

Oil and Gas Update

July 18, 2019 | Van Hook CookFest

Lynn Helms, ND Department of Mineral Resources Director



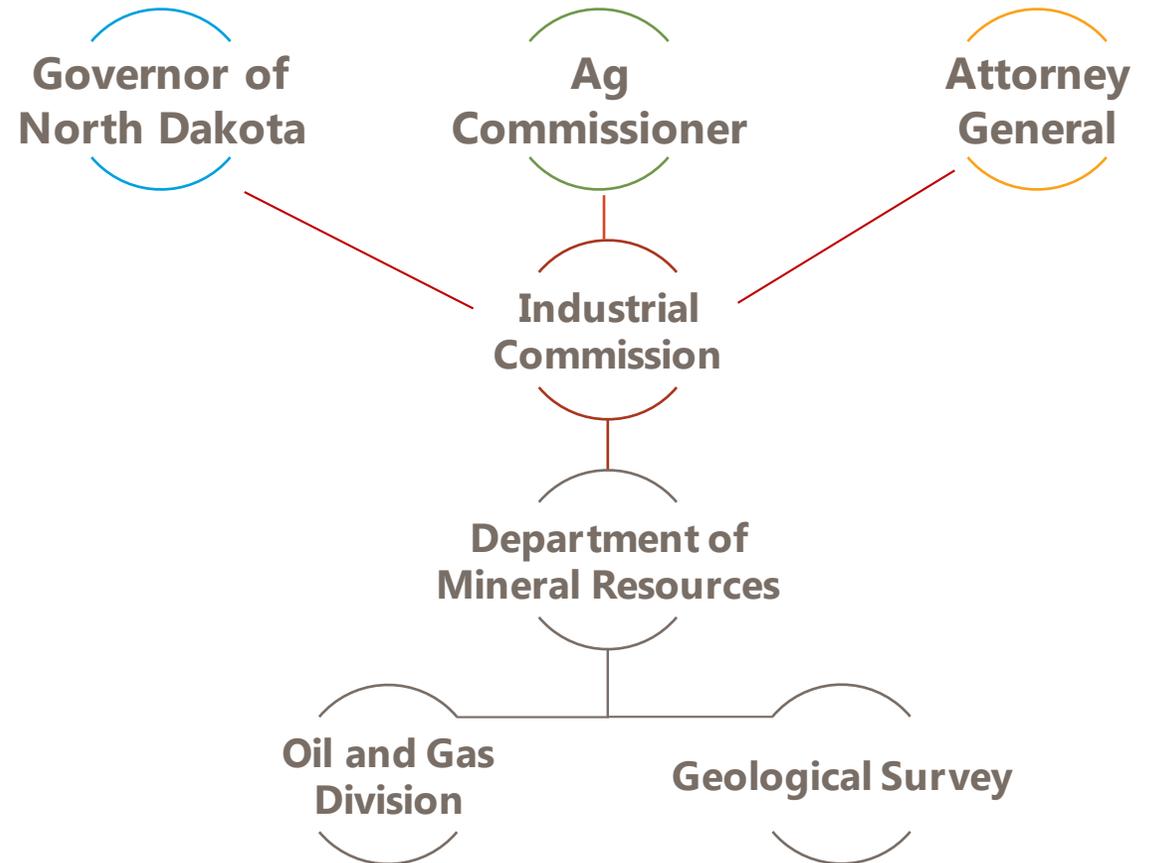
THE DRILL DOWN:

- Permitting and Wells
- Active Drilling Rigs
- Oil and Gas Production
- Enhanced Oil Recovery
- Mountrail County & Fort Berthold Update
- Mineral Interests
- 2019 Legislation & Rulemaking



OIL AND GAS DIVISION

“Our mission is to encourage and promote the development, production, and utilization of oil and gas in the state in such a manner as will prevent waste, maximize economic recovery, and fully protect the correlative rights of all owners to the end that the landowners, the royalty owners, the producers, and the general public realize the greatest possible good from these vital natural resources.”



An aerial photograph of a shale oil field in North Dakota during autumn. The landscape is dominated by rolling hills covered in dense forests with vibrant yellow and orange foliage. In the center, a large, reddish-brown circular area contains several oil pumpjacks. A dirt road winds through the terrain. In the background, a range of hills is visible under a clear blue sky, with a few communication towers on a distant peak.

North Dakota Shale

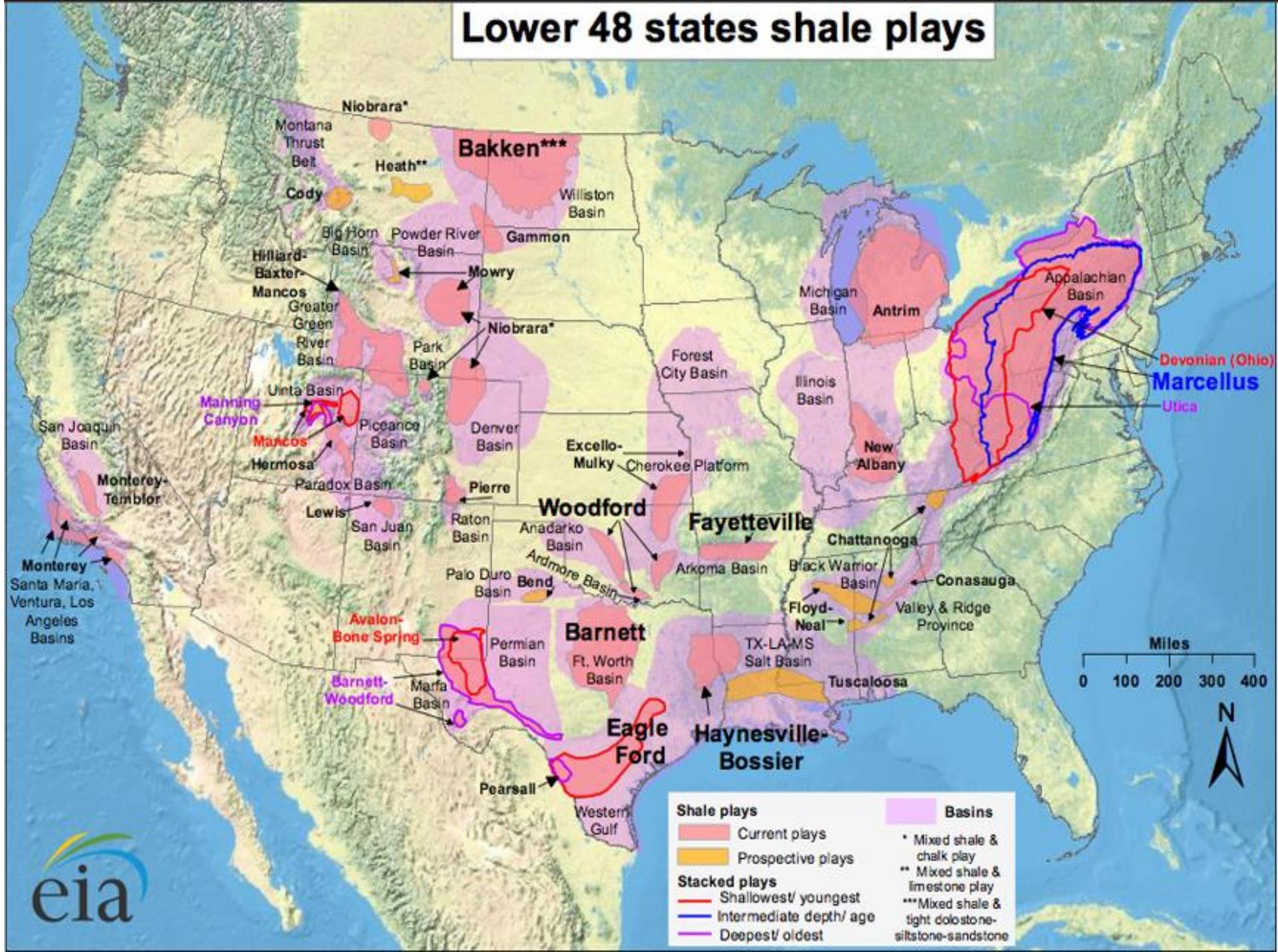
UNITED STATES OIL FIELDS

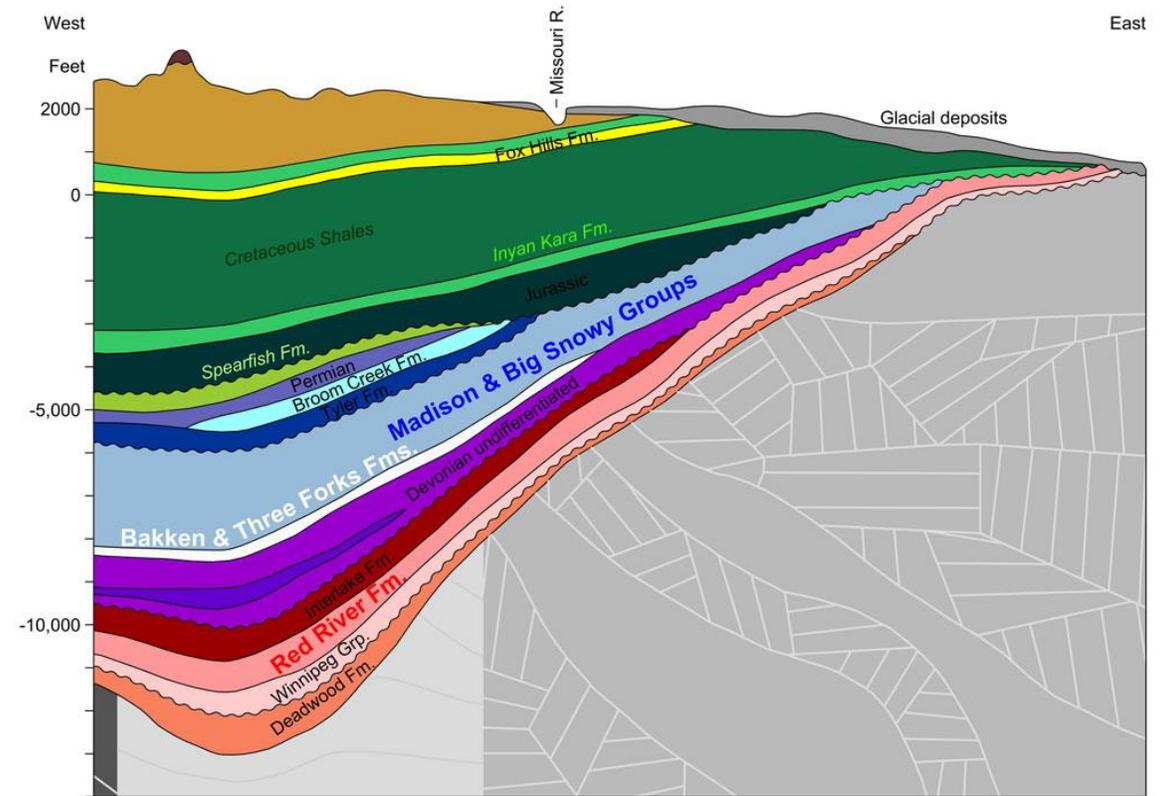
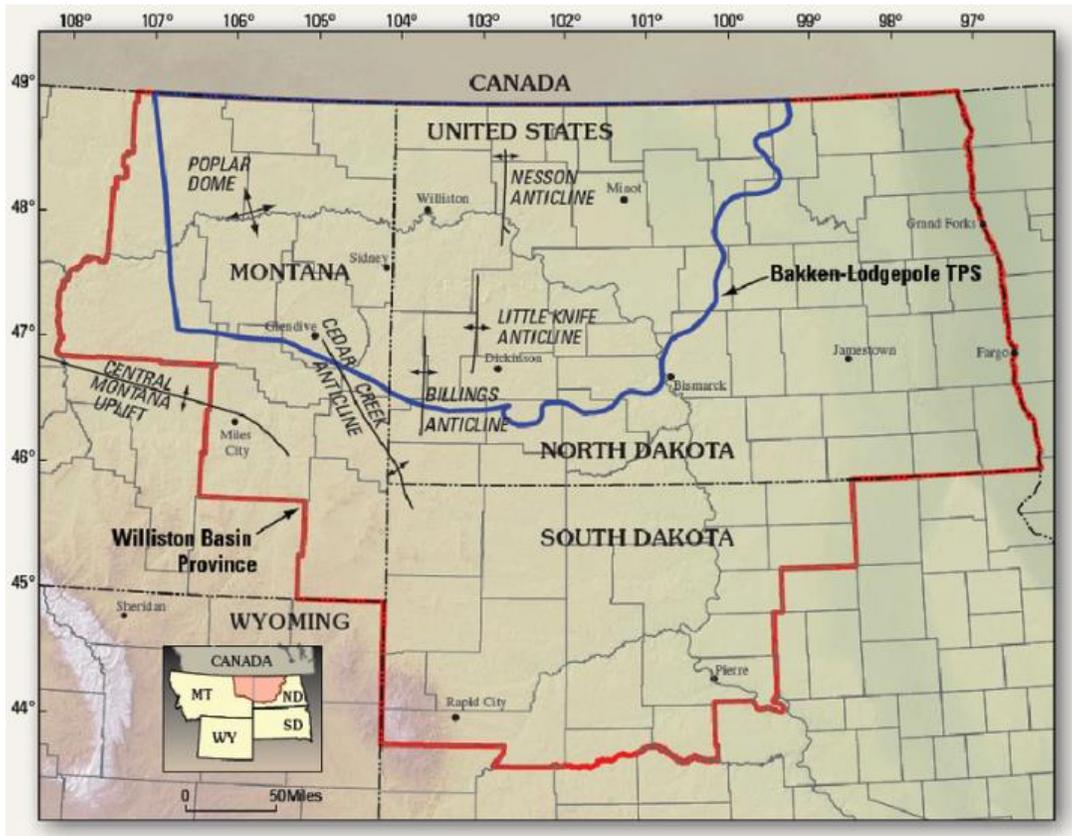
2010 - ND Geological Survey Bakken & Three Forks Assessments:

- **OOIP - 169 billion barrels**
("OOIP" – Original Oil in place)
- **EUR - 4 billion barrels**
("EUR" – Expected ultimate recovery)

Bakken/Three Forks Production YTD: 2.98 billion barrels of oil

Lower 48 states shale plays





WILLISTON BASIN

BAKKEN "POOL" CUMULATIVE PRODUCTION

DMR Pool	Cumulative Oil Production
Bakken	2,878,197,018 bbls oil
Bakken/Three Forks	17,818,985 bbls oil
Sanish	87,443,276 bbls oil
Three Forks	2,604 bbls oil
TOTAL	2,983,461,883 bbls oil

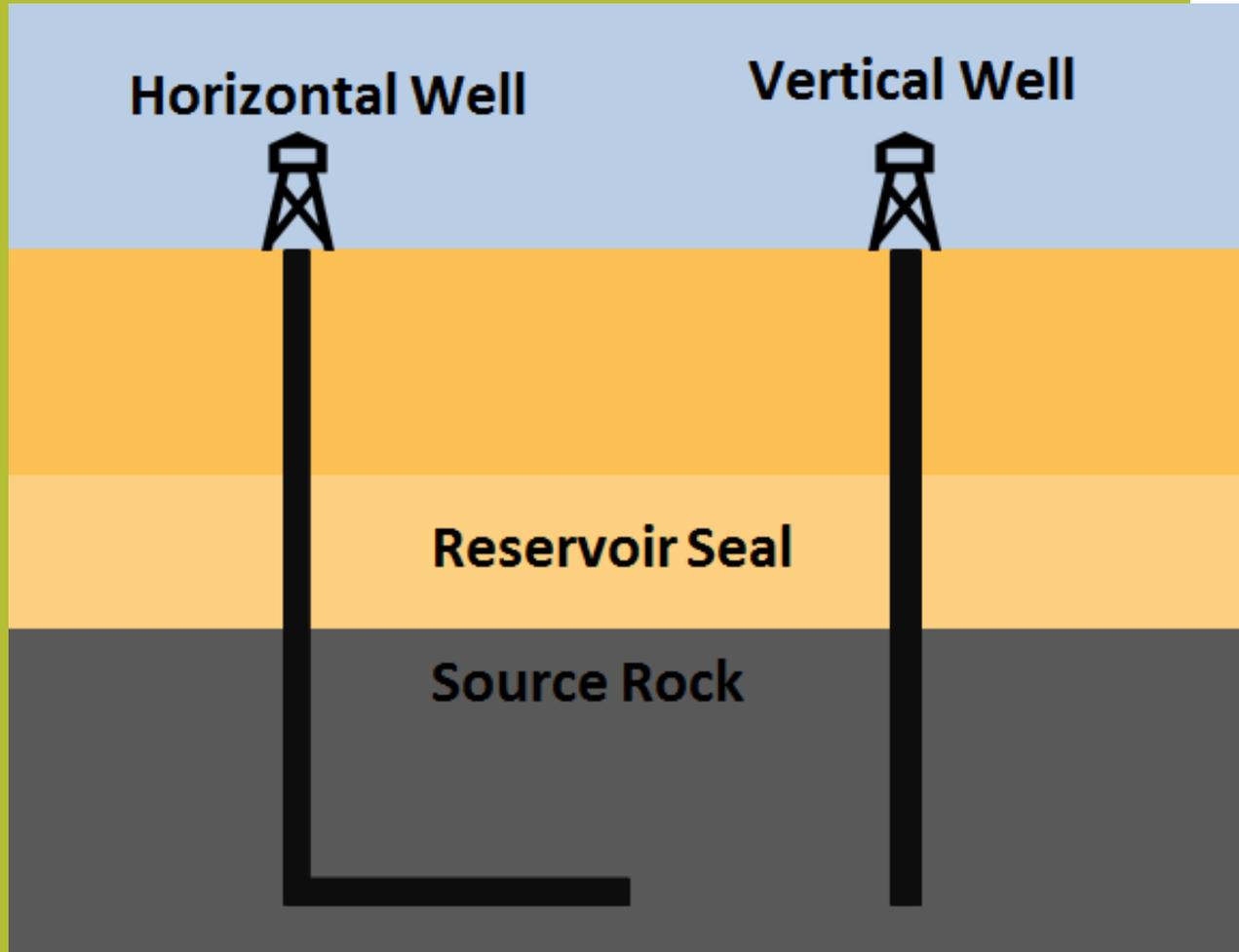


2 Miles

ADVANCEMENTS IN DRILLING TODAY

- More efficient rigs
 - MWD and Mud Motors
 - PDC Bits
 - Walking Rigs
 - Batch Drilling
- More efficient rig teams
 - MWD, Geologists, Rig Hands, Tool Pusher, Company Rep
 - Targeted deposits
- Better well control
- Horizontal Drilling & Next Generation Fracking

