

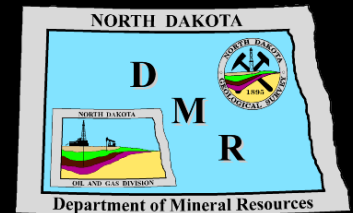
# ***DEVELOPMENT OF THE BAKKEN RESOURCE***

*UND Law Students*

*Bismarck, ND – March 2, 2018*



**School of Law**

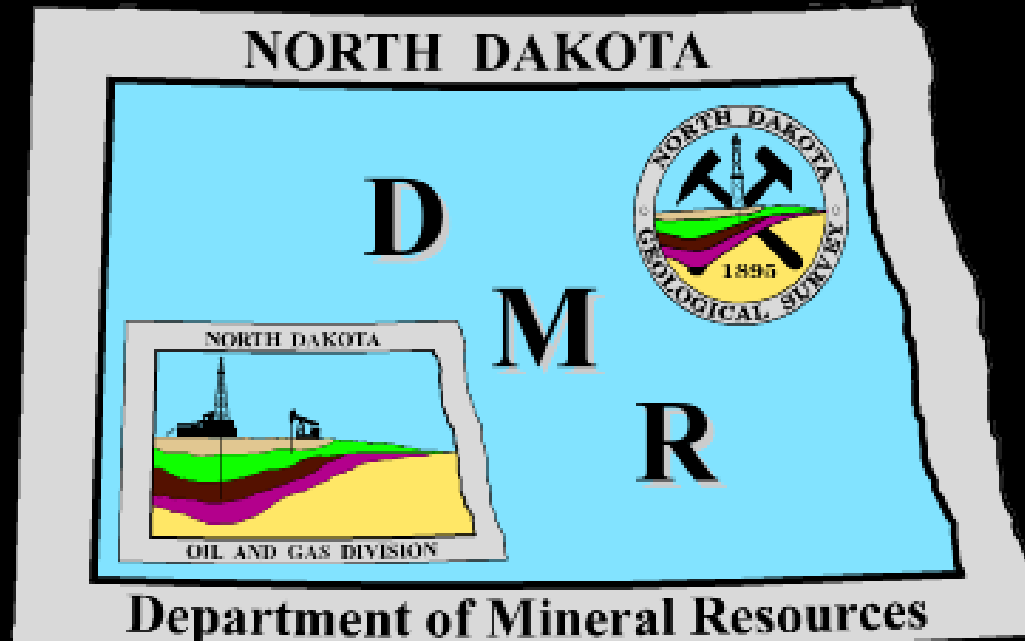


# **North Dakota Development**

- **Regulations**
- **Resource Play**
- **Development**
- **Bakken Results**

*Bruce E. Hicks  
Assistant Director  
NDIC-DMR-OGD  
Bismarck, ND*

# North Dakota Department of Mineral Resources



*<https://www.dmr.nd.gov/oilgas/>*

*<https://www.dmr.nd.gov/ndgs/>*

*600 East Boulevard Ave. - Dept 405*

*Bismarck, ND 58505-0840*

*(701) 328-8020      (701) 328-8000*

## Services

Rules & Regulations

Policies & Guidance

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Hearing Dockets

Active Drilling Rigs

Daily Activity Reports

Information Center

Confidential Well List

General Statistics

Seismic

Well Search

Report a Spill/Incident

Gathering Pipelines

GIS Map Server

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Surface Mineral Owner

Basic Services

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Related Links

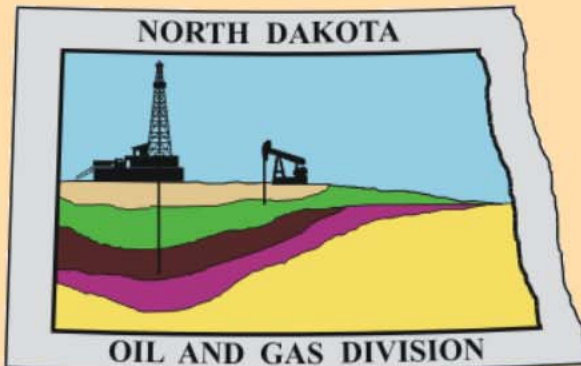
FAQ & Web Help

Employment Opportunities

## Contact Us

Employee Directory

Email Addresses



## Welcome to the North Dakota Industrial Commission Mineral Resources, Oil and Gas Division

[Rules Approved by the Commission and ARC Hearing](#)

[Rule Changes Full Notice](#)

[General Guidelines for Temporary Abandonment of Wells](#)

[Bakken and Three Forks Information!](#)

The Oil and Gas Division regulates the drilling and production of oil and gas in North Dakota. 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,

**Phone:** (701) 328-8000

**Fax:** (701) 328-8022

**Mail:**

NDIC Oil and Gas Division

600 East Boulevard

Related Links

Active Drilling Rigs  
Daily Activity Reports  
Confidential Well List

## Information Center

The Director's Cut is an update on current activity in the North Dakota oil patch from the Director of the Department of Mineral Resources.

### [Tentative Director's Cut Dates](#)

[Director's Cut - 02/17/2016](#)

[Director's Cut Archive](#)

[Director's Cut Webinars](#)

### [Recent Presentations](#)

View [press releases](#) from the Oil and Gas Division

### Oil and Gas Division Program Descriptions:

This section of the Information Center is dedicated to program descriptions within the Oil and Gas Division. We will be adding descriptions as they become available, so check back for further information.

[Underground Injection Control Program](#)

[\[DMR Home\]](#) [\[Disclaimer\]](#) [\[Privacy\]](#) [\[Security\]](#) [\[Feedback\]](#)

# Regulations

# Spacing

## Drilling Units

- **NDAC Sec 43-02-03-18**
  - One hor well per Section (640 acres)
  - Exception—notice & hearing

## Spacing Units

- **Comm order after notice & hearing**
  - Multiple hor wells per SU (2-30+)
  - 320,640,960,1280,1920,2640,3200,5280

# Pooling

## NDCC Sec 38-08-08

- Two or more separately owned tracts
- No voluntary pooling
- NDIC “shall” force pool all interests



# **Unitization**

## **NDCC Sec 38-08-09.3**

- **Project to substantially increase recovery**
- **EOR unnecessary for approval**

## **NDCC Sec 38-08-09.5**

- **55% MIO approval**
- **55% WIO approval**
- **Corral Creek-Bakken Unit—eff 1-1-2012**
- **Grail-Bakken Unit—3-3-2014 failed to ratify**
- **Hofflund-Bakken Unit—hearing 4-4-2018**

# **MONTHLY HEARINGS**

## **Administrative Docket**

- **pooling**
- **increase density wells**
- **saltwater disposal**

## **Regular Docket**

- **hearing examiner—Asst Atty Gen**
- **create 1280-ac spacing unit**
- **create overlapping spacing units**
- **other exceptions to rules**

# **DISPOSING OF CASES**

## **Industrial Commission**

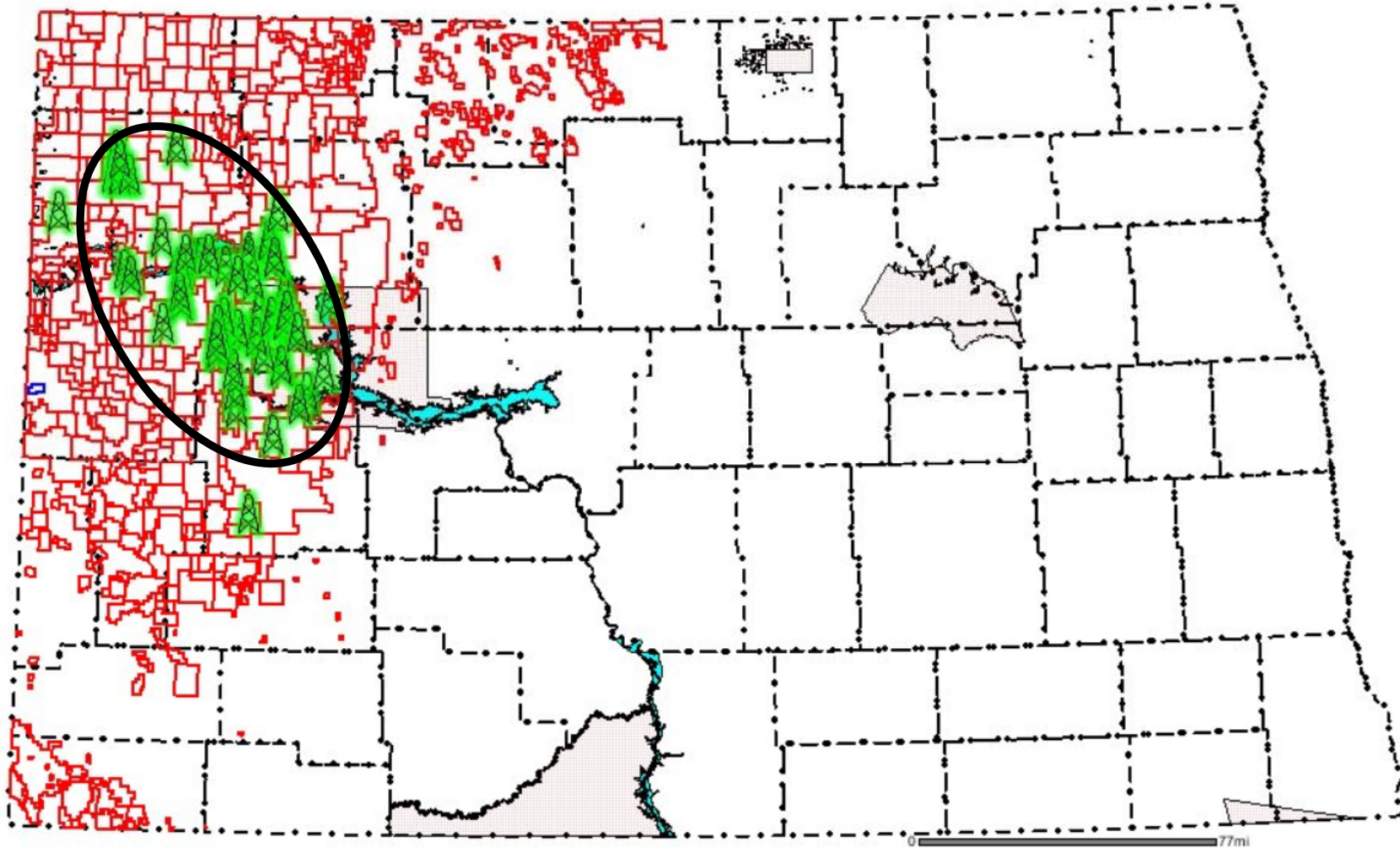
- **Gov, Atty Gen, Comm of Ag**
- **controversial cases**
- **orders denying the appl**
- **orders imposing fines**
- **orders involving unitization**

