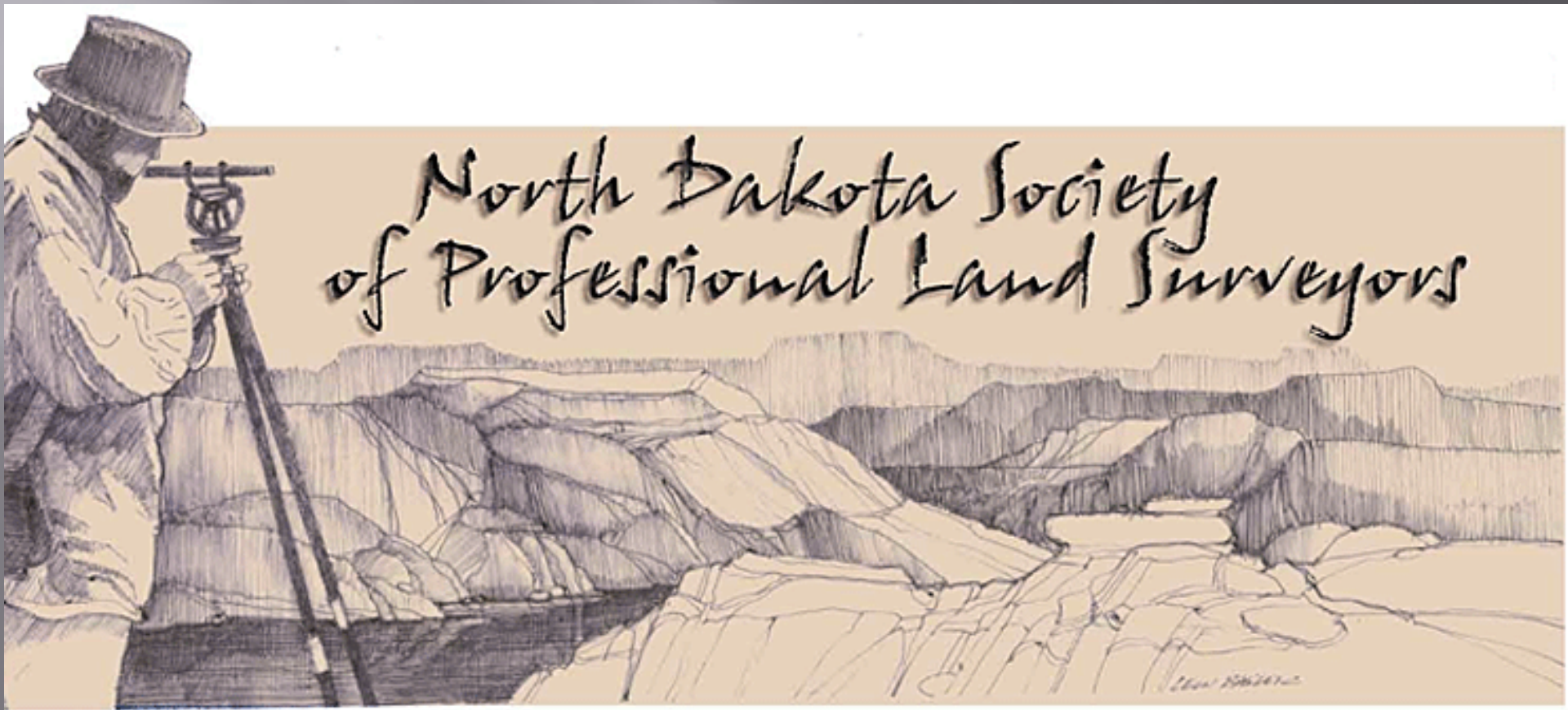
NDSPLS 33rd Annual Convention
February 8, 2012
Ramada Grand Dakota Lodge & Conference Center
Dickinson, ND



NORTH DAKOTA

*HORIZONTAL WELL BASICS
-STAGE FRACKING

*ACTIVITY

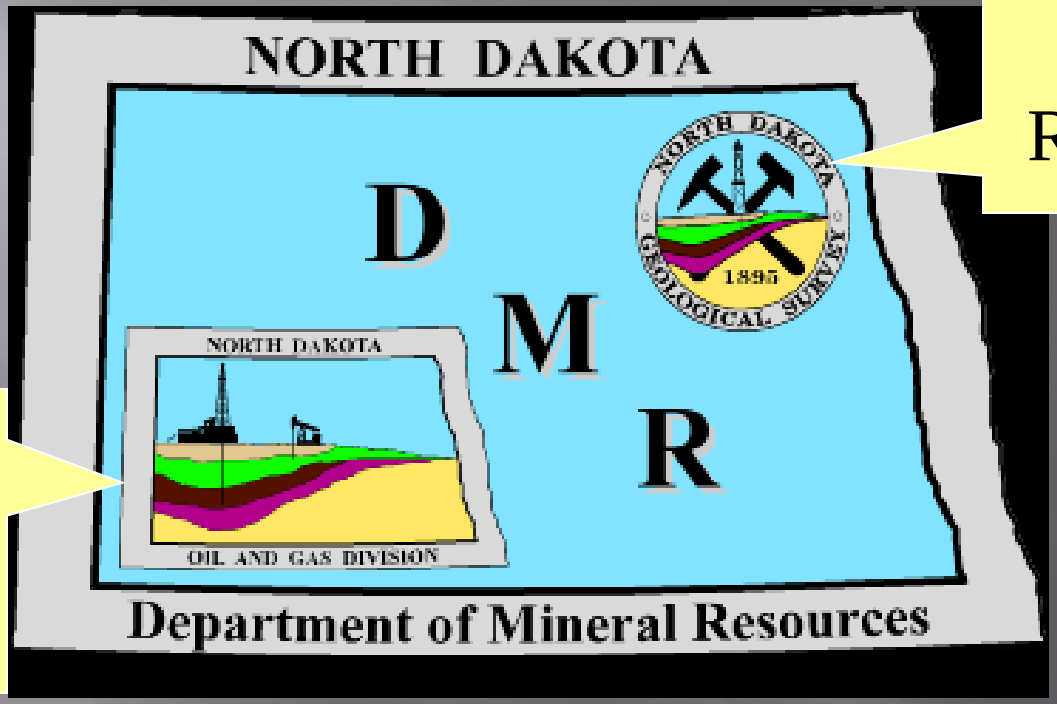
*NDIC PERMITTING PROCESS
-PLATS REQUIRED, RULES,
EXAMPLES & RIPARIAN ISSUES.

*DISTANCE RESTRICTIONS AND NOTICES

Todd L. Holweger
Permit Manager
NDIC-Oil & Gas Division

North Dakota Department of Mineral Resources

NDGS
Research Arm

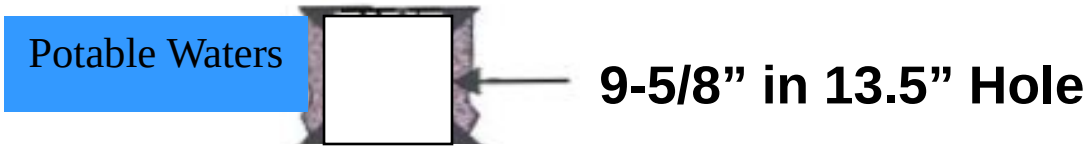


OGD
Regulatory
Arm

https://www.dmr.nd.gov/oilgas/ *https://www.dmr.nd.gov/ndgs/*

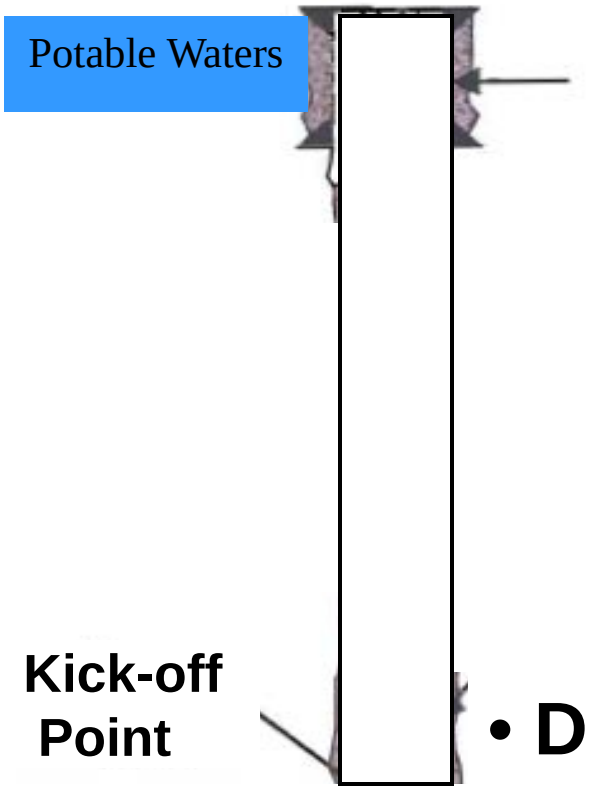
600 East Boulevard Ave. - Dept 405
Bismarck, ND 58505-0840
(701) 328-8020 *(701) 328-8000*

TYPICAL HORIZONTAL OIL WELL



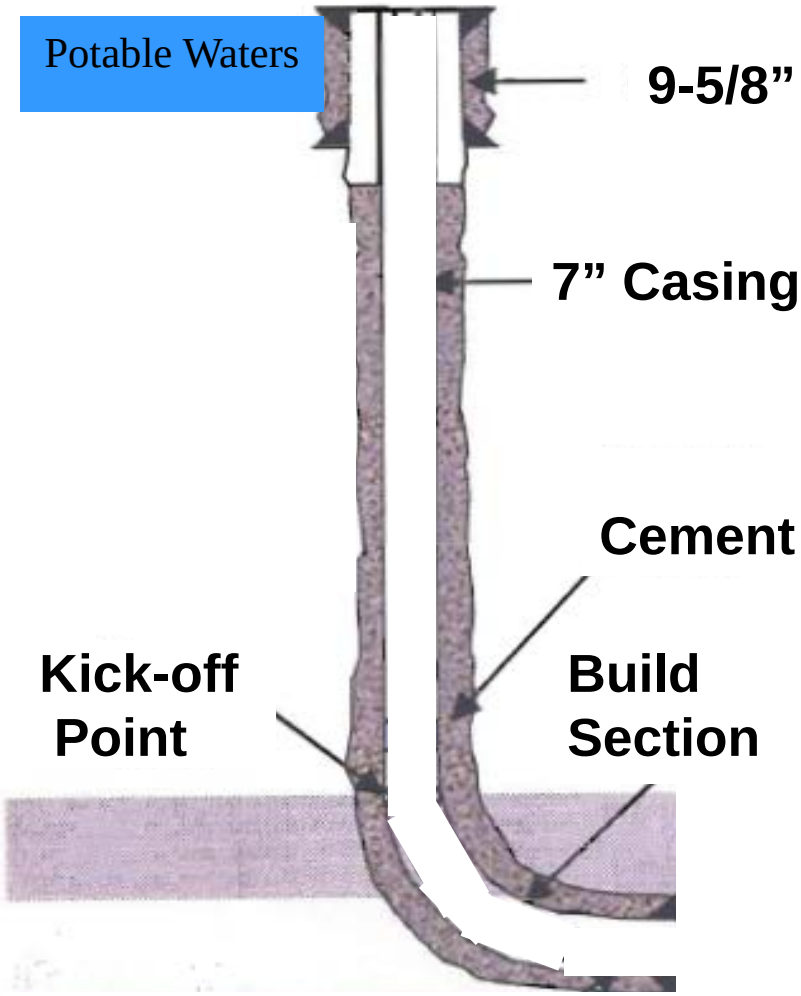
- Drill with fresh water
- Total depth below lowest potable water
- Run in hole with surface casing
  - 1st layer of surface water protection
- Cement casing back to surface of ground
  - 2nd layer of surface water protection

