

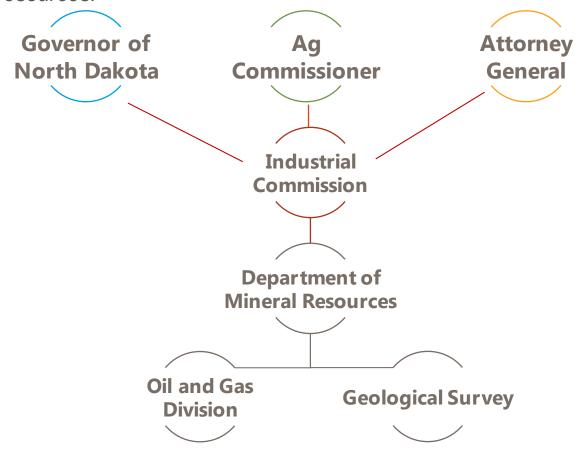


- Permitting and Wells
- Active Drilling Rigs
- Oil and Gas Production
- Enhanced Oil Recovery
- Mountrail County & Fort Berthold Update
- Mineral Interests
- 2019 Legislation & Rulemaking



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."



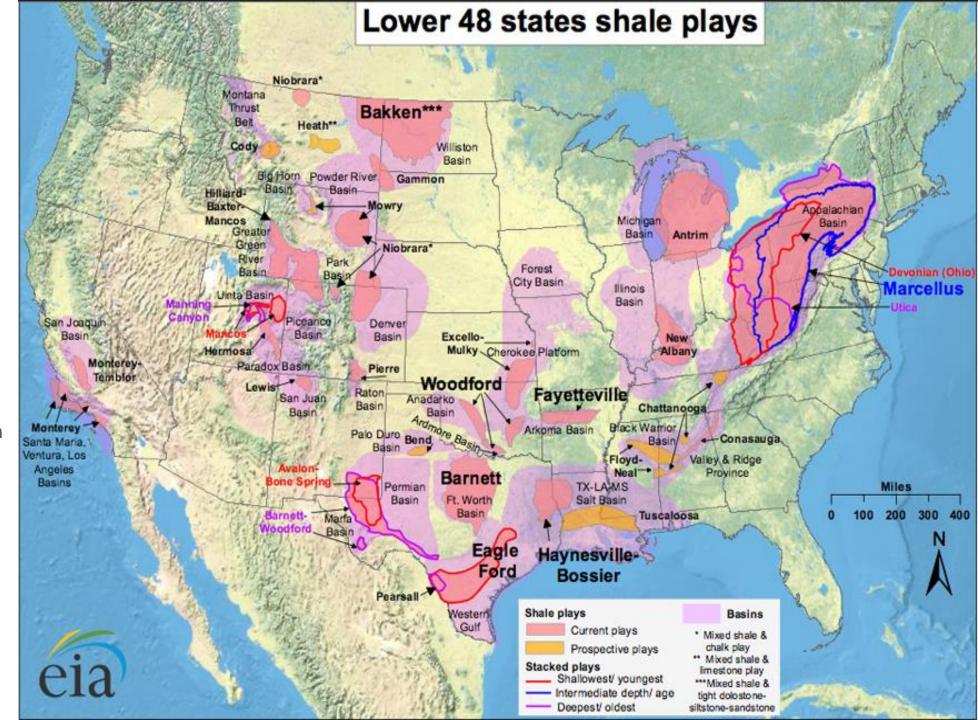


UNITED STATES OIL FIELDS

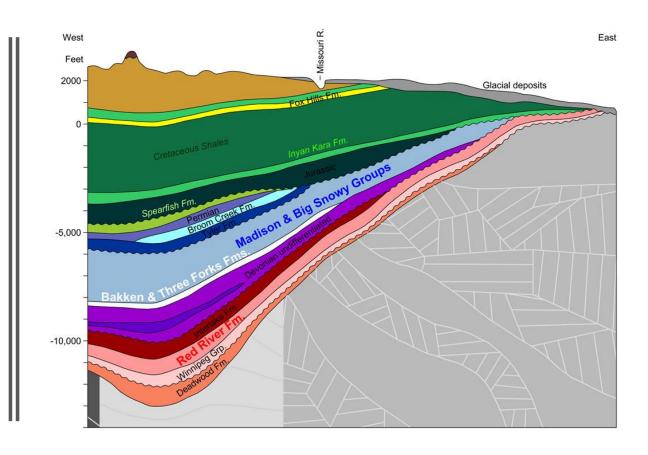
2010 - ND Geological Survey Bakken & Three Forks Assessments:

- 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





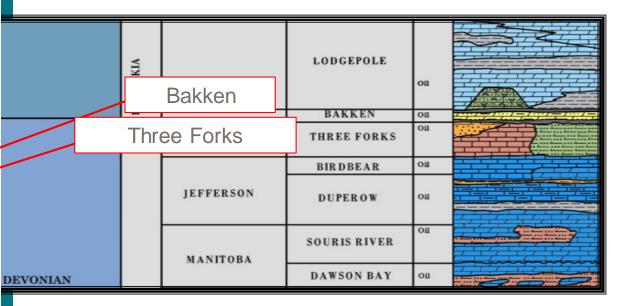


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STRATIGRAPHIC COLUMN

Bakken Formation	Three Forks / Sanish
~360 Million Years Old	~370 Million Years Old
Paleozoic Era	Paleozoic Era
Mississippian/Devonian Period	Devonian Period
~110' thick	~240' thick



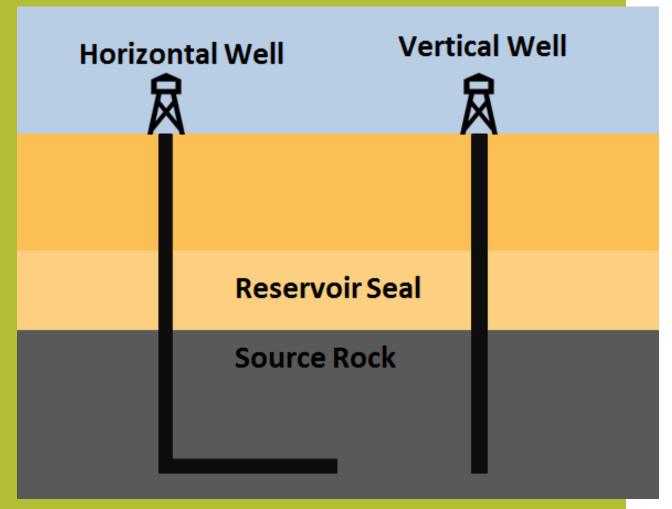


BAKKEN "POOL" CUMULATIVE PRODUCTION

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

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

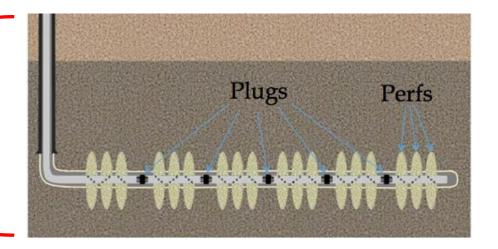
- Vertical or "Conventional" drilling was the 1st method of accessing oil reserves with a smaller reach. Resulted in more wells in a geographic area.
- Horizontal Drilling capabilities emerged allowing for:
 - Ability to reach difficult targets
 - Ability to drain a broader area
 - Increase are of well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

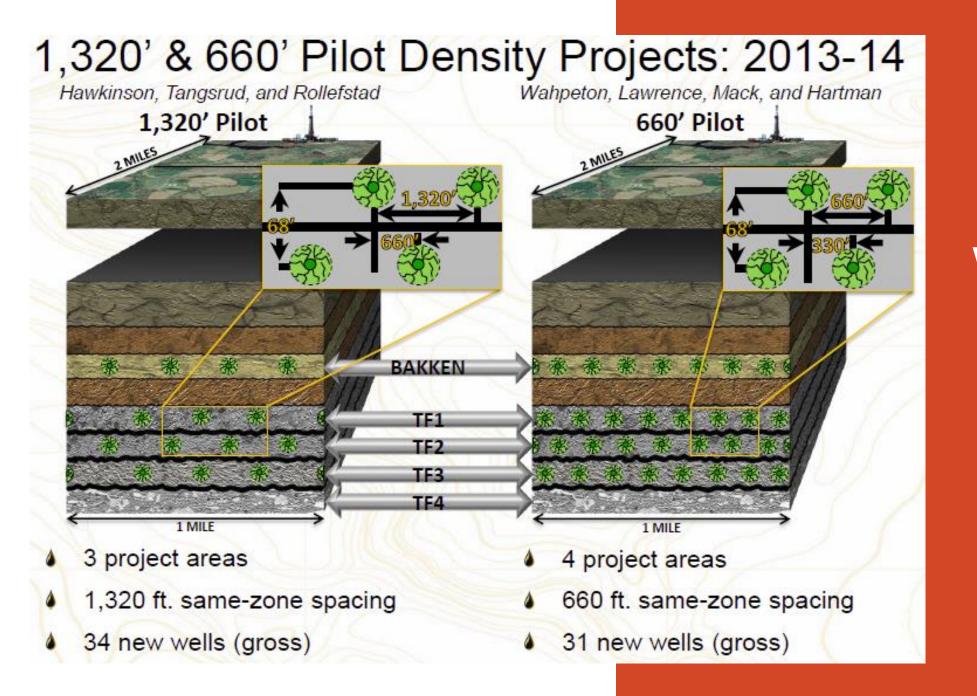
FRACKING FOR FUEL Hydraulic fracturing is used to access oil and gas resources that are locked in non-porous rocks. Water recovery tanks Polluted flowback water Methane gas escapes during the may be injected into a deep storage well, recycled or mining process. sent to a treatment plant. are possible. Poorly treated flowback water has leaked into Water Leakage of fracking drinking water. table fluids from the pipe has not been seen. Possible flow of methane. Leakage of fracking fluid Cement casing from the Holes in the well casing allow fluid to exit and gas to enter. Steel pipe High-pressure fracturing fluid High-pressure fracking Gas flows fluid opens networks of fractures in the fractures Shale shale. Sand props the into the pipe fractures open. Fissures