## **Director of Oil & Gas Division**

- **routine cases**
- **IC delegated cases**

# **Resource Play**

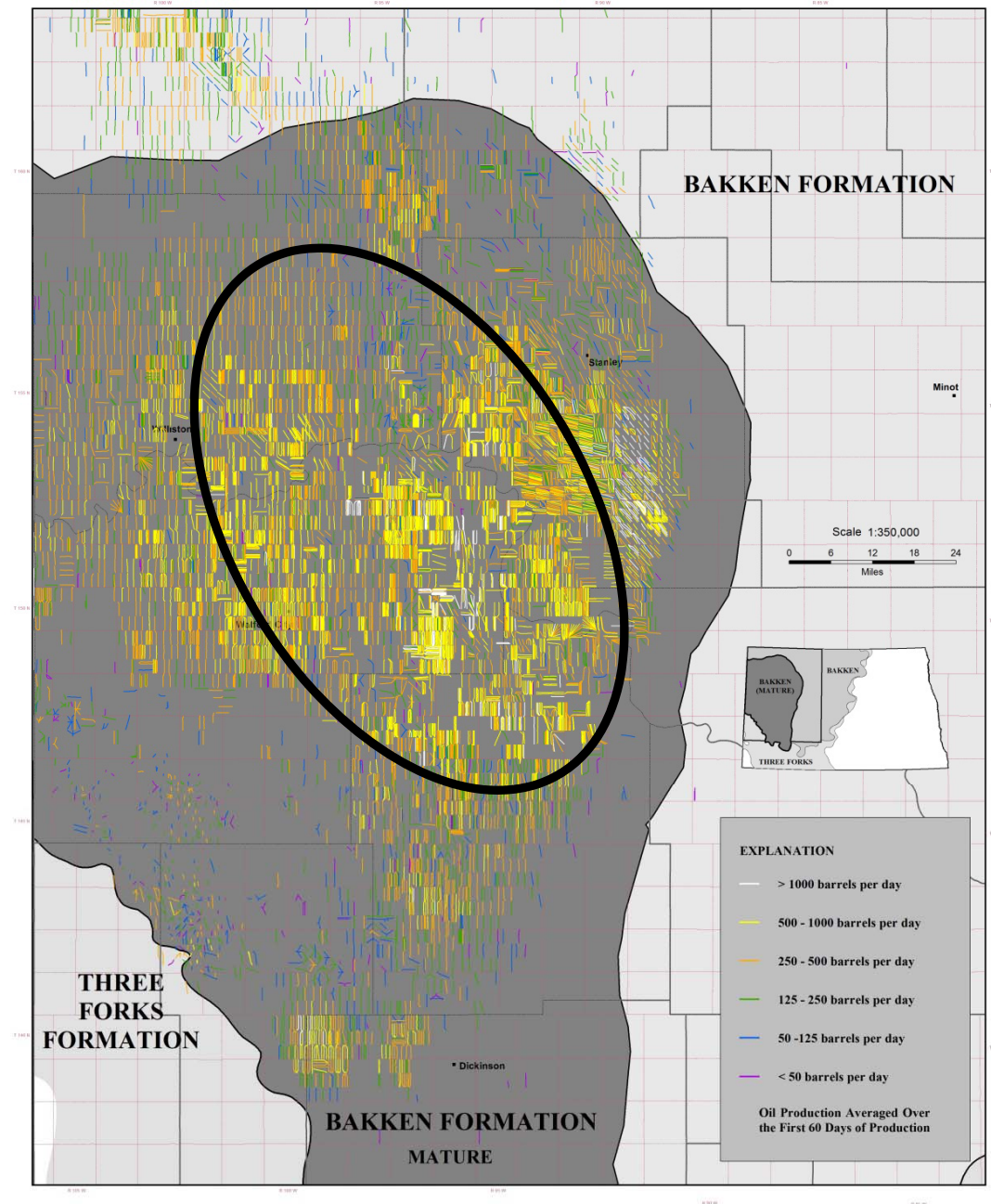
## **NORTH DAKOTA – 59 DRILLING RIGS – MARCH 2018**



