

Controlling Water Risks in Extra Heavy Oil Environment

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Abstract

SINCOR is one of the major operators of the Orinoco Belt in Venezuela. It produces 8.5 °API Extra Heavy Oil (EHO) with a viscosity at reservoir conditions of 2500 cP. The EHO is upgraded in Venezuela to market of high quality 32 ° API synthetic crude oil.

The geological context is fluvio-deltaic with high sand content, very good permeabilities and large regional aquifer. Before start-up, the impact and strength of the aquifer were identified as major risks for both production and reserves due to extreme viscosity contrasts.

The first development phase is completed and includes more than 300 horizontal wells. SINCOR produces 200.000 bbl EHO/d today.

Prior to a second development phase, answering to the question: "what have we learnt of the aquifer risk?", should help making the next development phase more efficient.

Some of the main lessons learnt are:

- Water entry is very local in the wells
- Risk of water interference between wells in the same sand is high
- Wells accumulate large volumes of EHO after water breakthrough

Thorough monitoring policy of wet wells allowed evidencing some specific characteristics of this EHO field:

- water banking at well level
- link liquid rate/water cut ... favorable to EHO
- data acquisition allowing partial quantification of aquifer strength

A production policy was then implemented that allowed optimizing both production potential and reserves of existing wet wells.

To maximize reserves, water handling capacity (WHC) is adjusted with time and the future drilling sequence will account for both planned WHC modifications and risks of water interference.

Phased development coupled with thorough monitoring policy lead to understand better the behavior of EHO crude in unfavorable environment. Today, this allows SINCOR to adapt its development plan to improved control of the risks linked to the aquifer.