TYPICAL HORIZONTAL OIL WELL



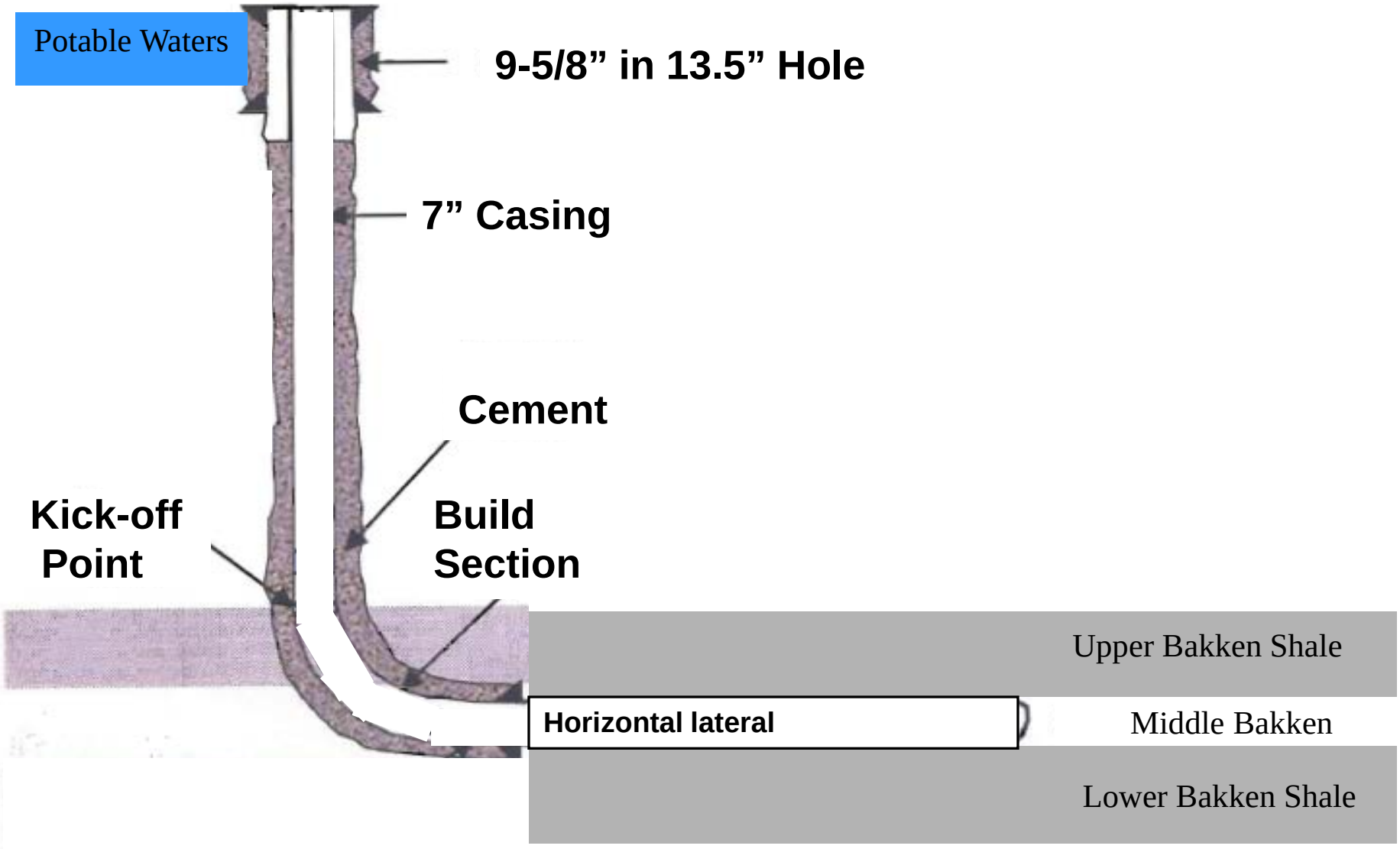
- Drill vertically to kick-off point
- Run in hole with bent assembly
- Downhole mud motor

TYPICAL HORIZONTAL OIL WELL

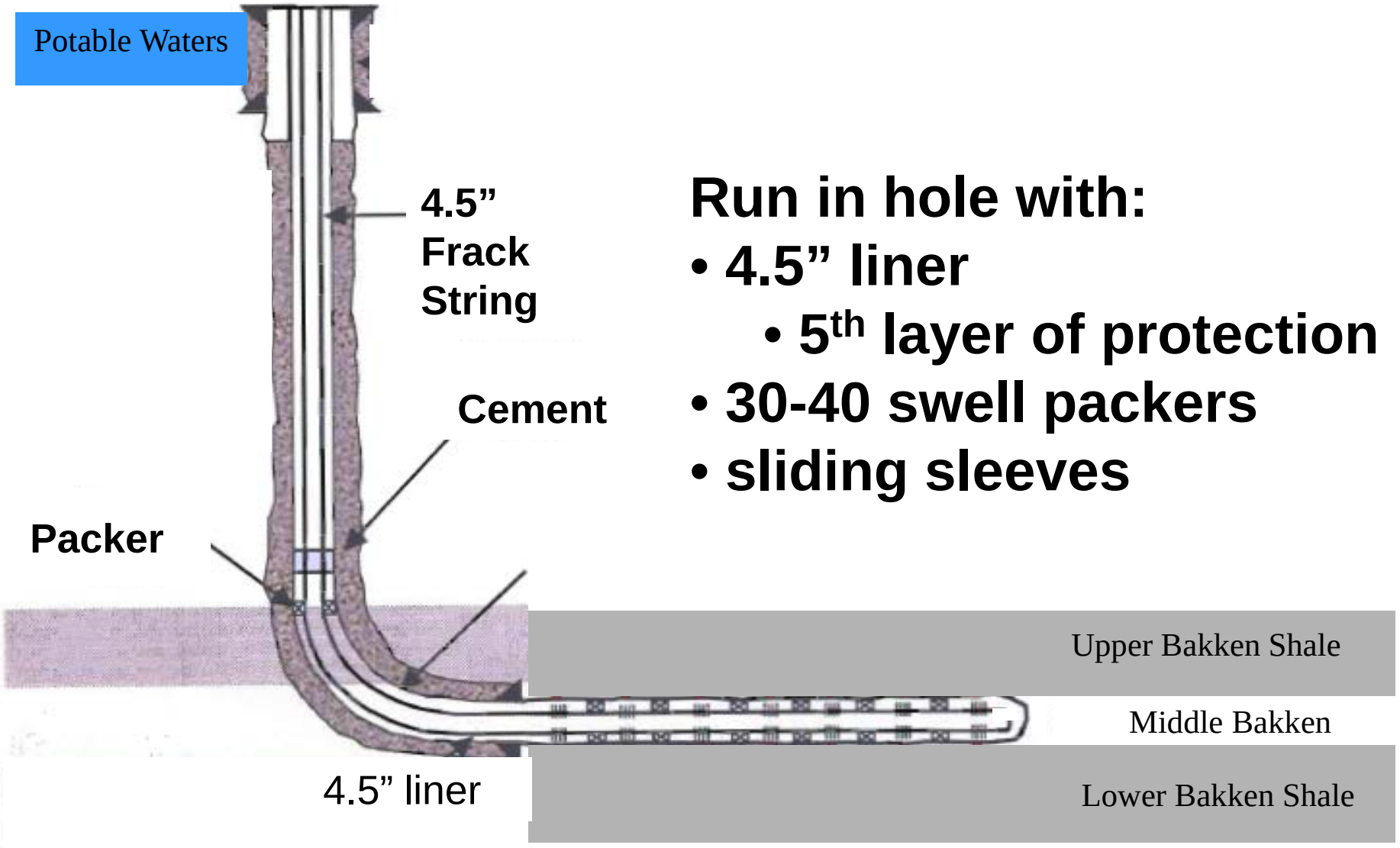


- Drill 8-3/4” hole to pay
- Run in hole with 7” casing
  - 3rd layer of protection
- Cement 7” casing
  - 4th layer of protection

