



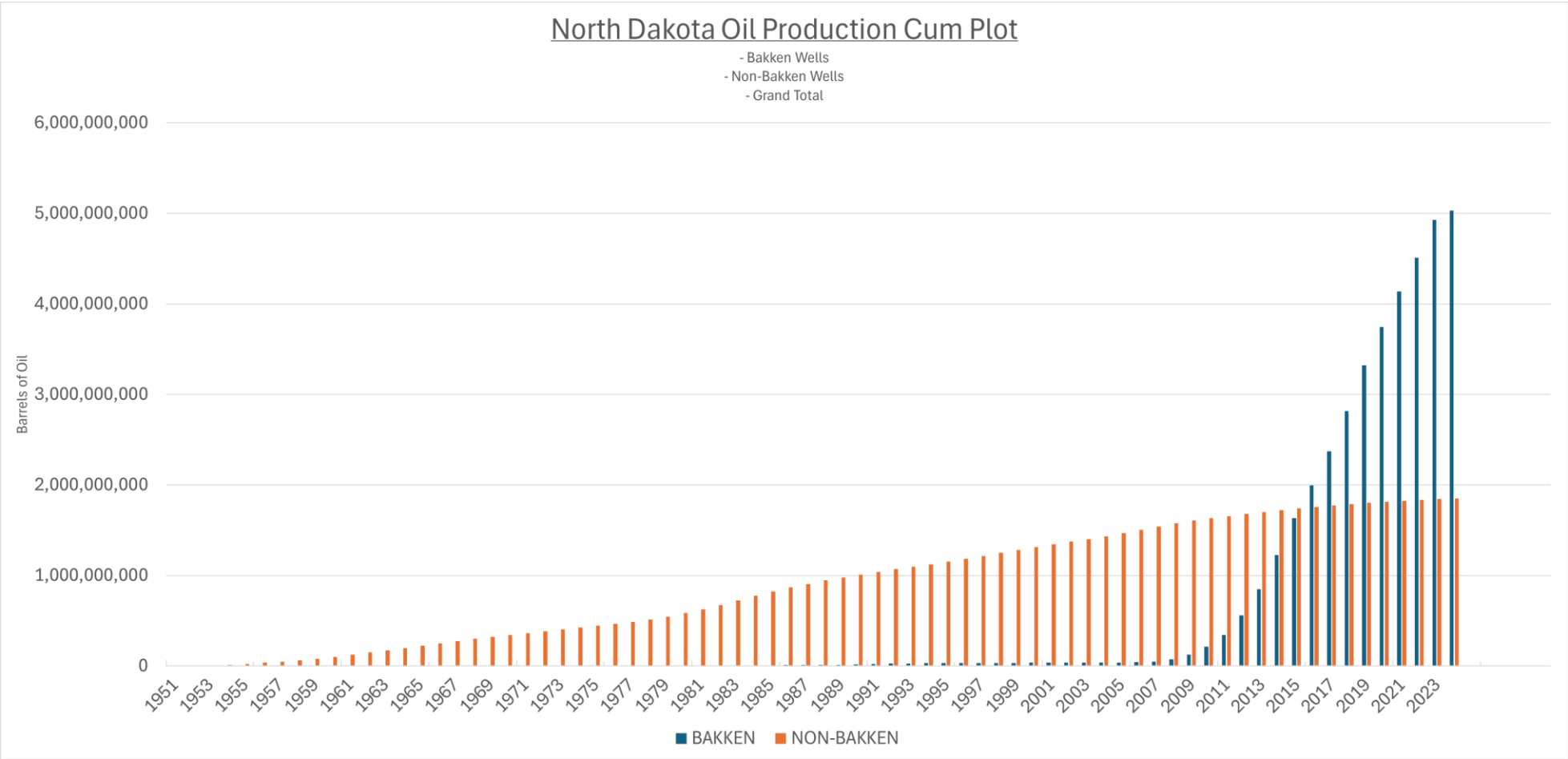
Williston Basin Petroleum Conference

May 2024

Preston Page
Dakota Energy, LLC

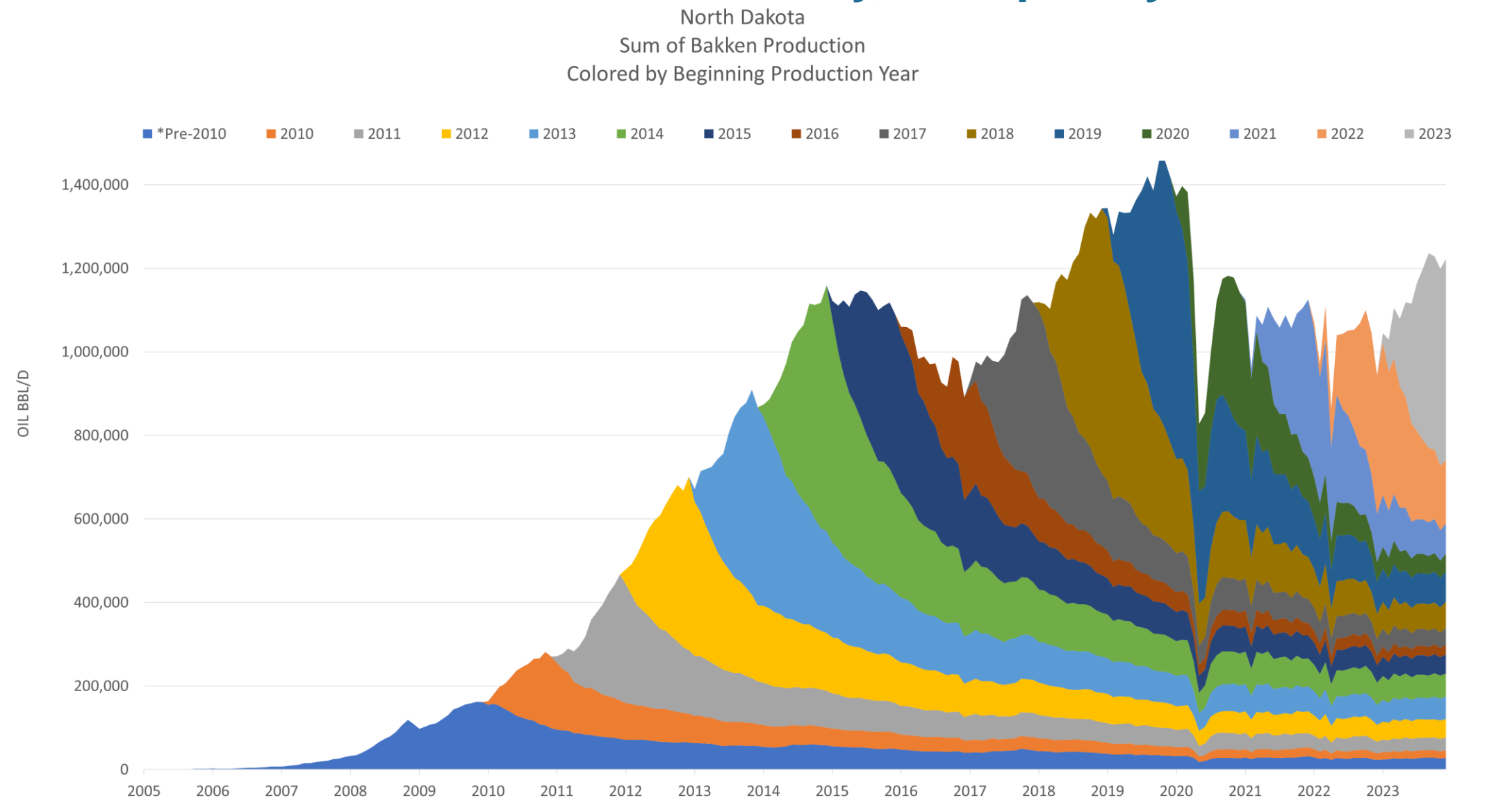


Cum Plot – North Dakota Oil Production



May 2024 - NORTH DAKOTA BAKKEN = 5,030,448,956 bo

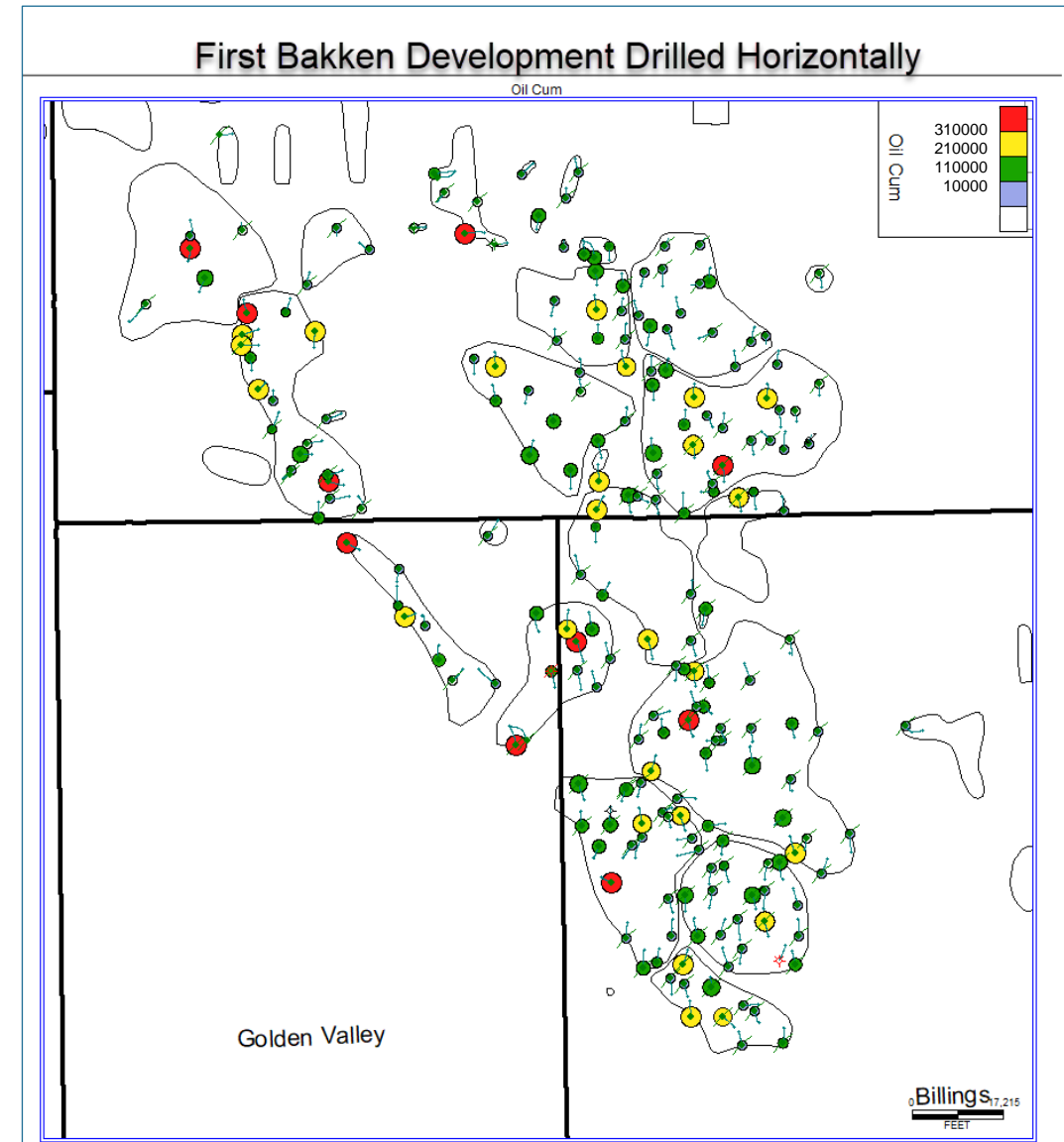
Bakken Production – Monthly, Grouped by Year



