

2017 HOUSE ENERGY AND NATURAL RESOURCES

HCR 3027

2017 HOUSE STANDING COMMITTEE MINUTES

Energy and Natural Resources Committee Coteau –A Room, State Capitol

HCR 3027
3/2/2017
28641

- Subcommittee
 Conference Committee

Committee Clerk Signature

Kathleen Davis

Explanation or reason for introduction of bill/resolution:

To consider studying the estimated fiscal impact to the state of refracturing existing oil wells

Minutes:

Attachment #1-1A-#2

Chairman Porter: Called the committee to order on HCR 3027 and the clerk read the short title.

Rep. Streyle, presented Attachments #1 and #1A.

3:53

Chairman Porter: is there areas where the technology is moving forward and being used?

Rep. Streyle: yes it is being done now as we speak. The theory behind this study is whether or not if we incentivized it, that would jump start it bring on more frack crews to go specifically at these targeted well sites.

Chairman Porter: further questions? Further testimony in support of HCR 3027? I read this article last night (Attachment #1). It's frightening how people are looking at the Bakken. There's quite a bit of fluff in it but was frightening what they're thinking and how the investors would start looking at these things.

5:17

Ron Ness, president of the ND Petroleum Council, presented Attachment #2 urged a Do Pass on HCR 3027. I just did an interview with KX on that article. They don't have winter in south TX or Oklahoma. We got 90,000 barrels in December which was equal to our production in 2005 which is remarkable.

Chairman Porter: questions? Further support? Opposition. Closed the hearing on HCR 3027

2017 HOUSE STANDING COMMITTEE MINUTES

Energy and Natural Resources Committee Coteau –A Room, State Capitol

HCR 3027
3/2/2017
28653

- Subcommittee
 Conference Committee

Committee Clerk Signature

Kathleen Davis

Explanation or reason for introduction of bill/resolution:

To consider studying the estimated fiscal impact to the state of refracturing existing oil wells

Minutes:

Chairman Porter: Called the committee to order on HCR 3027.

Rep. Heinert: I would move a Do Pass on HCR 3027 and place on the consent agenda.

Rep. Mock: Second

Chairman Porter: I have a motion for a Do Pass on HCR 3027 to be placed on the consent calendar from Rep. Heinert, second from Rep. Mock. Discussion? The clerk called the roll call vote.

Yes 12 No 0 Absent 2 Motion carried. Rep. Heinert is carrier.

Date: 3-2-17

Roll Call Vote #: 1

**2017 HOUSE STANDING COMMITTEE
ROLL CALL VOTES
BILL/RESOLUTION NO. HCR3027**

House Energy & Natural Resources Committee

Subcommittee

Amendment LC# or Description: _____

Recommendation

- Adopt Amendment
- Do Pass Do Not Pass Without Committee Recommendation
- As Amended Refer to Appropriations
- Place on Consent Calendar

Other Actions Reconsider _____

Motion Made By Rep Heinert Seconded By Rep Mock

Representatives	Yes	No	Representatives	Yes	No
Chairman Porter	✓		Rep. Lefor	AB	
Vice Chairman Damschen	✓		Rep. Marschall	✓	
Rep. Anderson	✓		Rep. Roers Jones	✓	
Rep. Bosch	✓		Rep. Ruby	✓	
Rep. Devlin	✓		Rep. Seibel	✓	
Rep. Heinert	✓				
Rep. Keiser	AB		Rep. Mitskog	✓	
			Rep. Mock	✓	

Total (Yes) 12 No 0

Absent 2

Floor Assignment Rep Heinert

If the vote is on an amendment, briefly indicate intent:

REPORT OF STANDING COMMITTEE

HCR 3027: Energy and Natural Resources Committee (Rep. Porter, Chairman)
recommends **DO PASS** and **BE PLACED ON THE CONSENT CALENDAR**
(12 YEAS, 0 NAYS, 2 ABSENT AND NOT VOTING). HCR 3027 was placed on the
Tenth order on the calendar.

2017 SENATE ENERGY AND NATURAL RESOURCES

HCR 3027

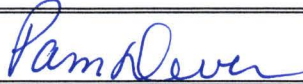
2017 SENATE STANDING COMMITTEE MINUTES

Energy and Natural Resources Committee Fort Lincoln Room, State Capitol

HCR 3027
3/16/2017
Job #29288

- Subcommittee
 Conference Committee

Committee Clerk Signature



Explanation or reason for introduction of bill/resolution: Directing the Legislative management to consider studying the estimated fiscal impact to the state of refracturing existing oil wells.

Minutes:

Attch#1=Ron Ness

Attendance was taken. All committee members present.

Chairwoman Unruh: Let's open HCR 3027.

Rep. Rosco Streyle, Dist 3, Minot, ND: A study is the state should incentivize refracture of oil wells. Before the Baakan exploded, there was an incentive programs for 75,000 barrels that was very successful. We want to see if something similar for wells that were drilled many, many years ago. The technology has gotten lots better. There are companies doing this right now. I would like to see an aggressive program done. It is a broad study. It should bring money and jobs here. (1.10-3.49) Any questions?

Vice Chair Kreun : Is this for one frac? We may do this two and three times. Would second time get the same benefit?

Rep. Streyle: It is wide open to what it would be. It could be one time or more. You could exclude wells over a certain date. The committee could look at all options on it.