TYPICAL HORIZONTAL OIL WELL



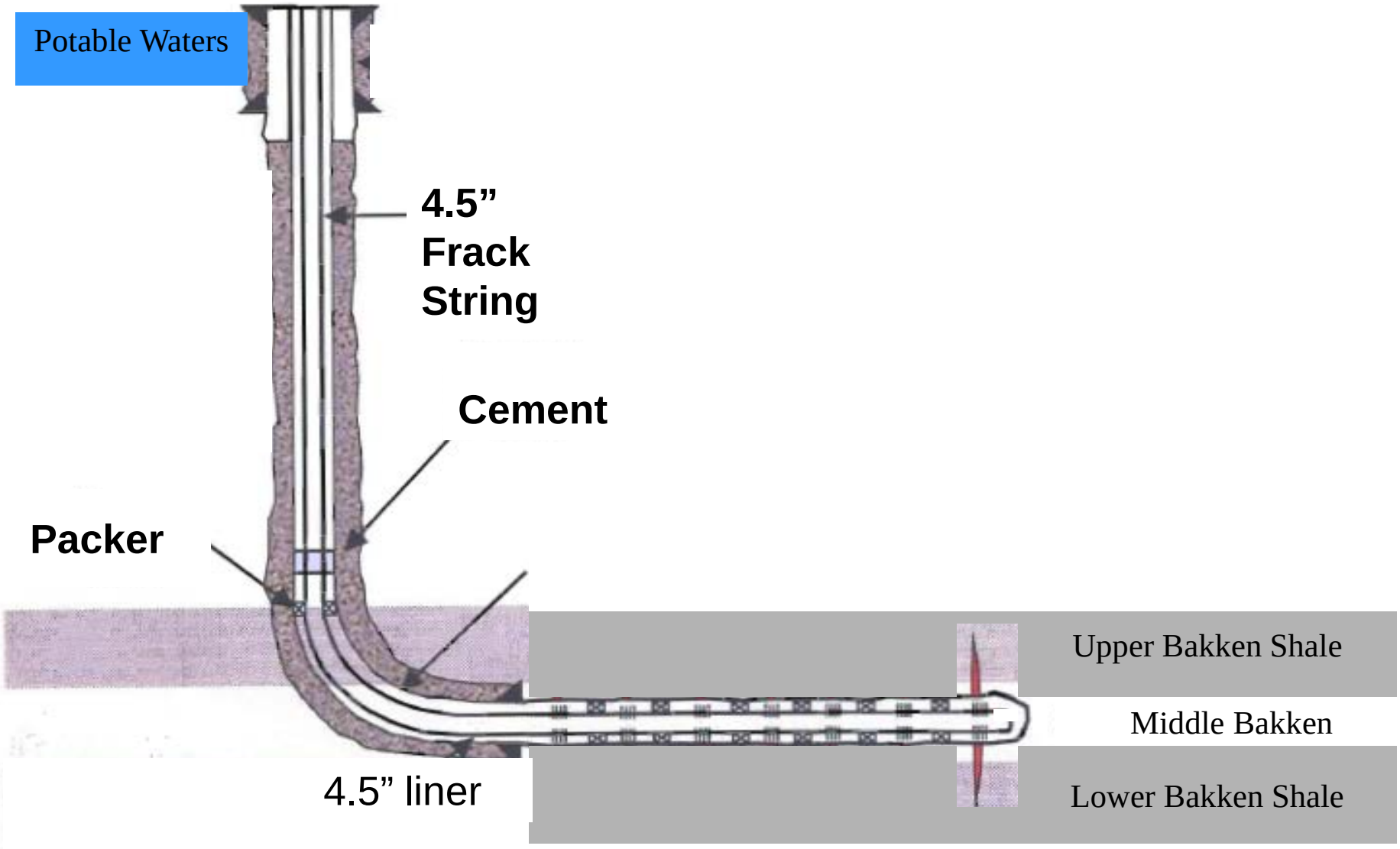
TYPICAL HORIZONTAL OIL WELL



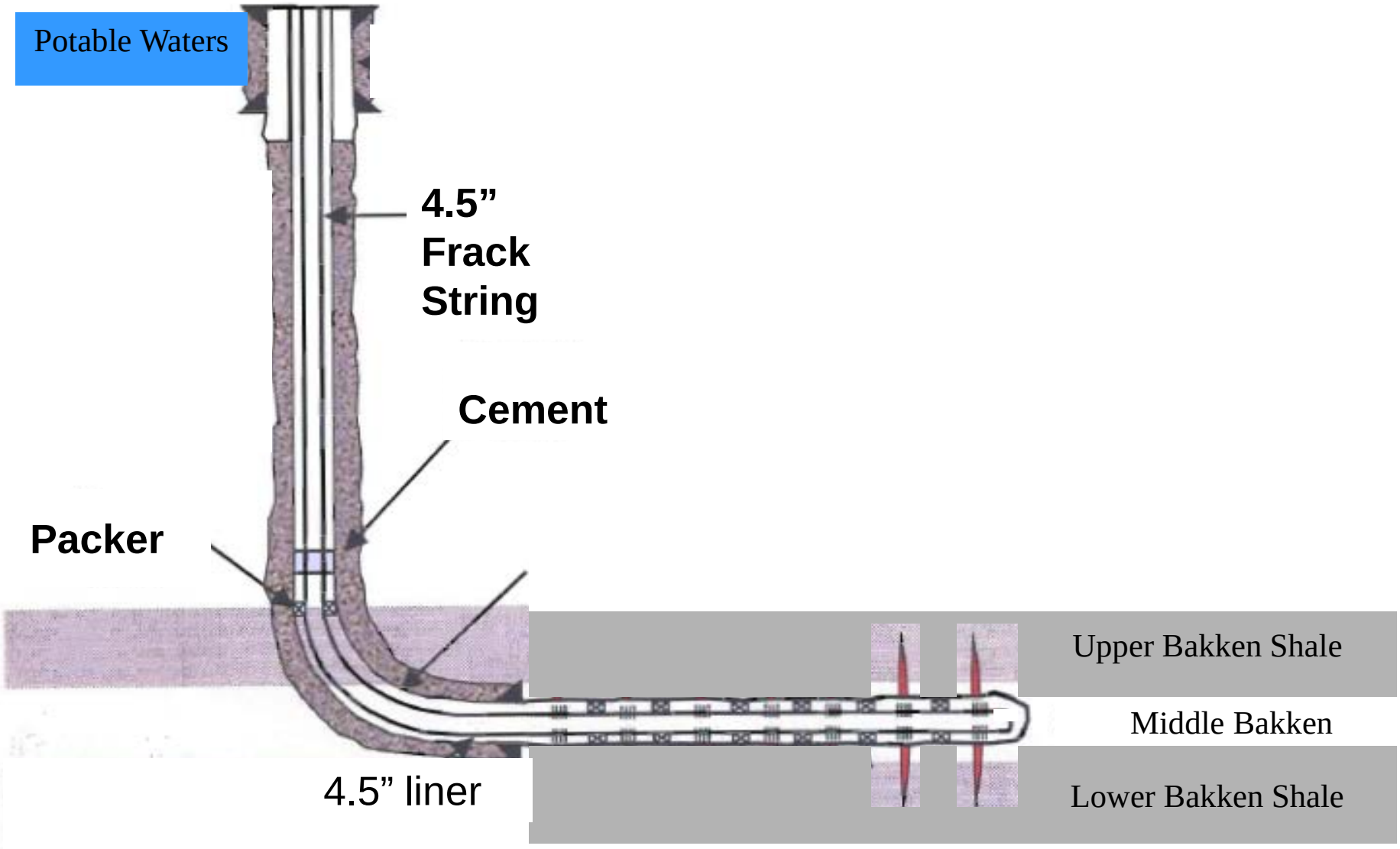
Run in hole with:

- **4.5” liner**
  - **5th layer of protection**
- **30-40 swell packers**
- **sliding sleeves**

