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Successful Field Application of an Inhibitor Concentration Detection System in Optimising the Kinetic Hydrate Inhibitor (KHI) Injection Rates and Reducing the Risks Associated with Hydrate Blockage

Orlin Lavallie, Ahmed Al Ansari, Stephen O'Neil and Olivier Chazelas, Dolphin Energy Limited, Doha, Qatar
Philippe Glénat, SPE, Total E&P, Pau, France
Bahman Tohidi, SPE, Hydrafact Ltd., Edinburgh, Scotland, UK

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Abstract

Currently, hydrate inhibitors are injected at the pipelines upstream based on the calculated/measured hydrate phase boundary, water cut, worst pressure and temperature conditions, and the amount of inhibitor lost to non-aqueous phases. In general, no means of controlling and monitoring are available along the pipeline and/or downstream to assess the degree of inhibition. Often high safety margins are considered to accommodate for the uncertainties in the above parameters and to ensure gas hydrate risks are eliminated. However, despite these efforts hydrates do still form and this can result in considerable economical and safety concerns.

As a result of a joint industry project, a novel device based on electrical conductivity and sonic velocity (C-V technique) has been developed for monitoring the hydrate safety margin to optimise inhibitor injection rates. The system determines the amount of inhibitors (e.g., salt, KHI, methanol, MEG, etc…) in the aqueous phase and the degree of inhibition they can provide.

The device has been successfully applied in determining the amount of KHI in produced water from the Dolphin field in Qatar. Compared to conventional chemical techniques the device is much faster (less than 3 minutes) and less labour intensive and there is no chemical requirement.

In this presentation, the results of the trial of this device in determining KHI concentration in produced water are described. The results shows that this new technique is very fast and reliable, optimising the KHI injection rate, improving the economy and reliability of hydrate inhibition strategy, and minimising the impact on the environment.