Sen. Armstrong: Do we have other incentives for water flooding or gas flooding on Baakan wells?

Rep. Streyle: I don't know what is left in Code. We wiped out a lot of them. Not sure. (5.23)

Ron Ness, Pres. ND Petroleum Council: (see Attch#1) (6.16-15.35) We are about a decade into the Baakan. There are 8000 wells that were drilled with early technology. We have invested \$600.000 in a refracture study. You cherry pick the best wells. We need to figure out how to get to the next technology. There is a 5-year exemption from the extraction tax. Water is not going to work in the Baakan. He showed committee different rocks from Baakan formations and explained how oil is extracted. The Baakan is the best crude in the world. We left 97 of the 100 barrels in the ground. A decade later, we get 7 or 8%. We are leaving 92 out of 100 barrels in the reservoir. What to do. We are leaving it in the hands of the EERC. There is a technology gap. You have to go in and plug up those existing perforations and gap them. Quite a science project. This is a secondary project for 800 wells out there.

Sen. Cook: How can we get people as excited as you?

Ron: The kids behind me. This is a game changer is you grew up here. Understand math and science. We are the focal point in the world.

Chairwoman Unruh; Any students have questions?

Chairwoman Unruh: Any more in support? Any opposition? Any agency? Close the hearing.

2017 SENATE STANDING COMMITTEE MINUTES

Energy and Natural Resources Committee Fort Lincoln Room, State Capitol

HCR 3027
3/16/2017
Job #29296

- Subcommittee
 Conference Committee

Committee Clerk Signature



Explanation or reason for introduction of bill/resolution: Directing the Legislative Management to consider studying the estimated fiscal impact to the state of refracturing existing oil wells.

Minutes:

Chairwoman Unruh: Let's look at HCR 3027 from this morning.

Sen. Cook: I do not know why we reference the 100,00 barrel here. I would put a period right after existing oil wells.

Chairwoman Unruh: We could just strike that. Line 15 and 16 starting on line 14.

Sen. Cook: Put a period right after existing oil wells on line 14. Leave the 'and'.

Sen. Cook: I move that amendment.

Sen. Roers: I second.

Chairwoman Unruh: We have a motion on the floor. Any discussion. All in favor signify with Yea, any opposed, No. Motion carried.

Sen. Cook: I move a Do Pass as amended.

Sen. Roers: I second.

Roll the roll for HCR 3027 a Do Pass as amended. YES 7 NO 0 -0- absent

Passed. **Sen. Cook** will carry the bill.

17.3073.01001
Title.02000

Adopted by the Senate Energy and Natural
Resources Committee
March 16, 2017

CJ
3/16
30
1 of 1

PROPOSED AMENDMENTS TO HOUSE CONCURRENT RESOLUTION NO. 3027

Page 1, line 14, remove "based on an oil"

Page 1, remove line 15

Page 1, line 16, remove "from a refractured oil well"

Renumber accordingly

Date: 3/16/17
 Roll Call Vote #: 1

**2017 SENATE STANDING COMMITTEE
 ROLL CALL VOTES
 BILL/RESOLUTION NO. HR 3027**

Senate Energy and Natural Resources Committee

Subcommittee

Amendment LC# or Description: 17-3073.01001 *remove "based on an oil" remove line 15*

Recommendation: Adopt Amendment
** remove line 16 "from a refractured oil well"*

- Do Pass Do Not Pass Without Committee Recommendation
- As Amended Rerefer to Appropriations
- Place on Consent Calendar

Other Actions: Reconsider _____

Motion Made By Sen Cook Seconded By Sen Roers

Senators	Yes	No	Senators	Yes	No
Chair Jessica Unruh			Sen. Erin Oban		
Vice Chair Curt Kreun					
Sen. Kelly Armstrong					
Sen. Dwight Cook					
Sen. Jim Roers					
Sen. Don Schaible					
<i>Jim Oban</i>					

Total (Yes) _____ No _____

Absent _____

Floor Assignment _____

If the vote is on an amendment, briefly indicate intent:

no amend copy at vote *all year's amend passed*

3/16/17

Date:

Roll Call Vote #: 2

2017 SENATE STANDING COMMITTEE
ROLL CALL VOTES
BILL/RESOLUTION NO. HR 3027

Senate Energy and Natural Resources Committee

Subcommittee

Amendment LC# or Description: 17-3073.01001

- Recommendation:
- Adopt Amendment
 - Do Pass Do Not Pass Without Committee Recommendation
 - As Amended Rerefer to Appropriations
 - Place on Consent Calendar
- Other Actions: Reconsider _____

Motion Made By Sen Cook Seconded By Sen Roers

Senators	Yes	No	Senators	Yes	No
Chair Jessica Unruh	/		Sen. Erin Oban	/	
Vice Chair Curt Kreun	/				
Sen. Kelly Armstrong	/				
Sen. Dwight Cook	/				
Sen. Jim Roers	/				
Sen. Don Schaible	/				

Total (Yes) 7 No -0-

Absent -0-

Floor Assignment Sen Cook

If the vote is on an amendment, briefly indicate intent:

REPORT OF STANDING COMMITTEE

HCR 3027: Energy and Natural Resources Committee (Sen. Unruh, Chairman)
recommends **AMENDMENTS AS FOLLOWS** and when so amended, recommends
DO PASS (7 YEAS, 0 NAYS, 0 ABSENT AND NOT VOTING). HCR 3027 was
placed on the Sixth order on the calendar.

