

Case study: Mid-continent, United States

# XERIC heavy oil pretreatment demulsifier reduced crude tank sludge, improved desalter operations

A refinery customer was experiencing desalter upsets due to the inconsistent quality of crude coming from the tank farm. To re-establish acceptable desalter performance, the primary demulsifier dosage rate was increased 10 times, which also increased treatment costs. This reactive approach also resulted in periods of higher slop generation and re-processing penalties, such as reduced fresh crude rate.

The customer contacted Baker Hughes regarding this issue and inquired about the **Baker Hughes Crude Oil Management™ approach** to pinpoint the source of the problem and recommend a solution. Baker Hughes conducted a system-wide survey inclusive of the crude unit, tank farm, and slop system to identify probable causes and mitigation strategies. The survey results showed that the desalter upsets were due to accumulated waxy sludge in a crude storage tank that also contained high solids. Infrared (IR) scans confirmed there was approximately seventeen foot of sludge in one of the crude tanks (Fig. 1).

On an intermittent basis, crude with tank sludge and emulsions was being sent to the desalter, causing upsets, and leading to poor desalter performance. There were also periods of high brine oil and grease (O&G) and water carryover which increased the rate of slop generated and pressured up the atmospheric tower.

As a proactive means to provide a more consistent feed to the desalter, and to minimize sludge accumulation in tankage, Baker Hughes recommended a crude pretreatment program with a **XERIC™ heavy oil demulsifier** formulated specifically for tank farm conditions. Crude pretreatment offers refiners the ability to maximize oil-demulsifier residence time and mixing, which delivers faster emulsion resolution at the desalter and improved cost efficiency. Additionally, the injection of XERIC heavy oil demulsifiers into a crude storage tank enables emulsions and sludge resolution with a cleaner water draw. Four years into a new tank run and the implementation of the Baker Hughes

## Challenges

- Improve consistency of crude quality by reducing sludge accumulation in the crude tanks
- Reduce frequency of desalter upsets and slop volumes
- Reduce cost of tank cleanings and sludge disposal to achieve targeted tank run lengths

## Results

- Reduced 4-year tank sludge buildup by 90%, resulting in cleaning and disposal savings of \$1MM USD per tank
- Delivered consistent crude quality to the desalter which improved performance and emulsion control
- Reduced emulsion layer from 5 feet to less than 3 inches
- Decreased slop re-processing allowed for an additional \$625,000 USD profit per year from fresh crude rate
- Improved desalting program cost efficiency with crude pretreatment

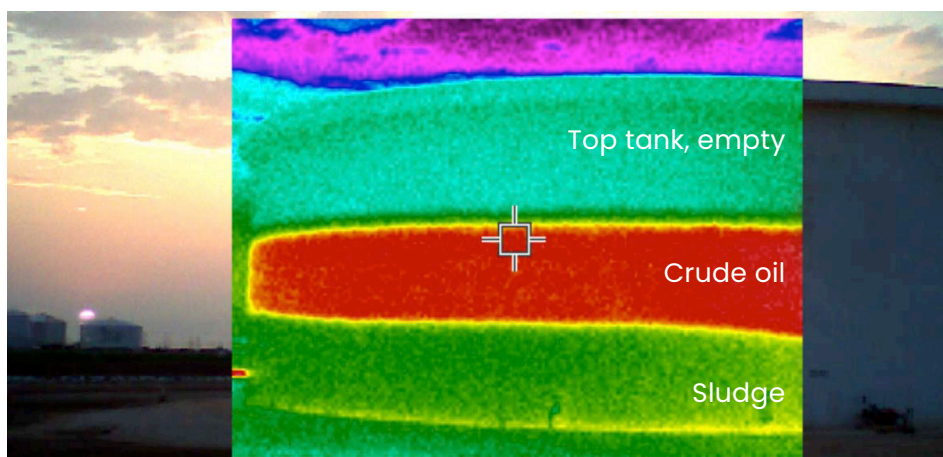


Fig 1. Tank without XERIC pretreatment. Highest sludge point estimated at 17 ft, approximately 7 years into run.