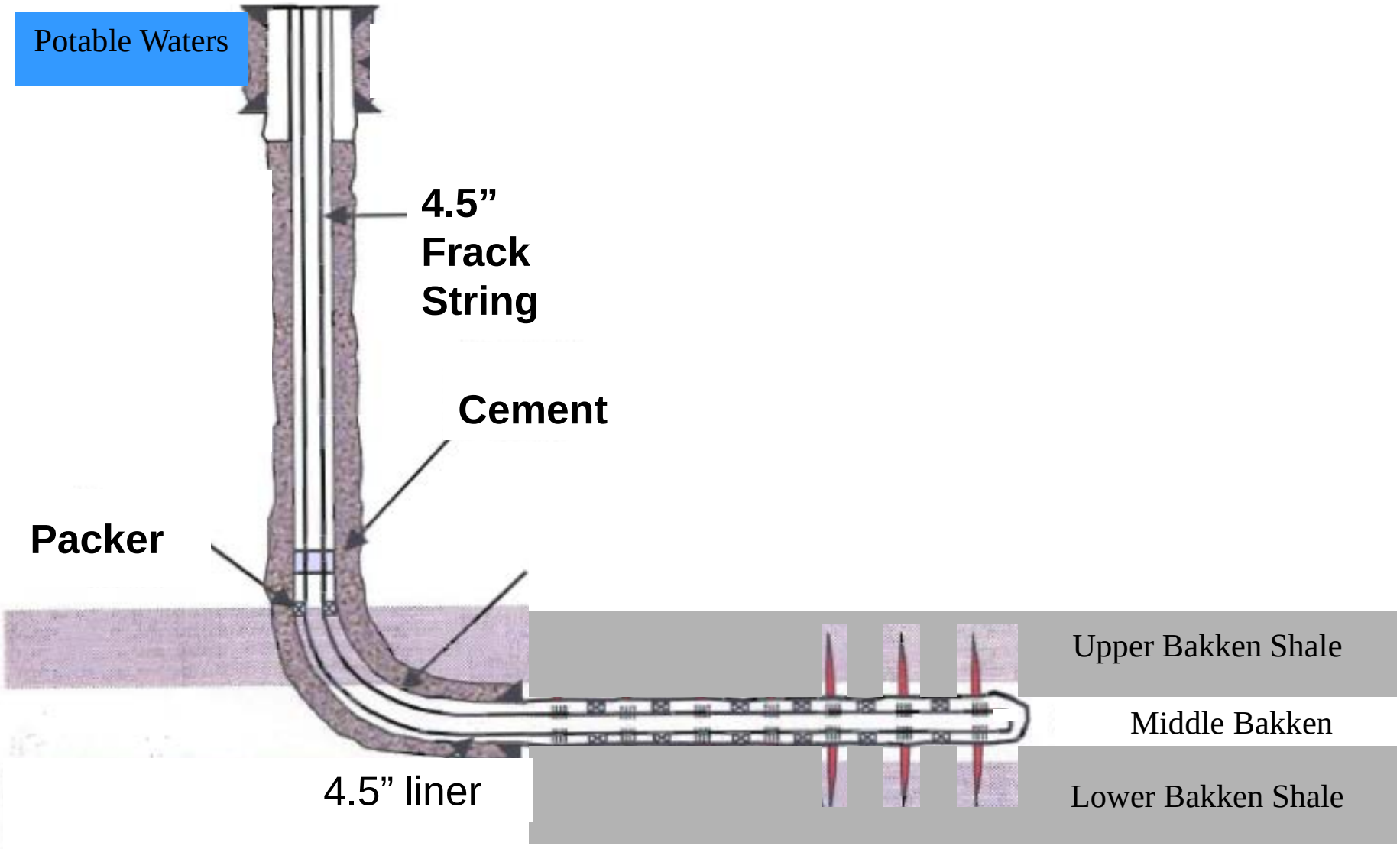
TYPICAL HORIZONTAL OIL WELL



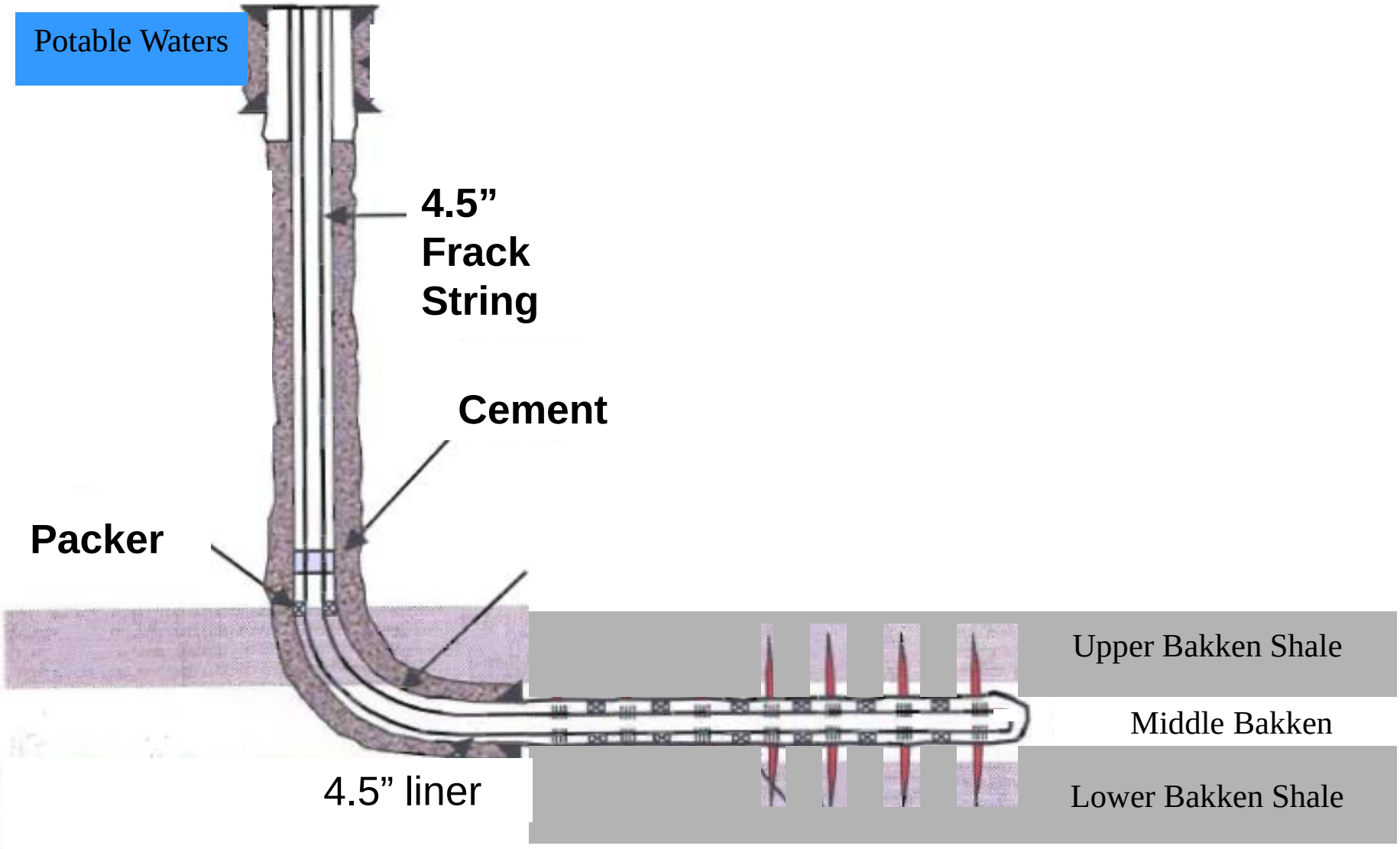
TYPICAL HORIZONTAL OIL WELL



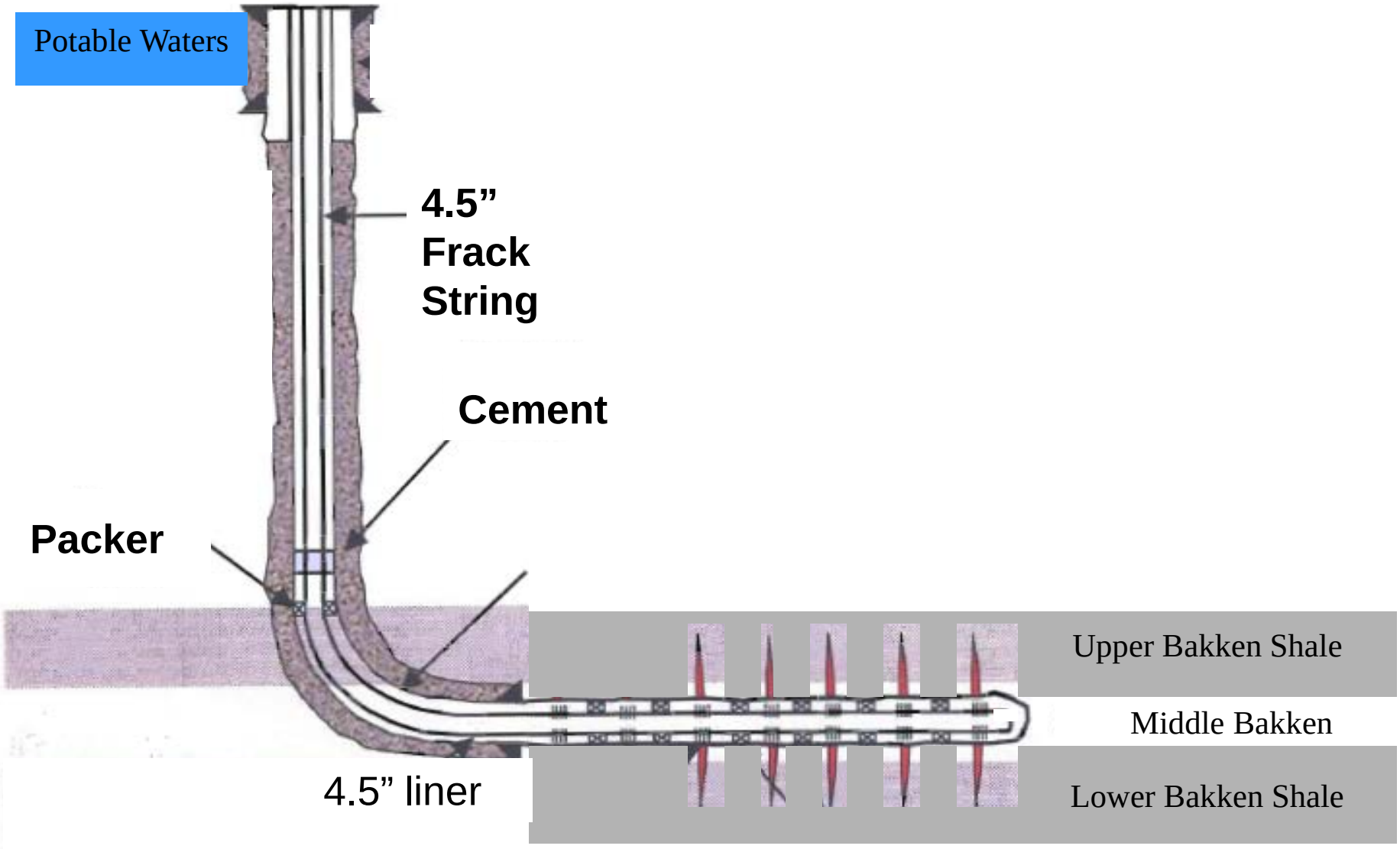
TYPICAL HORIZONTAL OIL WELL



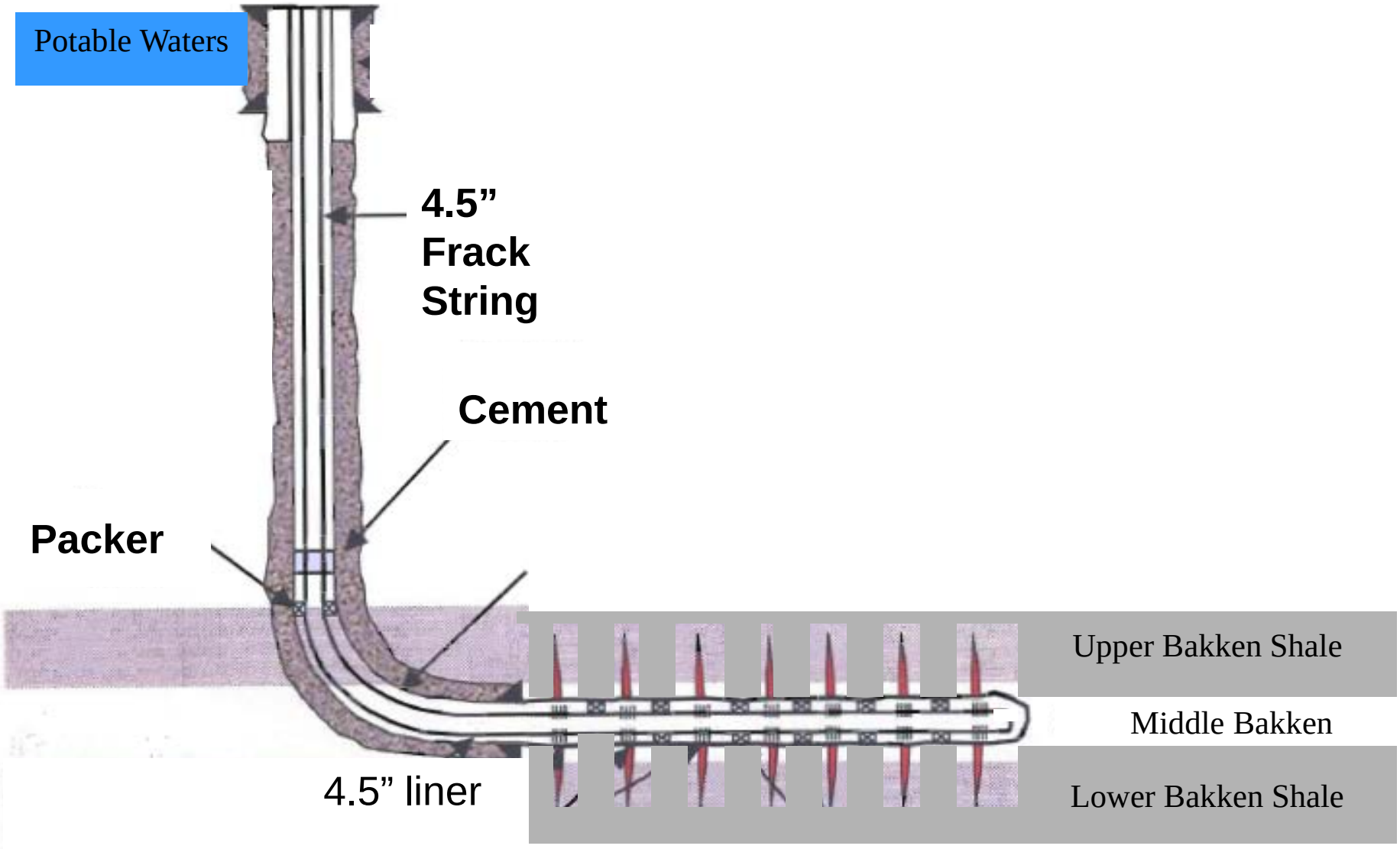
TYPICAL HORIZONTAL OIL WELL

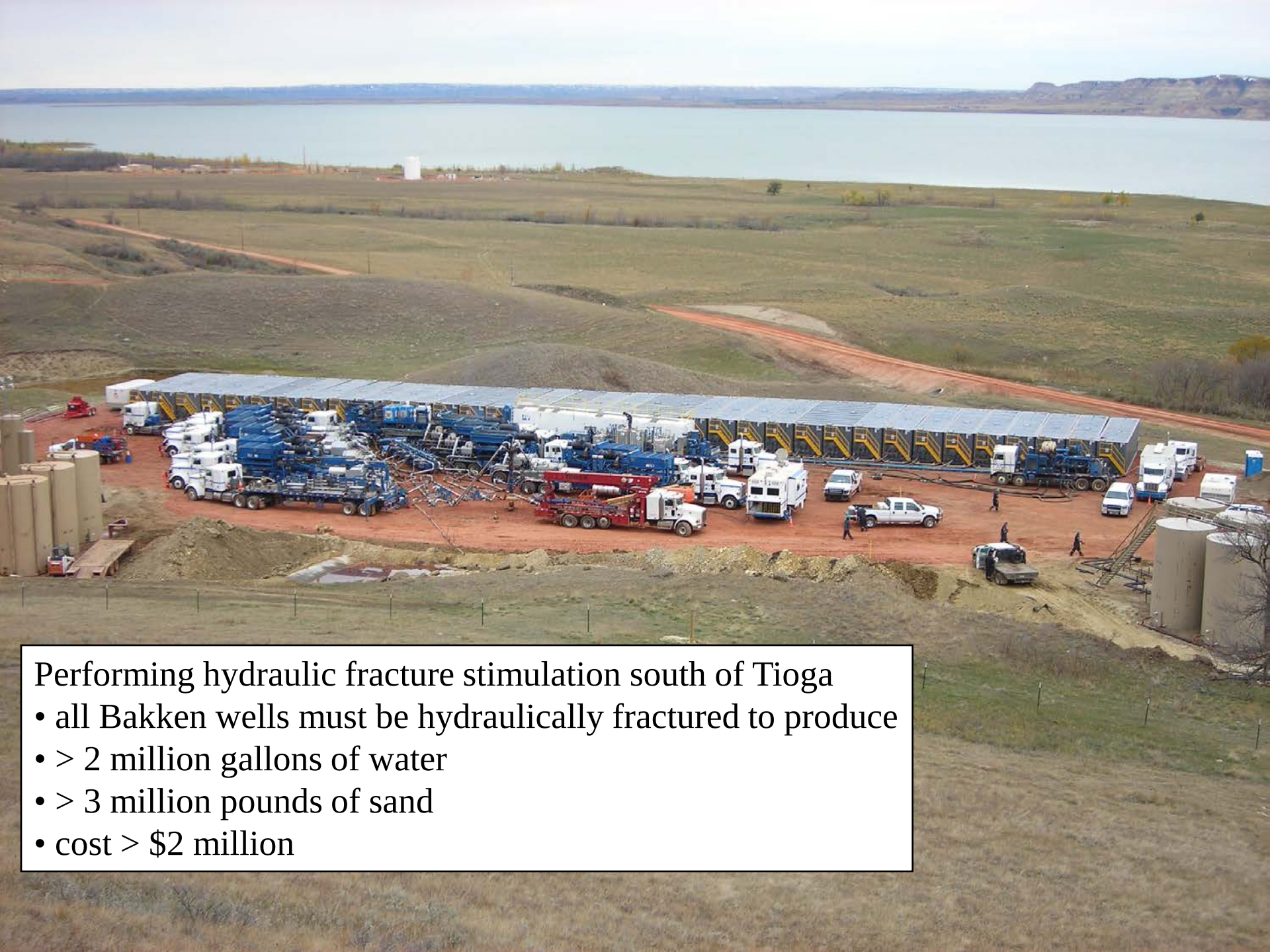


TYPICAL HORIZONTAL OIL WELL



TYPICAL HORIZONTAL OIL WELL





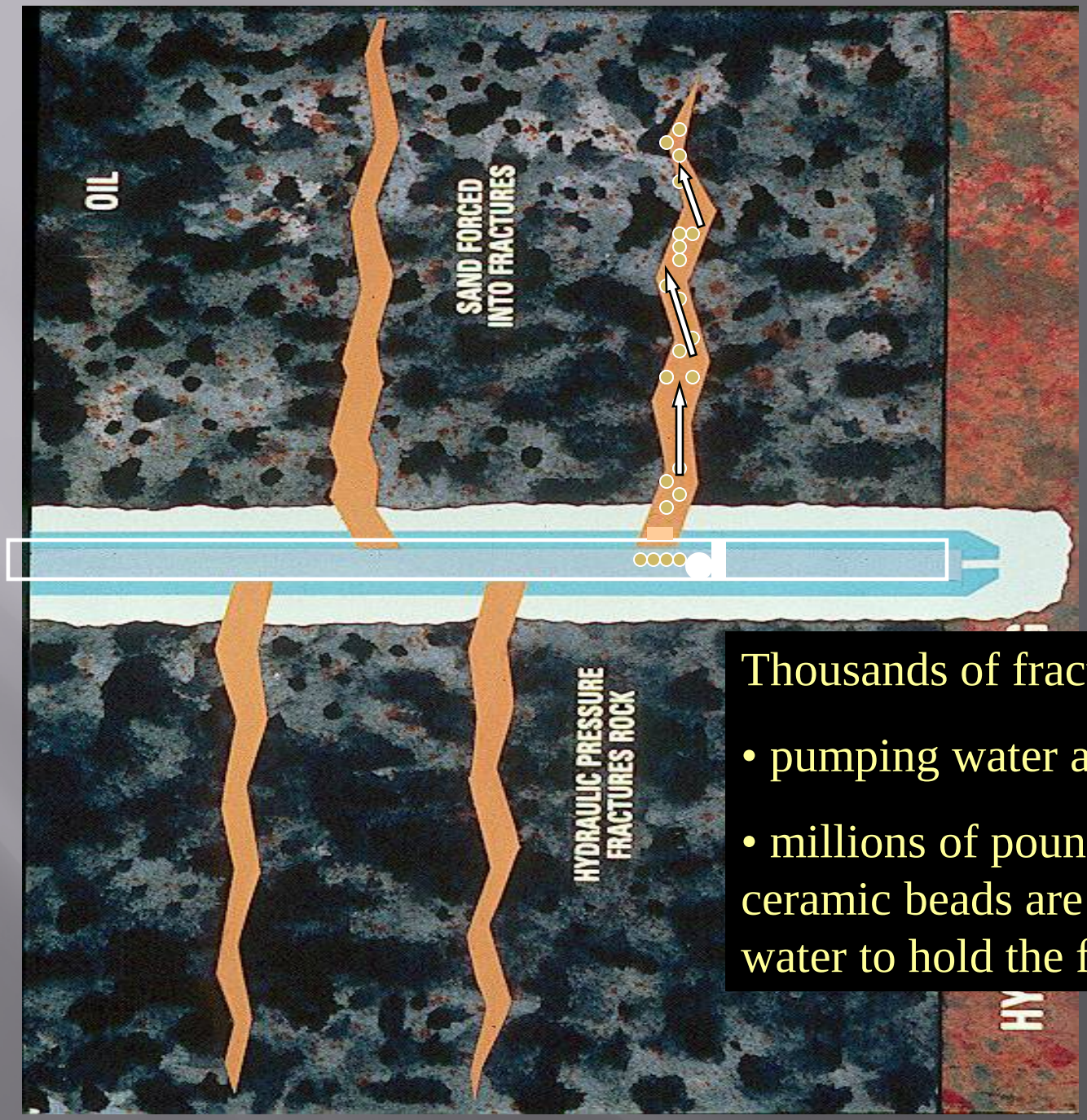
Performing hydraulic fracture stimulation south of Tioga

- all Bakken wells must be hydraulically fractured to produce
- > 2 million gallons of water
- > 3 million pounds of sand
- cost > $2 million

WHY FRACK THE ROCK?

