2010 Project:

Title: Performance of Bilateral Water Sink (BWS) and Downhole Water Loop (DWL) Wells with Water-free Oil Production Oil from Reservoirs with Water Coning/Cresting

Objectives: Few heavy oil reservoirs with strong bottom water drives have been developed successfully, because severe water coning causes low ultimate recovery, low well productivity, and high water production. Moreover, Downhole Water Sink (DWS) method has proven to be effective but it produces large volumes of water.

One objective of this project is to build a model and assess feasibility of the Downhole Water Loop (DWL) technique that controls water coning without large volumes of produced water (PW). DWL wells are triple-completed so instead of lifting the sink water to the surface, they use downhole pumps to drain and re-inject the water to the same aquifer. DWL wells have environmental advantage of waste volume minimization and productivity advantage of maintaining water drive pressure. Their disadvantage, however, is the need for keeping up with injectivity decline.

The second objective is to model and analyze recovery performance of heavy oil with bottom water using BWS wells. The BWS method suppresses water cresting by producing oil and water simultaneously from separate horizontal wells completed in the oil and water zones; the oil and water completions are parallel, with the oil well directly above the water well. In conventional horizontal well production, water cresting causes water to bypass oil, and the water drive mechanism is ineffective. BWS controls water invasion by altering the pressure distribution in the near-well area. With cresting suppressed, the oil completion remains water-free, and water can displace oil from the edges of the well drainage area to the well.