Page 1, line 14, remove "based on an oil"

Page 1, remove line 15

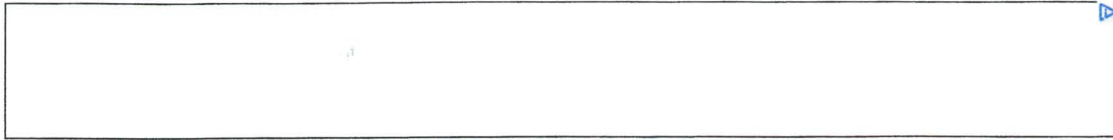
Page 1, line 16, remove "from a refractured oil well"

Renumber accordingly

2017 TESTIMONY

HCR 3027

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HCR 3027
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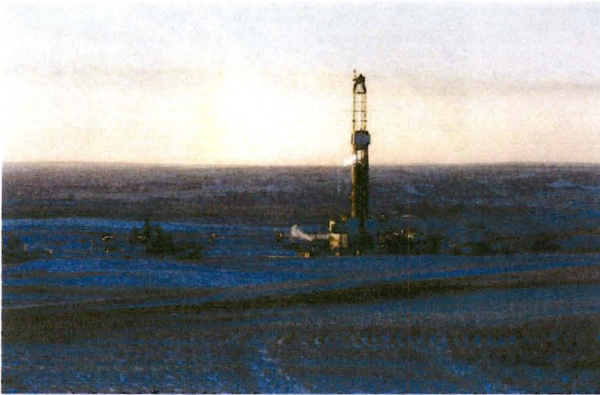
Art Berman Contributor

I write about plays and trends in the oil and gas business.

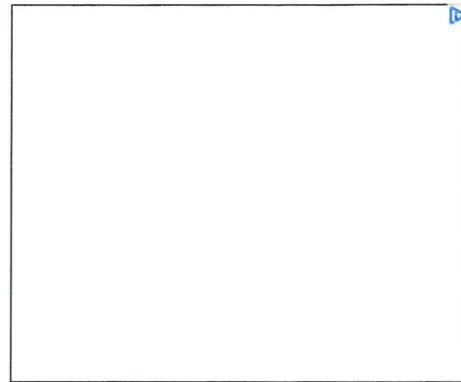
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ENERGY 3/01/2017 @ 7:45AM 11,800 views

The Beginning Of The End For The Bakken Shale Play



In this Feb. 25, 2015 photo, a drilling rig is seen near Epping, N.D. (AP Photo/Matthew Brown)



It's the beginning of the end for the Bakken Shale play.

The decline in Bakken oil production that started in January 2015 is probably not reversible. New well performance has deteriorated, gas-oil ratios have increased and water cuts are rising. Much of the reservoir energy from gas expansion is depleted and decline rates should accelerate. More drilling may increase daily output for awhile but won't resolve the underlying problem of poorer well performance and declining per-well reserves.

December 2016 production fell 92,000 barrels per day (b/d)—a whopping 9% single-month drop (Figure 1). Over the past two years, output has fallen 285,000 b/d (23%). This was despite an increase in the number of producing wells that reached an all-time high of [13,520](#) in November. That number fell by 183 wells in December.

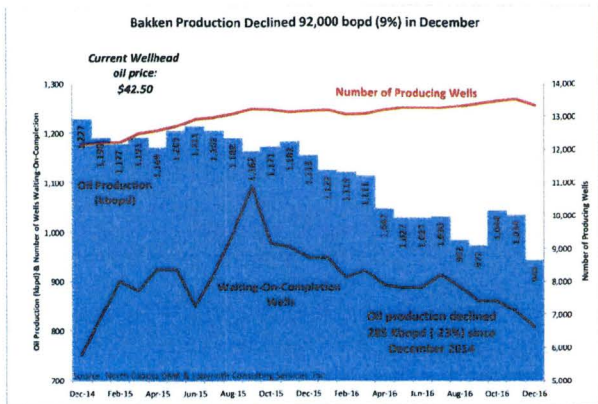


Figure 1. Bakken Production Declined 92,000 bopd (9%) in December. Source: North Dakota Department of Mineral Resources and Labyrinth Consulting Services, Inc.

Well Performance Is Declining

Well performance was evaluated for eight operators using standard rate vs. time decline-curve analysis methods. These operators account for 65% of the production and also 65% of producing wells in the Bakken play (Table 1).

OPERATOR	CUMULATIVE OIL PRODUCTION	TOTAL PRODUCING WELLS	2012-2015 WELLS USED FOR DCA
WHITING OIL AND GAS CORPORATION	256,346,497	1,757	999
CONTINENTAL RESOURCES, INC.	187,381,729	1,557	775
HESS BAKKEN INVESTMENTS II, LLC	185,106,777	1,382	819
STO ENERGY, INC.	126,073,289	980	509
EOG RESOURCES, INC.	172,746,928	976	262
STATOIL OIL & GAS LP	99,820,181	719	403
BURLINGTON RESOURCES OIL & GAS CO	107,349,533	677	394
MARATHON OIL COMPANY	105,585,646	575	279

Table 1. Operators, Cumulative Oil Production, Total Producing Wells and 2012-2015 Wells Used for Decline-Curve Analysis (DCA) in this study. Source: Drilling Info and Labyrinth Consulting Services, Inc.