- already developed easy oil
  - oil flows easily without fracking

- Unconventional Reserves
  - reservoirs are tight
  - uneconomic to produce w/o fracking
  - must create a path for oil to flow

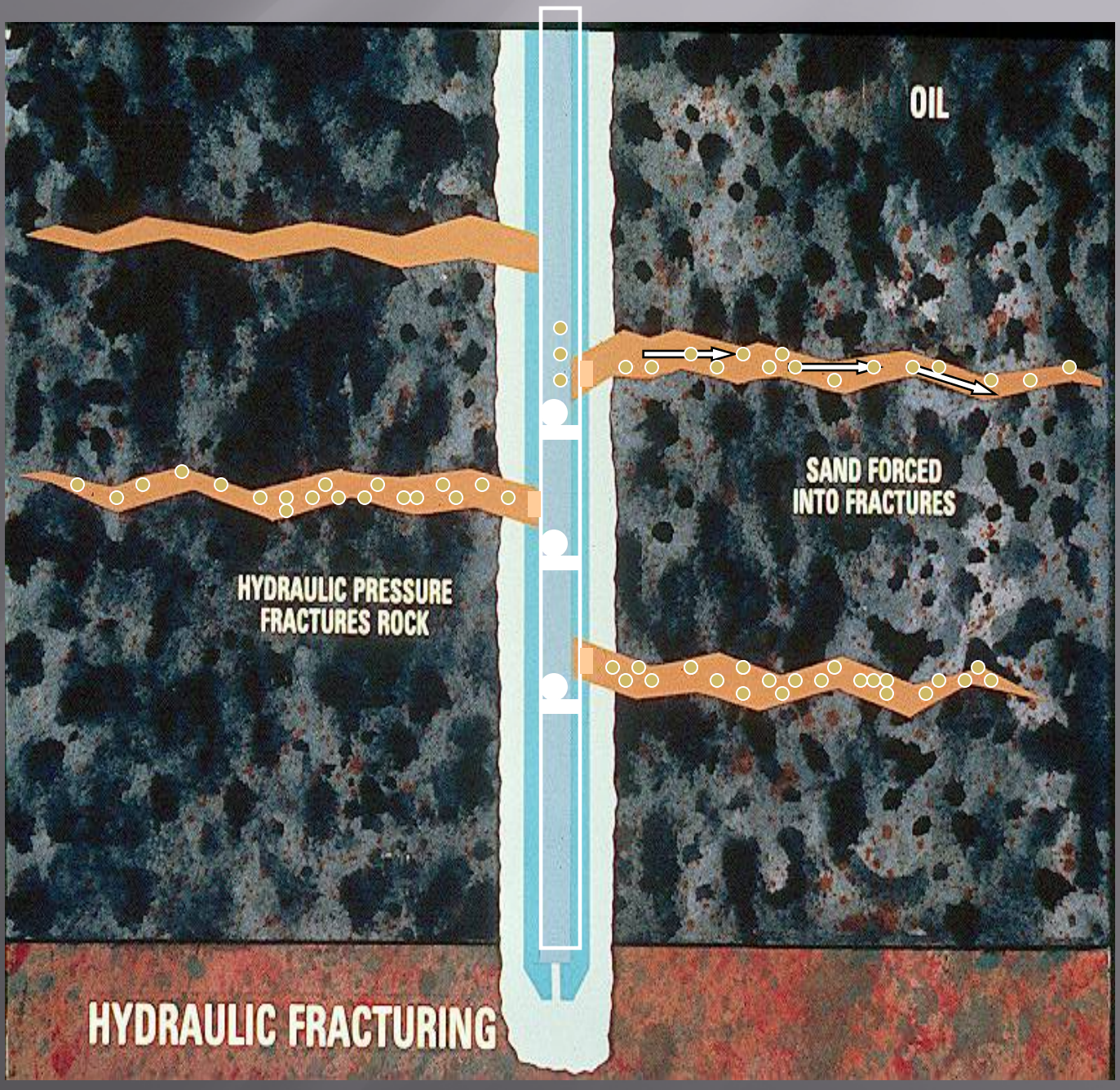


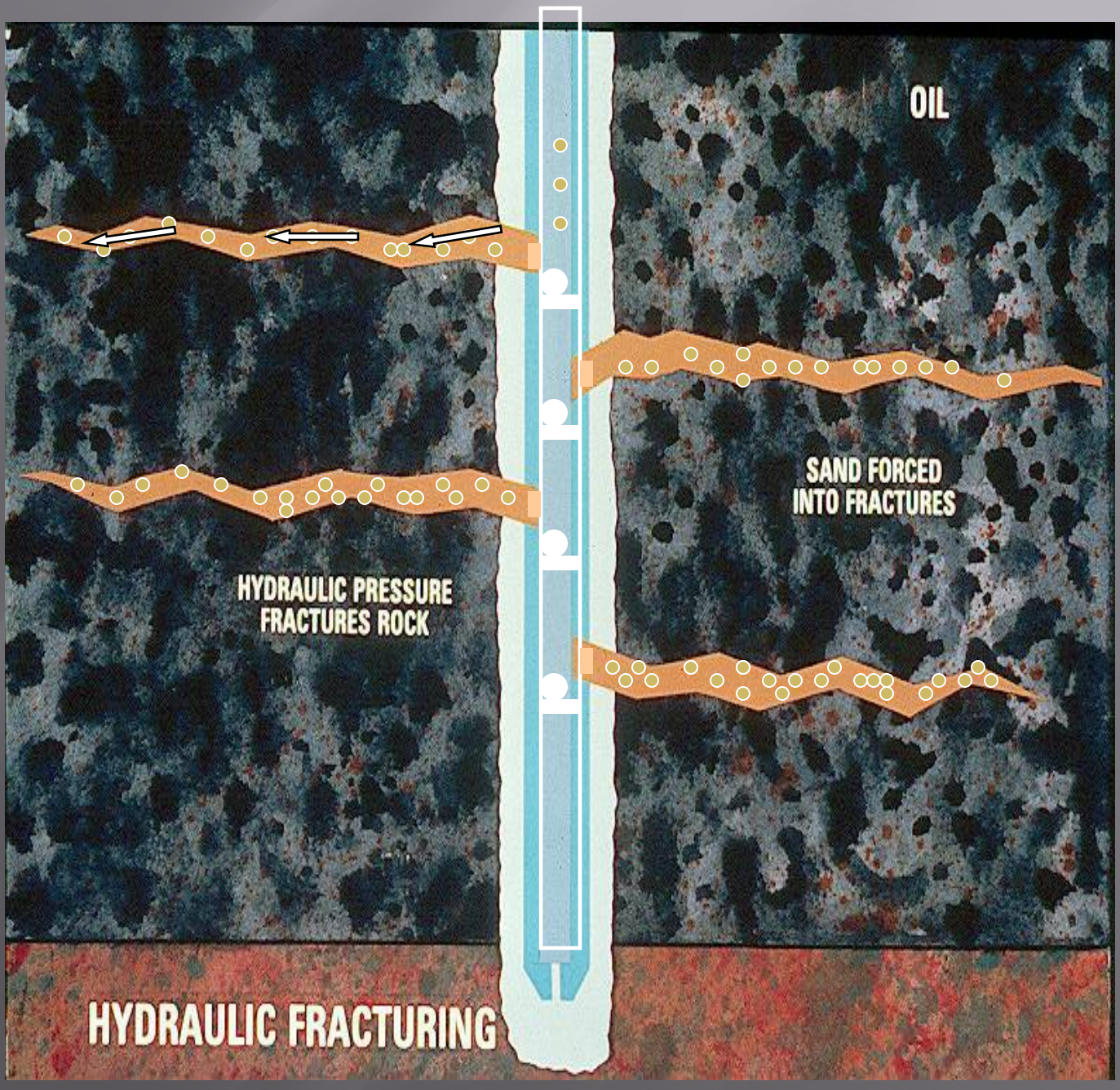
Thousands of fractures are created

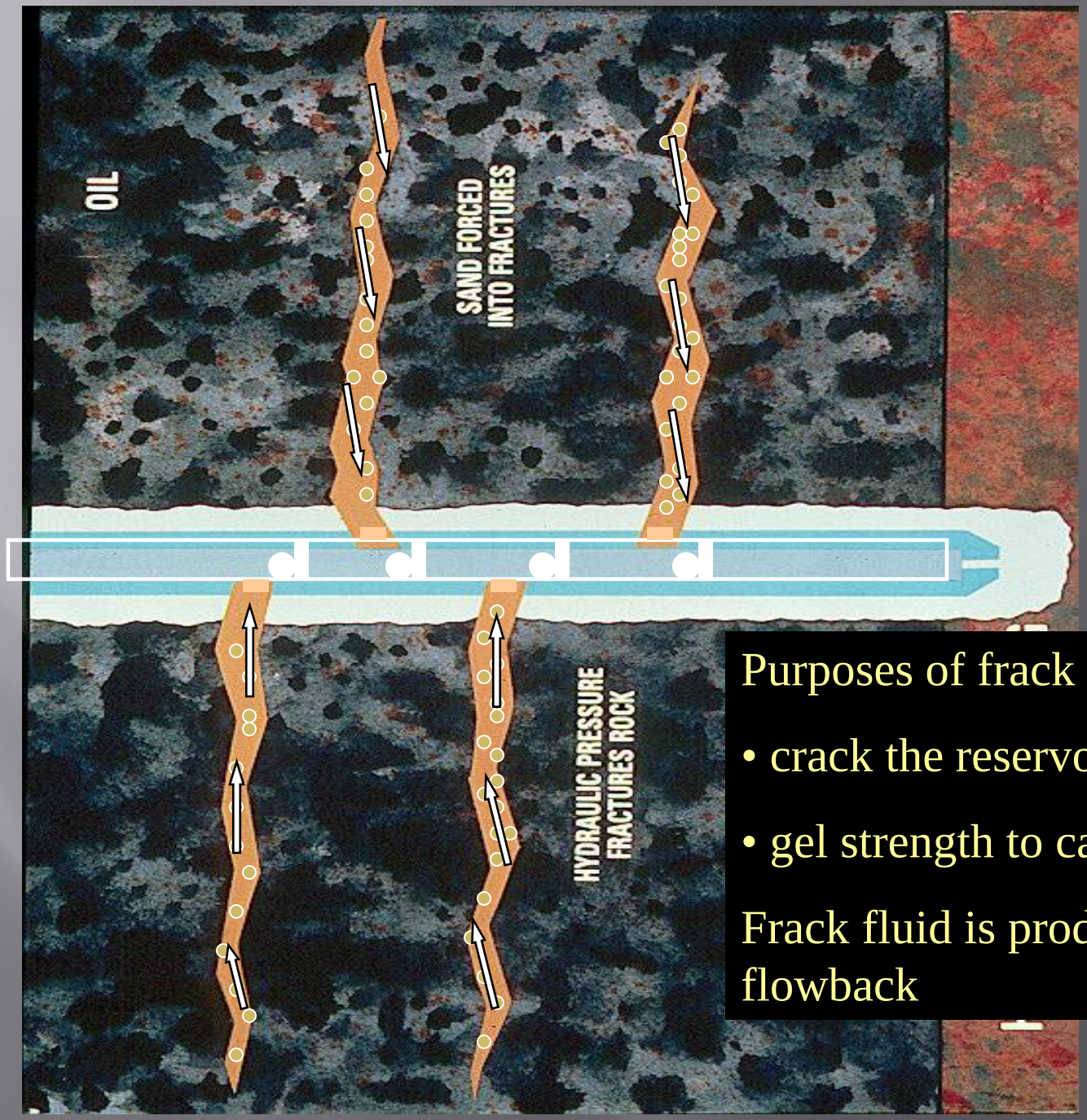
- pumping water at 6,000-9,000 psi
- millions of pounds of sand and ceramic beads are pumped with the water to hold the fractures open.

