

## For More Information

### Mark Hayes

Manager, Petroleum and Resource Geology

Phone: (250) 952-0364

Mark.Hayes@gems3.gov.bc.ca

or

### Filippo Ferri

Senior Petroleum Geologist

Phone: (250) 952-0377

Fil.Ferri@gems3.gov.bc.ca

Ministry of Energy and Mines

New Ventures Branch

6<sup>th</sup> Floor, 1810 Blanshard Street

PO Box 9323 STN PROV GOVT

Victoria, BC V8W 9N3

www.gov.bc.ca/em

### Source

Ministry of Energy and Mines

Petroleum Geology

Special Paper 2002-1

*Vitrinite and bitumen reflectance data and preliminary organic maturity model for the northern two thirds of the Bowser and Sustut basins, north-central British Columbia*

by

C.A. Evenchick, M.C. Hayes,

K.A. Buddell and K.G. Osadetz

Available from

Crown Publications

www.crownpubs.bc.ca

### NEW VENTURES BRANCH

develops and promotes

BC oil and gas investment

opportunities

### BRITISH COLUMBIA OFFERS:

- Pro-business government
- Competitive fiscal regime
- One stop regulatory approval
- Ready access to Canadian and U.S. Markets
- A skilled service sector



**BRITISH  
COLUMBIA**

**MINISTRY OF  
ENERGY AND MINES**

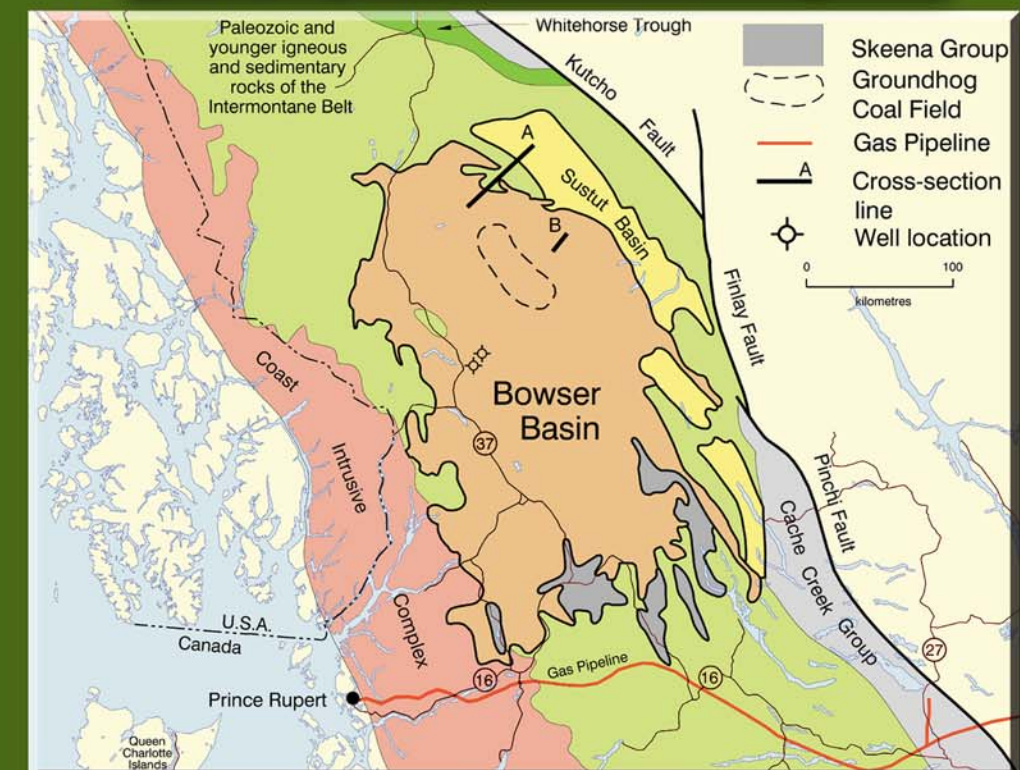
# Oil and Gas Opportunities in North-central British Columbia Bowser and Sustut Basins



The Bowser and Sustut basins outline an area in excess of 65,000 square kilometres. The larger Bowser Basin is represented by the Bowser Lake and Skeena groups, a package of Middle Jurassic to Early Cretaceous clastics having a minimum thickness conservatively estimated at 5,000 metres. Clastic sediments of the Late Cretaceous Sustut Group are at least 2,000 metres thick and were deposited along the eastern margins of the Bowser Basin.