Estimated ultimate recovery (EUR) decreased over time for most operators and 2015 EUR was lower for all operators than in any previous year (Figure 2). This suggests that well performance has deteriorated despite improvements in technology and efficiency.

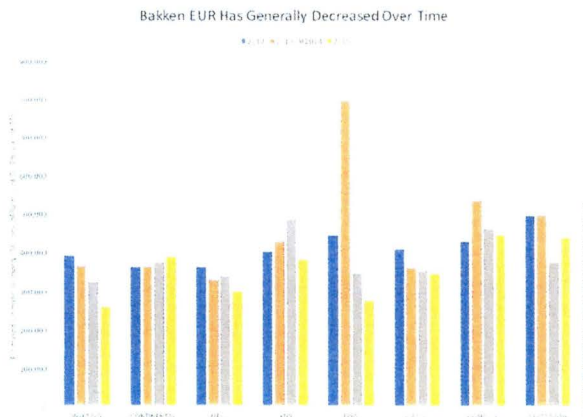
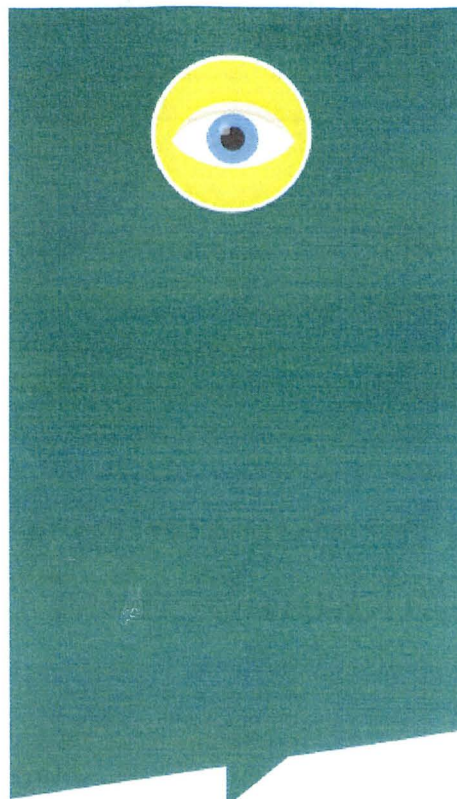


Figure 2. Bakken EUR (Estimated Ultimate Recovery) Has Generally Decreased Over Time. Source: Drilling Info and Labyrinth Consulting Services, Inc.

Figure 3 shows Bakken EUR and the commercial core area in green. The map on the left shows all wells with 12-months of production history and



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MUTUAL FUNDS

the map on the right, all wells with first production in 2015 and 2016.

Most 2015-2016 drilling was focused around the commercial core area. The fact that EURs from these core-centered locations were lower than earlier, less favorably located wells indicates that the commercial core is showing signs of depletion and well interference.

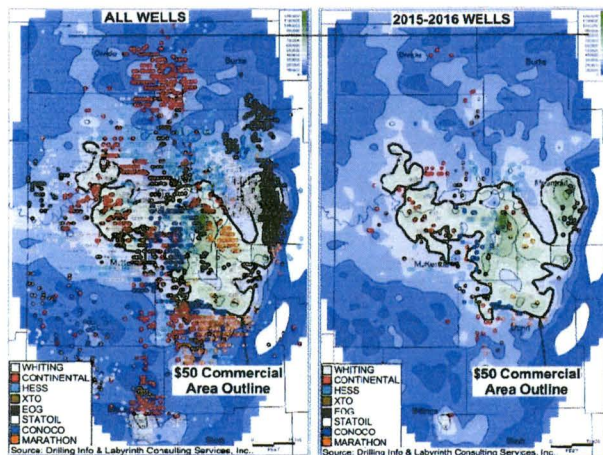


Figure 3. Bakken EUR map showing all wells with 12-months of production and all wells with first production in 2015 and 2016. Source: Drilling Info and Labyrinth Consulting Services, Inc.

Well-level analysis indicates a fairly systematic steepening of decline rates over time. Figure 4 shows Continental Resources wells with first production in 2012 and 2015. 2012 wells have a shallow, super-harmonic (b-exponent = 1.3) decline rate but 2015 wells have a steeper, weakly hyperbolic (b-exponent=0.2) decline rate.

Oil reserves for 2012 wells averaged 343,000 barrels but only 229,000 barrels for 2015 wells—a 33% decrease in well performance. Steeper decline rates result in lower EURs.

