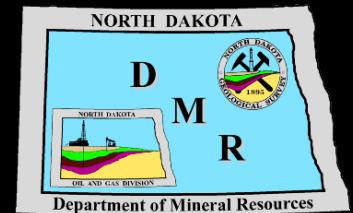


DEVELOPMENT OF THE BAKKEN RESOURCE

IOGCC

***Legal & Regulatory Affairs
Committee***

Salt Lake City, UT – May 19, 2015

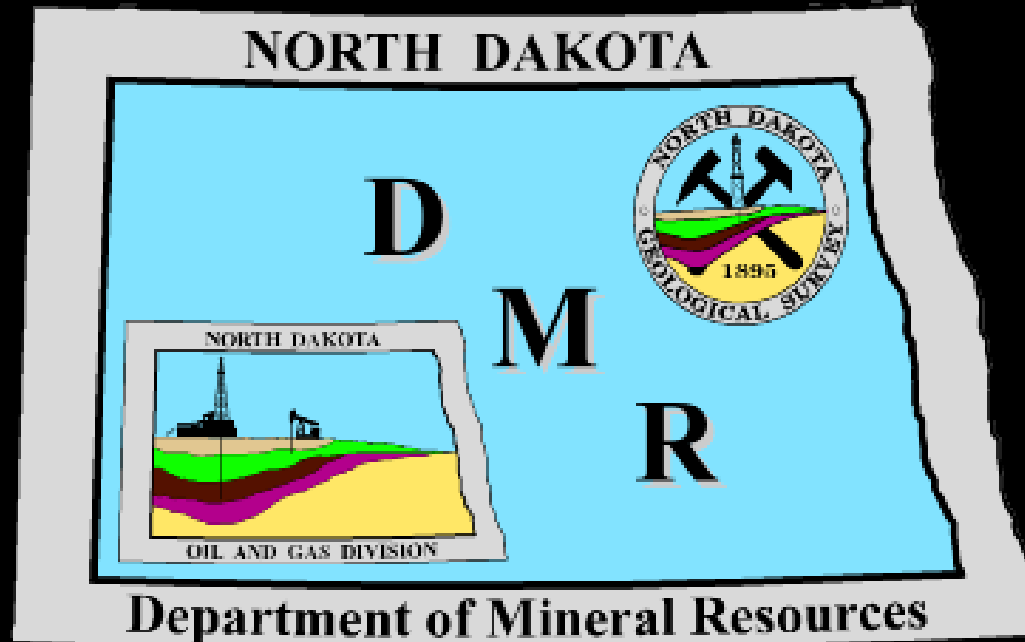


North Dakota Development

- **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/>

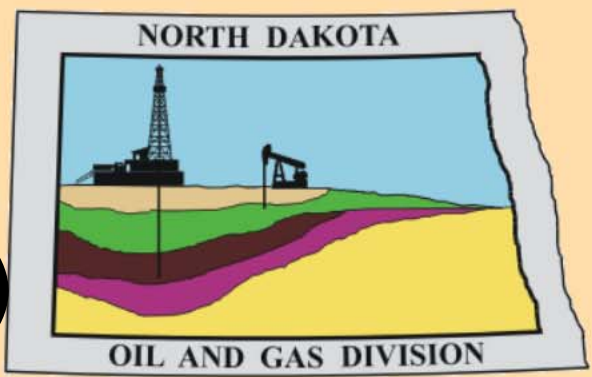
<https://www.dmr.nd.gov/ndgs/>

600 East Boulevard Ave. - Dept 405

Bismarck, ND 58505-0840

(701) 328-8020 (701) 328-8000

- Services
- Rules & Regulations
- Policies & Guidance
- Forms
- Hearing Dockets
- Active Drilling Rigs
- Daily Activity Reports
- Information Center
- Confidential Well List
- General Information
- Seismic
- Well Search
- Report a Spill/Incident
- Gathering Lines
- GIS Map Server
- Publications
- Surface Mineral Owner
- Basic Services
- Premium Services
- Electronic Filing
- Related Links
- FAQ & Web Help
- Employment Opportunities
- Contact Us
- Employee Directory
- Email Addresses



Welcome to the North Dakota Industrial Commission, Department of Energy and Mineral Resources, and Oil and Gas Division, Home page

Please check out the new [Information Center](#) and [Policies](#)

[Bakken and Three Forks Information!](#)

Available on the ND Petroleum Council web site are the [Surface Owner Information Center](#), the [Royalty Owner Information Center](#), and the [Leasehold Information Center](#).

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, 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.

Phone: (701) 328-8020
Fax: (701) 328-8022
Mail:
 NDIC Oil and Gas Division
 600 East Boulevard Ave D
 Bismarck, ND 58505-0840
General Shipping:
 NDIC Oil and Gas Division
 1016 East Calgary Ave
 Bismarck, ND 58503-5512
Core and Samples Shipping:
 ND Geological Survey Co.
 2835 Campus Rd., Stop 81
 Grand Forks, ND 58202

North Dakota Development

- **Regulations**
 - Spacing
 - Pooling
 - Unitization
- Resource Play
- Development
- Bakken Results

Spacing

Drilling Units

- **NDAC Sec 43-02-03-18**
 - One hor per 320 or 640 acres < Miss Can
 - One hor well per 640 acres > Miss Can
 - Well proposed must justify DU
 - Exceptions allows after notice & hearing

Spacing Units

- **Comm order after notice & hearing**
 - Multiple hor wells per SU (2-30+)
 - No min WIO interest necessary f/operatorship
 - 320,640,960,1280,1920,2640,3200,5280

North Dakota Development

- **Regulations**
 - Spacing
 - **Pooling**
 - Unitization
- Resource Play
- Development
- Bakken Results

Pooling

NDCC Sec 38-08-08

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

North Dakota Development

- **Regulations**
 - Spacing
 - Pooling
 - **Unitization**
- Resource Play
- Development
- Bakken Results

Unitization

NDCC Sec 38-08-09.3

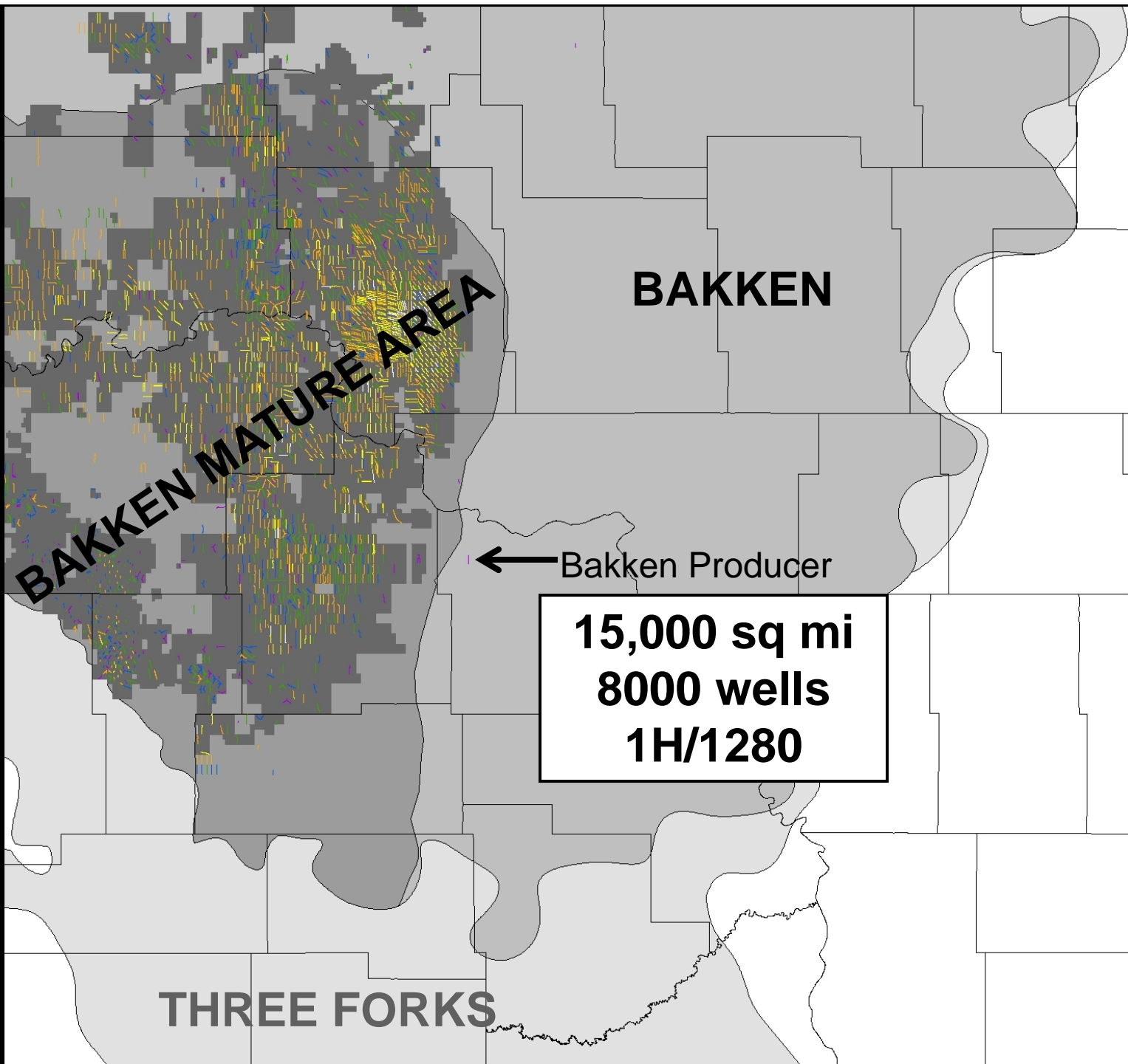
- **Project to substantially increase recovery**
- **EOR unnecessary for approval**

NDCC Sec 38-08-09.5

- **60% MIO approval**
- **60% WIO approval**

North Dakota Development

- Regulations
 - Spacing units
 - Pooling
 - Unitization
- **Resource Play**
- Development
- Bakken Results