**Current drilling activity is focused  
in Mountrail, Dunn, McKenzie, and Williams Counties.**

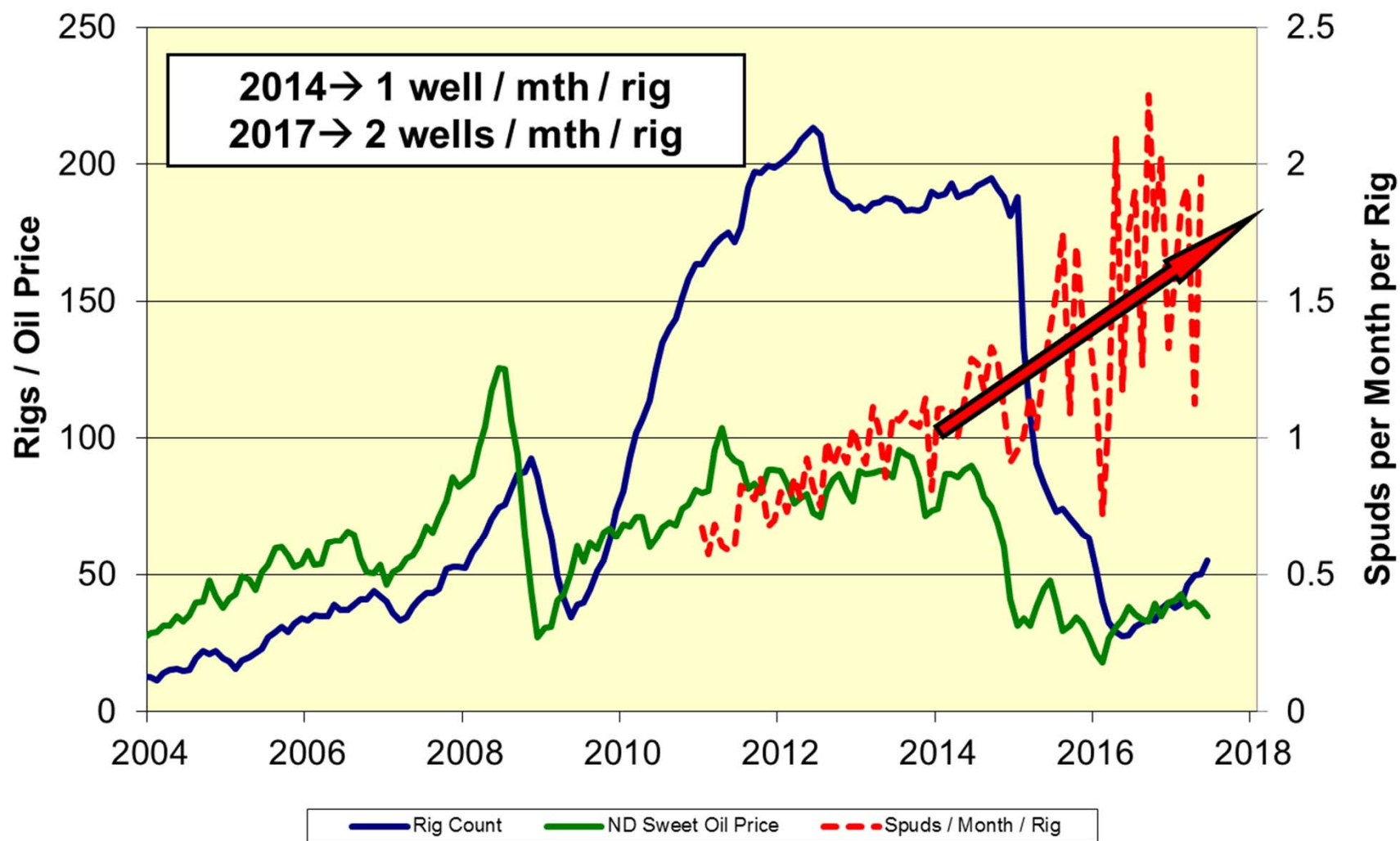


# First 60 Day Average Bakken Horizontal Production by Well July 2015



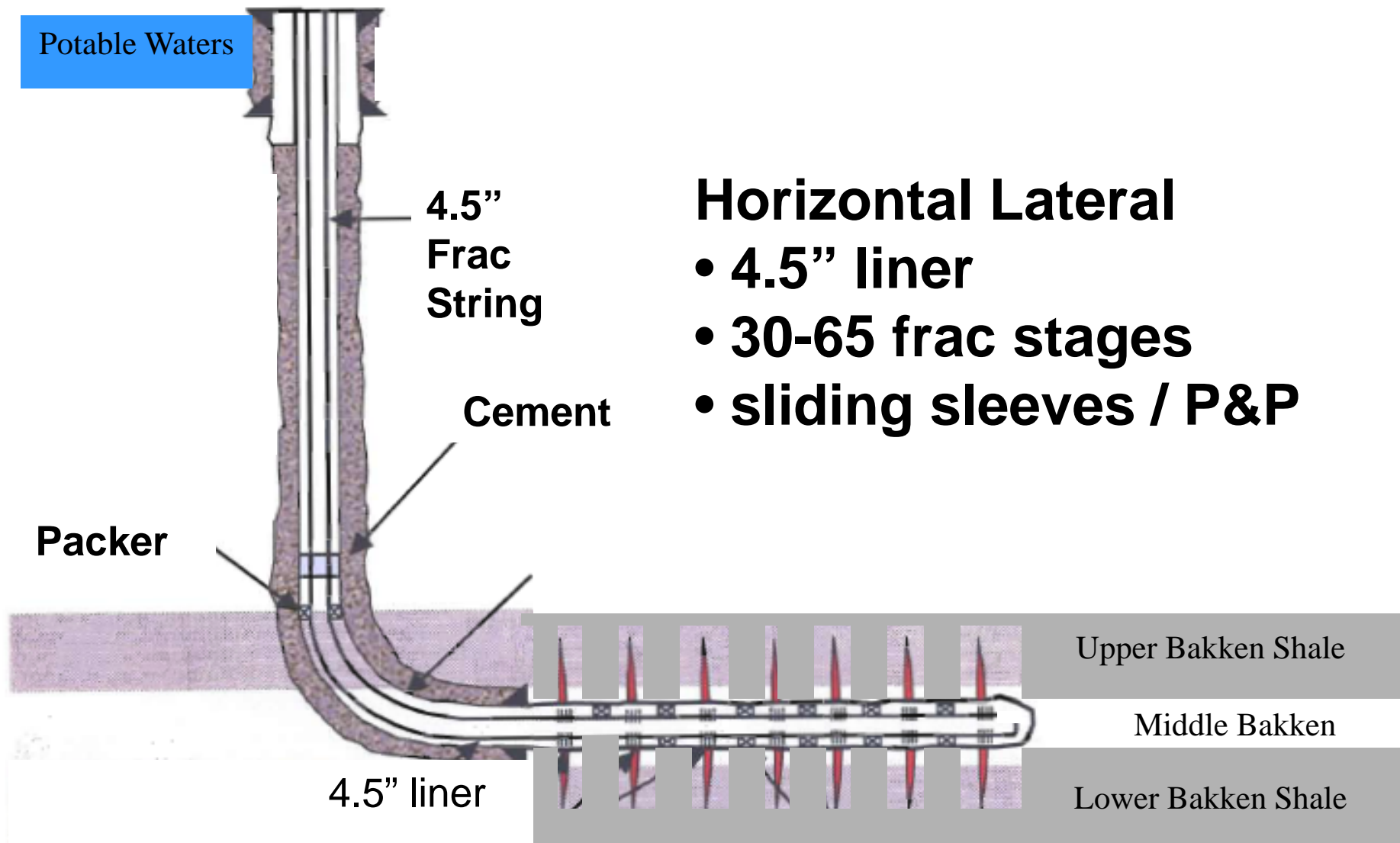


## North Dakota Average Monthly Rig Count

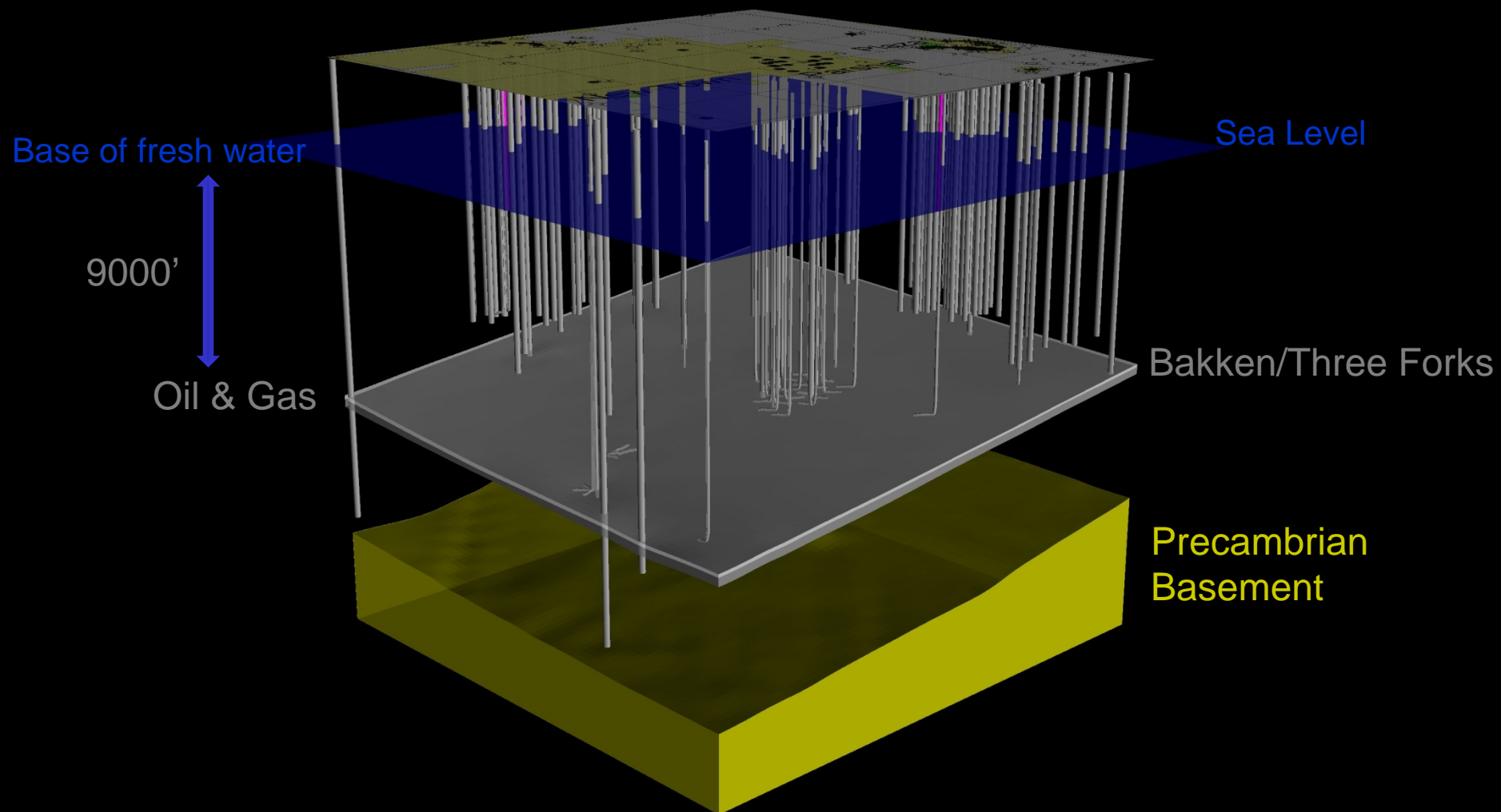




# TYPICAL HORIZONTAL OIL WELL



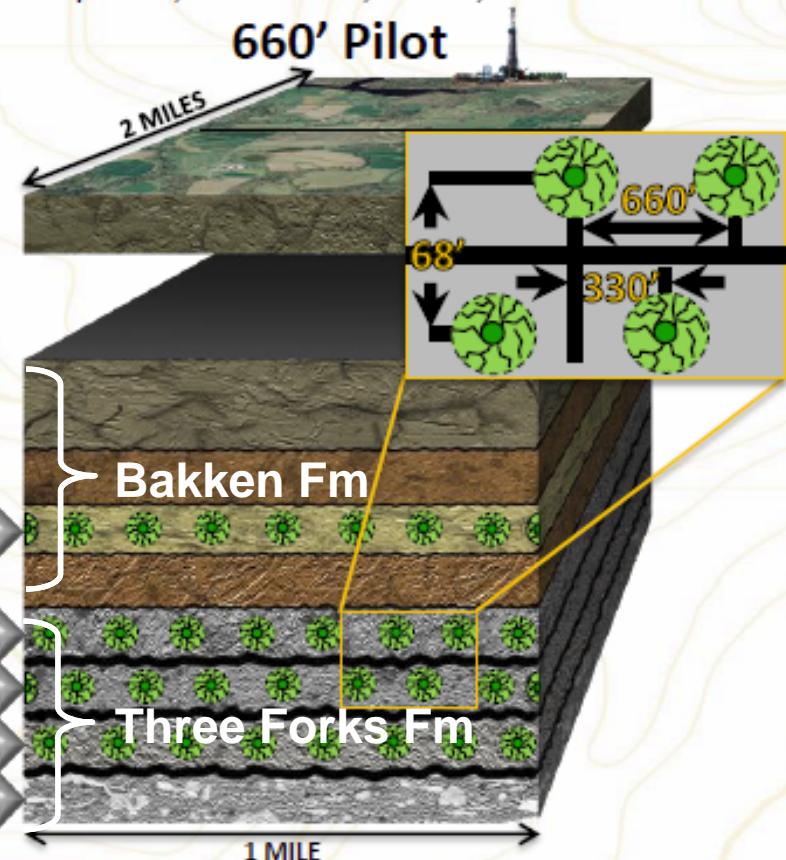