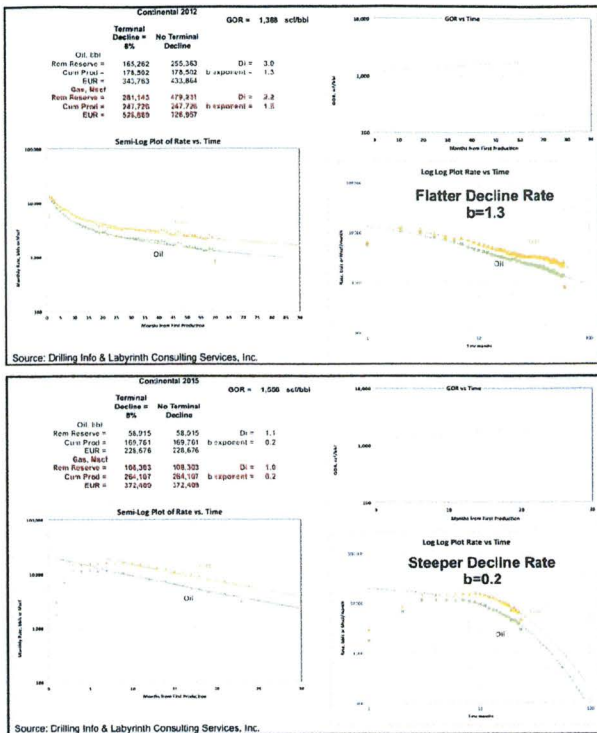


Figure 4. Well-level analysis shows steeper decline rates for more recent wells than for older wells. Source: Drilling Info and Labyrinth Consulting Services, Inc.

Gas-oil ratios (GOR) for most operators increased from 2012 through 2014 and then, decreased for wells with first production in 2015 (Figure 5).*

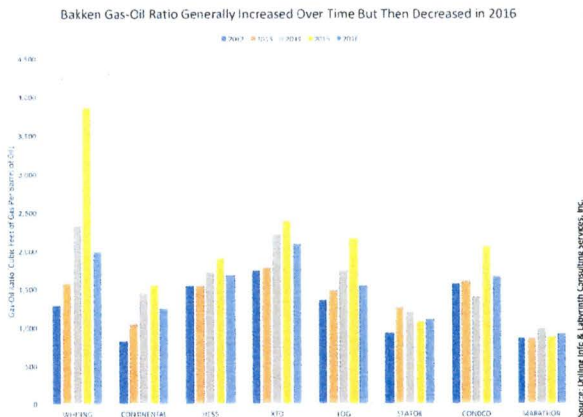


Figure 5. Bakken gas-oil ratios generally increased over time but then decreased in 2016. Source: Drilling Info and Labyrinth Consulting Services, Inc.

Changing GOR is important because it suggests decreasing reservoir energy. The Bakken has a solution gas drive mechanism. Initially, oil is produced by liquid expansion across the pressure drop from the reservoir to the well bore. Later, gas dissolved in the oil expands and this is the mechanism that lifts oil to the surface.

Rapidly increasing GOR in the Bakken probably indicates partial reservoir depletion and subsequently decreasing GOR suggests more

advanced depletion accompanied by declining reservoir pressure, declining oil production and increasing water cut (Figure 6).

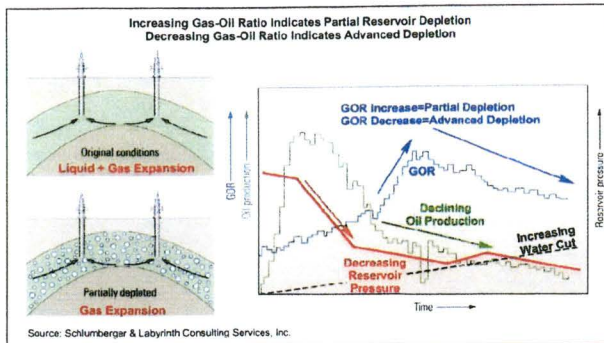


Figure 6. Increasing gas-oil ratio indicates partial reservoir depletion—Decreasing gas-oil ratio indicates advanced depletion. Source: Schlumberger and Labyrinth Consulting Services, Inc.

The sequence of events summarized in Figure 6 is demonstrated in Bakken field production shown below in Figure 7. Gas increased before oil production peaked in December 2014 and continued increasing through March 2016, and then declined.

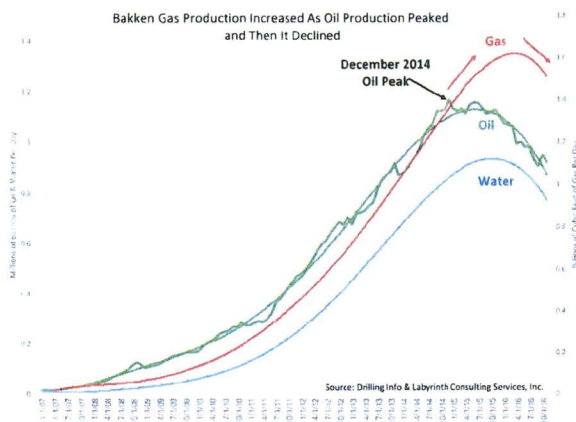


Figure 7. Bakken gas production increased as oil production peaked and then it declined. Source: Drilling Info and Labyrinth Consulting Services, Inc.

Water cut—water as a percent of total liquid produced—has increased for most operators over time (Figure 8) and this provides additional support for progressive Bakken depletion.

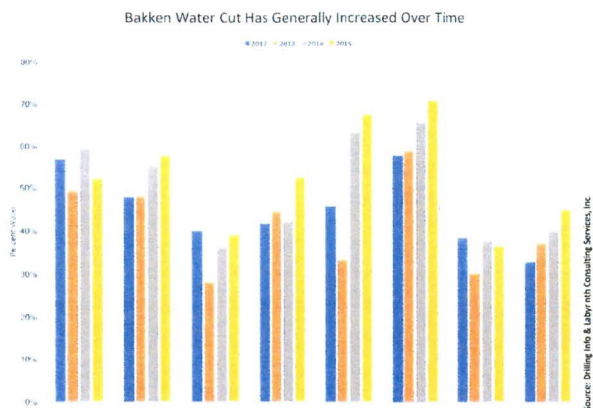


Figure 8. Bakken water cut has generally increased over time. Source: Drilling Info and Labyrinth Consulting Services, Inc.