BAKKEN MATURE AREA

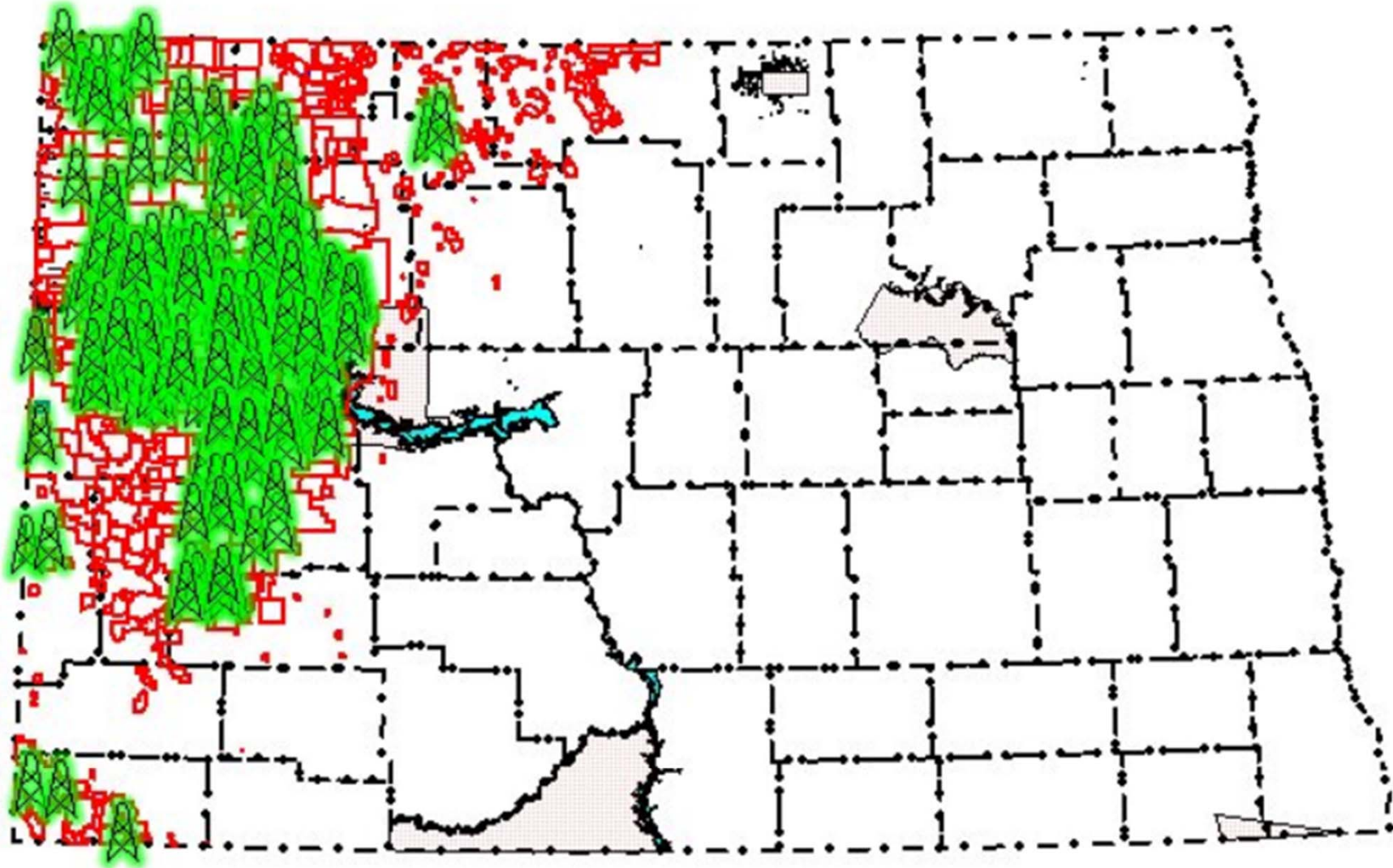
BAKKEN

← Bakken Producer

15,000 sq mi
8000 wells
1H/1280

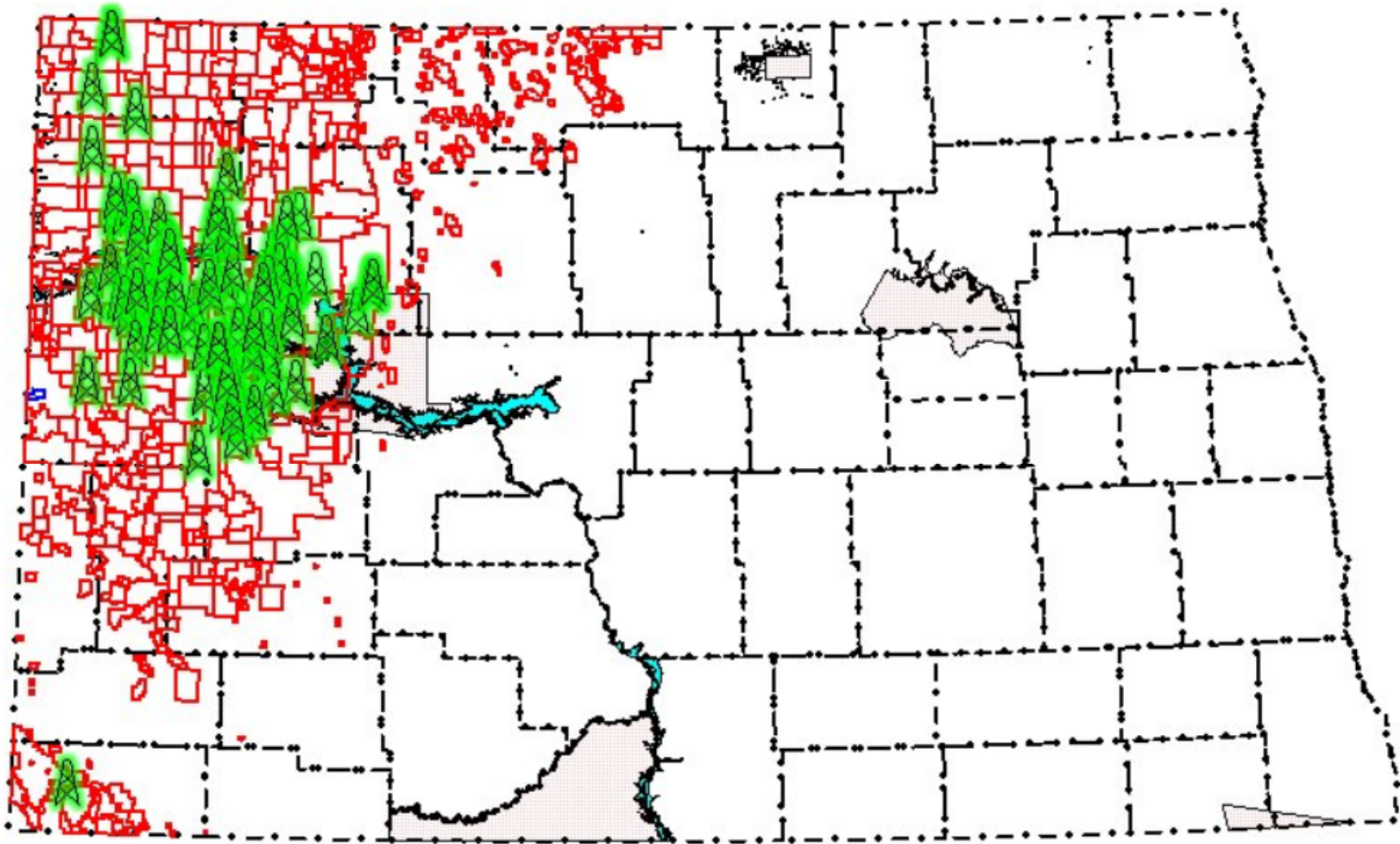
THREE FORKS

NORTH DAKOTA – 191 DRILLING RIGS – DECEMBER 2014



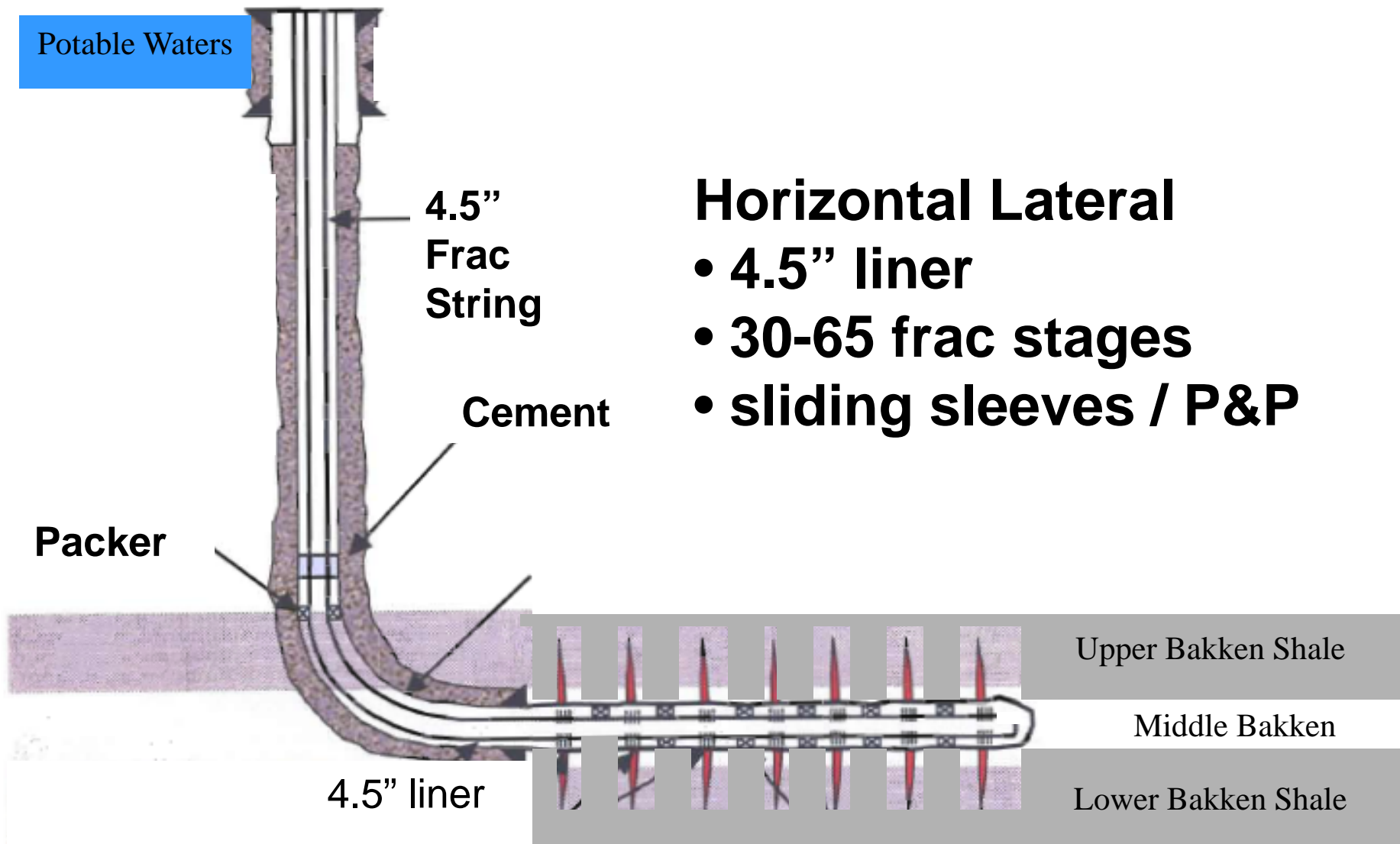
**Current drilling activity is focused
in Mountrail, Dunn, McKenzie, and Williams Counties.**

NORTH DAKOTA – 83 DRILLING RIGS – MAY 2015



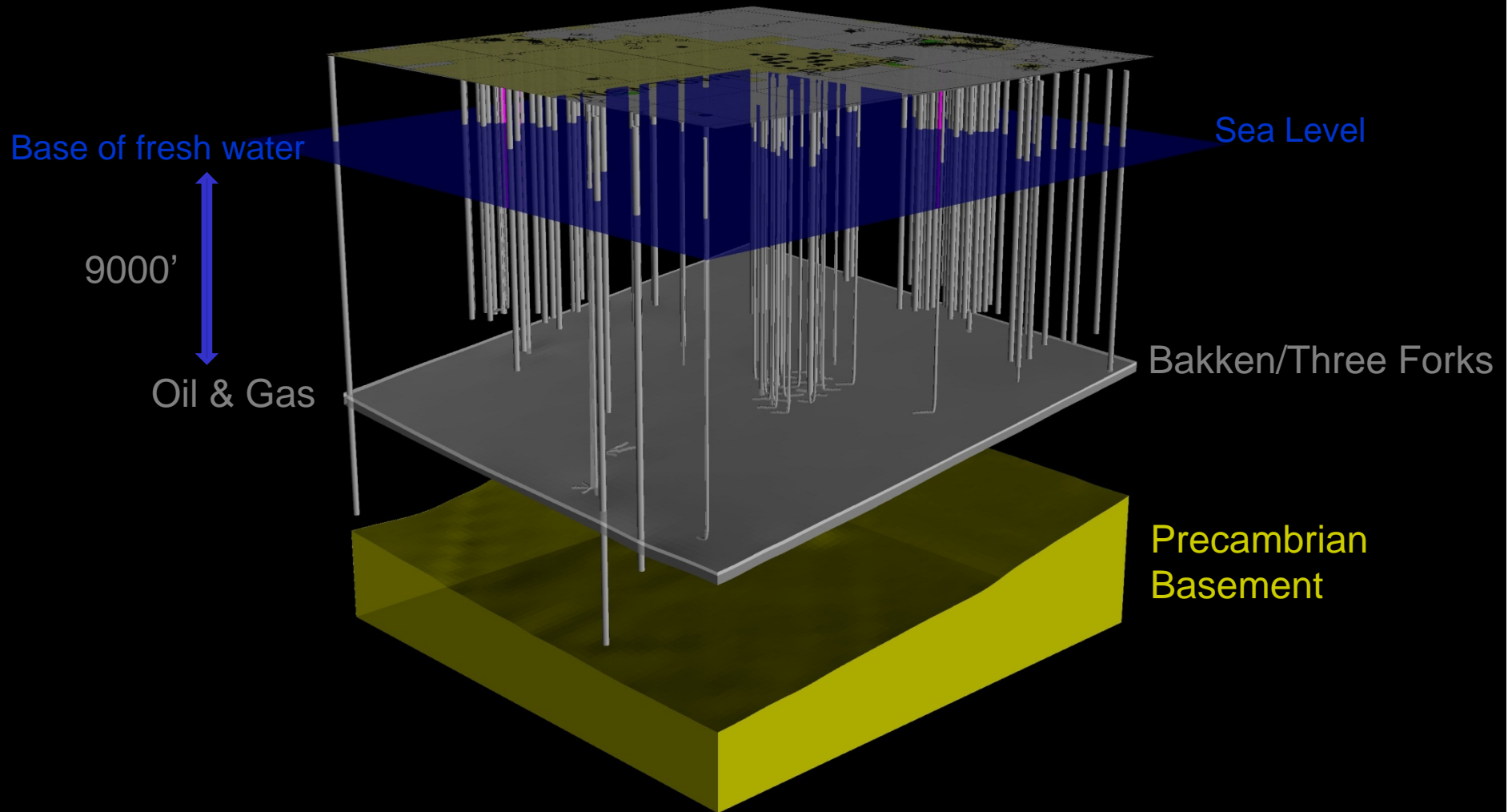
**Current drilling activity is focused
in Mountrail, Dunn, McKenzie, and Williams Counties.**