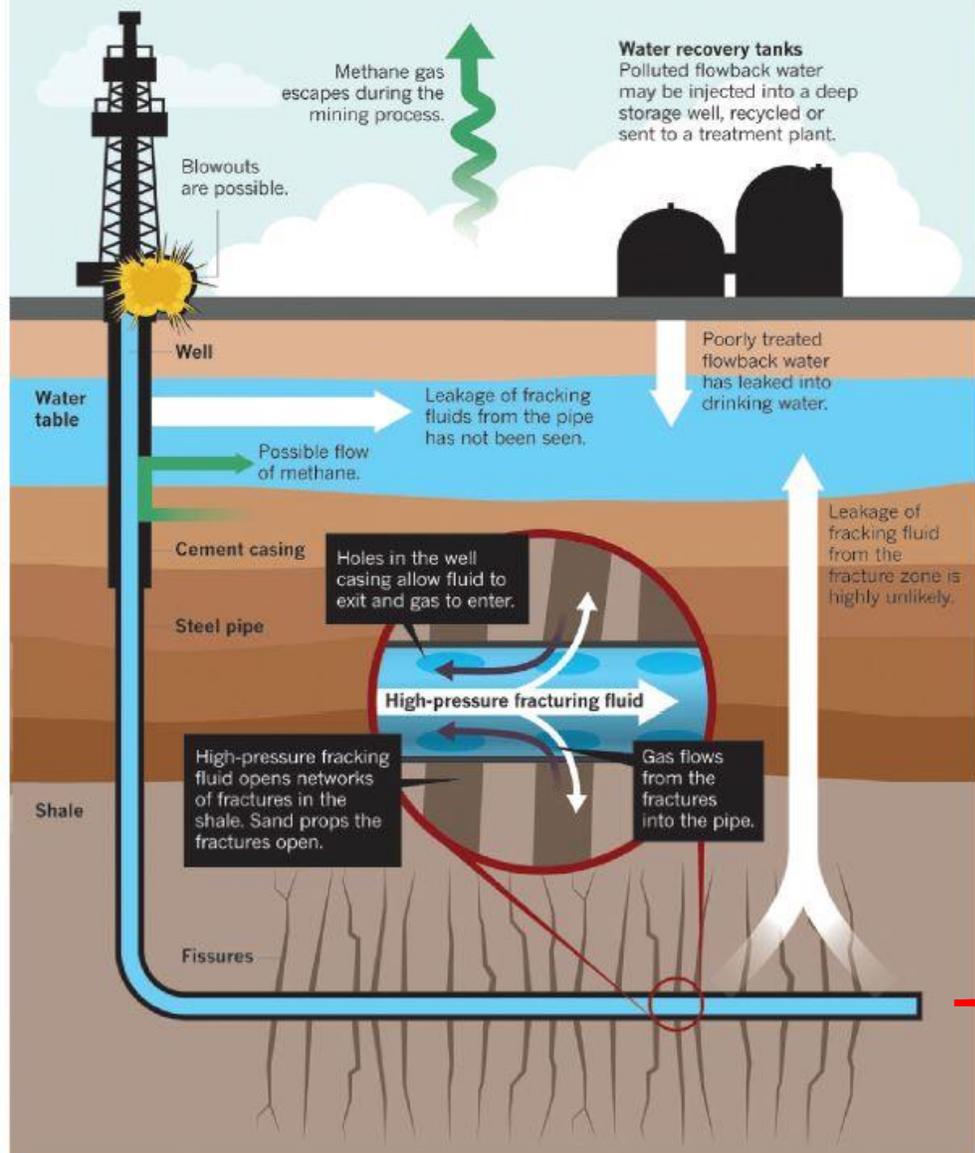
VERTICAL & HORIZONTAL WELLS



- Vertical or “Conventional” drilling was the 1st method of accessing oil reserves with a smaller reach. Resulted in more wells in a geographic area.
- Horizontal Drilling capabilities emerged allowing for:
 - Ability to reach difficult targets
 - Ability to drain a broader area
 - Increase are of well
 - Improve productivity of fractured reservoirs
 - Seal or relieve pressure in an out-of-control well.

FRACKING FOR FUEL

Hydraulic fracturing is used to access oil and gas resources that are locked in non-porous rocks.



HYDRAULIC FRACKING

- Transitioned from sliding sleeve to plug and perf
- Targeted frac zones vs. fixed intervals
- Average sand amount doubled from 2014
- Number of frac zones up by 50%

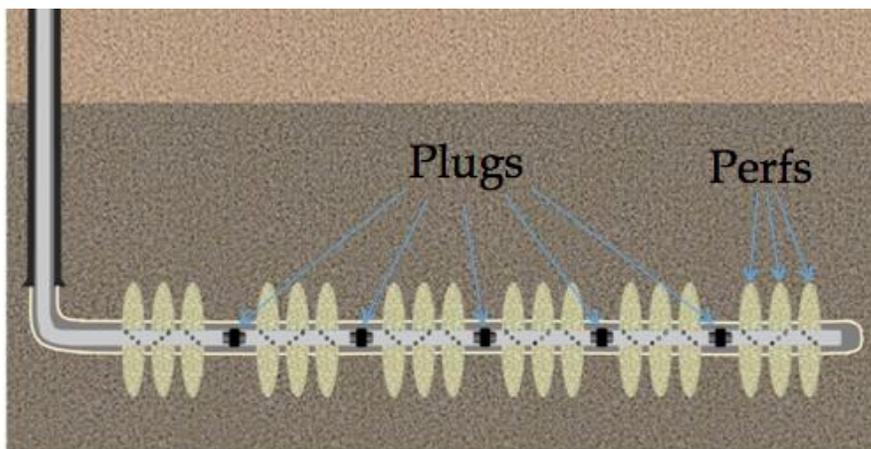
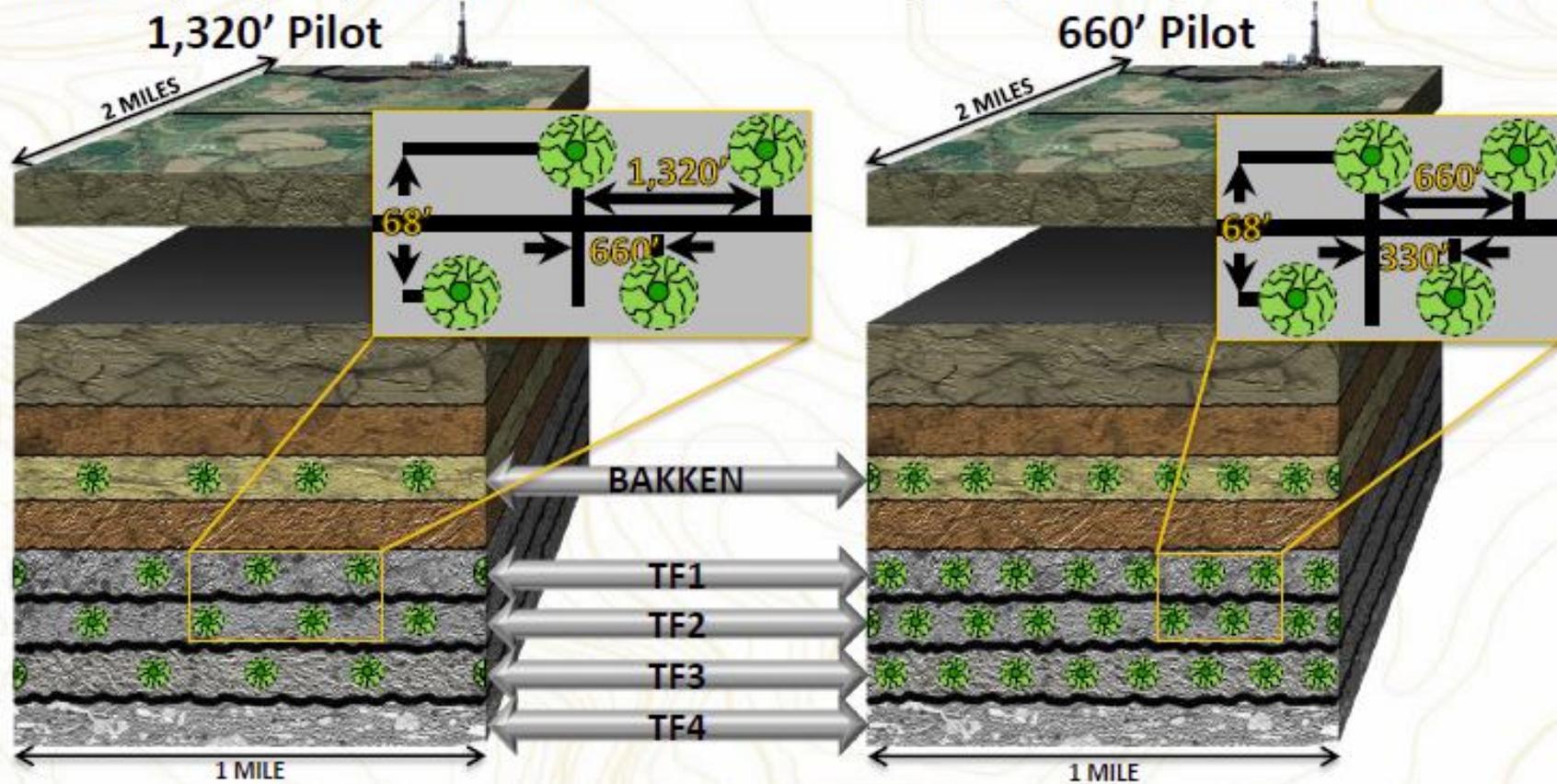


Figure. Basic mechanism of hydraulic fracturing and potential routes of water contamination.² Reprinted with permission.

1,320' & 660' Pilot Density Projects: 2013-14

Hawkinson, Tangsrud, and Rollefstad

Wahpeton, Lawrence, Mack, and Hartman



WELL
DENSITY

3 project areas

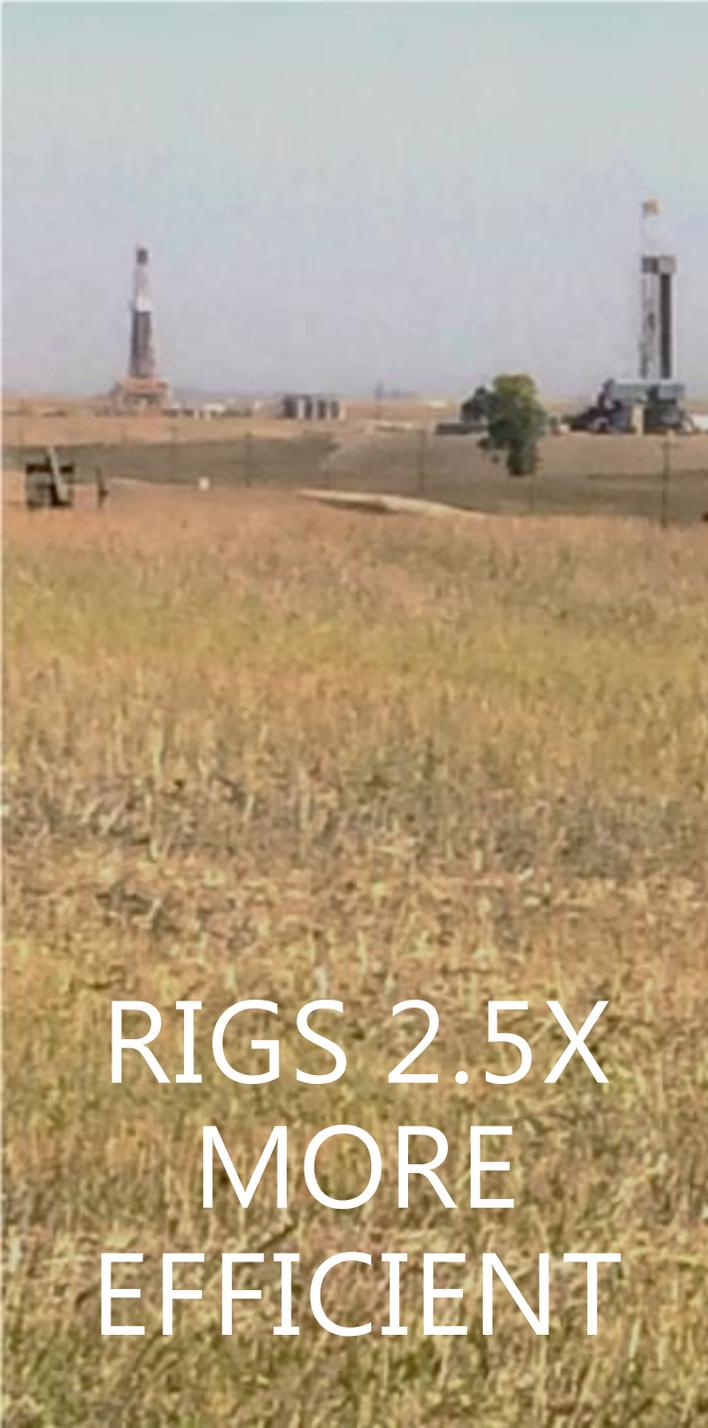
1,320 ft. same-zone spacing

34 new wells (gross)

4 project areas

660 ft. same-zone spacing

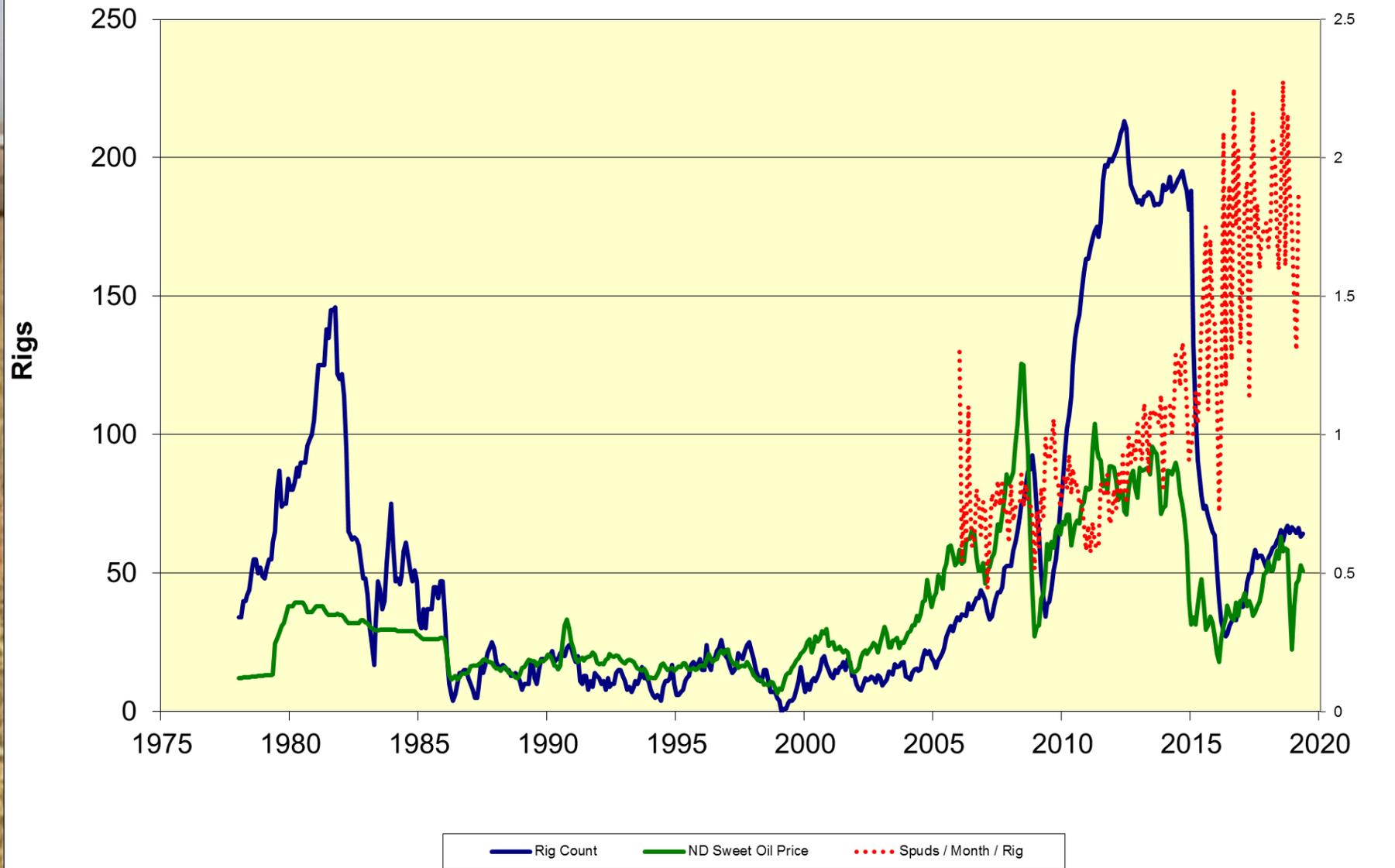
31 new wells (gross)