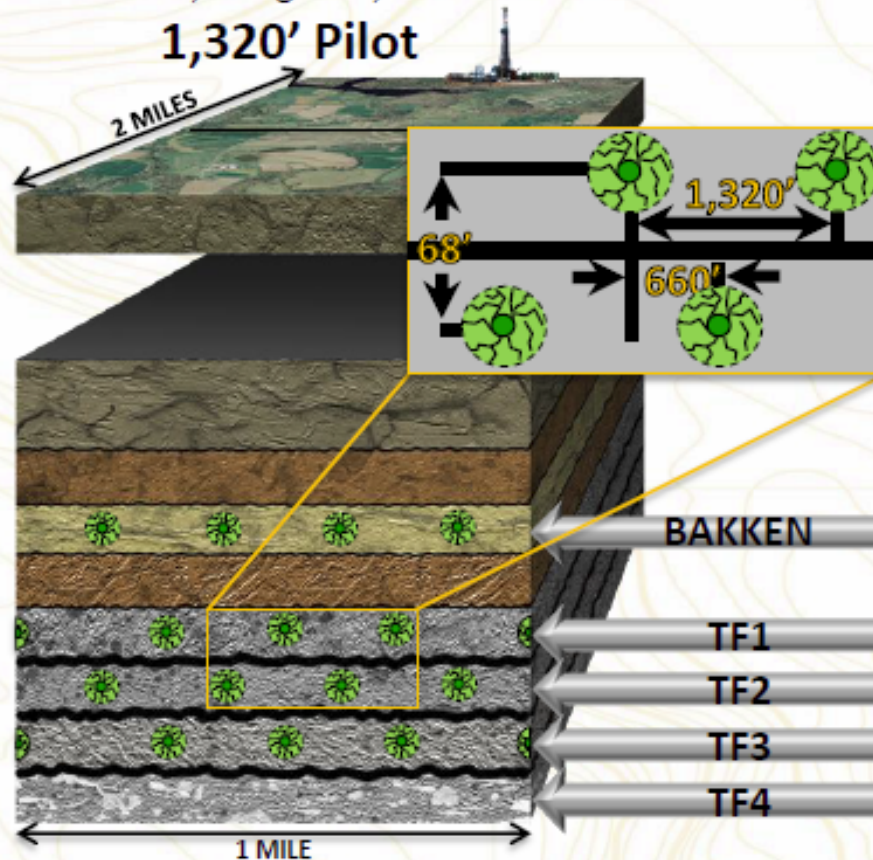




# 1,320' & 660' Pilot Density Projects: 2013-14

*Hawkinson, Tangsrud, and Rollefstad*

*Wahpeton, Lawrence, Mack, and Hartman*



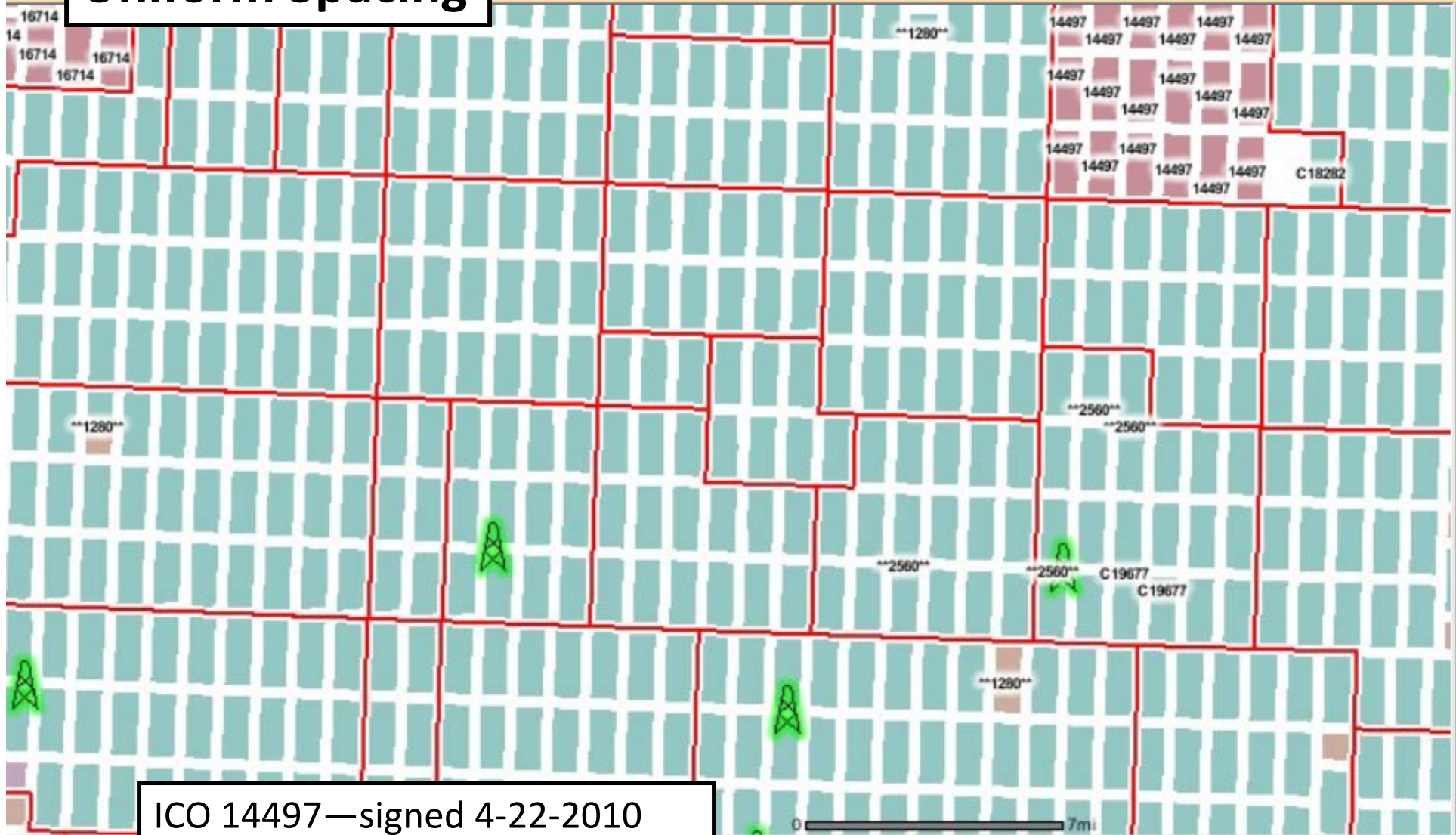
- 3 project areas
- 1,320 ft. same-zone spacing
- 34 new wells (gross)

- 4 project areas
- 660 ft. same-zone spacing
- 31 new wells (gross)