TYPICAL HORIZONTAL OIL WELL



Horizontal Lateral

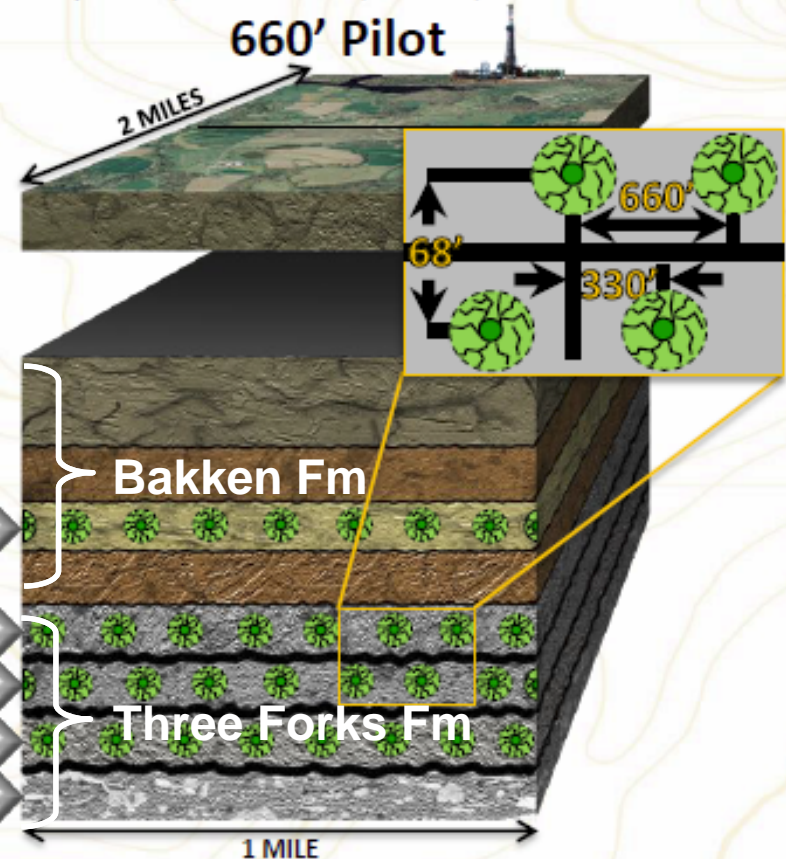
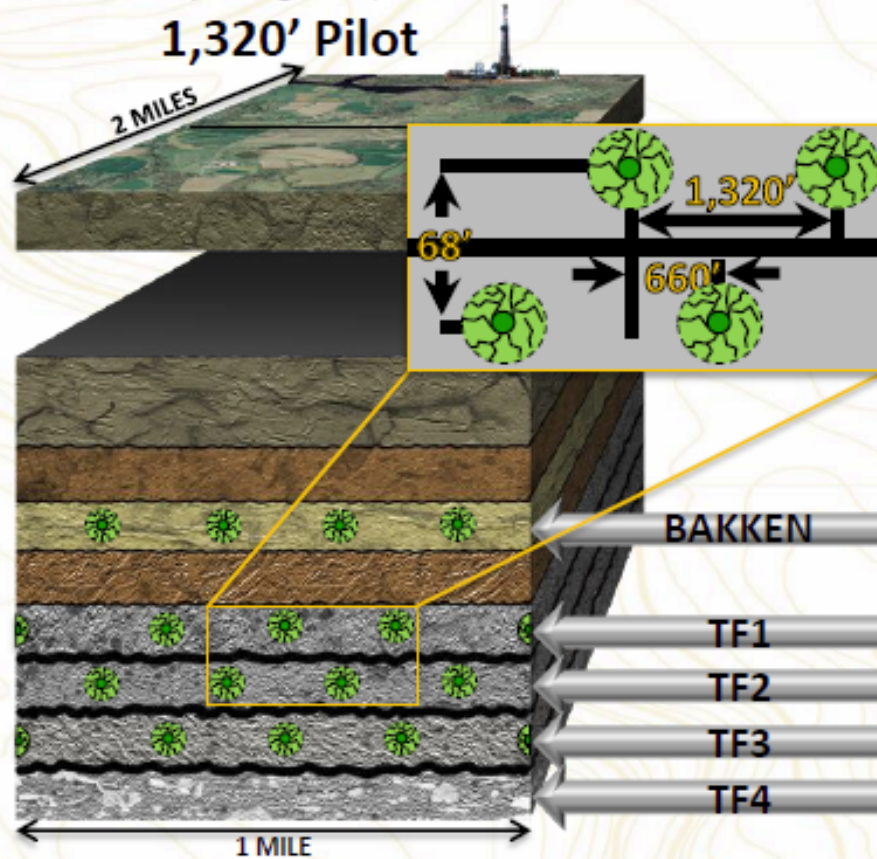
- 4.5" liner
- 30-65 frac stages
- sliding sleeves / P&P



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)

North Dakota Development

- Regulations
 - Spacing
 - Pooling
 - Unitization
- Resource Play
- **Development**
 - **Uniform Spacing—orderly development**
 - Multi-well locations—small footprint
 - Energy Corridors—industry & residents
- Bakken Results

ArcIMS Viewer



Five Spacing Patterns

Townships

Rec	Township	Tdir	Range	Rdir	TWPRNG	TWPTEXT	RNGTEXT
1	156	N	90	W	156090	T156N	R 90W

ND OIL

- Oil an
- We
- Pe
- Rig
- Dir
- Dir
- Ho
- Ho
- Ca
- Oil
- Un
- Ins
- Dri
- Se
- Ga
- Other
- Re
- Co
- Riv
- Lai
- Imagery
- Topo/
- Topo/
- NAIP

R

Power

Download Shape Files



ND OIL & GAS LAYERS

- Oil and Gas
 - Wells
 - Permit Status Before Spud
 - Rig Location
 - Directional Surveys
 - Directional Legs
 - Horizontal Surveys
 - Horizontal Legs
 - Cases Docketed
 - Oil Fields
 - Unit Boundaries
 - Inspector Areas
- Drilling / Spacing
 - Seismic
- Gas Plants
- Other
- Imagery
 - Topo/DRG 250k
 - Topo/DRG 100k
 - NAIP 2009

Refresh Map

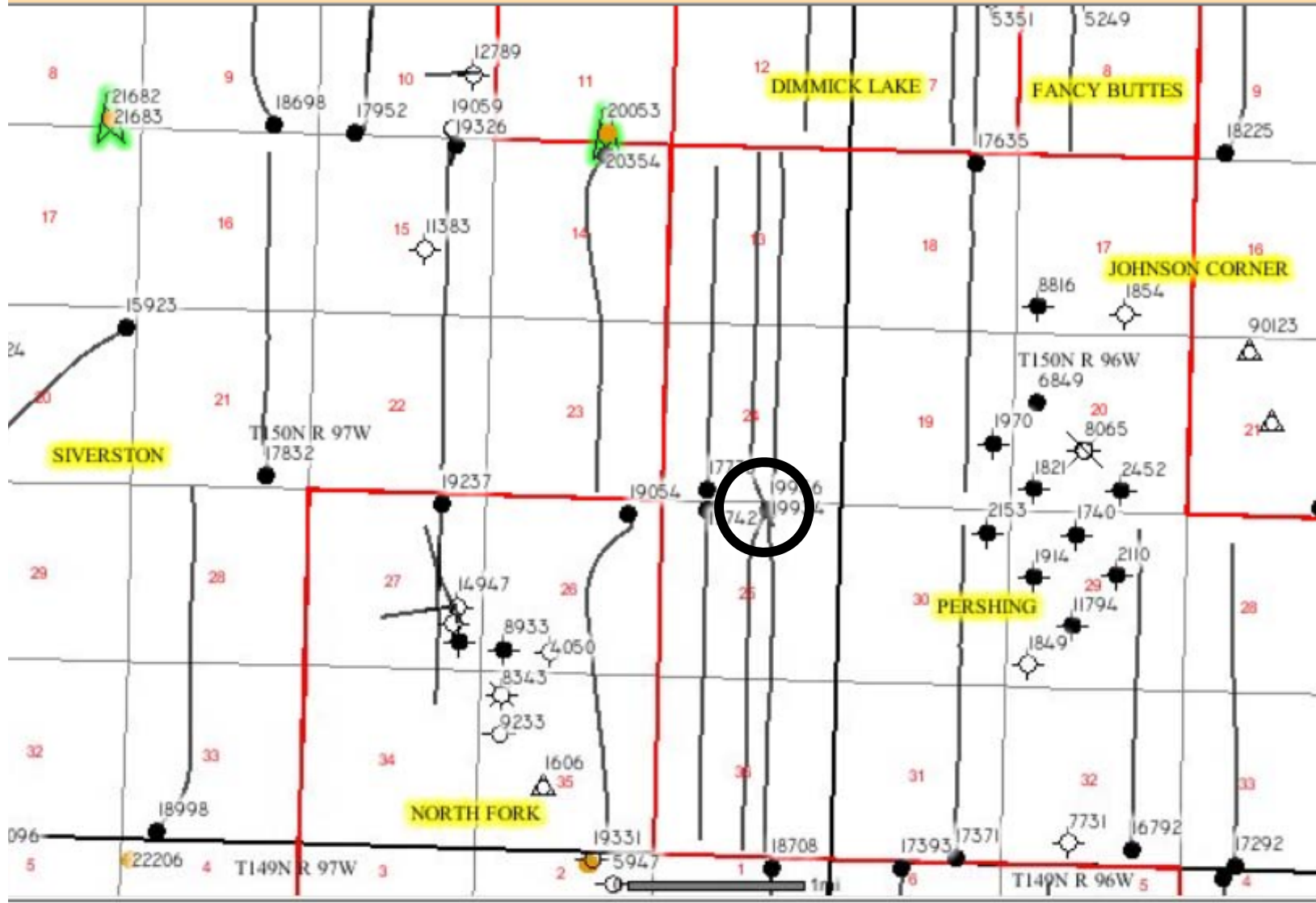
Auto Refresh

Help:

- A closed group, click to open.
- An open group, click to close.
- A map layer.

North Dakota Development

- Regulations
 - Spacing
 - Pooling
 - Unitization
- Resource Play
- **Development**
 - Uniform Spacing—orderly development
 - **Multi-well locations—small footprint**
 - Energy Corridors—industry & residents
- Bakken Results



ND OIL & GA

- Oil and Gas
 - Wells
 - Rig Location
 - Directional
 - Directional
 - Horizontal
 - Horizontal
 - Cases Do
 - Oil Fields
 - Unit Bound
 - Inspector
 - Drilling / S
 - Seismic
 - Gas Plant
 - Other
- Imagery
 - Topo/DRG 2
 - Topo/DRG 1
 - NAIP 2009

Refresh

Auto F

Help:

- A closed group, click to o
- An open group, click to d
- A map layer.
- A hidden group/layer, dic
- A visible group/layer, did
- A visible layer, but not at
- A partially visible group. c