Company Performance, Break-Even Prices and Future Drilling Locations

Well performance for the 8 key operators shown above in Table 1 above provides a framework for company performance and break-even prices for the Bakken play.

Reserves were estimated for more than 4,400 wells with first production in 2012 through 2015 using standard rate vs. time methods. Decline-curve analysis (DCA) was used to evaluate wells with at least 12 months of production history for key operators. Production group DCA was done separately by operator and year of first production for oil, gas and water.

Results are summarized in the following tables.

	GROUP	WHITING	CONTINENTAL	HESS	XTO	EOG	STATOR	CONOCO	MARATHON
WTD AVG EUR BOE 15	368,593	339,387	318,035	331,495	422,861	449,721	348,102	470,653	433,889
BREAK-EVEN OIL PRICE	\$54.98	\$59.85	\$63.80	\$61.30	\$47.96	\$45.09	\$58.30	\$43.08	\$46.73

Source: Drilling Info & Labyrinth Consulting Services, Inc.

Break-Even Wellhead Price (\$/Barrel)	EUR MBOE 15	Economic Assumptions
\$45	451	\$7 MM Well Cost
\$50	406	80% Net Revenue Interest
\$55	369	11% Severance Tax
\$60	338	50 Barrels NGL per Mmcf
\$65	312	OPEX \$12/BOE
\$70	290	8% Discount

Source: Drilling Info & Labyrinth Consulting Services, Inc.

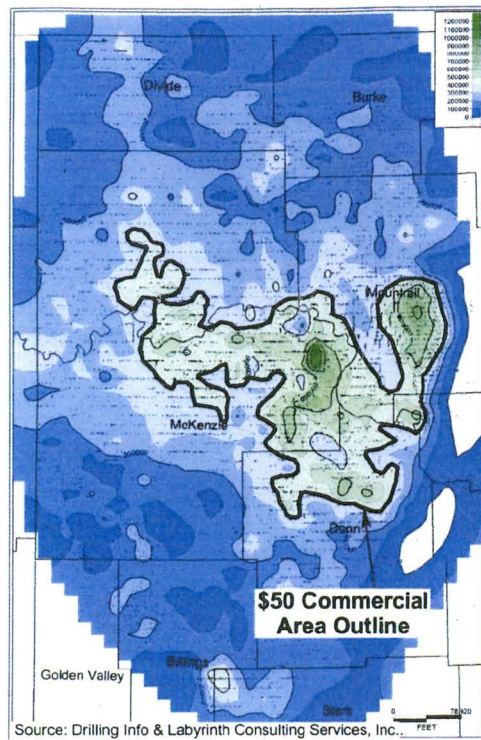
	Per Mcf	Price Per Unit	Assumptions
NGL Yield 50 BPM	0.05	\$0.90	NGL value is 40% of \$45/bbl
Gas Shrinkage 86%	0.86	\$2.15	Assumes \$2.50/Mcf
Market Value of Gas/Mcf		\$3.05	NGL/Mcf + Shrunken Gas/Mcf
Market Value of Condensate		\$45.00	\$45/bbl
Gas-to-BOE Conversion Factor	15	15 Mcf/BOE	\$45 oil price/\$3.05 NGL-adjusted gas price

Source: Labyrinth Consulting Services, Inc.

Table 2. Summary tables of key operator EUR and break-even prices and economic assumptions. Source: Drilling Info and Labyrinth Consulting Services, Inc.

None of the key operators' average well breaks even at current Bakken wellhead prices of \$42.50 per barrel although ConocoPhillips (\$43.08 break-even price) is very close. EOG, XTO and Marathon all break even at prices less than \$50 per barrel but other operators need higher oil prices to break even. It is worth noting that Bakken wellhead prices are about \$10 per barrel less than WTI benchmark prices.

Current well density was calculated by measuring the area of the \$50 commercial area (406,000 BOE cutoff) and dividing by the number of horizontal wells within that area. There are 5,500 producing wells within the 1.2 million acre commercial area shown in Figure 9. That equates to a current well density of 215 acres per well.



Source: Drilling Info & Labyrinth Consulting Services, Inc.

	Acres	Wells	Well Density
\$45 Commercial Area	1,182,401	5,500	215

Source: Drilling Info & Labyrinth Consulting Services, Inc.

Figure 9. Bakken EUR map showing the \$50 (406,000 BOE EUR) commercial area and well density table. Source: Drilling Info and Labyrinth Consulting Services, Inc.

Tight oil operators describe infill spacing of 40 to 120 acres per well favoring the lower end of that range. Current well density in the Bakken core of 215 acres per well suggests substantial infill locations remain yet declining EURs, increasing water cut and falling GOR do not support further infill drilling.

The Bakken is unique because of the extraordinary lengths of lateral wellbores compared with other tight oil plays. Laterals are commonly more than 10,000 feet in length and often approach 12,000 feet.