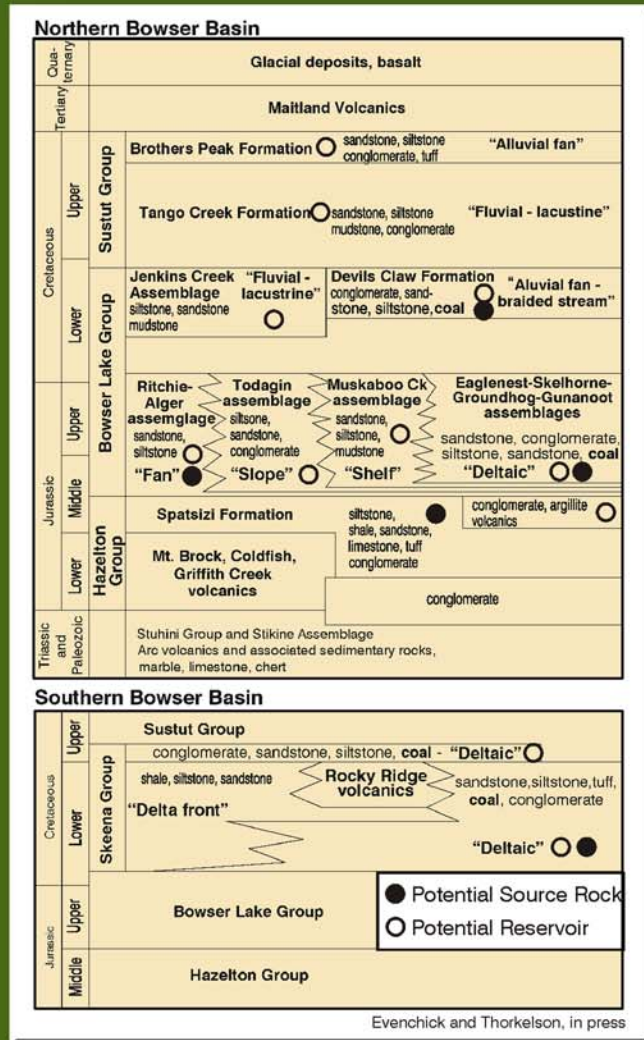
The Bowser Basin was flanked to the north by the Stikine Arch and to the south by the Skeena Arch. Uplifted Cache Creek rocks in the northeast supplied much of the detritus, preserved now in the form of chert-rich clastics. The lower Bowser Lake Group defines a southwestward prograding marine sequence of complexly interfingering deltaic, shelf, slope and submarine fan assemblages in excess of 3,000 metres. These are succeeded by several thousand metres of low energy fluvial deposits and alluvial fan and braided stream systems. Mid to Late Cretaceous Skeena Group rocks contain marine to non-marine deltaic and open marine deposits in excess of 2,000 metres.

## Simplified Geological Map of Bowser and Sustut Basins



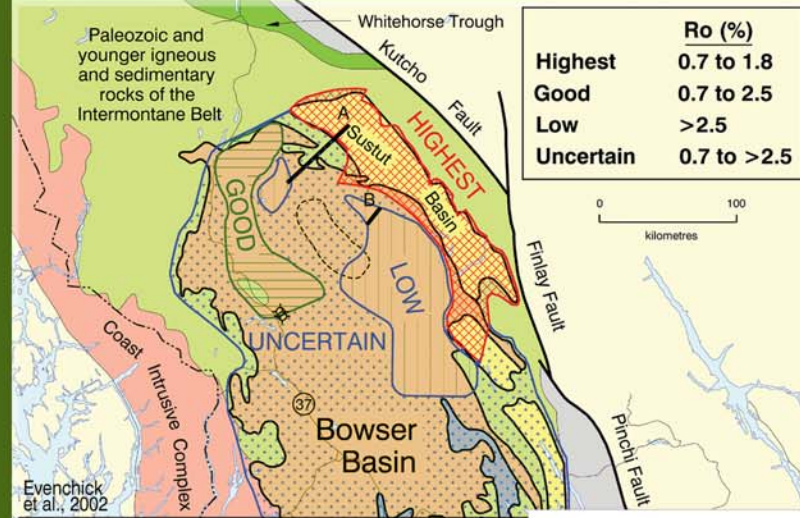
# Bowser and Sustut Basins - British Columbia

## Simplified Stratigraphic Column of Bowser, Sustut and Skeena Groups



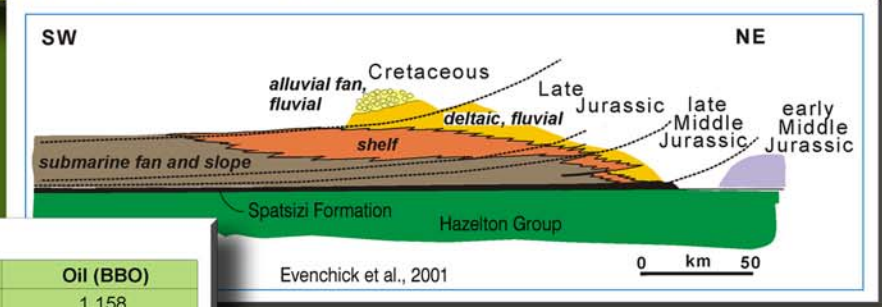
The Sustut Group represents a foreland basin to the developing Skeena Fold Belt within the Bowser Lake Group. Sustut Group rocks records fluvial-lacustrine deposition in low to high energy alluvial-fluvial systems. Strata of the lower Sustut Group, assigned to the Tango Creek Formation, were deposited in lower energy, fluvial and lacustrine environments. These are succeeded by alluvial fan conglomerates of the Brothers Peak Formation.