XERIC heavy oil demulsifier pretreatment program, the treated crude tank showed only sixteen inches of accumulated sludge, a 90% reduction. For comparison, during this same time period, a non-pretreated tank with the same crudes had already built up a twelve-foot sludge layer (Fig 2). With the 90% reduction in the pretreated tank, the desalter operation stabilized. The customer currently operates with a 3-in. emulsion layer which is a 95% reduction. The refinery's total slop generation rate was reduced more than 65%, resulting in an additional 1000 BPD of fresh crude rate.

By implementing a XERIC heavy oil pretreatment demulsifier program, the joint Baker Hughes and customer team was

able to deliver significantly improved performance for equivalent costs compared to the base case. In addition to cost neutral operating expenses, the value of reduced sludge accumulation in tankage and the higher fresh crude rate translated to USD IMM savings per tank and \$625,000 USD per year in incremental profit, respectively.

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

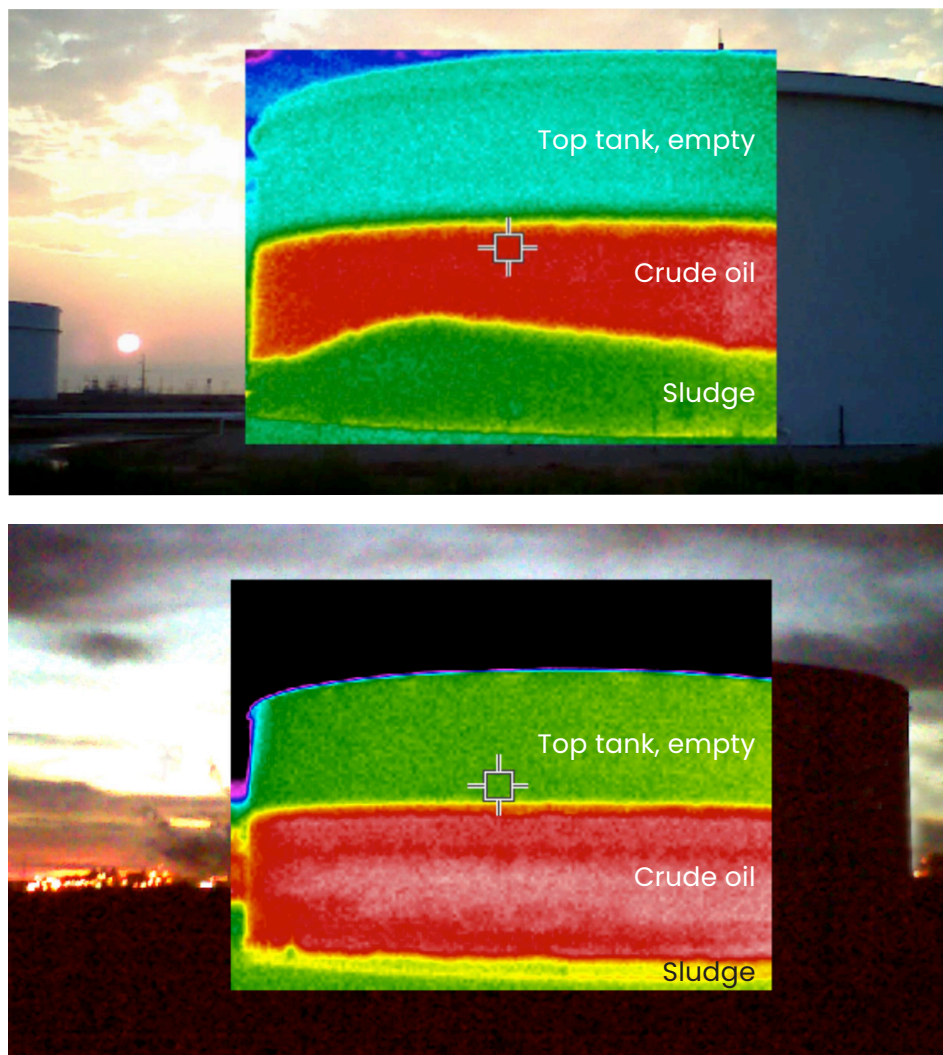


Fig 2. Tank without XERIC pretreatment (top): ~12-ft. sludge accumulated vs. tank with XERIC pretreatment (bottom): 16-in. sludge accumulation. Both tanks 4 years into tank run—similar crude storage.