First Horizontal Bakken Wells - Spud Prior to 2005

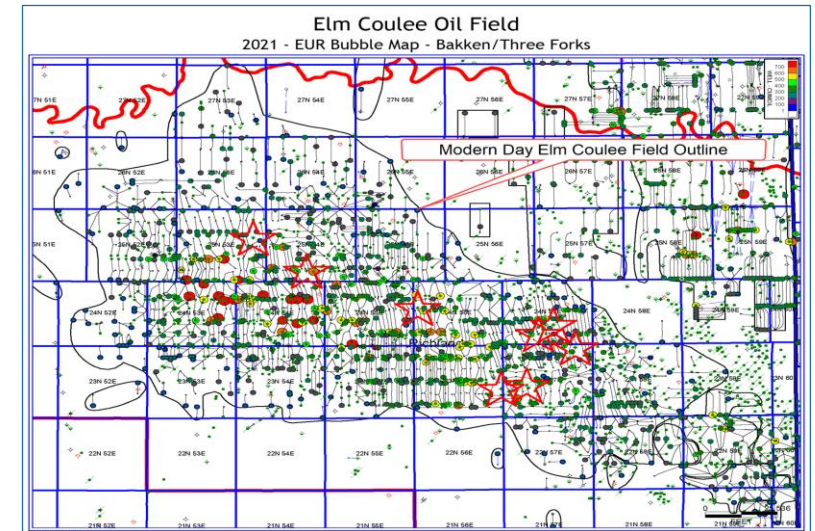
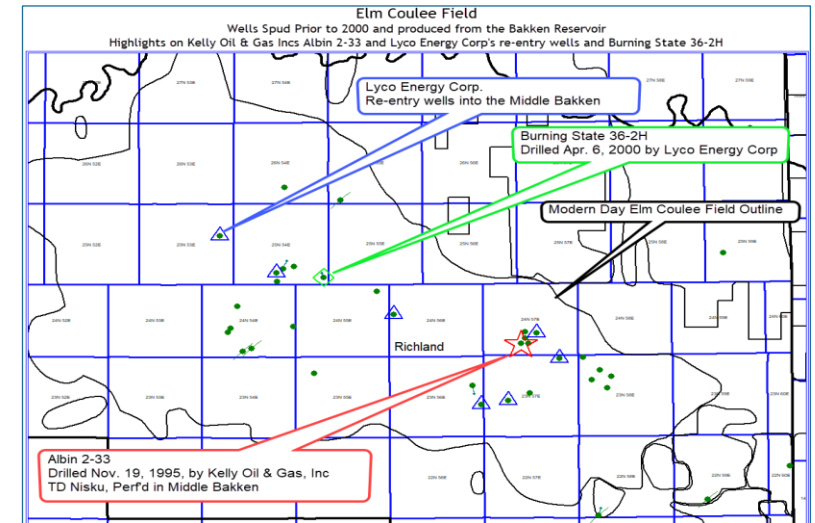
- The first Bakken reservoir to be directly targeted by horizontal drilling was in the McKenzie, Billings, Golden Valley County area.
- Starting in 1987 to 1994
 - 211 wells were drilled horizontally targeting the Bakken (upper Bakken)
 - Cumulative oil production of the 211 wells is 25mmbo (avg. 119mbo/well)
- Meridian Oil Inc (Burlington Resources) drilled 135 wells with a cumulative production of 16mmbo (avg. 120mbo/well)
- Major Fields: Bicentennial, Elkhorn Ranch, Rough Rider, etc.

Takeaway: Horizontal drilling increased the success of striking oil; however, the lower permeability reservoir still did not give up enough oil to be economically viable at the time.



Elm Coulee Oil Field

- **Bob Robinson (Kelly Oil & Gas Inc) and Dick Findley (Prospector Oil Inc)**
 - Drilled **Albin 2-23** Nov 19, 1995
 - Originally targeted the Nisku but was a dry hole.
 - Perf'd a 12' interval in the Middle Bakken after noticing porosity
 - IP30 of 2,600bo
 - 30bopd after a year
 - Saw the Bakken was a '**Sleeping Giant**'
 - Partnered with Lyco Energy Corp to test if the Middle Bakken
 - Re-entered 10 more wells and perf'd them in the Middle Bakken.
 - Seven wells produced 643,112bo as of Jan. 2021
 - Three wells had mechanical failures.
 - Although these wells were not commercially successful, they **proved the potential**.
- Since 2000, over 800 wells have been drilled in Elm Coulee
- Production at Elm Coulee has more than doubled the oil output of the state of Montana
- Oil cum of 182mmbo as of January 2021



Bakken/Three Forks – North Dakota – Spud 2003 to 2006

- By the mid-2000s, Elm Coulee had hundreds of horizontal Bakken wells completed.
- We can identify 47 Horizontal Wells spud in North Dakota Between 2003 and 2006 that produced from the Bakken.

Notable wells drilled in this era:

Robert Heuer 1-17H

- Re-entry Operator: Jolette Oil (USA), LLC
- Location: T161-R95-S17, Divide County, ND
- Re-Entry: December 26, 2003
- Completion: 319K lbs and 179K gals
- Perf'd Lateral Length: ~4,376
- Oil Cum to date: 138mbo
- Note: Well was permitted as a Madison re-entry

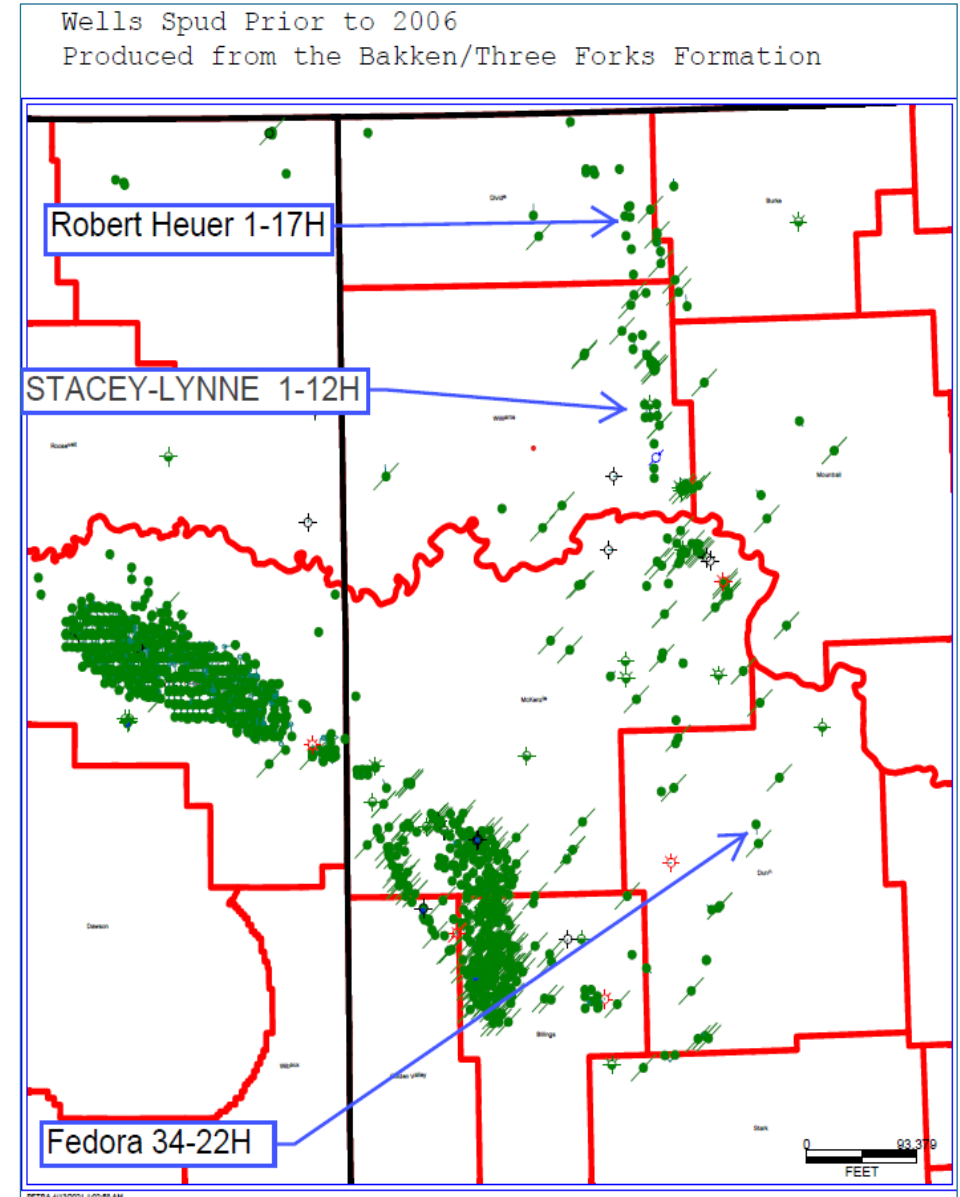
Fedora 34-22H

- Orig. Operator: Petroleum Development Corp
- Location: T146N-R96-S22, Dunn County
- Spud: July 4, 2005
- Completion Data: 650Klbs and 304K gals
- Perf'd Lateral Length: ~7,333'
- Oil Cum to date: 238mbo

First Economic ND Bakken Well:

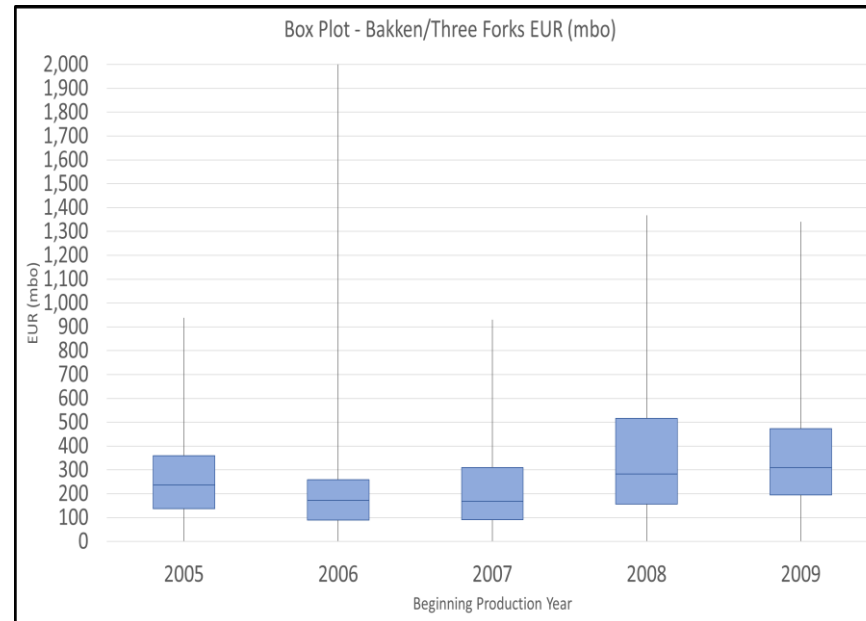
Stacey-Lynne 1-12H

- Orig. Operator: Murex Petroleum Corporation
- Location: T156N-96W-01, Williams County, ND
- Spud: November 7, 2004
- Completion Data: 451K lbs and 513k gal
- Perf'd Lateral Length: ~ 5,428'
- Oil Cum to date: 404mbo
- AFE: \$2,750,000



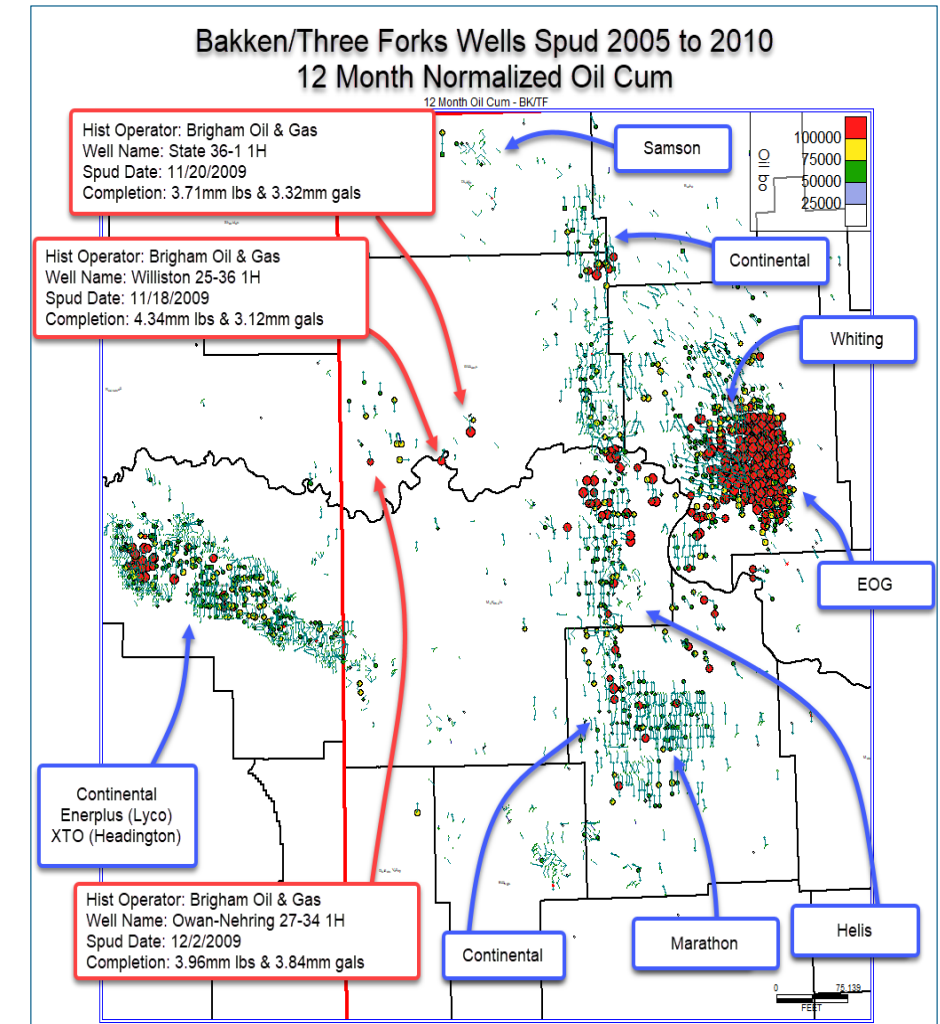
Bakken/Three Forks Wells Spud 2005 to 2010