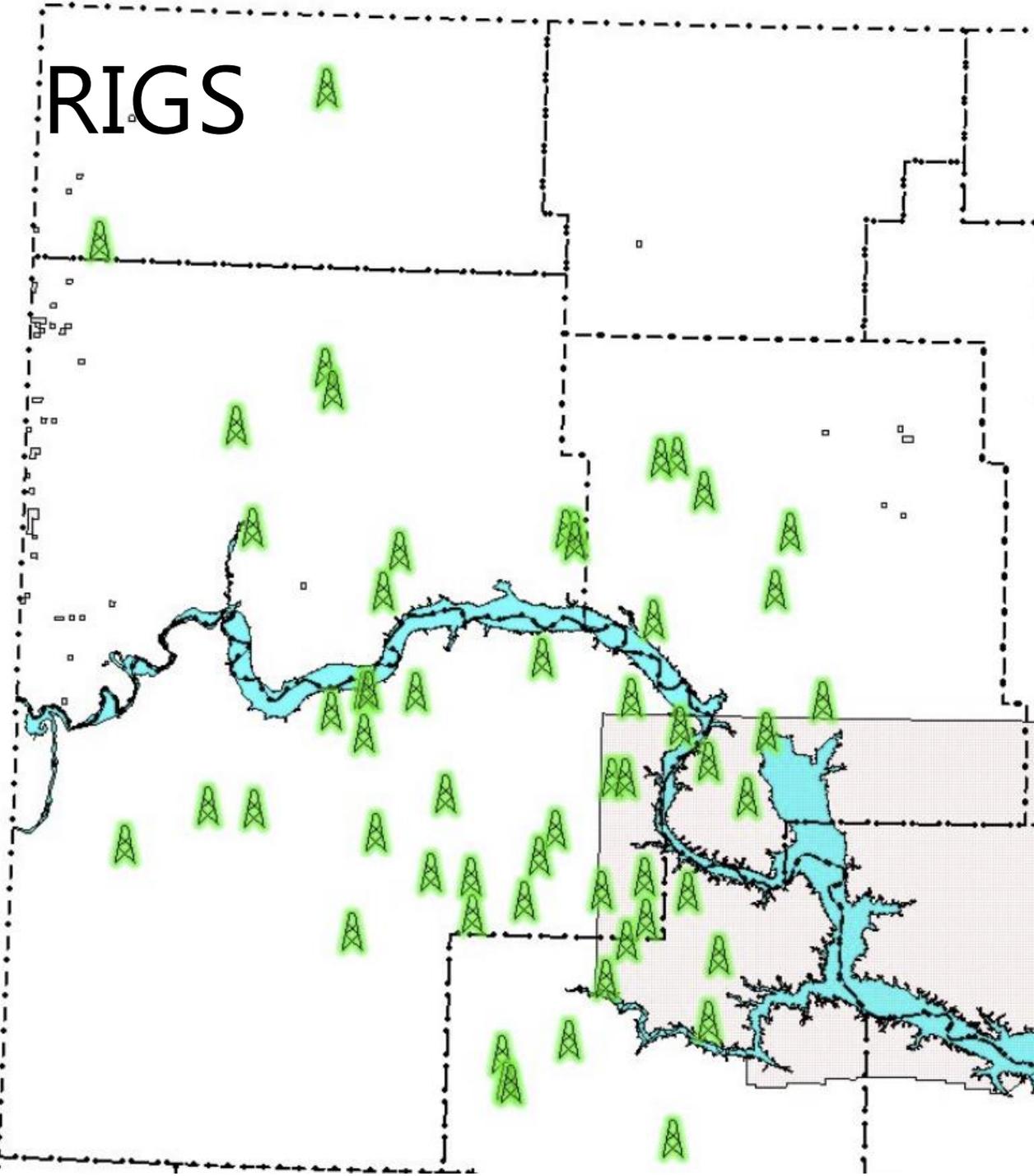
RIGS 2.5X
MORE
EFFICIENT



North Dakota Average Monthly Rig Count



RIGS



WELLS

Active	15,397
Conventional	1,706
Bakken/Three Forks	13,691
Inactive >\$50 for 90 days Jan. 2019	1,517
Waiting on Completion >\$55 for 90 days Feb. 2019	867
Permitted >\$60 for 90 days	1,880
Increase Density Approved 03/31/19	13,948
Total	33,609
Estimated Final	
\$60/BO = 60-70 Rigs = 20 Yr	40,000
\$80/BO = 70-80 Rigs = 70 Yr	85,000

**INDUSTRIAL COMMISSION OF NORTH DAKOTA
OIL & GAS DIVISION
2019 MONTHLY STATISTICAL UPDATE**

Month	Monthly Oil Production	Wells Producing	Average Daily Production	Permits				Spuds	Average Rig Count
				Dev	Ext	WC	Total		
Jan	43,519,155	15,424	1,403,844	127	0	0	127	98	66
Feb	37,425,711	15,156	1,336,633	109	0	0	109	85	64
Mar	43,144,557	15,365	1,391,760	133	0	0	133	128	66
Apr	41,735,647	15,490	1,391,188	128	0	1	129	109	63
May	43,191,793	15,698	1,393,284	140	0	0	140	147	65
Jun									
Jul									
Aug									
Sep									
Oct									
Nov									
Dec									
Totals	165,825,070		1,370,455	637	0	1	638	567	65

**INDUSTRIAL COMMISSION OF NORTH DAKOTA
OIL & GAS DIVISION**

2019

Month	Monthly Oil Production	Wells Producing	Average Daily Production	Permits	Spuds	Average Rig Count
				Total		
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Apr	41,735,647	15,490	1,391,188	129	109	63
May	43,191,793	15,698	1,393,284	140	147	65
Jun						
Jul						
Aug						
Sep						
Oct						
Nov						
Dec						
Totals	165,825,070		1,370,455	638	567	65

2018

Permits	Spuds	Average Rig Count
Total		
151	93	56
96	100	57
108	122	59
104	119	60
121	104	62
113	102	63
163	123	66
152	140	61
113	106	65
183	143	67
116	123	64
92	116	67
1512	1391	62



North Dakota Production

NORTH DAKOTA PRODUCTION-MAY 2019



1,393,284

BARRELS PER DAY

1,403,808

January 2019



2,821,672

MCF PER DAY

2,833,131

April 2019

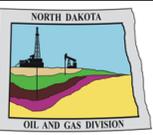


15,698

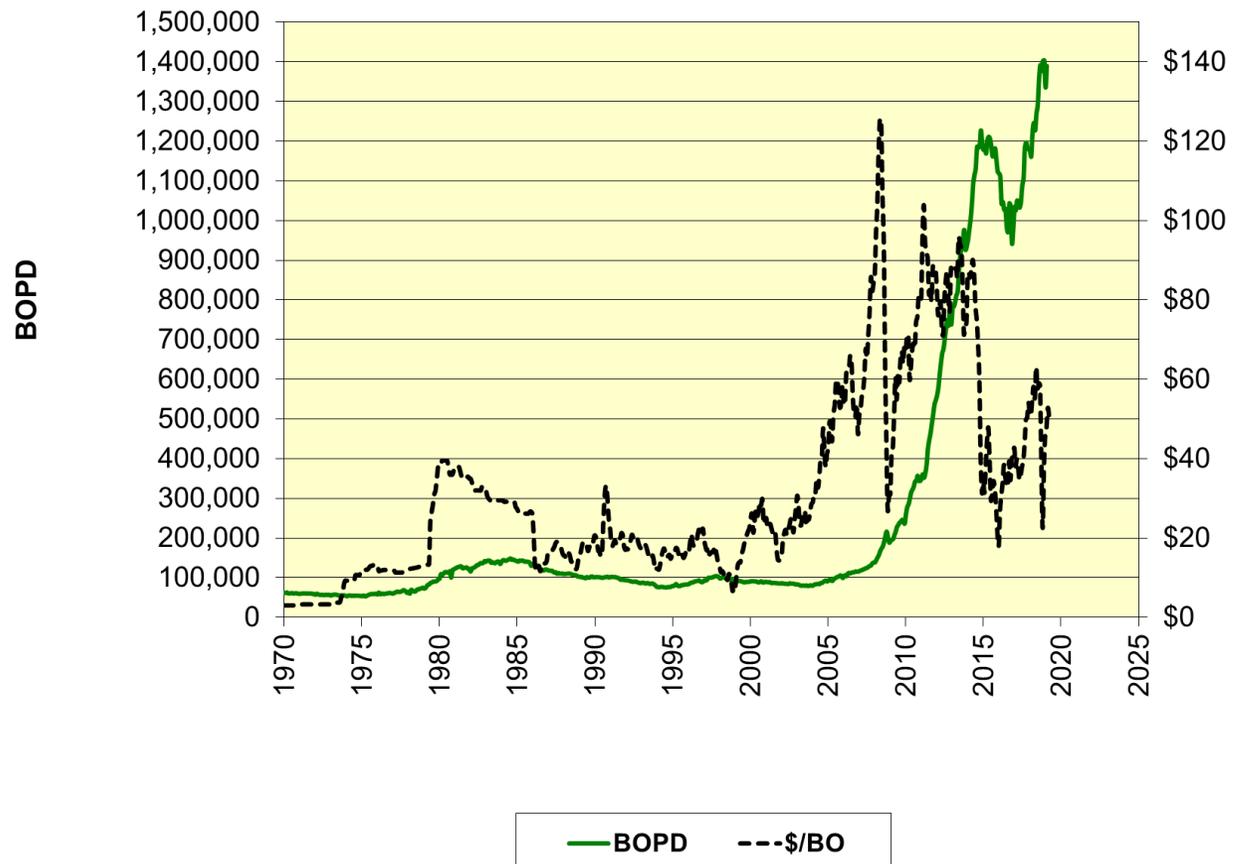
PRODUCING WELLS

NEW RECORD

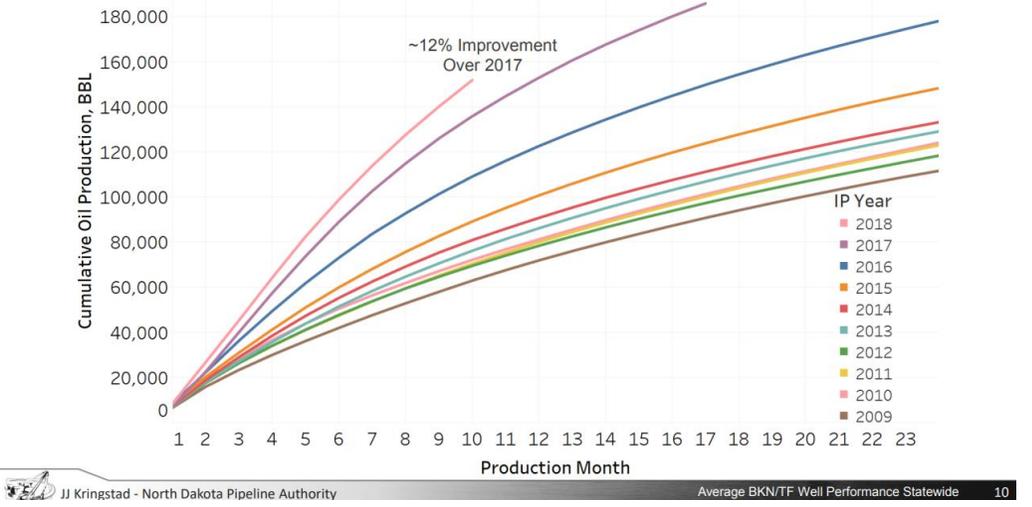
DAILY OIL PRODUCTION



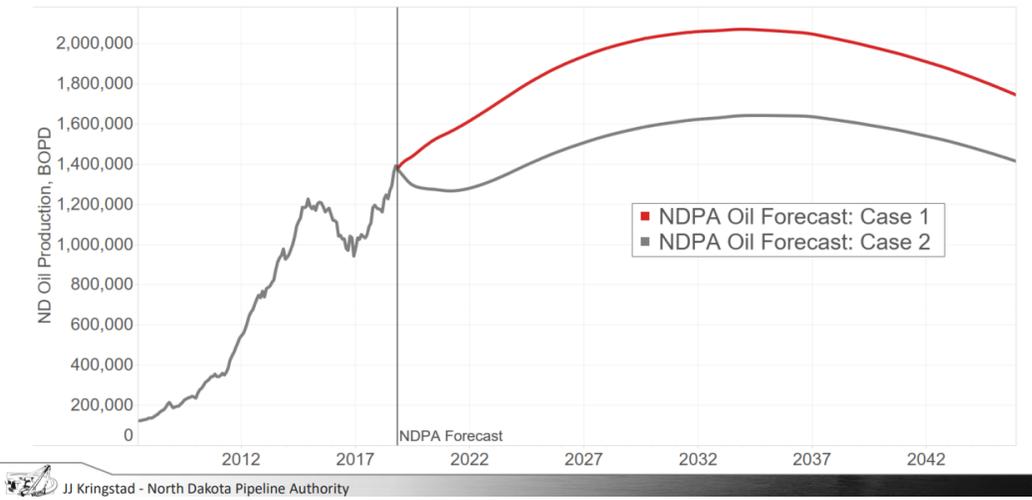
North Dakota Daily Oil Produced and Price



Statewide Oil Performance



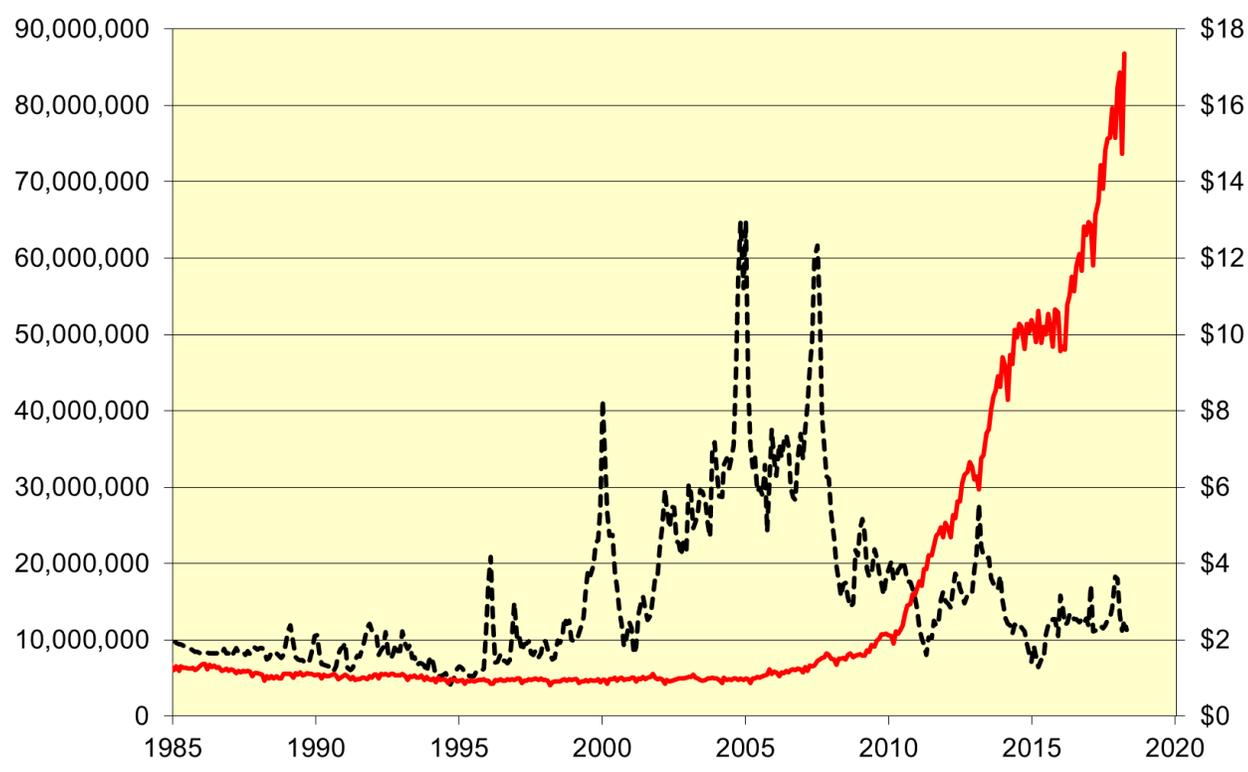
North Dakota Oil Production Forecast
Assumes Current Technology – Enhanced Oil Recovery Not Included