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

HYDRAULIC FRACKING

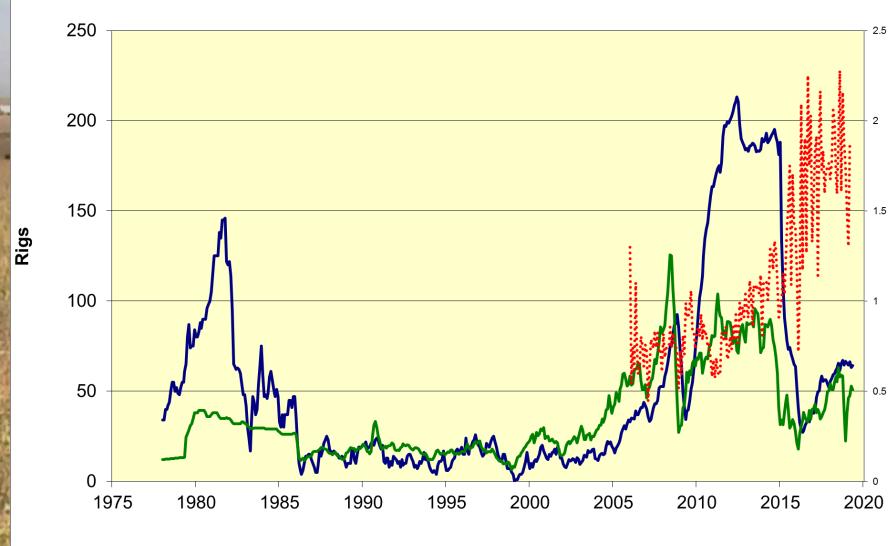
- Transitioned from sliding sleeve to plug and perf
- Targeted frac zones vs. fixed intervals
- Average sand amount doubled from 2014
- Number of frac zones up by 50%





WELL DENSITY





ND Sweet Oil Price

• • • • Spuds / Month / Rig

Rig Count

RIGS A

WELLS

Active Conventional Bakken/Three Forks	15,397 1,706 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 \$80/BO = 70-80 Rigs = 70 Yr	40,000 85,000

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

	Monthly Oil	Wells	Average Daily		Perr	mits			Average
Month	Production	Producing	Production	Dev	Ext	WC	Total	Spuds	Rig Count
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									

637

638

567

65

1,370,455

165,825,070

Totals

INDUSTRIAL COMMISSION OF NORTH DAKOTA OIL & GAS DIVISION

1,370,455

165,825,070

Totals

							Da		A
	Monthly Oil	Wells	Average Daily	<u>Permits</u>		Average	Permits		Average
Month	Production	Producing	Production	Total	Spuds	Rig Count	Total	Spuds	Rig Count
Jan	43,519,155	15,424	1,403,844	127	98	66	151	93	56
Feb	37,425,711	15,156	1,336,633	109	85	64	96	100	57
Mar	43,144,557	15,365	1,391,760	133	128	66	108	122	59
Apr	41,735,647	15,490	1,391,188	129	109	63	104	119	60
May	43,191,793	15,698	1,393,284	140	147	65	121	104	62
Jun							113	102	63
Jul							163	123	66
Aug							152	140	61
Sep							113	106	65
Oct							183	143	67
Nov							116	123	64
Dec							92	116	67



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

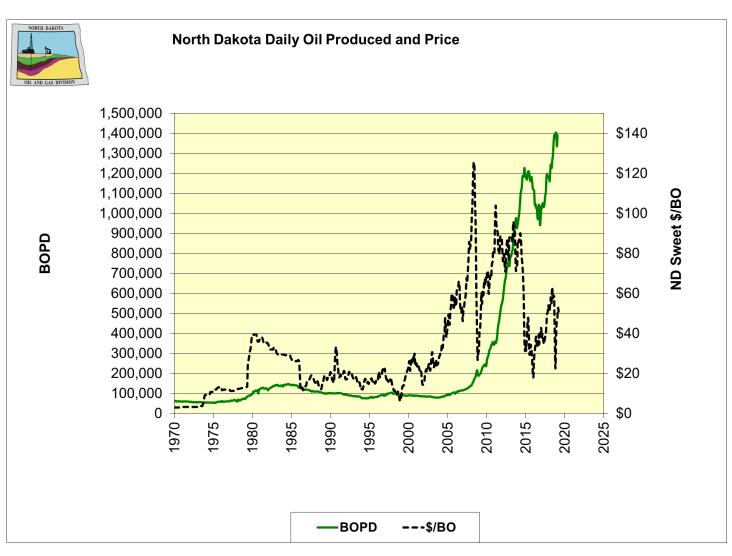


15,698

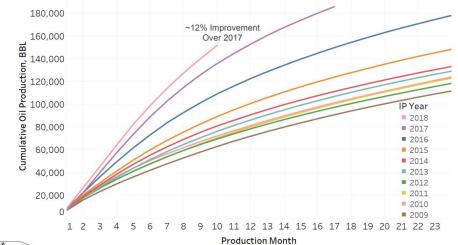
PRODUCING WELLS

NEW RECORD

DAILY OIL PRODUCTION





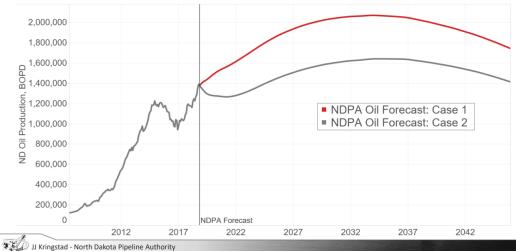


JJ Kringstad - North Dakota Pipeline Authority

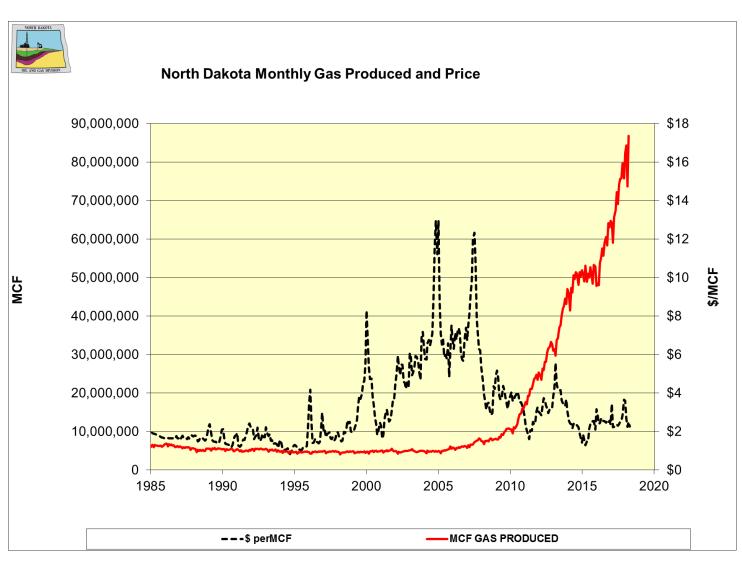
Average BKN/TE Well Performance Statewide

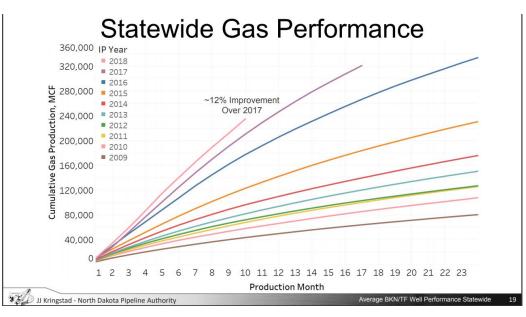
North Dakota Oil Production Forecast

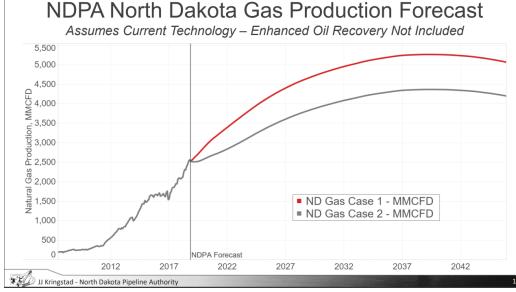
Assumes Current Technology – Enhanced Oil Recovery Not Included