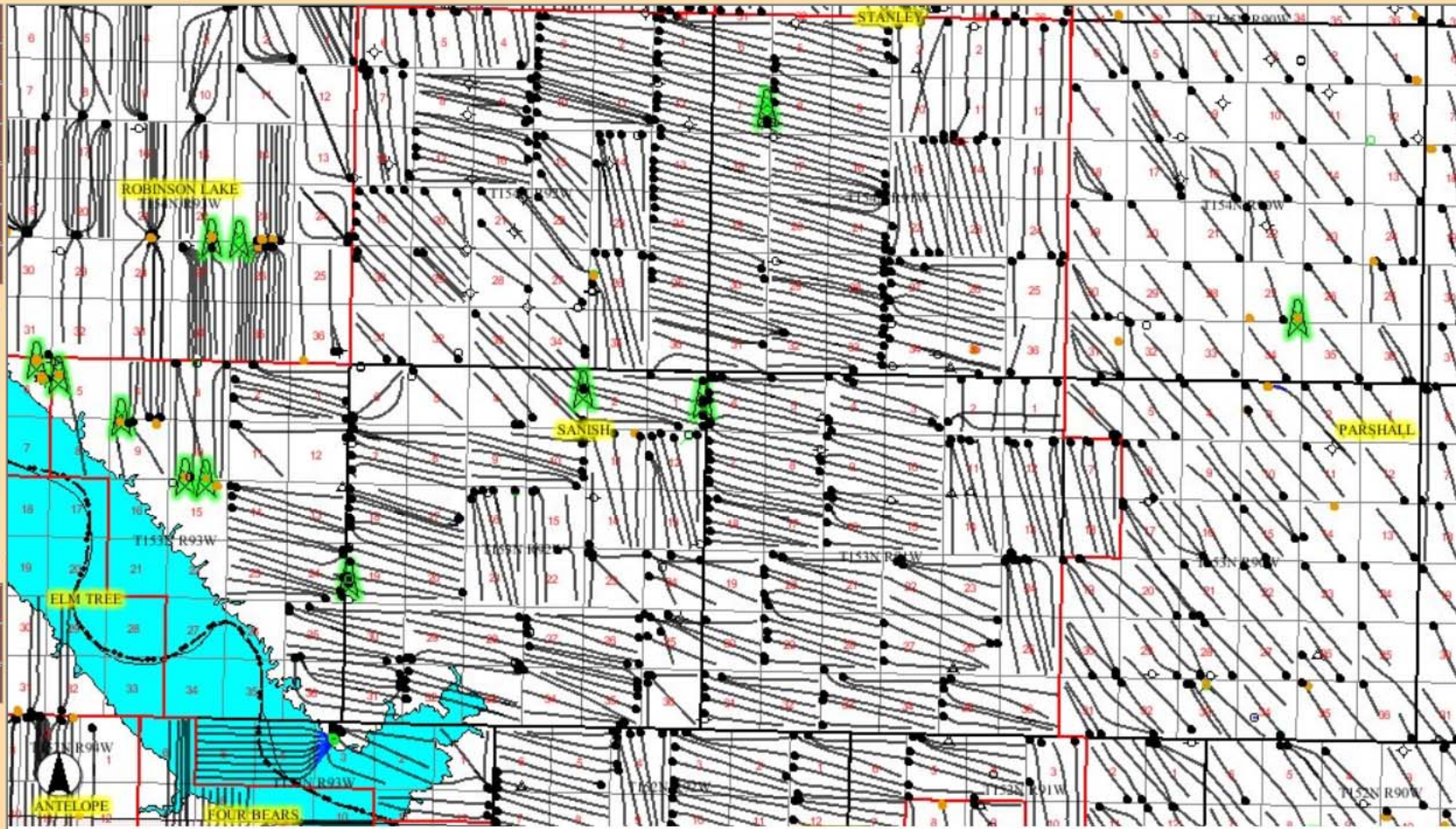
Vern Whitten Photography

North Dakota Development

- Regulations
 - Spacing
 - Pooling
 - Unitization
- Resource Play
- **Development**
 - Uniform Spacing—orderly development
 - Multi-well locations—small footprint
 - **Energy Corridors—industry & residents**
- Bakken Results

Oil and Gas Subscription: ArcIMS Viewer

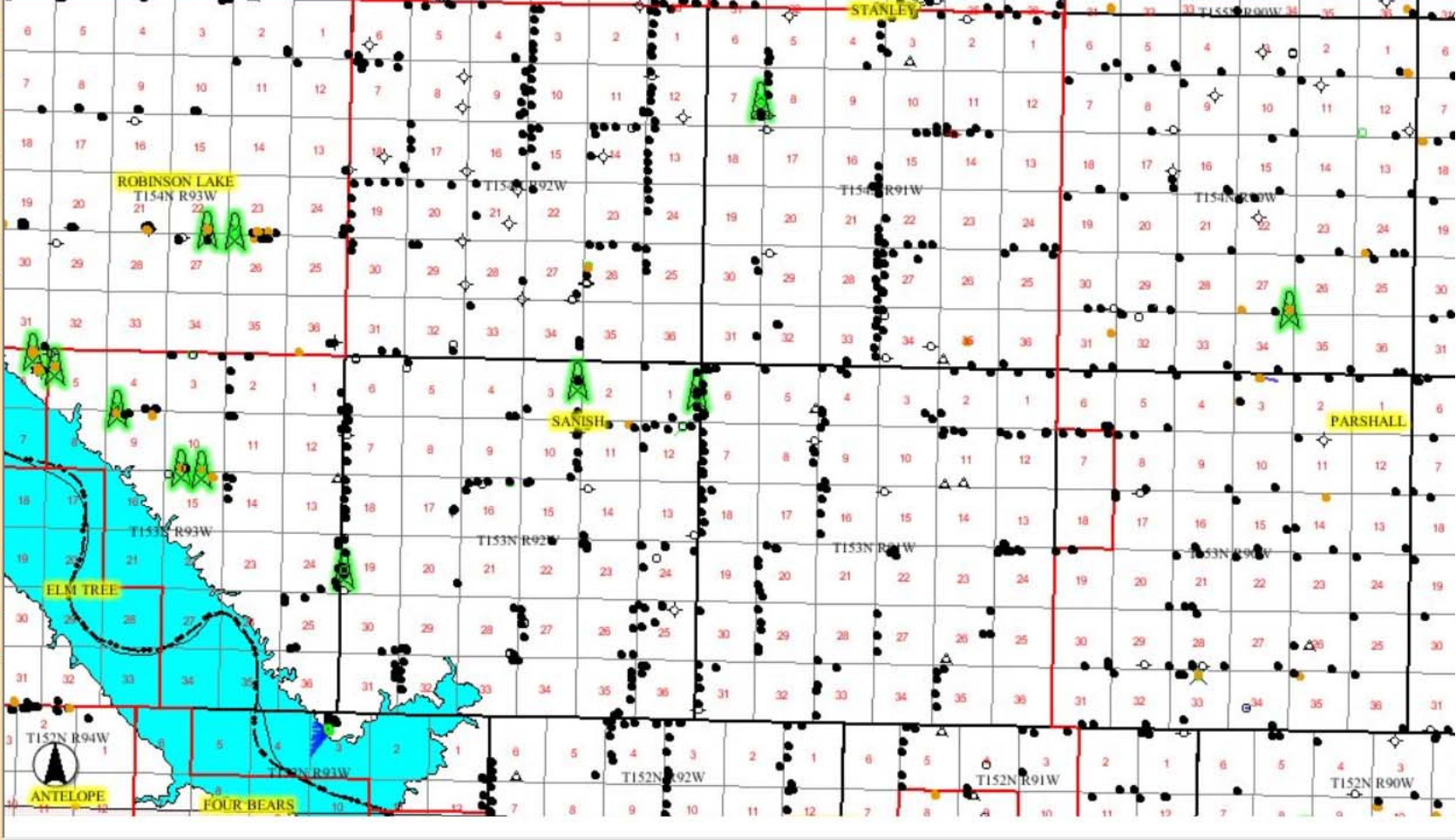
- Legend / Layers
- Overview Map
- View Entire State
- Previous View
- Clear Selection
- Search
- Create PDF
- Zoom In
- Zoom Out
- Pan**
- Rect Identify
- Select Object
- Buffer
- Distance
- Find Well
- Find Field / Unit
- Find Section



Pan

Oil and Gas Subscription: ArcIMS Viewer

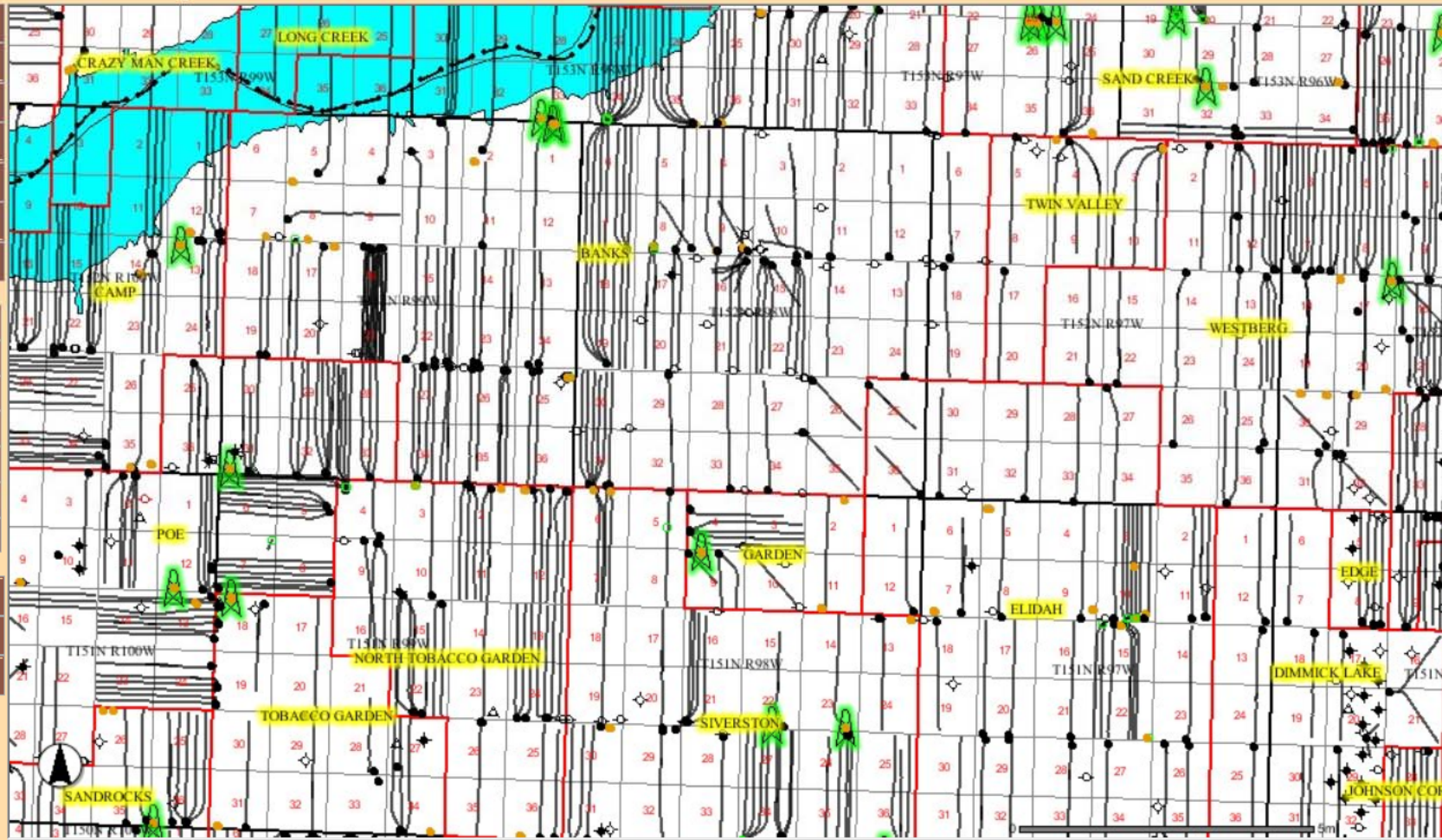
- Legend / Layers
- Overview Map
- View Entire State
- Previous View
- Clear Selection
- Search
- Create PDF
- Zoom In
- Zoom Out
- Pan
- Rect Identify
- Select Object
- Buffer
- Distance
- Find Well
- Find Field / Unit
- Find Section



Pan

Oil and Gas Subscription: ArcIMS Viewer

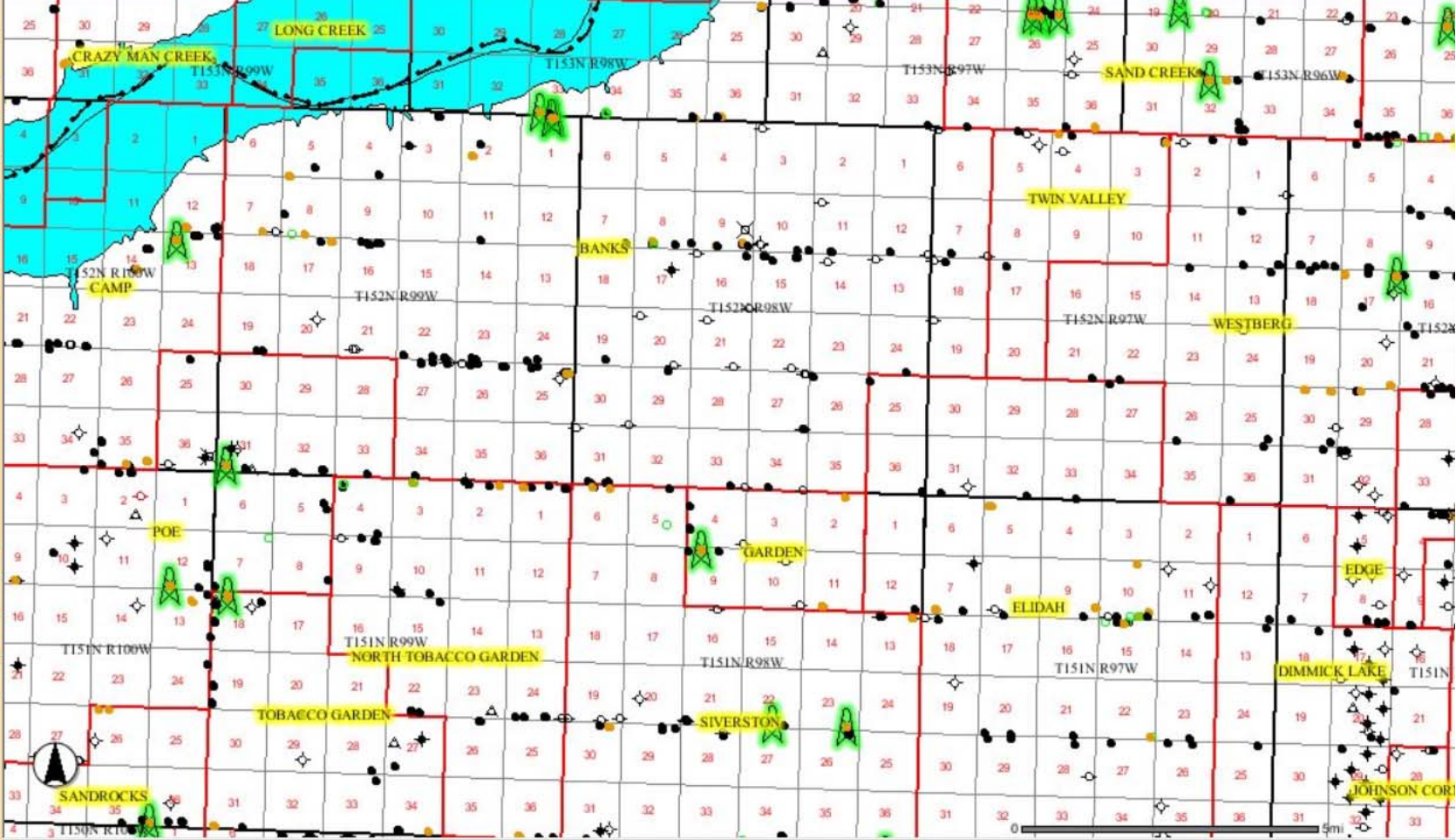
- Legend / Layers
- Overview Map
- View Entire State
- Previous View
- Clear Selection
- Search
- Create PDF
- Zoom In
- Zoom Out
- Pan**
- Rect Identify
- Select Object
- Buffer
- Distance
- Find Well
- Find Field / Unit
- Find Section