- Average EUR – 301mbo
- Elm Coulee was heavily drilled by the end of 2010 and Parshall and Sanish Fields were hitting on all cylinders
- Prior to 2010, Central and Western Williams and McKenzie County was largely un-drilled
- Brigham proved **larger completions** yielded significantly **higher production** results further west



NPV Stool

- **Volumes High**
- (in focused areas)
- **Well Costs Modest**
- **Prices High**

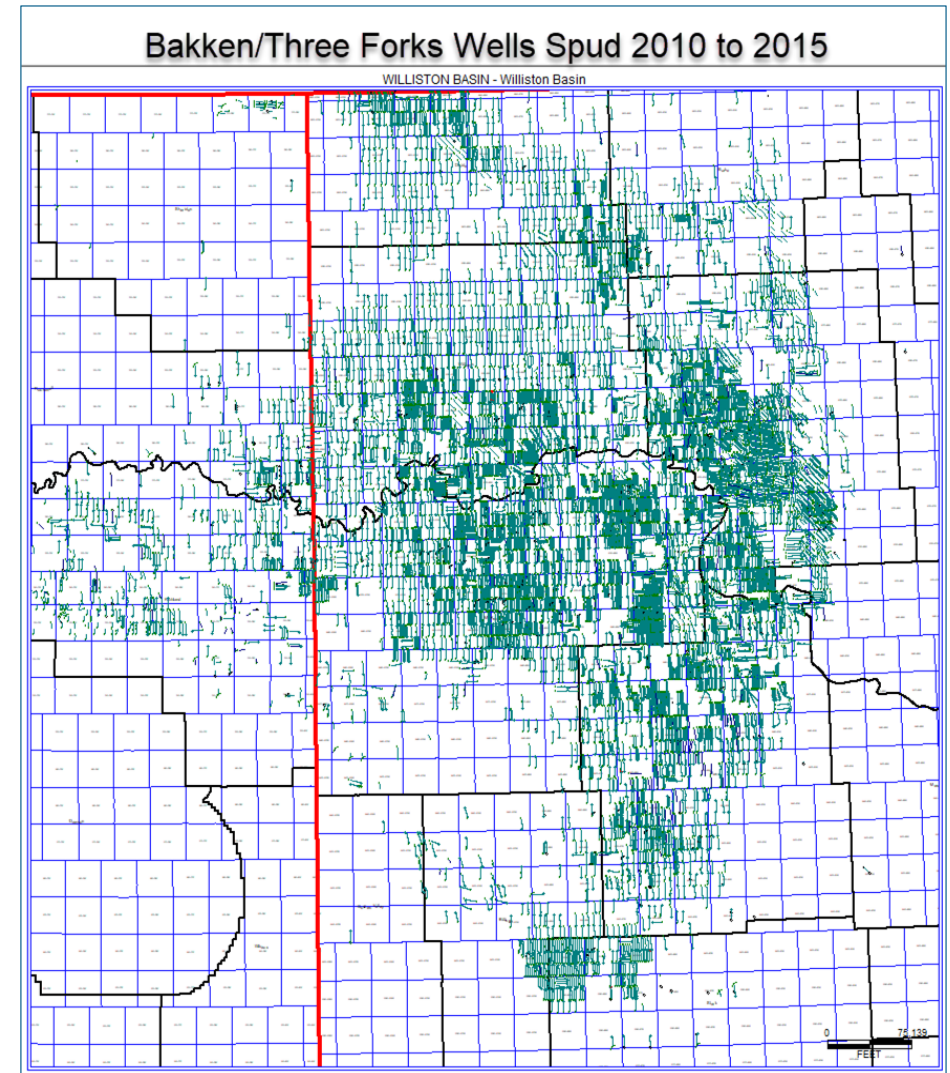
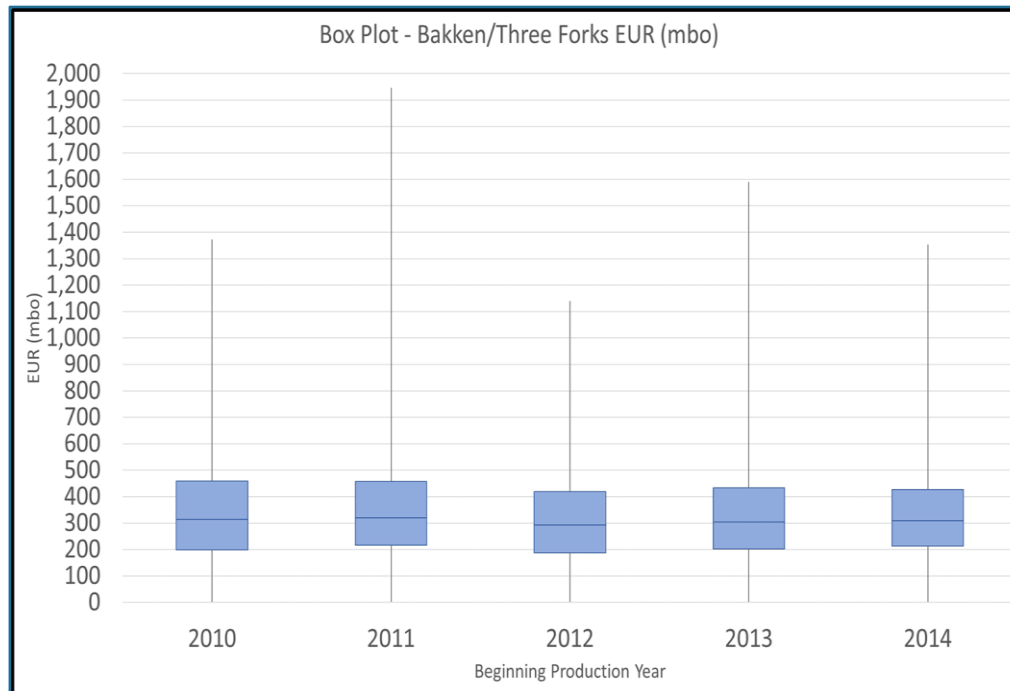


Bakken/Three Forks Wells Spud 2010 to 2015

- Average EUR – 332mbo
- Divide County
 - Average EUR – 183mbo (from 2010 through 2014)
 - 650 Wells from 2010 through 2015
 - 34 Wells spud since 2016
- Significant Expansion of Tiers (along with Capital Destruction)

NPV Stool

- **Volumes Modest**
- **Well Costs High**
- **Prices High**

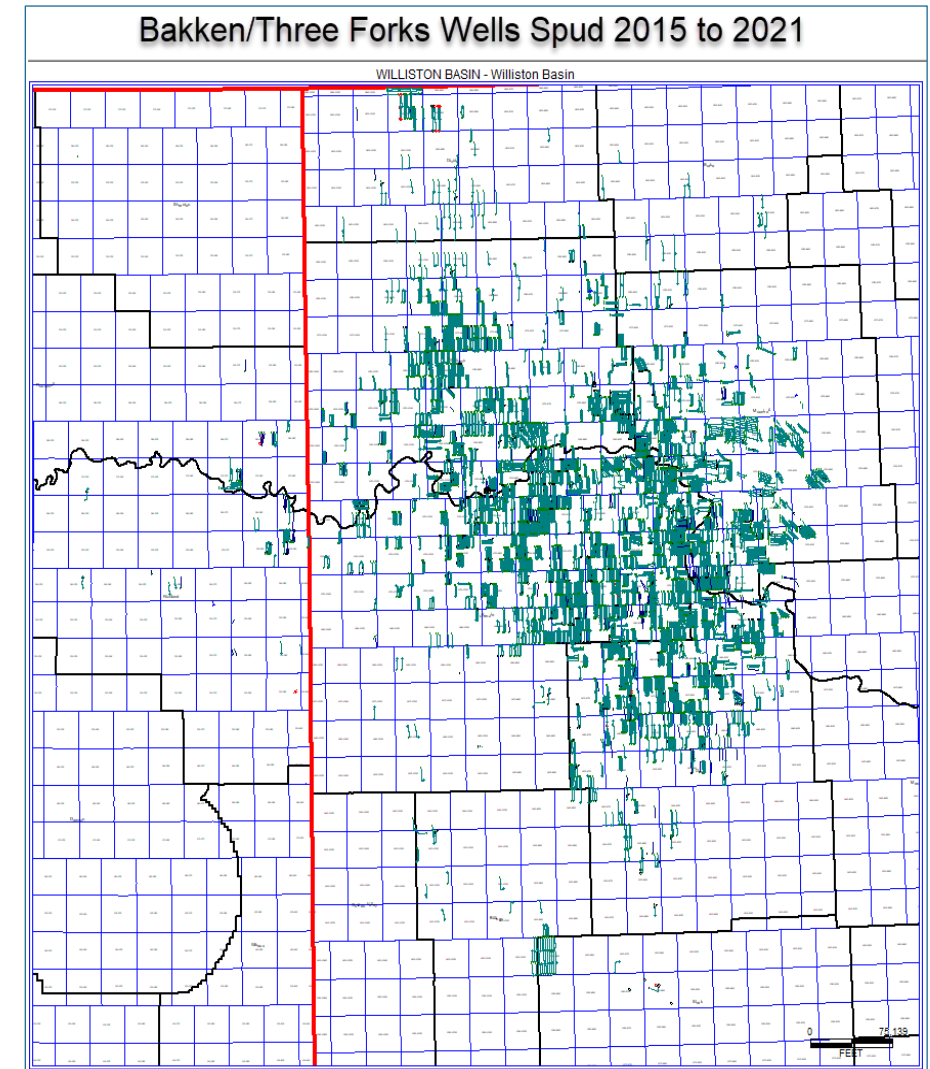
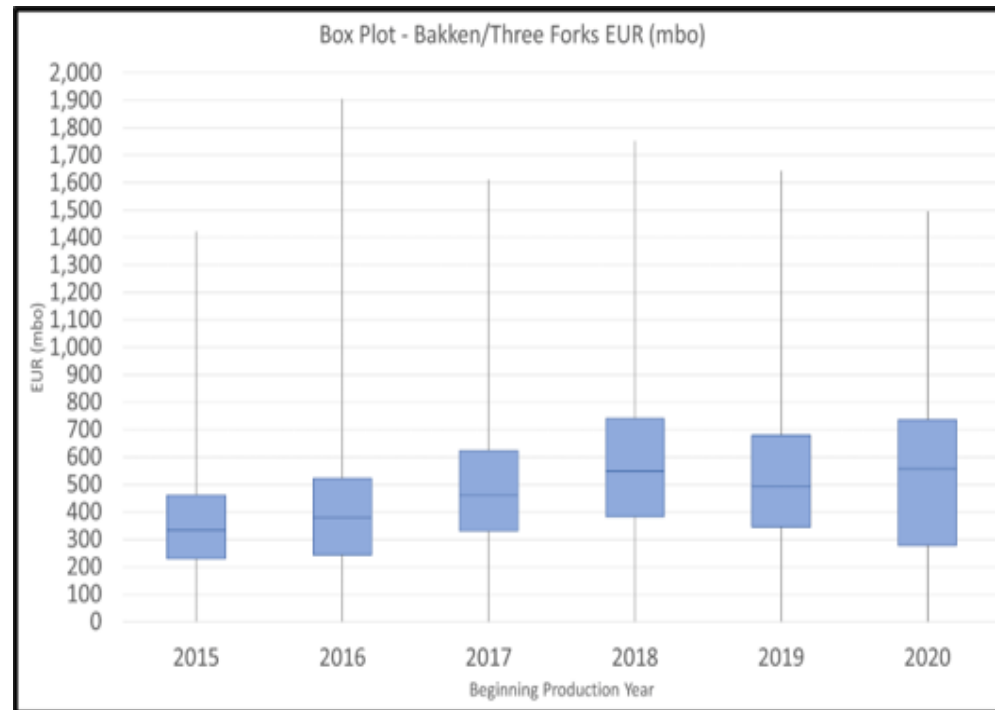


Bakken/Three Forks Wells Spud 2015 to 2021

- Average EUR – 476mbo
 - (EUR will likely go up with more data)
- Significant improvements in completions yielded much higher production volumes
- Development was contracted, predominately to Tier 1.

