

Case study: Gulf Coast, United States

XERIC heavy oil pretreatment demulsifier enabled greater crude diet flexibility and profitability

A US Gulf Coast refinery was processing heavy, high solids opportunity crudes which were negatively impacting key performance indicators (KPIs) at the desalter and the wastewater treatment plant (WWTP). A small amount of heavy Canadian crude was included in the feedstock blend, as little as 13%, but the customer observed a consistent solids-stabilized emulsion throughout the desalter resulting in brine oil and grease (O&G) >5000 ppm. Any attempts to clean up the brine through mudwashing had been unsuccessful due to improper oil-water separation in the desalter. During mudwashes, the large, oily emulsion band was simply being agitated out of the bottom of the vessel. Additionally, high amounts of solids were intermittently carried over with the emulsion which contributed to downstream heat exchanger and furnace fouling. With their limited control over desalter performance and the resulting reliability challenges, the refiner decided to remove the discounted Canadian crude from the feed.

The customer contacted Baker Hughes and scheduled an initial refinery visit to discuss path forward options. After presenting the Baker Hughes **Crude Oil Management™ approach**, the local team was granted an opportunity to conduct a full system survey and perform the requested testing. Ultimately, the Baker Hughes team recommended the implementation of a crude pretreatment program with the **XERIC™ 7021 heavy oil demulsifier**, in addition to a primary demulsifier at the desalter. For improved cost efficiency, crude pretreatment allows for maximum oil-demulsifier residence time and mixing which helps to increase water coalescence and emulsion resolution at the desalter (Fig 1). The team decided that all existing adjunct chemistries, such as stabilizers and wash water polymers, could be discontinued. Within twenty-four hours of startup, a significant improvement in brine quality was noticed, as well as a reduction in the emulsion layer (Fig 2). After the pretreatment program with XERIC

Challenges

- Process >13% high-solids Canadian crude without sacrificing asset reliability or performance
- Achieve <1000 ppm brine O&G KPI
- Remove de-oiled solids from the desalter to avoid WWTP upsets and decrease downstream fouling

Results

- Enabled the customer to process high-solids Canadian crude at >35% of total crude diet, without sacrificing asset reliability or performance
- Decreased brine O&G by a factor >10, achieving customer KPI compliance
- Delivered an additional USD 325,500/day profit through increased crude diet flexibility

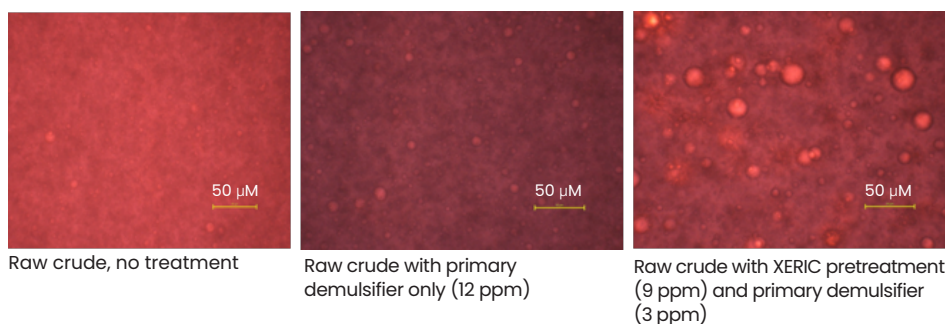


Fig 1. Phase contrast microscopy of emulsion (water droplet size and population)

7021 heavy oil demulsifier had been implemented, the team observed the content of the brine O&G drastically reduced to 200 ppm while the amount of high-solids Canadian crude processed had increased 0 to >35%.

After Baker Hughes was awarded the crude unit business, the customer was able to process as much as 50% heavy

Canadian crude and achieve all desalter KPIs. Ultimately, the performance improvements delivered with the XERIC 7021 crude pretreatment program enabled the customer to achieve an additional \$325,500 USD/day profit.

This case history is presented for informational and illustration purposes only. Results may vary between different applications.



Fig 2 - A. Brine and Trylines 1 to 5 before XERIC treatment program (L-R)



Fig 2 - B. Brine and Trylines 1 to 5 with XERIC treatment program after 4 hours, clear water at 17 in., oil-free brine with high solids (L-R)



Fig 2 - C. Brine and Trylines 1 to 4 with XERIC treatment program, after 24 hours, clear water at 24 in., oil-free solids (L-R)