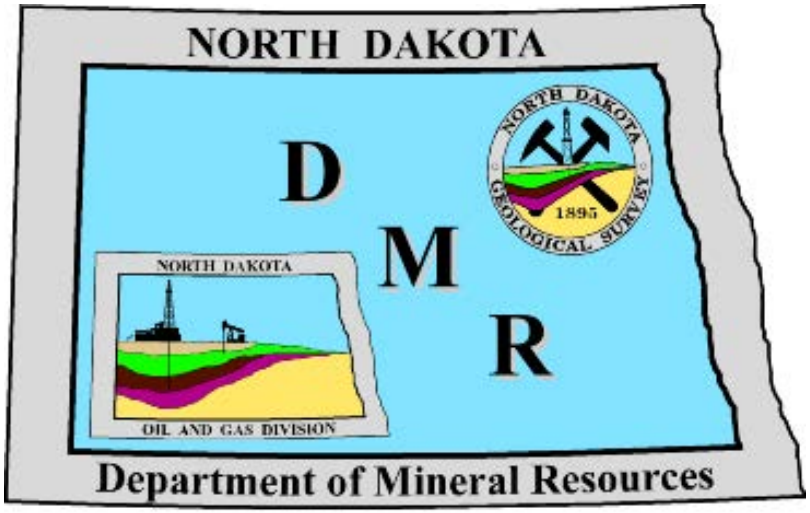
North Dakota Department of Mineral Resources

House Appropriations Committee

01/10/2013

Lynn D. Helms, Director



http://www.oilgas.nd.gov ***http://www.state.nd.us/ndgs***

600 East Boulevard Ave. - Dept 405

Bismarck, ND 58505-0840

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

Draft BLM Hydraulic Fracturing rule could double federal drilling permit approval time or worse. Final rule likely in June 2013

Current administration budget contains tax changes that could reduce drilling capital 35-50%

The future looks promising for sustained Bakken/Three Forks development

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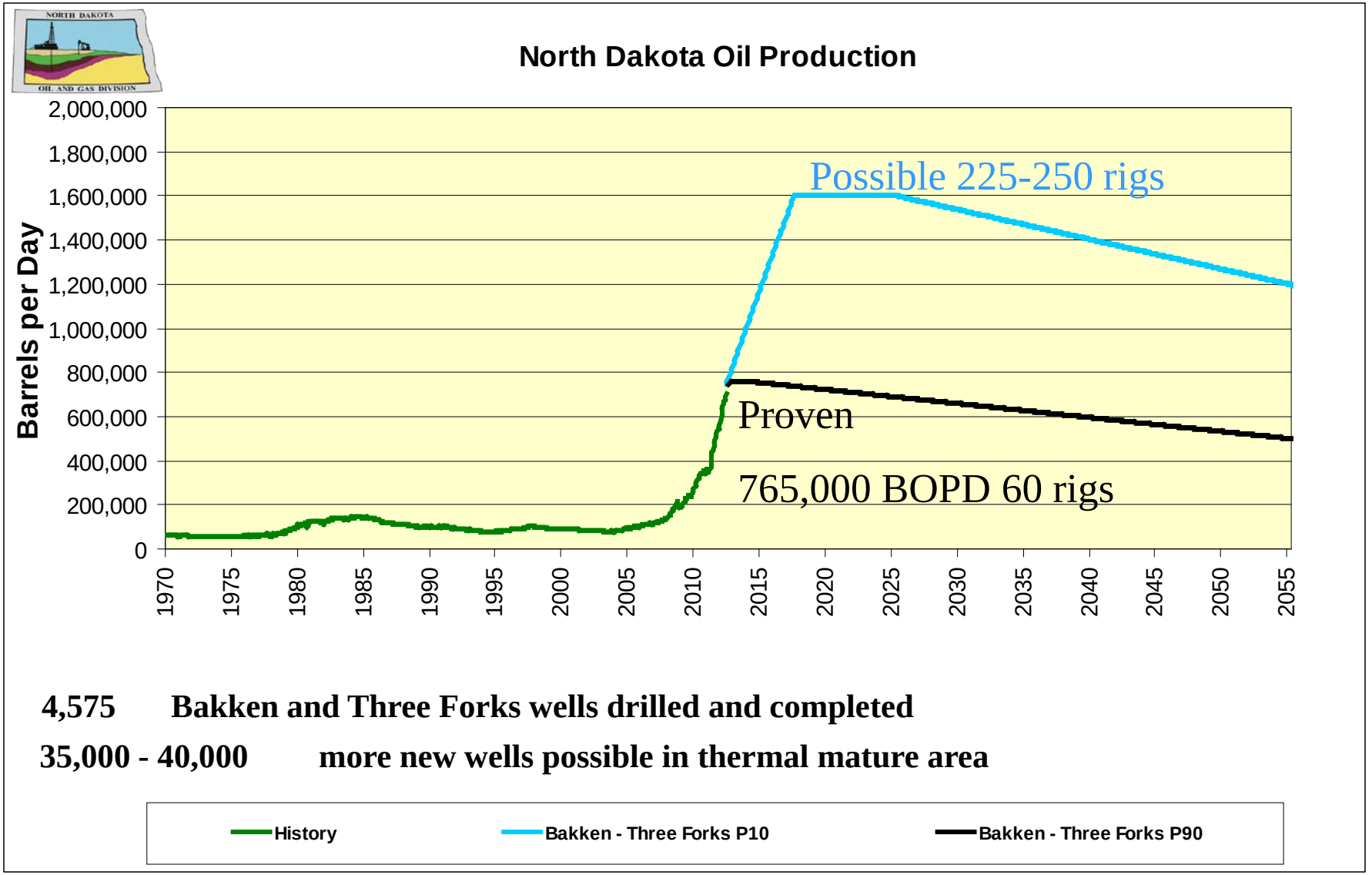
World and U.S. economies continue to struggle. If China joins the downward spiral oil price could fall enough to make most areas uneconomic



4,575 Bakken and Three Forks wells drilled and completed

35,000 - 40,000 more new wells possible in thermal mature area

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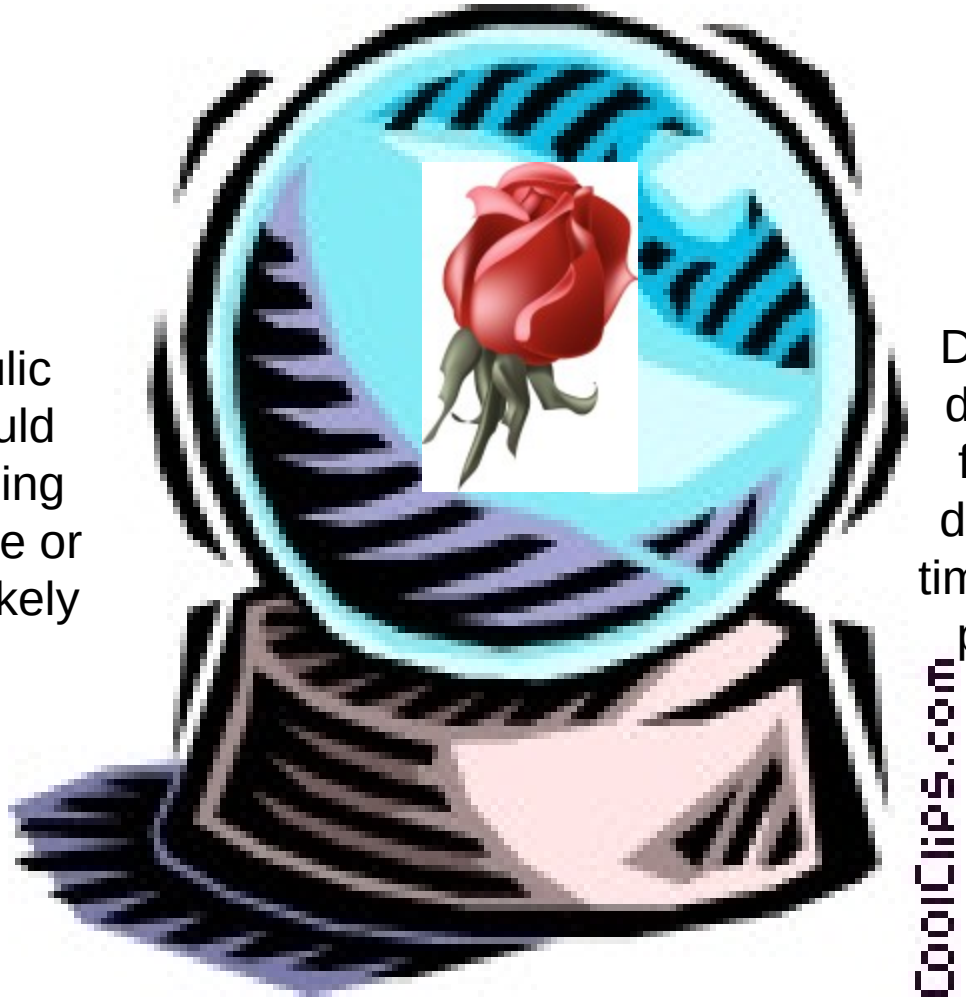

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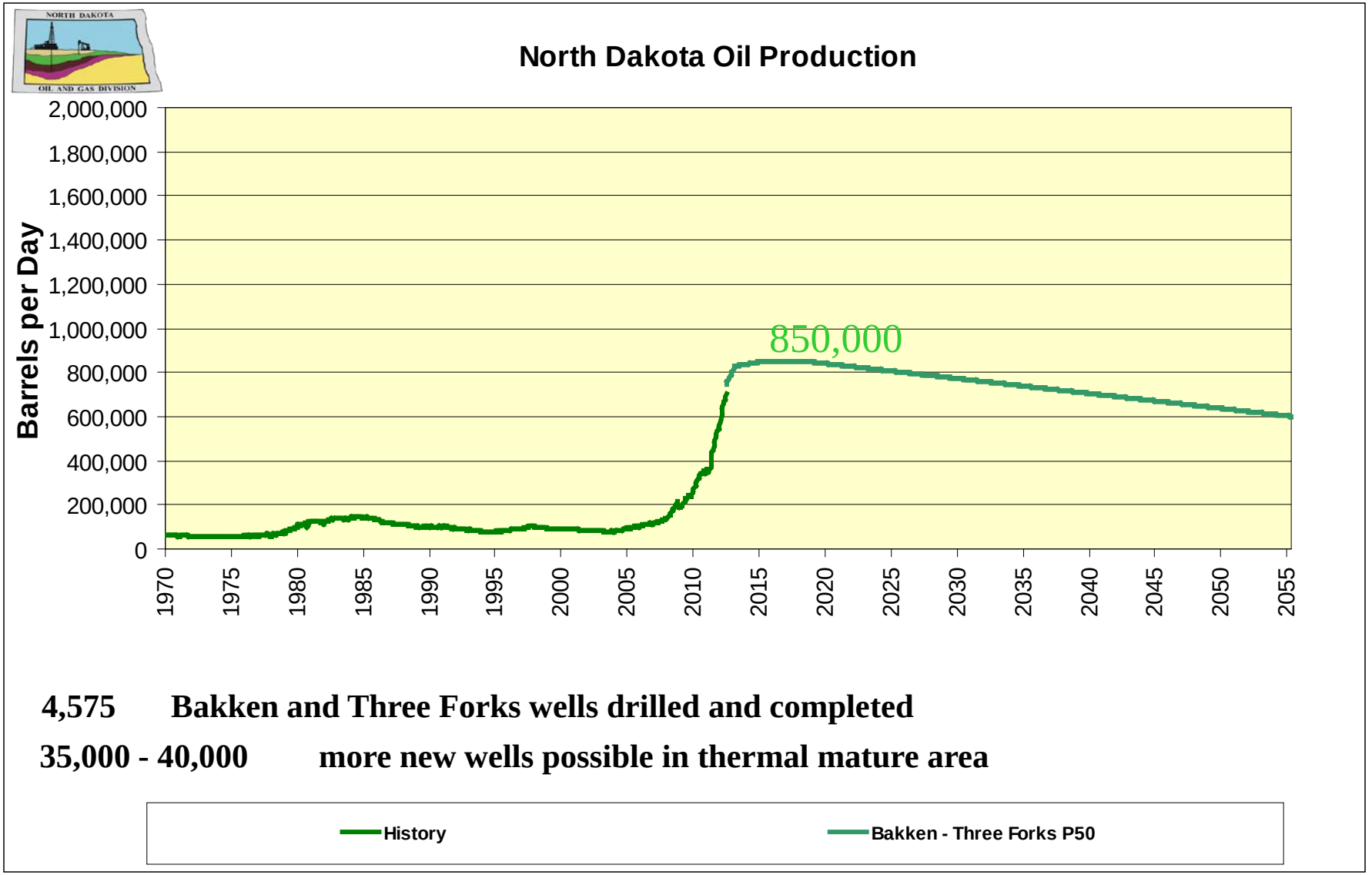
The future looks promising for sustained Bakken/Three Forks development

Western North Dakota

- 1,100 to 2,700 wells/year = 2,000 expected
  - 170 rigs = 20,000 temporary drilling jobs
  - Another 12,000 temporary jobs building infrastructure
  - 2,000-3,000 permanent jobs added each year
  - 170 rigs can complete the first phase of drilling in 14 months
  - 170 rigs will require more than 21 years to complete phase 2 drilling
  - 2,000 new wells per year require 11-22 million gallons of frac water per day
  - 40,000-45,000 new wells = 40,000-70,000 long term jobs
    17-28 million gallons per day maintenance water



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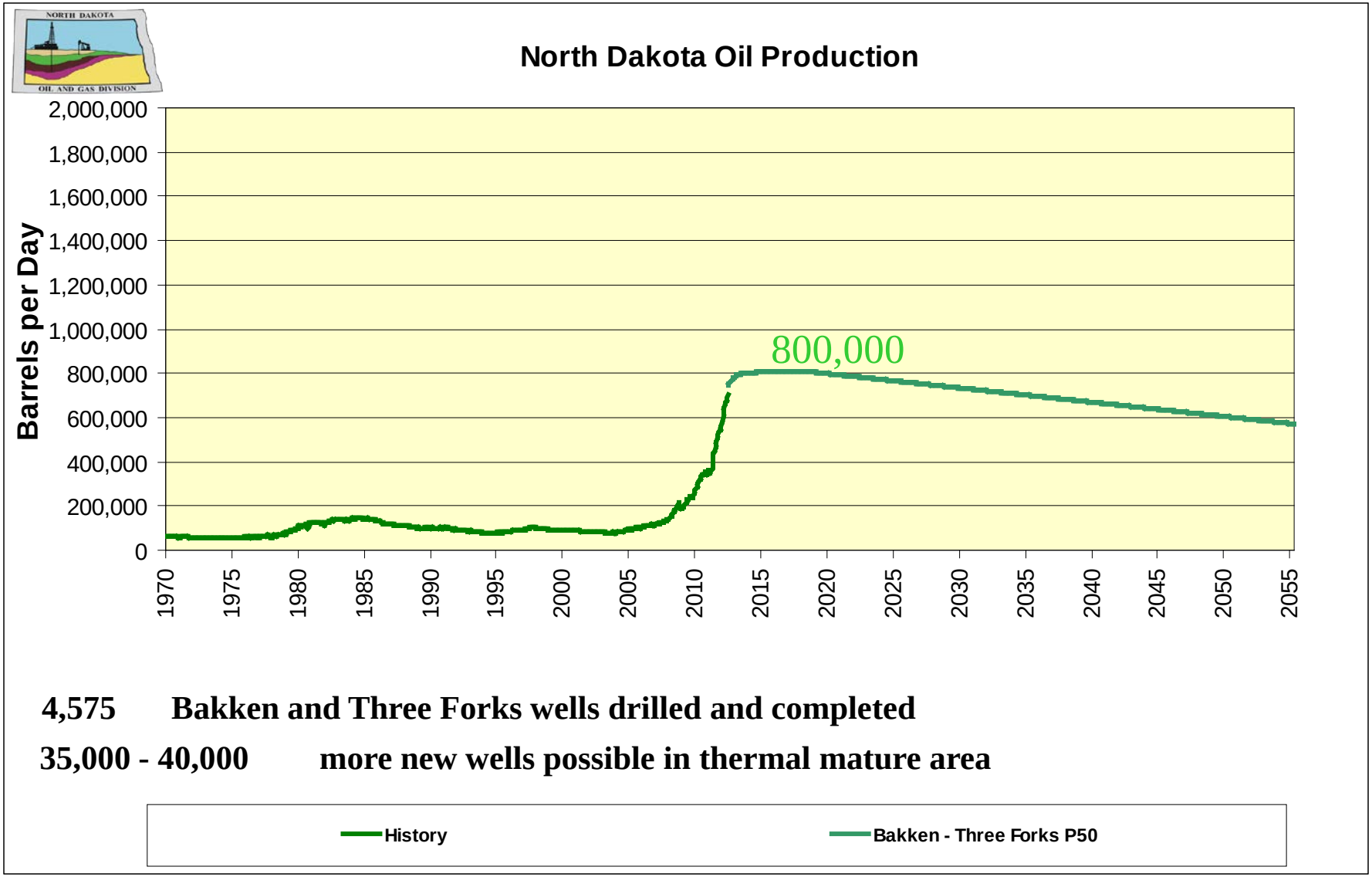
Western North Dakota