Figure 10 shows lateral lengths in the Bakken. It is clear that within the commercial core area, most laterals exceed 8,000 feet. Available evidence suggests that current well density is sufficient to fully drain reservoir volumes. That implies that further drilling will not result in producing new oil volumes but will interfere with and cannibalize production from existing wells.

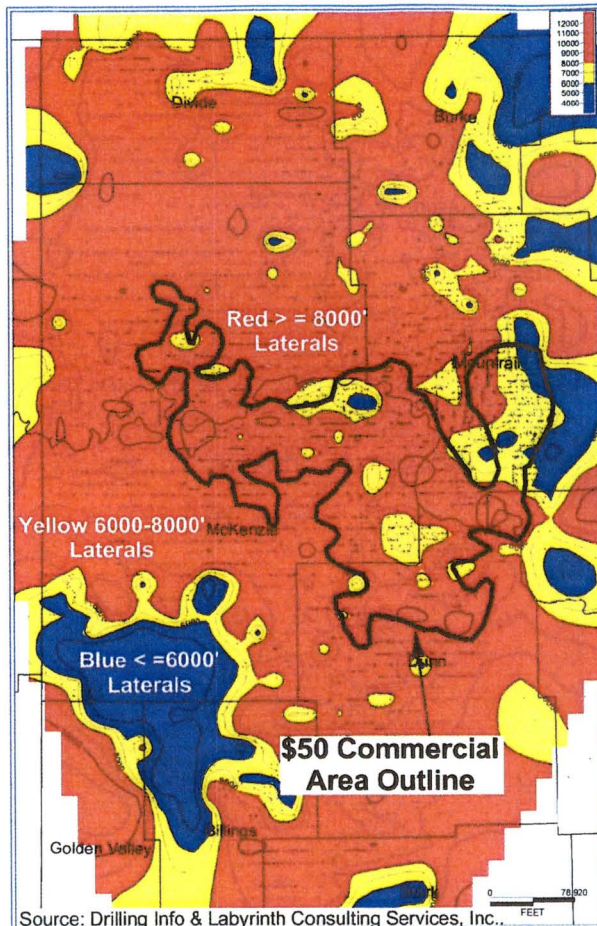


Figure 10. Bakken lateral length map. Source: Drilling Info and Labyrinth Consulting Services, Inc.

The Downside of Technology

The Bakken play represents the fullest application of modern horizontal drilling and hydraulic fracturing technologies. The Middle Bakken and Three Forks reservoirs are tight, naturally fractured sandstones that respond exceptionally well to long laterals and multi-stage fracture stimulation. Field rules allowed long laterals well before these were feasible in other plays.

The downside of efficiency and technology is that depletion has accelerated. Resulting higher initial rates masked underlying field decline that is becoming apparent only in wells with first production in 2015. The evidence for depletion is compelling but pressure data is not publicly available and is needed to complete the case.

The most appealing aspect of resource plays is their apparent lack of risk. Source rocks are the drilling target so finding oil and gas is given. Because the plays are continuous accumulations, there is no need to map and define a trap. Since

the reservoirs are tight, seals are not an issue either. But commercial risk should be more of a concern for investors than it seems to be so far.

The downside is that there is no way to stay away from water and it is produced from day one in large volumes. The Bakken has produced 1.5 billion barrels of water along with its 2.2 billion barrels of oil over the decades. Where are they putting it and what does that cost?

Investors should be worried. As analysts cheered the resilience of shale plays after the 2014 price collapse, nearly a billion barrels of Bakken oil were produced at a loss—about 40% of total production since the 1960s. Vast volumes of oil were squandered at low prices for the sake of cash flow to support unmanageable debt loads and to satisfy investors about production growth. The clear message is that investors do not understand the uncertainties of tight oil and shale gas plays.

And all major Bakken producers continue to lose money at current wellhead prices. If observations presented here hold up, there may be nowhere for the Bakken to go but down. Higher oil prices may not help much because the best days for the play are behind us. Future profits were sacrificed for short-term objectives that lost the companies and their shareholders money.

The early demise of the Bakken should serve as a warning about the future of other tight oil plays.

**Statoil and Marathon depart somewhat from this general observation. GOR for these companies is lower than average and peaked earlier than most operators although Marathon's GOR has been relatively flat.*

Sincere thanks to Lynn Pittinger for his many useful comments during research for this post.

