentrations:
  - Oil & Grease: < 15 ppm
  - BTEX: < 3ppm
- Oil consists of both very light and very heavy fractions

**FLOW RATE:** 6 m<sup>3</sup>/hr

**CONTACT / REFERENCE:** Upon request

### MYCELX DELIVERED:

**Innovative Solution**

**Reduced environmental footprint**

**Consistently meets RCER standards**

**Revenue generation from a waste product**



## CHALLENGE

IBN SINA was generating wastewater from the degasser unit at a flow rate of 6m<sup>3</sup>/hr. The stream had high concentrations of oil and grease as well as BTEX and gasoline range organics at appreciable concentrations. Although the degasser wastewater stream was less than 1% of the total wastewater generated at this facility, it flowed into other less-contaminated streams from the operations resulting in the entire waste stream becoming severely contaminated with high concentrations of BTEX, aromatics and gasoline range organics.

IBN SINA was designed to send all of its wastewater to the Central Waste Water Treatment Plant (CWWTP) but due to the degasser unit wastewater stream it was not meeting the required water quality acceptance standards set Marafiq. Without the ability to send wastewater to the CWWTP, IBN SINA was forced to either shutdown or dispose of the highly contaminated wastewater via expensive vacuum truck haul off. The high levels of hydrocarbons in the waste water caused emission levels to be higher than RCER standards. Furthermore, approximately 600m<sup>3</sup> per year of recoverable hydrocarbons that could be used as fuel was being lost in disposed wastewater.

## SOLUTION

MYCELX installed a specialist pilot testing skid that could accurately characterize the water at both high and low concentrations. The pilot trial led to a custom system design that combined an oil water separator and polishers. This allowed the system to handle the high concentrations of oil as well as emulsified fractions of oil and hydrocarbons.

The oil water separator, with its unique particle treatment and coalescence capabilities, reduced the high concentration of oil to low levels which could be removed by the polishing filters. The polishing filters had a preconditioning stage consisting of a MYCELX formulation, which was utilized to further coalesce the smaller droplets into larger droplets so that the last stage of polishing filters could remove them efficiently. The discharge from MYCELX's system was consistently below 5ppm despite the wild inlet fluctuations.

The first stage oil water separator was working so effectively that the oil it collected was filling a 300 gallon tank in less than a day. The volume of cumulative oil recovered per day led to a system redesign so that the oil collected could be directly pumped to the incinerator to serve as a source of fuel or sold to a third party. MYCELX's solution resulted in this highly contaminated by-product from CATOFIN dehydrogenation process, which was so costly to treat, becoming a fuel source that generates US\$240,000 per year.

The project was voted a Finalist for Engineering Project of the Year award at the 2009 Platt's Global Energy Awards. The system was also recognised at the SABIC Technical Conference in 2010

## IMPACT

### Innovative solution:

- Most cost effective solution to handle CATOFIN dehydrogenation wastewater – first of its kind in KSA

### Reduce environmental footprint:

- Point source Contamination Reduction facilitates water conservation through sustainable process water recycle and reuse

### Consistently meets RCER standards:

- System allows the customer to consistently meet RCER discharge requirements

### Safety, Health and Environmental (SHE) benefits:

- BTEX and aromatics odor reduction in the drains, sumps and wastewater collection ponds.
- Enable water conservation and reuse by contamination reduction at source.

### From Waste to Worth:

- Conversion of carcinogenic wastewater to a revenue stream by selling 600 tonnes per year of oil recovered at 98% purity which would otherwise be disposed of as hazardous waste.