- 1,100 to 2,700 wells/year = 1,200 expected
  - 100 rigs = 12,000 temporary drilling jobs
  - Another 10,000 temporary jobs building infrastructure
  - 1,200-1,800 permanent jobs added each year
  - 100 rigs can complete the first phase of drilling in 2 years
  - 100 rigs will require more than 36 years to complete phase 2 drilling
  - 1,200 new wells per year require 7-13 million gallons of frac water per day
  - 40,000-45,000 new wells = 40,000-70,000 long term jobs
    17-28 million gallons per day maintenance water



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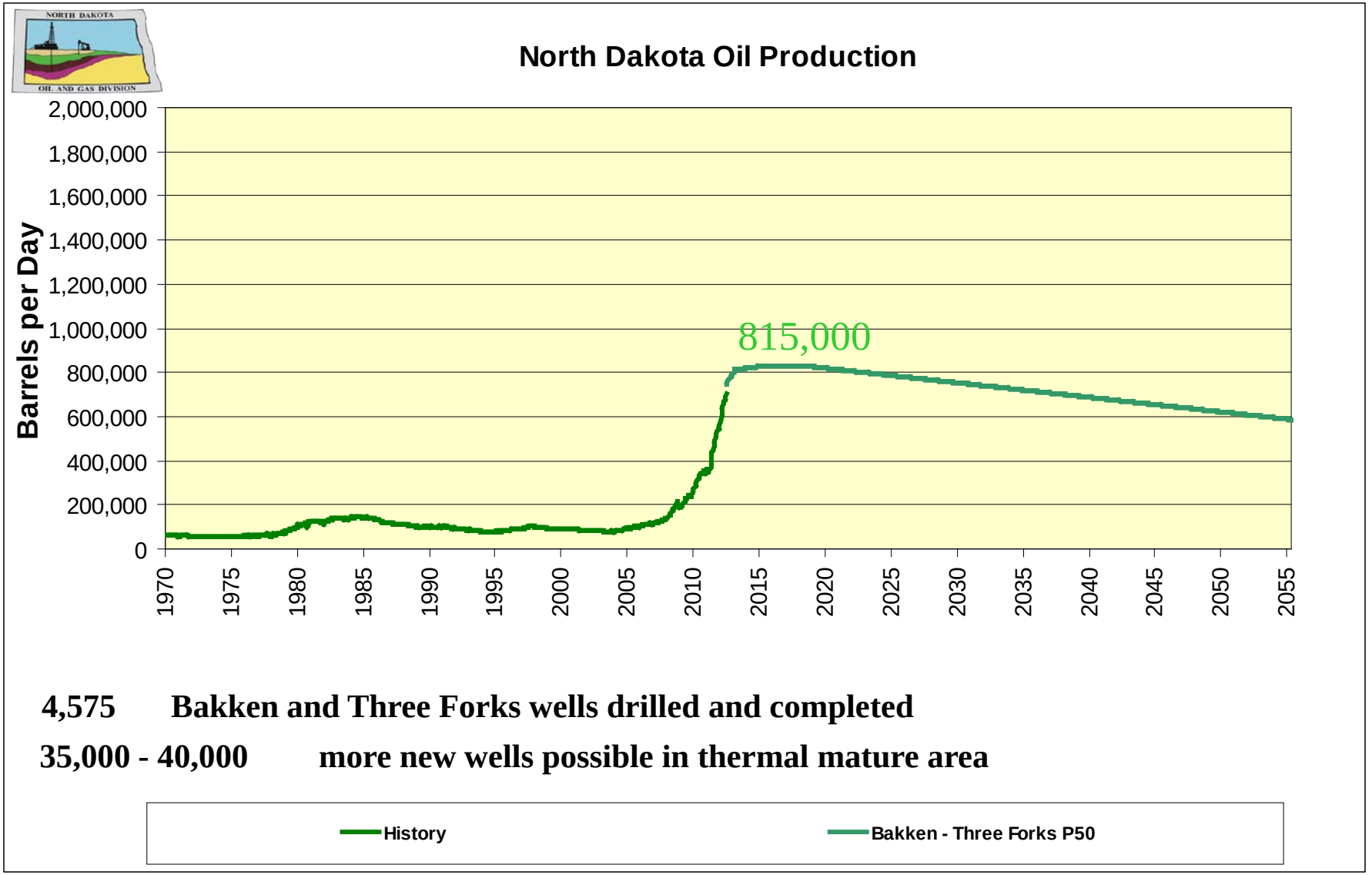
Western North Dakota

- 1,100 to 2,700 wells/year = 1,600 expected
  - 135 rigs = 12,000 temporary drilling jobs
  - Another 11,000 temporary jobs building infrastructure
  - 1,600-2,400 permanent jobs added each year
  - 135 rigs can complete the first phase of drilling in 18 months
  - 135 rigs will require more than 27 years to complete phase 2 drilling
  - 1,600 new wells per year require 9-18 million gallons of frac water per day
  - 40,000-45,000 new wells = 40,000-70,000 long term jobs
    17-28 million gallons per day maintenance water



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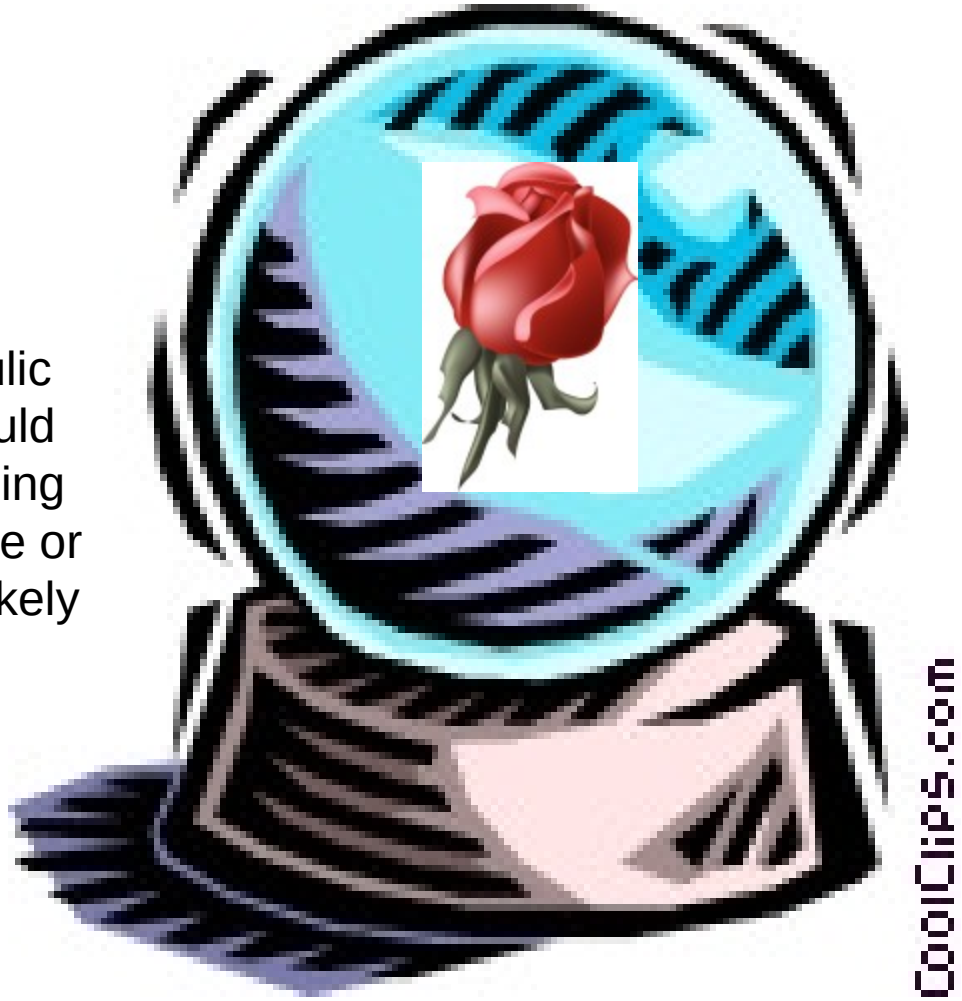
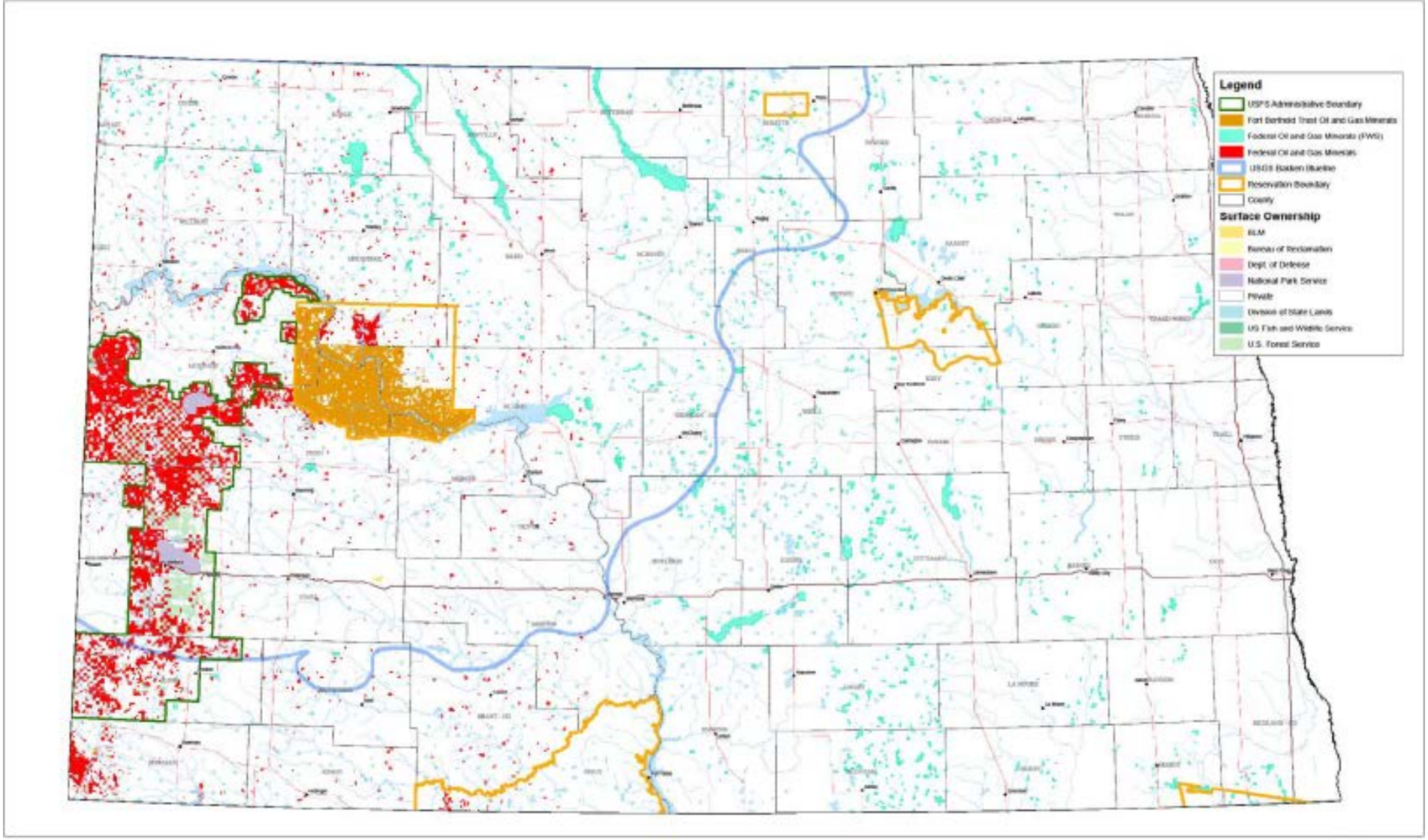


The future looks promising for sustained Bakken/Three Forks development



83% of Bakken spacing units contain some federal minerals

A federal permit is required for a well bore to penetrate those tracts

43% of the spacing units contain federal ownership of <25% or 320 acres

50% of the spacing units contain federal ownership of <32%

Lynn:

Thank you for reminding me that the NDIC has previously provided a website link to our office's information on oil and gas development. I would not have known to look under your Electronic Filing tab, but it is good to know that it is there. Thank you for providing that link.

With respect to inquiries to our office from oil companies that do not have a federal nexus, i.e. a federal license, permit, or funding, I will borrow your phrase and say that I find it increasingly difficult to understand why you continue to insist that there is some sort of effective system in place by which NDIC refers companies to the Fish and Wildlife Service, and further that we are actually being contacted by companies, because neither point is accurate.

I was unable to open the email string you attached, but we did receive it independently from the EneryWire reporter. Rather than a "clear example of the NDIC requiring contact with USFWL and confirmation of the contact for 2 wells that are not located on federal land and do not penetrate federal minerals", as you contend, this series of messages demonstrates a nearly complete lack of understanding on NDIC's part of the Fish & Wildlife Service's authorities, and gives a false impression that a simple screening of areas where piping plover critical habitat occurs is all that a company needs to worry about. **In fact, oil companies and any other entity must ensure that their activities do not result in a violation of the Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and the Refuge Improvement Act. The only ways an entity can be assured that they will not incur a violation from their proposed development in North Dakota is to receive a letter signed by me to that effect, or to apply for and receive a permit to take a protected species.** We do the former on a daily basis for innumerable companies and agencies. As I stated to the EnergyWire reporter and in my previous message to you, in my 9 1/2 year tenure in this job, I have not received a single request from an oil company for a review of their proposed development and confirmation that their activities are in accordance with the federal laws we implement where there was not a federal nexus. (We have however, recently begun discussions with one oil company in looking at their future development plans, and jointly preparing a wildlife conservation plan. We hope this will serve as an example to other companies.)

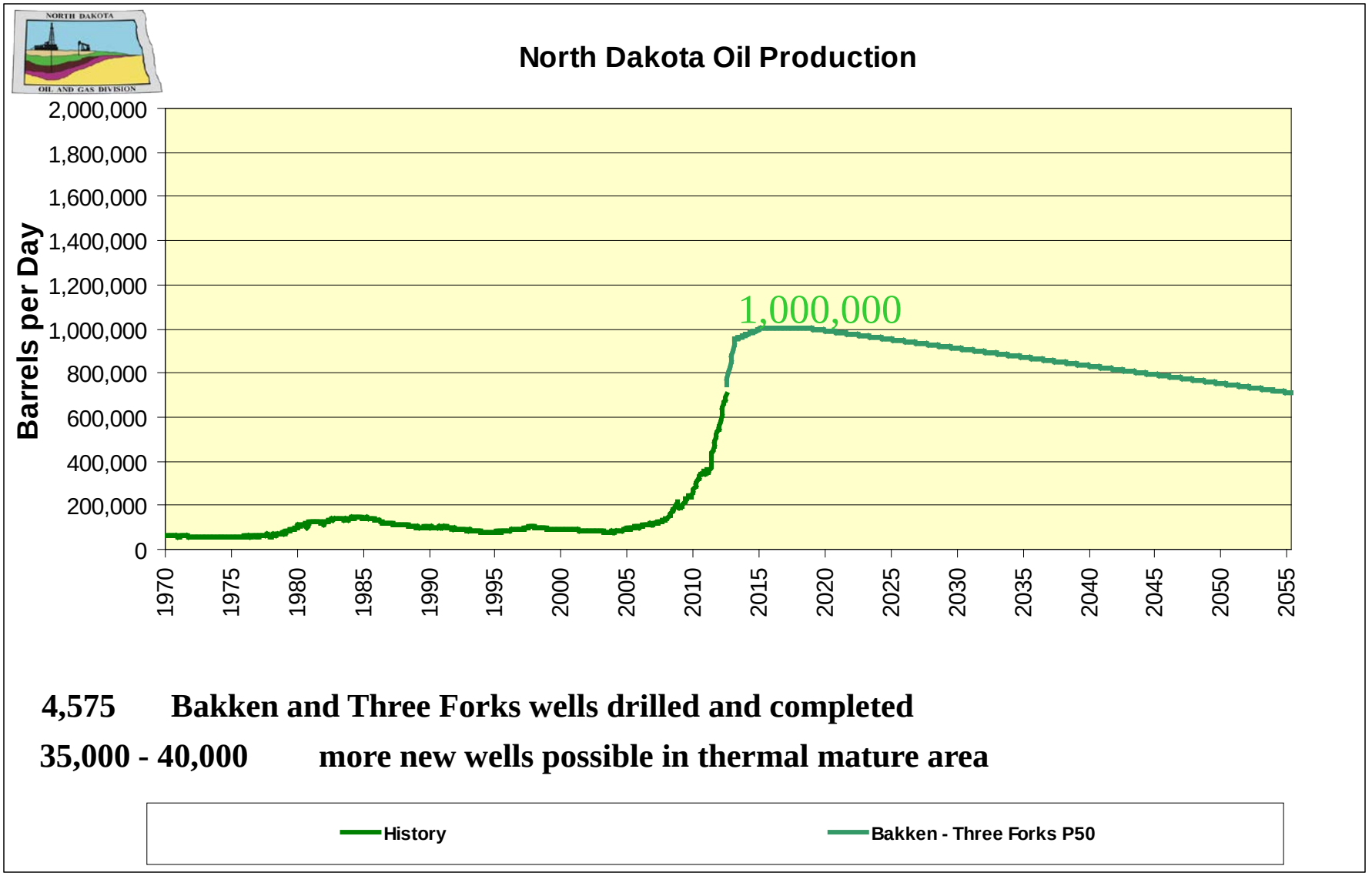
I do appreciate Mr. Holweger's statement in an email dated February 7, 2012 to the effect that the NDIC is only reviewing the ArcExplorer layer of piping plover habitat as a courtesy to the USFWS, and that NDIC does not have jurisdiction. However, I think if the NDIC wanted to be effective in advising companies of our program, and their need to coordinate their plans with the Fish and Wildlife Service, that you would routinely refer companies to this office so that we can advise them vis-a-vis all relevant federal wildlife laws, regardless of the presence or absence of piping plover critical habitat.

