Offshore Produced Water Treatment

CUSTOMER: Super Major Oil and Gas Company
LOCATION: North America

Application
Removal of oil in produced water generated by an offshore Deepwater Floating Production Facility (FPF) in the Gulf of Mexico.

FLOW RATE: 7,500 bpd of Produced Water

OBJECTIVE OF THE TREATMENT
Obtain National Pollutant Discharge Elimination System (NPDES) permit for discharge to open sea (<29 ppm monthly average, <42 ppm 24 hour average) with a customer discharge requirement to open sea of <10 ppm.

DATA

Inlet: Oil & grease 25 - 150 ppm;
Outlet: Oil & Grease below 10 ppm;
Temperature: 140°F
Pressure: Operating Pressure 30 psi
Challenge

A super major oil and gas company operating in the Gulf of Mexico on a deepwater FPF hub servicing wells at depths of 7,000 feet needed a tertiary treatment solution to intermittently support the primary and secondary treatment equipment. The hub experienced process upsets due to the addition of production chemicals (LDHI and hydrate inhibitor), well and platform shut-ins, new wells on line, compliance checking, well testing and production rate adjustments. Their existing tertiary treatment system was large and cumbersome, requiring large lift plans for monthly servicing, and two dedicated operators to be housed on board.

The customer desired a more cost-effective and compact solution to fit within the 10’x14’ deck space. The new system needed to be easily maintained using simple hand tools while allowing existing operators to perform all necessary functions. Other requirements included unlimited turndown capacity and 100% spare capacity for 22,500 bwpd at less than 10 psi of pressure drop with an overboard discharge of less than 10 ppm oil and grease (EPA 1664 method).

SOLUTION

Two custom designed, independent process trains of MYCELX polishers were installed. Each train consisted of three vessels with each one housing patented oleophilic filtration media elements to attract, recover and remove various oil types at varying concentrations.

The MYCELX Polisher system was designed for tertiary treatment of inlet concentrations of 40 ppm to enable discharge at 10 ppm. Proprietary characterization techniques were utilized to correlate the performance of the polisher system to the regulatory analytical standard.

MYCELX systems are designed per ASME, NACE and ABSA requirements on the pressure vessels, instrumentation and skids.

IMPACT

During the first year of operation, using only the MYCELX polisher as the tertiary treatment, operating costs amounted to $135,000.
- MYCELX polishers were active a total of 16% of the total time the platform was operating
- The platform experienced 18 water treatment upsets upstream, with an average duration of 25 hours greater than 30 ppm inlet into the MYCELX polisher. The average discharge for this period was 3.8 ppm.

During the second year of operation using the MYCELX polisher, operating costs were lowered to $70,000.
- Cost reduction was attributed to concise trending data which helped operators accurately judge when to activate the tertiary treatment
- MYCELX Polishers were active a total of 10% of production time and an average discharge of 4.3 ppm was achieved
- Only 30 man hours utilized to maintain the system when 15 upsets were experienced

After 28 months of operation with the MYCELX polisher and 33 upstream upsets, the deepwater FPF never violated NPDES regulations for water discharge nor experienced loss of oil and gas production because of water treating issues.