



Discussion of Tight Oil Performance Characteristics and Ultimate Recovery Estimation

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Tight oil performance analysis and ultimate recovery estimation is one of the difficulties in current. Different from conventional oil reservoirs, the tight oil production of a well depends on the quality of the tight oil reservoir and the effect of massive fracturing, and with the same fracturing technology, the better the quality of the tight oil reservoir, the higher the oil production of single well will be. The production performance of tight oil wells features two stages, the initial stage with high production and fast decline, and the middle-late stage with low production and slow decline. In the early stage, the high oil rate reflects the fluid flow in fractures, while in the middle to late stage, the low oil rate reflects the fluid flow in pores. Since the production decline curve analysis (DCA) for conventional reservoirs is only applicable to estimating the reserves of a well in its middle-late life time when consistent production decline trend appears, and in the early stage, DCA method have high uncertainty. Therefore, it is necessary to develop an approach to estimate the tight oil reserves of wells in their early production stage by analyzing the production performance, so that the reserves of tight oil can be assessed in the exploration period. Given this situation, two methods of recoverable reserves estimation for wells at different production stages have been proposed, one is material balance time method, the other is analogue method.

The material balance time method is mainly adopted to estimate the reserves of the wells showing boundary flow features. As there is the constraint of -1 slope of the trend line, human influence is significantly reduced, and the estimation results are more reliable.

Analogy is normally used for estimating the reserves of the wells only with short history of trial production. A chart of EUR vs. cumulative oil production in the first 6 or 12 months can be drawn by using the data of the wells in mature are or new area with long trial production history. Then, the EUR of wells with short trial production history can be determined by analogy to the corresponding wells in the chart. This provides a simple but efficient way of assessing the reserves of tight oil wells in their early production stage.