



NORTHERN CROSS

*Full report
in E-53 well file*

Birch B-34 and E-53, Wells, Eagle Plains, Yukon Territory

Thin Section Study: Permian Conglomerates, June 2000

Introduction and Purpose of the Study

Northern Cross (Yukon) Limited ("NCY") is the operator and major interest owner of SDL 20, which was assessed by two wells, Birch B-34 (drilled in 1965) and Birch E-53 (drilled in 1972).

The purpose of petrographic examination of thin sections prepared from cored conglomeratic reservoir of the Permian Jungle Creek Formation was to evaluate:

- grainsize, sorting and roundness of grains
- grain provenance variations
- intergranular pore space geometry
- diagenetic processes which may have occluded porosity
- cementation history

In addition, grains were examined for evidence of physical fracturing, which could be expected from permafrost conditions existed in the reservoir.

Another objective was to determine how poor DST flow rates for both wells matched up with the reservoir quality observed through petrographic examination.

Procedure

Birch B-34

For Birch B-34, thin sections available from the NEB Core & Sample Repository library were used rather than resample this well.

Birch E-53

For Birch E-53, cores 1-5 from the Jungle Creek interval were sampled, focusing on medium to coarse-grained chert and quartz pebble conglomerate intervals. Sampling involved cutting out 1" x 1 1/2" sample blocks from the core (Alan Scott). These sample blocks were sent to AGAT Laboratories, Calgary, where all samples were impregnated with blue epoxy and thin sections prepared.

Thin sections were examined and described by Peter Moignard P. Geol., consulting geologist to NCY; using the microscope facilities at AGAT. Photomicrographs and descriptions of typical microscope views constitute the results of this report.

Results

The attached thin section photomicrographs and descriptions are a self-explanatory documentation of the observed results.

Interpretation

The variable conglomeratic grainsize, ranging from pebble to medium sand, and the poor, generally bimodal sorting, combine with angular to subrounded grains to indicate that transport distances were short. These conglomerates are proximal to source.

The grains are a mixture of chert and quartz, more commonly dominated by chert in the coarser fraction. The color of the conglomerate intervals in the core varies from light cream-grey to dark grey. The lighter color zones tend to be higher in the section. The appearance color was not evident in the thin sections as a chert grain color, but darker grains were often diagenetically altered such that degraded grains have pyrite inclusions. Chert color variations may depend on the degree of diagenetic alteration of individual chert grains.

The source of the chert is possibly various Carboniferous and Devonian carbonates which were exposed by pre-Permian and syn-depositional tectonic episodes.

The Permian Jungle Creek at Birch is an excellent open pore reservoir with evidence of some hydrothermal fluid invading the primary pore space, and depositing diagenetic limonite/pyrite and dolomite. Timing of diagenetic fluid invasion is unknown.

No reason for poor DST performance was evident from the thin sections, but freezing of pore fluid upon DST may be an explanation.

Grain fracturing was evident in some thin sections, but the cause of fracturing may have been either depressuring after core removal, or possibly freezing of fluid in the reservoir under either present day interglacial permafrost or deep paleo-permafrost formed during Pleistocene glacial periods.

Further Work

No further work is contemplated as a result of these observations.

Submitted by:

Peter Moignard (P. Geol)

Geological Consultant

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