**Development**



## Uniform Spacing

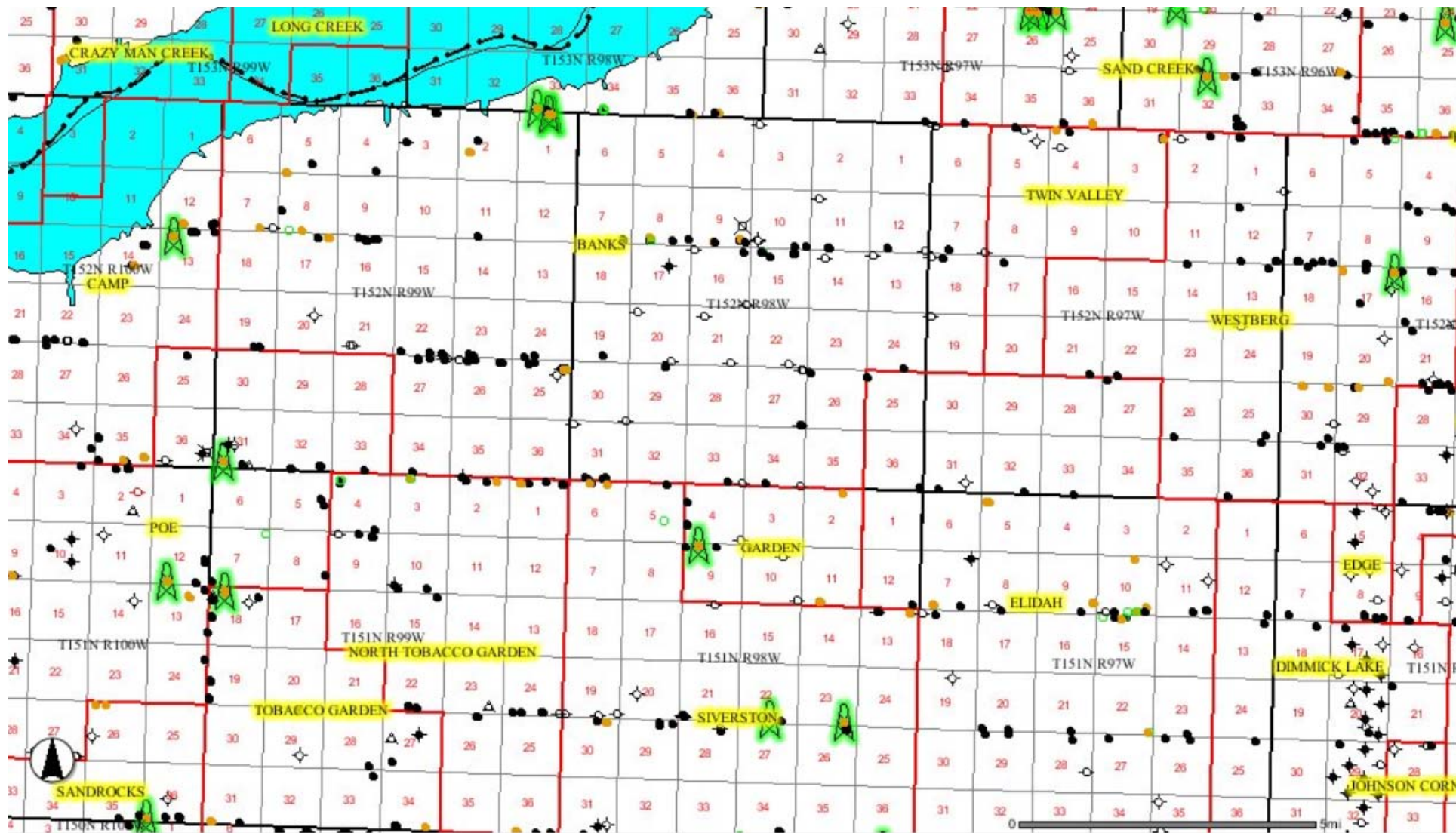


ICO 14497—signed 4-22-2010  
3000 sq miles  
Uniform standup 1280-acre units



**Uniform Spacing**





# Energy Corridors

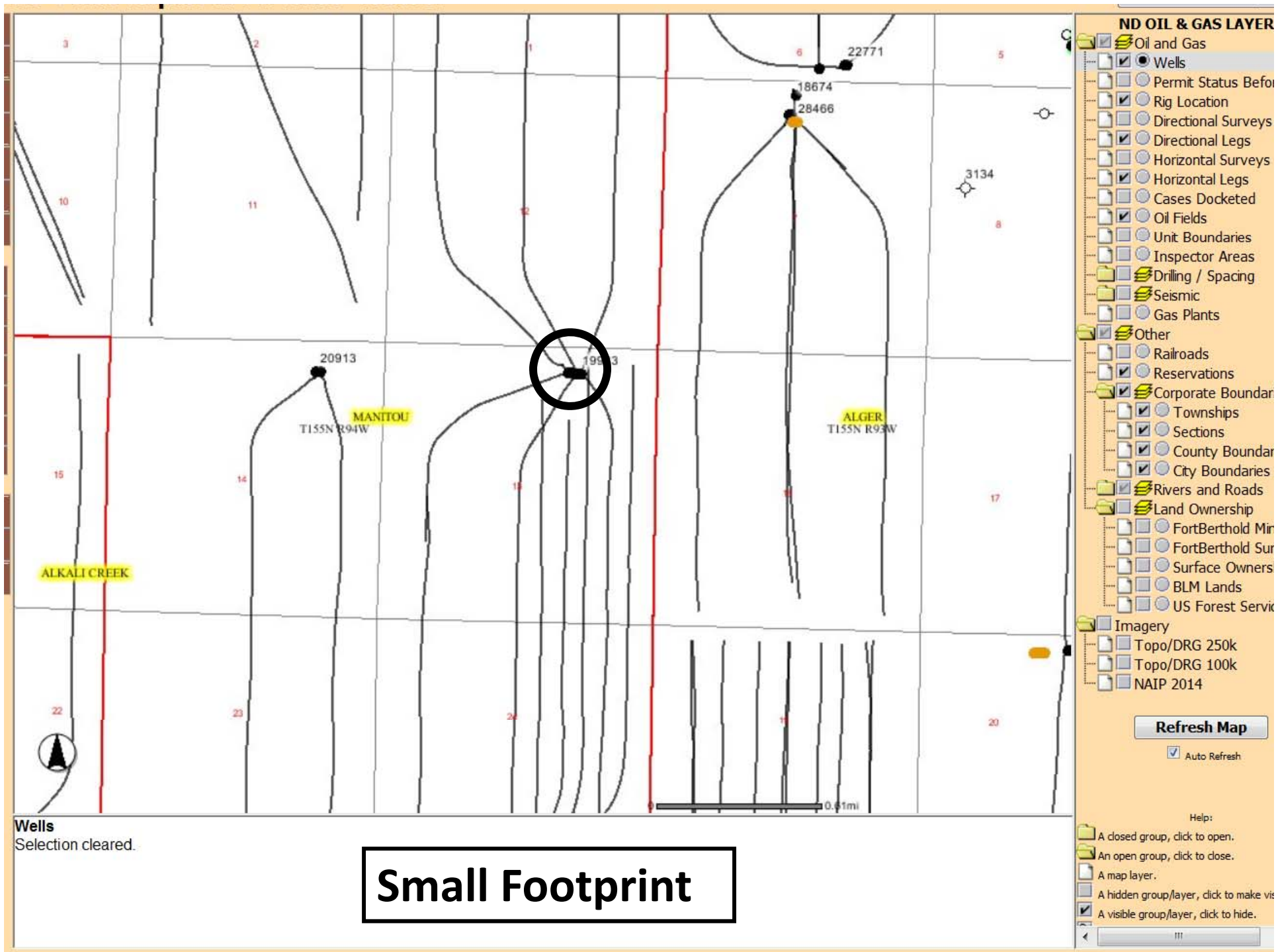




## Energy Corridor

- uniform development
- pipelines, electrical, traffic
- less impact on adjacent roads