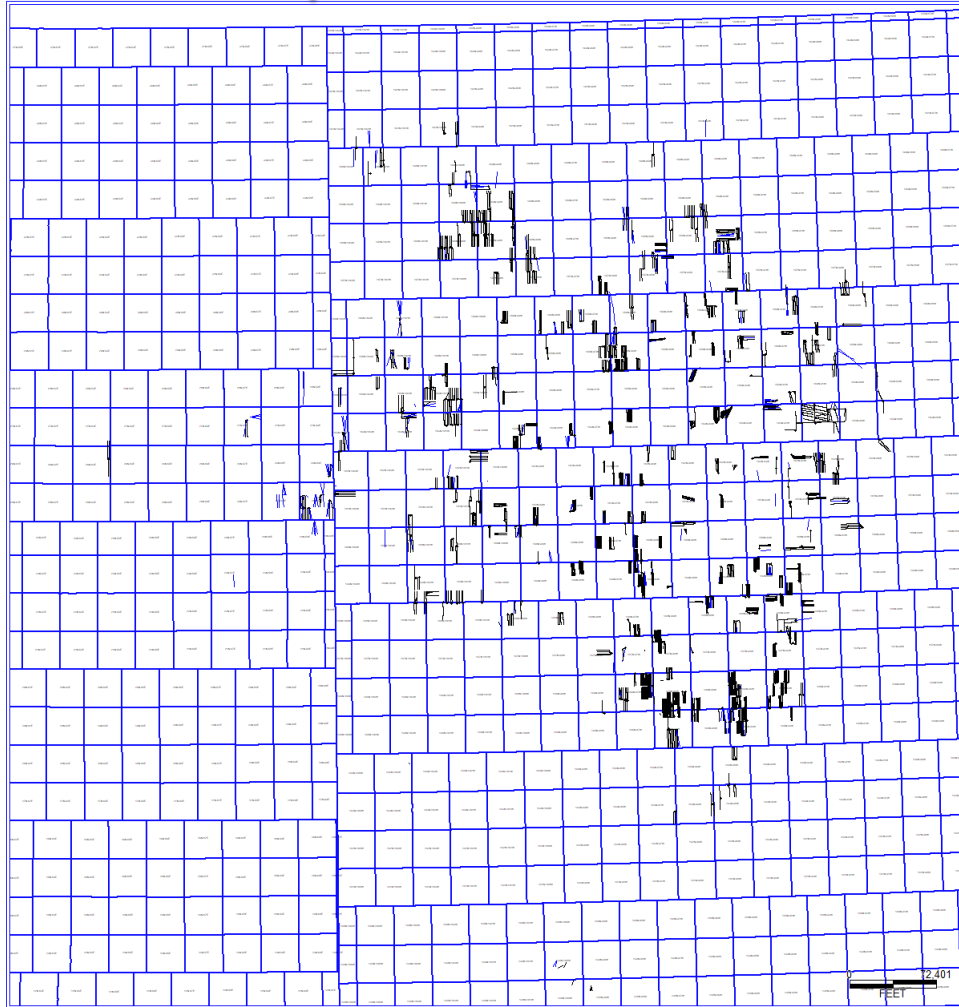
NPV Stool

- **Volumes High**
- **Well Costs Modest**
- **Prices Modest**

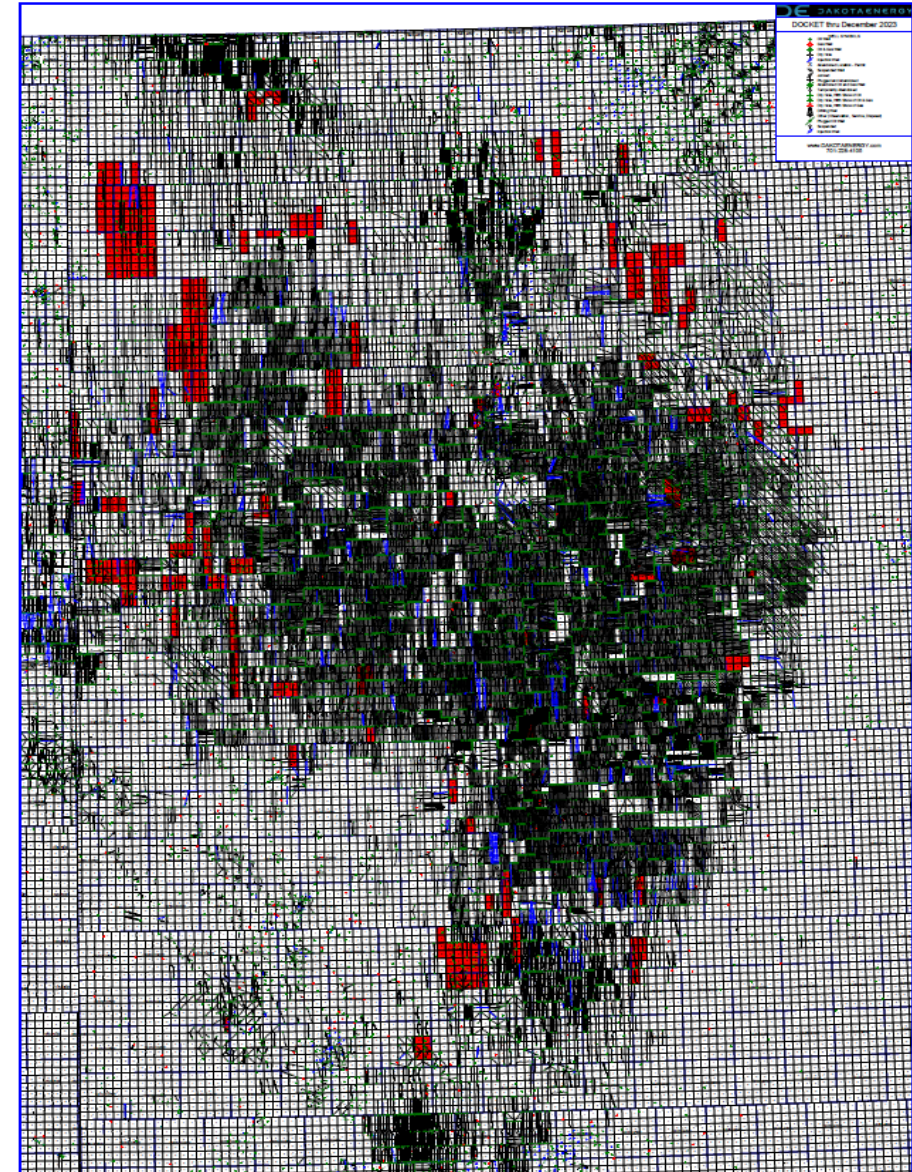


2022 & 2023 Wells Spud

Wells Spud in 2022 & 2023



2023 NDIC HEARING DOCKET



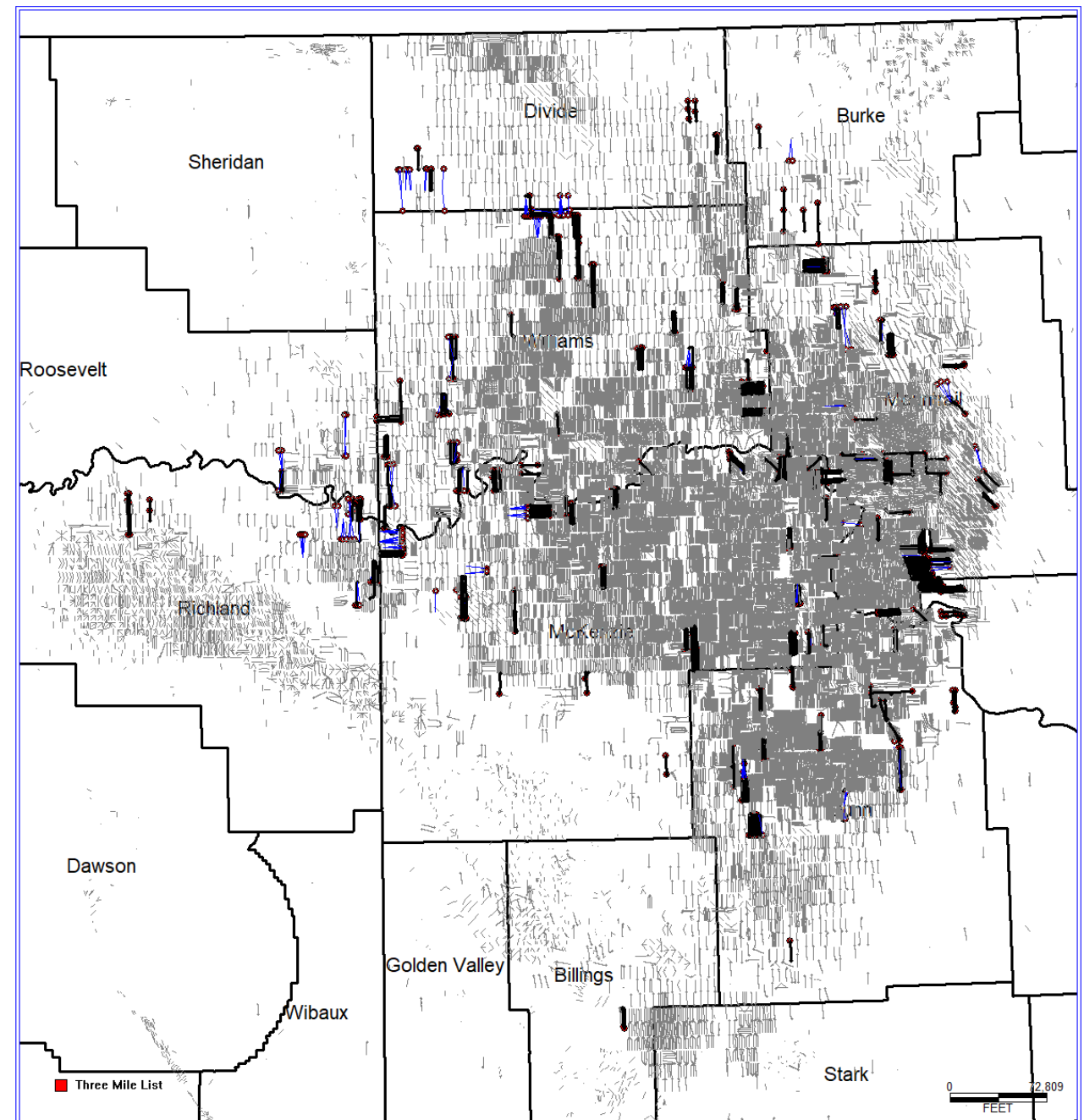
2.5 Mile+ Laterals Targeting Bakken / Three Forks

2.5 Mile+ Laterals Targeting Bakken / Three Forks

641 Wells

Longer laterals are one of the biggest game changers for Tier 2 & 3 acreage.

Well EURs are 30%+ higher than 10' laterals



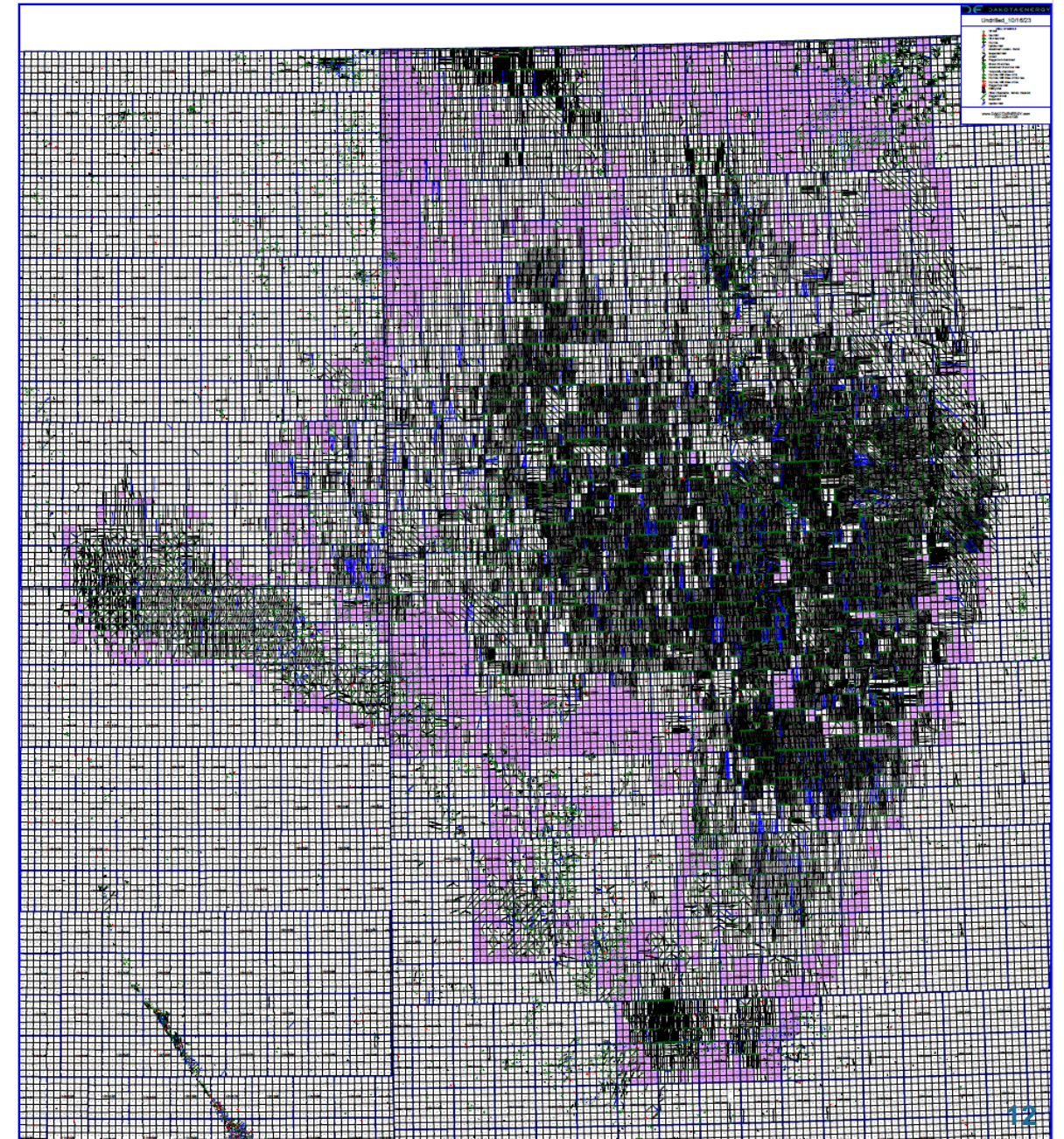
Undrilled Acreage in the Bakken

'Prospective' Bakken (ND & MT)

