Remediation of Asphaltenes in Deep Water Well Results in 2,000 BOPD Production Increase

XYLENE SOAK GUIDELINES DEVELOPED TO REMEDIATE ASPHALTENE DEPOSITS IN TUBING OF SUBSEA TIEBACK WELL
GULF OF MEXICO

OVERVIEW
Precipitation and deposition of asphaltenes is a common problem in Gulf of Mexico deepwater oil and gas production. As oil is produced from the reservoir and pressure is reduced, asphaltenes can flocculate and deposit causing issues such as restrictions in the tubing and flowlines, sticking of valves, topsides separations issues and equipment fouling.

PROJECT DETAILS
The operator’s producing well was located in approximately 5,000 feet of water with a reservoir pressure of 19,500 psi and reservoir temperature of 289°F. The well was connected to a production platform via a 7-mile insulated subsea tieback. Wellhead pressure was below the oil AOP (asphaltene onset pressure) of 10,000 psi and the fluid boarded the platform just below the bubble point of 3,000 psi. Asphaltene deposition was causing high tubing differential pressure and decreased production rates. All attempts to prevent asphaltene deposition in this well were unsuccessful and a remediation plan was needed to remove the deposits and prevent further production rate decreases.

Multi-Chem was approached by the customer to develop a remediation plan (xylene soak) that would reduce the tubing differential pressure and return production to normal levels.

CHALLENGE
Asphaltenes deposition in the tubing and subsea flowline caused flow restriction and reduced production.
- Attempts to prevent asphaltene deposition were unsuccessful
- Remediation plan needed to remove deposits and prevent further production rate decreases

SOLUTION
OLGA® modeling used to identify asphaltene deposition location and develop remediation guidelines for xylene soak.
- Information used to monitor and trend the variance of modeled and actual differential pressure to detect potential restriction formation
- Developed guidelines for xylene injection location, volumes and soak times

RESULT
- Xylene soak remediation resulted in a 2,000 BOPD increase in production and 1,550 psi decrease in tubing pressure
- Economic value to the operator was approximately $83,000/day
- Chemical costs were recovered in less than one day of additional production
OLGA® modeling software was used to predict the expected differential pressure in the tubing and flowline. This information was then used to monitor and trend the variance of modeled and actual differential pressure to detect potential restriction formation. OLGA modeling was also used to develop pressure profiles which were compared to expected asphaltene precipitation pressures to predict deposition location (flowline vs. tubing). This information was used to develop guidelines for xylene injection location, volumes and soak times. The initial soak was performed for 24 hours using 3,000 gallons of xylene injected from the wellhead down to the SCSSV. Performance of the initial soak was analyzed and used to optimize future treatments.

**SUMMARY**

The remedial xylene soak resulted in a 1,550 psi decrease in the tubing and differential pressure was decreased by 1,550 psi. Production from the well was increased from 13,750 BOPD to 15,750 BOPD, accounting for an increase of 2,000 BOPD. Based on the crude oil price at the time of the soak, the economic value to the operator was approximately $83,000/day. Chemical costs associated with the xylene soak were recovered in less than one day of additional production. Periodic xylene soaks are required to maintain production levels. Frequency and soak procedure is constantly optimized based on field results and updated modeling, providing additional cost savings and revenue increases to the customer.