Vern Whitten Photography







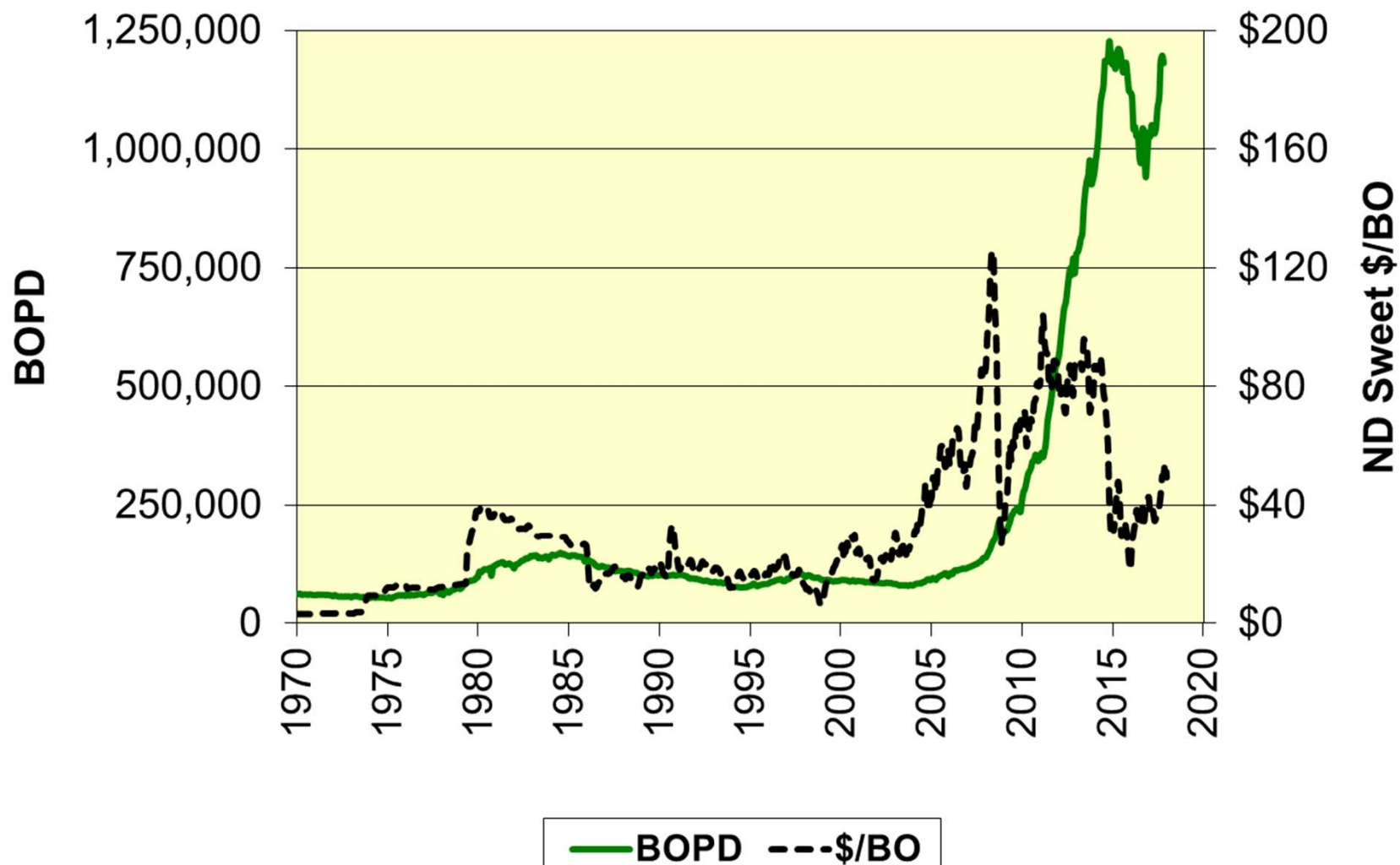
Vern Whitten Photography

# **Bakken Results**



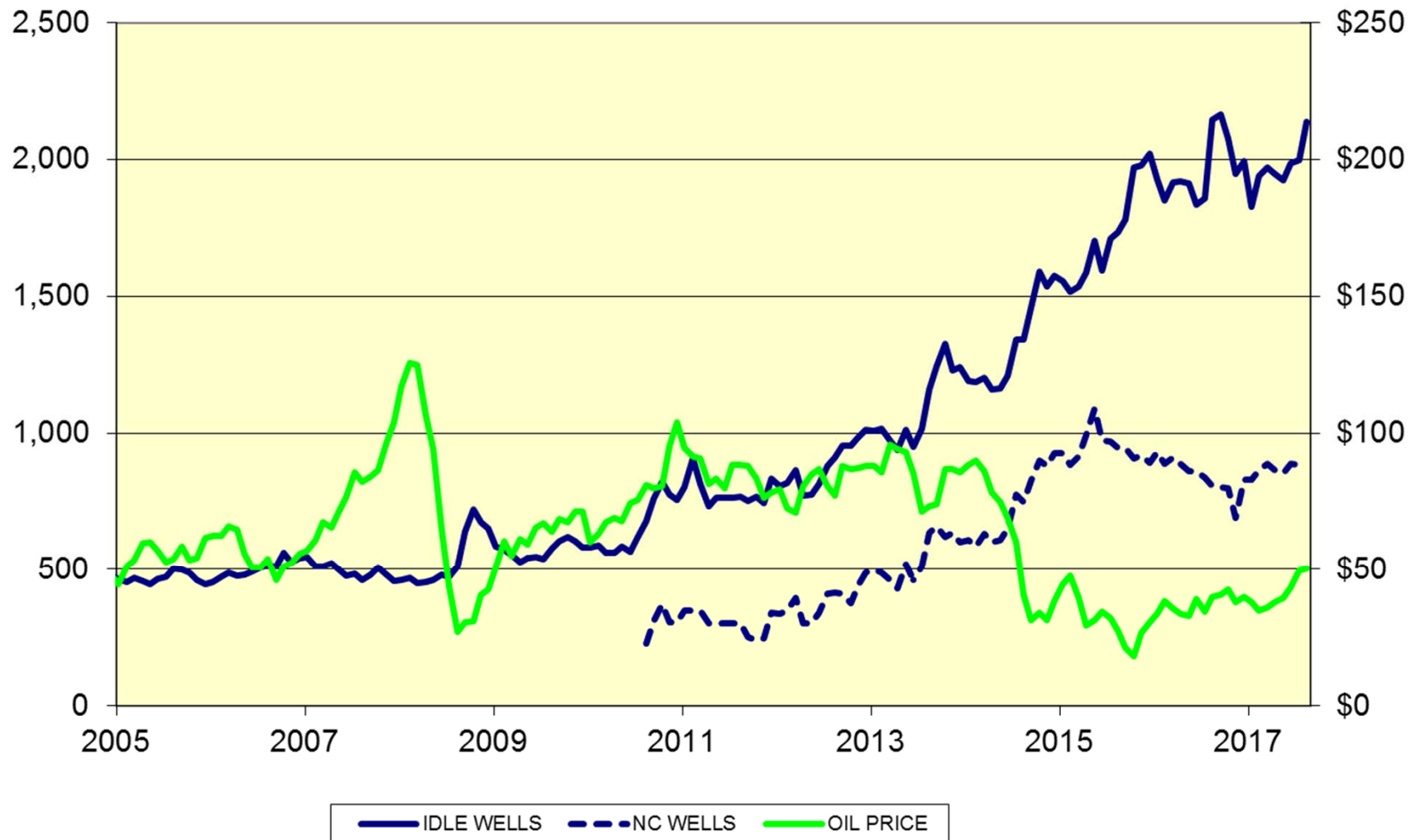


## North Dakota Daily Oil Produced and Price



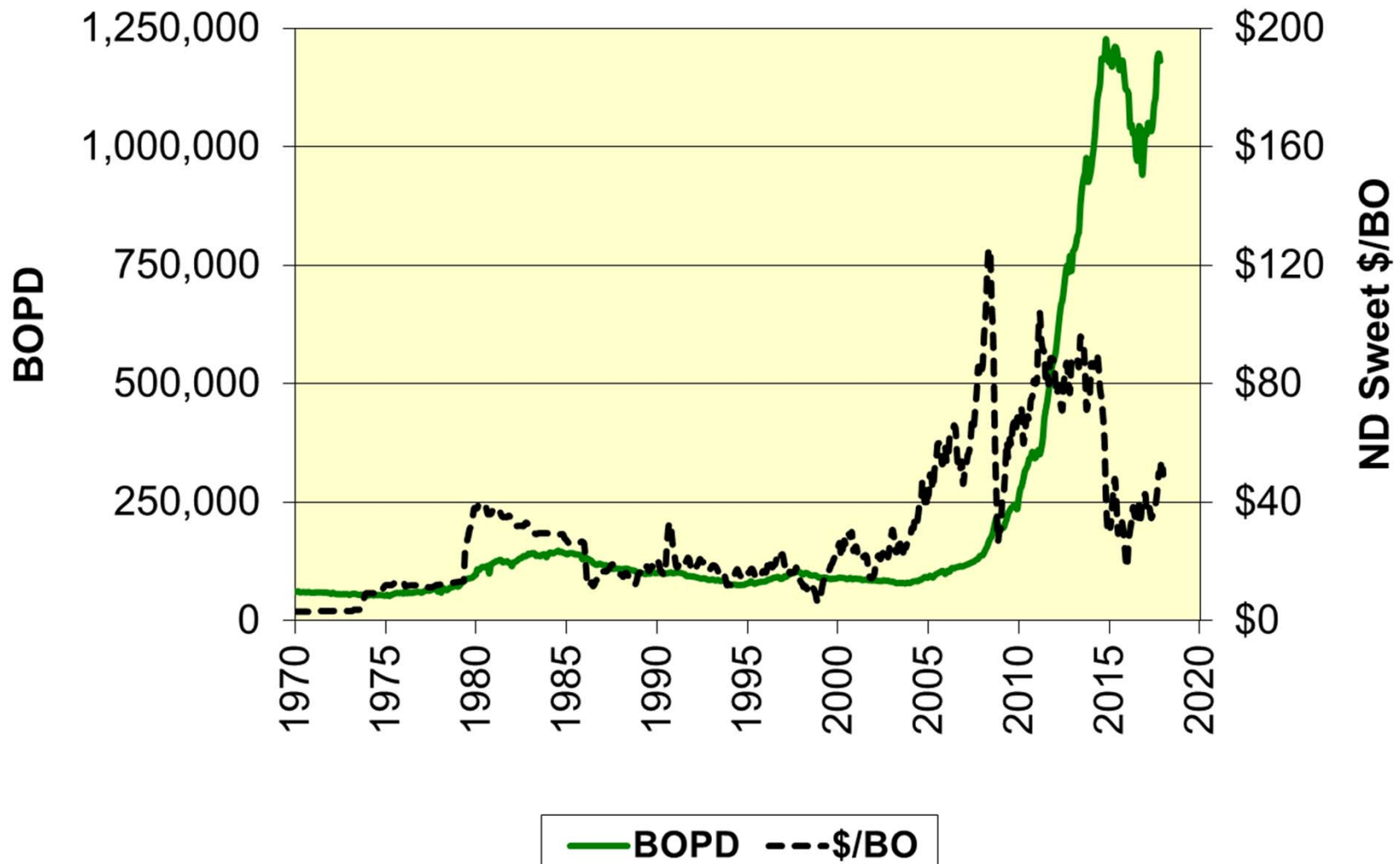


## North Dakota Idle and Non-Completed Wells





## North Dakota Daily Oil Produced and Price



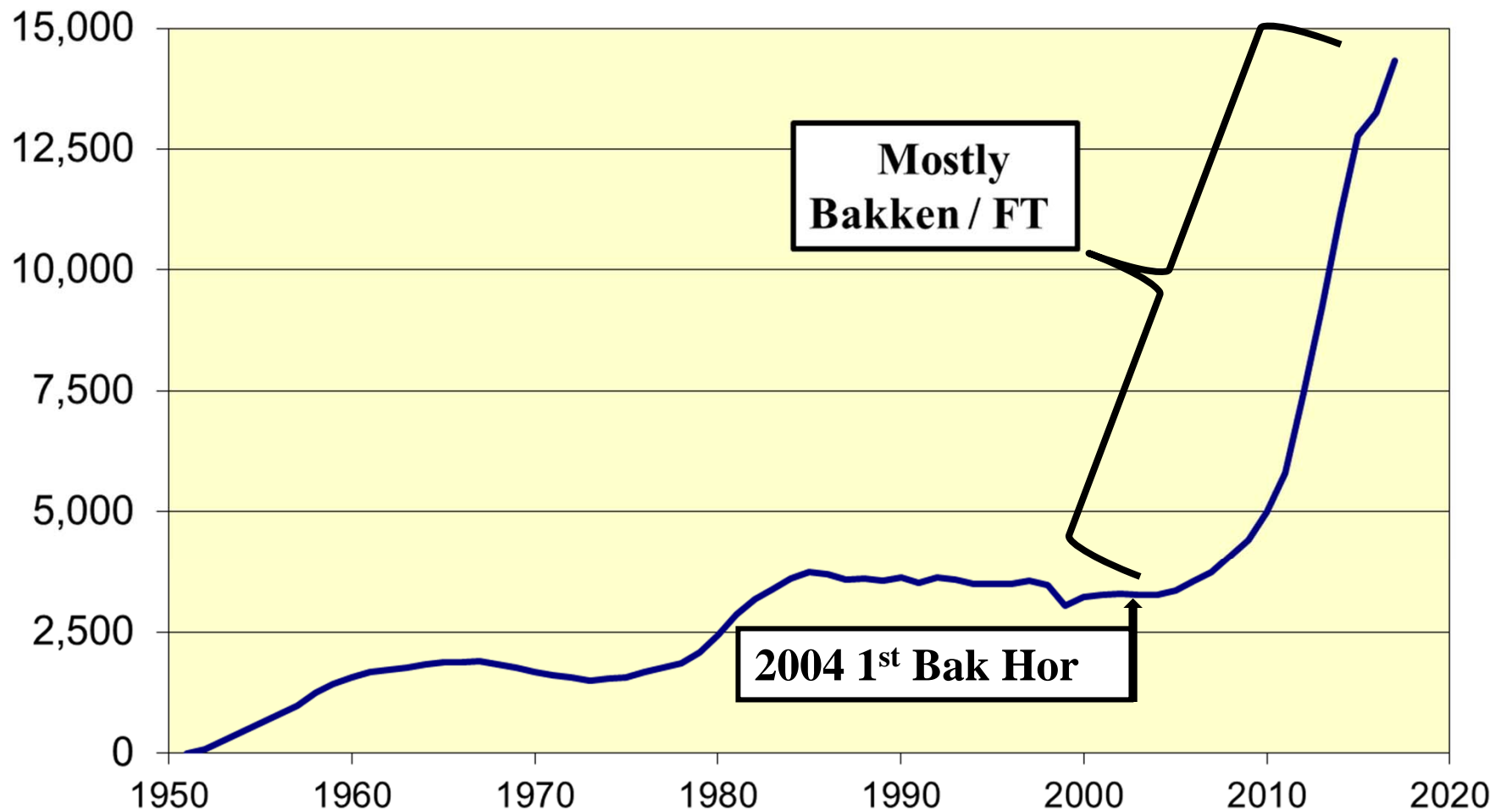
**Dec Production 1,181,319 bopd (appr 1,122,236 Bakken—95%)**

# WELLS

- **14,338 wells currently producing**
  - **12,361 Bak/TF (86%)**
- **40,000 additional development wells**
  - **59 rigs – another 28 years**
- **Bakken Pool: up to 3 targets**

