Operator Prevents Hydrate Blockage in Gulf of Mexico Deep Water Well

CONTINUOUS INJECTION OF DEEPSURE™ CERTIFIED MXUC 5-3900 LDHI OUTPERFORMS PREVIOUS HYDRATE TREATMENT

GULF OF MEXICO

OVERVIEW

Hydrate particle formation and deposition is a common problem in Gulf of Mexico deep water oil and gas production systems. Caused by a combination of gas, water, relatively low temperatures and high pressures, hydrate particles tend to agglomerate and deposit on pipe walls. This buildup can occur rapidly and lead to blockages, resulting in lost production and high remediation costs. Therefore, prevention is of utmost importance.

The operator’s producing well was located in approximately 5,635 feet of water and had been shut in for around 9 months. Upon startup, a different zone of the reservoir was accessed, resulting in unknown production volume and water chemistry. This time around, a more cost-effective, high-performance solution was sought, challenging Multi-Chem to deliver the right hydrate treatment plan engineered to meet customer needs.

Hydrate treatment strategies can vary significantly based on water cut, water volume, salinity and oil characteristics. So, Multi-Chem technicians designed a rocking cell test matrix to account for these unknown variables. OLGA dynamic multi-phase flow software was used to model steady state and transient oil and gas flow conditions, enabling simulation of the expected temperature and pressure profiles for this deep water subsea tieback.

The plot below shows the fluid temperature (green) falling below the hydrate association temperature (blue) during steady state flow.

OLGA Modeling

CHALLENGE

» Prevent blockages caused by hydrate particles in Gulf of Mexico deep water well
» Replace prior LDHI to save costs for operator, while meeting application and product performance requirements
» Understand variables of new production zone: water volume (bwpd), water cut, salinity and oil characteristics

SOLUTION

» Rocking cell testing to compare performance between incumbent product and DeepSure™ certified MXUC 5-3900 LDHI
» OLGA multi-phase transient modeling software to predict expected temperature and pressure profiles of the system
» Injection of DeepSure MXUC 5-3900 LDHI on a continuous basis to prevent hydrate particle formation

RESULT

» Eliminated hydrate-related problems
» DeepSure certified MXUC 5-3900 LDHI resulted in lower dosages needed in condensed water conditions and ability to treat higher water cuts compared to incumbent
» Saved customer 20% a year with improved plan
This phenomenon occurs at approximately 20,000 linear feet from the wellhead as the fluid flows up the riser, just prior to boarding the platform. It was concluded that a continuous low dosage hydrate inhibitor (LDHI) was needed to optimize chemical flow through the entire system.

COMPARATIVE LABORATORY TESTING
Rocking cell testing was designed conservatively to account for the worst-case scenarios of the new producing zone, with the ability to adapt as information was received from the field. Multi-Chem’s DeepSure™ MXUC 5-3900 LDHI and the incumbent product were lab tested head-to-head for a performance comparison under all potential conditions. MXUC 5-3900 LDHI performed better for all conditions during screening, including a lower dose rate required for condensed water (8% vs. 10% for incumbent) and the ability to treat higher water cuts at 12% salinity, keeping a constant dose rate of 2% (50+% vs. 45% for incumbent).

FLEXIBLE, RESPONSIVE TREATMENT PLAN
A transition plan was developed to decrease response time during the initial startup, so that adjustments to the treatment strategy and injection rates could be made as necessary. The initial treatment volume was 100 gpd to account for a wide range of conditions during ramp-up. Once water volume, water cut and salinity could be determined, the treatment rate was optimized down to 25 gpd. MXUC 5-3900 LDHI is still injected at 25 gpd continuously for treatment of hydrates during steady-state and transient operations.

SUMMARY
Transitioning to the MXUC 5-3900 LDHI from the incumbent resulted in 20% annual savings for the customer. Production from this well has been re-established via the new production zone, and to date there have been no indications of hydrate-related problems.