DAILY GAS PRODUCTION

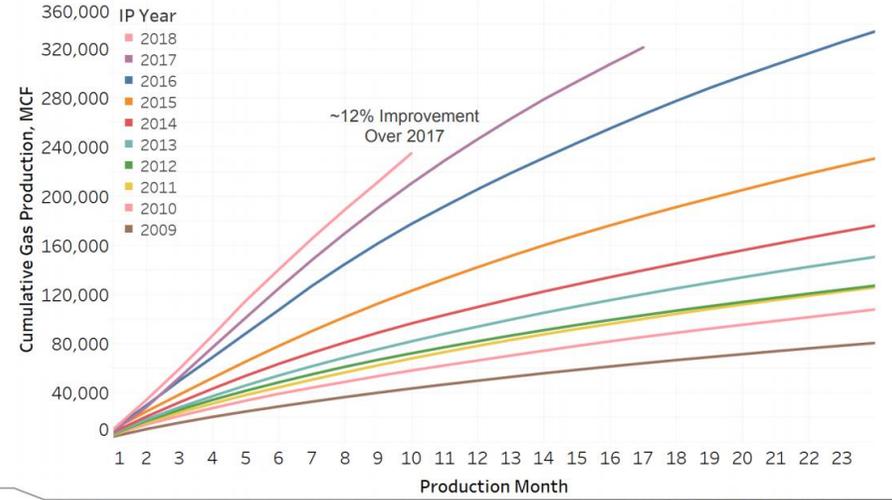


North Dakota Monthly Gas Produced and Price



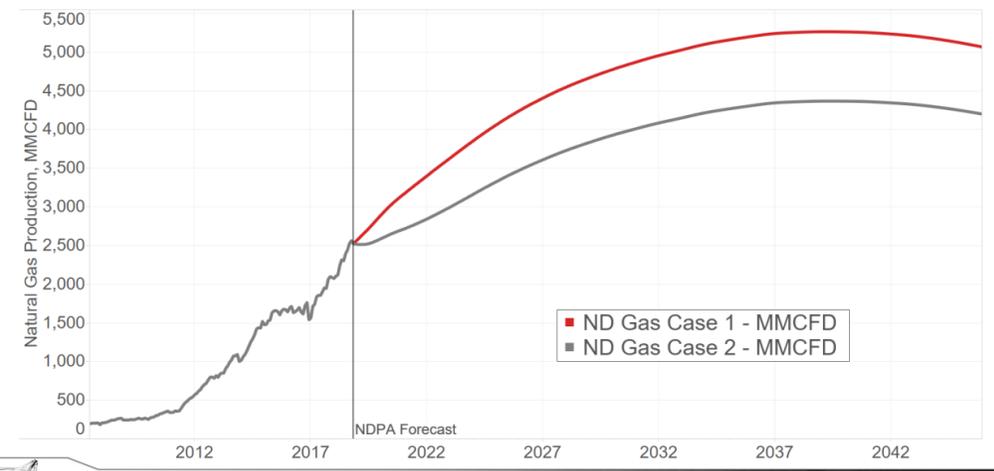
--- \$ perMCF — MCF GAS PRODUCED

Statewide Gas Performance



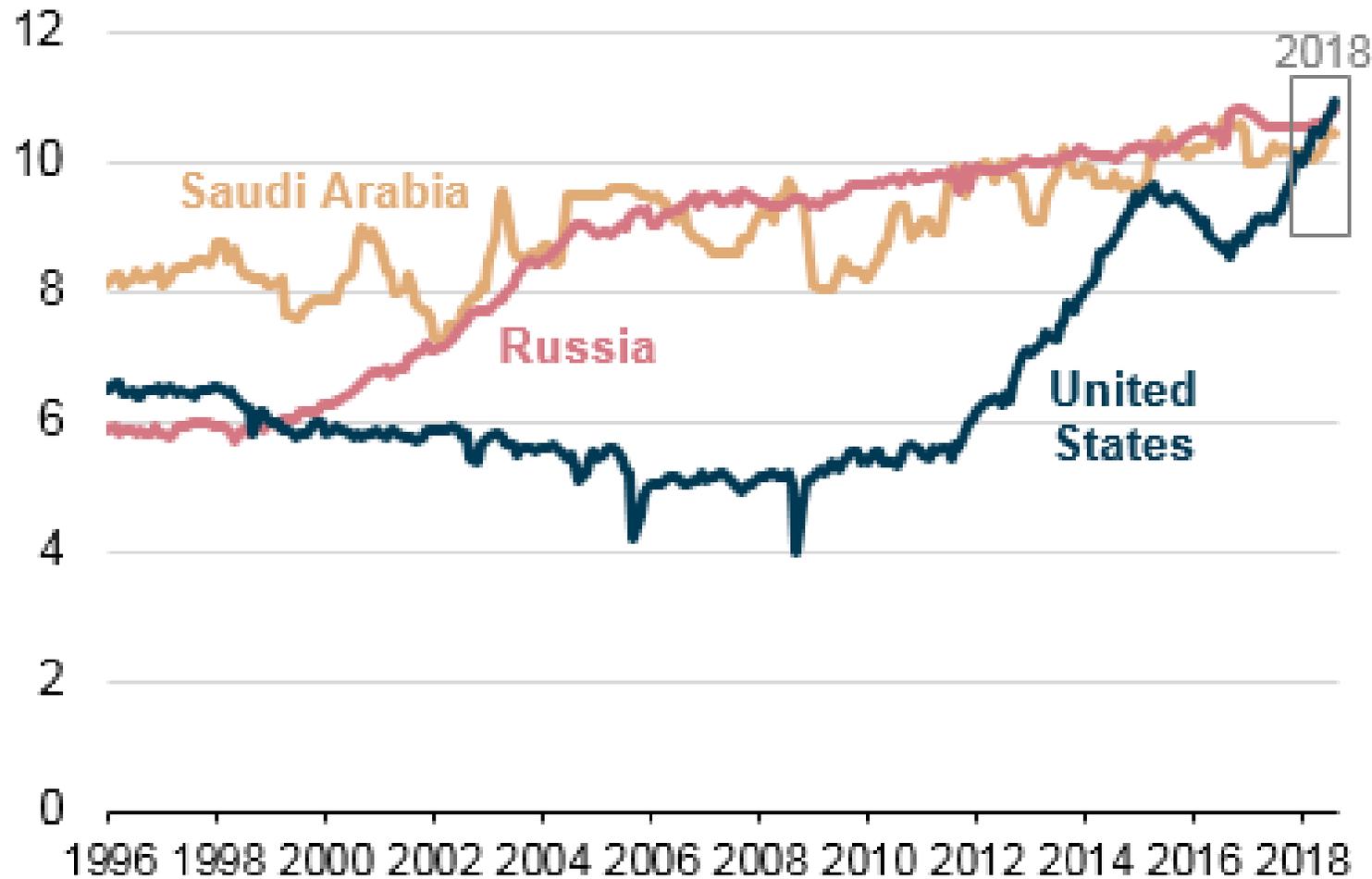
NDPA North Dakota Gas Production Forecast

Assumes Current Technology – Enhanced Oil Recovery Not Included

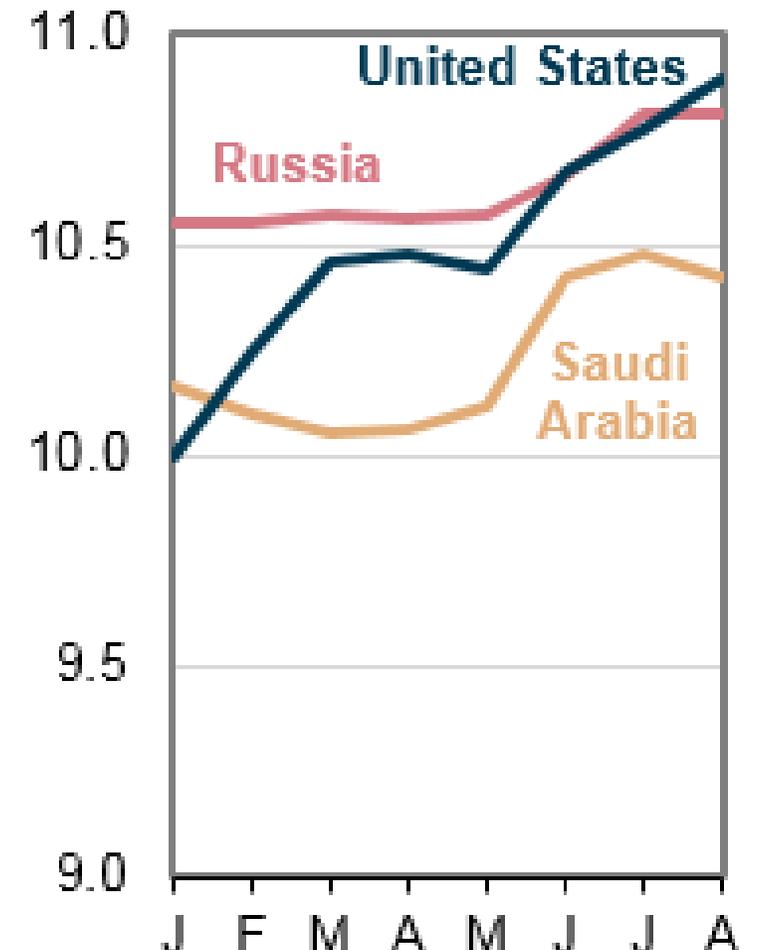


U.S. NUMBER ONE

Monthly crude oil production (Jan 1994-Aug 2018)
million barrels per day

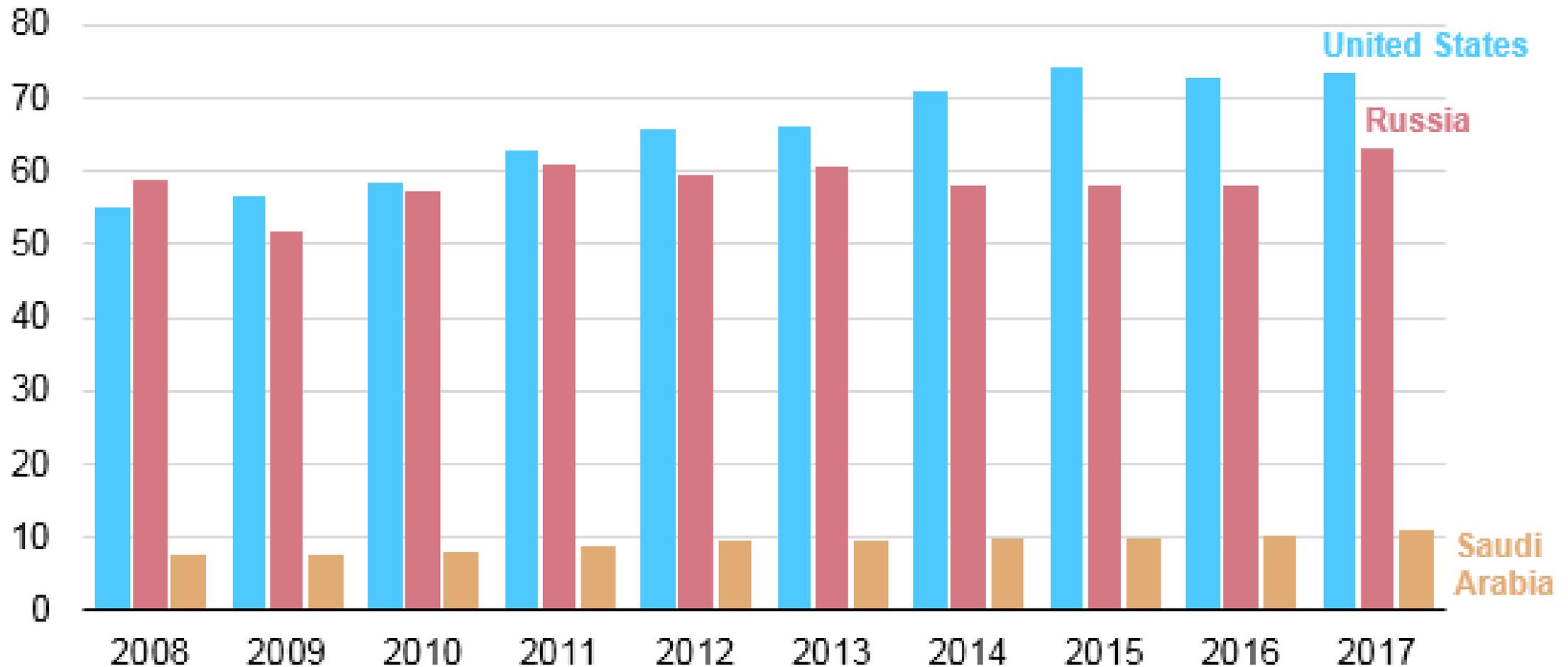


million barrels per day eia



U.S. NUMBER ONE

Estimated natural gas hydrocarbon production in selected countries (2008-2017)
billion cubic feet per day



Source: U.S. Energy Information Administration

An aerial photograph showing a landscape with rolling hills covered in dense forest with vibrant autumn foliage in shades of yellow, orange, and green. In the center, a circular area of reddish-brown earth contains several oil pumpjacks and a few vehicles. A dirt road winds through the forest. In the background, a range of hills is visible under a clear blue sky, with several tall communication towers on a distant peak.

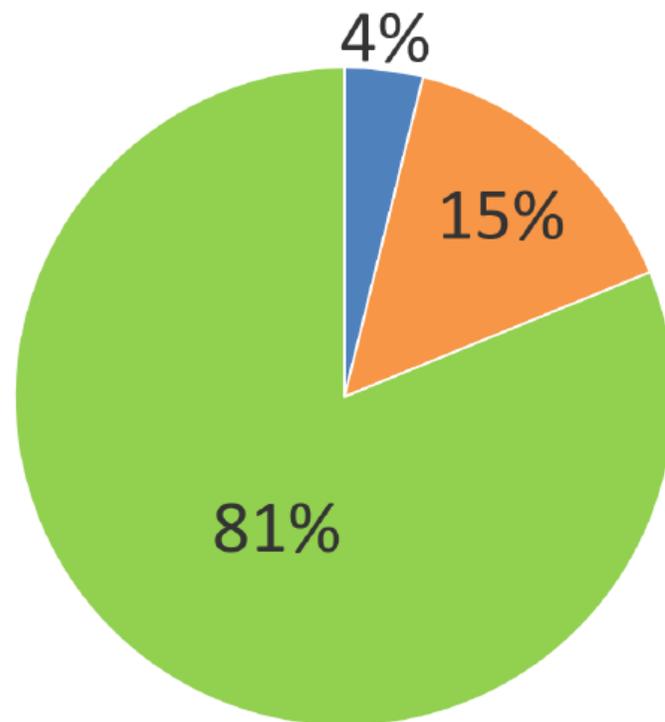
Gas Capture & Utilization

GAS CAPTURE POLICY

NDIC Order 24665

Policy Goals

- Increase the volume of captured gas and reduce the percentage of flared gas
- Incentivize investment in gas capture infrastructure



Statewide

GREEN – % of gas captured and sold
Blue – % flared from zero sales wells
Orange – % flared from wells with at least one mcf sold.