Stage Fracturing

- up to 40 stages


OIL
SAND FORCED
INTO FRACTURES
HYDRAULIC PRESSURE
FRACTURES ROCK
HYDRAULIC FRACTURING


OIL
SAND FORCED
INTO FRACTURES
HYDRAULIC PRESSURE
FRACTURES ROCK
HYDRAULIC FRACTURING

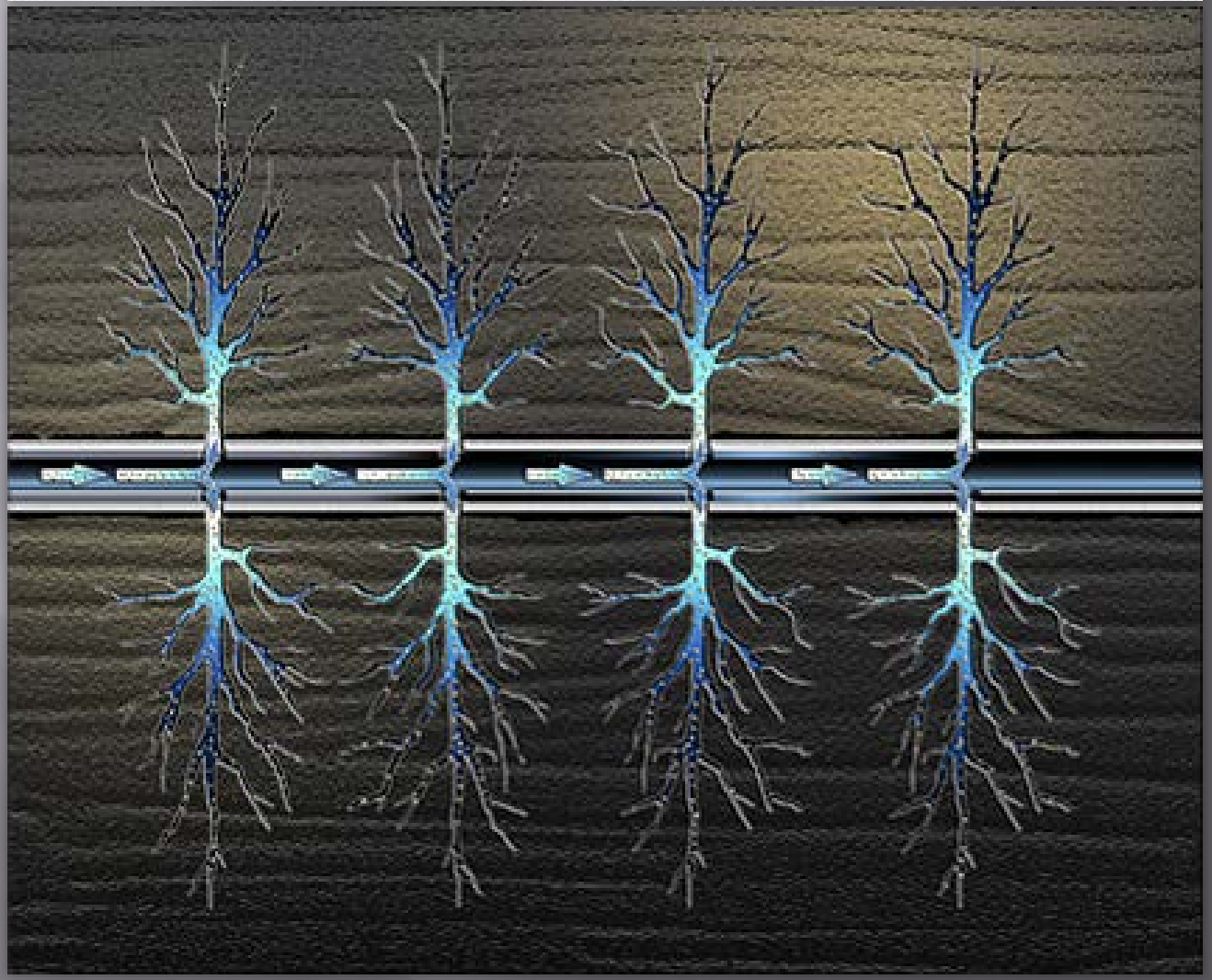


Purposes of frack fluid

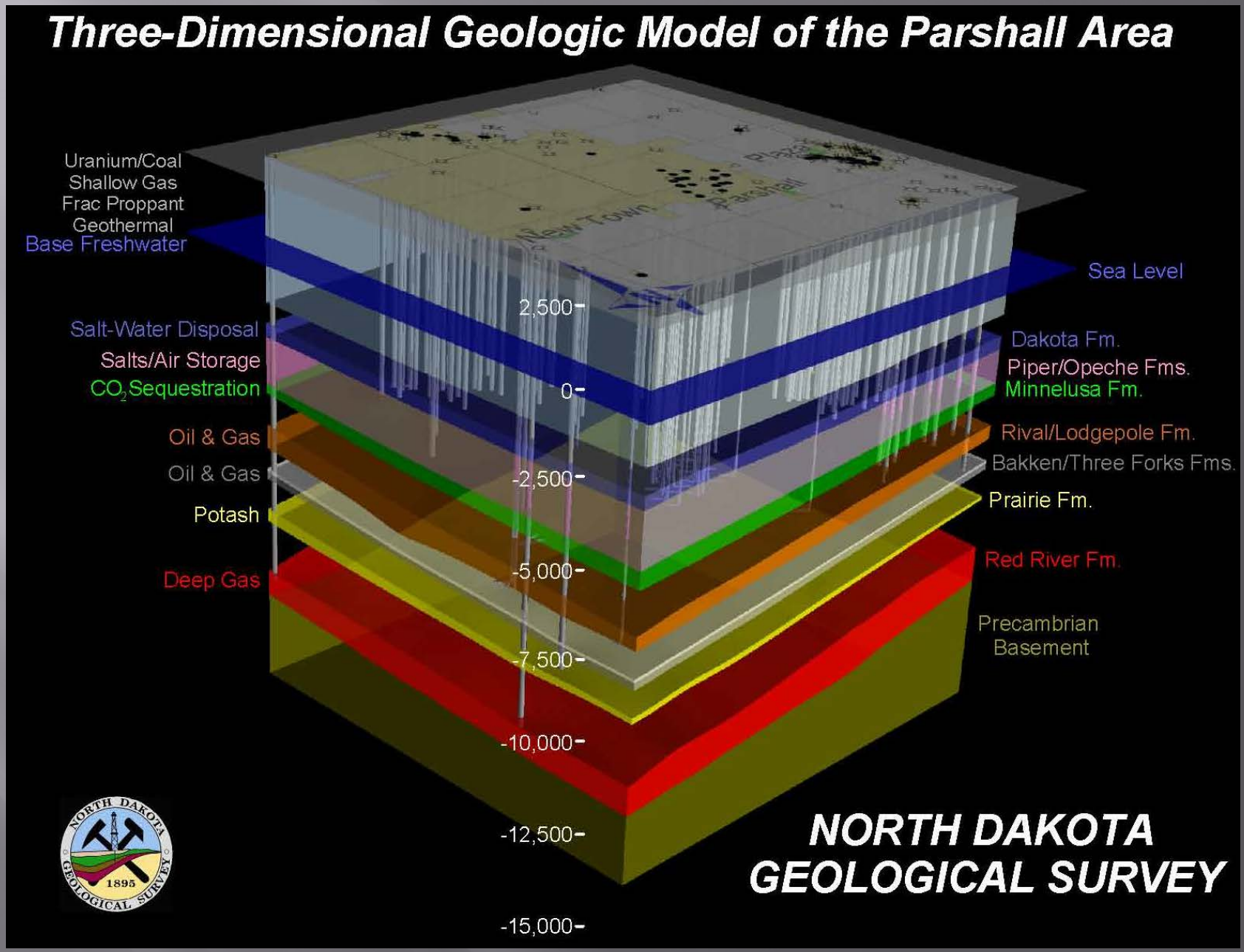
- crack the reservoir
- gel strength to carry sand

Frack fluid is produced back as flowback

Hydraulic Fracturing: Mixture of water, sand and chemicals pressurized and pumped into the well to form microscopic fractures in shale.



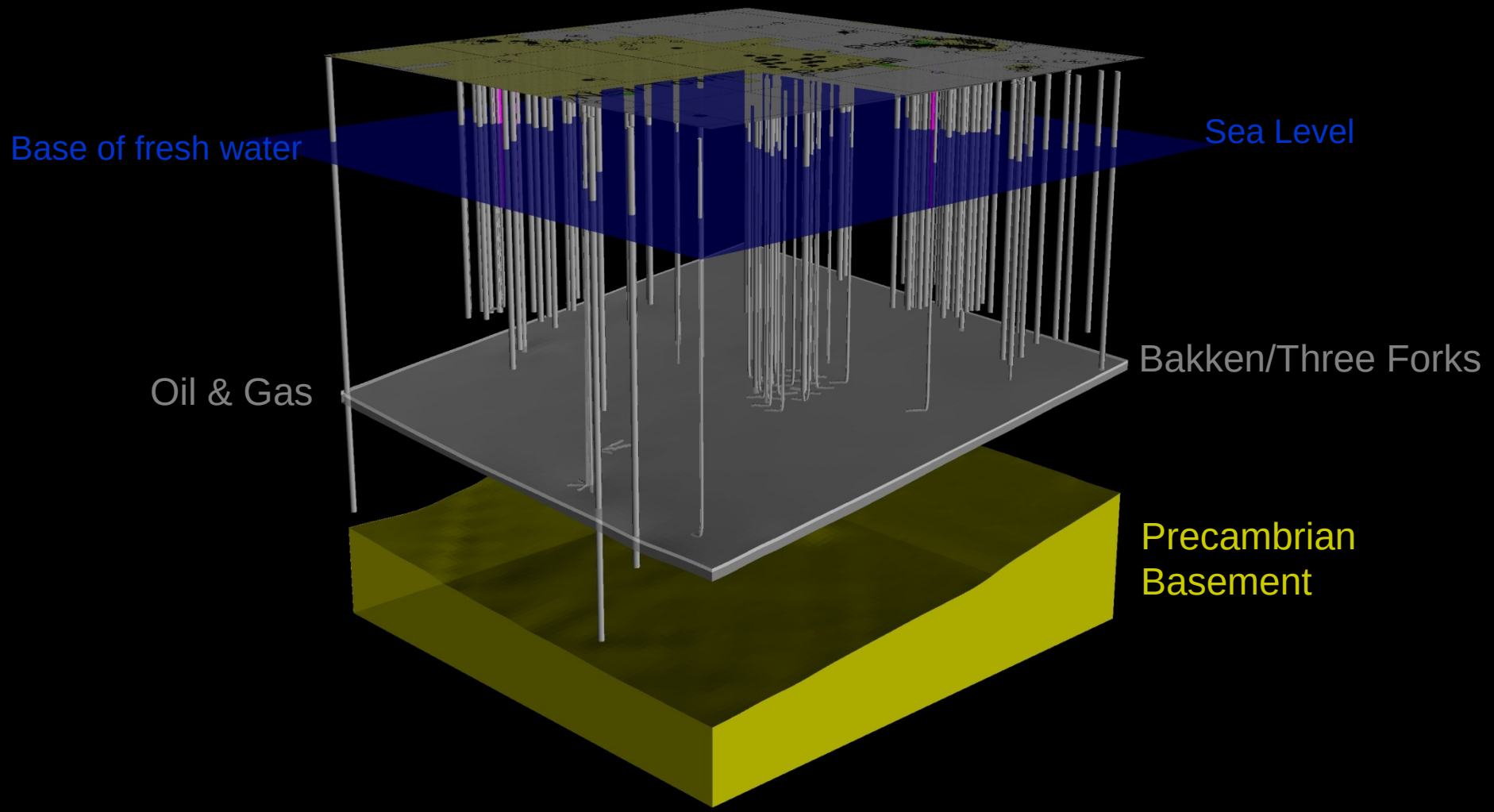
Three-Dimensional Geologic Model of the Parshall Area



