Routledge Unit #1

Waterflood Enhanced Oil Recovery (EOR)

Supplement

Recovery Predictions

Prediction for oil recovery under primary (with aquifer influx or natural water drive) and EOR Waterflood are shown in Figure #2. The recovery factor is 47.6%, based on 15.9 MMbbl of cumulative oil recovered (to January 2012) and the Routledge Unit #1 OOIP of 33.4 MMbbl. The estimated ultimate reserves (EUR) on primary production are 16.9 MMbbl resulting in a recovery factor of 50.6% of OOIP. The estimated ultimate reserves (EUR) on primary + waterflood production are 18.1 MMbbl resulting in a recovery factor of 54.2% of OOIP. This implies that we are expecting an incremental oil recovery factor of 3.6% with implementation of the Waterflood EOR as proposed in this application.

Displacement and Volumetric Sweep Efficiencies

There have been no water-oil relative permeability measurements for the Lodgepole reservoir in Routledge Unit #1. Enerplus is currently in the process of conducting an extensive Special Core Analysis (SCAL) and Reservoir Characterization study for the Lodgepole formation in Daly Unit #3. Since Enerplus believes that the Lodgepole formation in Daly Unit #3 is an analog to the Routledge Lodgepole formation, the displacement efficiency from the former (Daly), i.e. a value of 71% could be used for the Lodgepole in Routledge Unit #1.

- Volumetric sweep efficiency under the aquifer influx or natural water drive to January 2012 is estimated to be 67.0%, using a recovery factor of 47.6%
- Ultimate volumetric sweep efficiency under the aquifer influx or natural water drive to end of reservoir life (to ~ 2029) is estimated to be 71.3%, using a recovery factor of 50.6%
- Ultimate volumetric sweep efficiency under the waterflood EOR plus aquifer influx or natural water drive to end of project life is estimated to be 76.3%, using a recovery factor of 54.2%.

Economic Limits

Economic limits utilized for the production/recovery predictions are 24 bbl/day for Routledge Unit #1.

Reservoir Simulation Model

Enerplus does not have a Reservoir Simulation Model set up for Routledge Unit #1. The Waterflood Pilot experience in Section 22 in the Routledge Unit #1 (discussed under the Section, “Waterflood Pilot, 1973 – 1994” (on Page 11 of the original application) has provided some guidelines and expectations that we could use for waterflooding a wider area in the Unit.

Figure: 2

Oil Ultimate Forecast (Primary & Primary + Waterflood)