

Oil Outlook

Will the Bakken Take Backseat to the Three Forks Formation?

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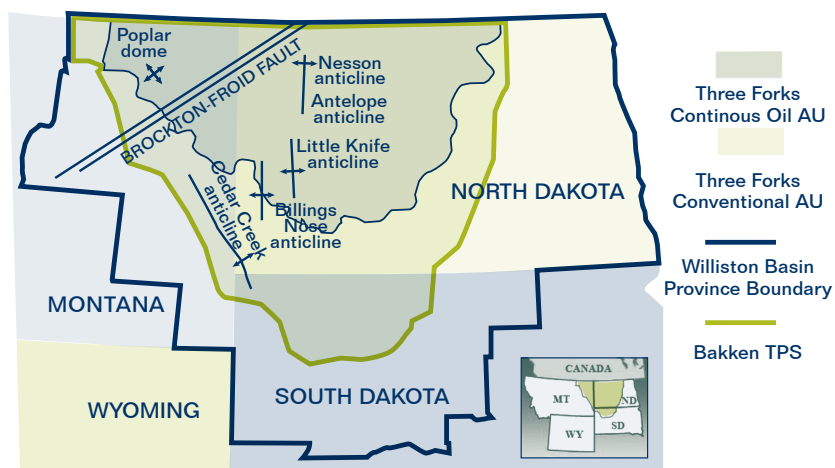
The U.S. has become the second largest oil producer in the world, surpassing Russia in 2012. Production from the Bakken formation, primarily in North Dakota, has nudged the U.S. closer to energy independence. As the Bakken boundaries become more defined and the wells mature, will the exponential growth in production continue or will production abate following the steep production decline curves observed with horizontally drilled wells? What are the issues that will change the landscape into the future?

The New Kid on the Block

In the spring of 2008, the U.S. Geological Survey (USGS) released their initial assessment of the undiscovered, technically recoverable oil and natural gas in the Bakken formation. This formation (Figure 1) encompasses North Dakota, South Dakota, and Montana. The formation also extends into Canada but the USGS assessment did not include this area. Their initial estimate was for 3.65 billion barrels of oil and 1.85 trillion cubic feet of natural gas of recoverable reserves.

Last spring, the USGS released an updated assessment that included the Three Forks formation as well as the Bakken formation. The revision more than doubled the 2008 assessment from 3.65 to 7.38 billion barrels of undiscovered oil and 6.7 trillion cubic feet of undiscovered natural gas – up from 1.85 trillion cubic feet, over a three-fold increase. The 2008

Figure 1
Bakken and Three Forks Formations within the Williston Basin North Dakota, Montana, and South Dakota



Source: U.S. Geological Survey.

assessment did not include an estimate for the Three Forks formation because it was then considered non-commercial.

Since the initial assessment, the USGS also has had the benefit of data from more than 4,000 wells that have been drilled in the Williston Basin. Information from these wells has provided significant geological data that has not been previously available. Continental Resources, the predominate leaseholder in the Bakken region, has published results from test wells in the Three Forks formation. According to their first-quarter 2013 earnings report, they have six producing wells in the lower benches, with average initial production rates of approximately 1,170 barrels per day. Per their news release “these six wells are performing in-line with typical middle Bakken and Three Forks first-bench wells in their respective areas.”

Transportation Issues

The biggest issue facing Montana and North Dakota producers has been transportation bottlenecks to get crude oil to markets. Without an adequate transportation system, producers can choose to stop production or discount prices as an incentive to transport their product.

The price differential between Bakken region oil and the West Texas Intermediate (WTI) price has narrowed since the beginning of 2012. As production increased in the Bakken region, pipeline constraints forced producers to discount their prices to get the crude oil to markets. However, railroad expansion beginning in mid-2012 eased the bottlenecks and resulted in significantly reduced price differentials. Both Burlington Northern Santa Fe and Canadian Pacific Railway

are expected to increase their rail capacity in the near term. In addition to expanding rail capacity, there are three North Dakota refineries in the early stages of construction. These refineries are being built in North Dakota near Minot, Dickinson, and Trenton. All three of the refineries will have the capacity to process about 20,000 barrels of oil per day.

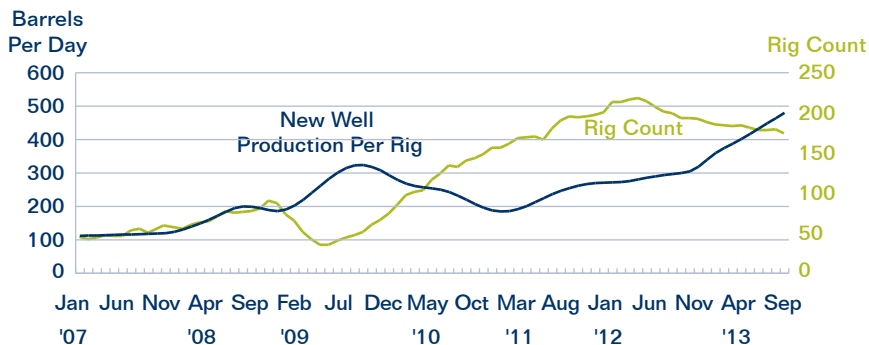
Rig Counts and Efficiencies

Rig counts, as published by Baker Hughes, show that 180 rigs were active in Montana and North Dakota as of November 27, 2013. This represents about a 10 percent decline from 2012. While rig counts have declined, total production for the two states has increased. This change is the result of multi-pad drilling, improved efficiencies, and operator efforts to reduce high drilling costs. For example, Continental Resources said in its 2013 third quarter earnings report that its average drilling and completion cost in North Dakota is now \$8 million per well. This represents a more than \$1 million reduction in costs per well.

Multi-pad drilling techniques allow rig operators to drill groups of wells more efficiently because it takes less time to move from one well location to the other. A drilling pad is the location where a number of wellheads are housed for horizontally drilled wells.

Moving a drilling rig between two well sites previously involved disassembling and reassembling the rig at the new location. A multi-pad may have five to 10 wells, which are drilled vertically with horizontally laterals drilled in different directions. On the surface, the wells are spaced

Figure 2
Bakken New Well Oil Production Versus Rig Count



Source: Energy Information Administration.

fairly close together. Once one well is drilled, the fully constructed rig can be lifted and moved a few yards over to the next well location using hydraulic walking or skidding systems. Today, this one rig results in the same amount of production that previously required several rigs to achieve. Figure 2 illustrates the relationship between rig counts and new well oil production. As Figure 2 shows, rig counts began to decline by mid-2012 while production continued to accelerate.

Oil Outlook Summary

Total U.S. oil production is roughly 60 percent of total U.S. consumption. Although the rapid development of the Bakken formation has lessened the need for imports, the U.S. still imports a significant amount of oil. The USGS assessment of the Three Forks formation increases the probability that the U.S. will import less oil in the future provided consumption does not exceed the additional production.

The outlook for Montana's oil industry is very promising. Based

on the new USGS assessment, the undiscovered, recoverable oil has more than doubled from their previous assessment. Since roughly one-third of the Bakken/Three Forks formation is located within Montana's boundaries, Montana's production should increase. And with multi-pad drilling technologies, drilling cost reductions as well as overall efficiencies are being realized. Production data, published by the Energy Information Administration, shows that Montana's production has increased over 13.6 percent for the first nine months of 2013 compared to the same period of 2012. An issue that could dampen development is transportation systems used to market the product. With existing pipeline capacity and current railway expansion, the bottlenecks have temporary been reduced. However, additional production from the region could exacerbate this problem and lead to reduced levels of development and/or lower well-head prices. ¹⁴