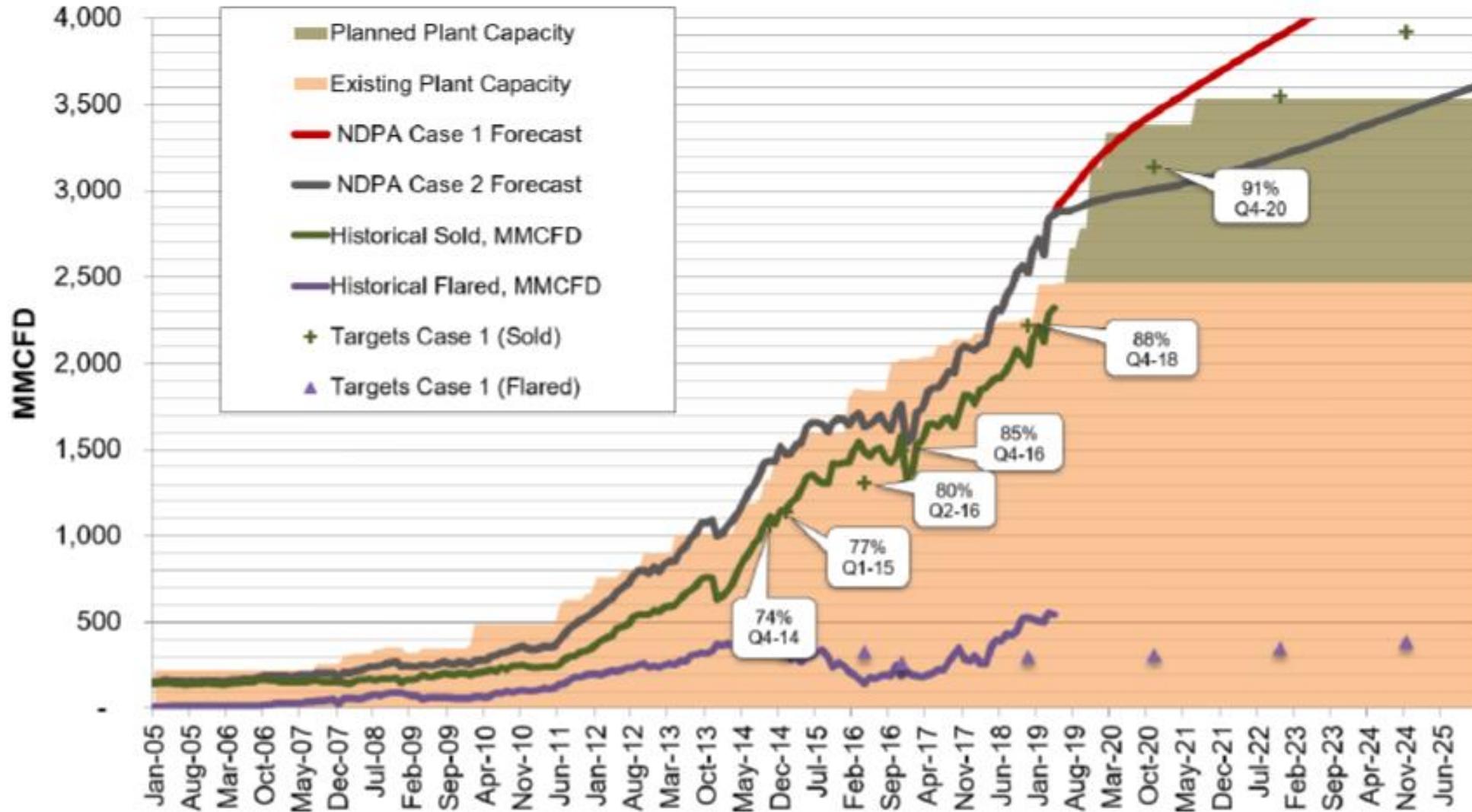
Simple Terms

Blue – Lack of pipelines
Orange – Challenges on existing infrastructure

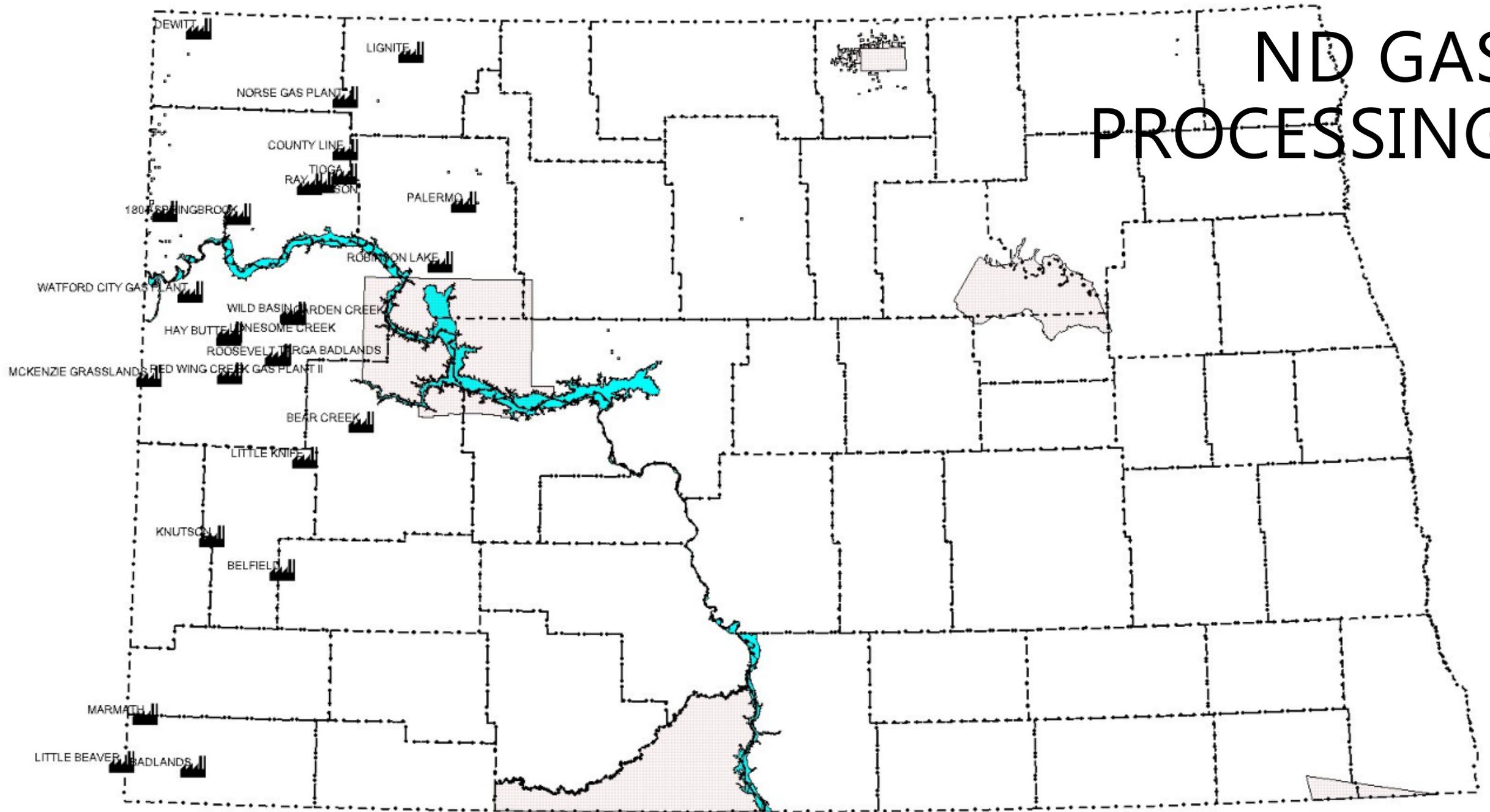
May 2019 Data – Non-Confidential Wells



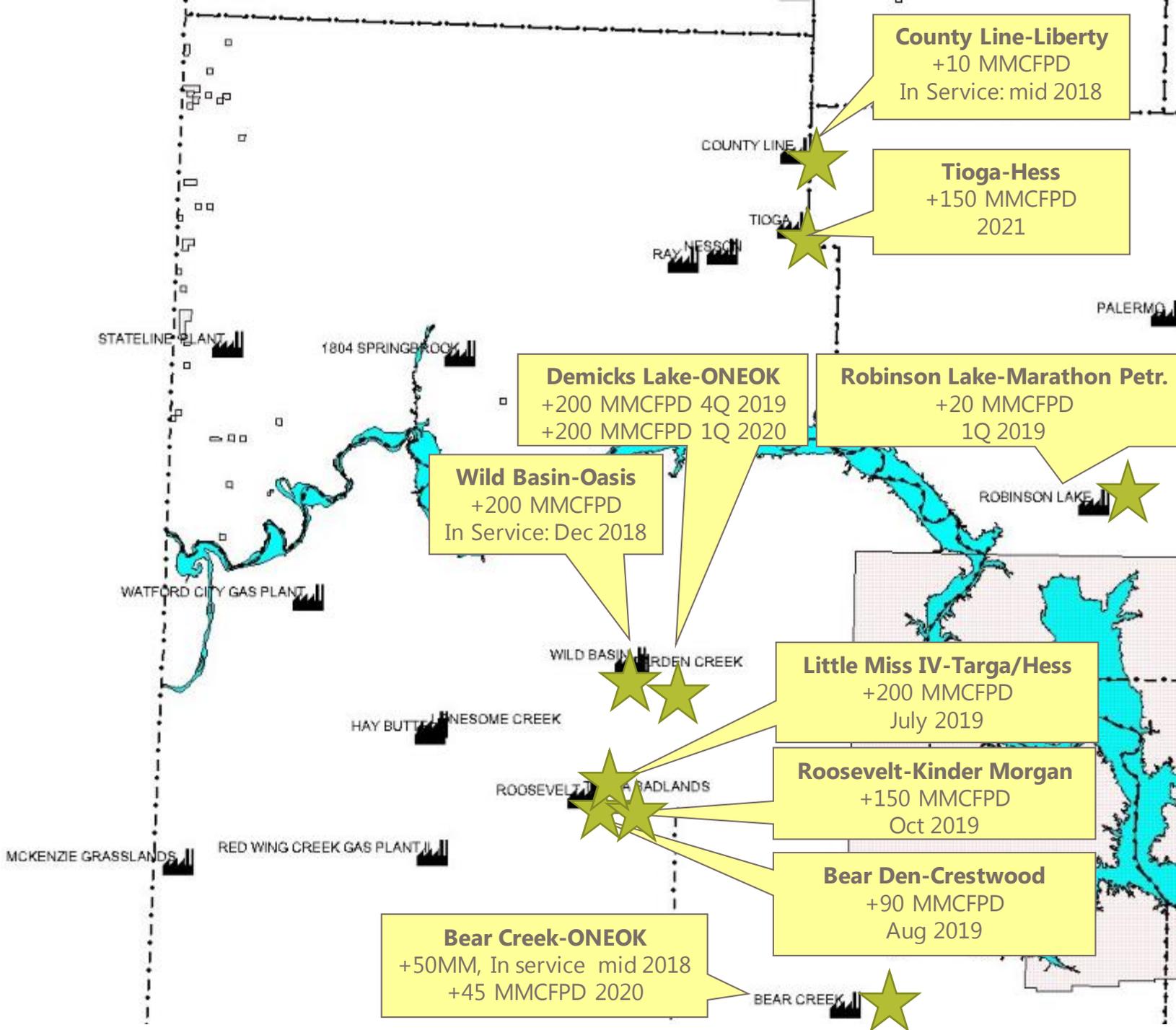
CAPTURING NATURAL GAS IN ND



ND GAS PROCESSING



GAS PLANT EXPANSIONS



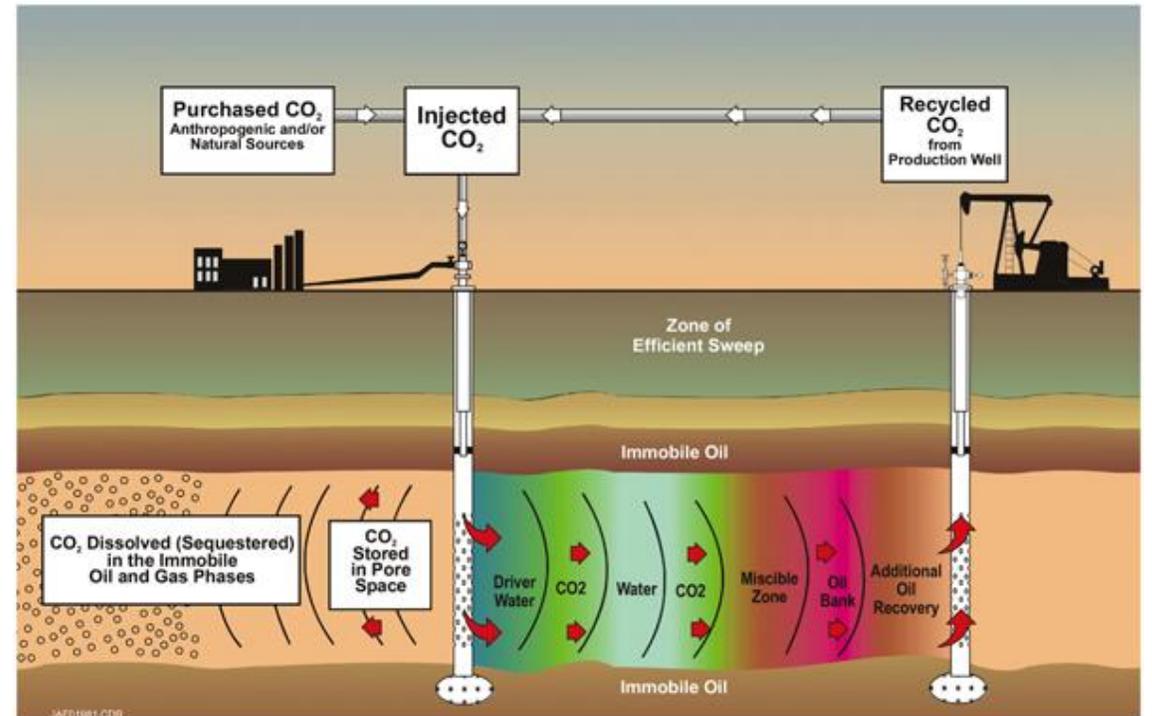
<u>2018</u>	<u>MMCFPD</u>	<u>Incr</u>	<u>Start Date</u>
Bear Creek	80→130	+50	In Service
County Line	20→30	+10	In Service
Wild Basin	145→345	+200	In Service
<u>2019</u>	<u>MMCFPD</u>	<u>Incr</u>	<u>Start Date</u>
RobinsonLk	130→150	+20	1Q 2019
Targa/Hess, LM4		+200	Jul 2019
Bear Den	30→120	+90	Aug 2019
Demicks Lake		+200	4Q 2019
Roosevelt	50→200	+150	Oct 2019
Demicks Lake	200→400	+200	1Q 2020
Bear Creek	130→175	+45	2020
Tioga, Hess	250→400	+150	2021
<u>Total</u>	<u>\$1.5 Billion</u>	<u>+1,165 MMCFPD</u>	

An aerial photograph showing an oil field situated in a valley surrounded by dense forests with vibrant autumn foliage in shades of yellow, orange, and red. In the center of the valley, a circular dirt area contains several pumpjacks (oil pumps) and a few vehicles. A dirt road winds through the landscape, curving around the central area. The background features rolling hills under a clear blue sky.

Enhanced Oil Recovery

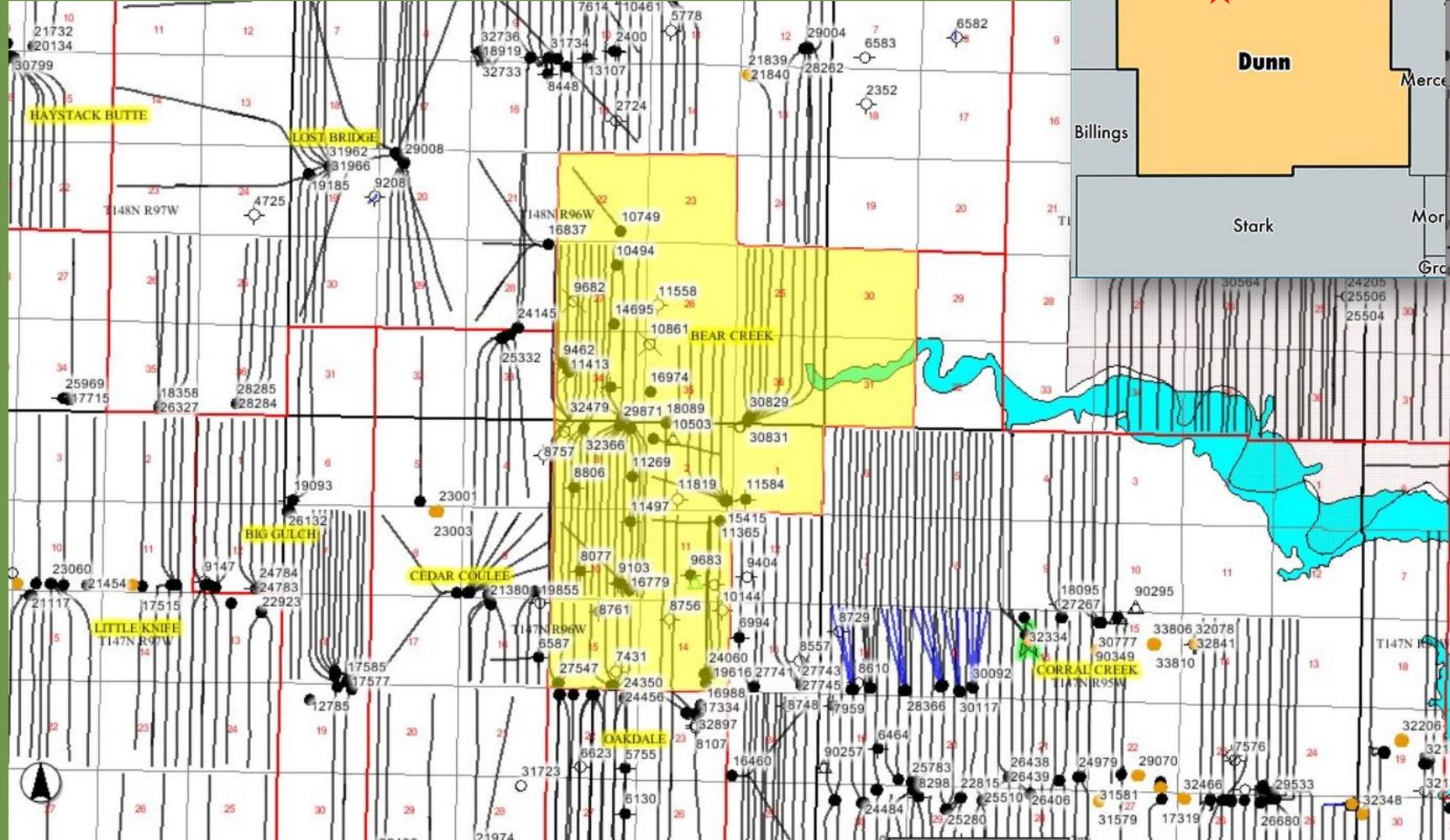
ENHANCED OIL RECOVERY (EOR)

- Injection of fluids or gasses into reservoir to “push” the additional oil and/or natural gas that was difficult or did not initially product to surrounding wells.



Source: Advanced Resources International and Melzer Consulting, Optimization of CO₂ Storage in CO₂ Enhanced Oil Recovery Projects, prepared for UK Department of Energy & Climate Change, November 2010.

BEAR CREEK



Operator: XTO Energy, Inc.

Pool: Duperow

Injectate:

Water from 1992 to 2010.

Implemented a short term pilot project for CO₂.

Approved for Natural Gas injection – currently waiting on injection to begin

MCGREGOR

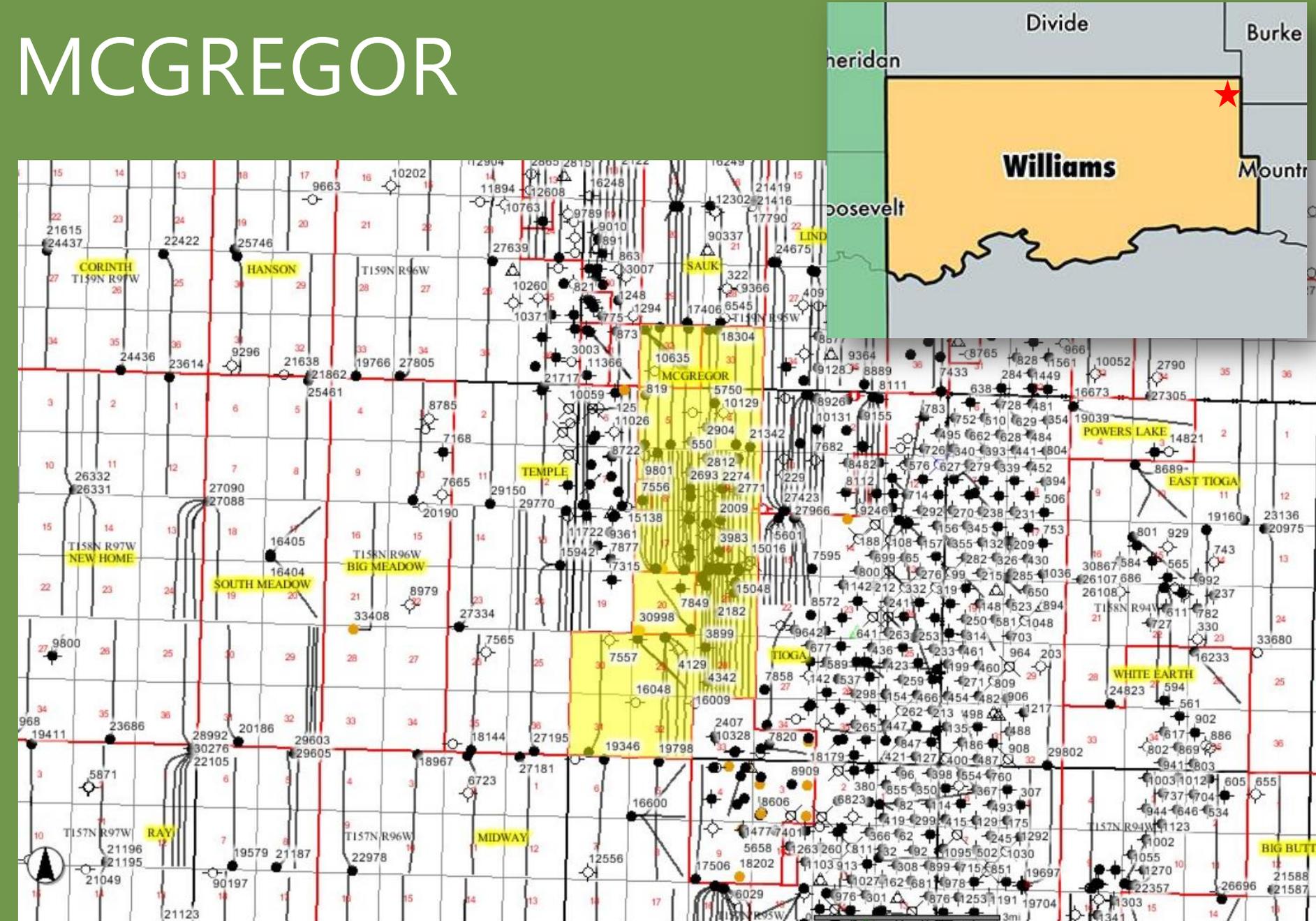
Operator: Liberty Resources Management, LLC

Pool: Bakken

Injectate:

Natural Gas from 2018 to present.

Currently injecting in alternating pattern into several wells on a 1280-acre spacing unit.



