[PS]The AB Basin Bakken Resource Play of NW Montana: Same Formation, Different Geology*

William B. Hansen[1]

Search and Discovery Article #10418 (2012)**
Posted July 2, 2012

*Adapted from poster presentation at AAPG Annual Convention and Exhibition, Long Beach, California, April 22-25, 2012

[1]Jireh Geological Associates, Great Falls, MT (wbhansen@mcn.net)

Abstract

Five hundred miles west of the Williston Basin, a new Bakken horizontal play is quietly emerging on the Blackfeet Indian Reservation, where the Alberta Basin extends into the United States. Newfield, Rosetta, and Anschutz are leading the way in this play, with each company having drilled 10-15 wells in Glacier County, Montana over the last two years. This is more drilling than has been seen on the Blackfeet Nation than in the previous 40 years. Despite this dramatic increase in activity, most of the townships on this large reservation remain untested. Two rigs were drilling in Glacier County as of the fall of 2011 under contracts to Rosetta and Anschutz. Newfield was conducting frac'ing and completion operations on several wells that were drilled the previous winter. Due to highly competitive leasing activity, very few completions have been announced, except for general statements about "encouraging results". However, some information has been released by the publicly traded companies during their quarterly earnings conference calls.

Although the AB Basin Bakken contains the same three-part lithology as in the Williston, geologic conditions are different enough that a new learning curve is required. The Bakken Formation is shallower, but apparently mature and overpressured, especially where the Alberta Basin axis nudges up against the thrust belt to the west. Unlike the Williston Basin, there is a thick salt section in northwest Montana directly below the underlying Three Forks Formation, which has created problems with horizontal frac'ing attempts for some operators. Productivity in the future may be enhanced by utilizing a pervasive regional fracture system, which runs roughly east-west through the area.

THE AB BASIN BAKKEN RESOURCE PLAY OF NW MT: SAME FORMATION, DIFFERENT GEOLOGY

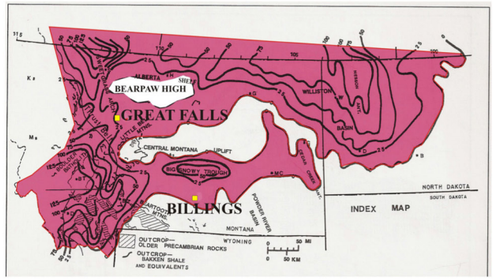
William B. Hansen, Consulting Geologist, Jireh Consulting Services, Great Falls, Montana

ABSTRACT: Three hundred fifty miles west of the Williston Basin, a new Bakken horizontal play is quietly emerging on the Blackfeet Indian Reservation, where the Alberta Basin extends into the United States. Newfield, Rosetta, and Anschutz are leading the way in this play, with each company having drilled 10-15 wells in Glacier County, Montana over the last two years. This is more drilling than has been seen on the Blackfeet Nation than in the previous 40 years. Despite this dramatic increase in activity, most of the townships on this large reservation remain untested. Three rigs are currently drilling in Glacier County in the spring of 2012 under contracts to Rosetta and Anschutz. A fourth rig is drilling south of the reservation in Pondera County for Primary Petroleum and their "undisclosed" partner. Newfield was conducting frac'ing and completion operations on several wells that were drilled last year. Due to highly competitive leasing activity, very few completions have been announced, except for general statements about "encouraging results". However, some information has been released by the publicly-traded companies during recent quarterly earnings conference calls and initial production information is now becoming available on the Montana Board of Oil and Gas website.

Although the AB Basin Bakken contains the same three-part lithology as in the Williston, geologic conditions are different enough that a new learning curve is required. The Bakken Formation is shallower, but apparently mature and overpressured, especially where the Alberta Basin axis nudges up against the thrust belt to the west. Unlike the Williston Basin, there is a thick salt section in northwest Montana directly below the underlying Three Forks Formation, which has created problems with horizontal frac'ing attempts for some operators. Productivity in the future may be enhanced by utilizing a pervasive regional fracture system, which runs roughly east-west through the area.

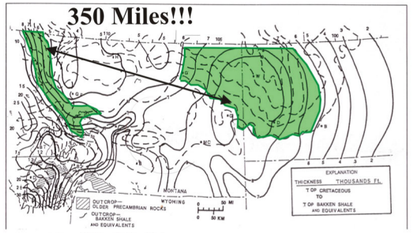
In addition to the Bakken source rock system, a second fully-mature source rock occurs in the mid-Cretaceous Greenhorn/Cone Formation. Sweet, high gravity oil and gas has been produced from a stripper well in the fractured Greenhorn since 1985, in East Glacier Field, where thrusting has buried the Greenhorn deep enough to generate hydrocarbons. Anschutz has recently completed some new horizontal Greenhorn/"Cone" producers.

Shallow sweet-gas sands of the Albian Blackleaf/Bow Island Formation and oil-producing Kootenai Formation sands also occur throughout the reservation. These shallow reservoirs are highly productive on the flanks of the nearby Sweetgrass Arch. Operators seeking horizontal Bakken success would be wise not to ignore the additional shallower potential of these reservoirs when drilling deeper tests, which could enhance cash flow of expensive horizontal completions.