NORTH DAKOTA GEOLOGICAL SURVEY

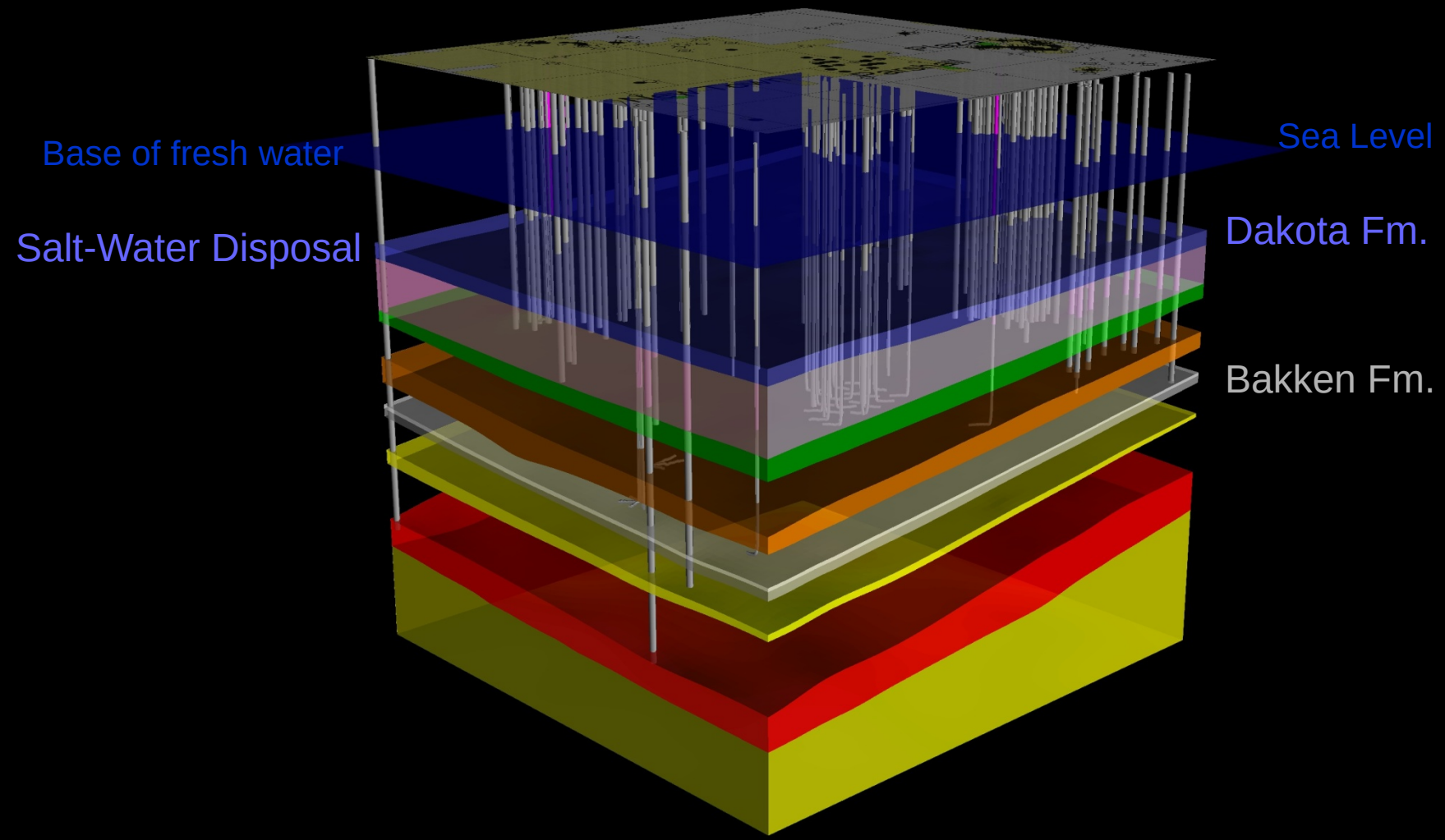
North Dakota has been regulating the full life cycle of hydraulic fracturing for decades

- Water Comm—water withdrawls
- Industrial Comm—well permitting & disposal of flowback water
- Health Dept—spill cleanup


Base of fresh water
Sea Level
Oil & Gas
Bakken/Three Forks
Precambrian
Basement

Industrial Commission Regulation

- Water flowback after frack
  - Storage in open pits prohibited
  - Disposal wells permitted through Underground Injection Program
  - Disposal zone is 2,500 feet below potable waters


Base of fresh water
Salt-Water Disposal
Sea Level
Dakota Fm.
Bakken Fm.

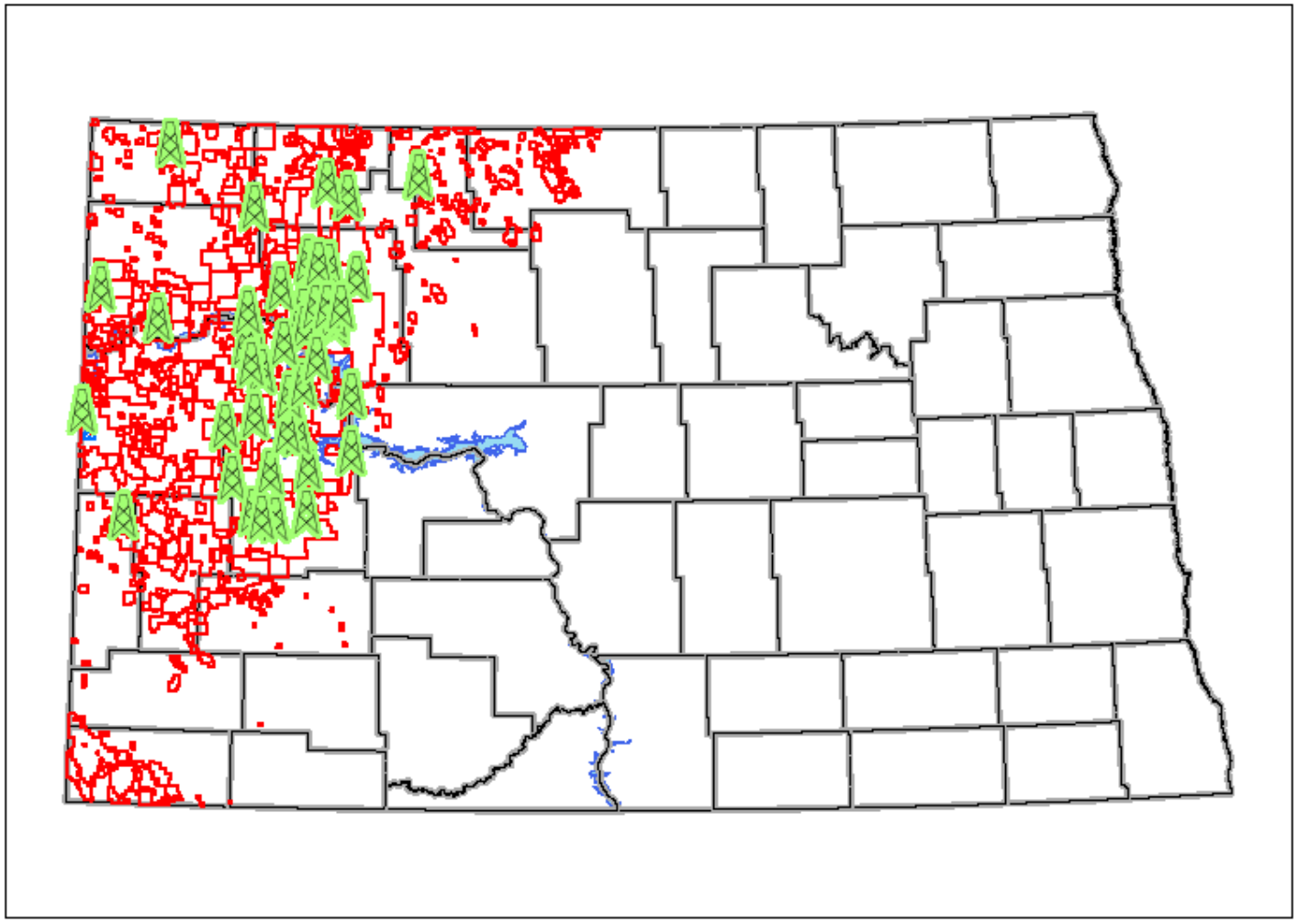
FRAC WATER NEEDS

- Lake Sakakawea best water resource
  - one inch contains 10 billion gal water
    - 5000 wells @ 2mil gal wtr/well
    - 2-year supply

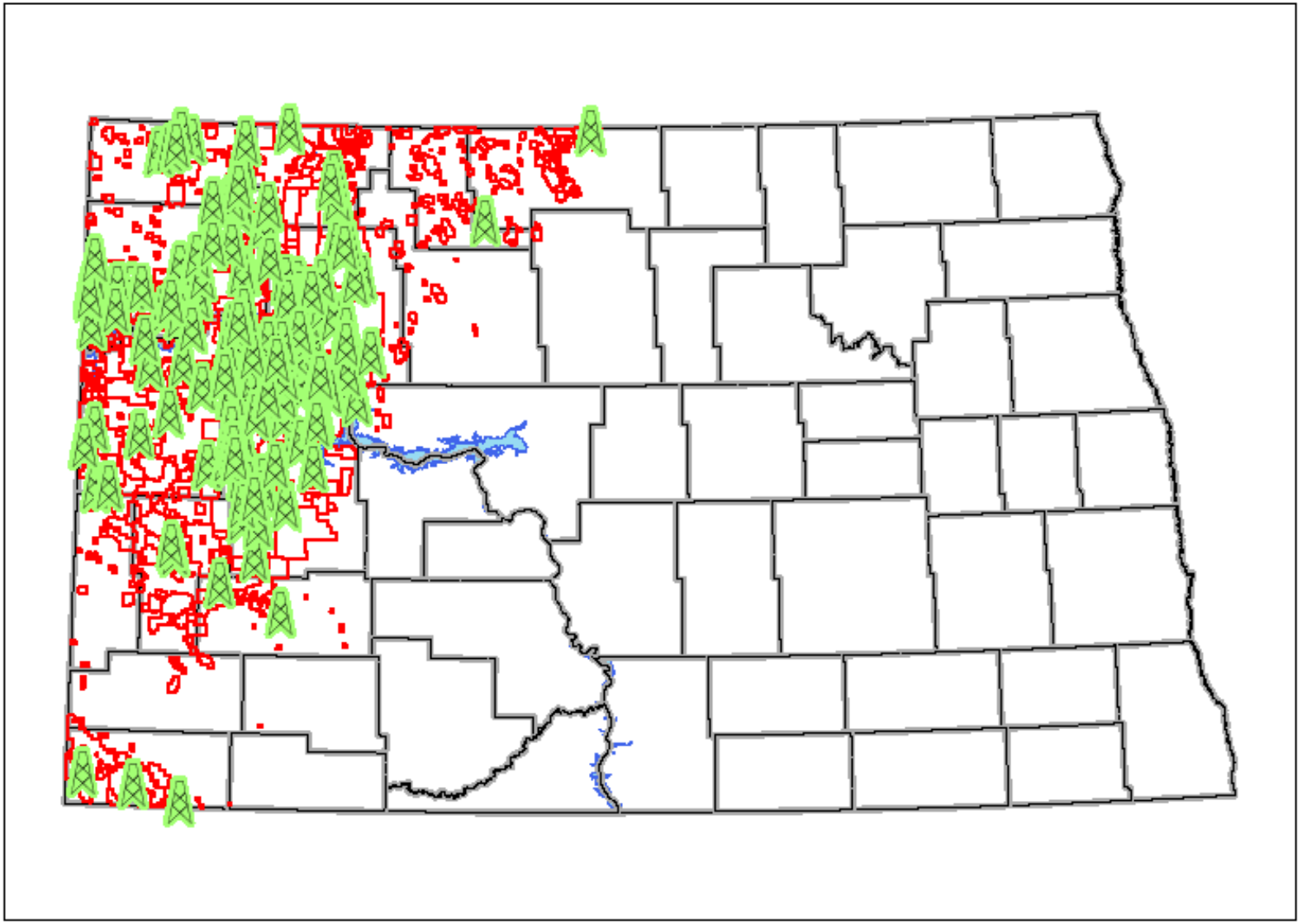
FRAC WATER ADDITIVES

- 99.5% water and sand
  - 80.5% water
  - 19.0% proppant
  - 0.5% chemicals
    - most are found in every household

