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## **Concept of Classified Polymer Flooding Control Extent and Influences on Flooding Effect**

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### **Abstract**

In oil reservoirs, if sand bodies are interconnected, and the polymer molecules can penetrate, then we regard the porous volume as swept volume of polymer flooding. But polymer flooding effects are associated with interconnection types of swept porous volume, which has not been involved in the previous concept of polymer flooding control. Based on reservoir interconnection type, we've classified polymer flooding control degree into two types. And through numerical simulation, studies on relations between interconnection types and oil displacement effects have been conducted, the research results show that:

1. As polymer flooding control degree of interconnection between sand channels increases, the final recovery rate of both water flooding and polymer flooding rises. The polymer flooding effects improve.
2. As polymer flooding control degree of interconnection between sand channels increases, the recovery rate increments from polymer flooding rise gradually. When control degree is lower than 75%, the recovery rate increments are influenced by control degree significantly. When it's higher than 75%, the recovery rate increase slows down. So, in order to obtain better polymer flooding effects, polymer flooding control degree should be maintained at approximately 75%.

### **1. Necessity of focusing on polymer flooding control degree**

Reservoir geological conditions are important factors influencing polymer flooding effects. Traditional reservoir engineering description methods usually adopt permeability difference, vertical permeability variation coefficient and water flooding control degree to quantitatively represent reservoir geological conditions.

However, when swept porous volume of water flooding is all 100%, the effects of polymer flooding vary. This indicates that the above-mentioned methods can not precisely describe the influence of reservoir geological conditions over polymer flooding effects. Since 'the tenth five year plan period', Daqing Oilfield has put forward the concept of 'polymer flooding control degree' based on polymer flooding of the secondary reservoirs (which refers to channel sand reservoirs, and non-channel sand reservoirs with effective thickness above 1 metre and effective permeability above  $0.1\mu\text{m}^2$ ). A set of polymer flooding development technologies of combination of perforated zones, well pattern and flooding plan design optimization aiming to enhance polymer flooding control degree have been developed and perfected.

But even so, with our further knowledge on polymer flooding in medium and low permeability reservoirs, we've found that the traditional methods can not satisfactorily reveal the influence of geological conditions on polymer flooding effects. So, it's necessary to deepen our knowledge of polymer flooding control degree.

### **2. Introduction of concept of classified polymer flooding control degree**

Practice of polymer flooding in Daqing Oilfield's secondary reservoirs show that, in the well groups with similar polymer flooding control degree, the dynamic variation of polymer flooding is significant (table 1, fig. 1). Analysis shows that there is fairly good correlation between polymer flooding effects and interconnection ratio of channel sand (fig. 2).