

## **An Integrated Technical Path to Identify Economic Upside for the Devonian Swan Hills Platform at Deer Mountain Unit #2, Alberta, Canada**

R. Carl Hughson  
Arcan Resources Ltd.  
Suite 3200, 450 -1st Street SW, Calgary, Alberta  
chughson@arcanres.com

### **Abstract**

Discovery of oil in 1957 in the Swan Hills region led to a bonanza of drilling that resulted in a proven OOIP of 458,100 E3m3 ( 2,882,764 mbbls) for the combined Beaverhill Lake A & B pools (Figure A). Oil production along the some 60 kilometres of platform edge for the Beaverhill Lake A-Pool was managed in the following Units: Deer Mountain #1 (1963), House Mountain Unit #1 (1966), Deer Mountain Unit #2 (1984). The Ethel Pool (1964) has yet to be included within any unit or given separate Unit status. Arcan Resources Ltd. acquired operatorship of Deer Mountain Unit # 2 in September, 2005. This unit has produced light sweet crude (API 42 degrees) from the Swan Hills Formation since initial production in December of 1964 from **00/12-19-068-08W5/0**. Unitization followed in late 1984 with the initiation of a water injection scheme. When Arcan acquired this Unit, it was producing oil at approximately 538 BOPD with the cumulative production of 2927 MSTB. In the Swan Hills Field the Beaverhill Lake A and B pools have a primary recovery of 15%. With current technologies, this primary recovery case could likely be increased, but in a realistic time frame 20% would be the most likely expectation. The reason for the lower recovery number, compared to other Devonian pools is the result of lower permeability coupled with lower well density. Arcan expects that a primary + water-flood scheme at Deer Mountain Unit #2 a recovery of 40% is achievable.

In December, 2009 Arcan commenced a horizontal drilling program utilizing multi-stage fracture completion technology on **ARCAN 12-29 HZ 09-068-08W5**. Implementation of this horizontal technology has effectively set up the equivalent of 5 to 6 vertical wells from just one horizontal well. The economic efficiency of this exploitation strategy has also provided the added benefit of a reduced surface land (environmental) footprint. Currently, Arcan has drilled and completed in the Unit, 13 horizontals including a bi-lateral, from 12 surface locations. Utilization of these technologies has resulted in a 3 fold increase of production from Unit #2 now at 1755 BOEPD as of December, 2010. One current horizontal well and the bi-lateral are not reflected in this number waiting on testing and completion respectively.

The stratigraphic sequence of the Swan Hills Formation within Unit #2 consists of a stacked succession of low angle carbonate ramp cycles. High-frequency correlations have identified several 3<sup>rd</sup> order cycles, but generally, identification of second order cycles within a slightly backward stepping stacking pattern proved sufficient for the purpose of mapping reservoir. Carbonate core descriptions as well as petrographic study proved invaluable in the mapping of depositional facies belts and ultimately reservoir quality within each cycle. These belts were found to have unique reservoir characteristics that could be combined with

engineering data. Application and utilization of 3D seismic has proven beneficial in determining structure. Going forward, application of this technology in time conversion to depth will produce a map establishing local variances in structure and will aid in the placement of wells. The benefit of taking a multidisciplinary integration path (geological facies and sequence model and reservoir engineering model) is a predictable tool with direct application to water flood design, effective placement of horizontal wells into more favourable reservoir rock and the extension of these facies into regions of little or no well control.

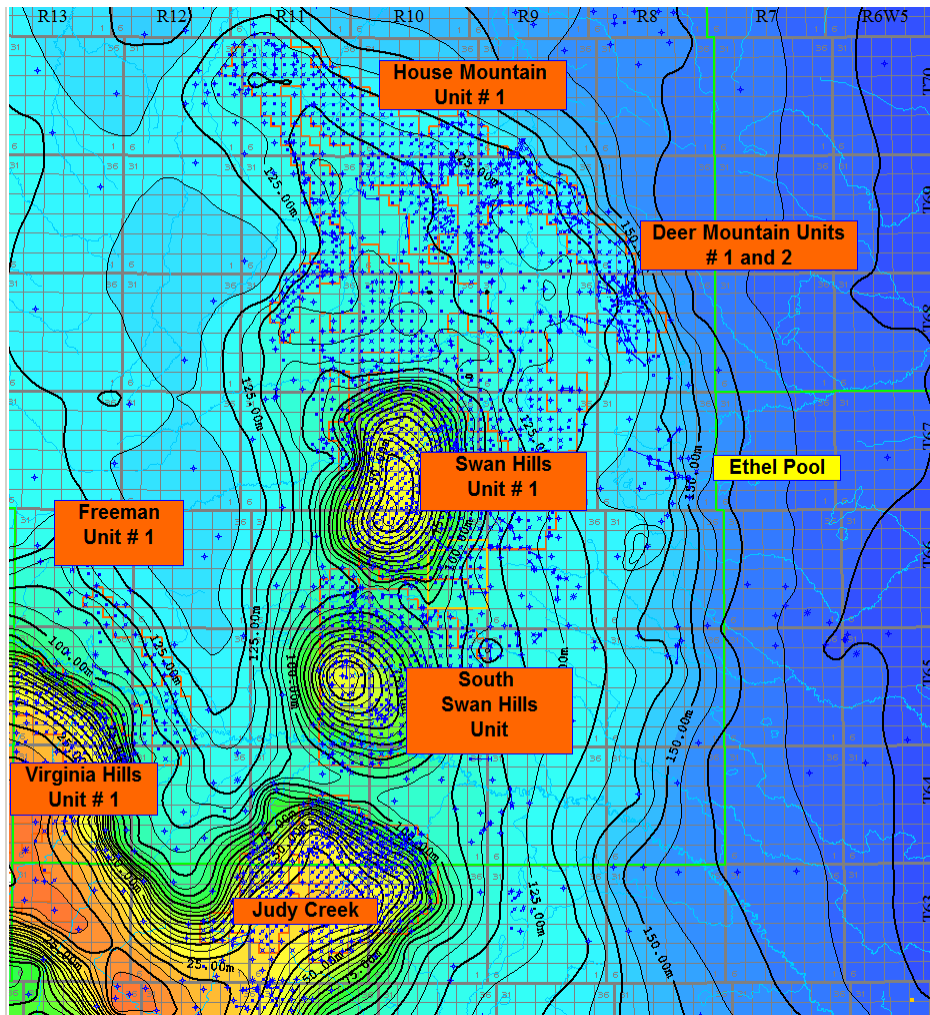


Figure A. Swan Hills Units – Beaverhill Lake to “clean” Carbonate Isopach CI: 5 meters