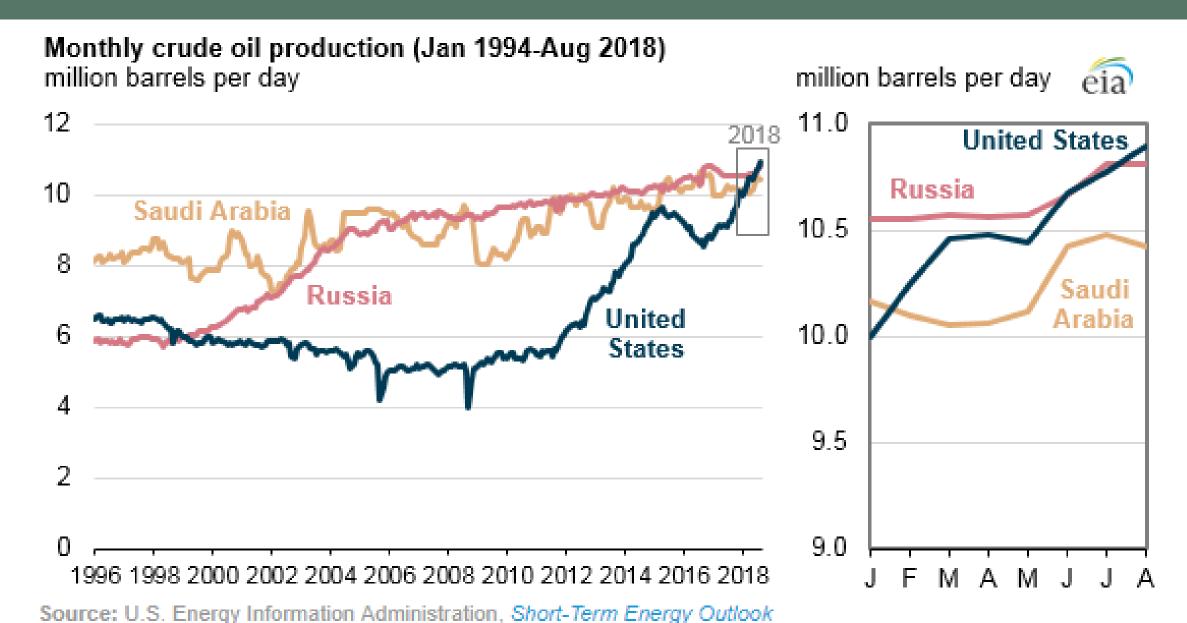
DAILY GAS PRODUCTION







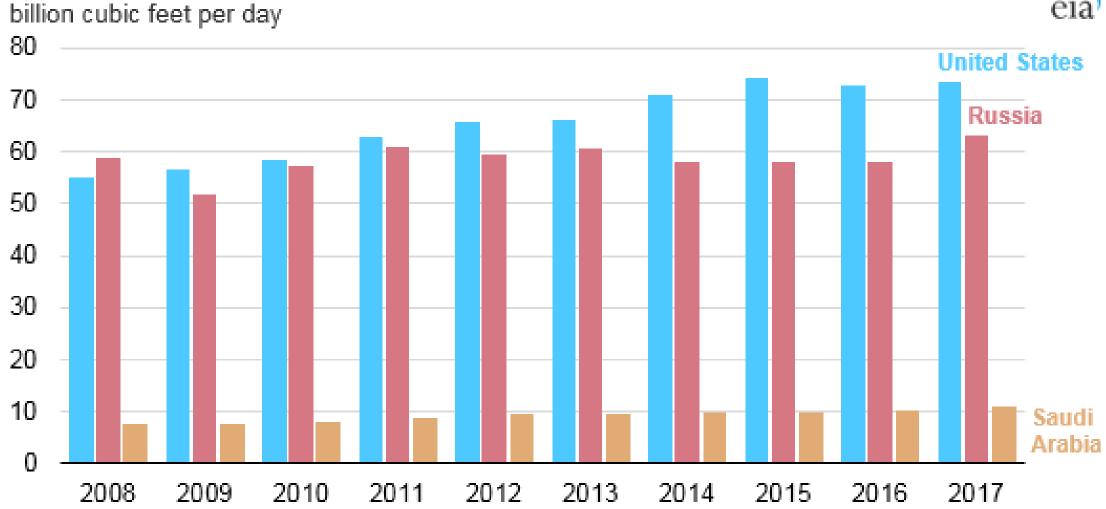
U.S. NUMBER ONE



U.S. NUMBER ONE

Estimated natural gas hydrocarbon production in selected countries (2008-2017)





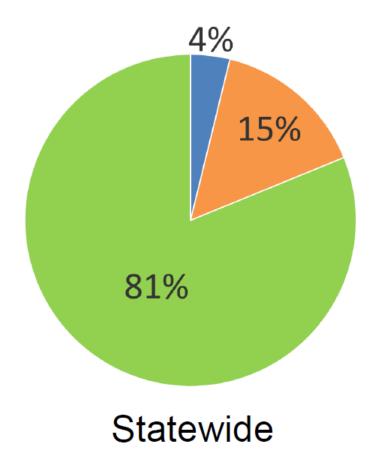
Source: U.S. Energy Information Administration



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



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

Simple Terms

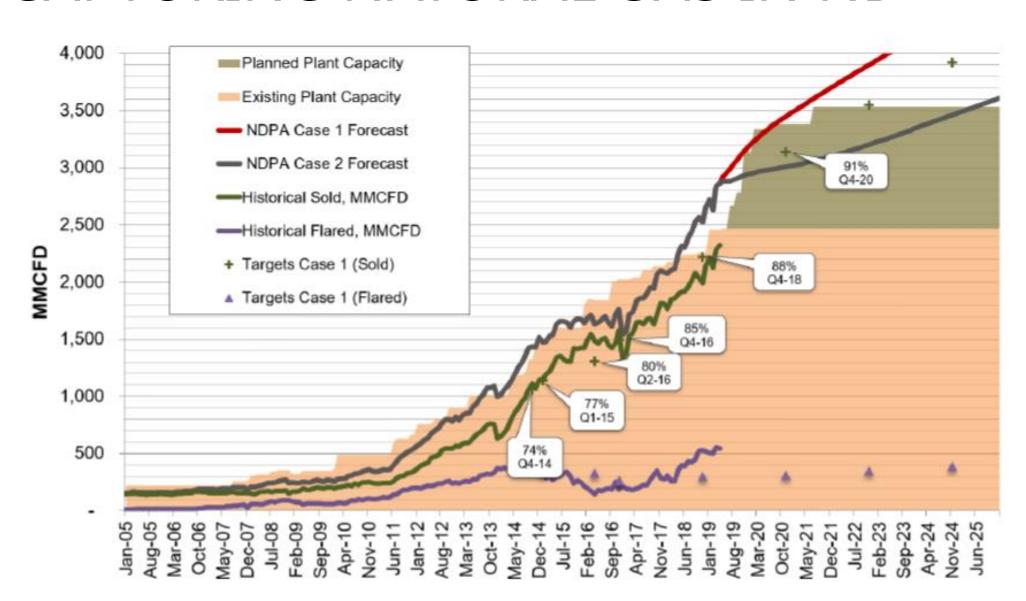
Blue – Lack of pipelines

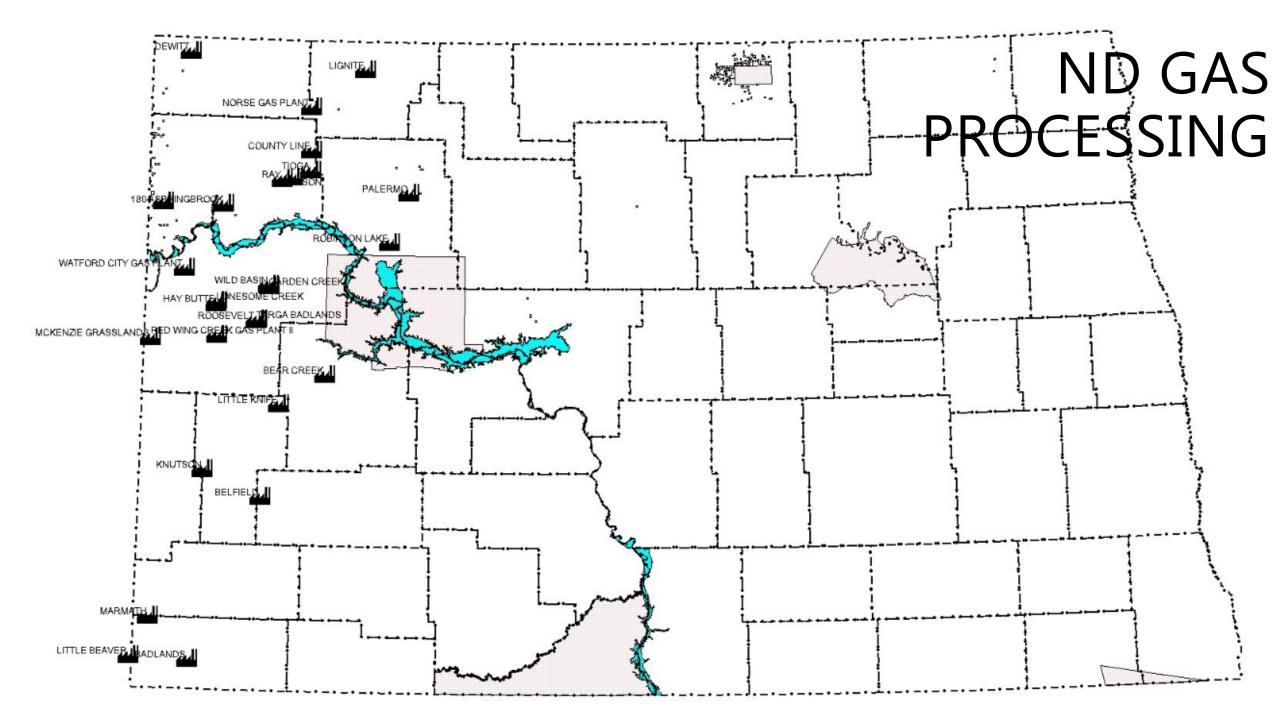
Orange – Challenges on existing infrastructure

