Reservoir Characterization of Plover Lake Heavy-Oil Field

Larry Lines*
Chorus, University of Calgary, Calgary, Alberta, Canada
lrlines@ucalgary.ca
Joan Embleton, Mathew Fay, Steve Larter, and Tony Settari
Chorus, University of Calgary, Calgary, Alberta, Canada
Bruce Palmiere and Carl Reine
Nexen Inc., Calgary, Alberta, Canada
and
Douglas Schmitt
Chorus, University of Alberta, Edmonton, Alberta, Canada

Abstract

Enhanced production of heavy oil from the Cretaceous and Mississippian sands of Eastern Alberta and Western Saskatchewan presents many challenges – requiring a more complete description of lithology, porosity, permeability and changes in reservoir fluid composition and physical properties. Our reservoir projects near Plover Lake, Saskatchewan seek to produce reservoir models that are consistent with all available data including well logs, cores, produced fluids and seismic data. Thus far, we have effectively used dipole sonic data and multicomponent 3-D data to effectively delineate sand layers. Core measurements suggest that interbedded shale layers will impact vertical permeability and consequently oil production. In order to effectively map production and reservoir changes, we propose to use time-lapse (4-D) seismic surveys to update our reservoir models. These seismic measurements are coupled to laboratory measurements of Vp/Vs from core samples and detailed oil-column profiling of fluid properties. Experience with 4-D seismic data at nearby Bodo field, near Provost, Alberta, has shown that seismic monitoring can effectively map the reservoir changes due to cold production. Hence, we advocate a reservoir characterization strategy that involves the use of logs, cores and a base 3-D seismic survey to describe geology with repeated multicomponent 3-D surveys being used to map reservoir changes. Our study shows reservoir studies on models and real data from the Plover Lake area, along with planned future research.