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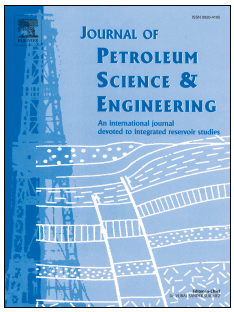

Coalbed methane development in China: Engineering challenges and opportunities

Hangyu Li, Hon Chung Lau, Shan Huang

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Coalbed Methane Development in China: Engineering Challenges and Opportunities

Hangyu Li, Shell International E&P Inc. Houston, TX, USA
Hon Chung Lau, National University of Singapore, Singapore
Shan Huang, Shell International E&P Inc. Houston, TX, USA

Abstract

Commercial development of coalbed methane (CBM) in China has lasted for a decade. However, in 2015 annual CBM production in China was less than 5 Bcm and lagged far behind those in US (35 Bcm) and Australia (18 Bcm). In this paper, we review the published literature to determine the engineering challenges and opportunities of CBM production in China. Our review has identified seven major engineering challenges to CBM development in China. They are low cleat permeability and underpressured formation pressure of high-rank coals, ductility of coal seams, suboptimal fracturing fluids, formation damage during drilling, borehole instability in horizontal wells, frequent pump failures during production, and inadequate produced water treatment methods.

Each of these challenges provides an opportunity for improvement. We propose a refocus on low-rank coals which have higher permeability. Other opportunities include development of better hydraulic fracturing fluids, non-formation damaging drilling fluids, use of geomechanics to understand borehole instability, optimization of the artificial lift methods and more robust and environmentally friendly produced water treatment methods.

Introduction - History and Current Status of CBM Development in China

China has the world's third largest CBM resources after Russia and Canada. The total CBM resource volume in China with a buried depth shallower than 2000 m is 36.8 Tcm based on a recent study by Liu *et al.* (2009). Over 65% (~24 Tcm) of this have a buried depth less than 1500 m, and are considered as technically recoverable (NDRC, 2006).

In recent years, the CBM production in China has seen steady increase as shown in Fig. 1. Commercial-scale CBM production started in 2004 and did not see an increase until 2008. Since then, the production increased by about three times, but was still significantly lower than the target set by the government. In April 2016, production figures published by the Ministry of Land and Resources (MLR, 2016) showed that CBM total production rose 24.8% to 4.43 Bcm in 2015. However, this only accounted for less than 32% of the CBM production target (14 Bcm) set in the 12th Five Year Plan (FYP) by China's National Energy Administration (NEA).