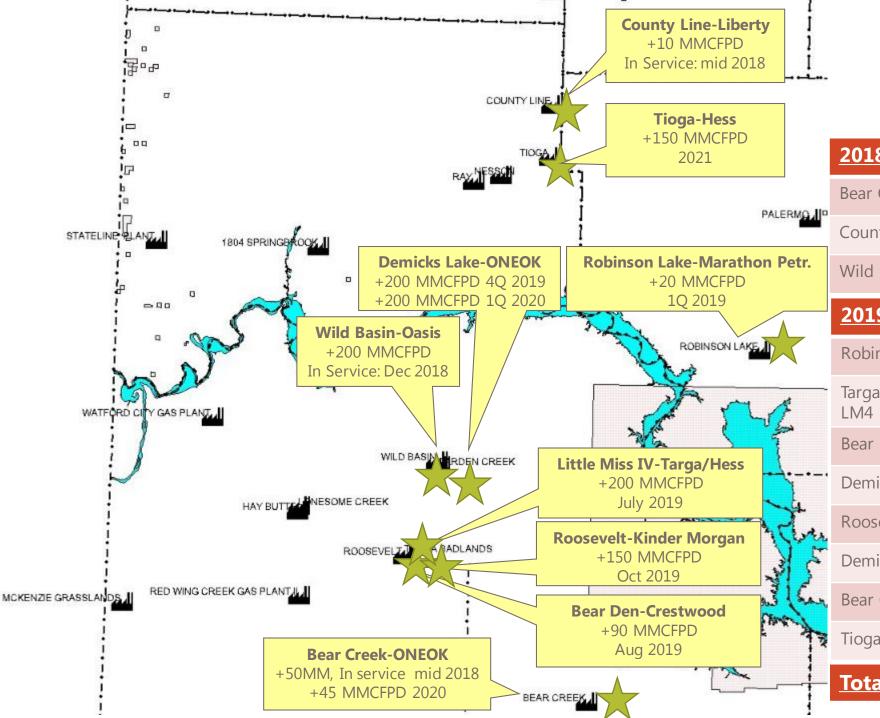
May 2019 Data – Non-Confidential Wells

77% 80% 85% 88% 74% 91% Jan 2015-Nov 2016-Nov 2018-**April 2016-**Oct 2014-Dec 2014 **Nov 2020 March 2016** Oct 2016 **Oct 2018** Oct 2020

CAPTURING NATURAL GAS IN ND







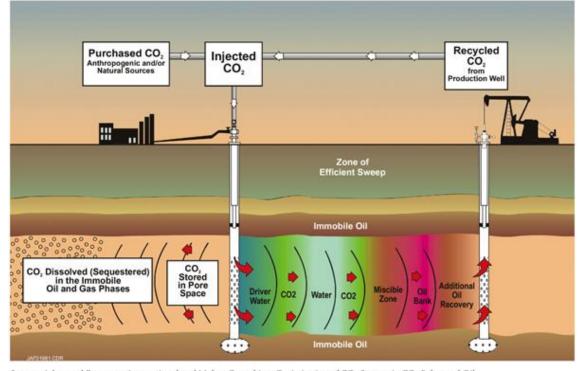
GAS PLANT EXPANSIONS

	<u>2018</u>	<u>MMCFPD</u>	<u>Incr</u>	Start Date	
to	Bear Creek	80→ 130	+50	In Service	
ľ	County Line	20→30	+10	In Service	
	Wild Basin	145→345	+200	In Service	
	<u>2019</u>	<u>MMCFPD</u>	<u>Incr</u>	Start Date	
	RobinsonLk	130→150	+20	1Q 2019	
	Targa/Hess, LM4		+200	Jul 2019	
	Bear Den	30→120	+90	Aug 2019	
	Demicks Lake		+200	4Q 2019	
ł.	Roosevelt	50→200	+150	Oct 2019	
	Demicks Lake	200→400	+200	1Q 2020	
×.	Bear Creek	130→175	+45	2020	
T.	Tioga, Hess	250→ 400	+150	2021	
	Total \$1.	.5 Billion	+1,165	<u>MMCFPD</u>	

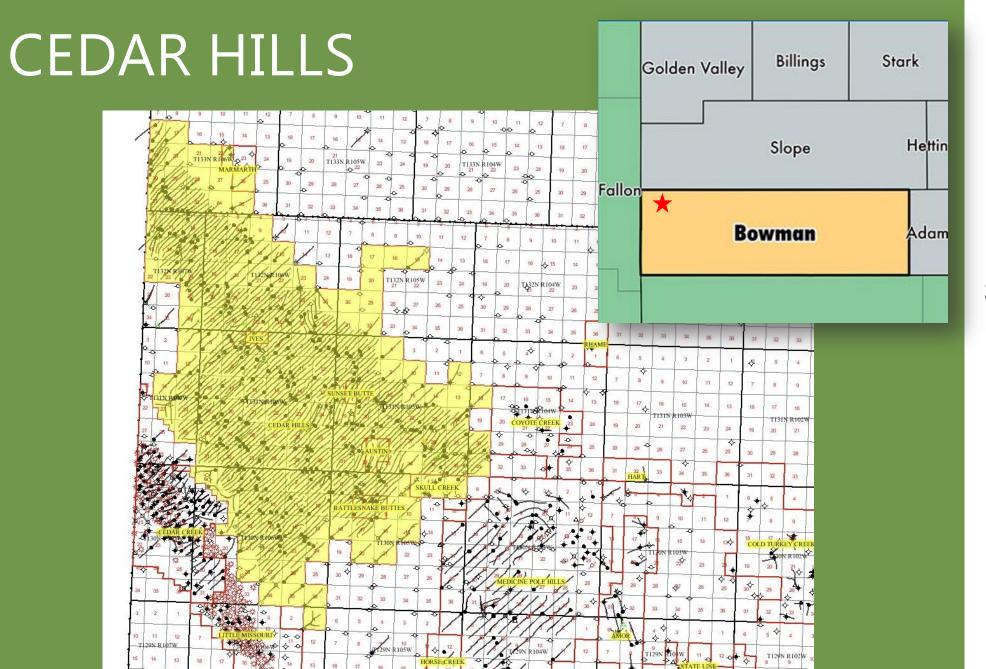


ENHANCED OIL RECOVERY (EOR)

• 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 CO, Storage in CO, Enhanced Oil Recovery Projects, prepared for UK Department of Energy & Climate Change, November 2010.



North Unit

Operator: Continental Resources, Inc

Pool: Red River Basin

Injectate: Air from 2003 to date. Water from 2002 to date.

South Unit

Operator: Denbury

Onshore, LLC

Pool: Red River Basin

Injectate: Water from

2001 to date and

currently investigating

CO₂ potential

Williams BEAR CREEK Mountrail McKenzie McLean 6582 Dunn Merce STACK BUTTE Billings 148N R97W Stark

Operator: XTO Energy, Inc.