1,590,343 Acres are UN-DRILLED

Potential Factors for Expansion

- **40'+ Thick Bakken/Three Forks**
- **Net Pay DPHI > 4% (Density Porosity)**
- **Offset production**
 - 30bo/ft+ from well completed with < 400'/ft
 - 50%+ Oil Cut from well completed with < 400'/ft
- **Gas Takeaway**
- **Surface Locations**
- **Potential for water gathering and SWD**



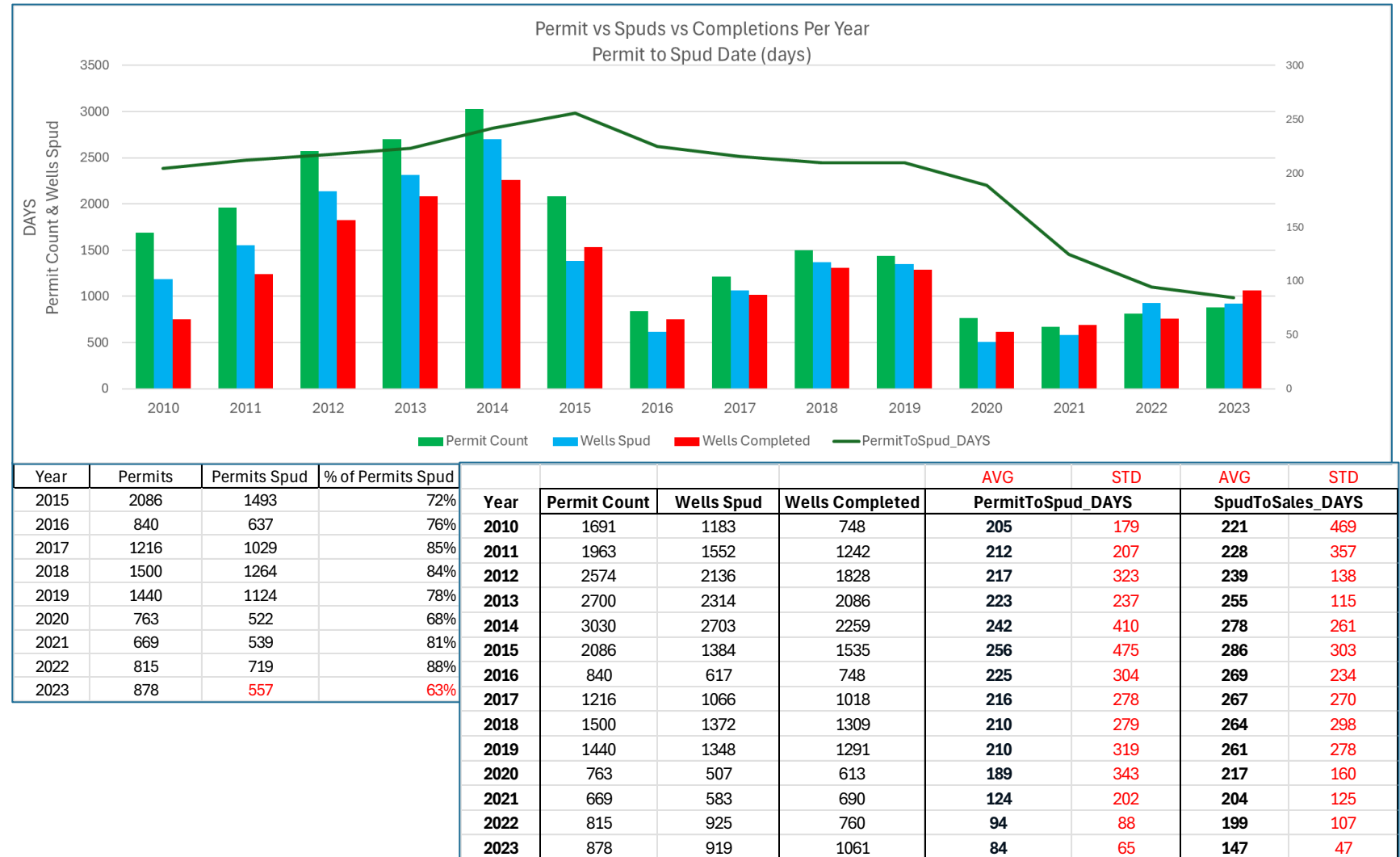
North Dakota – Permit Pace of Development

North Dakota Only Permits Since 2010

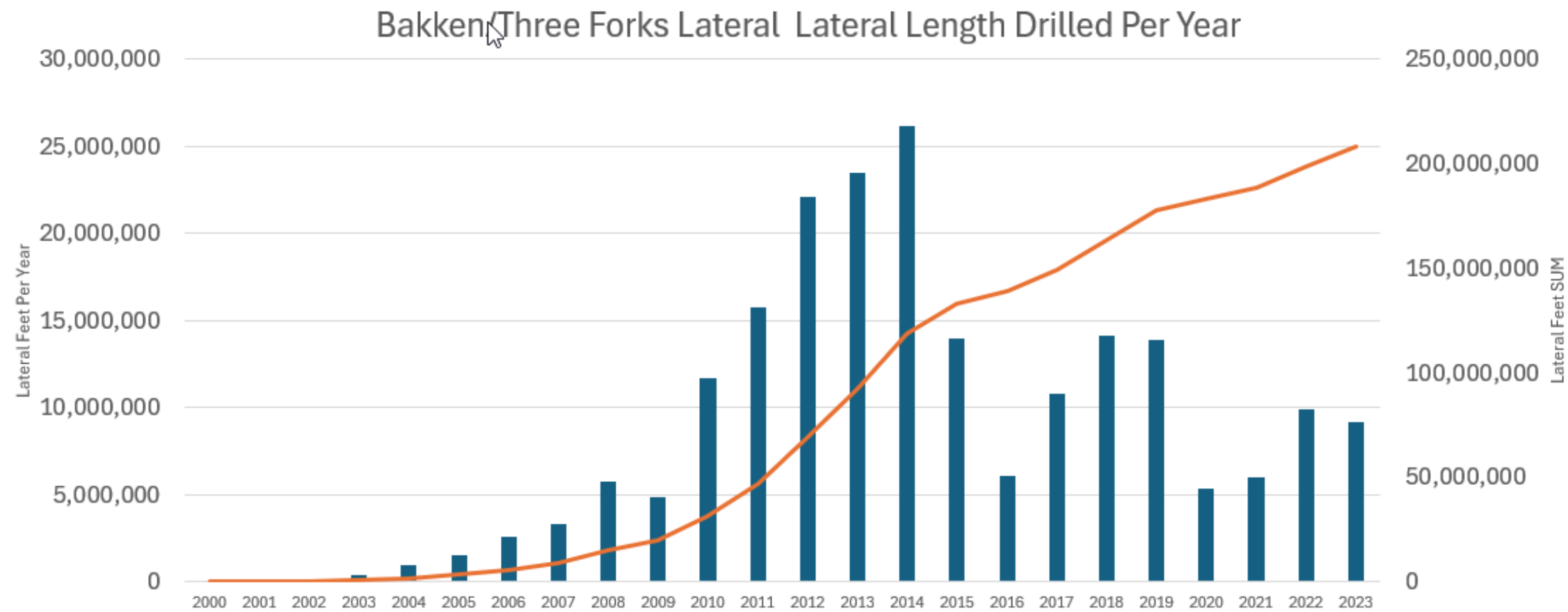
The chart on the upper right shows the permit, spud and completion count per year, with the secondary axis showing the Permit to Spud rate.

The lower right chart shows the Permit Count and Wells Spud, along with the rate of Permit to Spud, Spud to Rig Release, Spud to Completion, and Spud to Sales rates.

The lower left chart shows the Percentage of Permits issued each year that have a spud date.

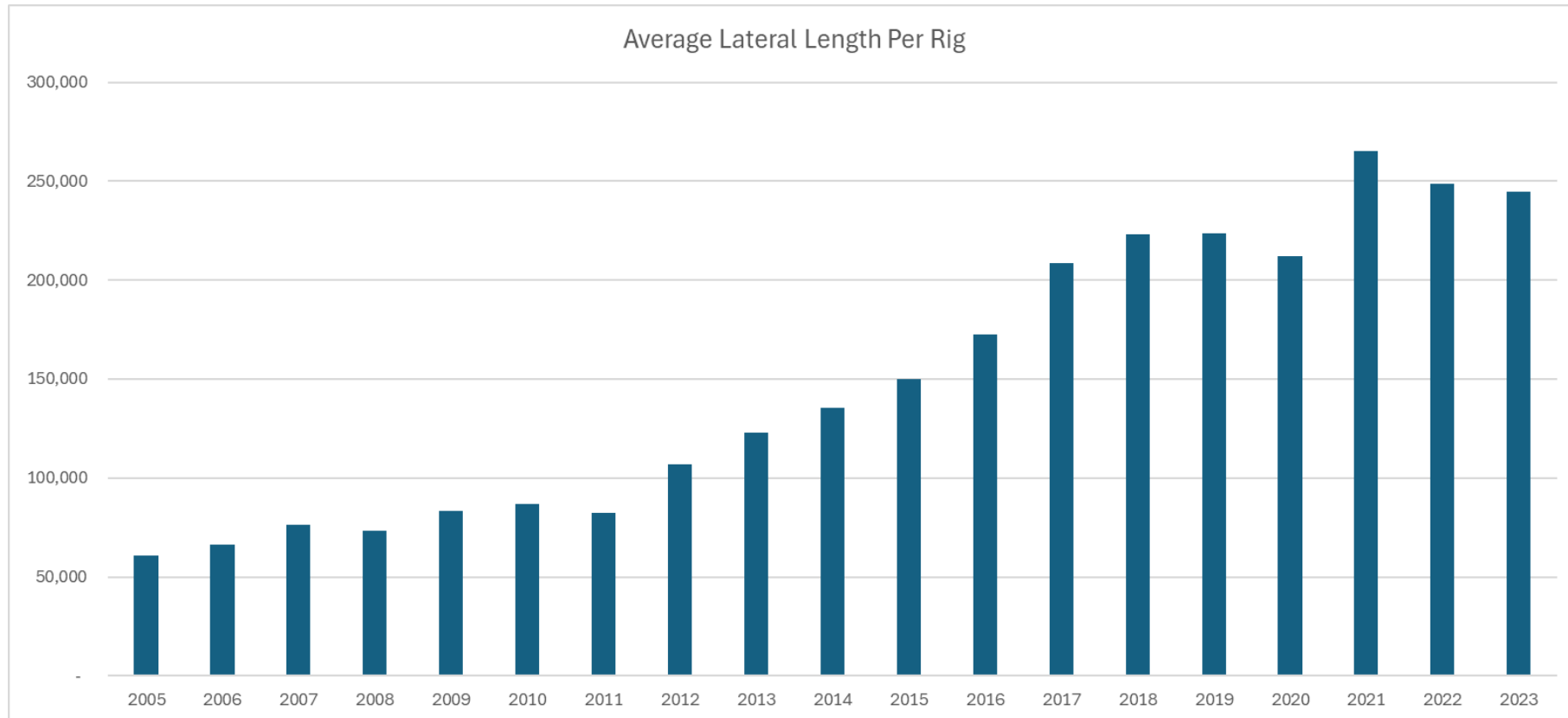


Bakken Lateral Length Per Year vs Rig Count



39.4K Miles of Lateral drilled in the Bakken since 2000 (1.58x the earth's circumference)

Average Lateral Length Drilled Per Rig



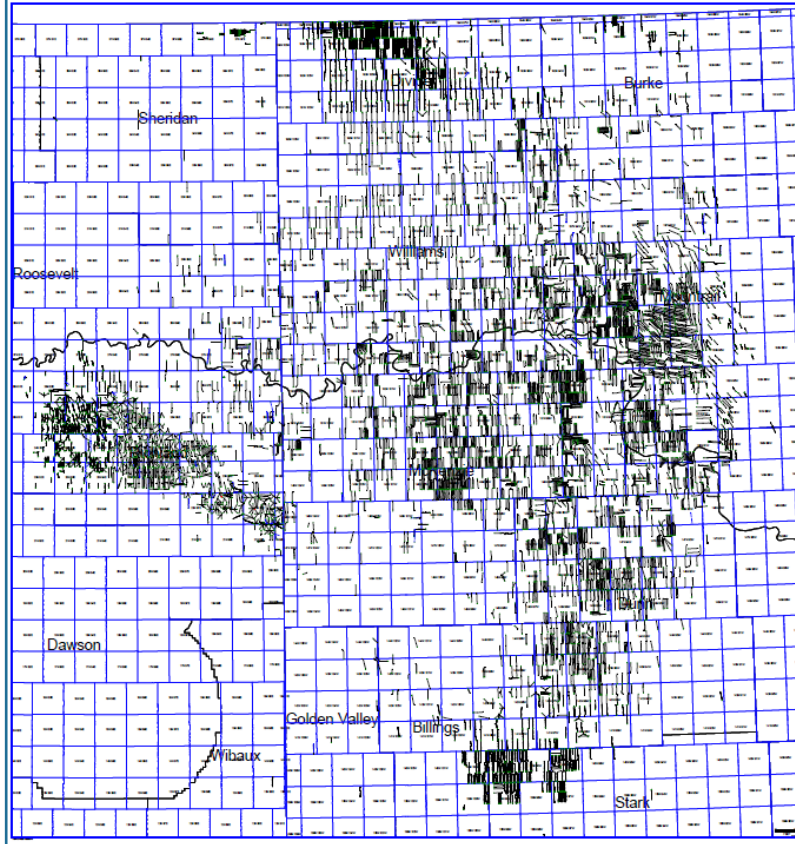
The average lateral length/rig has risen from 60K' in 2005 to 244K' in 2023.

