CO_2 Flooding Potential

Preliminary Assessment of CO_2 Flooding Potential for Light Oil Reservoirs

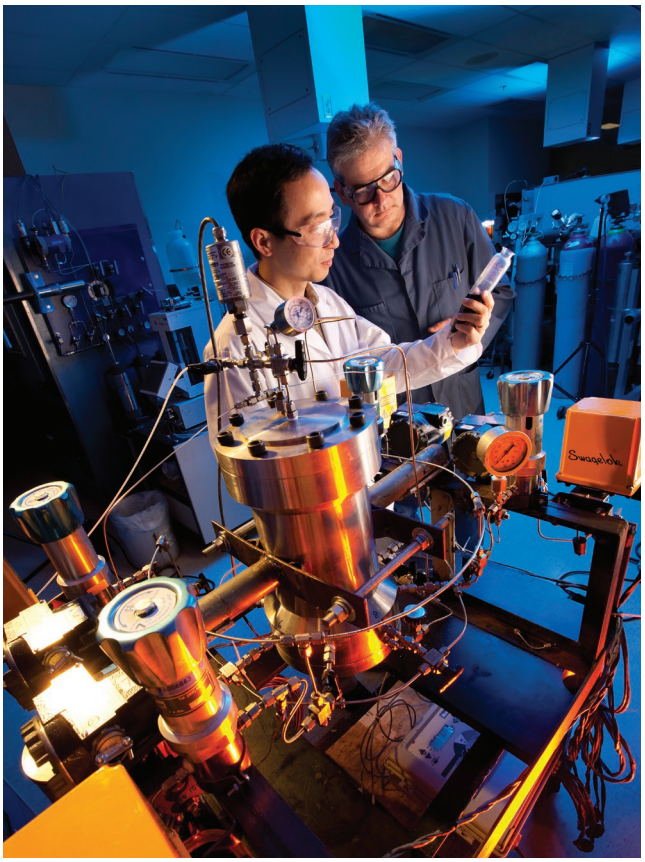
Carbon dioxide injection is now the leading enhanced oil recovery (EOR) process for light oils. It can recover 15 to 25 per cent of the original oil in place and prolong production by 15 to 30 years. Many small companies are looking seriously at this low-risk, effective technique to complement and eventually replace waterfloods.

But how suitable is CO_2 flooding for your field? The Saskatchewan Research Council (SRC) offers Williston Basin companies a fast, cost-effective preliminary assessment of the CO_2 flooding potential of their reservoirs.

The ongoing CO_2 floods at Weyburn and Midale fields in southeast Saskatchewan are proving just how successful the method can be. At Weyburn, for example, EOR operations account for 20,000 barrels per day, or two-thirds of total current production from the field.

The technical design of the Weyburn and Midale ventures relied on results from SRC's CO_2 injection research program underway since 1988. SRC continued to provide the necessary follow-up technical expertise to support the projects as they evolved.

The Saskatchewan Research Council is one of Canada's leading providers of applied research, development and demonstration (RD&D) and technology commercialization. SRC provides services and products to its 1,500 clients in 20 countries around the world.



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SRC's Approach

Our work with various light/medium oil-gas systems makes it possible to tailor CO_2 flooding to a range of reservoir pressure requirements and gas compositions.

We developed an effective near-miscible process for reservoirs that can't sustain the relatively high pressures needed for miscible injection. We also understand the effect of contaminants (e.g., N_2) in the injected gas.

SRC's assessment package comprises three tasks to determine if your property is a realistic candidate for CO_2 injection.

1) ***Reservoir Assessment*** includes geochemical modelling, studying dissolution/precipitation affects with CO_2, injectivity tests, capillary pressure curves using ultra-high-speed centrifuge, SEM, computed tomography imaging, XRD and a variety of other tests.

2) ***Phase behaviour (PVT) testing*** of the reservoir fluid with varying concentrations of CO_2 provides needed data on oil viscosity reduction, oil swelling and CO_2 solubility. These data support the other tasks and serve as input for any future numerical simulation to predict field performance.

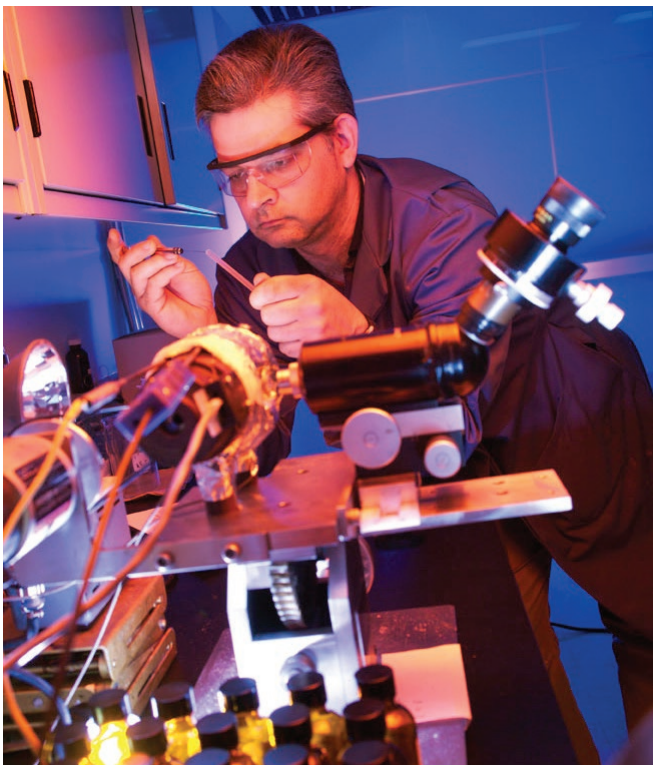
3) ***Minimum miscibility pressure measurement*** through rising bubble apparatus (RBA) and slim tube studies for various oil-solvent systems. The MMP is the key factor in determining if your reservoir is suitable for CO_2 injection.

4) ***Coreflood tests*** are carried out to assess oil recovery behaviour and potential under different injection strategies and to obtain endpoint relative permeability data for any future numerical simulation.

5) ***Numerical Modelling*** is used to scaleup laboratory results and optimize field implementation design.

We are also able to draw on a diverse array of expertise and facilities at SRC, including our Petroleum Analytical Laboratories, Advanced Microanalysis Centre™, Biotechnology Laboratories, Environmental Analytical Laboratories, Geoanalytical Laboratories, Mineral Processing Labs and Pilot Plants and Pipe Flow Technology Centre™. We put our extensive know-how to work tackling the needs of national and multinational clients, both in Canada and globally.

An SRC research technologist prepares the light oil coreflood apparatus for a test.



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