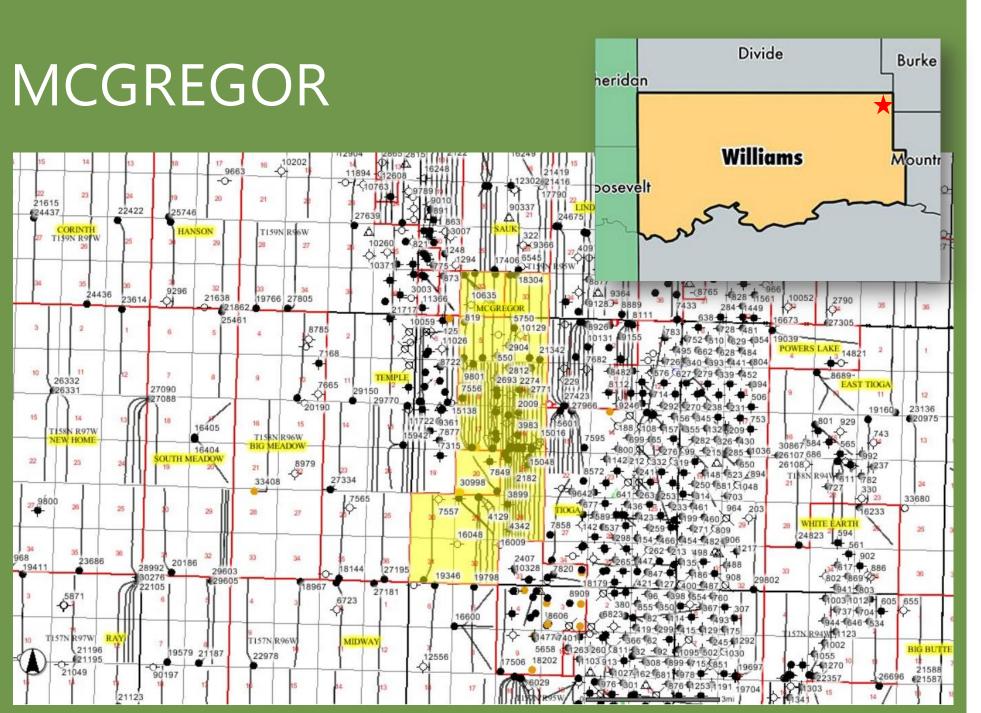
Pool: Duperow

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



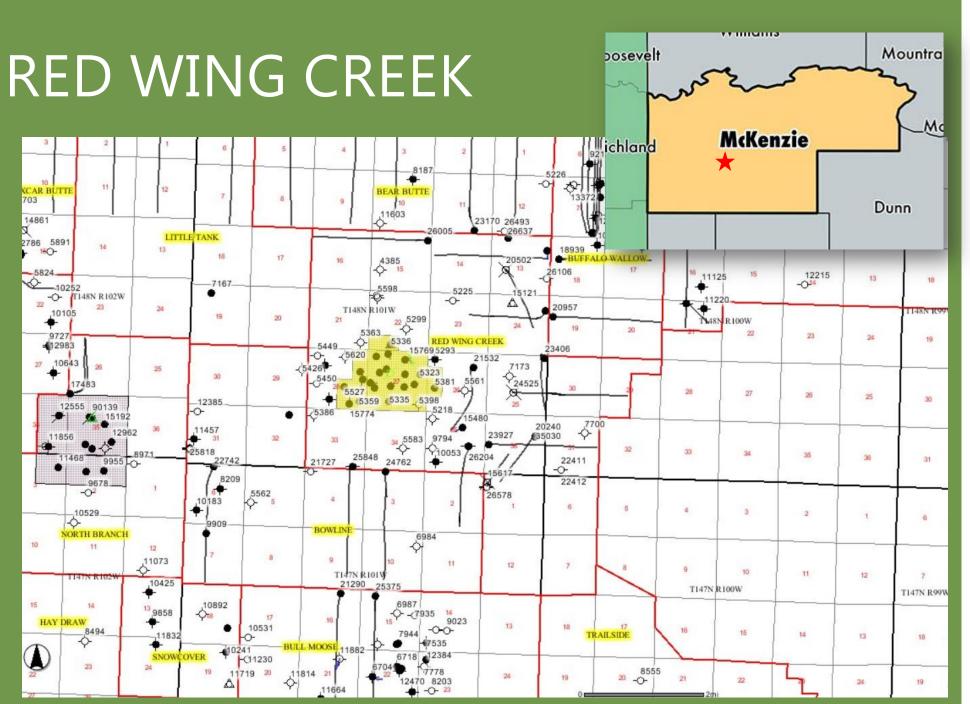
Operator: Liberty Resources Management, LLC

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

Pool: Madison

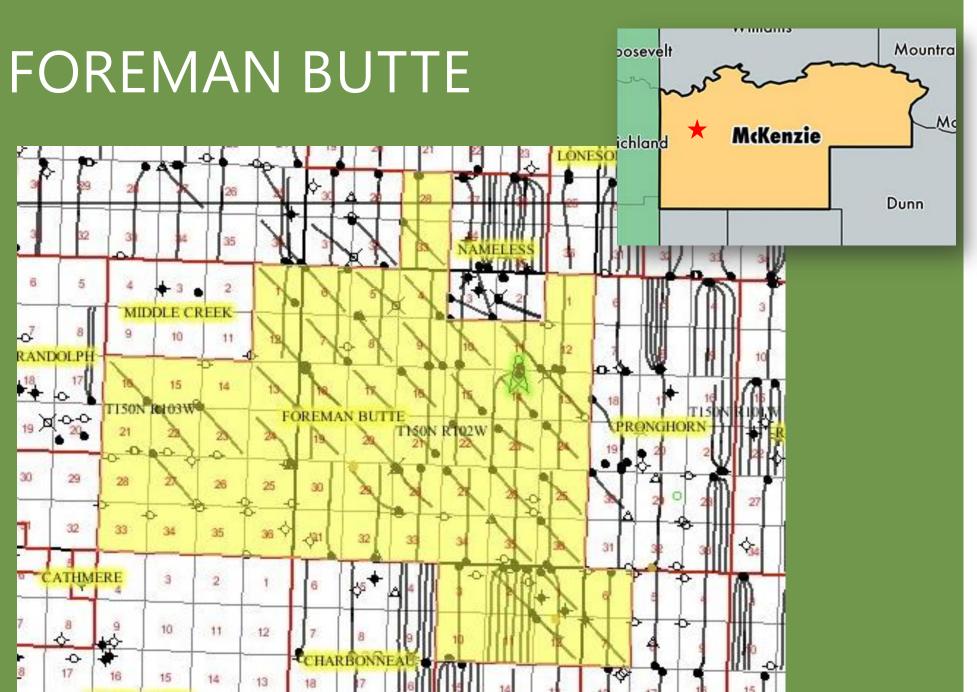
Injectate:

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.

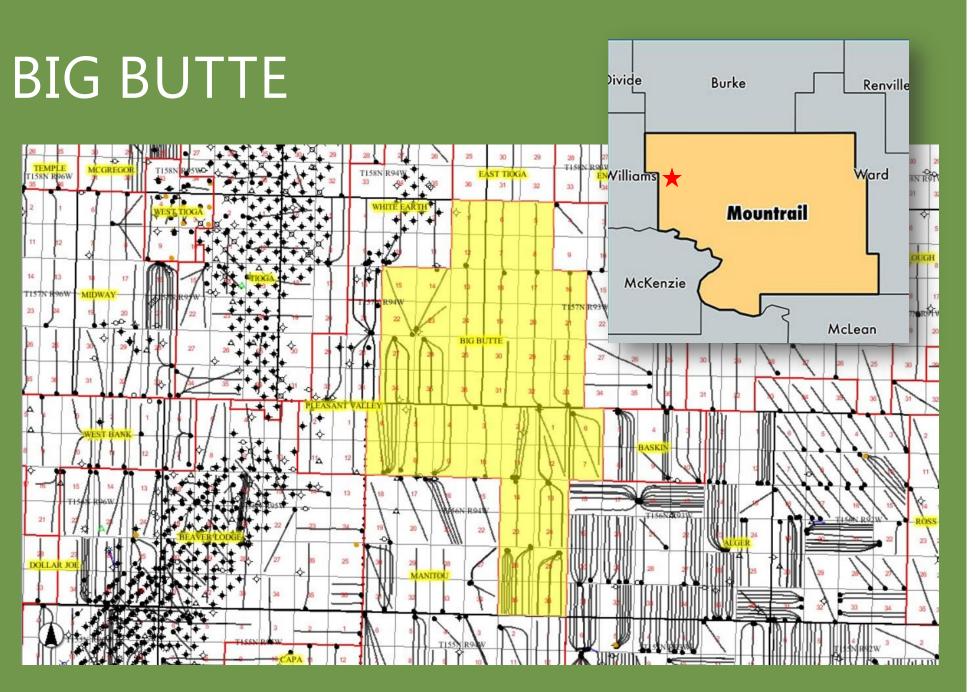


Operator: Samson Oil and Gas USA, Inc.

Pool: Madison

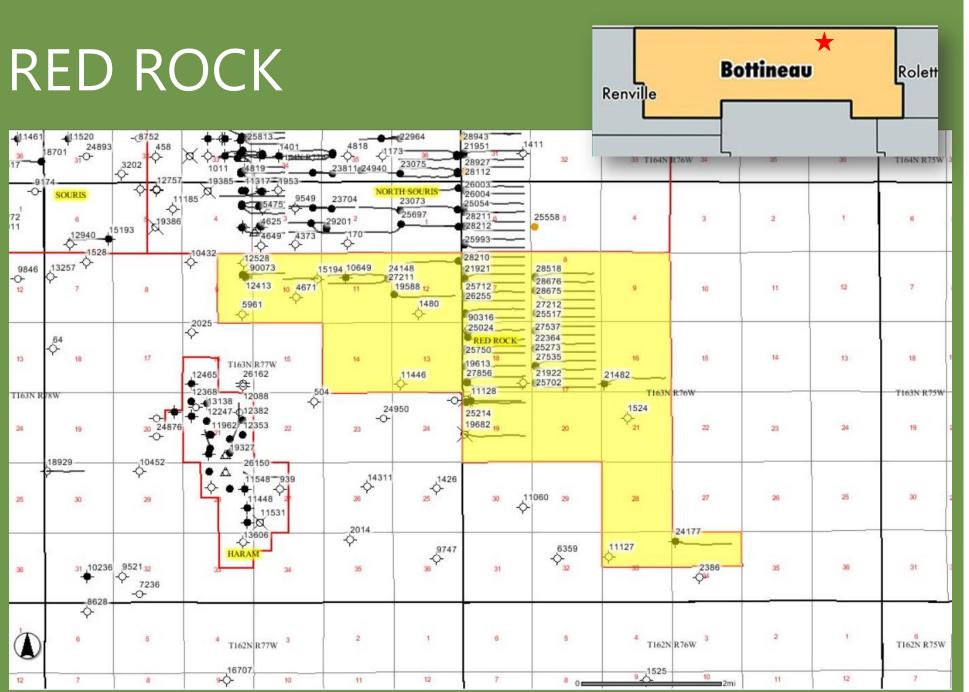
Injectate:

Water injection pilot project



Operator: Hess Bakken Investments II, LLC

Pool: Bakken

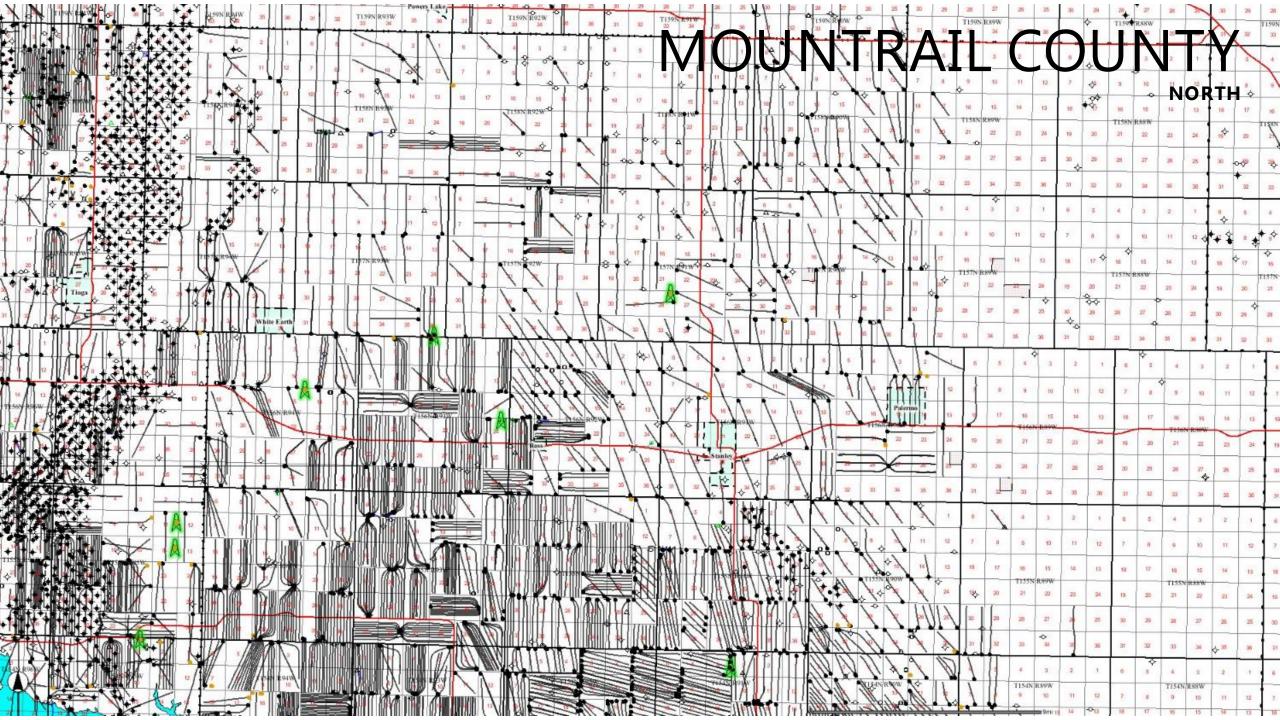


Operator: Ballantyne Oil, LLC

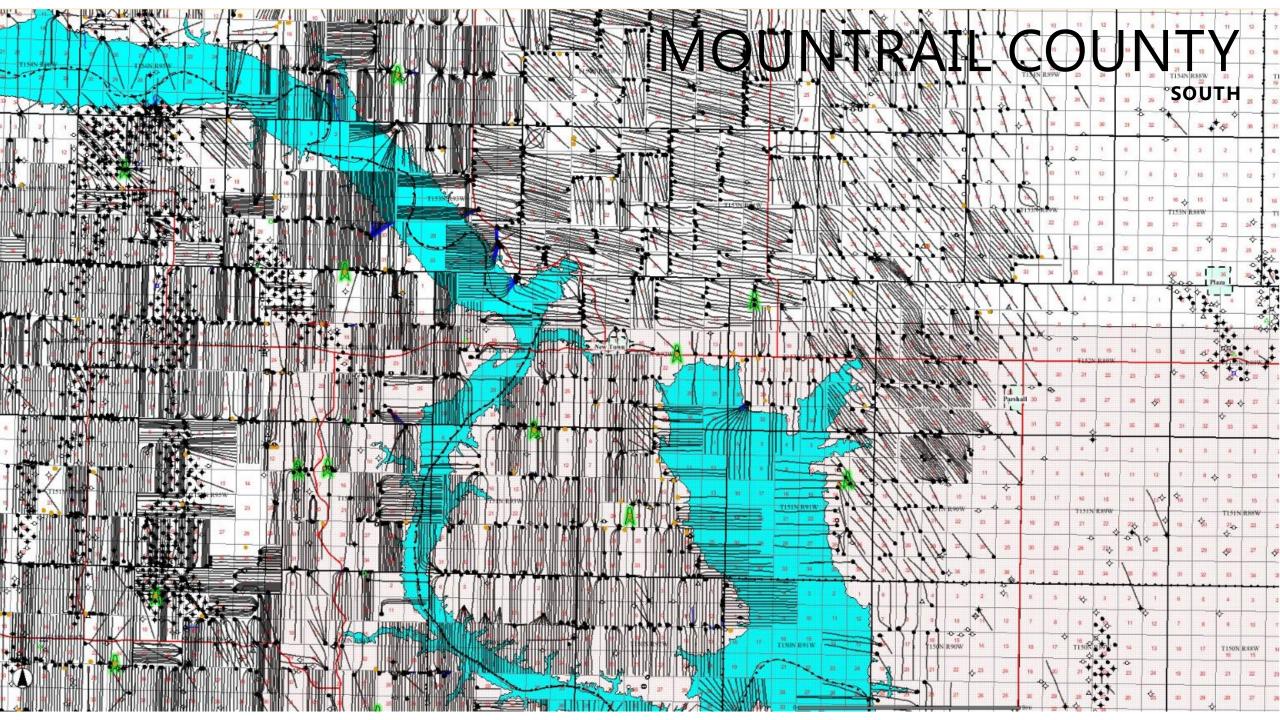
Pool: Spearfish

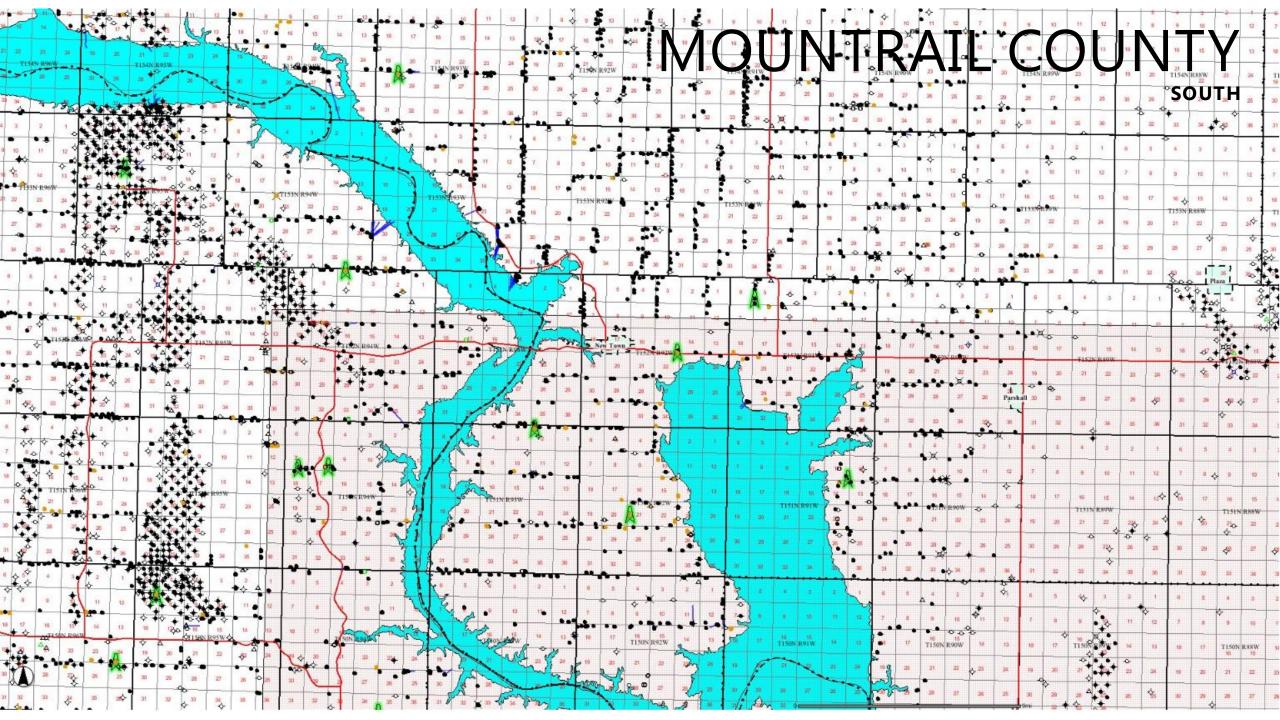
Injectate: Water injection pilot project – currently waiting on injection to begin.





