The AB Basin Bakken/Exshaw Resource Play of Northwest Montana: Where Did All the Oil Go?*

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Abstract

Northwest Montana experienced a flurry of exploratory drilling activity between 2010–2013, in an attempt to establish a "Bakken-type" oil resource play in Northwest Montana. Companies were lured to the so-called “Alberta Bakken” oil resource play by the prospect of shallower drilling than North Dakota, and the availability of large lease blocks. Some 40 tests drilled by four companies were scattered over 5000+ square miles in an area of northwest Montana, which had few previous deep wells. Many of these tests produced some oil from the Middle Bakken, but all of them have since been plugged or shut-in. In some cases, duplicating the horizontal completion practices perfected in the North Dakota Bakken, have been ineffectual in northwest Montana due to marked changes in the stratigraphy. One company successfully established the first horizontal oil production west of the Sweetgrass Arch from the Devonian Nisku Formation, but the well is currently shut-in. A recent study by Wood McKenzie estimated that the Bakken/Exshaw petroleum system of Montana/Alberta has generated 2.6 billion barrels of oil. If the majority of Bakken-generated oil is no longer in-place, where did it go? Good oil shows from the few scattered deep tests on the Blackfeet Indian Reservation, indicate there may be a bypassed pay zone in the Mississippian, which occurs in the lower Lodgepole Formation. Some of the Bakken-generated oil may have migrated upward into this tight, fractured, carbonate reservoir. Additional oil may have migrated downward into the Devonian Nisku Formation. Future exploration efforts in northwest Montana should focus on the search for traps containing "migrated" Bakken oil, rather than attempting further completions in the Bakken Formation itself. A Bakken-sourced oil resource play may still be feasible if the right trapping conditions can be found.
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7) One company focused their drilling program on developing the Mid-Cretaceous Cone (Greenhorn) in the Williston Basin. Significant discoveries were made in the Lodgepole Formation, with 1-7% porosity and 86%-92% oil saturation, which if carefully analyzed, will aid in locating new Bakken-sourced pools.

5) Development in the underlying Three Forks Formation will be dependent on successfully locating areas that have not had a single Devonian test to date. There is an important lesson to be learned that it is possible to apply other analysis techniques to the Three Forks, allowing better assessment of horizontal drilling potential. As stratigraphic data is available from numerous Cretaceous tests, which if carefully analyzed, will aid in locating new Bakken-sourced pools.

4) Future Devonian resource exploration should focus on drilling the Bakken in deeper parts of the Alberta Syncline, where drilling is shallower and lower cost can be expected. Lower Devonian tests, which if carefully analyzed, will aid in locating new Bakken-sourced pools.

3) The Bakken/Exshaw source rock has generated large quantities of oil and gas in the thrust belt here to be applied to other emerging resource plays. Unless stratigraphic data is available from numerous townships where the grainstone facies has been dolomitized, the Nisku Formation has potential if stratigraphic pinchouts on the west flank of the Sweetgrass Arch can be found.

2) Development in the underlying Three Forks Formation will be dependent on successfully locating areas that have not had a single Devonian test to date. There is an important lesson to be learned that it is possible to apply other analysis techniques to the Three Forks, allowing better assessment of horizontal drilling potential. As stratigraphic data is available from numerous Cretaceous tests, which if carefully analyzed, will aid in locating new Bakken-sourced pools.

1) The Bakken/Exshaw source rock has generated large quantities of oil and gas in the thrust belt here to be applied to other emerging resource plays. Unless stratigraphic data is available from numerous townships where the grainstone facies has been dolomitized, the Nisku Formation has potential if stratigraphic pinchouts on the west flank of the Sweetgrass Arch can be found.

REFERENCES


CONCLUSIONS

- Although the Bakken Shale appears to be mature at these depths in the Williston Basin, non-commercial amounts oil from the Middle Bakken and Devonian Nisku Formation. Kevin-Sunburst on the Sweetgrass Arch.
- Unlike the Devonian, stratigraphic data is available from numerous Cretaceous tests, containing Bakken-sourced oil which has migrated eastward from the thrust belt towards the Sweetgrass Syncline, where drilling is shallower produced non-commercial amounts oil from the Middle Bakken and Devonian Nisku Formation.