Operator: True Oil LLC

RED WING CREEK

Pool: Madison

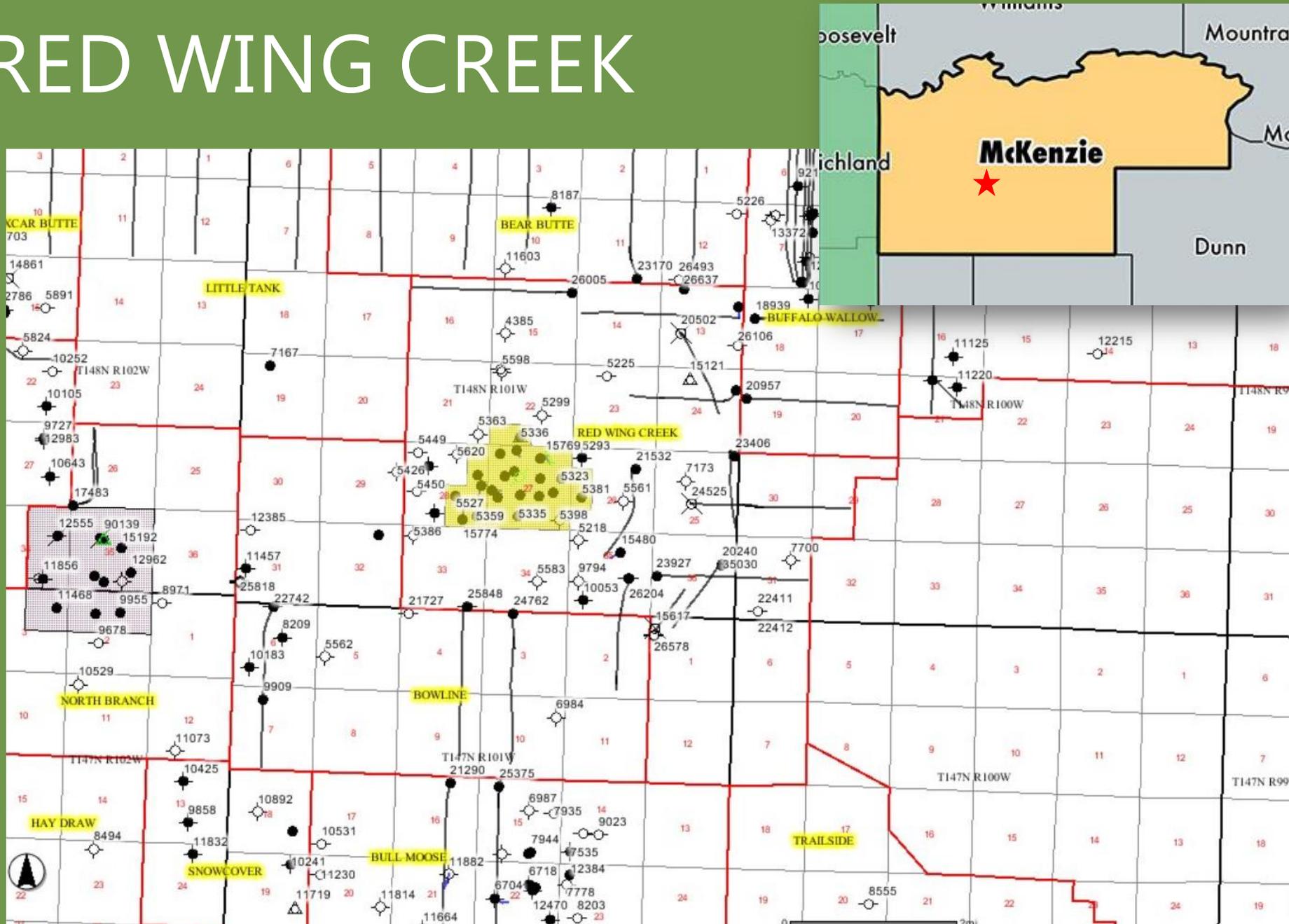
Injectate:

Natural Gas from 1981 to 1997;

Propane from 1983 to 2010;

Ethane from 2017 to 2019;

Approved for Butane – currently waiting on injection to begin.



FOREMAN BUTTE



Operator: Samson Oil and Gas USA, Inc.

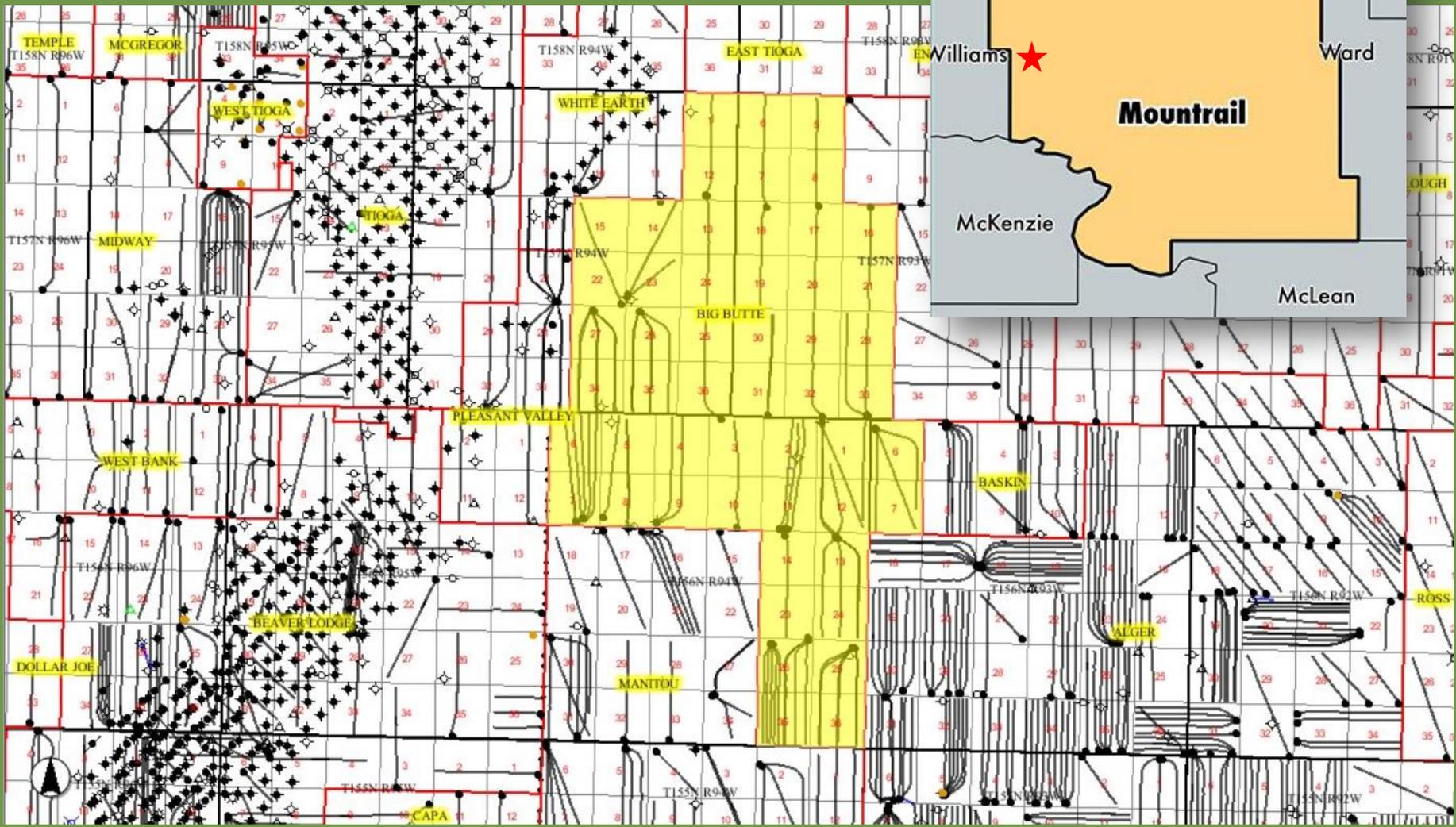
Pool: Madison

Injectate:

Water injection pilot project



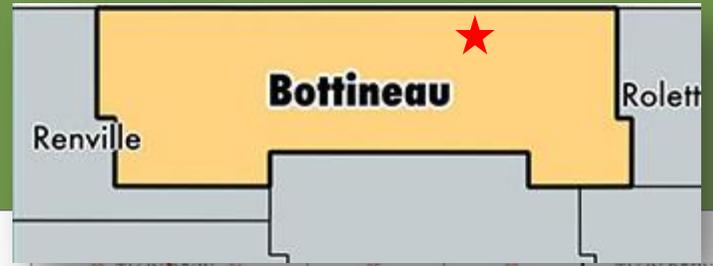
BIG BUTTE



Operator: Hess Bakken Investments II, LLC

Pool: Bakken

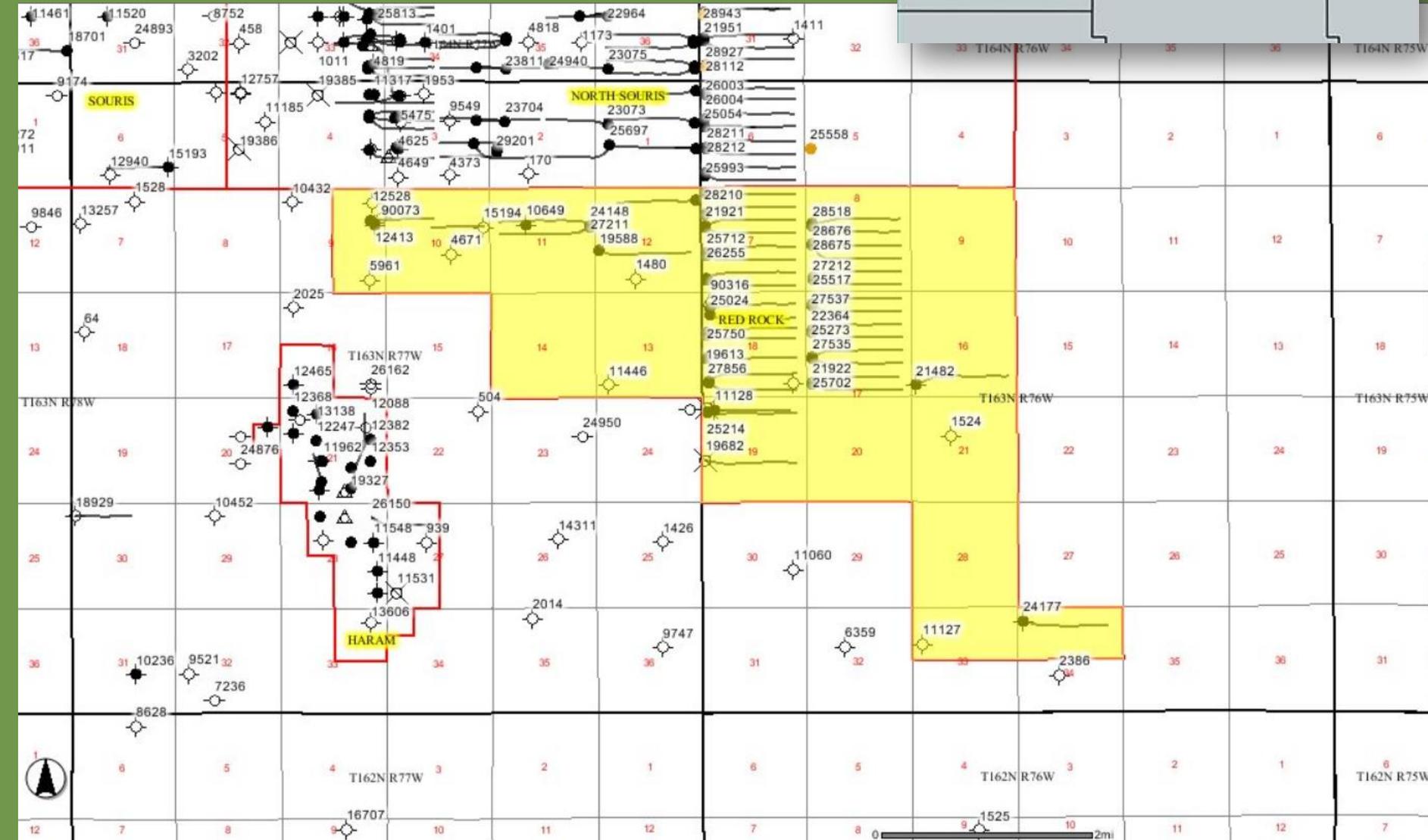
RED ROCK



Operator: Ballantyne Oil, LLC

Pool: Spearfish

Injectate: Water injection pilot project – currently waiting on injection to begin.