Pan

Oil and Gas Subscription: ArcIMS Viewer

- Legend / Layers
- Overview Map
- View Entire State
- Previous View
- Clear Selection
- Search
- Create PDF
- Zoom In
- Zoom Out
- Pan
- Rect Identify
- Select Object
- Buffer
- Distance
- Find Well
- Find Field / Unit
- Find Section

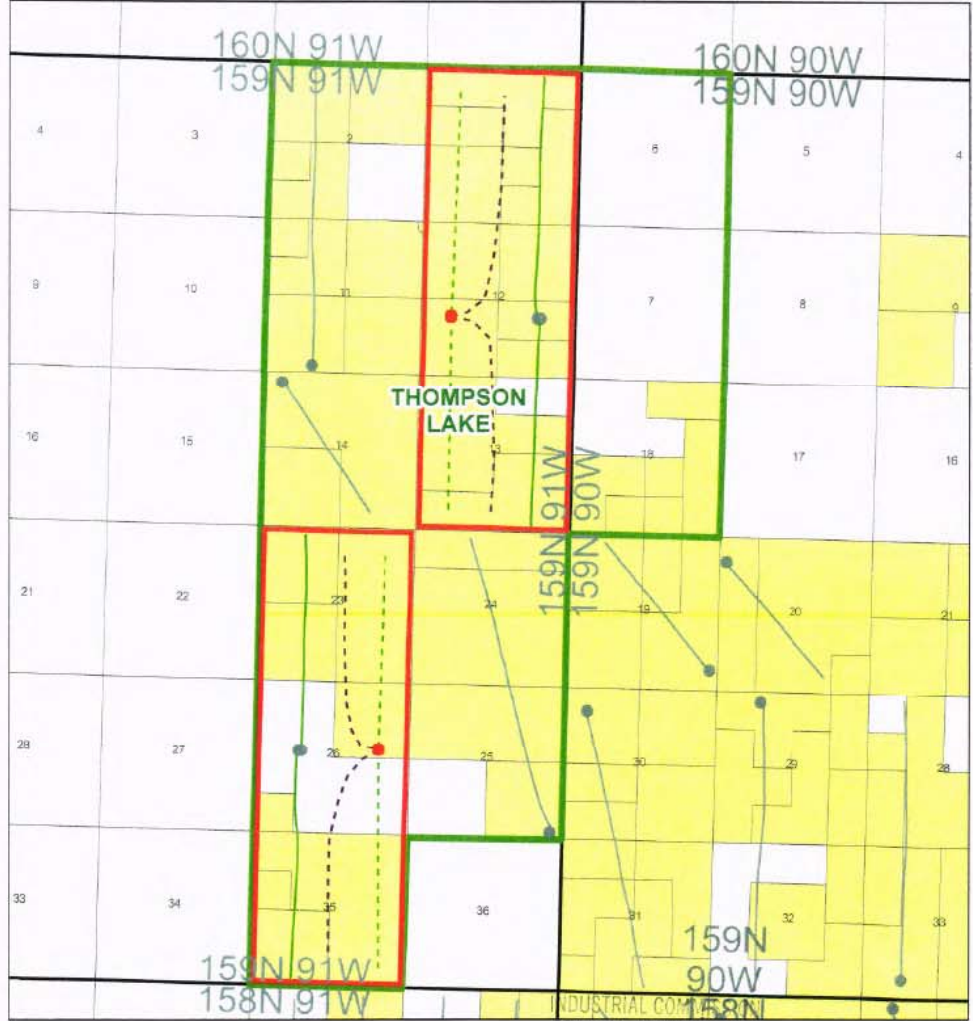


Pan

By No
Audio

Get Case File

Thompson Lake - Bakken Pool



Legend
Thompson Lake-Bakken Pool Boundary as established August 16, 2011 (Order No. 15367)

STATE OF NORTH DAKOTA
DATE 10-24-13 CASE NO. 20787
Case No. 20787
Exhibit L3



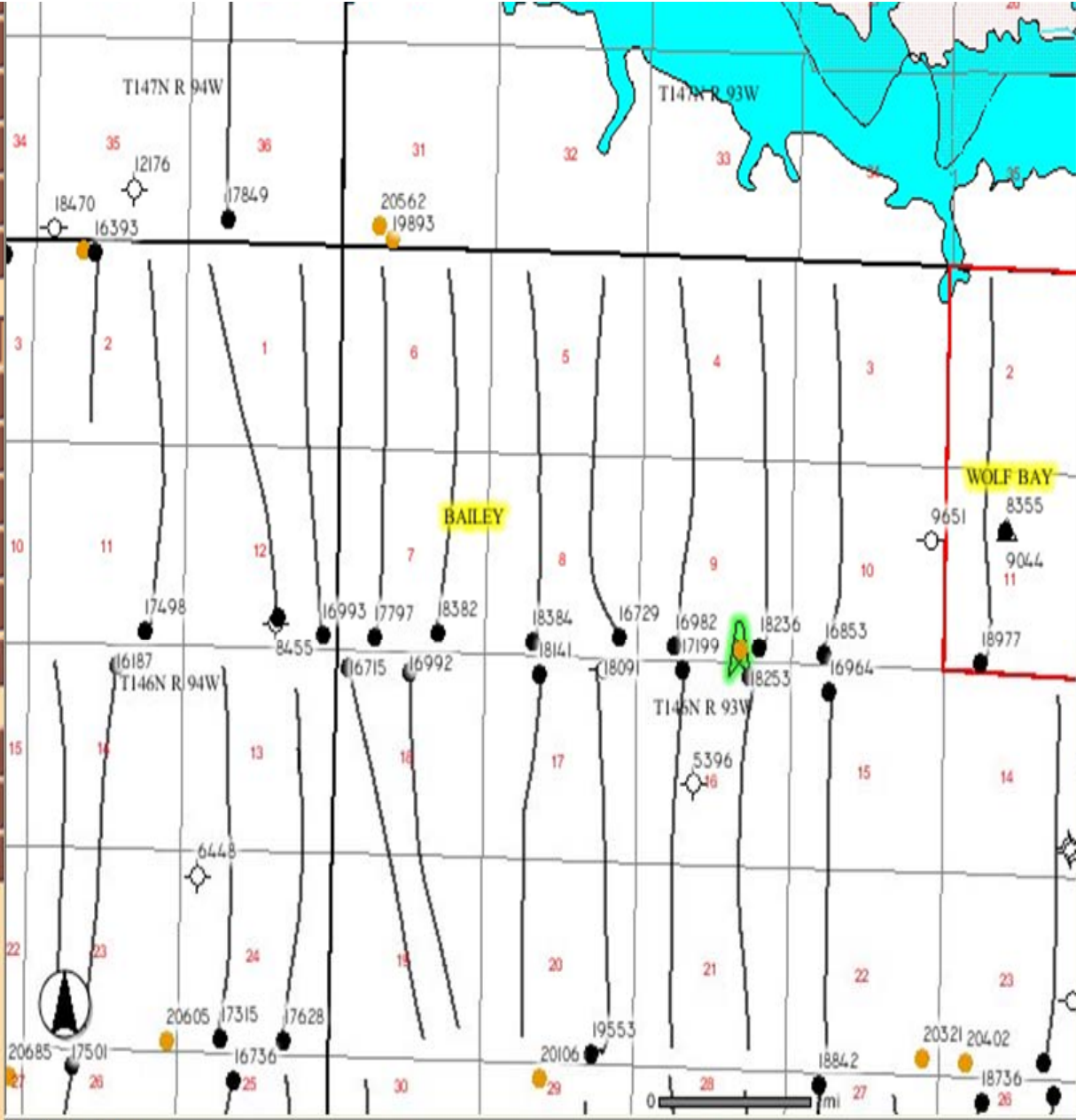
Energy Corridor

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

Vern Whitten Photography

View Entire State
Previous View
Clear Selection
Search
Generate PDF

Zoom In
Zoom Out
Pan
Rect Identify
Select Object
Buffer
Distance
Find Well
Find Field/Unit
Find Section



Major Rivers
Selection cleared.

- Rig Location
- Directional Surveys
- Directional Legs
- Horizontal Surveys
- Horizontal Legs
- Cases Docketed
- Oil Fields
- Unit Boundaries
- Inspector Areas
- Drilling / Spacing
- Seismic
- Gas Plants
- Other
- Reservations
- Corporate Boundaries
- Rivers and Roads
- County Roads
- Major Roads
- Major Rivers
- Missouri River
- Land Ownership
- Imagery
 - Topo/DRG 250k
 - Topo/DRG 100k
 - NAIP 2009

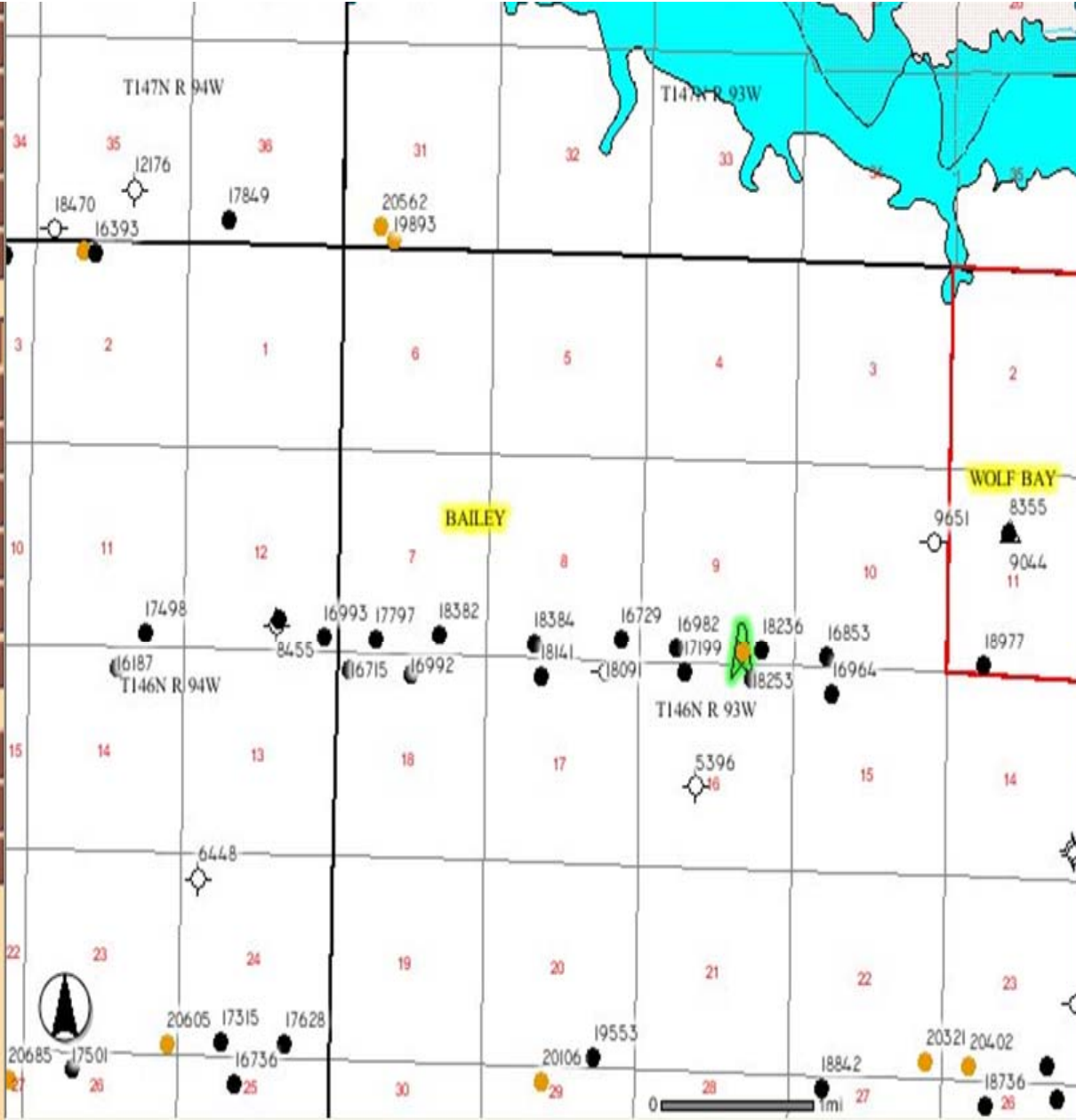
Refresh Map

Auto Refresh

Help:
A closed group, click to open.
An open group, click to close.
A map layer.
A hidden group/layer, click to make visible.

