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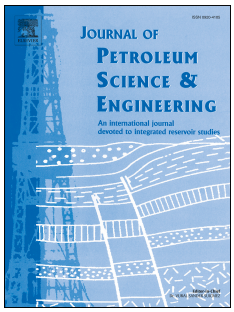

Flow assurance during deepwater gas well testing: Hydrate blockage prediction and prevention

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PII: S0920-4105(17)31057-4

DOI: 10.1016/j.petrol.2017.12.093

Reference: PETROL 4583

To appear in: *Journal of Petroleum Science and Engineering*

Received Date: 15 October 2017

Revised Date: 23 December 2017

Accepted Date: 30 December 2017

Please cite this article as: Wang, Z., Zhao, Y., Zhang, J., Pan, S., Yu, J., Sun, B., Flow assurance during deepwater gas well testing: Hydrate blockage prediction and prevention, *Journal of Petroleum Science and Engineering* (2018), doi: 10.1016/j.petrol.2017.12.093.

Flow Assurance during Deepwater Gas Well Testing: Hydrate Blockage Prediction and Prevention

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Abstract Hydrates cause serious flow assurance problems during deepwater operations (e.g. well testing). In order to efficiently prevent wellbore/pipeline blockage, it is of great importance to have a good understanding of hydrate formation, deposition and blockage behavior in the flowline. In this work, a model is developed to describe the development of hydrate blockage in the wellbore. The results indicate a non-uniform hydrate layer is formed on the inner wall along the testing tubing during deepwater gas well testing. With the proposed model, the position where hydrate blockage is most likely to occur can be identified. The blockage severity in terms of dimensionless hydrate layer thickness can also be assessed. Based on the model, a method is developed to prevent hydrate blockage with lower inhibitor consumption. We recommend that testing operations should be run within the Hydrate Blockage Free Window (HBFW). The HBFW refers to the period from the beginning of testing operations to the moment when a significant pressure drop increase is encountered. Implementation procedure of the proposed method is developed and further illustrated through case studies. The inhibitor consumption is much lower compared with the current over-inhibition THI-based method. This work provides possible ways to overcome the shortcomings of the current over-inhibition THI-based method.

Key words: Deepwater, Gas well testing, Flow assurance, Hydrate blockage, Hydrate Blockage Free Window

1. Introduction

Deepwater gas well testing is an important way to obtain formation parameters and evaluate the potential of reservoirs (Kabir et al., 2014; Stomp et al., 2004; Cervantes et al., 2012). Well testing operations are usually carried out on a drilling platform. During a typical well testing operation, formation fluid in the testing zone is induced to the wellbore by decreasing the bottomhole pressure (BHP). By analyzing well testing data, the reservoir characteristics and well productivity can be evaluated. For detailed discussion about deepwater well testing, one is recommended to refer to Stomp et al. (2004) and Chen et al. (2008).

Due to low temperature and high pressure conditions, gas hydrates can form in wellbore (Sloan and Koh, 2008), as shown in Fig. 1. The formed hydrates can block the wellbore and result in serious

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