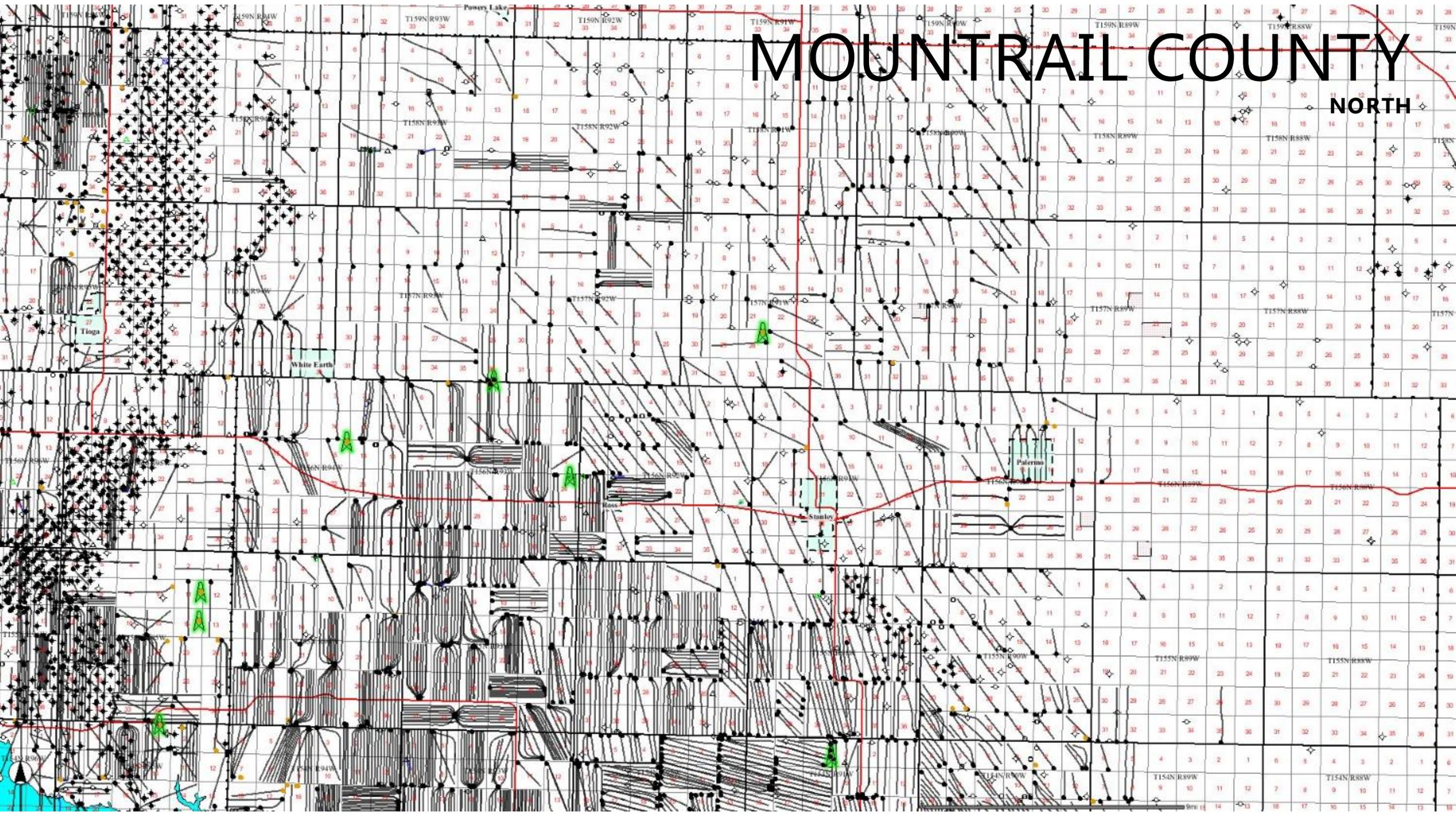




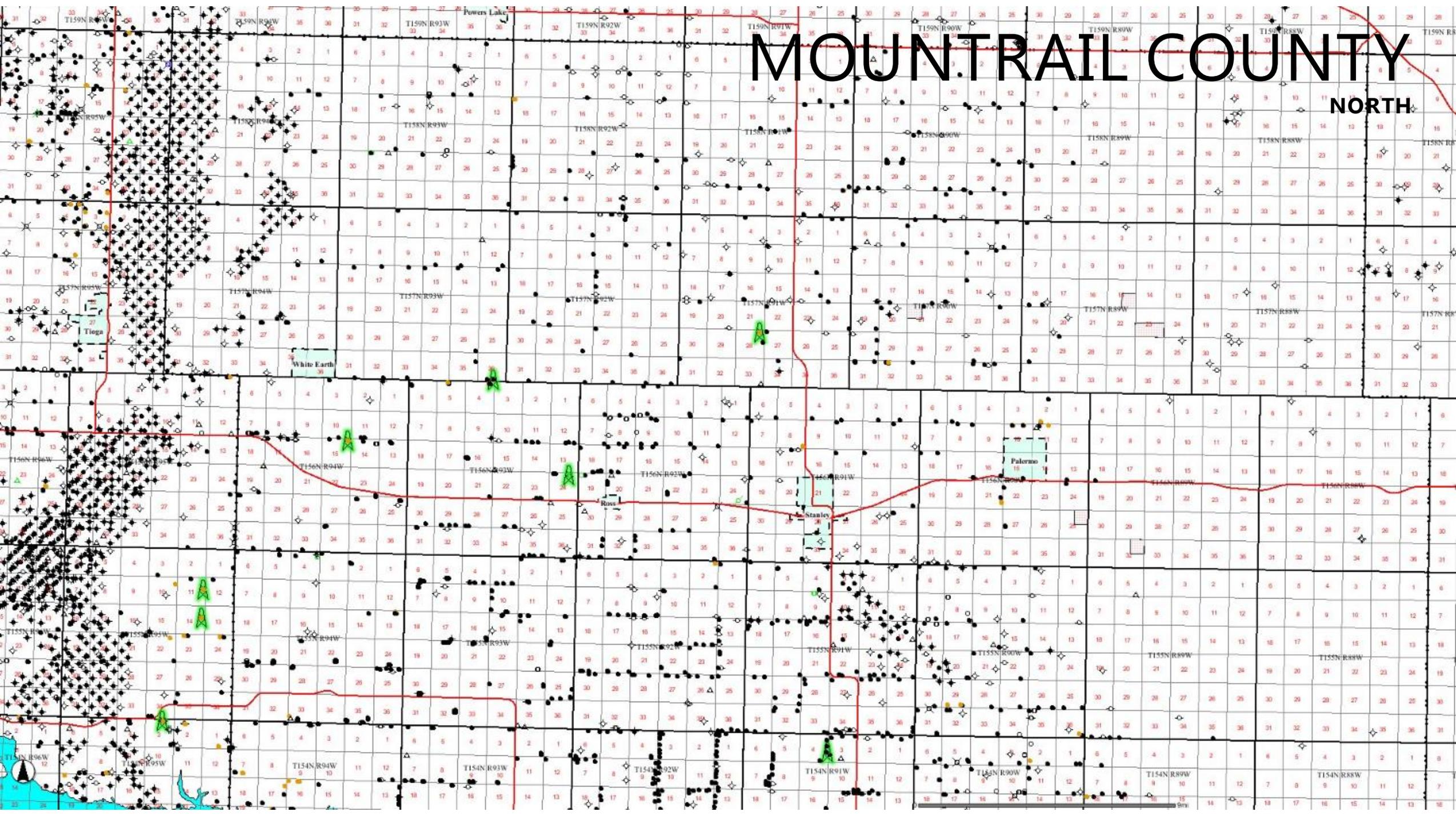
Mountrail County

MOUNT RAIL COUNTY

NORTH

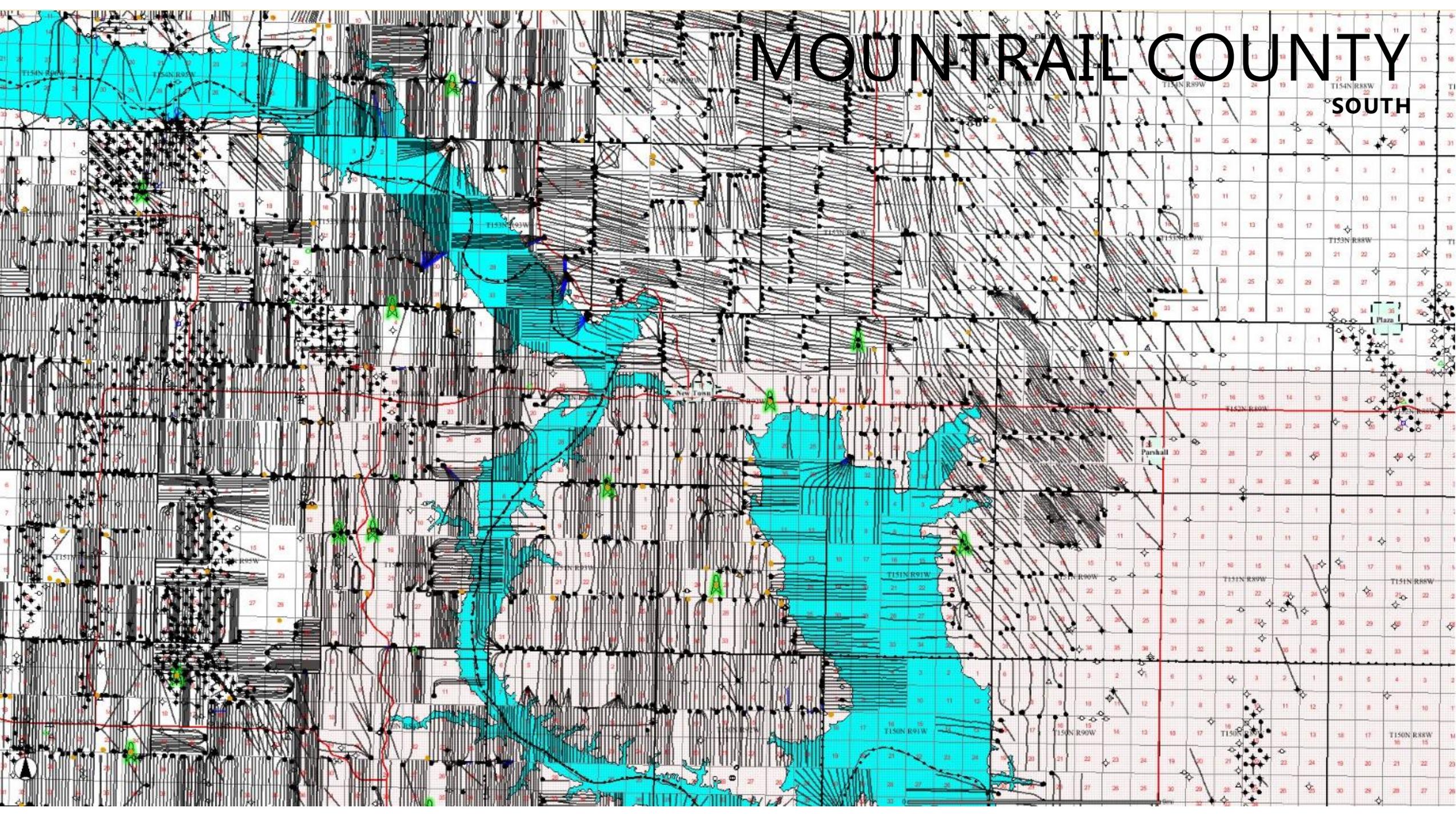


MOUNT TRAIL COUNTY NORTH

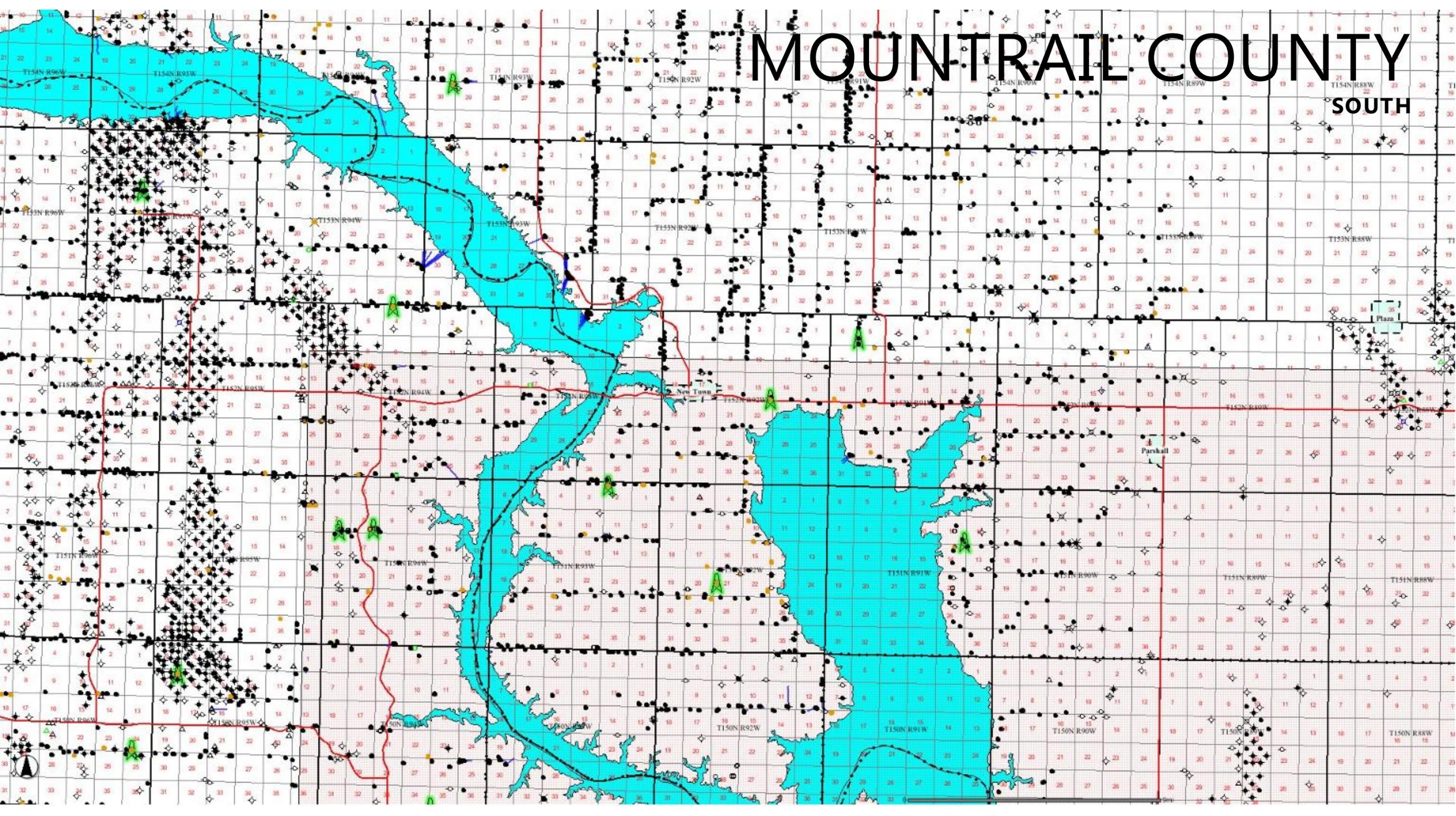


MOUNT TRAIL COUNTY

SOUTH



MOUNT TRAIL COUNTY SOUTH

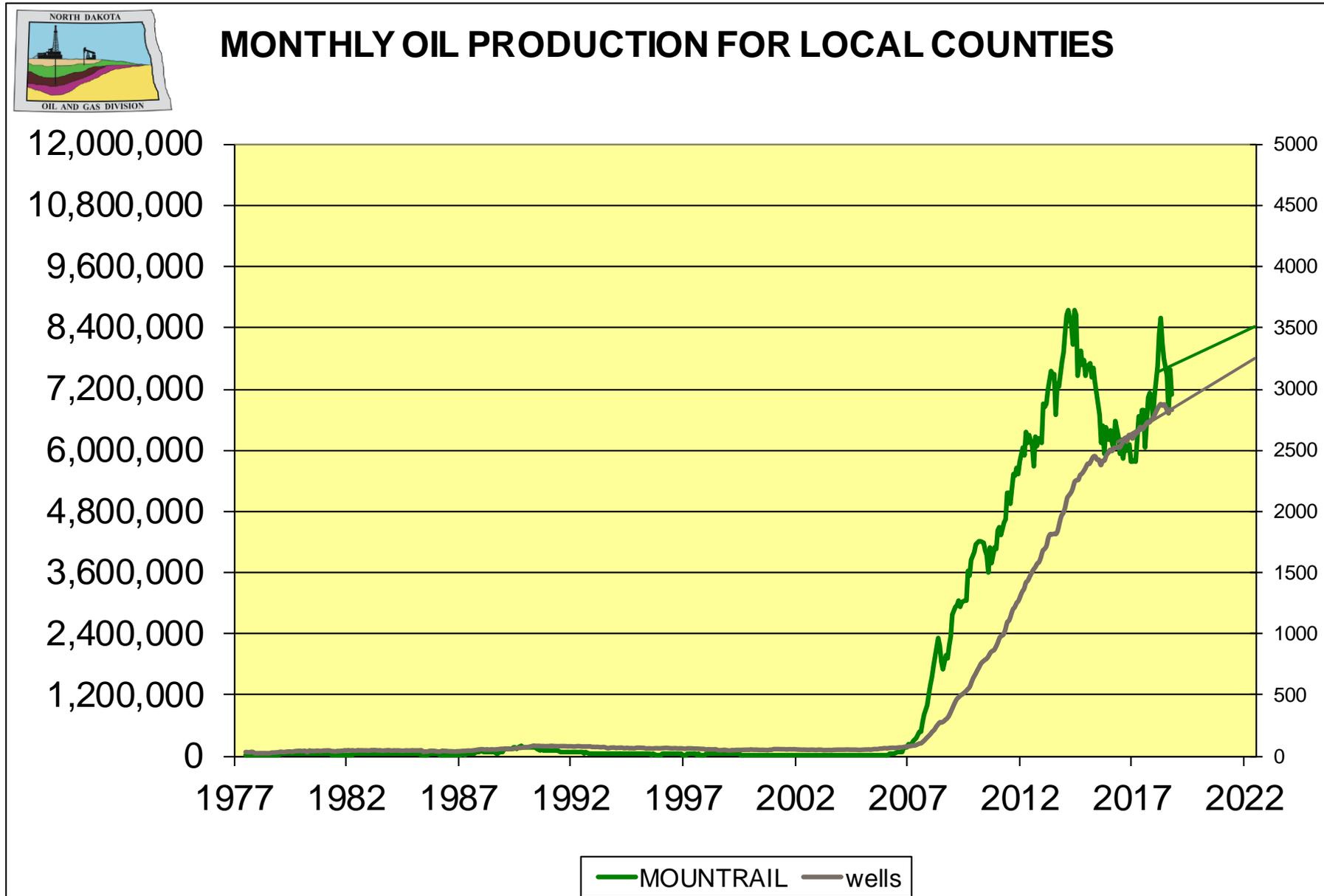


WELLS

Mountrail County

Well Status	Well Type								TOTAL
	GI Gas Injection	Confidential	INJP Injector, Producer	OG Oil and Gas	ST Stratigraphic Test	SWD Salt Water Disposal	WI Water Injection	WS Water Source	
Active (A)			1	2,865	6	48		2	2,922
Confidential		235							235
Permit to Drill (LOC)				219		3			222
Drilling (DRL)				29					29
Temporarily Abandoned (TA)	1			48		2	2		53
Inactive (IA)	1			144		5			150
Abandoned (AB)				26		2	6		34
DRY				206	23	1			230
Plugged and Abandoned (PA)				217		4	3		224
Permit Now Cancelled (PNC) or Expired Permit (EXP)				420		10			430
Not Completed (NC)				74	1				75
TOTAL	2	235	1	4,248	30	75	11	2	4,604

