Porosity, Permeability and Petrographic Analysis of Twenty-Two Bowser Lake and Skeena Group Hand Samples, Bowser Basin

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Abstract

The Bowser Basin, located in the northern Canadian Cordillera, contains Jura-Cretaceous clastic marine and fluvial sedimentary rocks assigned to the Bowser Lake and Skeena groups. Porosity, permeability and petrographic analysis were performed on twenty-two outcrop samples of Bowser Lake and Skeena groups from northern, central and southern Bowser Basin to help define their petroleum prospectivity.

In northern Bowser Basin, Bowser Lake lithologies are almost entirely composed of chert clasts whereas southern lithologies contain a significant component of volcanic detritus. Skeena Group samples are chert-rich or contain abundant volcanic and feldspathic material. The abundance and composition of chert clasts in northern Bowser Lake Group sediments suggests derivation from Cache Creek Group rocks to the east. Volcanic material within southern samples suggests a source terrane rich in basaltic to andesitic lavas. Possible sources may be either more proximal Cache Creek rocks or a volcanic terrane poor in chert (i.e. arc).

Porosity ranges between 1 to 5% and permeability between 0 and 0.34 mD. An advanced degree of compaction and cementation has destroyed most of the porosity in these samples. Pore-filling mineralogy reflects either volcanic-(chlorite-illite-anhydrite-laumontite-calcite) or chert-rich (quartz-siderite(?)-limonite/hematite-pyrite-chlorite-illite-calcite-Fe-dolomite) lithologies.

In complex tectonic areas, the original composition and diagenesis of sandstones can vary significantly. Porosity and permeability at surface may not be a true reflection of subsurface

reservoir characteristics, as shown by higher porosities in Ritchie a-3-J/104-A-6. Under certain subsurface environments, calcite and some framework grains could be dissolved, producing secondary porosity, and subsurface fractures could augment observed reservoir characteristics.