The Bowser Lake and Sustut groups, together with underlying basement rocks, were deformed during the Cretaceous and define the northeast-verging Skeena Fold Belt. This structural province is dominated by fold and thrust geometries, containing a well developed triangle zone within rocks of the Sustut Group, along its northeast margin.



Relative regional prospectivity for petroleum potential based on surface organic maturity levels, for the northern Bowser and Sustut basins

Inferred facies relationship in Bowser Lake Group showing southwestward progradation of delta front

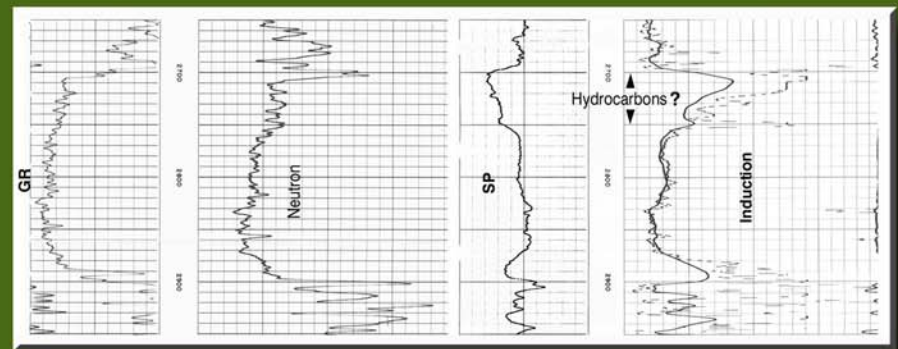


### Resource Estimate

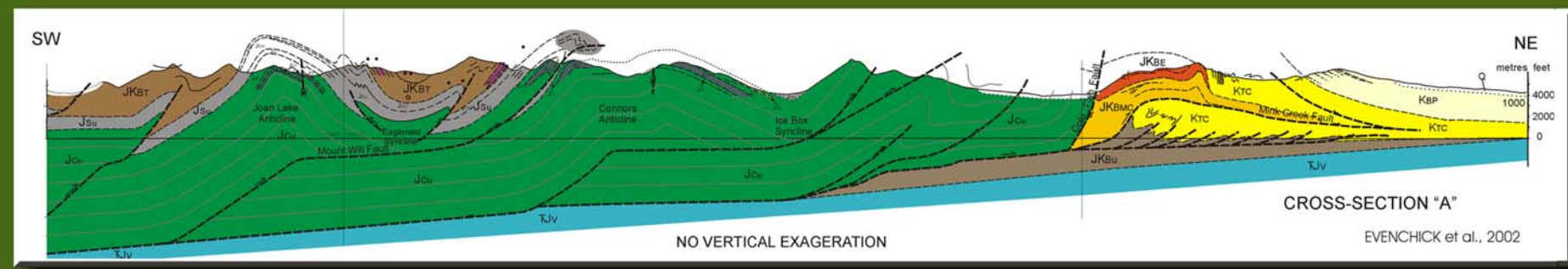
Resource Potential - (Hannigan, et al., 1995)

	Gas (TCF)	Oil (BBO)
Sustut Basin	1.86	1,158
Skeena Group	2.54	1,264
Bowser Lake Group	2.04	-
Ground Hog Coal Fields	8.1	-

Only two hydrocarbon wells have been drilled into the Bowser Basin. These penetrated the western margin of the basin and were spudded in 1969 and 1972. Although no hydrocarbons were encountered, these wells penetrated several thousand metres of Bowser Lake Group sediments, containing several sections of coarse clastics. Extrapolation of early thermal maturation work in the Groundhog-Klappan coal fields of north-central Bowser Basin suggested that much of the Bowser Basin was overmature with respect to hydrocarbons, leading to a decline in exploration interest. New surface reflectance data released in 2002, and covering much of the northern Bowser and Sustut basins, suggests that large parts of this area may be within the oil and gas window and that rocks of the Sustut Group are within the oil window. In addition, recent work by the Geological Survey of Canada and the B.C. Ministry of Energy and Mines, has found "live" oil stains in Bowser Lake Group sediments, providing direct evidence that there is an effective petroleum system in these rocks. This, and the reflectance data, indicates the presence of Type I and II bitumens. Organic-rich shales in the upper Spatsizi Formation are potential source beds. This new data not only increases the resource potential, but lowers the risk level for any play type. The Groundhog coal field contains a coal bed methane resource potential of 8.1 TCF. Coal is hosted by the deltaic Groundhog-Gunanoote assemblage and is found in aggregate thicknesses averaging 25 metres over a stratigraphic interval of 300 metres. Crown Petroleum and Natural Gas Tenure is available for most of the Bowser and Sustut basins.



Amoco Ritchie a-3-J/104-A-6  
Gamma ray neutron and induction logs across a thick (200 ft, 60m) section of conglomerate in Ritchie-Alger assemblage suggesting hydrocarbons in the upper part of the zone



Cross-section across northern Bowser and Sustut basins showing fold and thrust geometries of the Skeena Fold Belt and development of a triangle zone in Sustut rocks

