

Development of CHOPS in Jilin Oilfield, China

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ABSTRACT

Jilin Oilfield Limited Company (JOLC - Division of PetroChina) is the first in China to systematically implement cold heavy oil production with sand (CHOPS). Considering the difficult field conditions, Jilin has obtained impressive success so far. Starting from March 2001, JOLC drilled ~60 wells in the small Taobao field region, all of which were completed as CHOPS wells and equipped with Canadian-manufactured PC pumps. The JOLC production engineers have been progressively improving their field practice and understanding of CHOPS since that time, and the current goal is to improve the production capacity from 7.7×10^4 t/year to 12.87×10^4 t/year by drilling another 40 wells by the end of 2004.

Jilin field has a very different depositional framework and much more difficult reservoir conditions compared to Canadian CHOPS fields. The fine-grained sands occur as a series of thin beds, no thicker than 7 m and usually less, in a zone of 5-6 oil-saturated beds with a net to gross of perhaps 60%. Intervening oil-free beds are thin (several metres maximum), and are clayey silts to clayey sands in composition; it is unlikely that these thin interbeds are continuous and form regional hydraulic seals, so that water influx is difficult to control. Compared to Canadian experience, the Taobao field has gone through a distinctive development process described by Jilin engineers as the "four-step development procedure". Perhaps the best success to date in Taobao is a case where a single well went first from 7 ~ 14 b/d to 20 ~ 30 b/d, and eventually peaked at around 200 b/d, a performance unexcelled in China by any method except perhaps thermal stimulation, which is extremely costly. In the Taobao field, thermal stimulation proved uneconomical and was abandoned in 2000.

At present, stopping water invasion and developing the many thin pay zones (2~4 m) are the major challenges faced by Jilin field. In contrast to typical Canadian practice, Jilin engineers do not abandon water-invaded wells, but implement one or more of a set of methods to reduce the impact of the water, delay its entry, and so on. The methods used and the successes and failures should be of economic value to Canadian CHOPS operators.

Because of the Jilin success, CHOPS is becoming an attractive alternative method to CSS, which accounts for >90% of heavy oil production in China. It is likely that this experiment will lead to major changes in China's heavy oil industry in years to come.