Regards,

Jeff Towner
Jeffrey K. Towner, Field Supervisor
Ecological Services
U.S. Fish & Wildlife Service
3425 Miriam Avenue
Bismarck ND 58501
Telephone: 701-250-4481 ext. 508
Fax: 701-355-8513

Western North Dakota

- 1,100 to 2,700 wells/year = 2,400 expected
  - 200 rigs = 20,000 temporary drilling jobs
  - Another 14,000 temporary jobs building infrastructure
  - 2,400-3,600 permanent jobs added each year
  - 200 rigs can complete the first phase of drilling in 12 months
  - 200 rigs will require more than 18 years to complete phase 2 drilling
  - 2,400 new wells per year require 13-26 million gallons of frac water per day
  - 40,000-45,000 new wells = 40,000-70,000 long term jobs
    17-28 million gallons per day maintenance water



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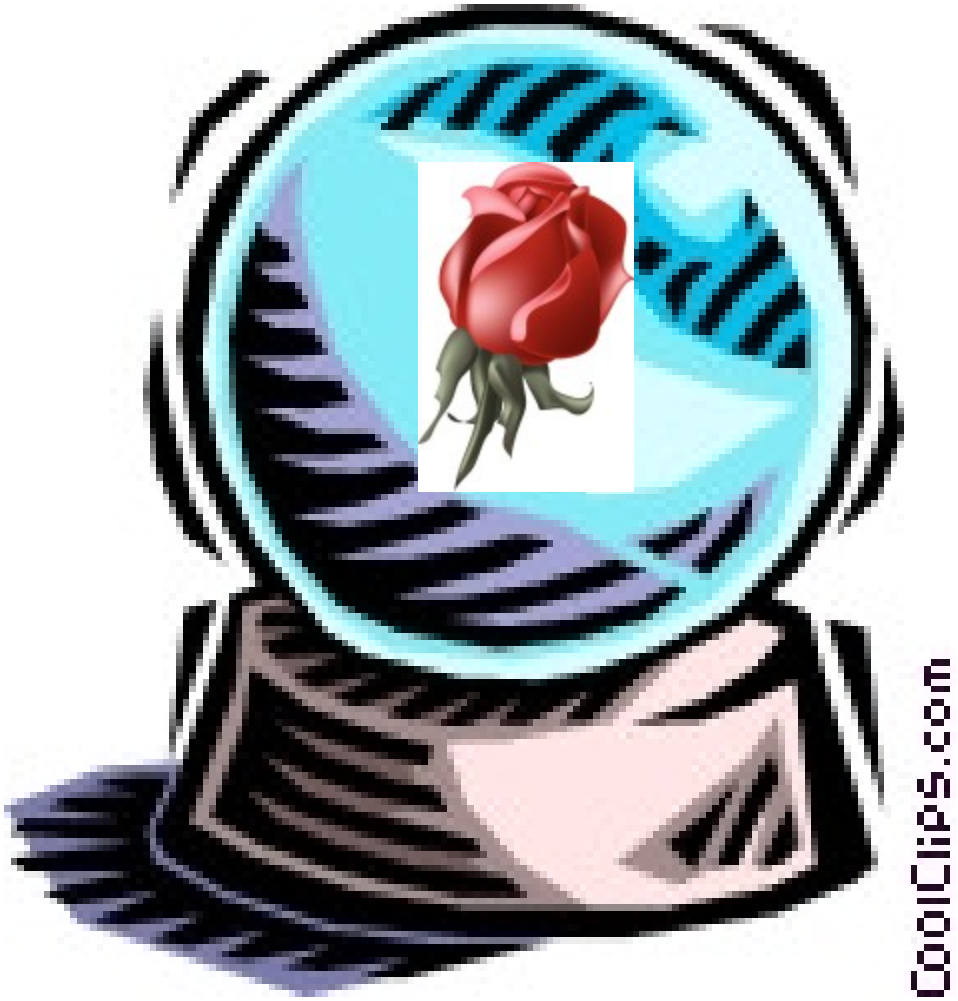
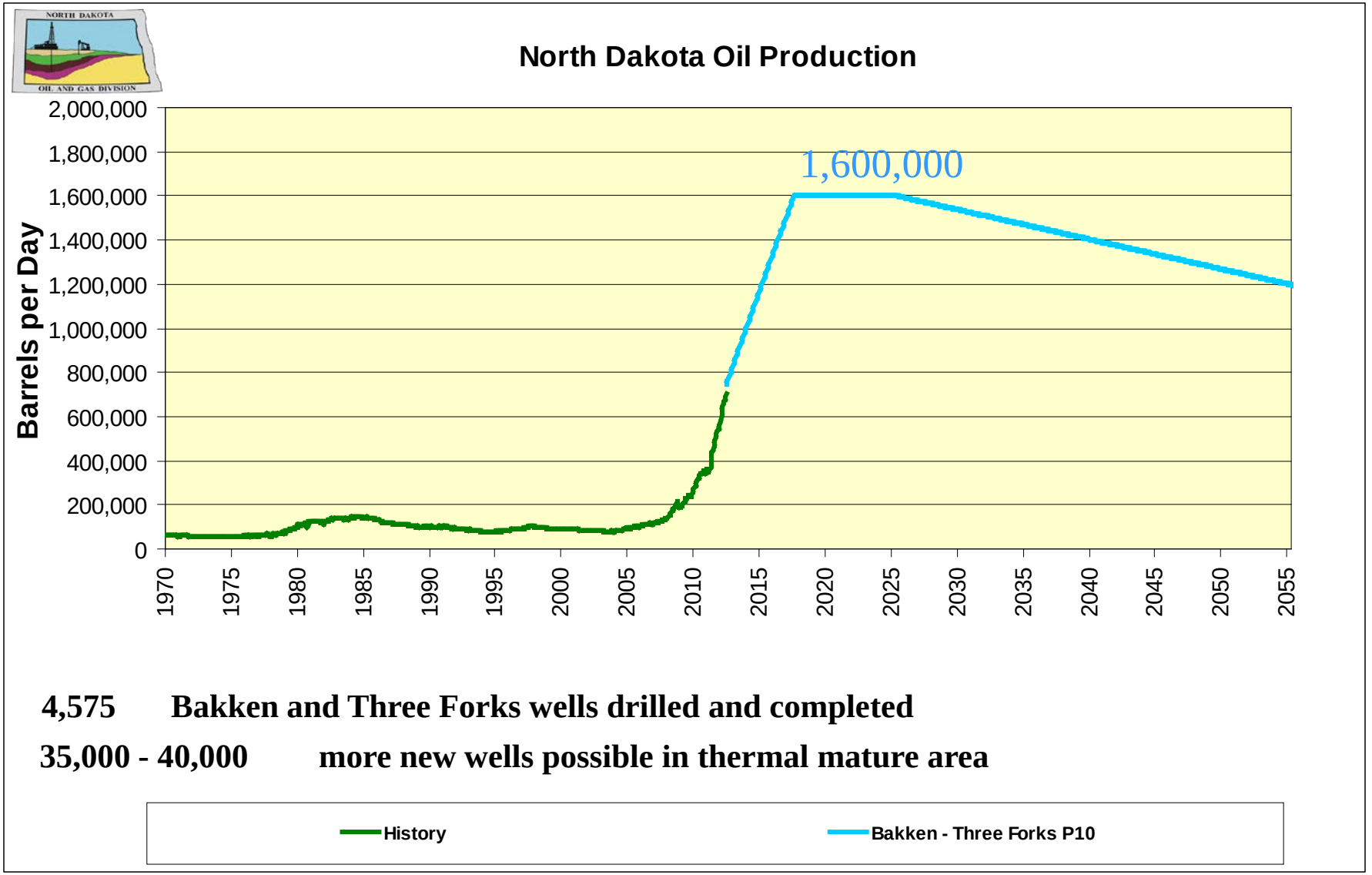


The future looks promising for sustained Bakken/Three Forks development

Western North Dakota

- 1,100 to 2,700 wells/year = 2,700 expected
  - 225 rigs = 20,000 temporary drilling jobs
  - Another 14,000 temporary jobs building infrastructure
  - 2,400-3,600 permanent jobs added each year
  - 225 rigs can complete the first phase of drilling in 11 months
  - 225 rigs will require more than 16 years to complete phase 2 drilling
  - 2,700 new wells per year require 15-30 million gallons of frac water per day
  - 40,000-45,000 new wells = 40,000-70,000 long term jobs
    17-28 million gallons per day maintenance water



4,575 Bakken and Three Forks wells drilled and completed

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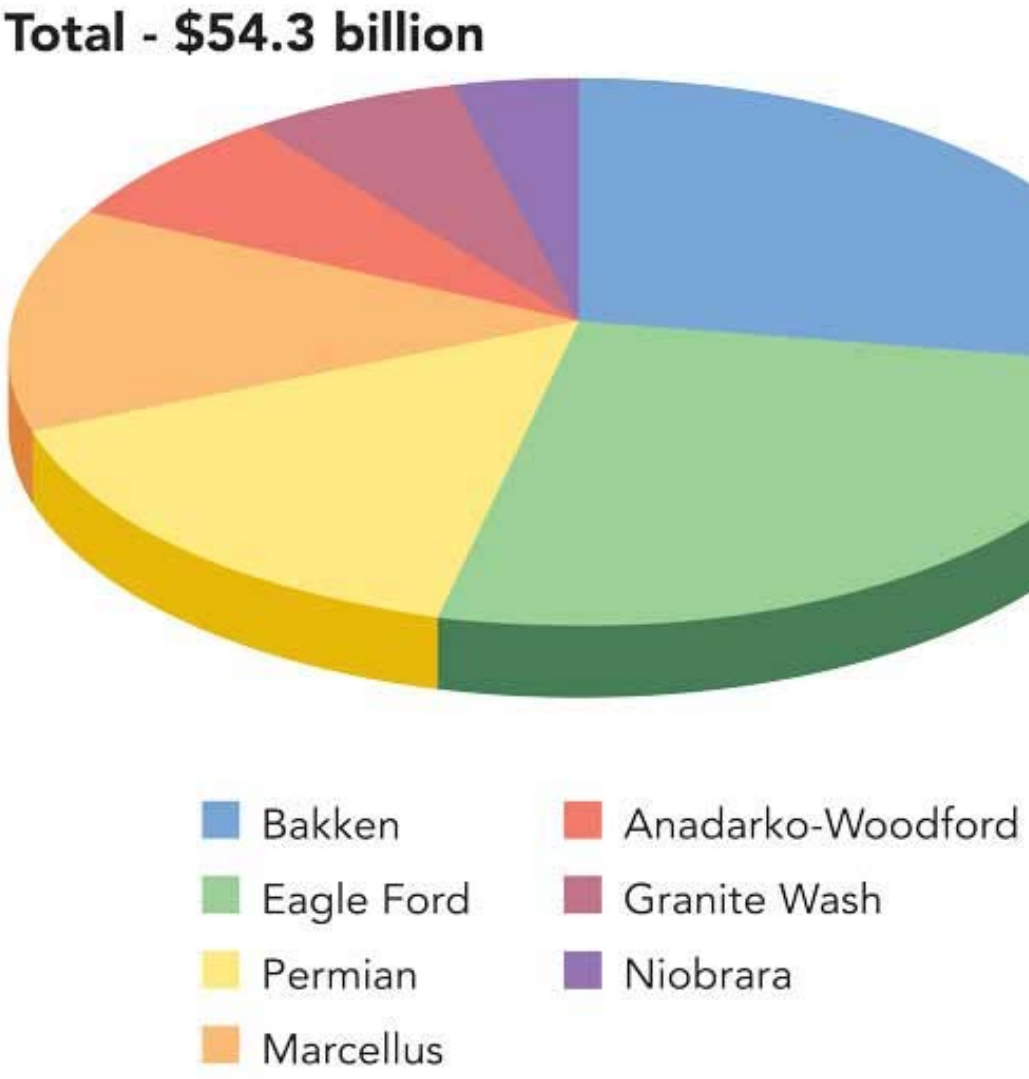
Source: U.S. Energy Information Administration based on data from various published studies. Canada and Mexico plays from ARI.
Updated: May 9, 2011

Fig. 1: Oilfield services expenditures in top US shales – 2012



Bakken – The Bakken shale play is one of the biggest oil discoveries in recent history. Long known since the early days of drilling in the Williston basin, the Bakken shale was largely ignored until technology came along to make it economic to develop. Since then, it has become a huge success.

Seven E&P companies will account for about 65% of Bakken drilling this year. In rank order they are: Continental Resources, Hess, Whiting Petroleum, Statoil/Brigham, Oasis Petroleum, Marathon, and EOG Resources.

Each is developing ways to become more efficient and reduce drilling days/well to somewhere in the mid-20s.

These wells will be around 10,000-foot TVD and cost over $9 million each.

Eagle Ford – About 400 miles in length and stretching from Southwest Texas into East Texas, the Eagle Ford shale is a very interesting play with oil, liquids, and dry gas windows with 60% to 70% carbonate content and a more brittle geology that's good for fracturing.

Four companies account for around 45% of all drilling here: Chesapeake Energy, EOG, Conoco Phillips, and Marathon. But there are other very aggressive players including Pioneer, Anadarko, Talisman/Statoil, and BHP (which paid $12 billion for Petrohawk and gained significant Eagle Ford holdings).

Most are drilling $6.5 million to $7 million wells with focus on the Eagle Ford's oil and liquids windows.

Permian – Several exciting shales now overlay an historic conventional oil basin where drilling began in the 1920s. They include the Avalon, Leonard, Wolfcamp, Bone Spring Field, Spraberry Field, and Yeso Oil Play. Also included is the Wolfberry Trend which refers to the Wolfcamp Shale and the Spraberry Field.

There are plenty of operators of record here, but just eight account for around 70% of shale drilling today in the Permian. The top three: Pioneer Natural Resources, Concho Resources (which just spent over $1 billion to acquire Three Rivers Operating), and Apache. Oxy follows close behind, then comes Energen, Sandridge, Cimarex, and EOG.

Marcellus – Most Marcellus shale wells are in Pennsylvania, with about 8 of 10 wells focused on natural gas. Range Resources and a few others are leading wet play development in the southwestern corner of the state.

TVDs are around 6,300 feet with horizontals costing around $5.3 million.

Busy players include Anadarko (with their Mitsui JV), Chesapeake and their associated JV with Statoil, then comes Range, Shell (which bought into the Marcellus by paying KKR $4.7 billion for East Resources), and then Chevron via their $4.3 billion acquisition of Atlas Energy. A plus for the Marcellus is its location adjacent to the biggest gas-consuming region in the country.

OIL&GAS FINANCIAL JOURNAL

Anadarko-Woodford – Also called the Cana Woodford, the Anadarko-Woodford is a growing crude and liquids play in West-Central Oklahoma running up within the Anadarko basin. It's a relatively deep horizontal play with depths ranging from 11,500 to 14,500 feet. Average drilling and completion costs/well can be ~ $8.5 million.

Granite Wash – A collection of several "wash plays" in the Texas-Oklahoma Panhandle are alluvial placers formed by mineral particles and deposits set down by ancient streams, involving a number of stacked oil and gas formations at depths of 11,000-15,000 feet. These wells can have up to 15 frac stages (at least at this time) and cost $7.5 million to $8 million each.

Niobrara – The Niobrara formation is located in a corner of the Rockies involving Colorado, Wyoming, Kansas, and Nebraska. Most activity today is in the northeastern corner of Colorado within the Denver-Julesburg basin. TVDs are in the neighborhood of 6,200 feet with well costs that range from $4.5 million to ~ $5 million/well.