View Entire State
Previous View
Clear Selection
Search
Generate PDF

Zoom In
Zoom Out
Pan
Rect Identify
Select Object
Buffer
Distance
Find Well
Find Field/Unit
Find Section



Major Rivers
Selection cleared.

- Rigs
- Rig Location
- Directional Surveys
- Directional Legs
- Horizontal Surveys
- Horizontal Legs
- Cases Docketed
- Oil Fields
- Unit Boundaries
- Inspector Areas
- Drilling / Spacing
- Seismic
- Gas Plants
- Other
- Reservations
- Corporate Boundaries
- Rivers and Roads
- County Roads
- Major Roads
- Major Rivers
- Missouri River
- Land Ownership
- Imagery
- Topo/DRG 250k
- Topo/DRG 100k
- NAIP 2009

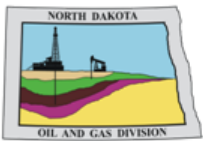
Refresh Map

Auto Refresh

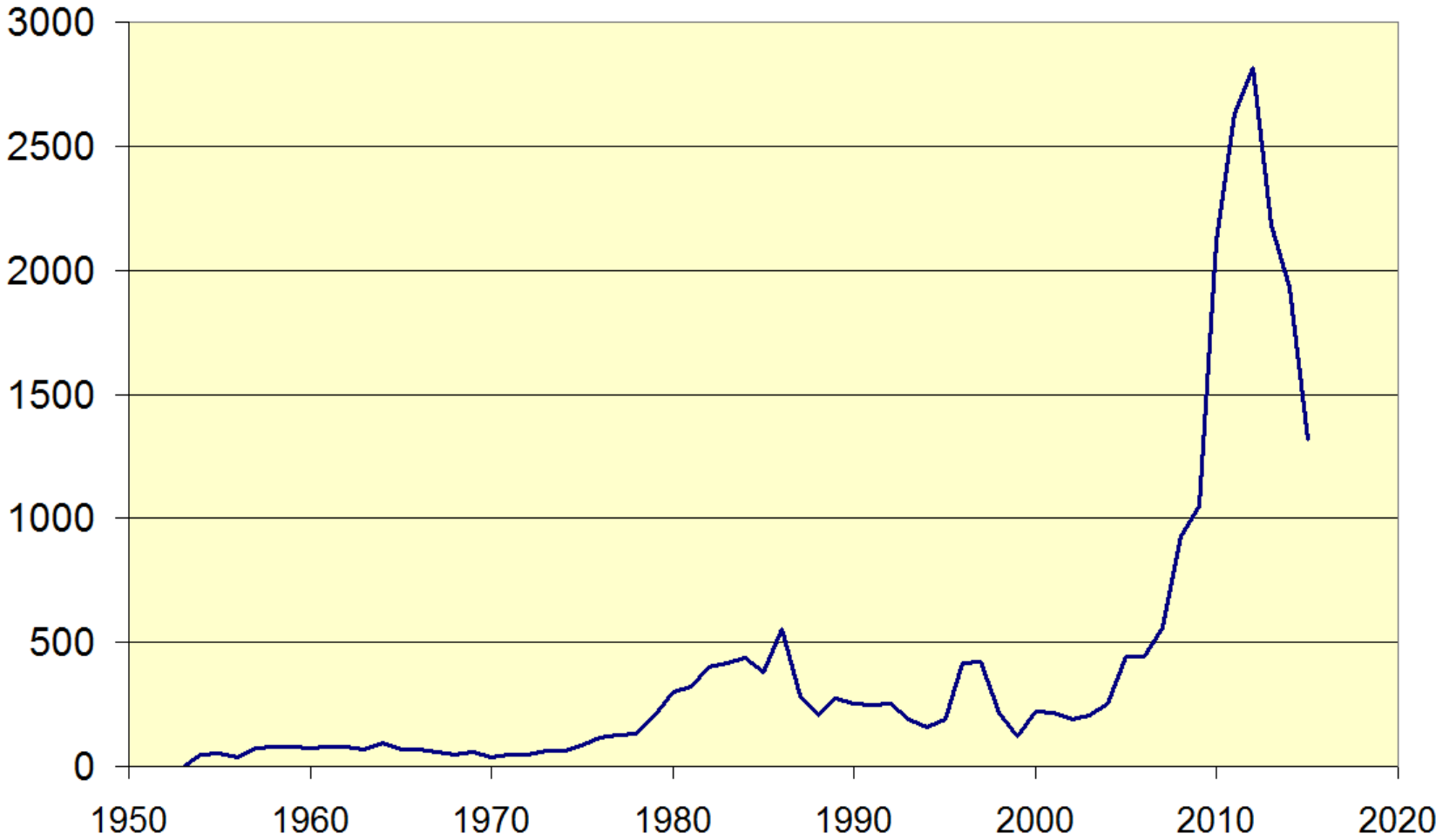
Help:
 A closed group, click to open.
 An open group, click to close.
 A map layer.
 A hidden group/layer, click to make visible.

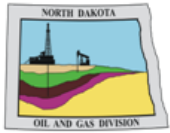
North Dakota Development

- Regulations
 - Spacing
 - Pooling
 - Unitization
- Resource Play
- Development
 - Uniform Spacing—orderly development
 - Multi-well locations—small footprint
 - Energy Corridors—industry & residents
- **Bakken Results**

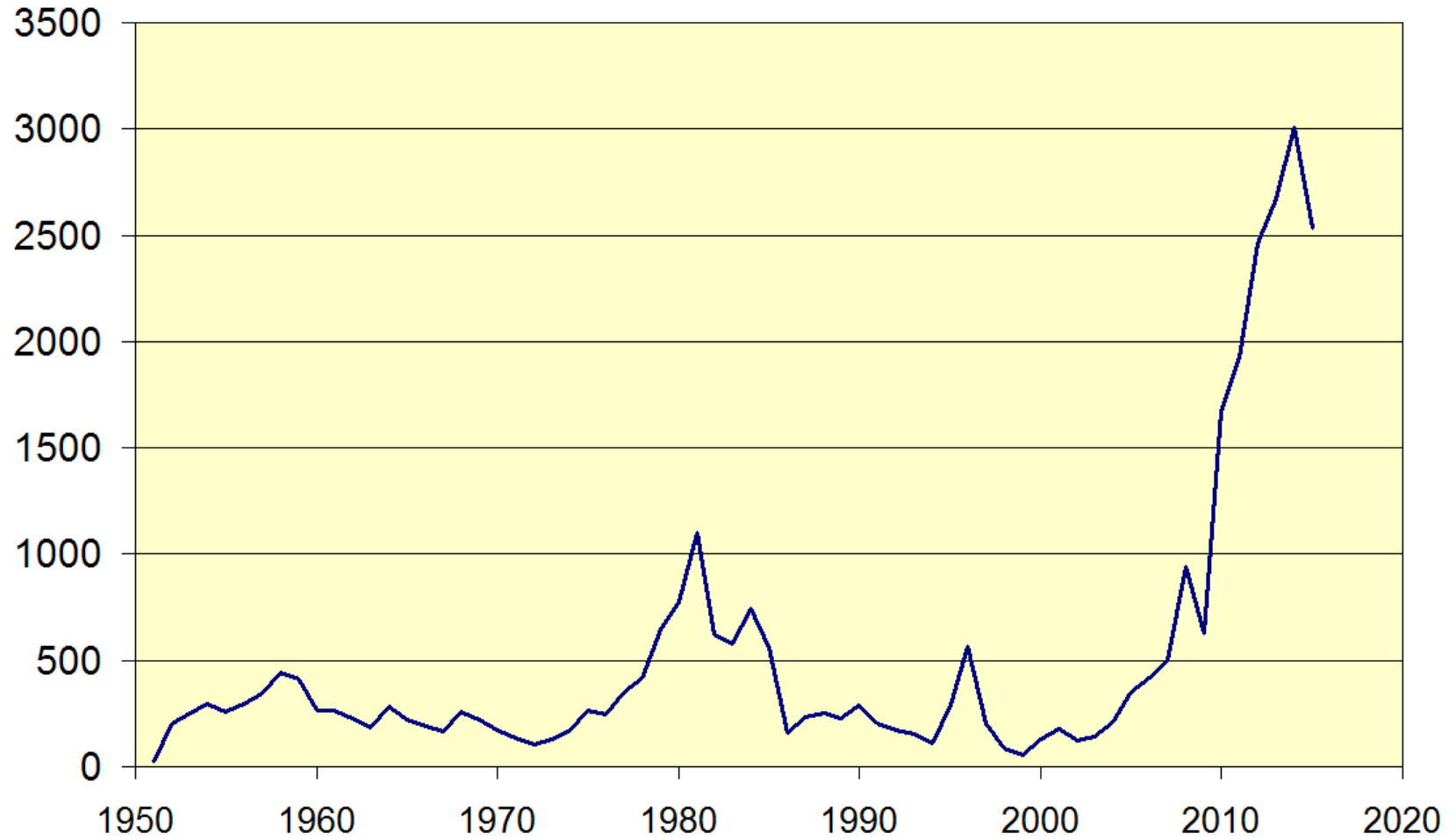


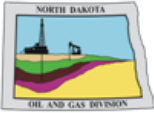
North Dakota Industrial Commission Cases Heard