That is 24.4, 10K' laterals/year/rig.

At that pace, 35 rigs can drill 854 wells per year (there was 820 wells spud in the BK/TF in 2023).

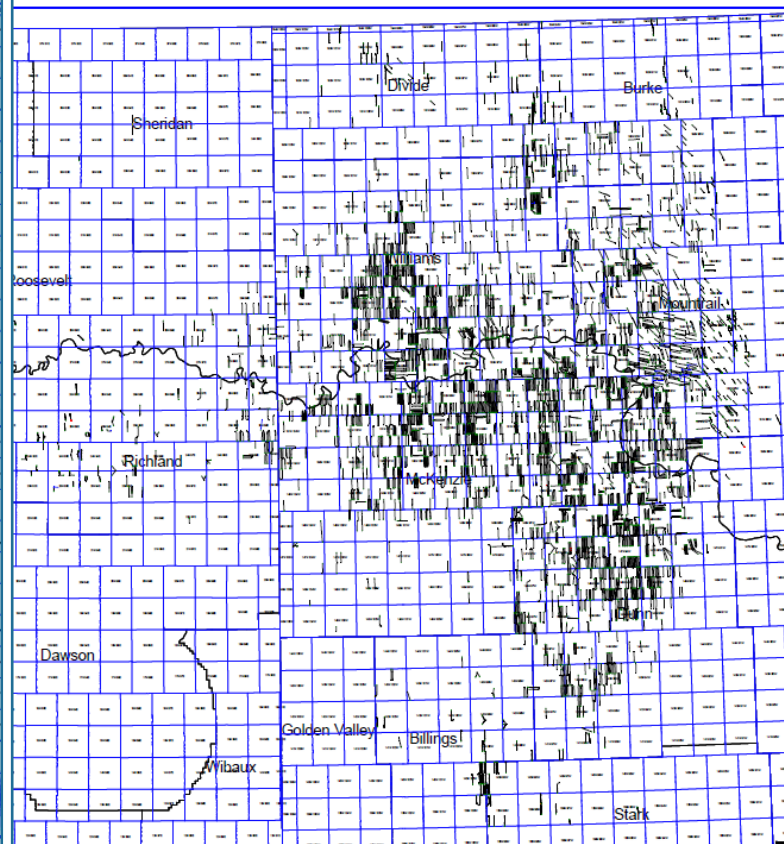
Frac Sizes – Bakken/Three Forks Since 2000

Less than 400 lbs/ft



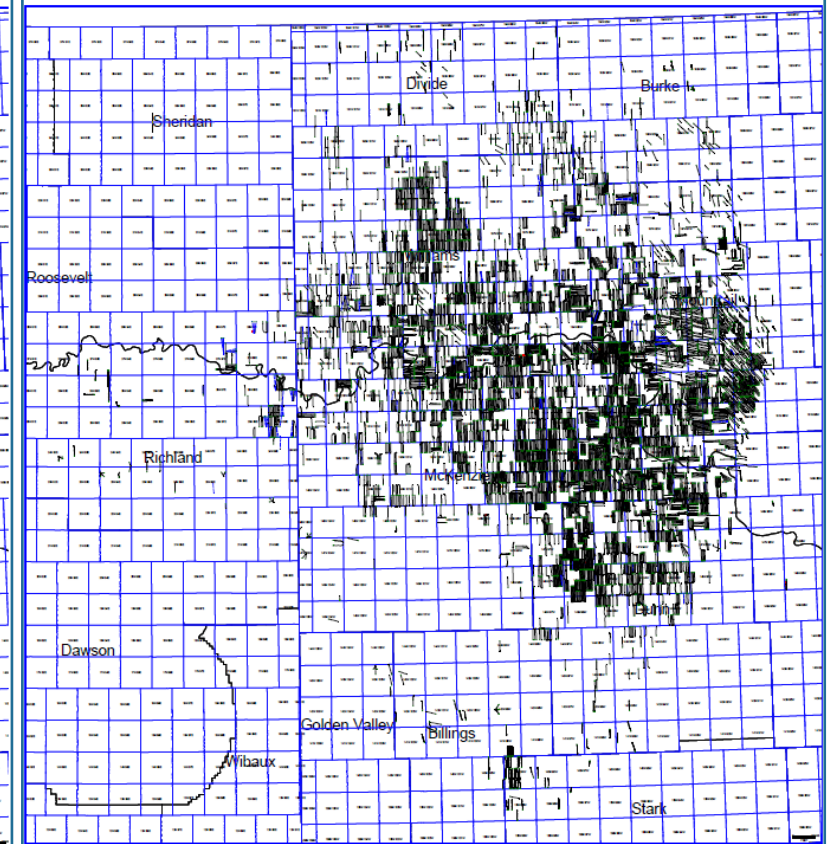
6,792 Wells
34%

Between 400 & 700 lbs/ft



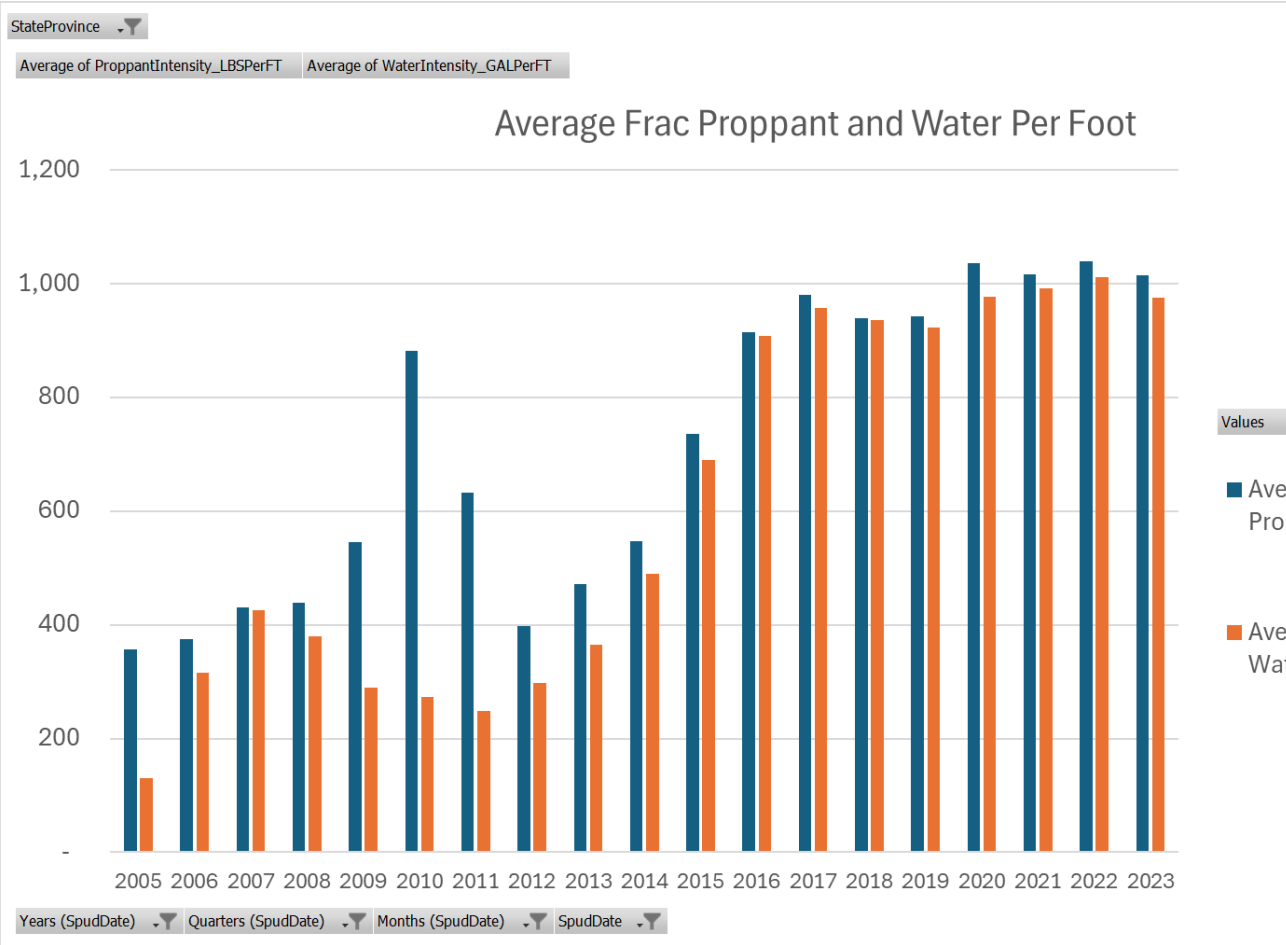
4,264 Wells
22%

Greater than 700 lbs/ft



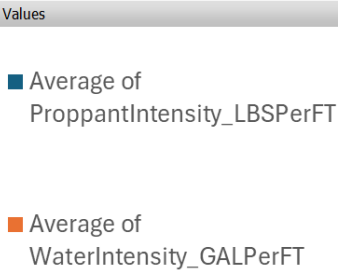
8,716 Wells
44%

Frac Intensity



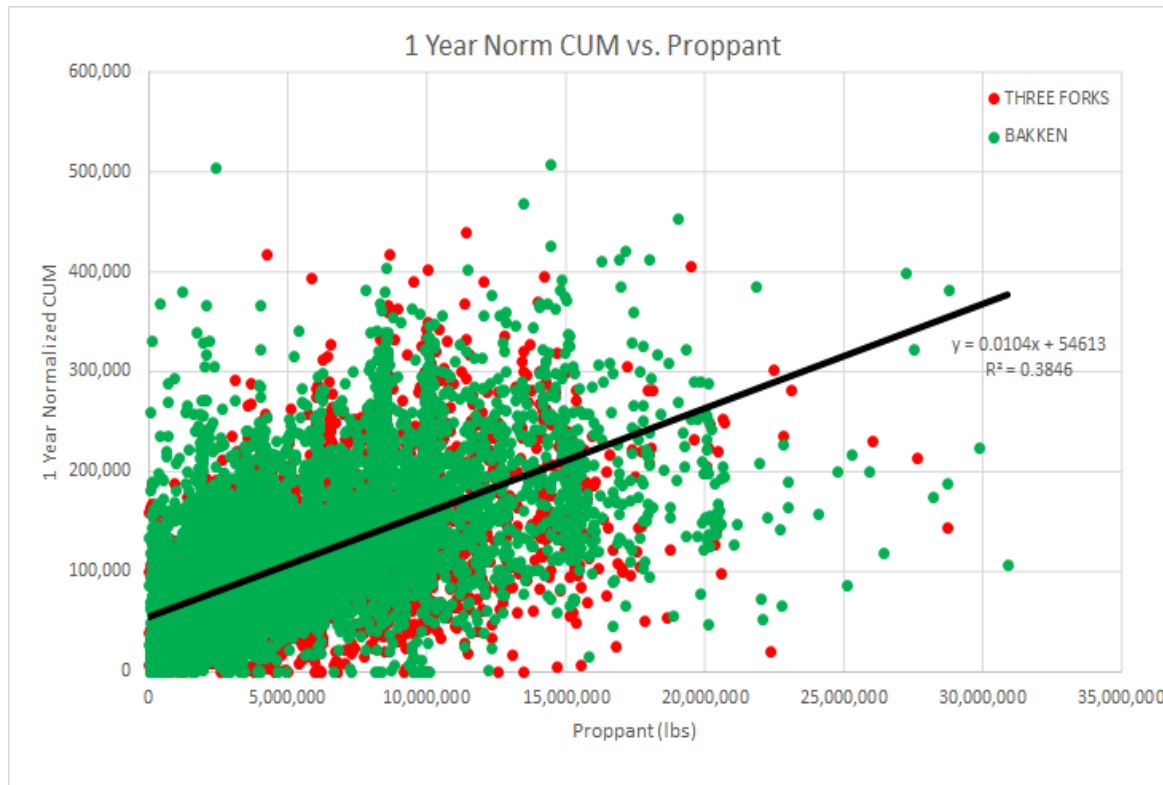
“No replacement for displacement”

