

MYCELX Technology Recovers 98% of Oil Content from Heavily Emulsified Produced Water

Oil-free water technology reduces 2,500-ppm content to less than 10 ppm, enabling polymer injection reuse in EOR campaign

CHALLENGE

Decontaminate produced water emulsified with 200- to 2,500-ppm oil and grease and 50- to 1,000-ppm solids—all with varying viscosities—from the enhanced oil recovery (EOR) process implemented in a mature field with medium-heavy oil.

SOLUTION

Deploy a customized suite of MYCELX oil-free water technology, which uses patented oleophilic filtration media to attract, recover, and remove a range of oil types at varying concentrations.

RESULTS

Removed oil initially at up to 2,500 ppm in the produced water to achieve oil content less than 10 ppm under upstream production process upset conditions, achieving an oil recovery rate of up to 98% and protecting the reservoir formation from plugging.



Remove oil from highly contaminated produced water for reinjection

A major oil and gas operator in North America implemented an EOR process in a mature field with medium-heavy oil. The EOR technologies used were polymer flooding and alkaline surfactant polymer (ASP) flooding. These techniques significantly increased production rates but resulted in highly emulsified produced water with higher concentrations of oil from the freewater-knockout outlet.

The produced water was emulsified with oils, solids, and residual polymer from the EOR process and contained 200- to 2,500-ppm oil and grease and 50- to 1,000-ppm solids, all with varying viscosities. The high levels of oil and total suspended solids (TSS) concentrations increased the consumption of chemicals to maintain production levels, reduced process efficiency, and risked plugging the reservoir formation.

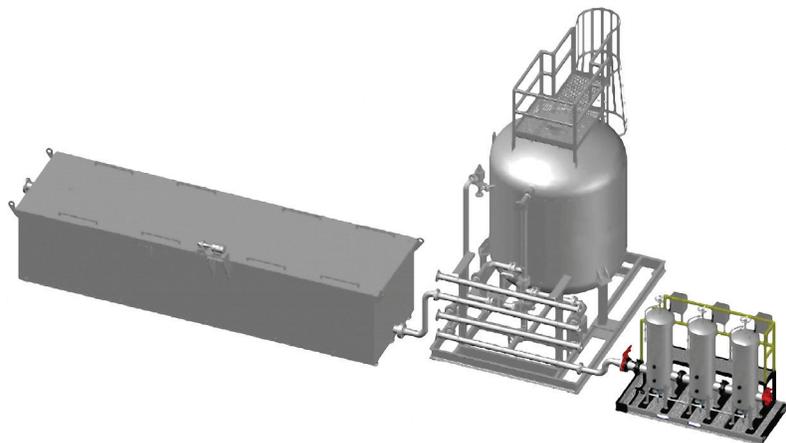
Conventional filtration technologies proved to be unsuccessful at consistently treating the water to less than 10 ppm, which is the level necessary for recycling the produced water and minimizing the use of chemicals required for polymer flooding.

Engineer a customized MYCELX technology solution

To meet the operator's objectives, Schlumberger recommended a custom MYCELX technology program in a pilot trial. The program presented a robust, compact solution consisting of

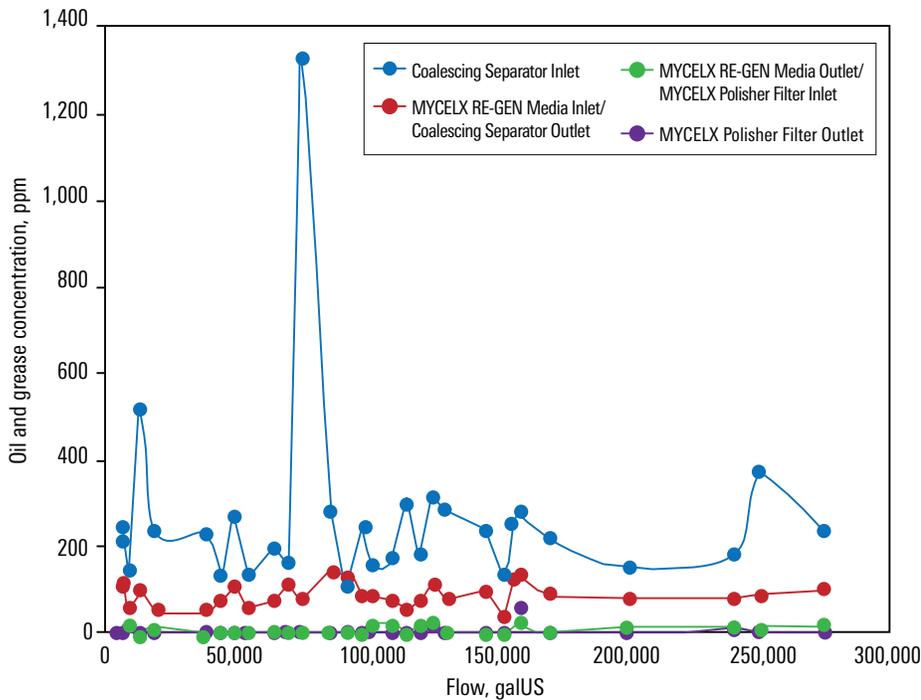
- oil/water separator to coalesce and recover oil in the primary stage
- MYCELX RE-GEN advanced water treatment in the secondary stage
- MYCELX Polisher oil-in-water polishing filters in the tertiary stage.

The technology uses a patented oleophilic filtration media that attracts, recovers, and removes various oil types at varying concentrations, and all systems are designed per American Society of Mechanical Engineers (ASME), National Association of Corrosion Engineers (NACE), and Alberta Boilers Safety Association (ABSA) requirements for pressure vessels, instrumentation, and skids.



MYCELX oil-free water technology was customized in a three-stage configuration (left to right) including an oil/water separator, MYCELX RE-GEN treatment media, and MYCELX Polisher filter units.

CASE STUDY: MYCELX technology recovers 98% of oil content from heavily emulsified produced water



Performance data indicated that the suite of MYCELX technology removed oil and TSS from the heavily emulsified produced water to less than 10 ppm.

Achieved 98% reduction of oil-in-water level for reuse injection

Using the suite of MYCELX technology, the operator consistently removed up to 98% of the oil from the produced water to achieve concentrations at less than 10 ppm, even at a flow rate of 286 bbl/h [46 m³/h] during upset conditions in the upstream production process. The operator was able to reuse the decontaminated water in its polymer injection campaign, saving time and costs. Because the filtration system was easy to operate and required minimal maintenance, the operator saved additional time and internal resources.



The inlet had contamination levels of 500–2,500 ppm of oil and grease with TSS of 2–100 ppm. After the suite of MYCELX technology was deployed, oil and grease at the final polisher outlet was below 10 ppm with a TSS below 10 ppm.

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