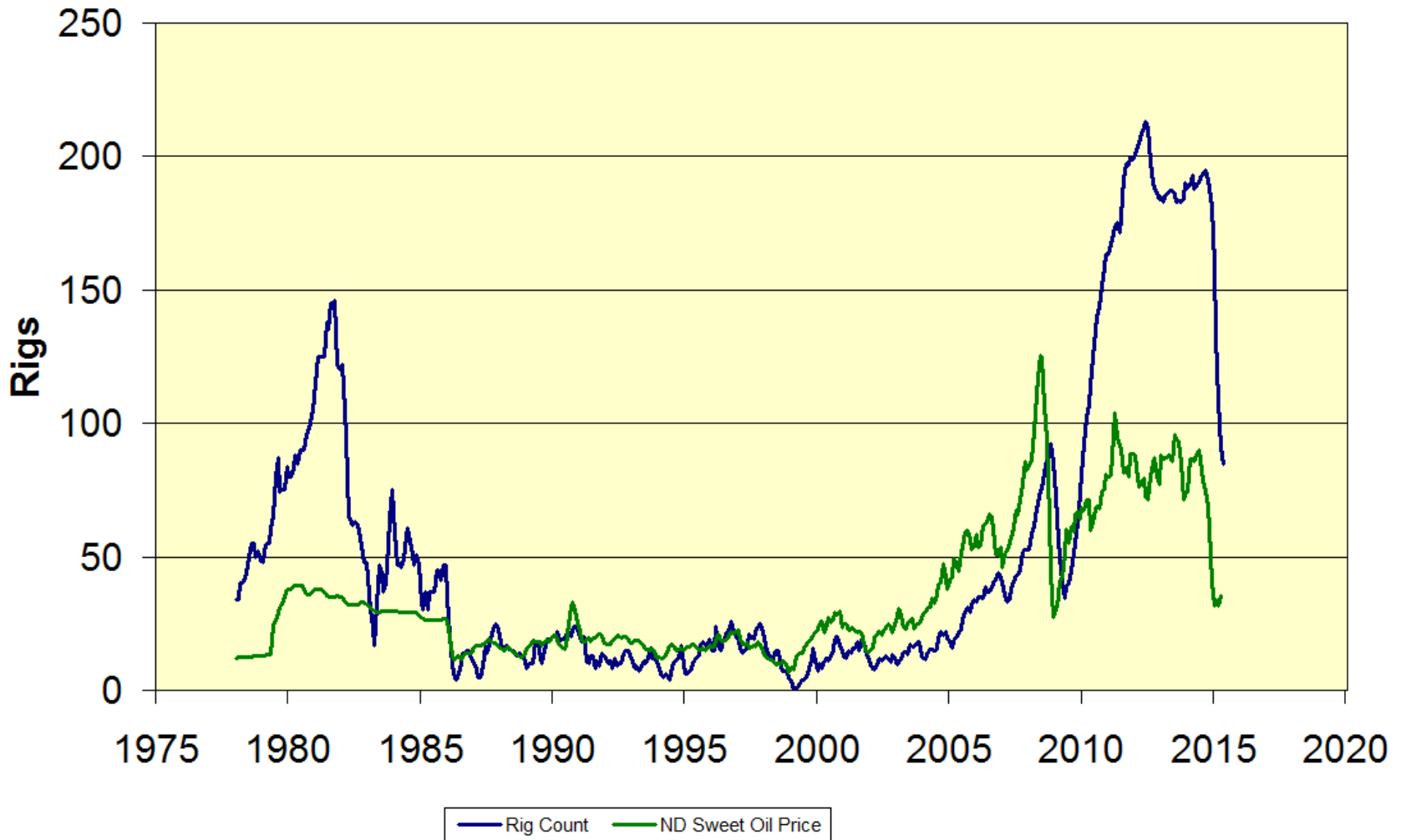


North Dakota New Well Permits Issued



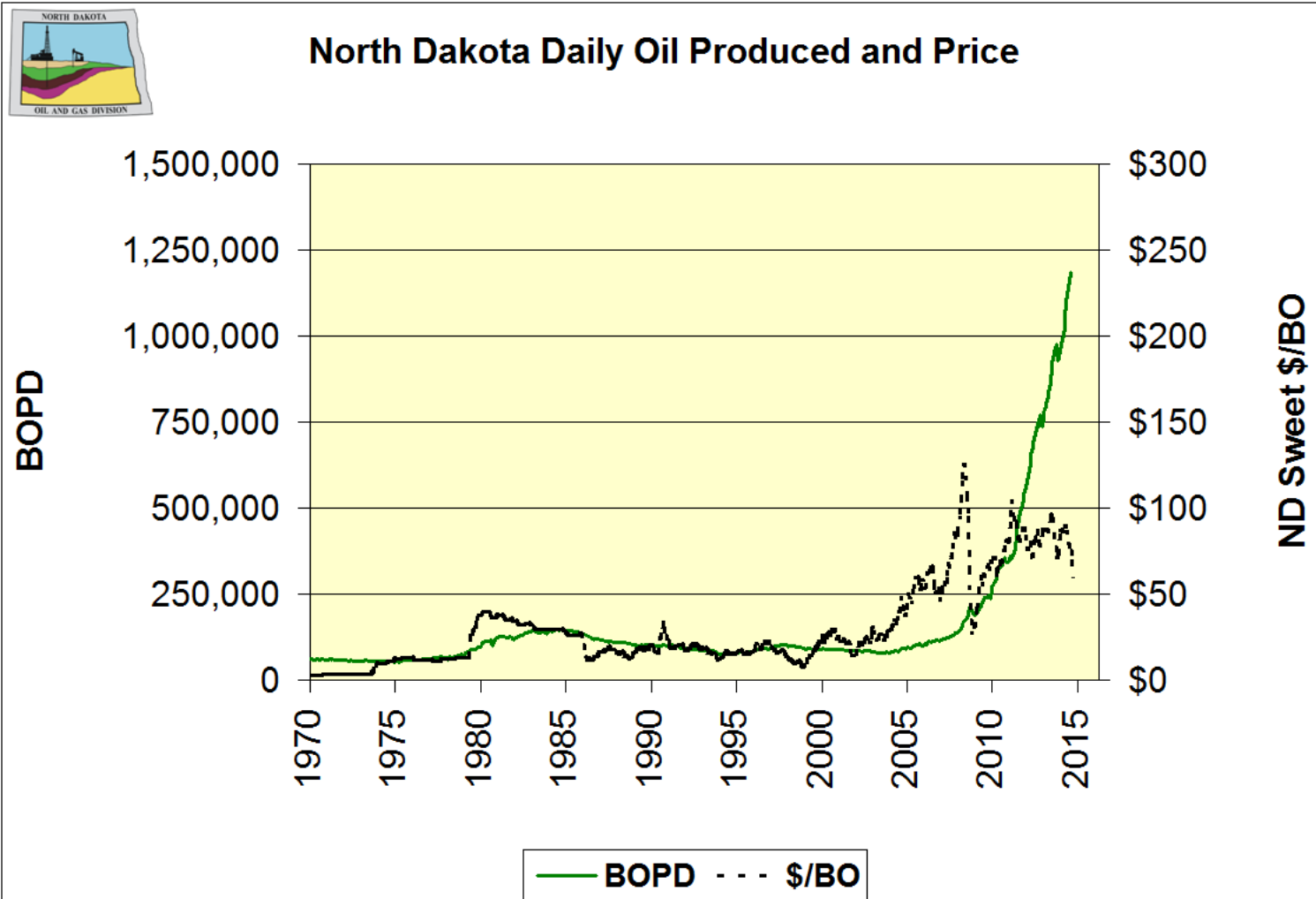


North Dakota Average Monthly Rig Count

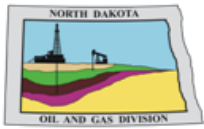


WELLS

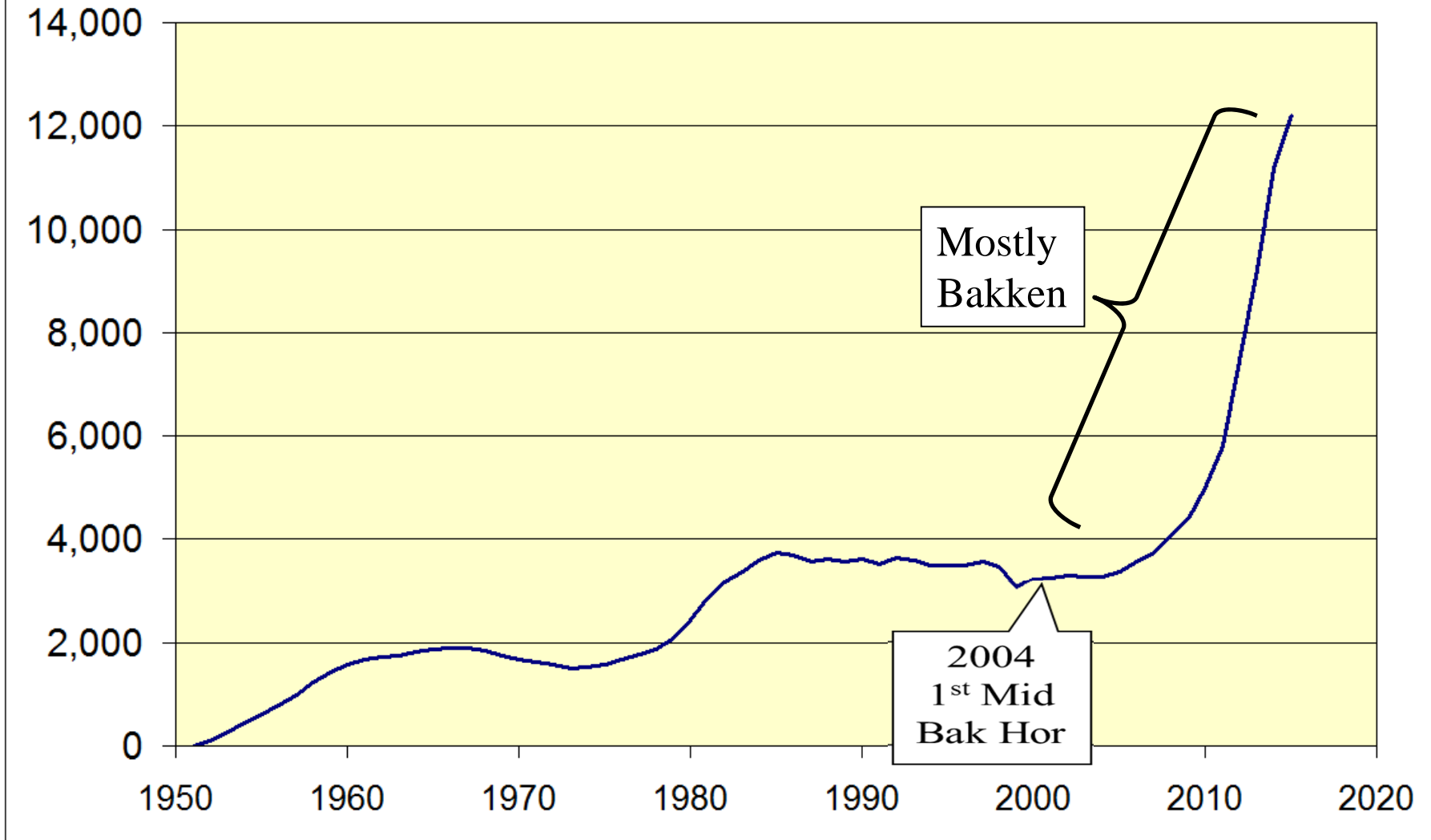
- **12,439 wells currently producing**
 - **9,397 Bakken**
- **< 1,000 to secure leases**
- **40,000 additional development wells**
 - **190 rigs – another 18 years**
- **Bakken Pool – 4 targets = more wells**



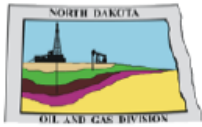
Production 1,190,583 bopd (appr 1,129,174 Bakken—95%)



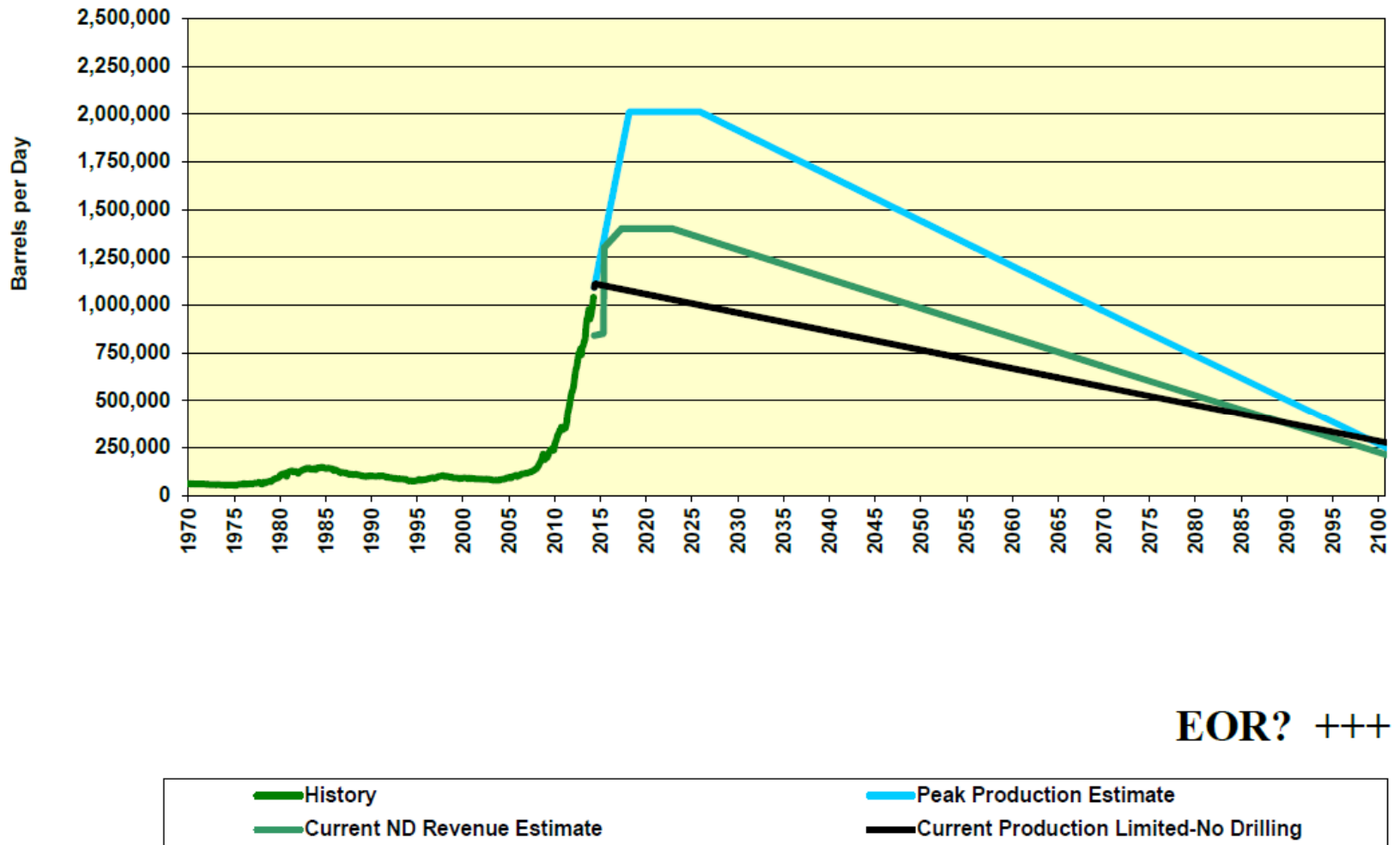
North Dakota Wells Producing



12,439 total wells – 9,397 Bakken horizontal (76%)