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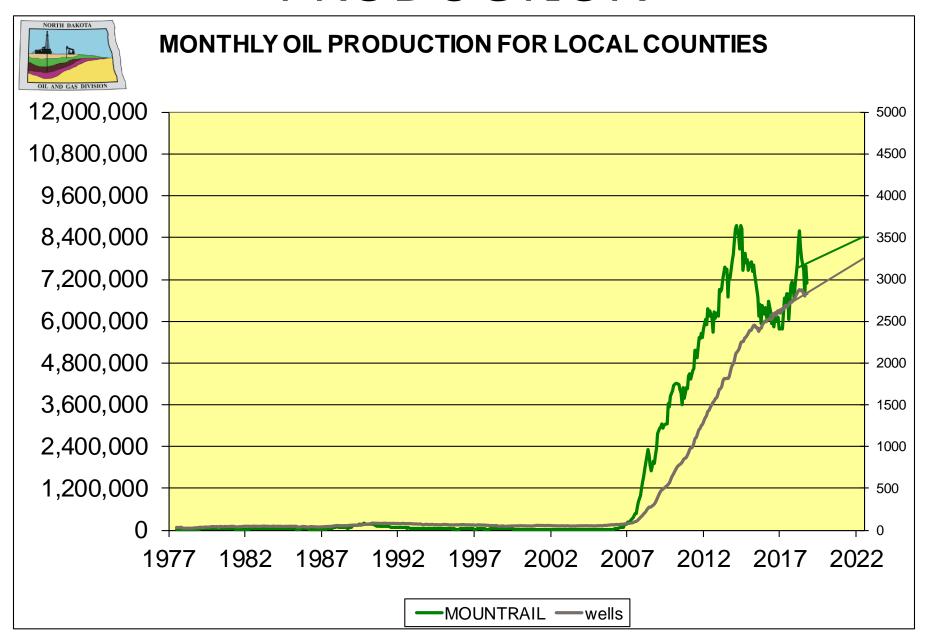
WELLS

Mountrail County

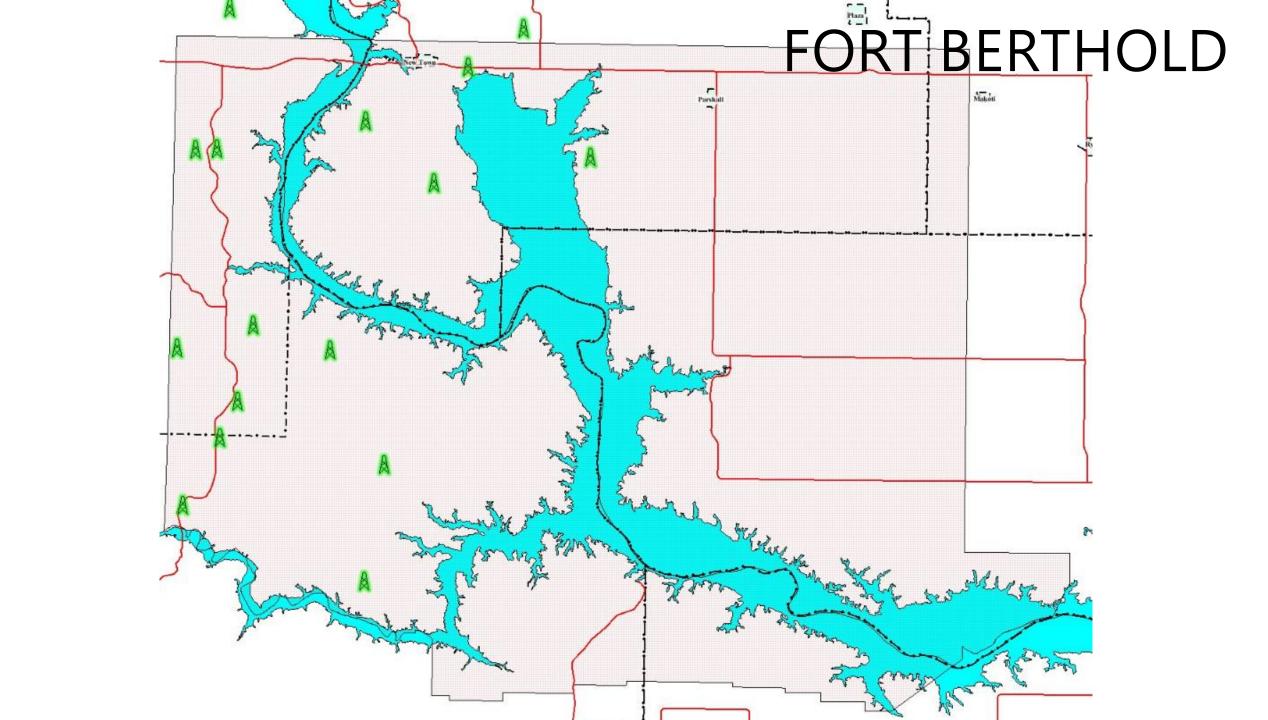
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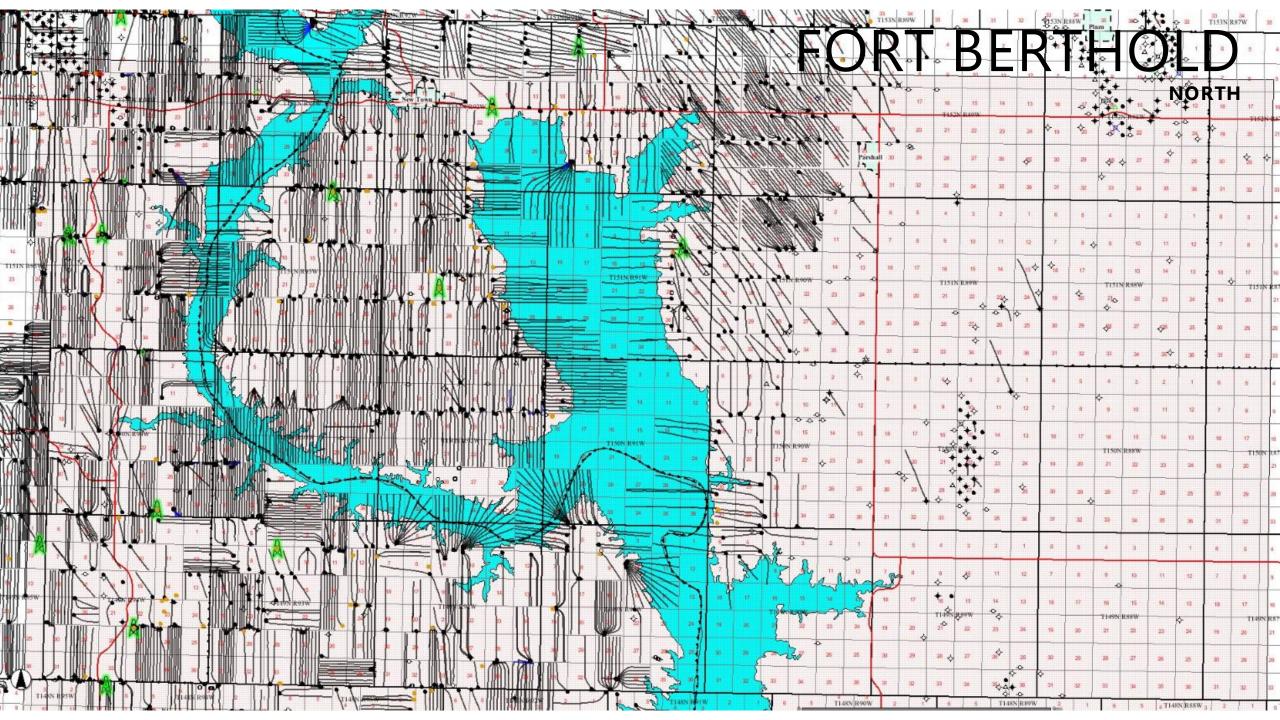
Well Status	GI Gas Injection	Confidential	INJP Injector, Producer	OG Oil and Gas	ST Stratigraphic Test	SWD Salt Water Disposal	WI Water Injection	WS Water Source	TOTAL
Active (A)			1	2,865	6	48		2	2,922
Confidential		235							235
Permit to Drill (LOC)				219		3			222
Drilling (DRL)				29					29
Temporarily 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