Recent Years Average around 1,000lbs and 1,000gals Per Lateral Foot



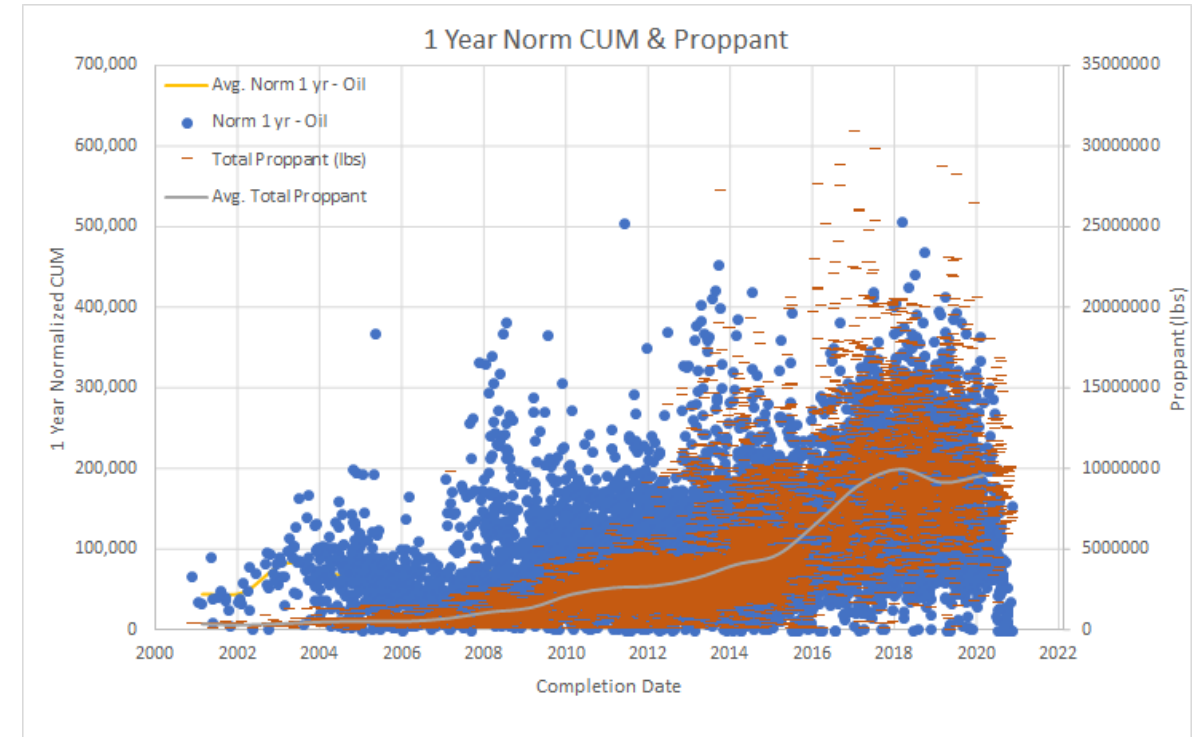
Rail Car Useful Load	231,000
2022 Frac Sand lbs.	9,712,407,584
2022 Rail Cars	42,045
Rail Cars/Well	43.29 (10MMlbs)

Total Proppant and 1 Year Normalized Oil Cum



**wells with spud dates in IHS, excluding 01/01/1900*

Through time completions got bigger which resulted in larger 1-year normalized oil CUMS

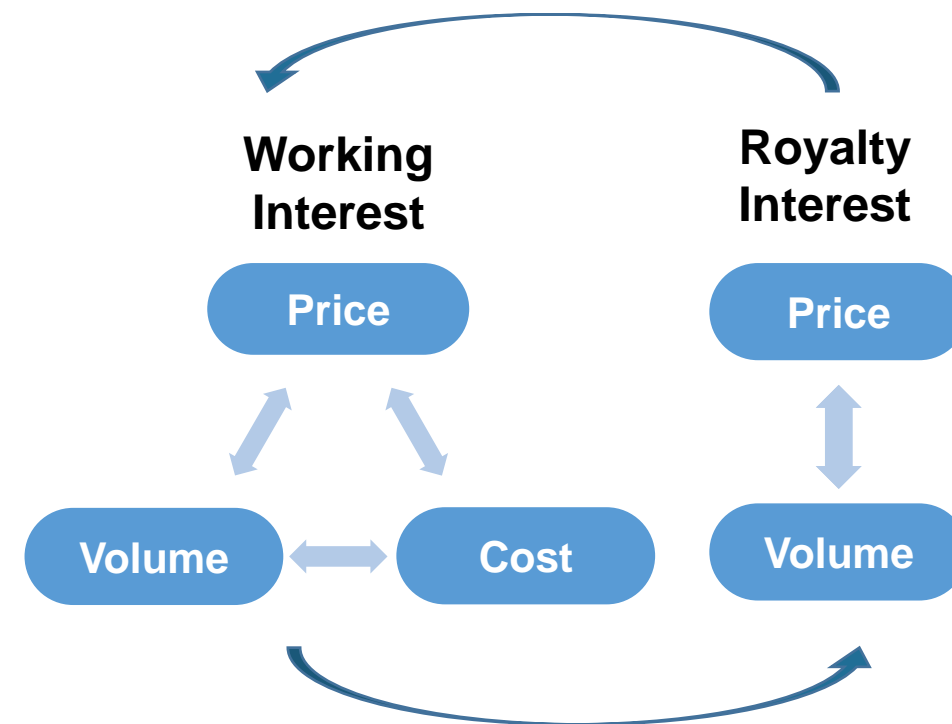


Frac stage lengths played a large role into this, however, in the beginning of 2015 companies revamped their completion techniques and started to use more fluid and proppant

Our View - Economics

- **Well Economics: Three Legs**
 - **Price:** Oil and Gas Prices
 - **Cost:** Cost to drill and complete and ongoing operations
 - **Volume:** Barrels of Oil
- **Royalties in the Williston Basin**
 - \$20 Billion+ Market
 - Preferred Asset Class
 - Billion+ barrels of NET oil have been paid to royalty owners in the Williston Basin
 - Estimated \$175-\$225 Million paid in fee royalties...every month
 - Estimated \$250 Billion+ in direct drilling investment
 - Estimated \$146 Billion into the Bakken
 - Royalties = cost-free production
 - Royalties are dependent on Working Interest
 - Add Cost to the Equation

Valuation Metrics Working Interest and Royalty Interest



Dakota Energy Title Database

849,453 Net Acres – FEE Title

- 19,018 Mineral Owners in our database
- This excludes Federal, State, BIA, etc.
- Predominately Tier 2 and 3 Areas
 - Average – **45.60** Net Acres Per Owner
 - Standard Deviation – 104.29 Net
 - A few factors pull our average up:
 - Ownership that breaks down less than 1-2 net acres often doesn't get broken out
 - A very small number of owners have large ownership (railroad, non-profits, coal company, etc.)
 - The area of this title ownership is predominately Tier 2 and 3 areas and is not as segregated as older developed areas

Conclusion

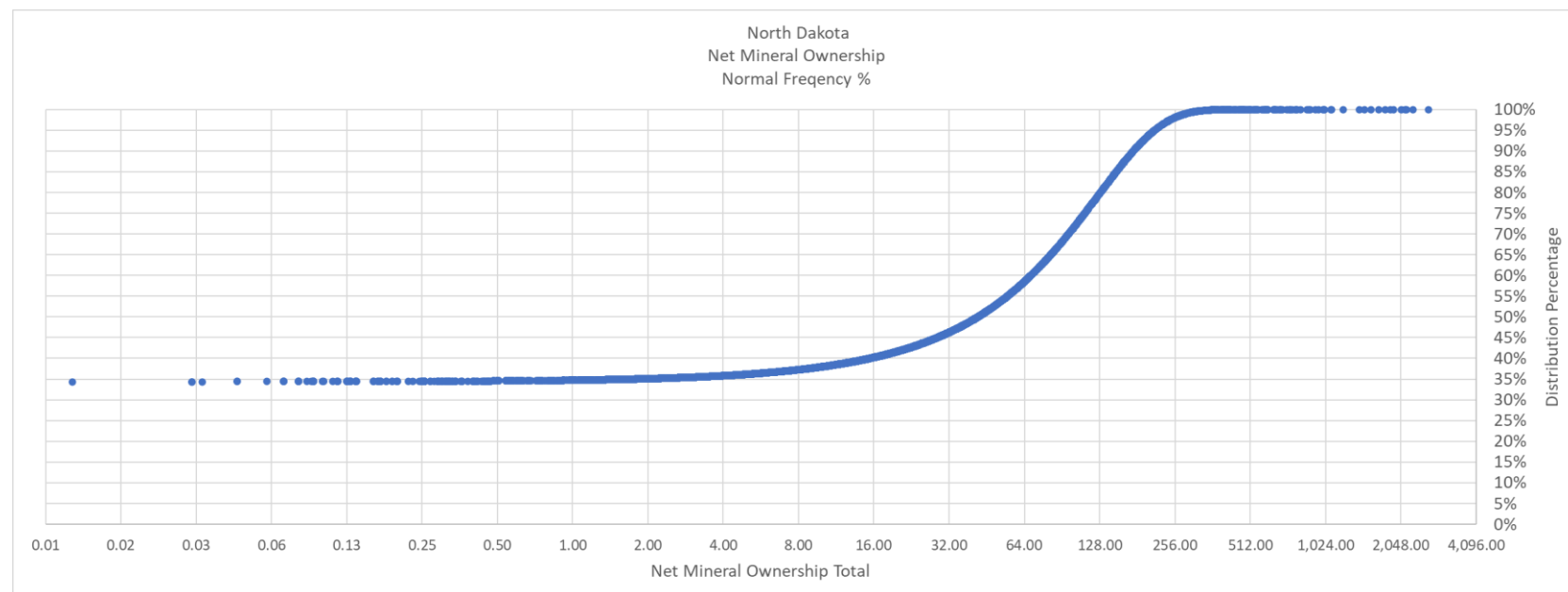
- Mineral Ownership in North Dakota is vastly diverse
 - We believe the prospective Bakken is 6.5 mm acres.
 - Say 70% of the prospective Bakken is fee title, using an average ownership of 45.60 net acres, which equates to **99,792** mineral owners.
 - Add in overriding royalties, I'd bet the revenue decks from all operators is 200K+ of fee royalty owners

North Dakota Mineral Ownership

Title Ownership 849,435
 Number of Owners 19,018
 North Dakota Owners 5,017 (26% of Total Owners)
North Dakota Owners Net Acres 318,966 (37% of Total Net Acres)

ROYALTY RATES 849K Acres

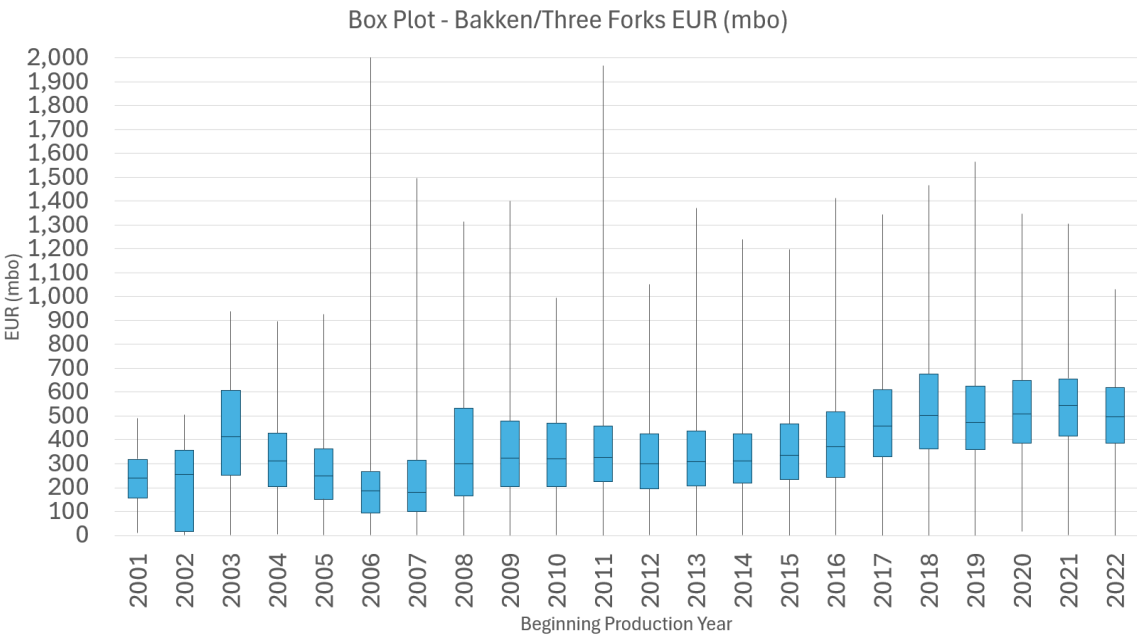
Lease Royalty	Net Acres	% of Total
≤12.5%	44,364	5.22%
13%	19	0.00%
14%	6,579	0.77%
15%	58,402	6.88%
16%	229,980	27.07%
17%	67,347	7.93%
18%	187,476	22.07%
19%	10,924	1.29%
20%	99,045	11.66%
21%	527	0.06%
22%	924	0.11%
≥23%	350	0.04%
UNKNOWN	77,357	9.11%
UNLEASED	66,141	7.79%
	849,435.33	