The North Dakota Model

https://www.dmr.nd.gov/ - Oil and Gas Subscription: ArcIMS Viewer - Windows Internet Explorer

Oil and Gas Subscription: ArcIMS Viewer

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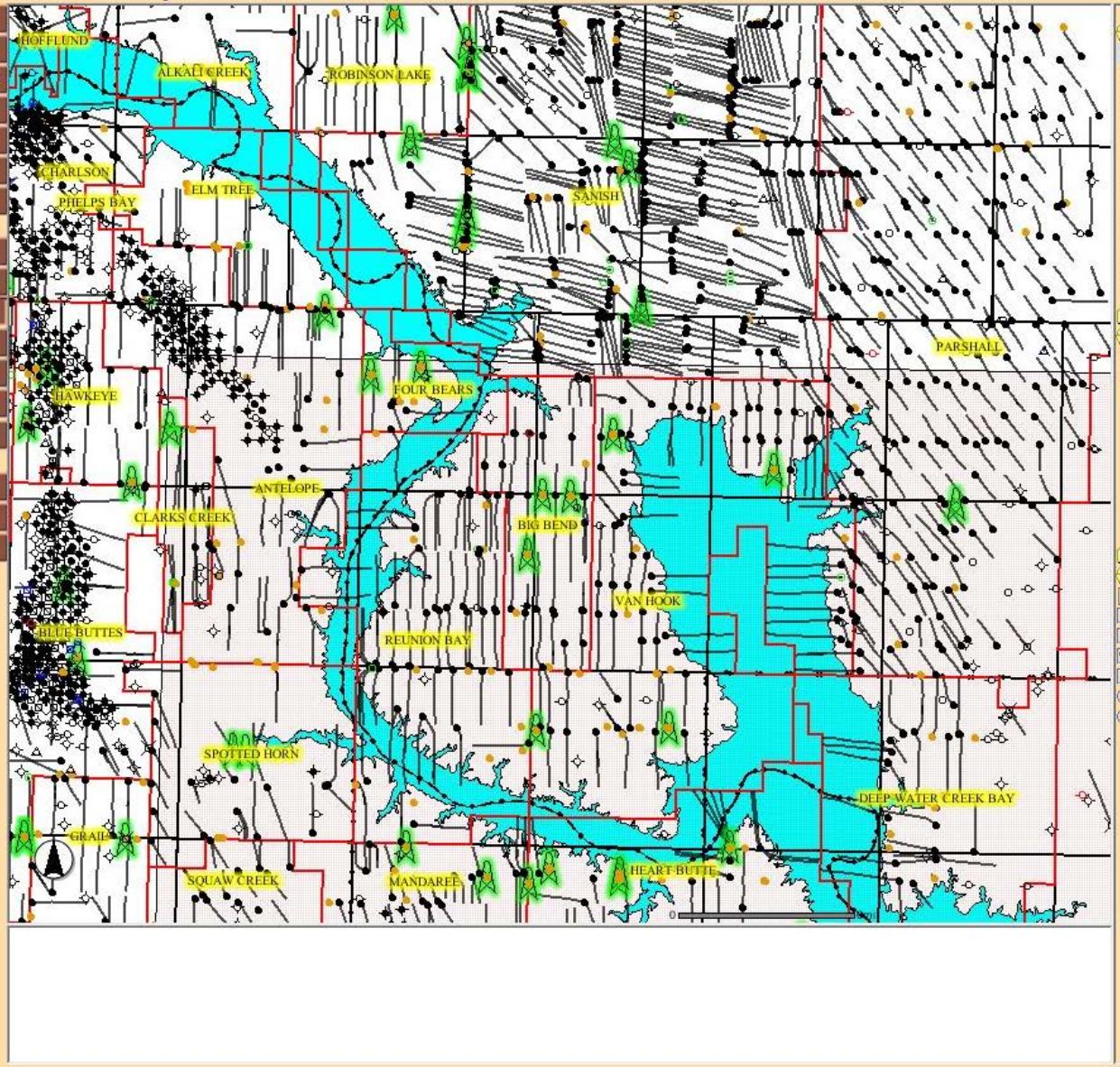

ND OIL & GAS LAYERS

- Oil and Gas
  - Wells
  - 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:

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- The active layer.

Pan

Map Data Last Updated : 8/20/2012

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8/27/2012

https://www.dmr.nd.gov/ - Oil and Gas Subscription: ArcIMS Viewer - Windows Internet Explorer

Oil and Gas Subscription: ArcIMS Viewer

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Find Field/Unit
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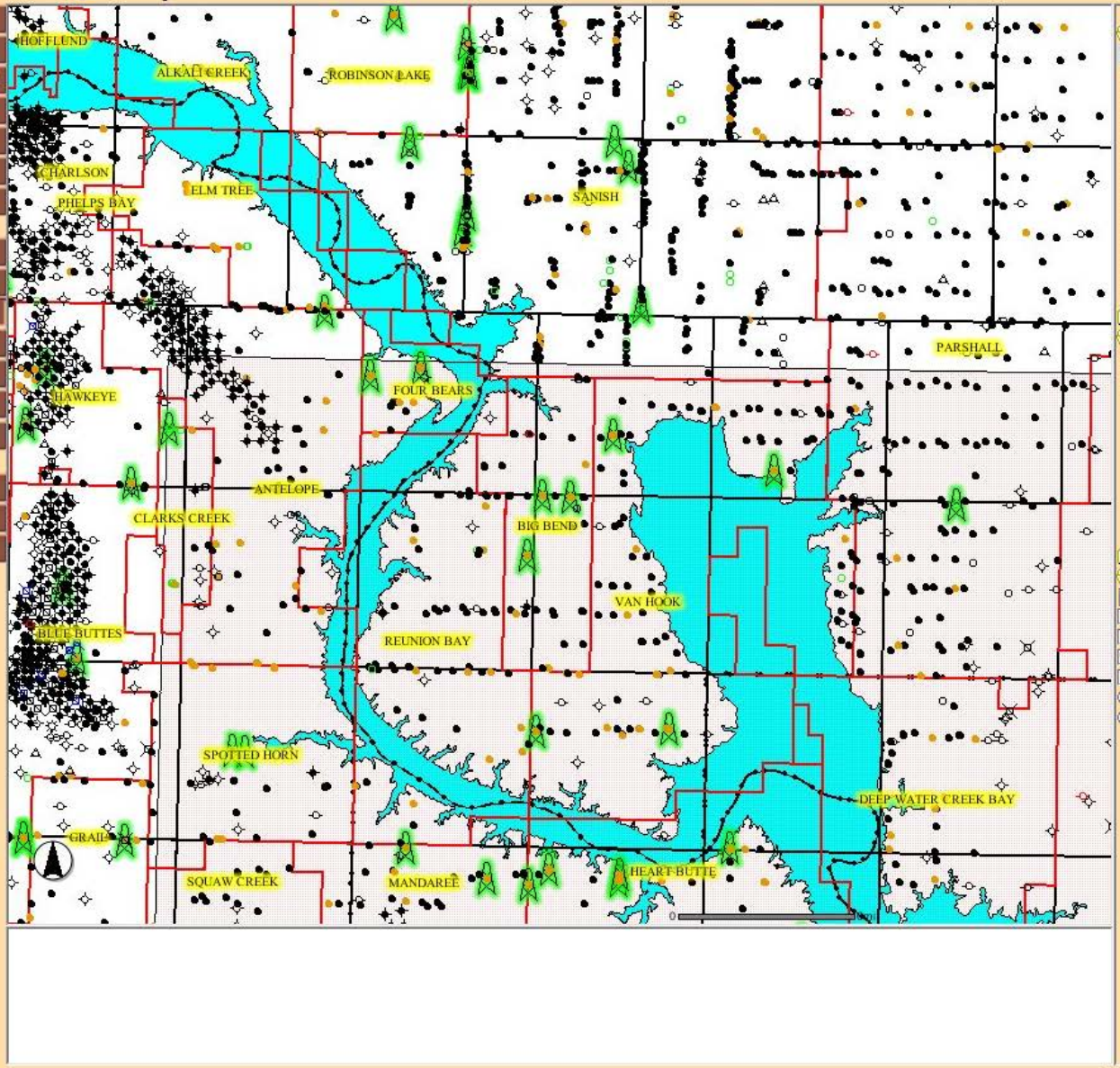

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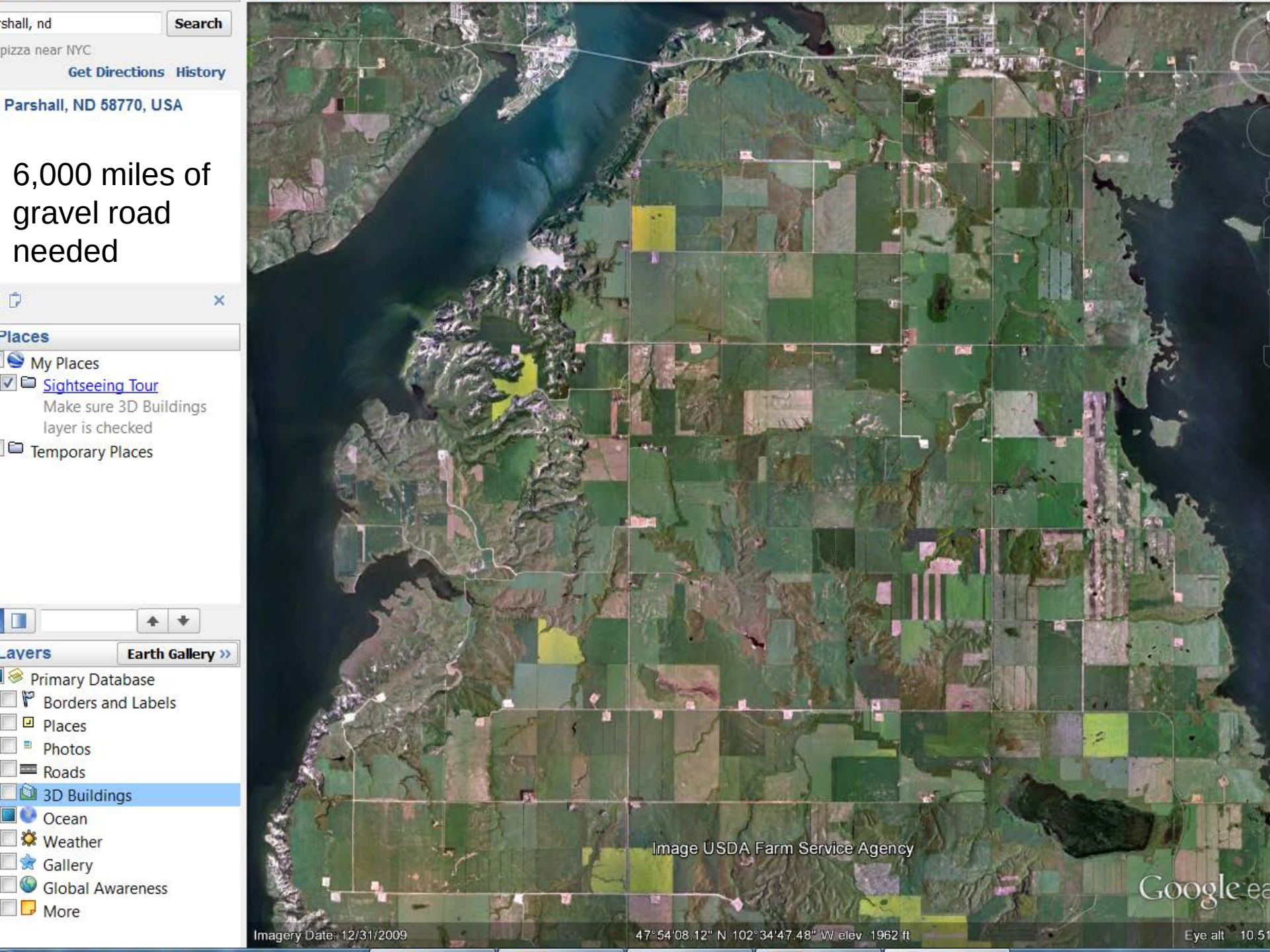
Vern Whitten Photography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Ocean
Weather
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Global Awareness
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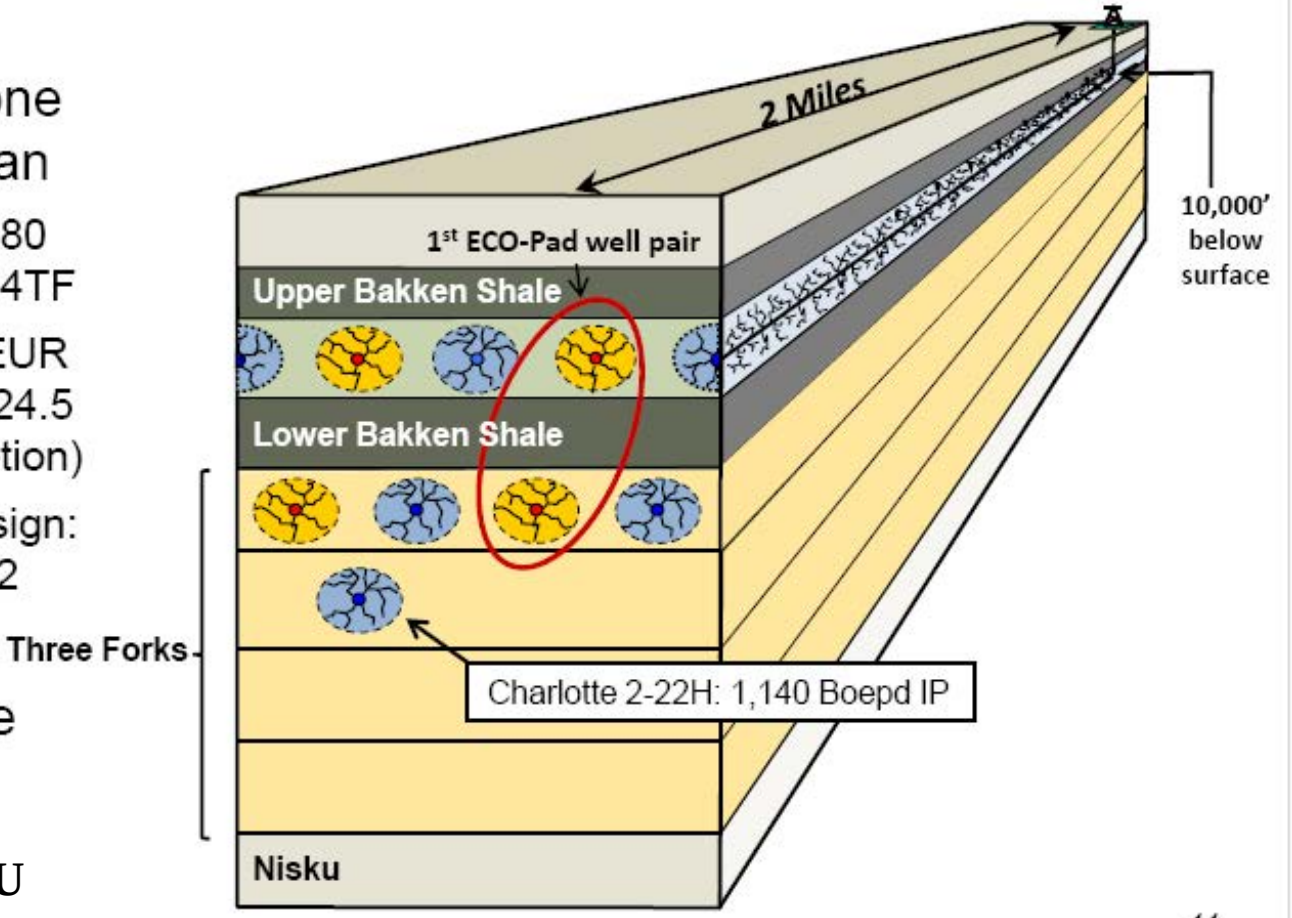
Image USDA Farm Service Agency
Google ea
Imagery Date: 12/31/2009
47°54'08.12" N 102°34'47.48" W elev 1962 ft
Eye alt 10.51

Bakken Development Plan

- Original dual-zone development plan
  - 8 wells per 1,280 acres – 4 MB, 4TF
  - 603,000 Boe EUR per well (avg. 24.5 stages/completion)
  - ECO-Pad® design: 2 wells south, 2 wells north
- Additional Three Forks potential



