

Stratigraphy, Well Abandonment and Guide 20 in the Pembina Area

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ABSTRACT

In the Pembina area, there are hundreds of oil wells which were drilled into the Cardium Fm between 1950 and 1980. Commonly, the wells were completed with approximately 200 meters of surface casing, and completion casing with cement only across the producing horizon. This left the Lea Park Formation and overlying sediments of Upper Cretaceous and Lower Tertiary age open for hydraulic communication behind the casing. Over time, any pressurised fluids and gas within porous and permeable sandstones would have had the opportunity to equilibrate and in some cases escape their traps. The abandonment of these old wells entailed isolation of the Cardium and Belly River producing formations with a cement plug in the Lea Park and Bearpaw shales, respectively. Sediments above the Alberta Environment (AENV) defined base of groundwater protection were also isolated using cemented casing.

The release of Guide 20 by the AEUB in 2003 led to a re-examination of well abandonment procedures for compliance. According to this guide any sandstone with porosity over 3% must be isolated and that potentially usable groundwater must be protected. The Belly River Fm has produced oil and gas, whilst the overlying Edmonton Group and Paskapoo Fm contain numerous stacked gas and water-charged sandstone channels and a number of potential coal bed methane targets. The base of groundwater protection was mapped using the AENV picks and then with hydrochemical data from Rakhit (RPCL). The RPCL data indicated low-salinity groundwater below the base of groundwater protection. Also, the Bearpaw Fm cannot be resolved in the northern part of the Pembina area.

AEUB was informed of the problems and replied that, for general compliance, a cement plug should be placed above the Lower Belly River Fm Sandstones. The AENV base of groundwater protection should be used, unless there is a major sandstone aquifer directly below which also should be cemented off.