

Shallow Gas Exploration Through Drift Thickness and Bedrock Topography Modeling, Northwestern Alberta.

A.S. Hickin*, J.G. Pawlowicz, M.M. Fenton, and R.C. Paulen
Alberta Geological Survey, Alberta Energy and Utilities Board
4th Floor, 4999 – 98 Avenue, Edmonton, AB T6B 2X3
Adrian.Hickin@gov.ab.ca

ABSTRACT

The Alberta Geological Survey, in cooperation with partners, the Geological Survey of Canada and British Columbia Ministry of Energy and Mines, is conducting a multi-disciplinary study of drift thickness, bedrock topography and stratigraphy of northwestern Alberta. This project is aimed at assisting shallow gas exploration in an area known to have producing reservoirs in Quaternary sediments. The goals of the project are to identify areas of significant drift (>300 m), generate 3-D models of the bedrock topography and refine the Cretaceous to Quaternary stratigraphy in northwestern Alberta.

The process involves the compilation of subsurface information, integration of the data into geological software and a GIS, and modeling of several surfaces that represent key stratigraphic horizons. The subsurface information is derived from an extensive database of down-hole geophysical logs (oil and gas), groundwater lithologs, archived well cuttings, core, and other sub-surface investigative techniques such as shallow seismic and resistivity surveys. The information is entered into a database where by data are assessed for quality control and compiled in a standard form. Stratigraphic picks are processed through geologic software to model the bedrock topography and key shallow bedrock surfaces.

This work has identified several linear topographic depressions that are interpreted to represent buried, pre-glacial valleys. In some cases, these valleys have been deeply incised into the Cretaceous bedrock and intersect known gas bearing horizons such as the Bluesky Formation (Lower Albian). It is speculated that the presence of hydrocarbons in the Quaternary sediments resulted from gas in bedrock migrating into the permeable fluvial sediment of the valley fills. The clay rich tills and glaciolacustrine deposits have less permeability and act as 'cap rocks' within the Quaternary package.