Recent cases for 18 wells/SU

Six Wells on a Single Pad

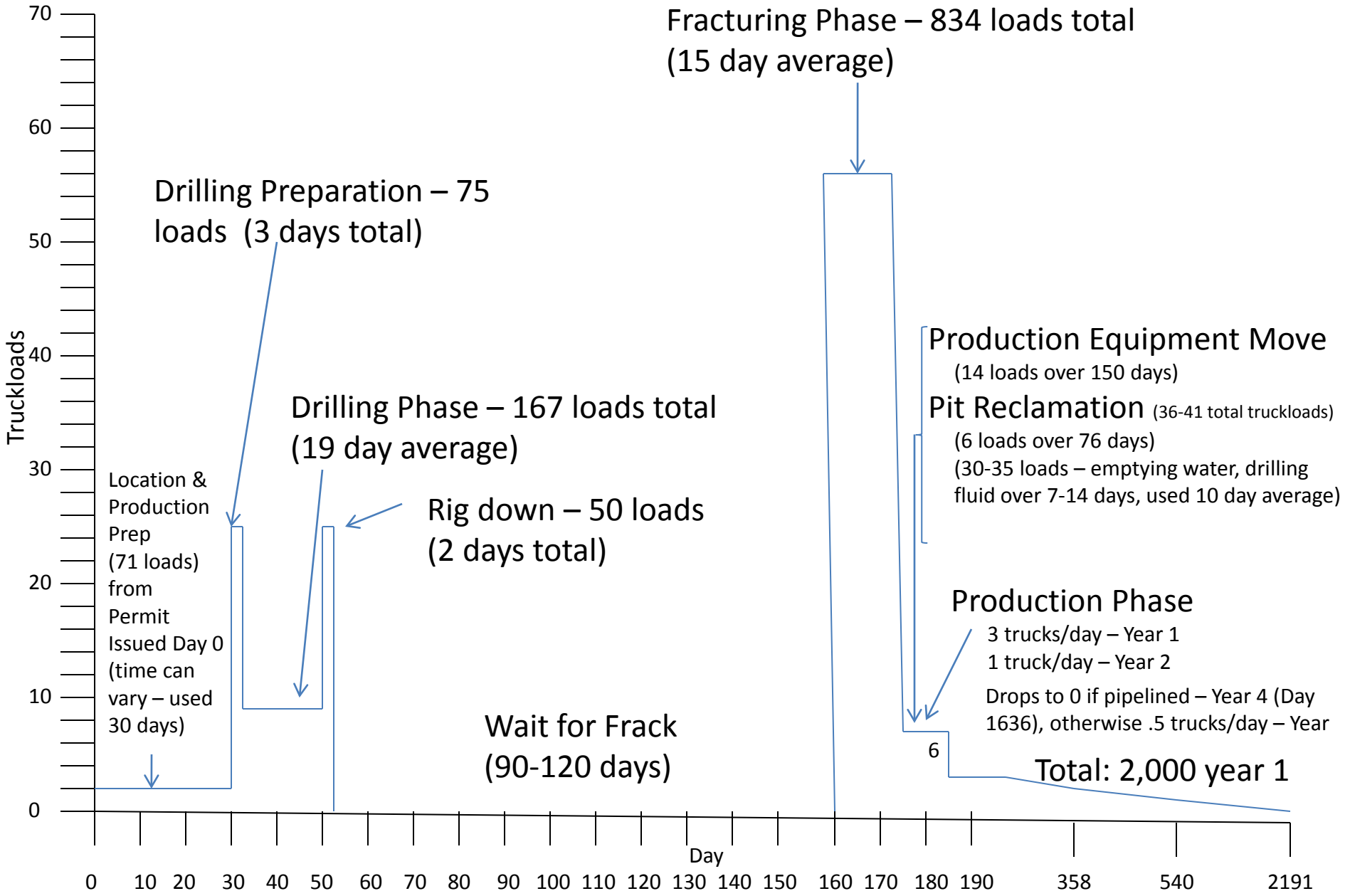
Vern Whitten Photography

Now drilling a 14 well pad and permitting some 18 well pads

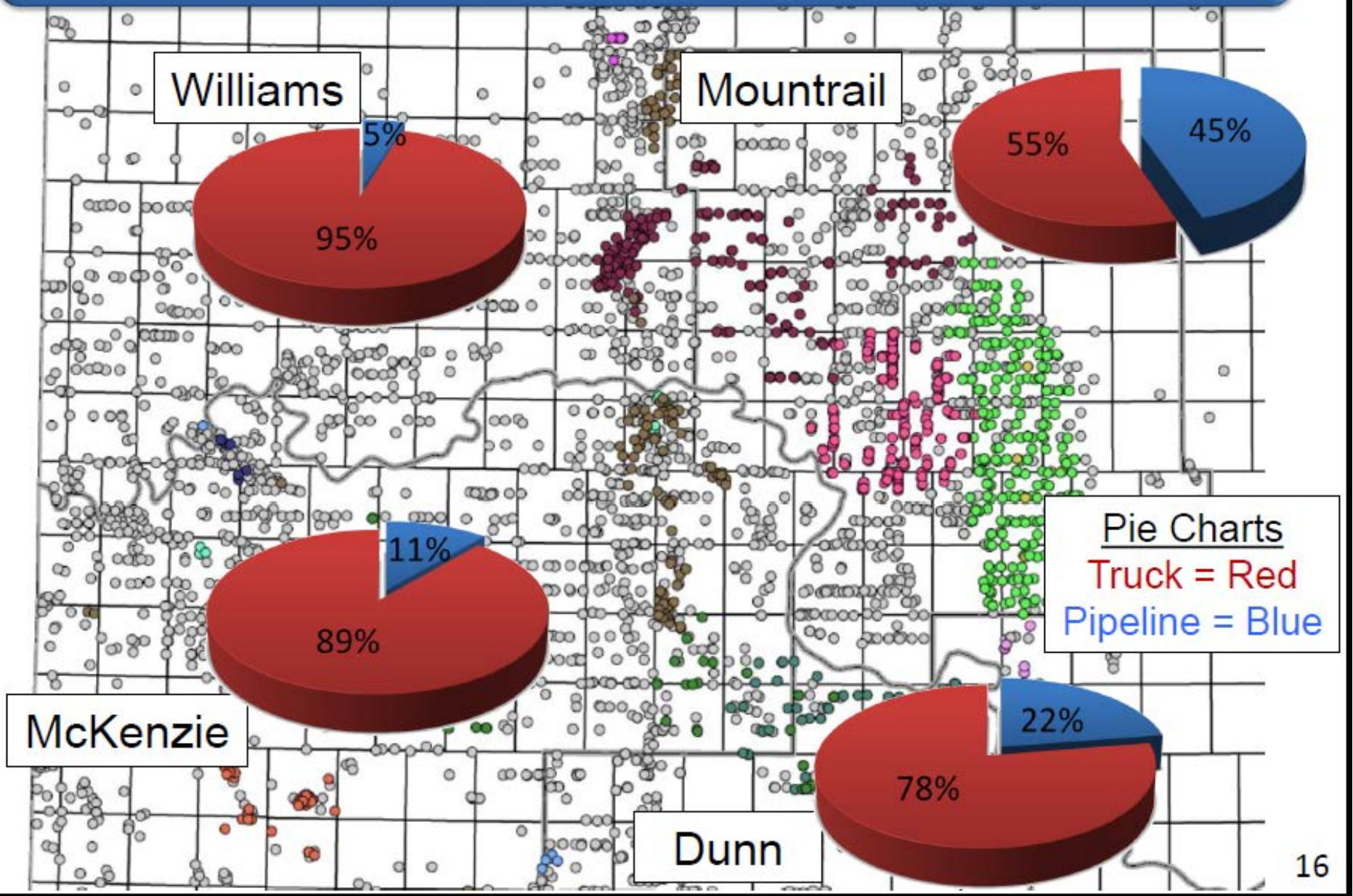
North Dakota Challenges

New Bakken Well – Truckload Timeline

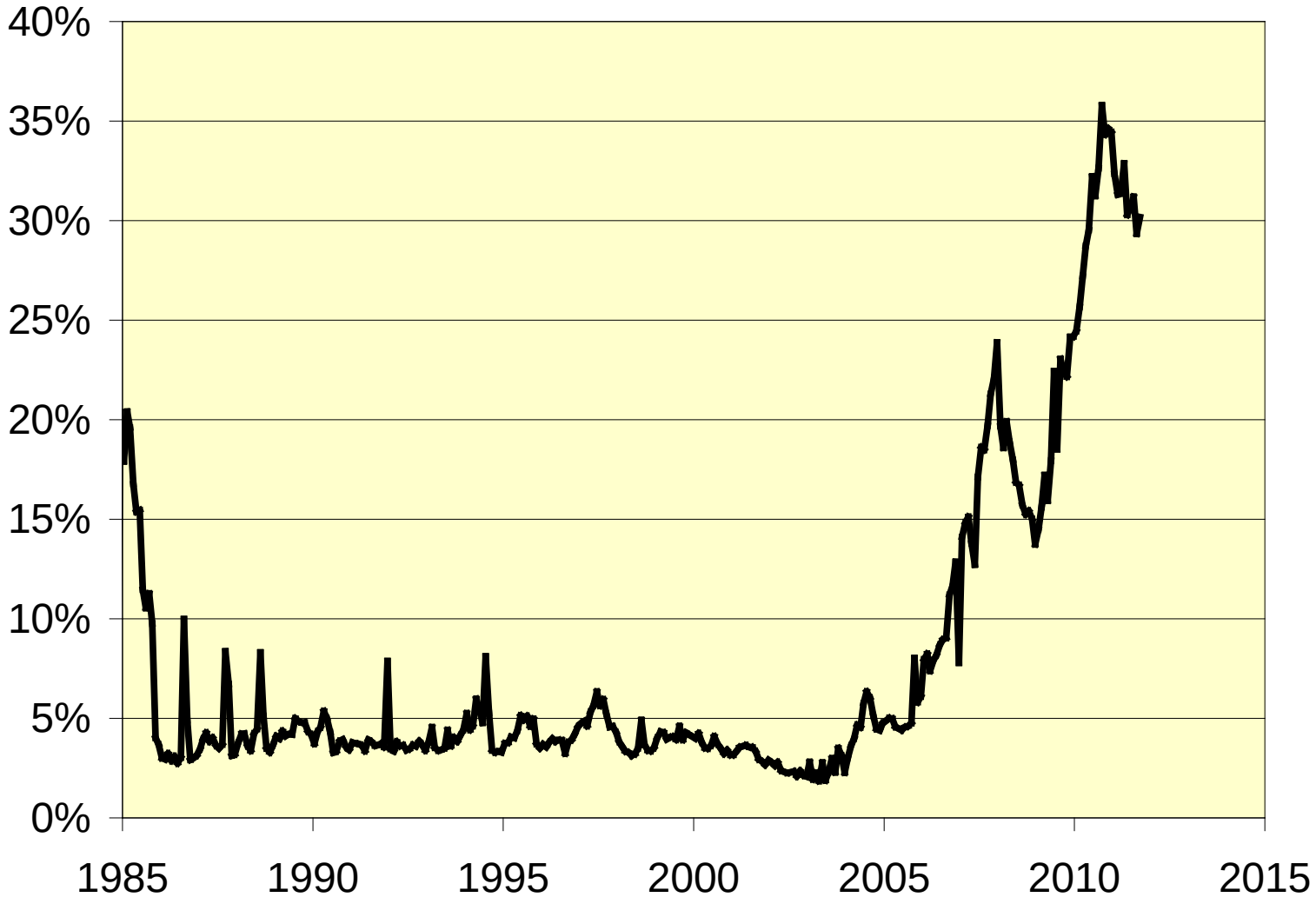
NDDOT
North Dakota
Department of Transportation