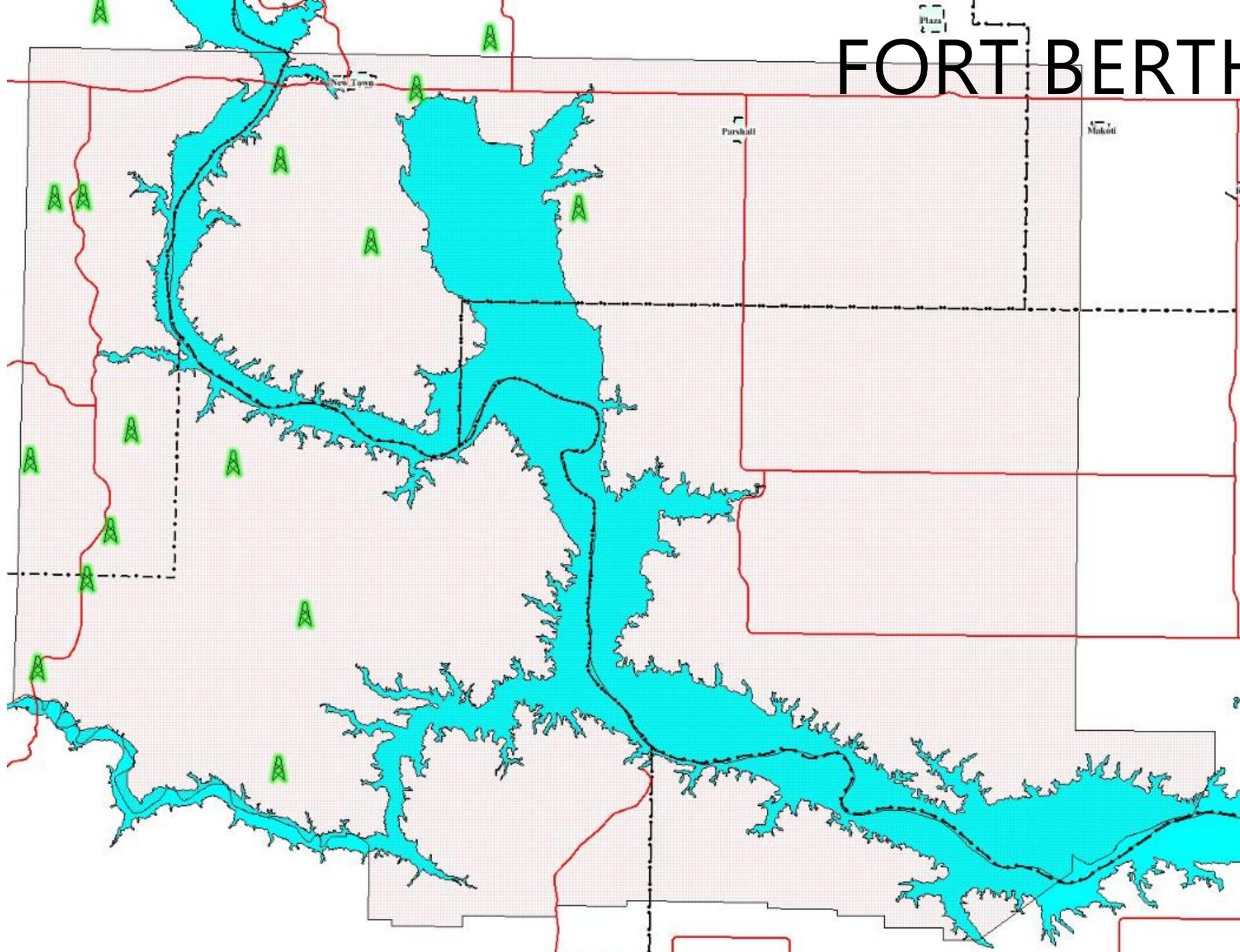
PRODUCTION





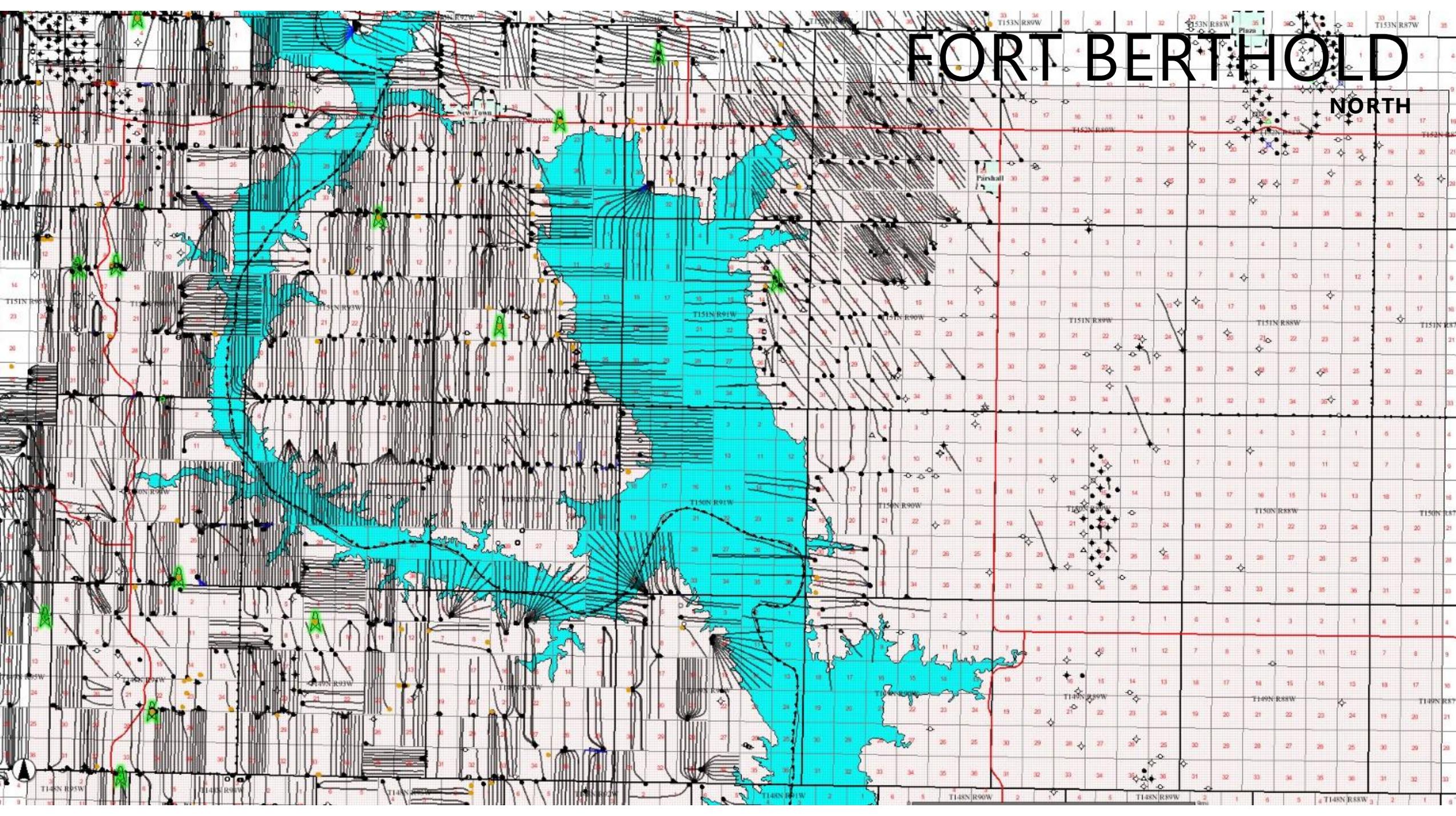
Fort Berthold

FORT BERTHOLD

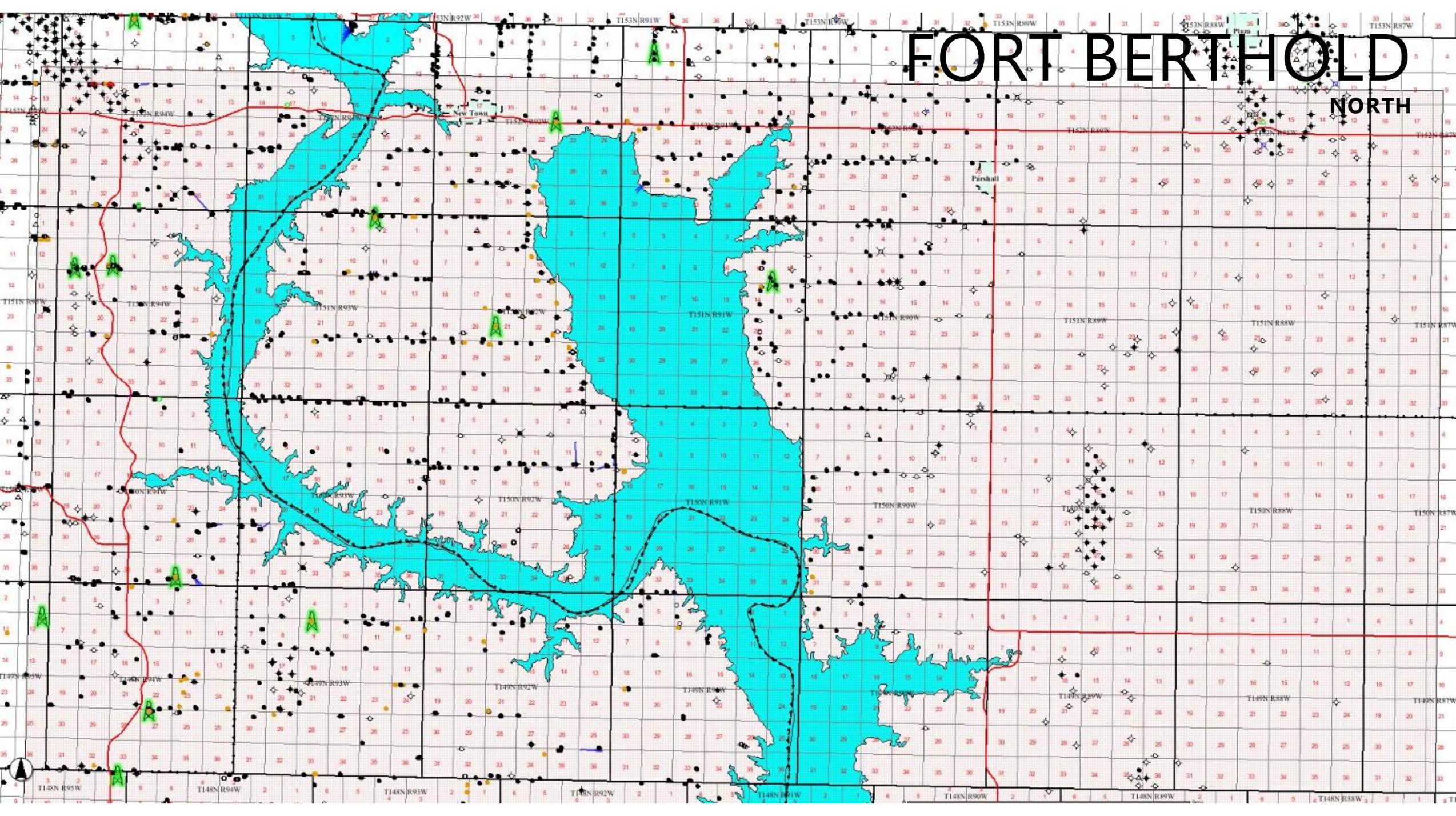


FORT BERTHOLD

NORTH

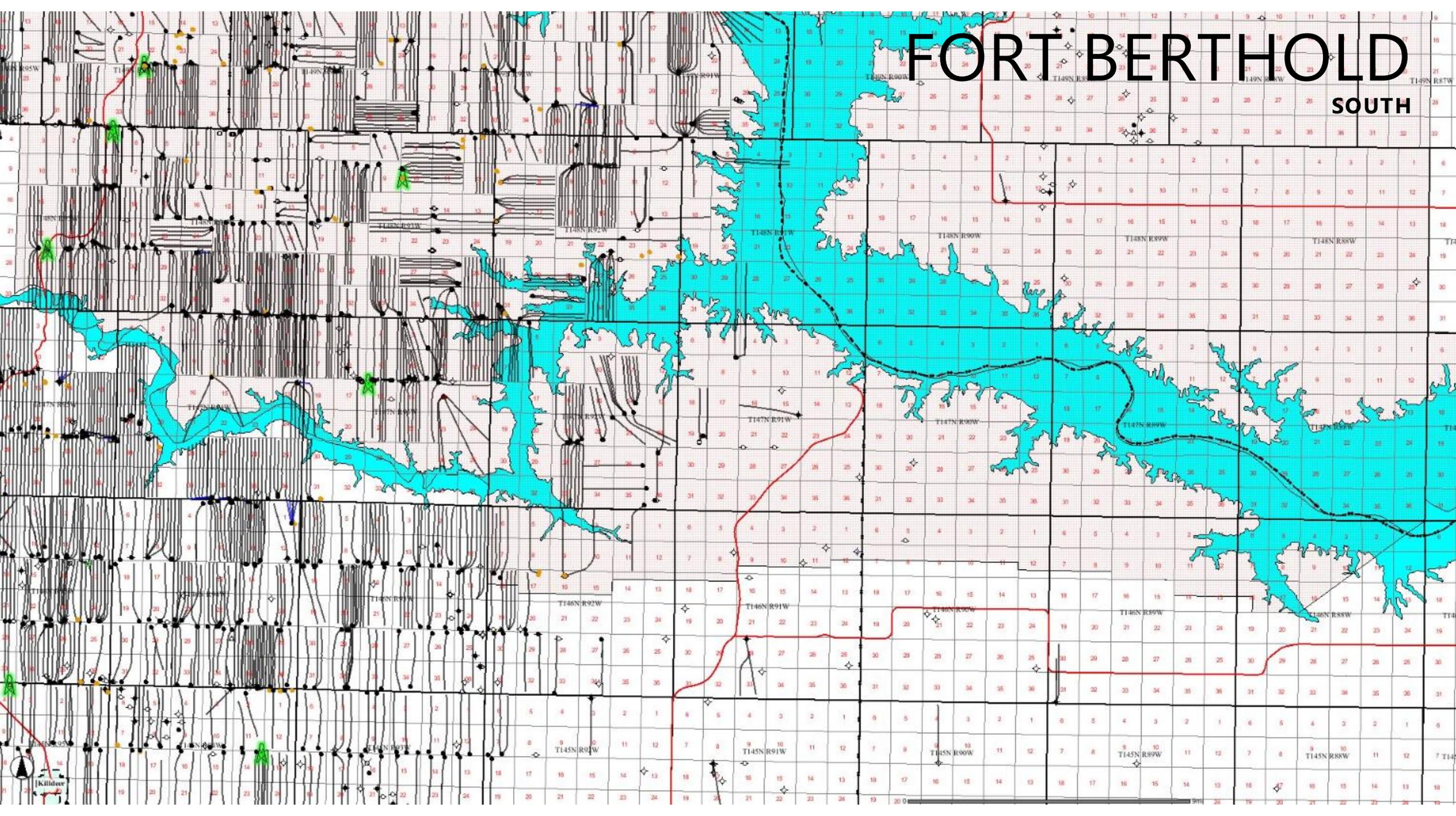


FORT BERTHOLD NORTH

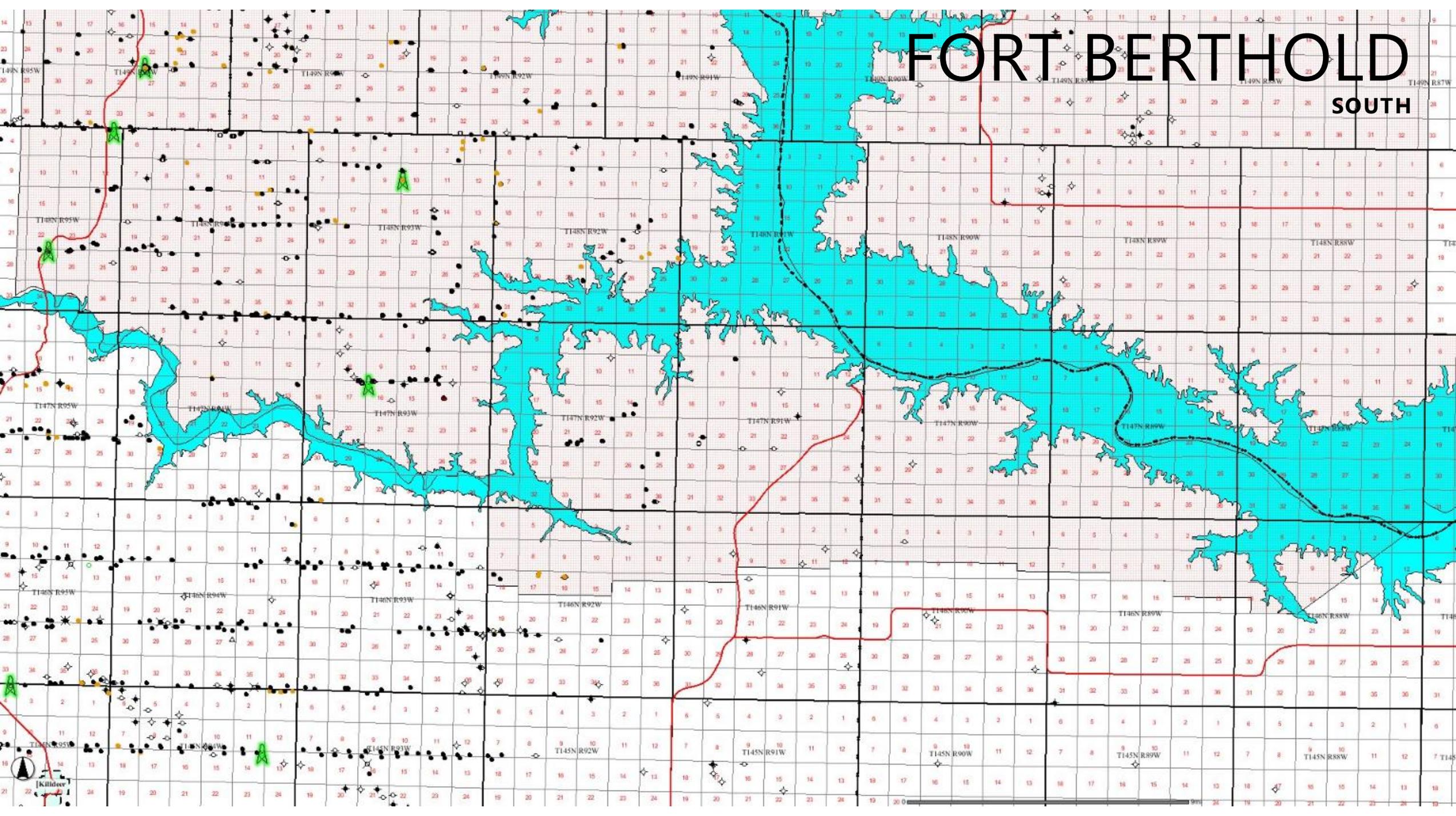


FORT BERTHOLD

SOUTH



FORT BERTHOLD SOUTH



Fort Berthold Reservation Activity – April 2019

	Total	Fee Land	Trust Land
Oil Production	315,155 barrels/day +12,382 May '19 +45,352 YTD	107,322 barrels/day +9,055 May '19 +23,962 YTD	207,833 barrels/day +3,327 May '19 +21,390 YTD
Drilling Rigs	14 No change from May '19 +3 YTD	4 No change from May '19 +3 YTD	10 No change from May '19/YTD
Active Wells	2,157 +59 May '19 +288 YTD	578 +5 May '19 +39 YTD	1,579 +54 May '19 +249 YTD
Waiting on Completion	172 +33 May '19 +93 YTD		
Approved Drilling Permits	456 +9 May '19 +182 YTD	97 -1 May '19 +29 YTD	359 +10 May '19 +153 YTD
Potential Future Wells	4,395 -59 May '19 +684 YTD	1,186 -5 May '19 +591 YTD	3,209 -54 May '19 +93 YTD



Mineral Interests

Deductions=

Transportation

Processing

Compression

Administrative Costs

ROYALTY STATEMENTS

ADMINISTRATIVE CODE 43-02-06-01

Royalty Owner Information Statement

Price: Addition of natural gas liquids to the price breakdown.

Deductions & Adjustments: Will be broken into two sections

Adjustments: The amount and purpose of each adjustment or correction made

Deductions: The amount and purpose of each deduction separated into four categories: Transportation, Processing, Compression & Administrative Costs

Changes effective: July 1, 2019

ROYALTY STATEMENTS

ADMINISTRATIVE CODE 43-02-06-01.1

Ownership Interest Information Statement

Operator or payor shall provide the mineral owner with a statement identifying:

Spacing unit for the well (AND the effective date of the spacing unit change if applicable);
the net mineral acres owned by the mineral owner;
the gross mineral acres in the spacing unit; and
the mineral owner's decimal interest that will be applied to the well.

Statement will be sent within 120 days after the end of the month of the first sale of production from a well OR change in the spacing unit of a well.

Changes effective: July 1, 2019



2019 Legislation & Rulemaking

PASSED

- HB 1383 & SB 2261 Mitigation
- SB 2211 Trust Lands OHWM Ownership Determination
- SCR 4010 Royalty Deductions Study
- HR 1014 DMR Budget
- HB 1429 Extraction Tax Incentive for Captured CO2
- SB 2037 High Level Radioactive Waste
- SB 2123 DMR Confiscation Authority
- SB 2344 Pore Space

FAILED

- HB 1480 Flared Gas Solutions (13:33)
- HCR 3013 Spacing and Pooling = Eminent Domain (8:33)
- SB 2332 Increased Flaring Restrictions (15:32)
- HB 1290 Prohibit Entry & Search of Buildings on Land (4:43)

OTHER ND IMPACTS

- Washington State Senate Bill 5579 threatens to disrupts 150,000-200,000 barrels per day.
 - Industrial Commission reviewing next steps – No action has been taken at this time.

RULEMAKING PROCESS

2019	May-September	<ul style="list-style-type: none"> • Recommendations sought for rule changes from staff. • Request for approval to proceed with rulemaking from Industrial Commission. • Legal rules notice published in ND newspapers statewide.
	October-December	<ul style="list-style-type: none"> • Rules hearings held in DMR office locations: Bismarck, Dickinson, Williston and Minot. • Public comment period after final rules hearing. • Finalize responses to comments and make appropriate amendments to rules. • Request approval of rules from Industrial Commission. • Submit rules for legal opinion from Office of the Attorney General.
2020	January-March	<ul style="list-style-type: none"> • File rules and Attorney General opinion with ND Legislative Council. • Notification period of upcoming Administrative Rules Committee Hearing. • Administrative Rules Committee Hearing.
	April	<ul style="list-style-type: none"> • Adoption and implementation of final rules.

A few items up for review:

- **Permitting:** Clarification of permit application requirements for wells, treating plants and other facilities.
- **Royalty Statements:** Additional information relating to owner's value and any interest changes.
- **Bonding:** Review of bond amounts and requirements for geophysical exploration, treating plants, and non-producing wells (AB/TA Status).
- **Gathering Pipelines:** Review of Gathering Pipeline notifications of milestones (new construction/in-service)



North Dakota
Department of Mineral Resources
www.dmr.nd.gov

Phone: 701.328.8020

Email: oilandgasinfo@nd.gov

Mailing Address: 600 East Boulevard Ave. Dept 405; Bismarck, ND 58505