

## **Back to the Future! - Rejuvenation of a Billion Barrel Oil Field, Weyburn CO2 EOR project, Saskatchewan**

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### **Alberta**

The Weyburn oil field located in south-east Saskatchewan has recovered to date almost 400 million barrels out of the 1.4 billion barrels originally in place. The field, over its 50 year history, has been at the fore front in Canada for applying new technologies to maximize oil recovery. Waterflooding, vertical well downspacing, water shut-offs and multi-lateral horizontal wells are some of the technologies successfully applied in Weyburn. In the year 2000 a CO<sub>2</sub> miscible flood was implemented in the field. The CO<sub>2</sub> flood is expected to recover an incremental 155 million bbls and extend the life of the reservoir for another 30 years. Implementation of the CO<sub>2</sub> flood employs a unique pattern configuration comprising dual leg horizontal CO<sub>2</sub> injectors and simultaneous water injection in nearby vertical wells. This unique configuration was tailored specifically to optimize recovery from the unique geology of the Weyburn Midale Beds. In addition to pattern configuration the operator, on behalf of the working interest owners in the field, is experimenting with significant infill development to reduce well spacing, increased injector to producer ratios as well as optimization of CO<sub>2</sub> – water injection ratios. Through the use of these innovations, production from the field has increased to 30,000 BOPD, a rate not seen from this mature oil field since the early 1970's.

A leading edge technology being developed at Weyburn is the use of 3D time lapse seismic to track the movement of the CO<sub>2</sub> flood front. Since 1999 four seismic surveys have been conducted and although tracking CO<sub>2</sub> using seismic methods is still in its infancy, seismic time lapse mapping does appear to be imaging the progress of the flood front and confirming some field observations.

In 2000 under the auspices of the International Energy Agency, the world's largest CO<sub>2</sub> sequestration study was implemented in Weyburn. The study was completed in 2004 and demonstrated that under the appropriate conditions geological storage of greenhouse gases is a possible future use for mature oil reservoirs.