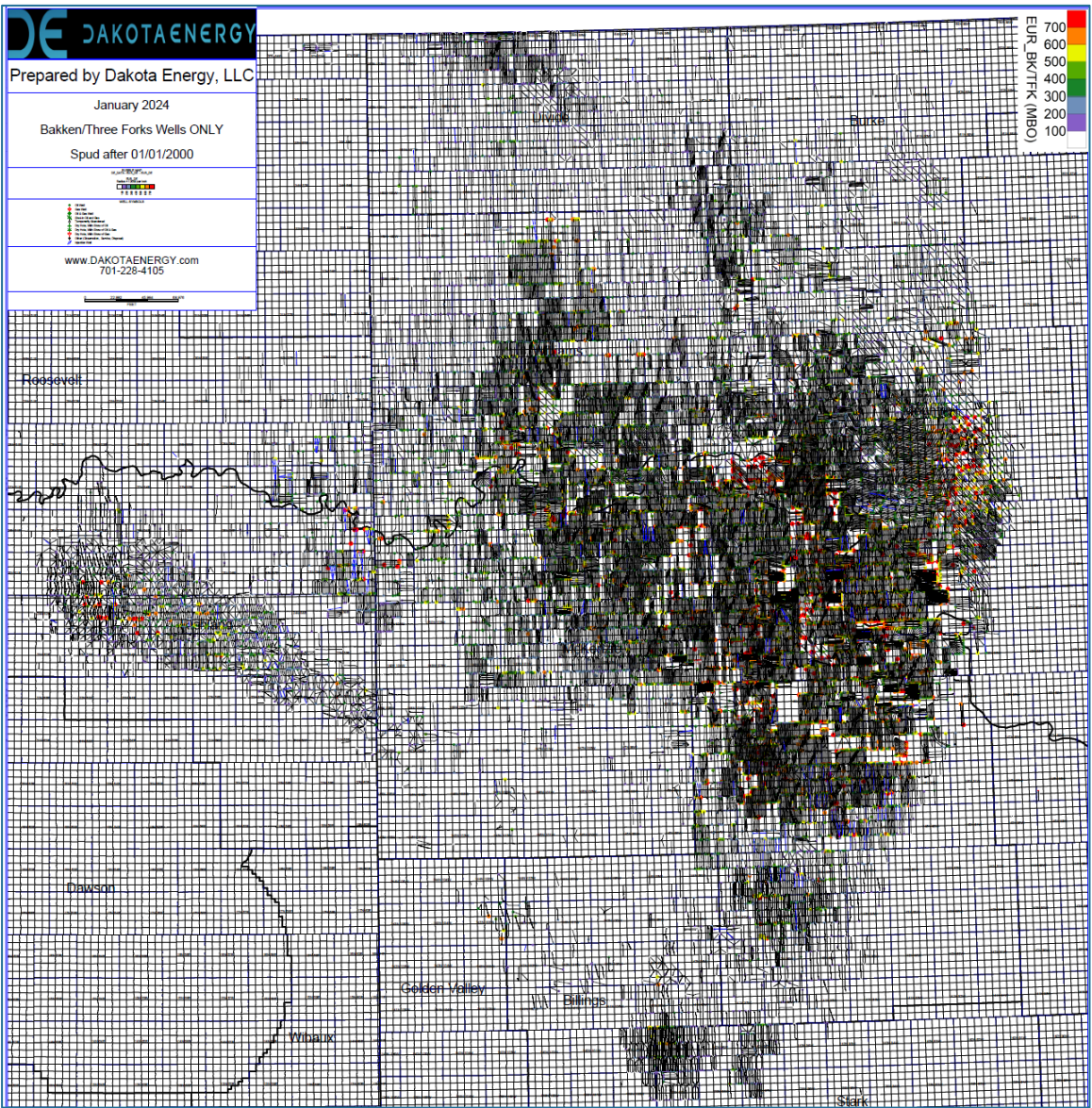
Bakken/Three Forks EUR Bubble Map

Dakota Energy forecasts the oil production from each Bakken / Three Forks well in the Williston Basin. The EUR (Estimated Ultimate Recovery) is displayed on the right in the bubble map. This map gives a comprehensive image of the oil EURs in the Williston Basin.

EUR Box Plot highlights improving averages over time.



EUR (Estimated Ultimate Recovery) Bubble Map



Generalized - Bakken/Three Forks Tiers

We have worked to quantify what innning the Bakken/Three Forks development is in. This is generalized analysis and has a high level of subjectivity. Existing production projections from each well in the Basin was used to determine each tier.

The Below Tier EURs are Normalized to 10,000' Laterals

Tier 1 – 650mbo EUR+ (1,888,081 Acres)

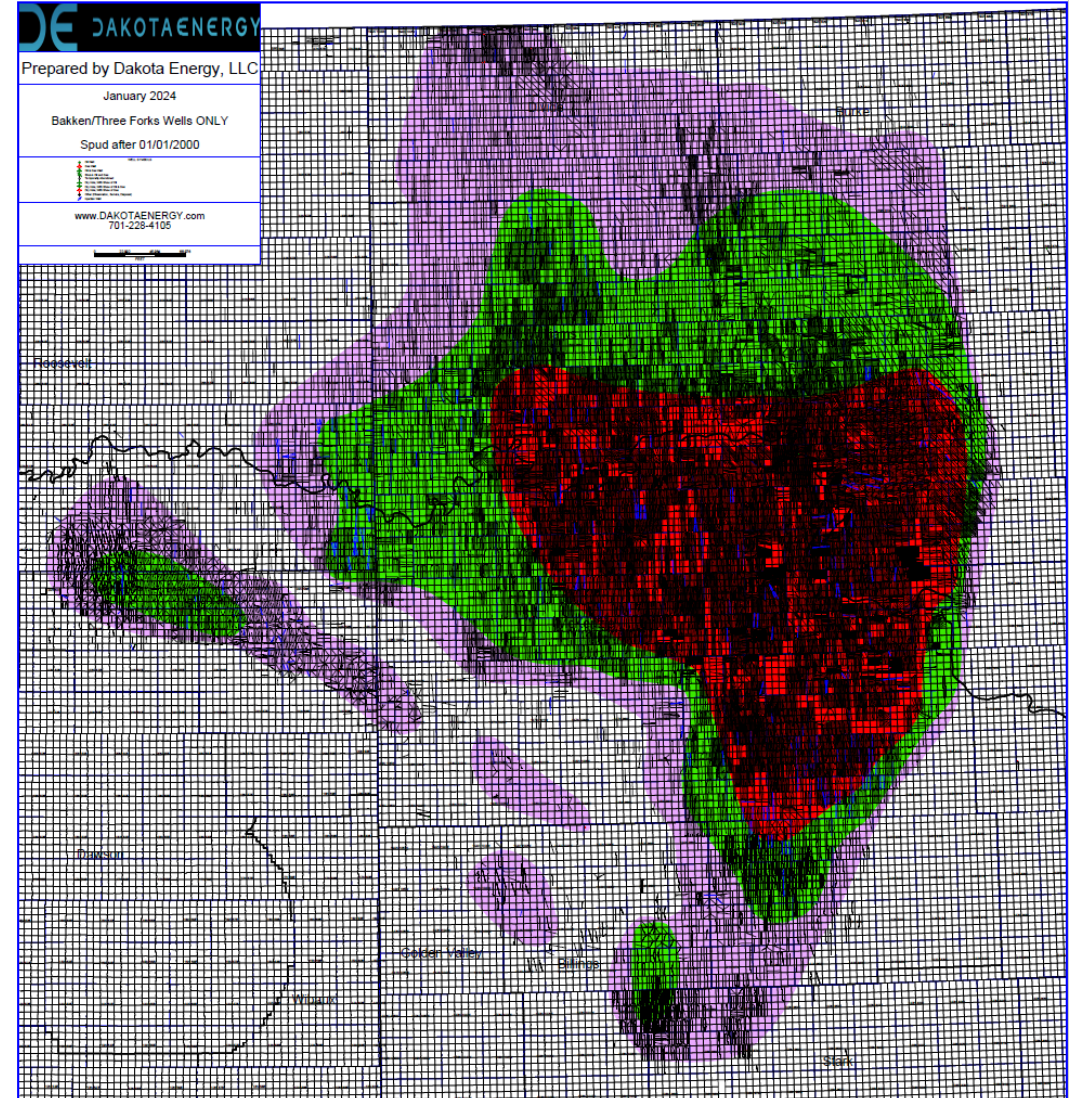
- **Drilled: 11,333 Wells**
 - Oil CUM: 3,599mm oil
 - Oil REM: 1,567mm oil
- **Remaining: 3,418 Locations** (77% Drilled Out)
 - 128 Acre Spacing (10 Wells/1280)
 - 2,221mm bo rem (@650mbo EUR)

Tier 2 – 500mbo EUR+ (2,105,781 Acres)

- **Drilled: 4,815 Wells**
 - Oil CUM: 1,064mm oil
 - Oil REM: 451mm oil
- **Remaining: 3,411 Locations** (59% Drilled Out)
 - 256 Acre Spacing (5 Wells/1280)
 - 1,705mm bo rem (@500mbo EUR)

Tier 3 – 350mbo EUR+ (2,506,859 Acres)

- **Drilled: 2,490 Wells**
 - Oil CUM: 406mm oil
 - Oil REM: 89mm oil
- **Remaining: 3,385 Locations** (42% Drilled Out)
 - 426 Acre Spacing (3 Wells/1280)
 - 1,184mm bo rem (@350mbo EUR)




Basin Balance Sheet

- Basin balance sheet is very strong
- Asset to Liabilities estimated at 34x
- What does the net decade look like...
- PDP - 3BBo+
 - 300mmbo State
 - 321mmbo Royalties
 - 118mmbo Royalties ND Owners
- PUD - 5BBo+
 - 500mmbo State
 - 535mmbo Royalties
 - 198mmbo Royalties ND Owners


				\$60,000	\$100,000	
County	Avg BO/PD	Well Count	BO/Well	Value/BO	Liabilities	Net Value
RENVILLE	1,422	190	7.48	\$85,326,167	\$19,000,000	(\$66,326,167)
WARD	46	6	7.65	\$2,752,500	\$600,000	(\$2,152,500)
BOTTINEAU	3,745	482	7.77	\$224,685,667	\$48,200,000	(\$176,485,667)
MC HENRY	129	15	8.59	\$7,734,167	\$1,500,000	(\$6,234,167)
BURKE	7,288	508	14.35	\$437,287,333	\$50,800,000	(\$386,487,333)
GOLDEN VALLEY	1,277	82	15.58	\$76,629,167	\$8,200,000	(\$68,429,167)
BOWMAN	9,334	531	17.58	\$560,032,000	\$53,100,000	(\$506,932,000)
STARK	4,883	273	17.89	\$292,985,667	\$27,300,000	(\$265,685,667)
DIVIDE	15,003	797	18.82	\$900,201,000	\$79,700,000	(\$820,501,000)
BILLINGS	9,280	482	19.25	\$556,778,833	\$48,200,000	(\$508,578,833)
MCLEAN	1,433	43	33.32	\$85,975,500	\$4,300,000	(\$81,675,500)
SLOPE	607	16	37.93	\$36,412,667	\$1,600,000	(\$34,812,667)
WILLIAMS	170,856	3,329	51.32	\$10,251,371,167	\$332,900,000	(\$9,918,471,167)
MOUNTRAIL	219,310	3,534	62.06	\$13,158,620,333	\$353,400,000	(\$12,805,220,333)
MCKENZIE	376,621	5,676	66.35	\$22,597,256,833	\$567,600,000	(\$22,029,656,833)
DUNN	251,413	2,956	85.05	\$15,084,809,667	\$295,600,000	(\$14,789,209,667)
				\$64,358,858,667	\$1,892,000,000	(\$62,466,858,667)

1,656 Billion Barrells NET to the State and Royalty Owners.



Scan the *QR*
code to view the
**Bakken Three
Forks EUR
Bubble Map**





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