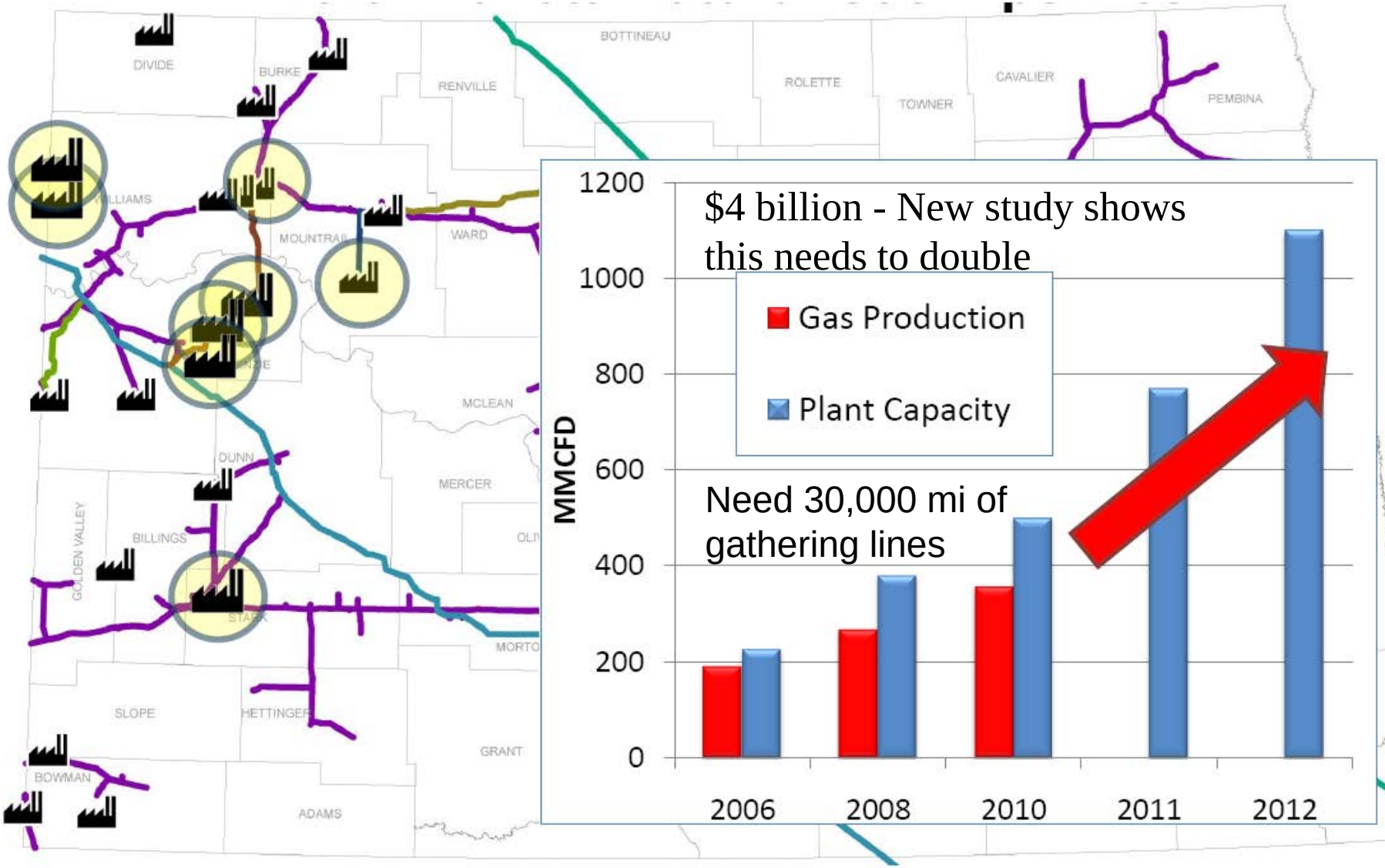
North Dakota Crude Gathering



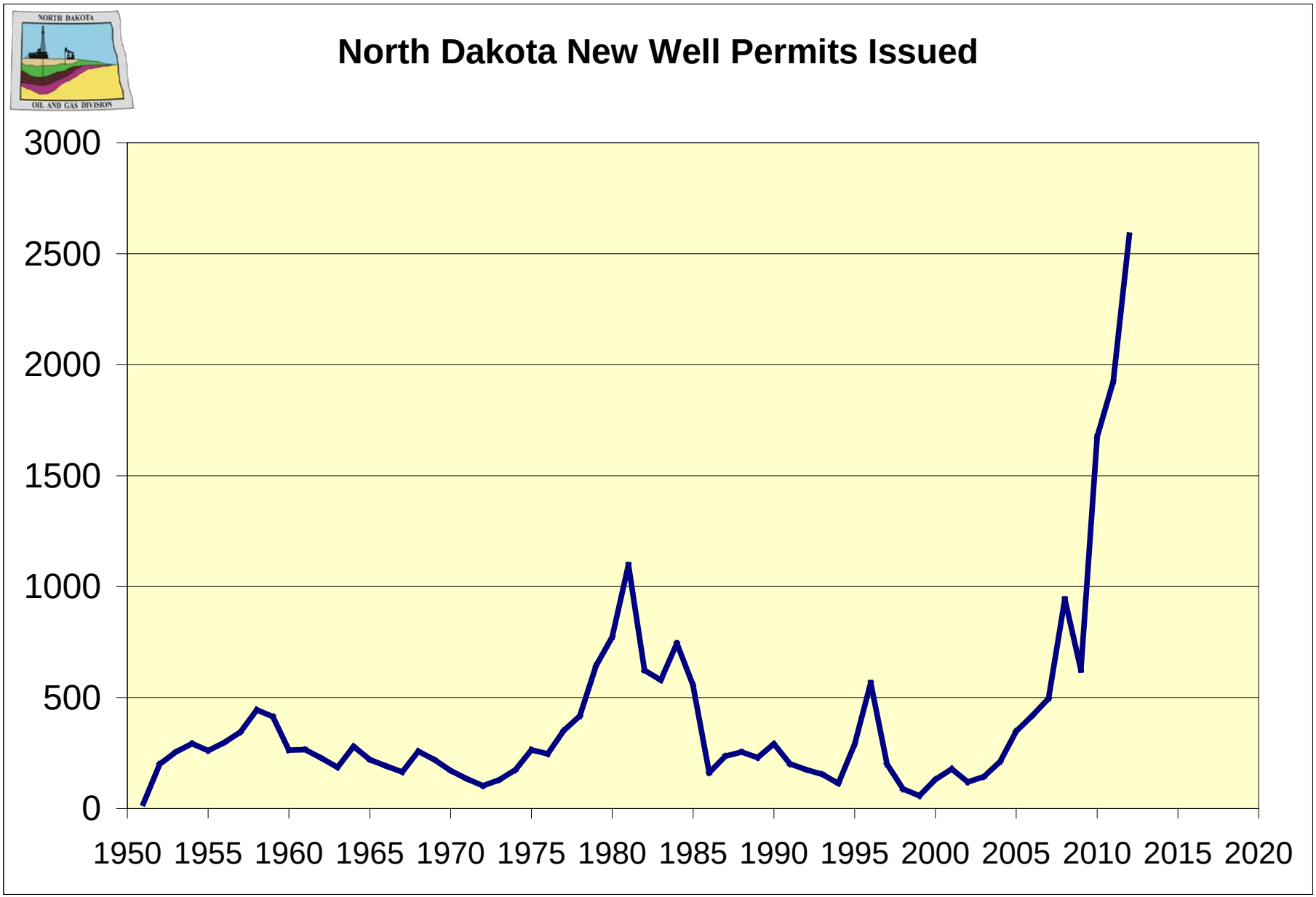
North Dakota Monthly Gas Flared



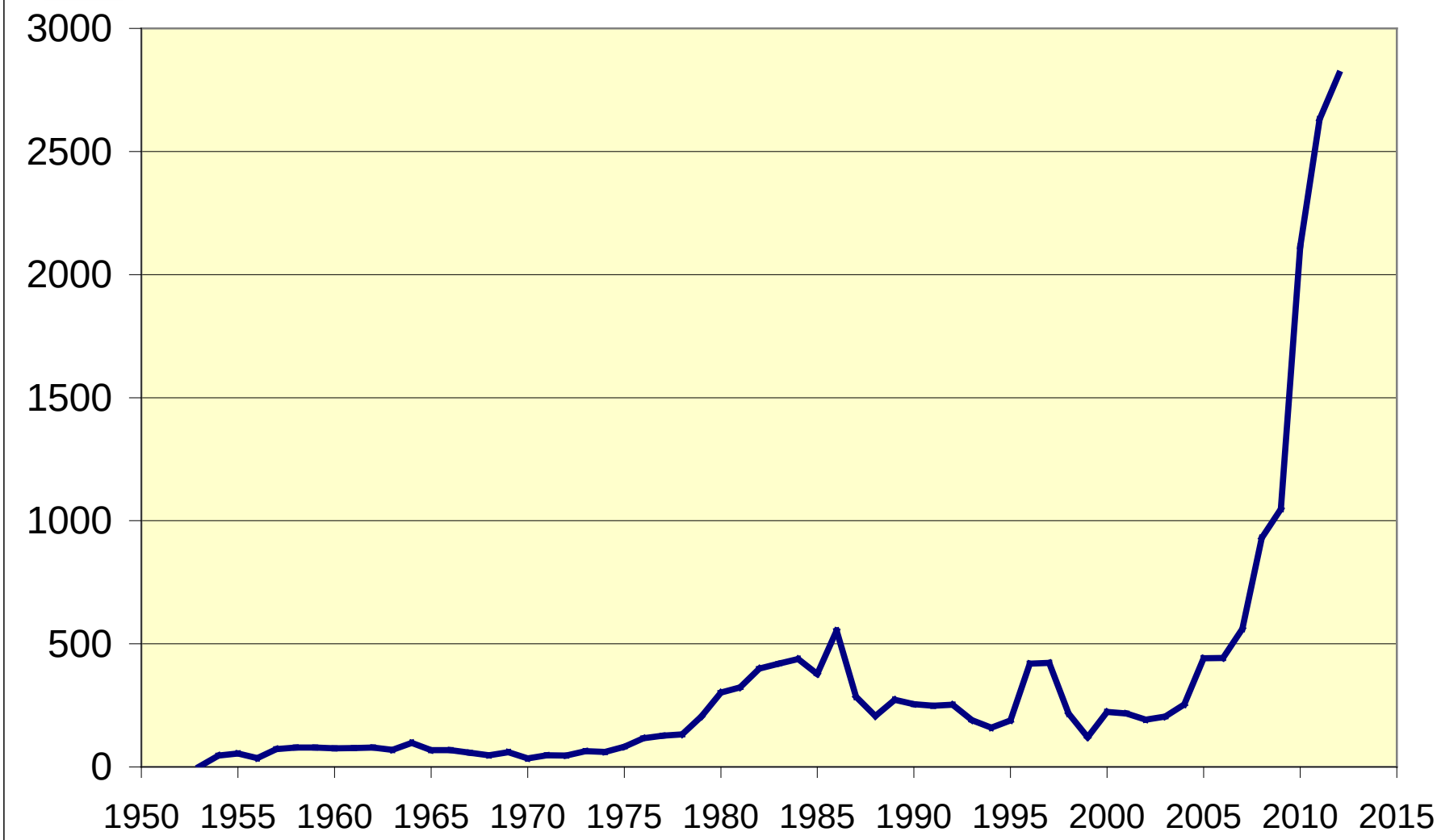
New or Expanding Gas Plants



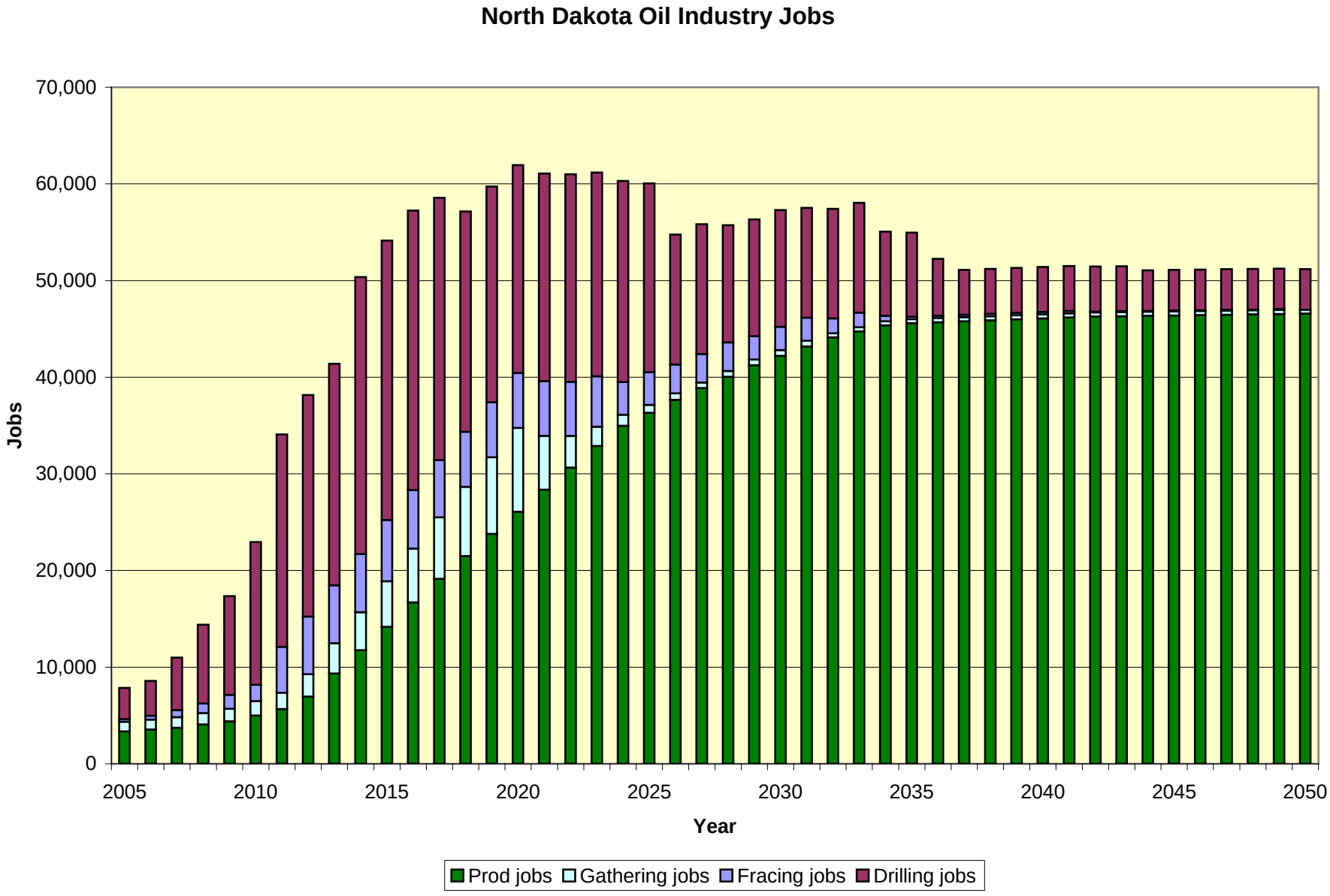
North Dakota New Well Permits Issued



North Dakota Industrial Commission Cases Heard



Expected Case



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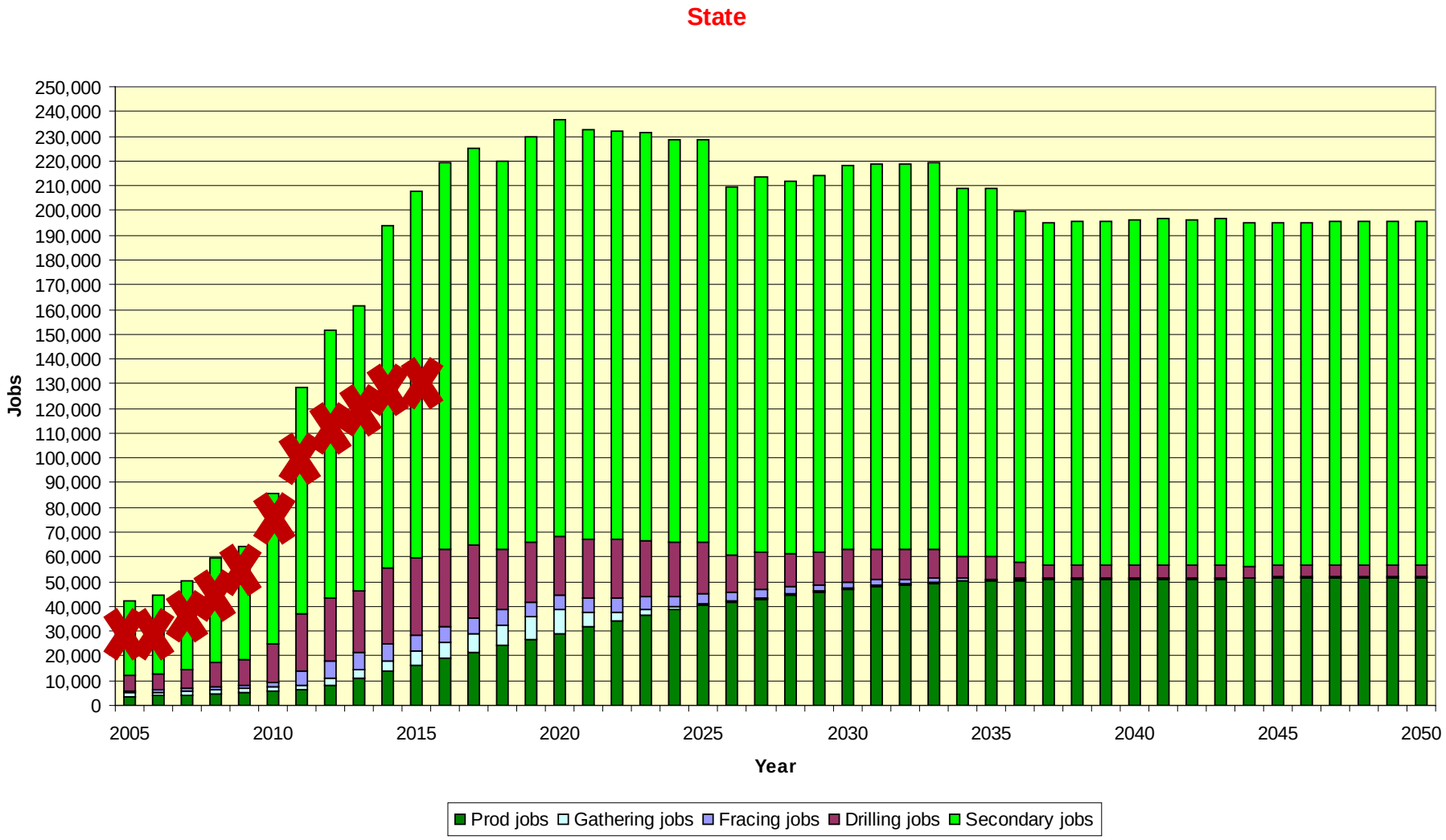
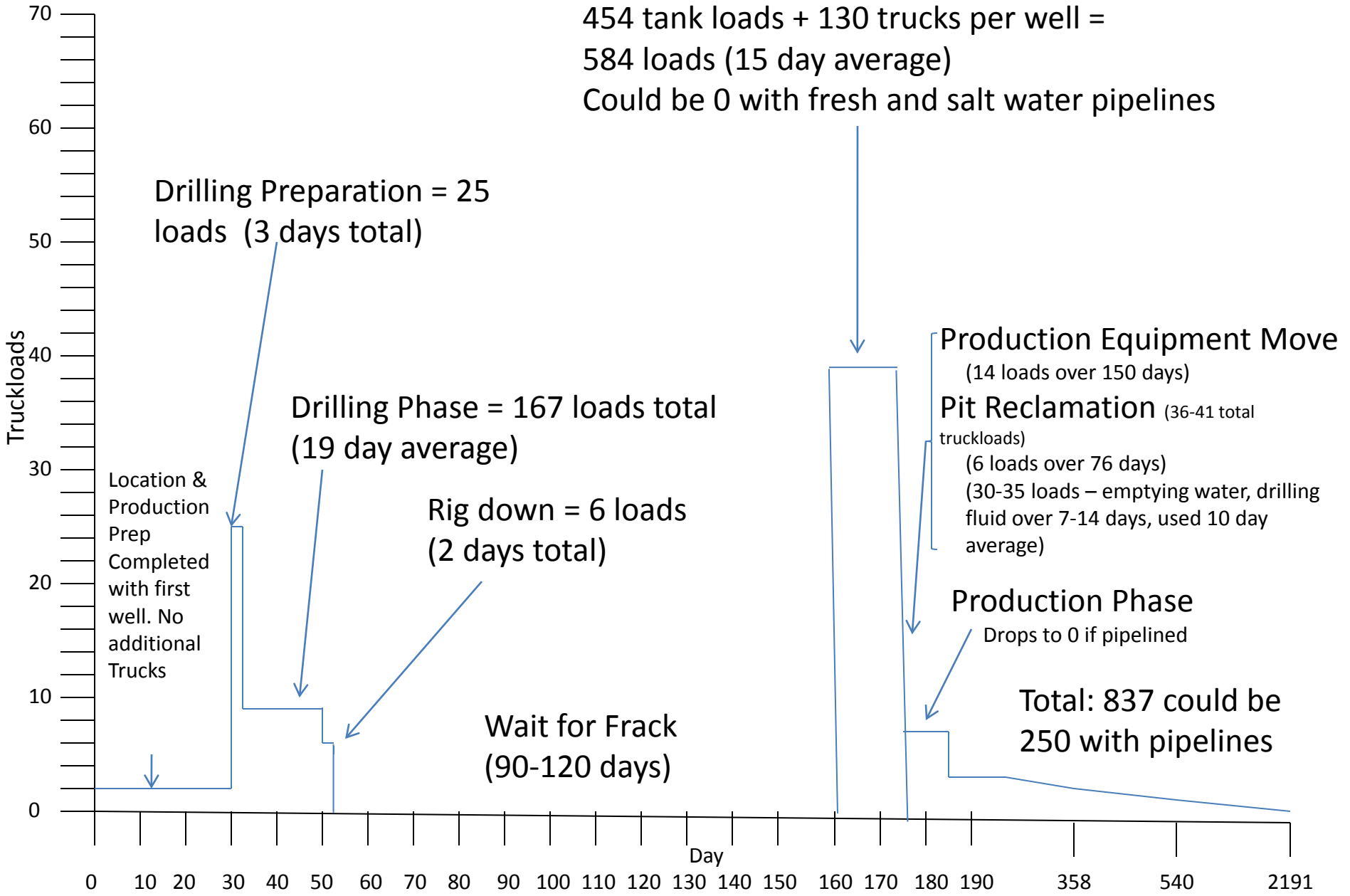


North Dakota Opportunities

Bakken Wells 2-4 – Truckload Timeline



PROPPANT PROJECT

2 millions tons/year

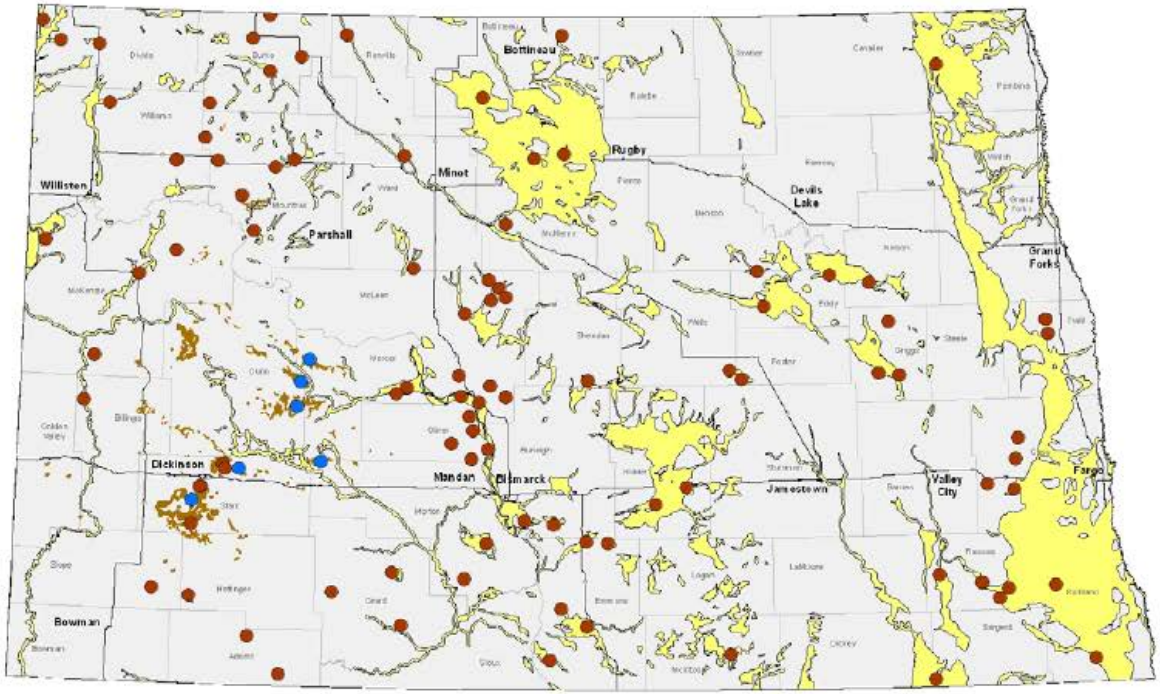
Photomicrograph of sand grains collected in McHenry County.