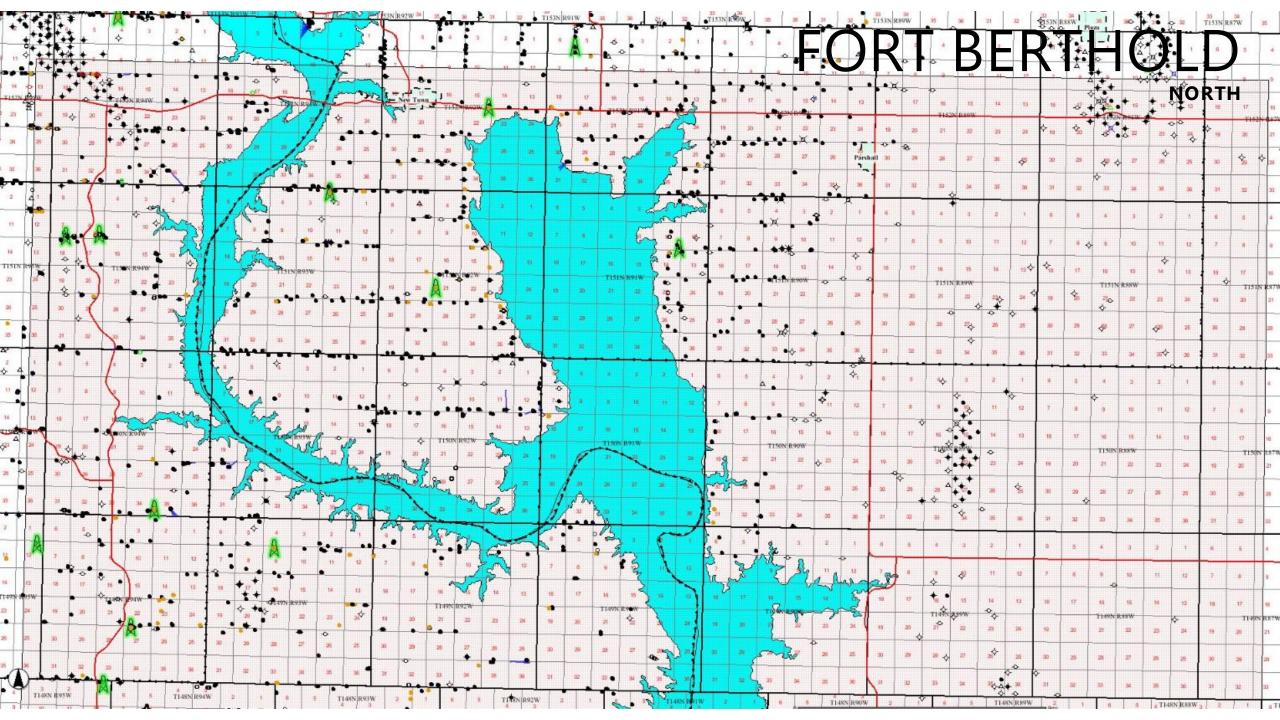
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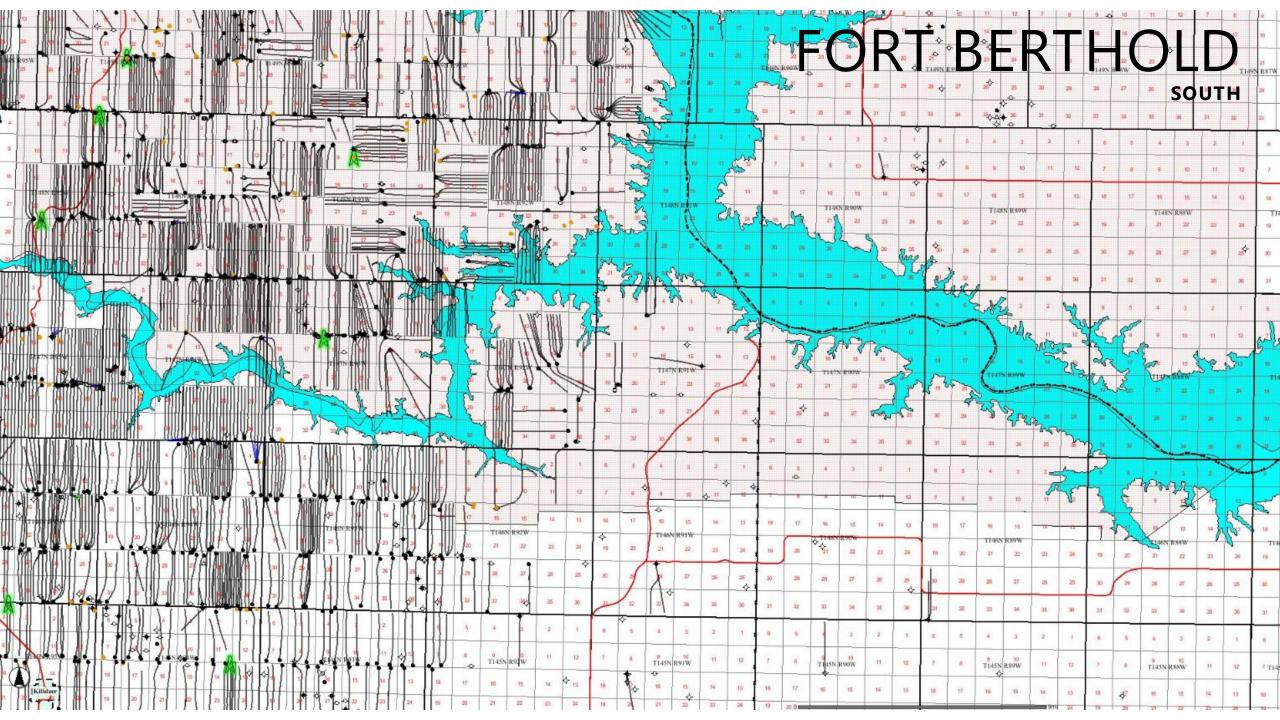


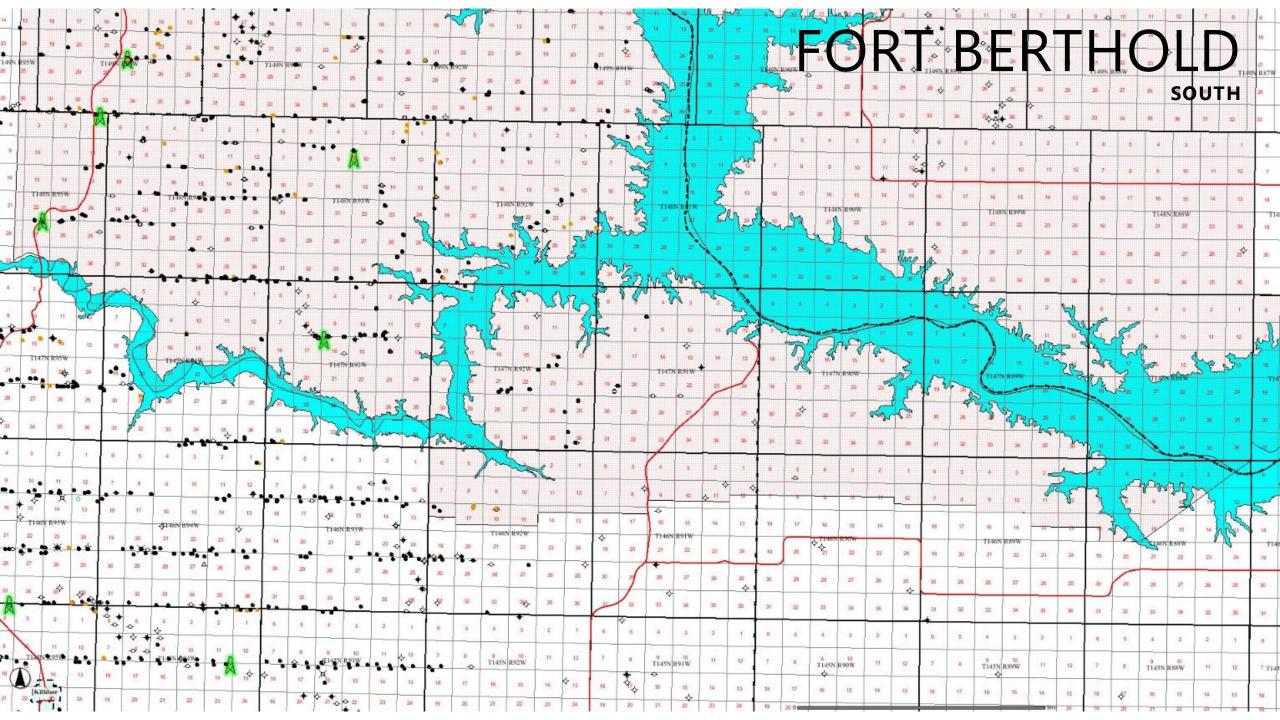












Fort Berthold Reservation Activity – April 2019

	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



Deductions= **Transportation Processing Compression Administrative Costs**

ROYALTY STATEMENTS

ADMINISTRATIVE CODE 43-02-06-01 **Royalty Owner Information Statement**

<u>Price</u>: Addition of natural gas liquids to the price breakdown.

<u>Deductions & Adjustments:</u> 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



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

	May-September	 Recommendations sought for rule changes from stafe Request for approval to proceed with rulemaking from Industrial Commission. Legal rules notice published in ND newspapers statewide. 						
2019	October-December	 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	 File rules and Attorney General opinion with ND Legislative Council. Notification period of upcoming Administrative Rules Committee Hearing. Administrative Rules Committee Hearing. 						
	April	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 nonproducing wells (AB/TA Status).
- Review of Gathering
 Pipelines:
 Review of Gathering
 Pipeline notifications of
 milestones (new
 construction/in-service)



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

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