Reducing Water Production in Mississippian Reservoirs Using Gelled Polymer Systems

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A two-well field test is proposed to determine if the gelled polymer technology that has been applied successfully in Arbuckle reservoirs in Central Kansas can be extended to Mississippian reservoirs. The Mississippian reservoirs in Kansas are a major source of oil production, accounting for about 18%(6.13 million barrels in 2004) of the total annual production. Cumulative production from Mississippian reservoirs in Kansas exceeds 1 billion barrels. The Mississippian reservoirs are heterogeneous and produce under a strong water drive. High water cuts and low recovery factors are typical of these reservoirs. The perceived risk of trying the new technology used successfully in the Arbuckle formation has prevented the evaluation of the new gelled polymer technology in Mississippian reservoirs.

The proposed field test will be conducted in the Schaben Field in Central Kansas. This field, studied in a DOE Class 2 demonstration project in 1994-1997, has regions containing high mobile oil saturations that may be potentially recoverable if water production can be reduced and the water influx diverted to matrix rock to displace mobile oil. Water production rate following treatment of a well using a gelled polymer system can be reduced by a process in which the gel that has formed in situ is dehydrated following placement by slow injection of oil. Three results are anticipated: 1) substantial reduction of water production rates after treatment, 2) increased incremental oil production caused by creation of new displacement paths for the water moving to the wellbore and 3) longer interval between gel treatments because the dehydrated gel is stronger than the original gel because the polymer concentration increases in the gel that is dehydrated. The field test is a cooperative field demonstration program between the Kansas University Energy Research Center, American Warrior Inc. and Pickrell Drilling Co. Inc. independent oil producers in Kansas.