2 millions tons/year

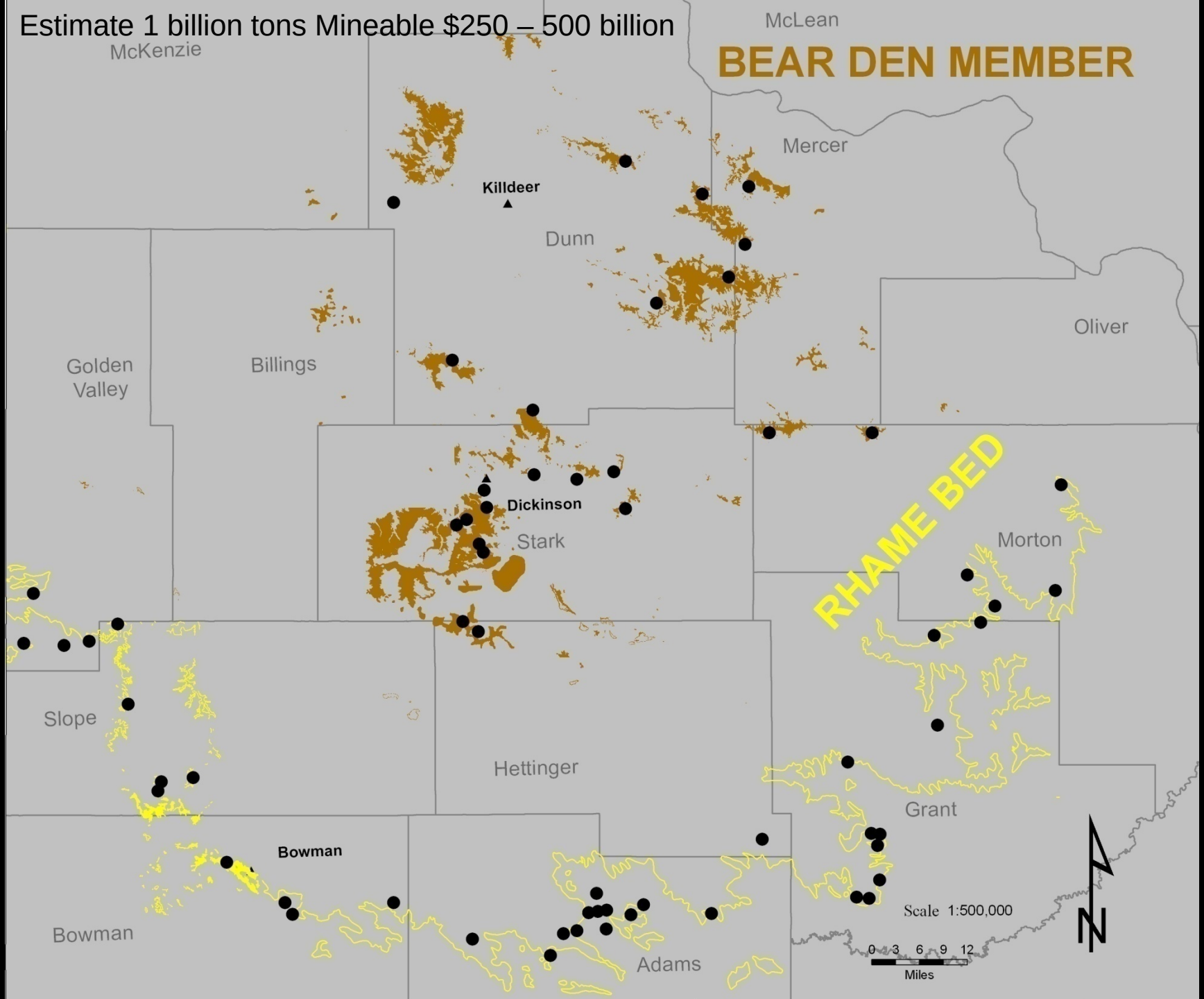
Photomicrograph of ceramic proppant from a batch that was used in a Bakken well in North Dakota. This proppant was manufactured in China.

Millions of tons of sand and ceramic proppants are used every year in the Williston Basin, part of a multi-billion dollar industry. The Geological Survey has collected 125 sand samples throughout the state in our search for deposits that could be utilized for oil and gas proppants in the well fracing process. We are in the process of performing preliminary analysis on those samples to determine if any would fit the proppant criteria. We have also collected clay samples and will be testing those samples for their kaolin content to determine their suitability in the manufacturing of ceramic proppants.

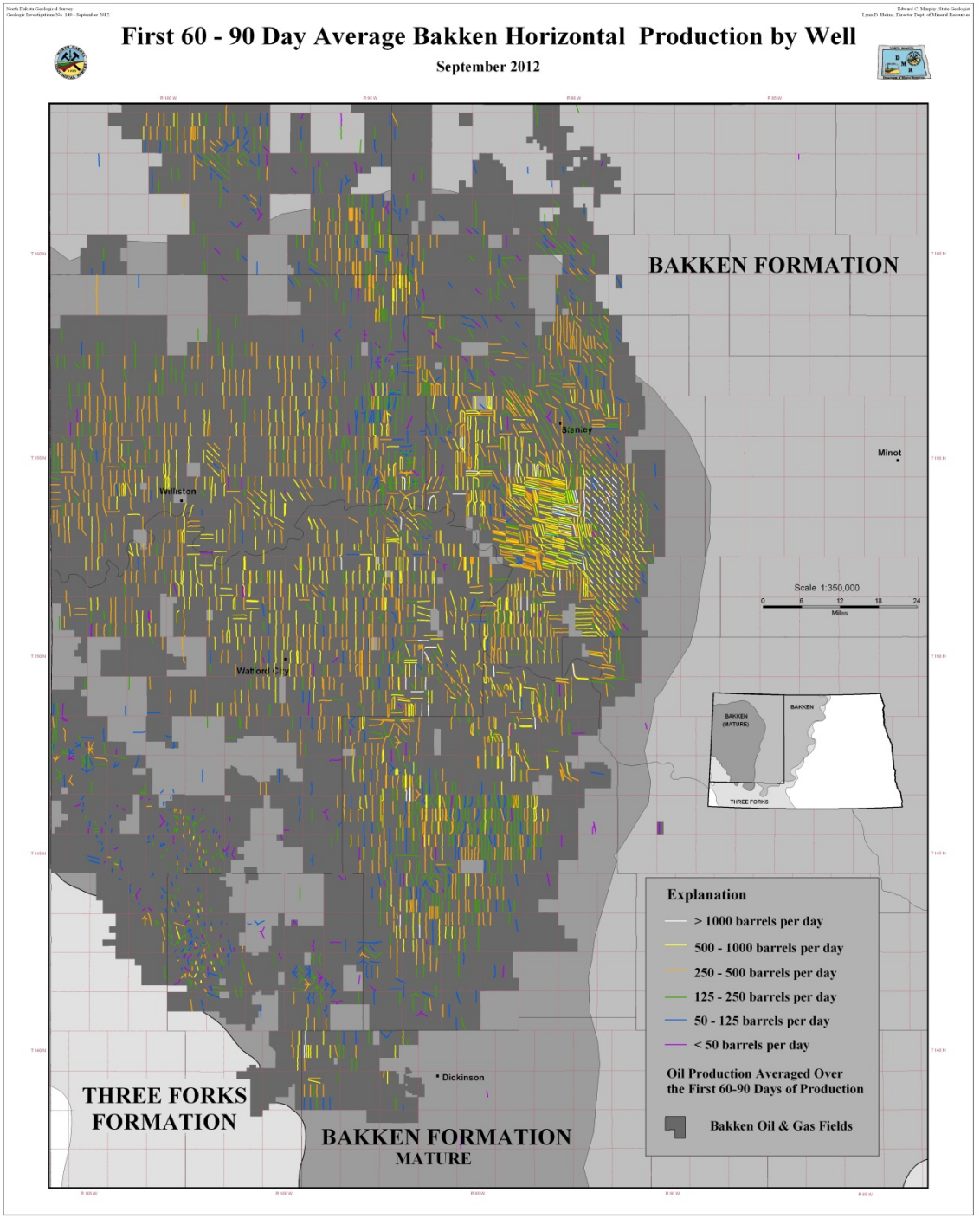
Under the second phase of this project, the ten most promising sand samples will undergo full ISO analysis (including bulk density, specific gravity, crush resistance, etc), mineralogy (XRD), and stack conductivity analysis to determine which are the most suitable proppant candidates and we will continue to evaluate the clay beds.

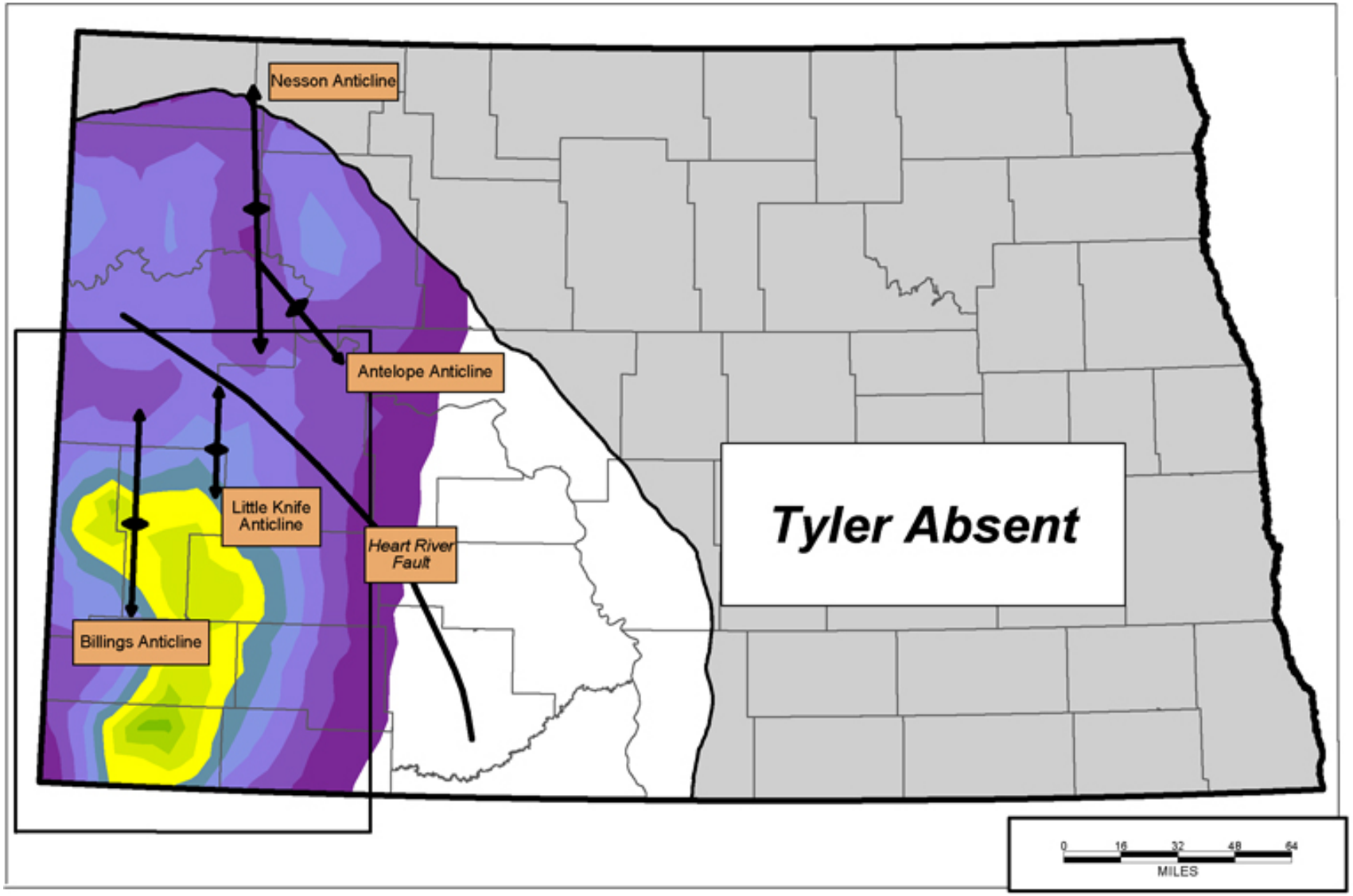


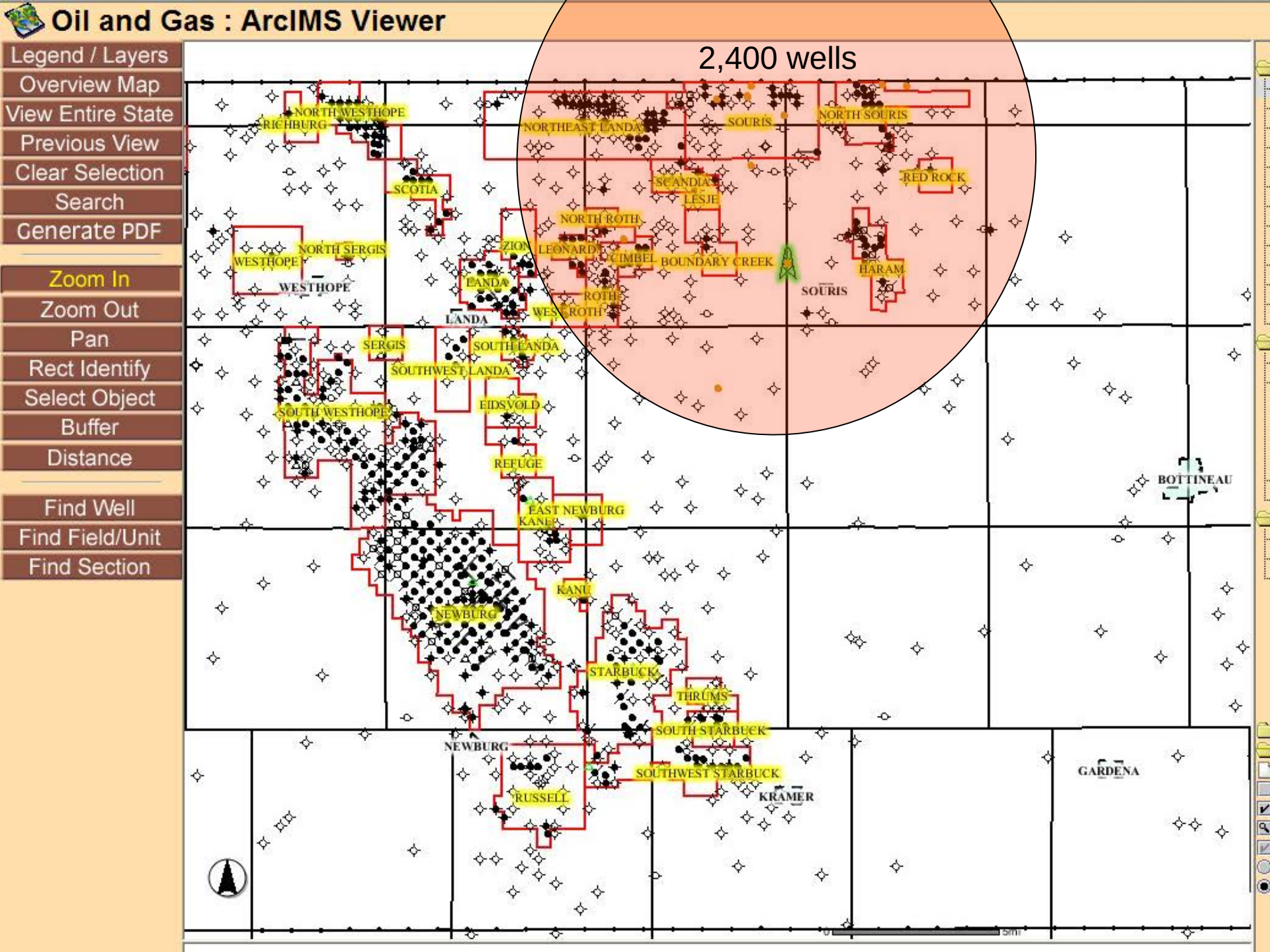
Locations of sand samples (red dots) and clay samples (blue dots) collected during this study. The areas in yellow are known sand deposits and the areas in brown are kaolinitic claystones within the Golden Valley Formation.