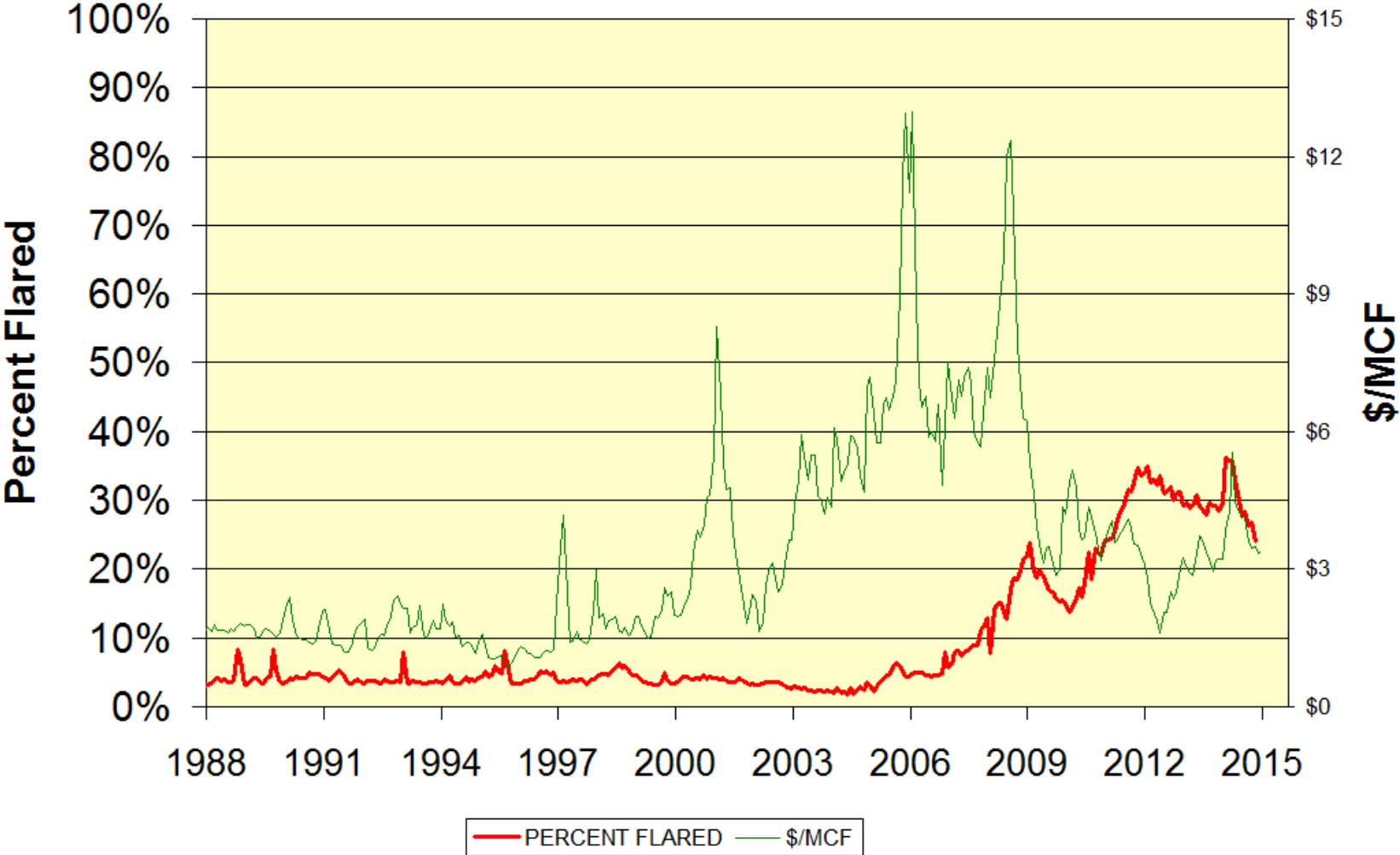


North Dakota Oil Production

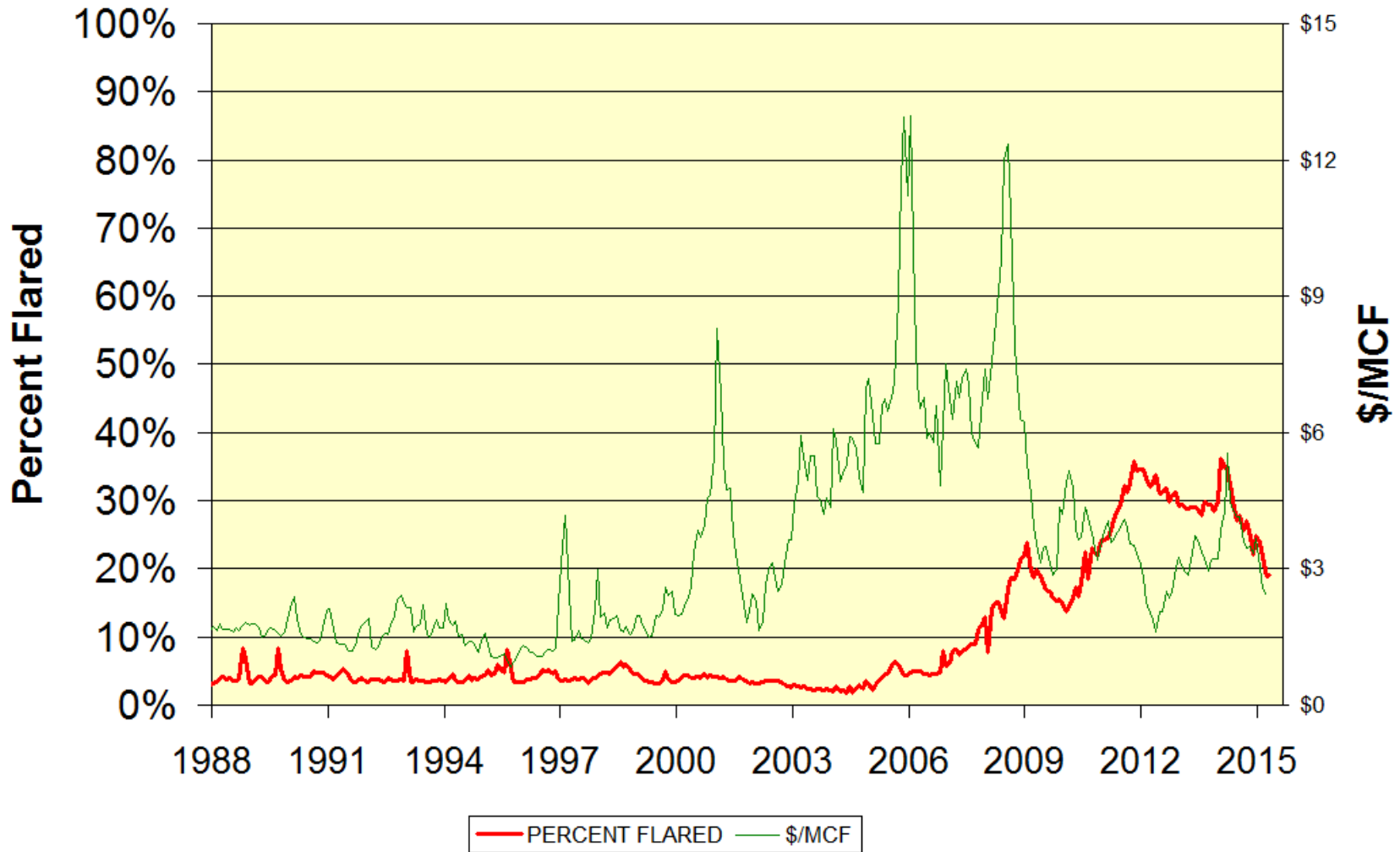


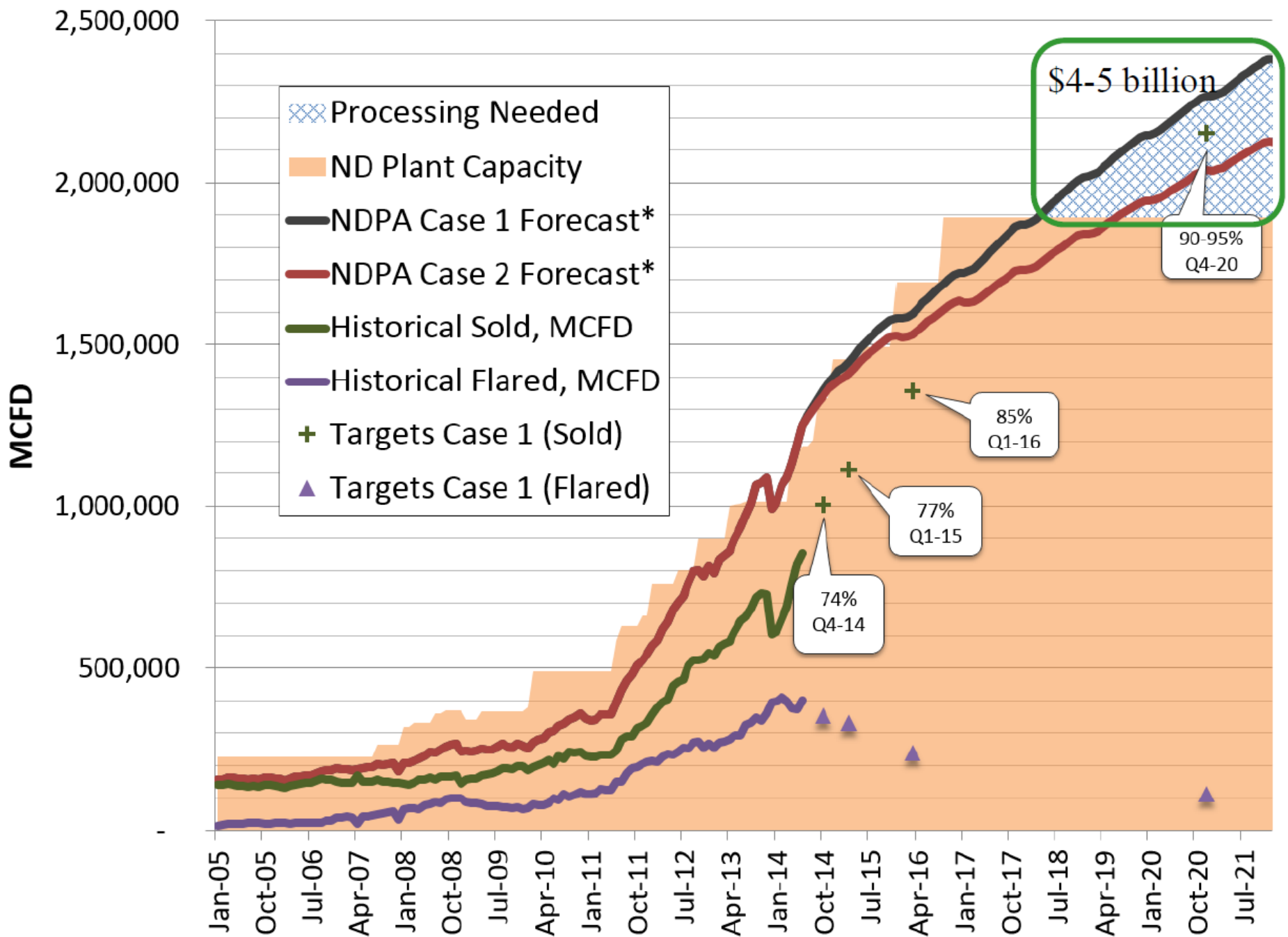
EOR? +++

North Dakota Monthly Gas Flared



North Dakota Monthly Gas Flared





WHAT'S AHEAD

- **Spearfish horizontal play**
- **Tyler horizontal play**
- **Three Forks—testing lower benches**
- **Enhanced Recovery in Bakken**

Reclaimed Location