Occurrence of Bakken (and equivalents), throughout Montana & North Dakota. Isopach contour interval 25 feet.
(Peterson, 1996)

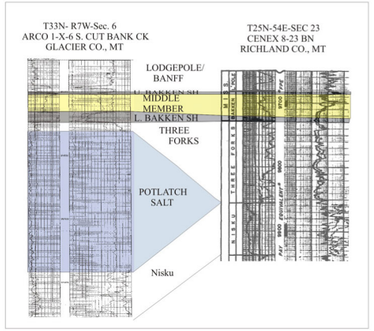
Sedimentary overburden on Bakken-Exshaw and equivalents at close of Cretaceous.
Dashed lines are isopachs of Bakken-Exshaw shales.

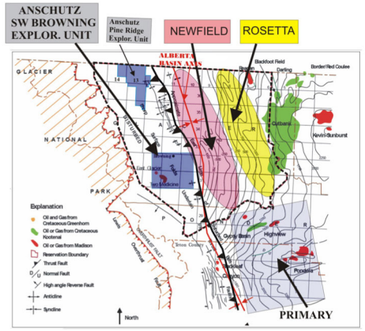


Area of Mature Bakken Shale based on burial depth

After Peterson, in Montana Geological Society,1996

There are major differences in Bakken-area stratigraphy between the productive fields of Richland County, and the Alberta Basin of NW Montana. One of the most important differences to note when drilling and completing laterally, is the presence of the thick Potlatch Salt directly below the Three Forks Formation in Glacier County, which is completely absent in the Williston Basin. If a lateral is drilled too close to the Potlatch, all the horizontal frac energy can be deflected downward into the salt, rather than the oil-saturated sections above.





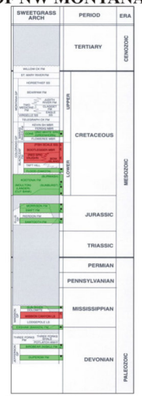
Companies involved in Bakken resource play in NW Montana
(modified from Mohseni and Anderson, 2010)

AB BASIN BAKKEN/EXSHAW RESOURCE ESTIMATES

Rosetta Resources (2010): 13-15 MBOE/sq mile

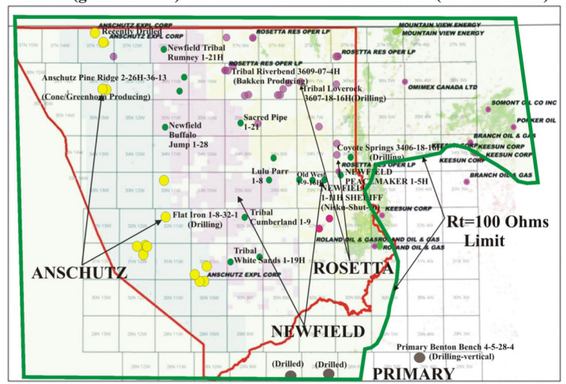
Wood McKenzie (2011): 2.6 Billion Barrels, AB/MT

MAJOR OIL & GAS PRODUCING HORIZONS OF NW MONTANA



Rosetta established the first Middle Bakken oil production in Northwest MT in late 2011.

AREA (green outline) OF MATURE BAKKEN SHALE (Rt >100 ohms)



Modified From Mohleni & Anderson, 2010
Data from MT Board of Oil & Gas, 2012

MAJOR DRILLING RESULTS TO DATE

	Wells Drilled V	Wells Drilled H	Wells Completed V	Wells Completed H	Best Well to Date	Current Status
Rosetta	6	10	6	6	2570 BO, 7090 MCF, 1007 BW -Dec. 2011 (Bakken)	Producing
Newfield	3	5		2	1336 BO, 1942 MCF, 2975 BW - Dec. 2010 (Nisku)	Shut-in
Anschutz	7	6	4	3	2007 BO, 1264 MCF, 1435 BW - Dec. 2011 (Cone)	Producing
Primary	6				Under evaluation with partner	

REFERENCES

Dolson, J., and J. Piombino, 1994, Giant proximal foreland basin non-marine wedge trap: Lower Cutbank Sandstone, Montana, in John C. Dolson, ed., Unconformity-Related Hydrocarbons in Sedimentary Sequences: Rocky Mountain Assoc.of Geologists, p. 135-148.

Mohseni, P. And Anderson, R., 2010, New oil and gas exploration activity on the Blackfeet Reservation, Montana: Bureau of Indian Affairs Division of Energy and Mineral Development Brochure, Denver, CO.

Montana Board of Oil and Gas, 2012, Online data site: http://bogc.dnrc.mt.gov/onlinedata.asp

Peterson, J. A., 1996, Bakken and other Devonian-Mississippian petroleum source rocks, Northern Rocky Mountains-Williston Basin: Depositional and burial history and maturity estimations, in RMS-AAPG Expanded Abstracts Volume: Montana Geological Society, p.127-132.