Estimate 1 billion tons Mineable $250 – 500 billion
McLean
BEAR DEN MEMBER
McKenzie
Mercer
Killdeer
Dunn
Oliver
Golden Valley
Billings
Dickinson
Stark
RHAME BED
Morton
Slope
Hettinger
Grant
Bowman
Bowman
Adams
Scale 1:500,000
0 3 6 9 12
Miles
N

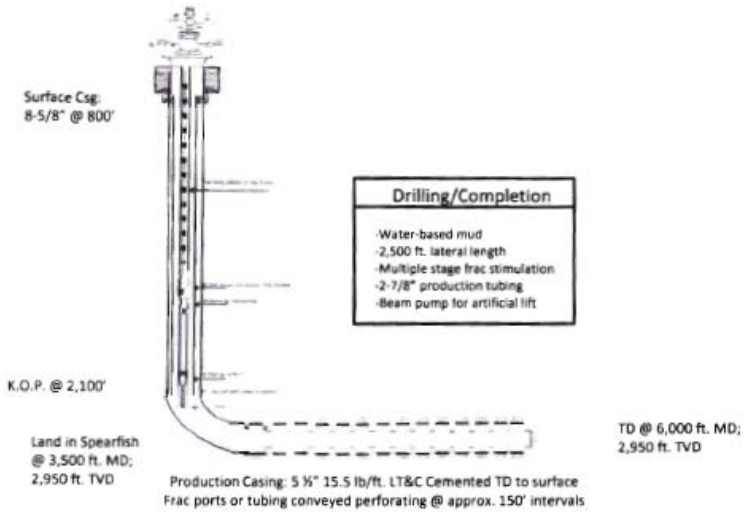
Development area
> 15,000 sq mi
Size of West Virginia

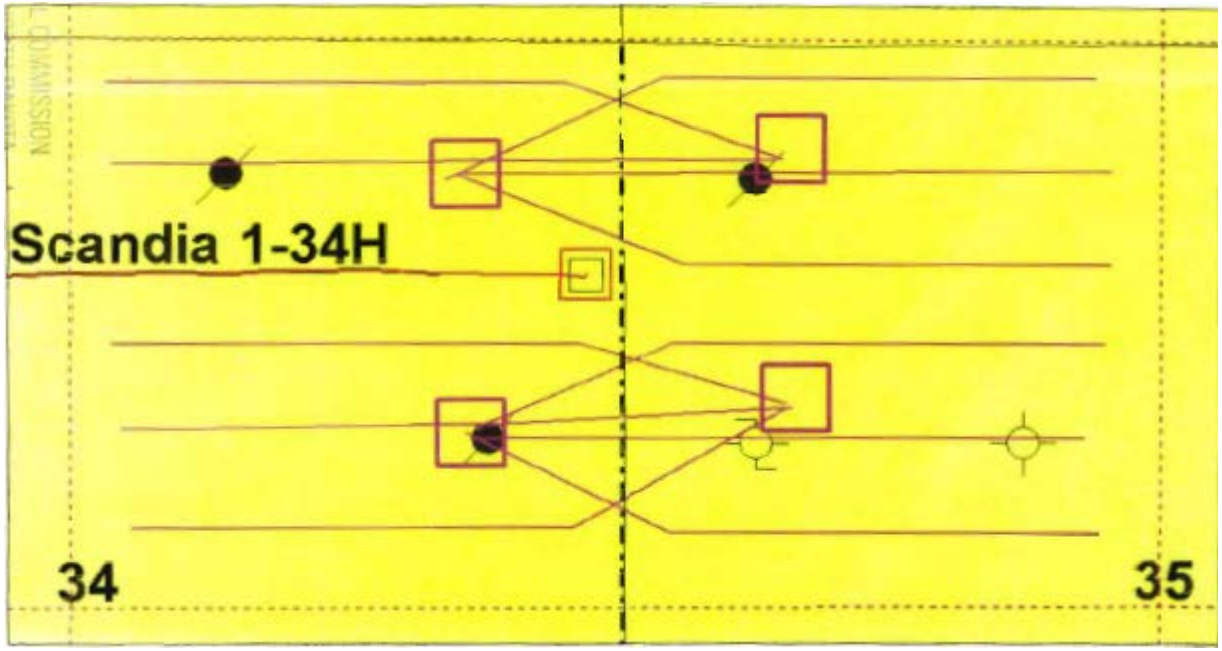



Nesson Anticline
Antelope Anticline
Little Knife Anticline
Heart River Fault
Billings Anticline
Tyler Absent
0
16
32
48
64
MILES


Oil and Gas : ArcIMS Viewer
Legend / Layers
Overview Map
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
2,400 wells
NORTH WESTHOPE
RICHBURG
SCOTIA
NORTH SERGIS
WESTHOPE
WESTHOPE
LANDA
SERGIS
SOUTH LANDA
SOUTHWEST LANDA
SOUTH WESTHOPE
EIDSVOLD
REFUGE
EAST NEWBURG
KANE
KANU
NEWBURG
NEWBURG
STARBUCK
THRUMS
SOUTH STARBUCK
SOUTHWEST STARBUCK
KRAMER
RUSSELL
GARDENA
BOTTINEAU
NORTHEAST LANDA
SOURIS
NORTH SOURIS
RED ROCK
SCANDIA
LESJE
NORTH ROTH
ZION
LEONARD
CIMBEL
BOUNDARY CREEK
HARAM
SOURIS
ROTH
WEST ROTH

Proposed Spearfish Horizontal Wellbore Diagram
Souris Spearfish/Madison Pool

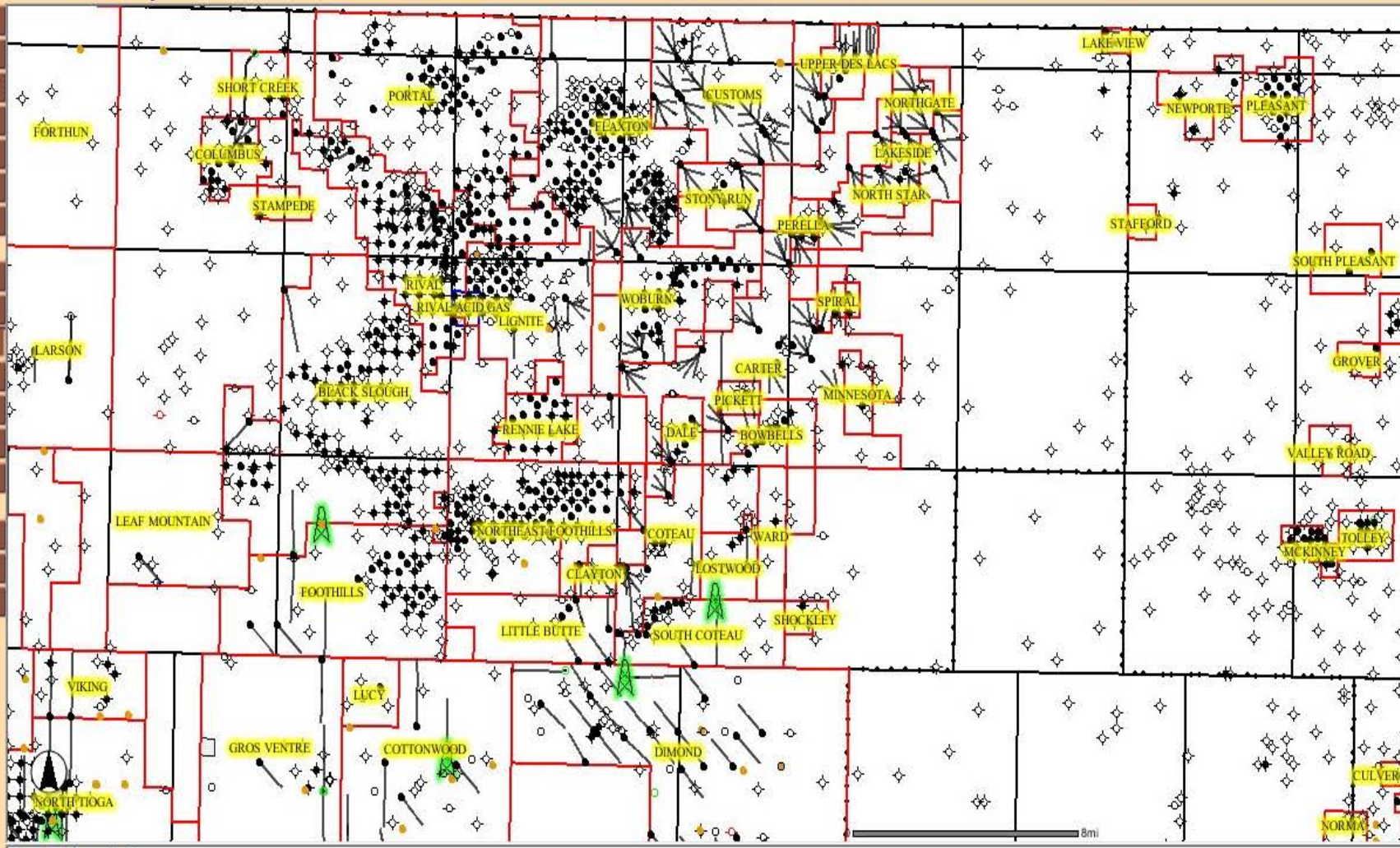




https://www.dmr.nd.gov/ - Oil and Gas Subscription: ArcIMS Viewer - Windows Internet Explorer

Oil and Gas Subscription: ArcIMS Viewer

- Legend / Layers
- Overview Map
- 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



County Boundaries
Selection cleared.

Pan

WELLBORE DIAGRAM

Cornerstone Natural Resources LLC

Date: 5/3/2012

Well Name: Ormiston #1

NDIC# 16072

County: Burke | State: ND | Field: Carter | API# 33-013-01347

Surf Location: 650 FSL, 2472 FEL, SWSE Sec 23 T162N R90W | GL Elev: 1959 | RKB: 14'

BH Location: N Lat - 591.43 FNL, 1177.82 FEL, NENE Sec 23 T162N R90W | TVD: 5,890 | PBTD: 6 1/8"OH MD: 10,860

BH Location: S Lat - 2338.07 FNL, 908.83 FEL, NESE Sec 26 T162N R90W | TVD: 6,035 | PBTD: 6 1/8"OH MD: 10,040

Original Spud Date: 1/18/2006 | Completed Pool: Nesson/Midale

CASE # 18033

EXHIBIT E2

E/2 Sec's 23 & 26 T162N R90W

BURKE COUNTY, ND

By: MILLER June 2012

Depth	Csg Details	Hole Size
?	Conductor	
1,290'	9-5/8" 32.3# H-40 LTC 470 sks Cmt cmt to surface	13.5"

Producing Oil Well
(current)

Additional 7" casing detail
7" 23# J-55 LTC surface to 5020 ft
7" 29 P-110 LTC 5020 ft to 6168 ft

5,485' KOP

Tubing Details: Run Date: 4/25/2012

Description	Qty	Length	Depth
KB			14
2-7/8", 6.5# L80 EUE	168	5,455.63	5,470
Mechanical SN	1	0.80	5,470
7" x 2 7/8" TAC	1	2.40	5,473
2-7/8" x 6 ft sub	1	6.10	5,479
4 1/2" gas anchor, XO, swage	1	49.30	5,528
	0	0.00	5,528
	0	0.00	5,528
End of Tubing			5,528

Rod Details: Run Date: 4/28/2012

Description	Size	Qty	Length	Depth
Polished	1-1/2"	1	30.0	14
Pony	0.75	1	2.0	16
Pony	0.75	1	2.0	18
Pony	0.75	1	6.0	24
S-88 Rods	1.00	0	0.0	24
S-87 Rods	7/8"	0	0.0	24
S-87 Rods	3/4"	206	5,150.0	5,174
Weight Bar	1.50	10	276.0	5,450
Insert Pump	2	1	26.0	5,476
Pump Depth				5,476

Pump Description:
2-1/2" x 2" x 26'

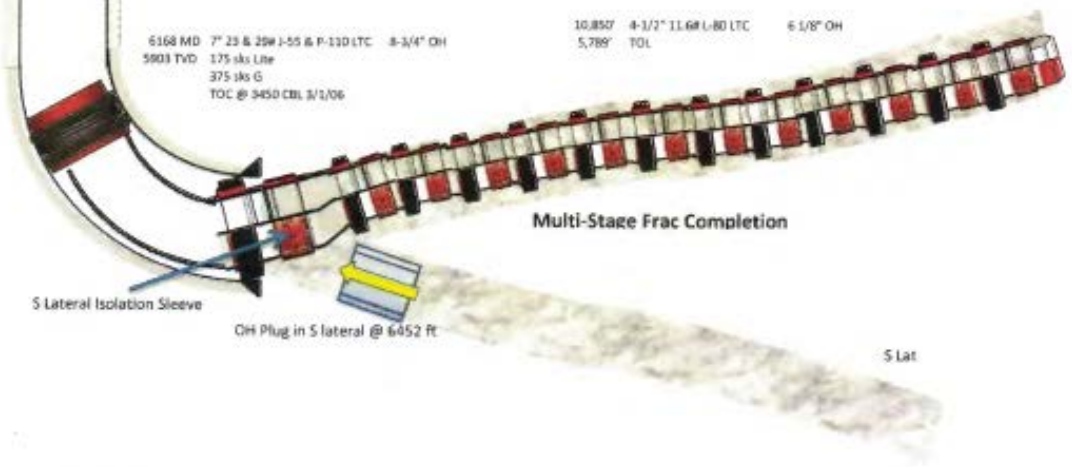
Lateral	KOP	Lateral
N Lat	5,485	6,168 to 10,860 ft OH
S Lat	6,204	6,168 to 10,040 ft OH
		CIBP @ 6452 in S Lat

Liner / Completion Details:
4-1/2" 11.6# L-80
15 ft PBR
13 stg-swell pkrs & slvs
see Northern States schematic for details

Pumpjack Unit:
456-305-168 (HUA YOU YI JI)

6168 MD 7" 23 & 29# J-55 & P-110 LTC 8-3/4" OH
5903 TVD 175 sks Lite
375 sks G
TOC @ 3450 CBL 3/1/06

10,857 4-1/2" 11.6# L-80 LTC 6 1/8" OH
5,789' TOL



INDUSTRIAL COMMISSION
STATE OF NORTH DAKOTA
DATE 6-7-12 CASE NO. 18033
Introduced By Cornerstone
Exhibit E2
Identified By Miller

Estimate 20-50 billion tons of ND Mineable Reserves

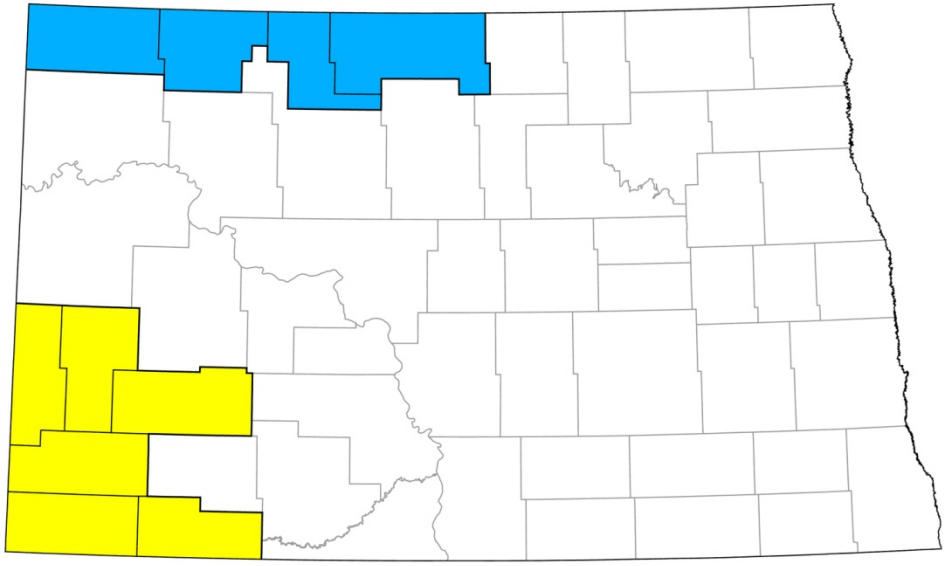
$6 trillion -15 trillion

Potash core from a depth of 9,000 feet in Burke County.

We have received a number of enquires from the mineral industry in the past 18 months as the price increased for a variety of elements and minerals. Chief among these enquiries has been uranium and potash. Uranium was mined in North Dakota in the 1960s. It was heavily explored for in the 1970s, but has been of little interest for the last 30 years until the price for uranium oxide reached an all time high in June of 2007. Companies have also expressed interest in associated elements molybdenum and germanium. If a company submits a permit to do in situ leach uranium mining, we will need a geologist dedicated full-time to that project. We are aware of three companies that are contemplating mining uranium in southwestern North Dakota.

Potash or potassium salts are primarily used in the production of fertilizer. Potash exploration took place in northwest North Dakota in the 1970s. Since the beginning of 2007, the price of potash has risen from $190 to $1,050 per ton based on a low supply and increasing demand. Due to the increased workload, we will need a geologist to oversee potash exploration and production if we receive a permit from either of the two companies that we know are actively pursuing potash exploitation.

Formation Resources drilling for uranium, 1/10/2013, and germanium under a subsurface mineral permit in Billings County during the fall of 2008.



Counties that contain uranium deposits are in yellow and those that contain the shallowest potash deposits are in blue.

Colorado study shows Mineral Industries >> Government & Recreation

Industry	Jobs Multiplier	Earnings Multiplier
Information	**4.25**	**2.73**
Utilities	**3.82**	**2.24**
Mining	**3.44**	**2.08**
Manufacturing	**3.32**	**2.85**
Management of Companies	**2.70**	**1.64**
Real Estate, Rental & Leasing	**2.42**	**3.27**
Finance	**2.30**	**1.93**
Wholesale trade	2.17	1.69
Professional & Technical Services	1.95	1.58
Construction	1.81	1.57
Government	1.79	1.63
Transportation and Warehousing	1.73	1.65
Health Care & Social Assistance	1.61	1.53
Other Services	1.50	1.66
Administrative & Waste Services	1.48	1.63
Education	1.41	1.59
Retail	1.41	1.66
Arts, Entertainment & Recreation	1.37	1.61
Accomodation & Food Service	1.35	1.76