MYCELX
A Whole New Dimension in Oil-Free Water

CASE STUDY

Catofin dehydrogenation wastewater

CUSTOMER: IBN SINA-SABIC
LOCATION: Al-Jubail Industrial City, Kingdom of Saudi Arabia
END USER: IBN SINA, SABIC

Description of Application

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

FLOW RATE: 1 – 6 m3/hr.

OBJECTIVE OF THE TREATMENT
Point source treatment of waste water to prevent system-wide contamination. Discharge requirement of 15 ppm or less and BTEX less than 3 ppm. Convert toxic waste byproduct from process to value based product.

DATA
Inlet loading: oil ranges from 1000 ppm to 900,000 ppm. BTEX ranges from 20 ppm to 220 ppm. Oil consists of both very light and very heavy fractions.

CONTACT / REFERENCE: Upon request

Challenge

IBN SINA was generating wastewater from the degasser unit at flow rate of 6 m3/hr. The stream had high concentrations of oil and grease as well as BTEX and gasoline range organics at appreciable concentrations. Though the degasser waste water stream was less than 1 % of the total waste water generated at this facility, it flowed into other less-contaminated streams from the operations resulting in severely contaminating the entire waste stream with high concentrations of BTEX, aromatics and gasoline range organics. IBN SINA was sending all of the facility waste water to the central waste water treatment plant (CWWTP) and was not meeting the required water quality acceptance standards set by the CWWTP. IBN SINA was ultimately facing disposing the entire waste water stream to CWWTP at a much higher disposal costs because of the high overall contamination levels caused by the degasser unit waste stream. Additionally, the high levels of hydrocarbons in the waste water caused emission levels to be higher than their standards and approximately 600 m3 per year of recoverable hydrocarbons that could be used as fuel was lost in waste water.

SOLUTION

MyCelx implemented a custom pilot testing skid that could accurately characterize the water at high concentrations as well as in low concentrations. The pilot trial led to the custom design of the combination of oil water separator and polishers to handle the high concentrations of oil as well as emulsified fractions of oil and hydrocarbons.

The oil water separator, with 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 pre-conditioning 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 first stage oil water separator was working so effectively that the oil collected was filling a 300 gallon tank in less than a day. The volume of cumulative oil recovered per day led to the redesigning of the system so that the oil collected was directly pumped to the incinerator to serve as a source of fuel or sold as fuel to third party. The highly contaminated byproduct from catofin dehydrogenation process which was so costly to treat was converted to a fuel source equating to $240,000USD per year.

The discharge from the MyCelx system was consistently below 5 ppm despite the wild fluctuations on the inlet side. The project was voted a Finalist for Engineering Project of the Year award at the 2009 Platt's Global Energy Awards. A notable article was written and presented on the MyCelx installation for point source treatment of contaminated waste water at the SABIC STM 2010 technical conference in Al-Jubail, Saudi Arabia.

IMPACT

- First solution implemented in SABIC for waste by product handling from catofin reactors.
- BTEX and aromatics odor reduction in the drains, sumps and wastewater collection ponds.
- Conversion of carcinogenic wastewater to value product by selling recovered hydrocarbon phase at 98% purity which would otherwise be disposed of as hazardous waste.
- Enable water conservation and reuse by contamination reduction at source.
- Lower environmental footprint of catofin dehydrogenation process.
- Safety, health and environmental benefits by recovering 600 tonnes per year of carcinogenic waste and converting to fuel thereby improving industrial hygiene and the operators work environment.