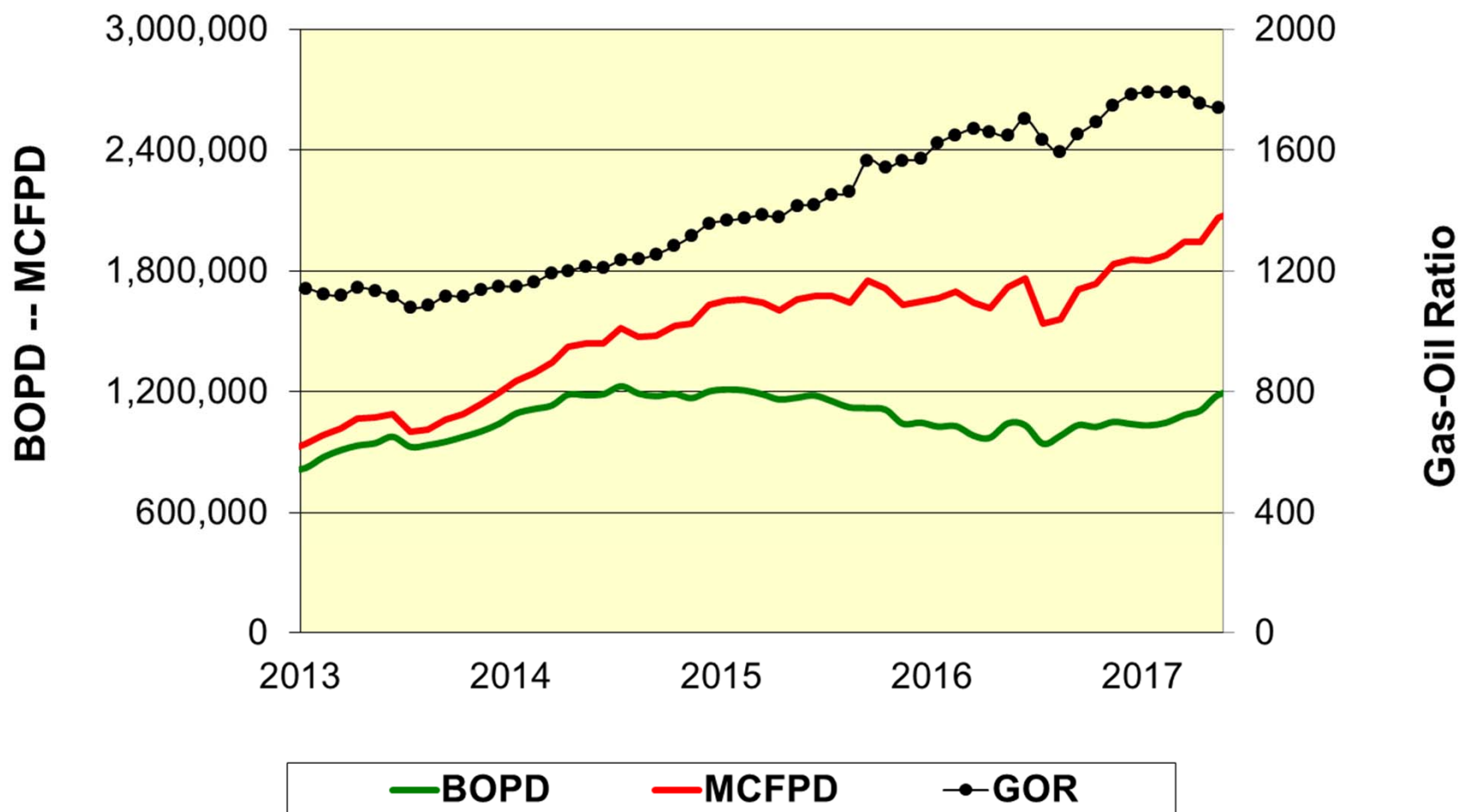


## North Dakota Wells Producing





## North Dakota Gas-Oil Ratio

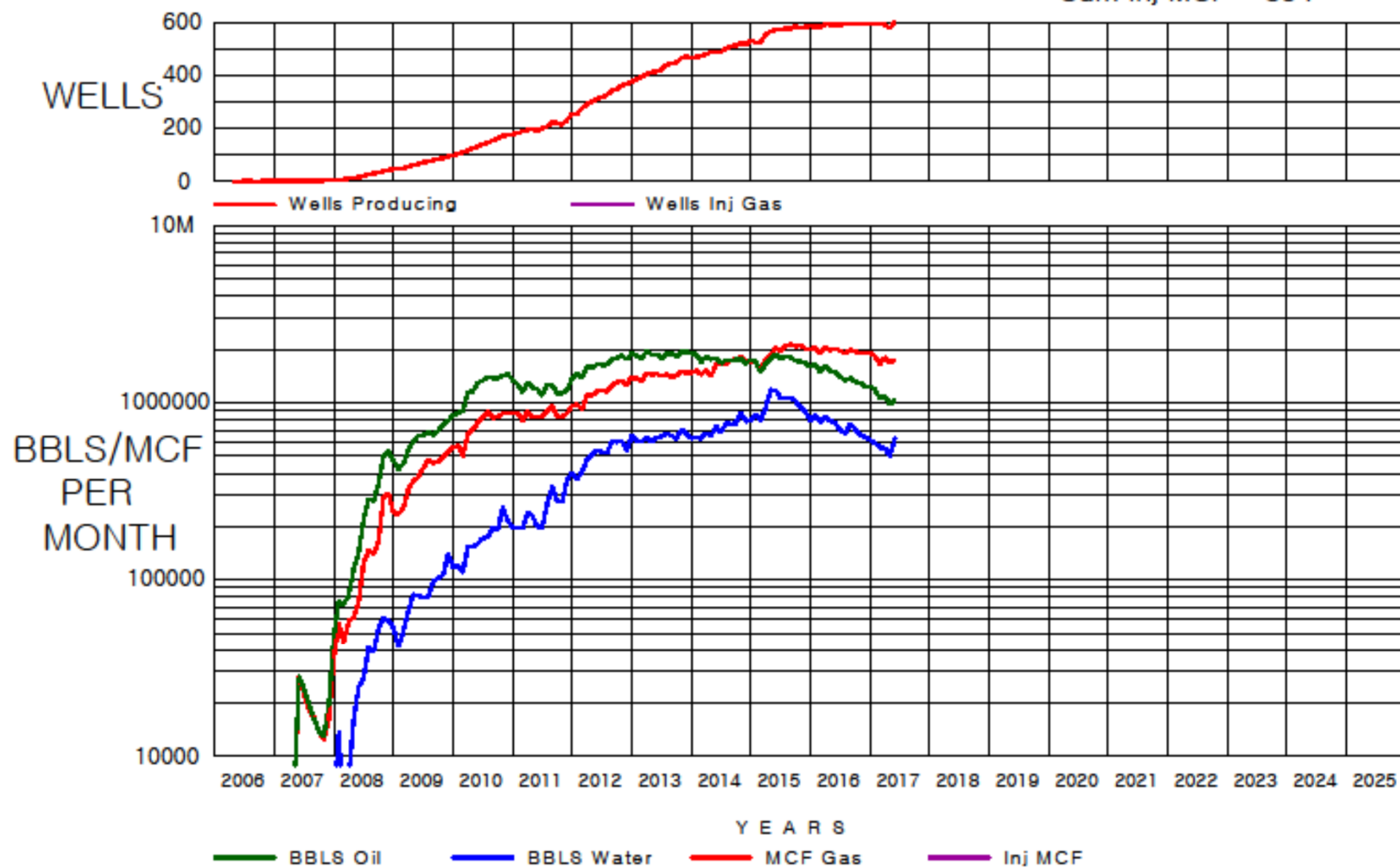




7/20/2017

# SANISH - BAKKEN

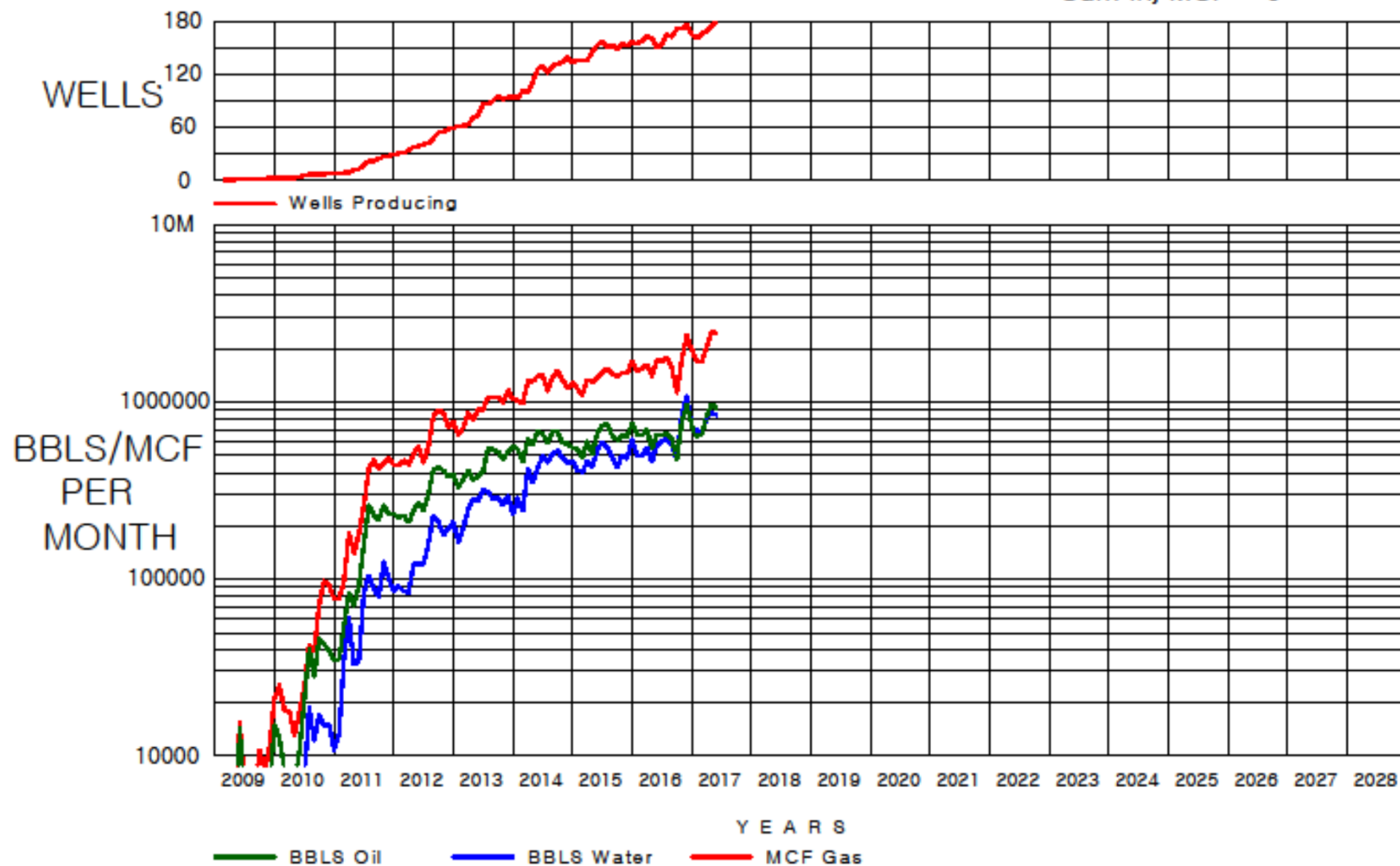
Cum Oil = 147307688  
Cum Water = 53054111  
Cum Gas = 133126306  
Cum Inj BBLS = 0  
Cum Inj MCF = 894



7/20/2017

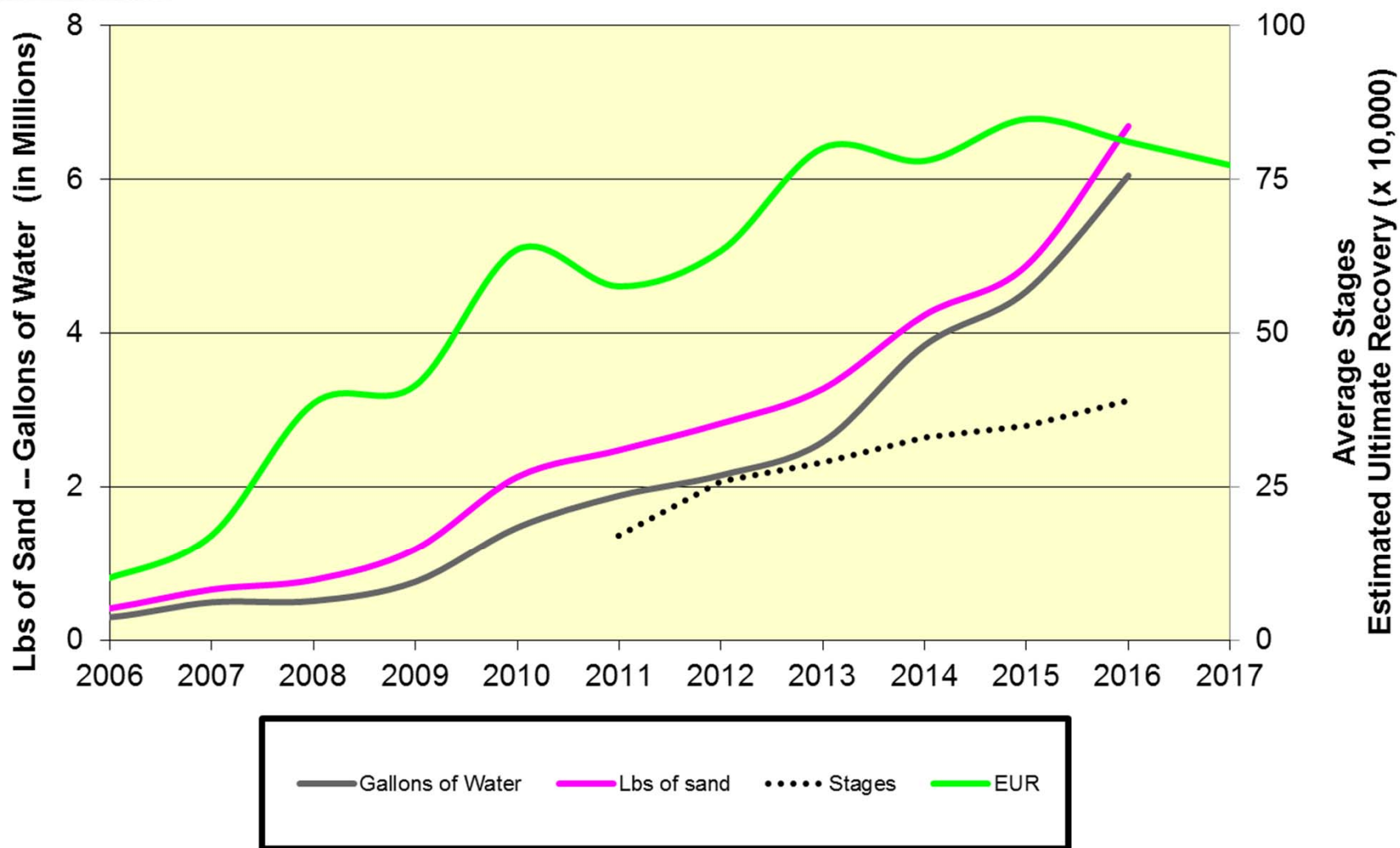
## BANKS - BAKKEN

Cum Oil = 38422430  
Cum Water = 28403534  
Cum Gas = 85587932  
Cum Inj BBLS = 0  
Cum Inj MCF = 0





## North Dakota Stimulations

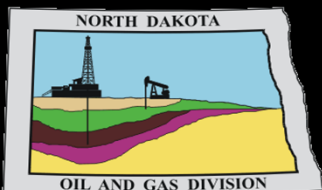


# **Bakken/Three Forks EOR Potential**

- **Pilot projects**
  - **CO<sub>2</sub> injection**
  - **water injection**
  - **projects small-scale and usually inconclusive**
  - **ethane injection encouraging in lab**
  - **further testing must be conducted**
- **> 300 billion barrels OOIP**
  - **every 1% of EOR = 3 billion barrels**  
**(note: cum oil prod from 1951-2017 = 4.2 bil bo)**

# **Bakken Takeaways**

- **Multi-well pads allow batch drilling**
- **Rig efficiency = more wells / rig**
- **SI + NC wells = near term prod increase**
- **GOR increasing = more gas issues**
- **Stimulation improvements = higher EUR**
- **WOR increase = disposal + pipeline needs**
- **Bakken EOR Potential**



# **NDIC – DMR - OGD**

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Assistant Director  
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