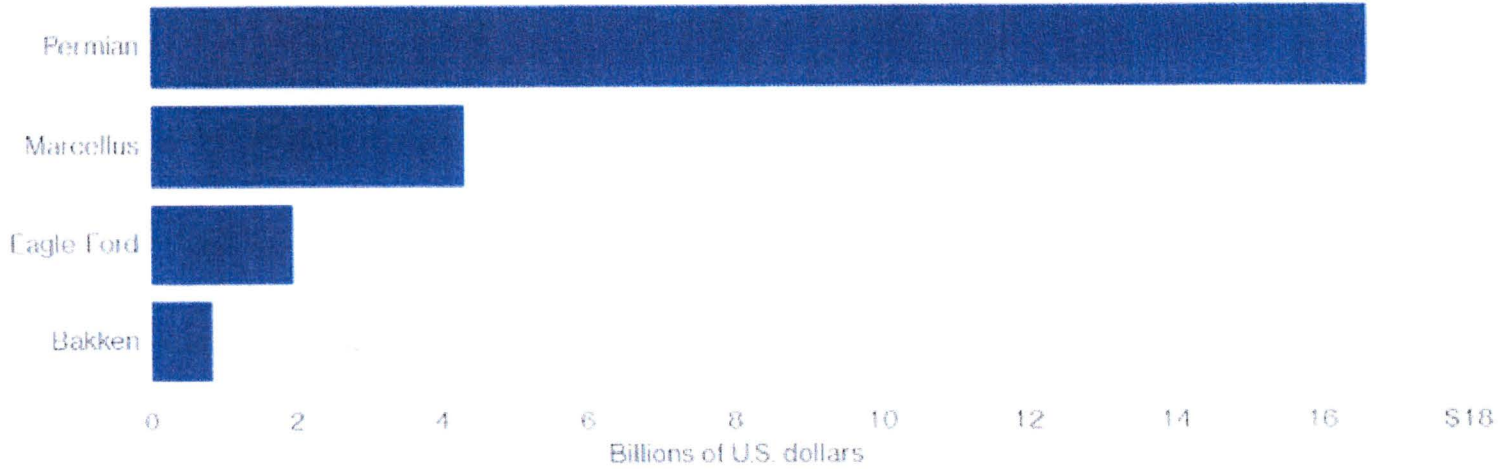
Art Berman
Petroleum Geologist and Professional Speaker
Visit my website for more information:
artberman.com

RECOMMENDED BY FORBES

[Hip-Hop Cash Princes 2017](#)

Playing Favorites

The Permian has attracted the most M&A dollars by far among U.S. shale plays this year.



Source: Bloomberg Intelligence data

Bloomberg

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House Concurrent Resolution 3027
Testimony of Ron Ness
House Energy and Natural Resources Committee
March 2, 2017

Chairman Porter and members of the House Natural Resources Committee, my name is Ron Ness, president of the North Dakota Petroleum Council. Last year the North Dakota Petroleum Council represented more than 500 companies in all aspects of the oil and gas industry, including oil and gas production, refining, pipeline, transportation, mineral leasing, consulting, legal work, and oilfield service activities in North Dakota. I appear before you today in support of House Concurrent Resolution 3027.

There are approximately 8,000 Bakken wells already drilled that have tremendous potential if we can develop and enhance refract technology. These wells have already been drilled, and the ability to extract more of the resources out of these wells would further reduce the environmental impact and increase the ultimate recovery of the Bakken.

Industry will be recompleting somewhere around 50+ Bakken wells in 2017. These older, open hole wells compete for capital in a company's portfolio and of course with all the other oil shale plays across the country. These early Bakken wells did not use staged fracs and are top candidates for recompletion now. However, the next generation of wells was completed using 10-20 staged fracs, and will require further innovation to increase proven reserves per well. An incentive would help stimulate interest in going after the next tier of wells, by making Bakken recompletions more attractive and competitive for capital necessary to refine the recompletion technology increasing the proven reserves per well. The recompletion process requires the work of a large drilling rig and an entirely new completions operation to be performed on a well at a rate of \$2-3.5 million/well. All of this demands well liner, water, frac sand, etc. like a new Bakken well.

Extending the life of these wells through recompletion will add jobs and increase royalty payments, sales, income, and oil and gas tax revenues. For these reasons, we encourage you to study potential incentives and urge a Do Pass on HCR 3027. I would be happy to answer any questions.

HCR 3027
3-16-17
AH #1
pg 1



NORTH DAKOTA
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C O U N C I L

100 West Broadway, Ste. 200 | P.O. Box 1395 | Bismarck, ND 58501-1395
701.223.6380 | ndpc@ndoil.org | www.NDOil.org

House Concurrent Resolution 3027
Testimony of Ron Ness
Senate Energy and Natural Resources Committee
March 16, 2017

Chairman Unruh and members of the Senate Natural Resources Committee, my name is Ron Ness, president of the North Dakota Petroleum Council. Last year the North Dakota Petroleum Council represented more than 500 companies in all aspects of the oil and gas industry, including oil and gas production, refining, pipeline, transportation, mineral leasing, consulting, legal work, and oilfield service activities in North Dakota. I appear before you today in support of House Concurrent Resolution 3027.

There are approximately 8,000 Bakken wells already drilled that have tremendous potential if we can develop and enhance refract technology. These wells have already been drilled, and the ability to extract more of the resources out of these wells would further reduce the environmental impact and increase the ultimate recovery of the Bakken.

Industry will be recompleting somewhere around 50+ Bakken wells in 2017. These older, open hole wells compete for capital in a company's portfolio and of course with all the other oil shale plays across the country. These early Bakken wells did not use staged fracs and are top candidates for recompletion now. However, the next generation of wells was completed using 10-20 staged fracs, and will require further innovation to increase proven reserves per well. An incentive would help stimulate interest in going after the next tier of wells, by making Bakken recompletions more attractive and competitive for capital necessary to refine the recompletion technology increasing the proven reserves per well. The recompletion process requires the work of a large drilling rig and an entirely new completions operation to be performed on a well at a rate of \$2-3.5 million/well. All of this demands well liner, water, frac sand, etc. like a new Bakken well. Extending the life of these wells through recompletion will add jobs and increase royalty payments, sales, income, and oil and gas tax revenues. For these reasons, we encourage you to study potential incentives and urge a Do Pass on HCR 3027. I would be happy to answer any questions.