

# **CO<sub>2</sub> Flooding in Southeast Saskatchewan—Proven Success Leads to Another Boom Era**

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*With the commercial implementation of Weyburn and Midale CO<sub>2</sub> flooding projects, CO<sub>2</sub> miscible flooding has been proven successful in southeast Saskatchewan. In fact, many other oil pools scattered in this area are deemed to be amenable to CO<sub>2</sub> miscible flooding as well. Nevertheless, before a miscible CO<sub>2</sub> flood can be designed and implemented, many technical issues need to be tackled by the operators. This presentation summarizes the research findings of the Saskatchewan Research Council on CO<sub>2</sub> miscible flooding for southeast Saskatchewan over the past two decades. A number of representative reservoirs, including the Weyburn, Pinto, and Steelman fields, were selected to assess the suitability of CO<sub>2</sub> flooding. Comprehensive engineering design work was conducted for these reservoirs. First, the key parameter for the design of a miscible CO<sub>2</sub> flood— minimum miscibility pressure (MMP)—was determined using slim tube tests and a rising bubble apparatus (RBA). The effects on MMP change of different impurities present in the injected CO<sub>2</sub> stream were experimentally studied and analyzed in detail. Then, extensive PVT properties of the reservoir fluid–injection solvent were measured. Various gases, such as reservoir produced gas and synthetic flue gas, were evaluated. Finally, oil recovery performance was assessed using linear coreflood displacement tests with different injection scenarios. Meanwhile, several important phenomena during the CO<sub>2</sub> miscible flooding process, e.g., asphaltene precipitation, water blocking, brine influence, viscous fingering and gravity override, were also investigated with specially designed tests. Our research findings lead to a number of technical conclusions and recommendations on the suitability of CO<sub>2</sub> flooding for southeast Saskatchewan. On the basis of our experience with CO<sub>2</sub> flooding evaluation for conventional oil reservoirs, the technical feasibility and challenges of CO<sub>2</sub> flooding for tight Bakken reservoirs are also discussed.*

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