NORTH DAKOTA – 54 DRILLING RIGS – Oct 2009



NORTH DAKOTA – 153 DRILLING RIGS – Oct 2010

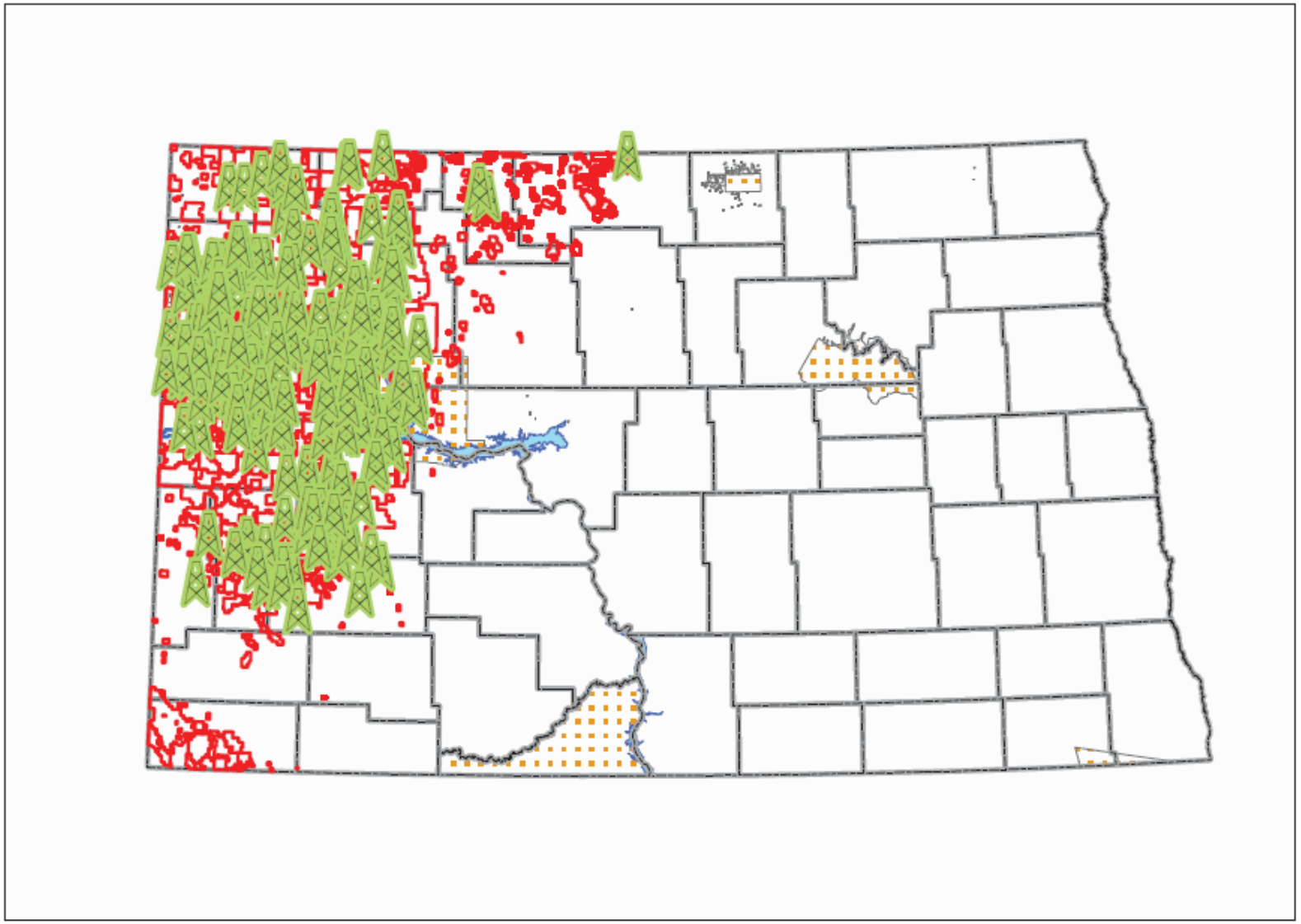


Disclaimer: Neither the State of North Dakota, nor any agency, officer, or employee of the State of North Dakota warrants the accuracy or reliability of this product and shall not be held responsible for any losses caused by reliance on this product. Portions of the information may be incorrect or out of date. Any person or entity that relies on any information obtained from this product does so at his or her own risk.

0 30 60 120 Miles

Prepared by N.D.I.C.
Oil and Gas Division
DATE : 9/17/2010
Time : 3:42:13 PM

NORTH DAKOTA – 200 DRILLING RIGS – JANUARY 2012



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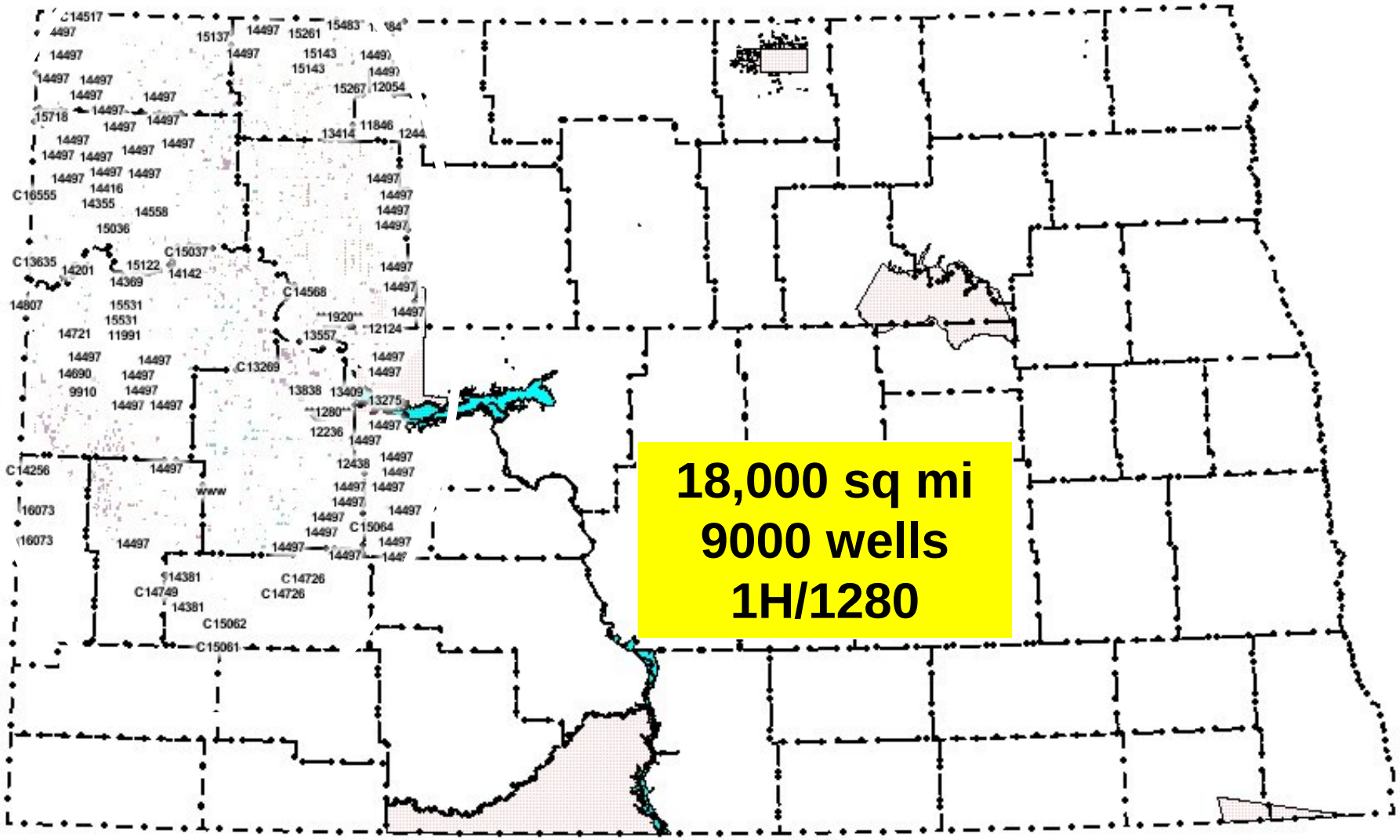
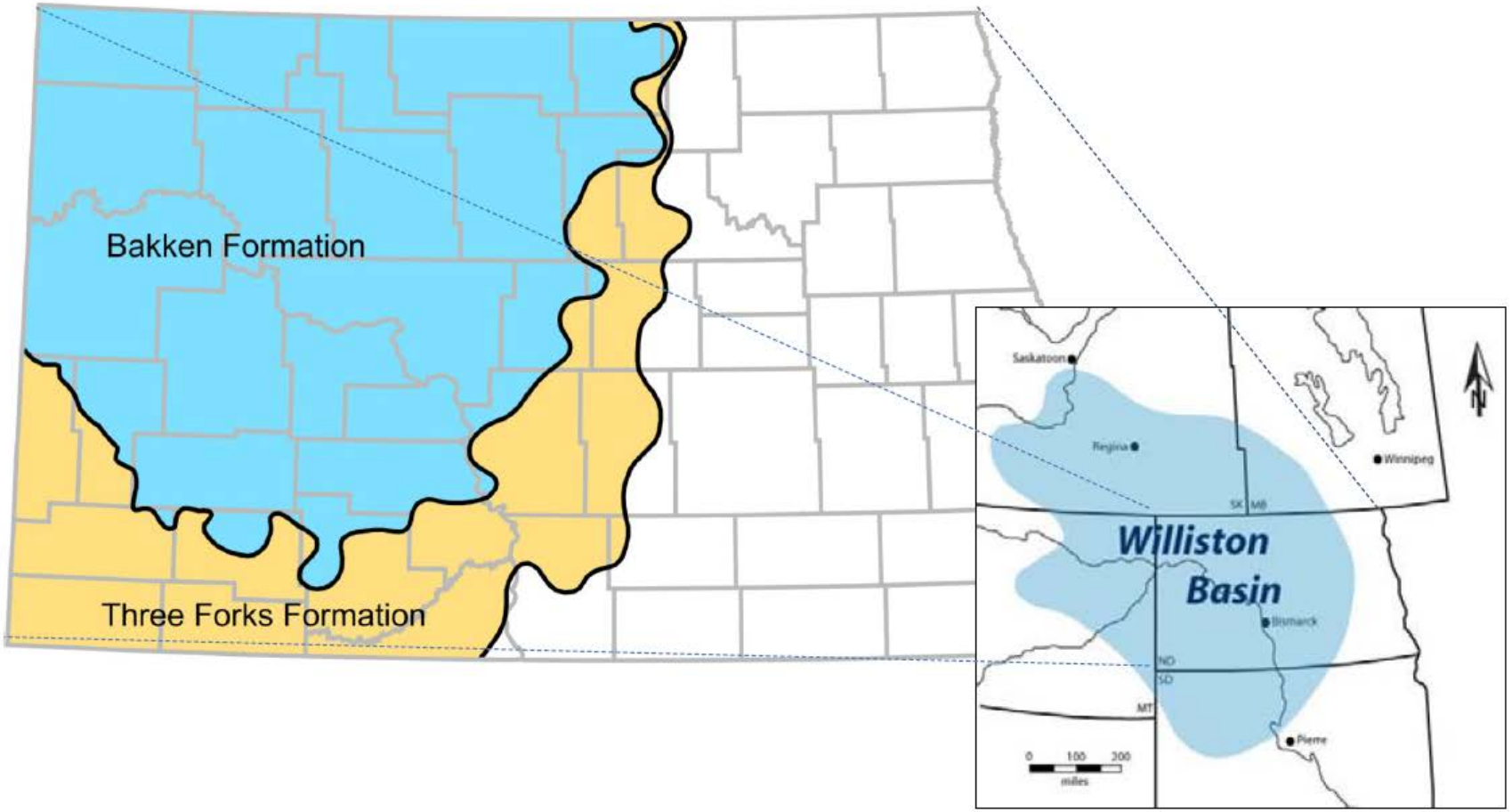
0 35 70 140 Miles

Prepared by N.D.I.C. Oil and Gas Division
DATE : 1/13/2012
Time : 7:53:24 AM

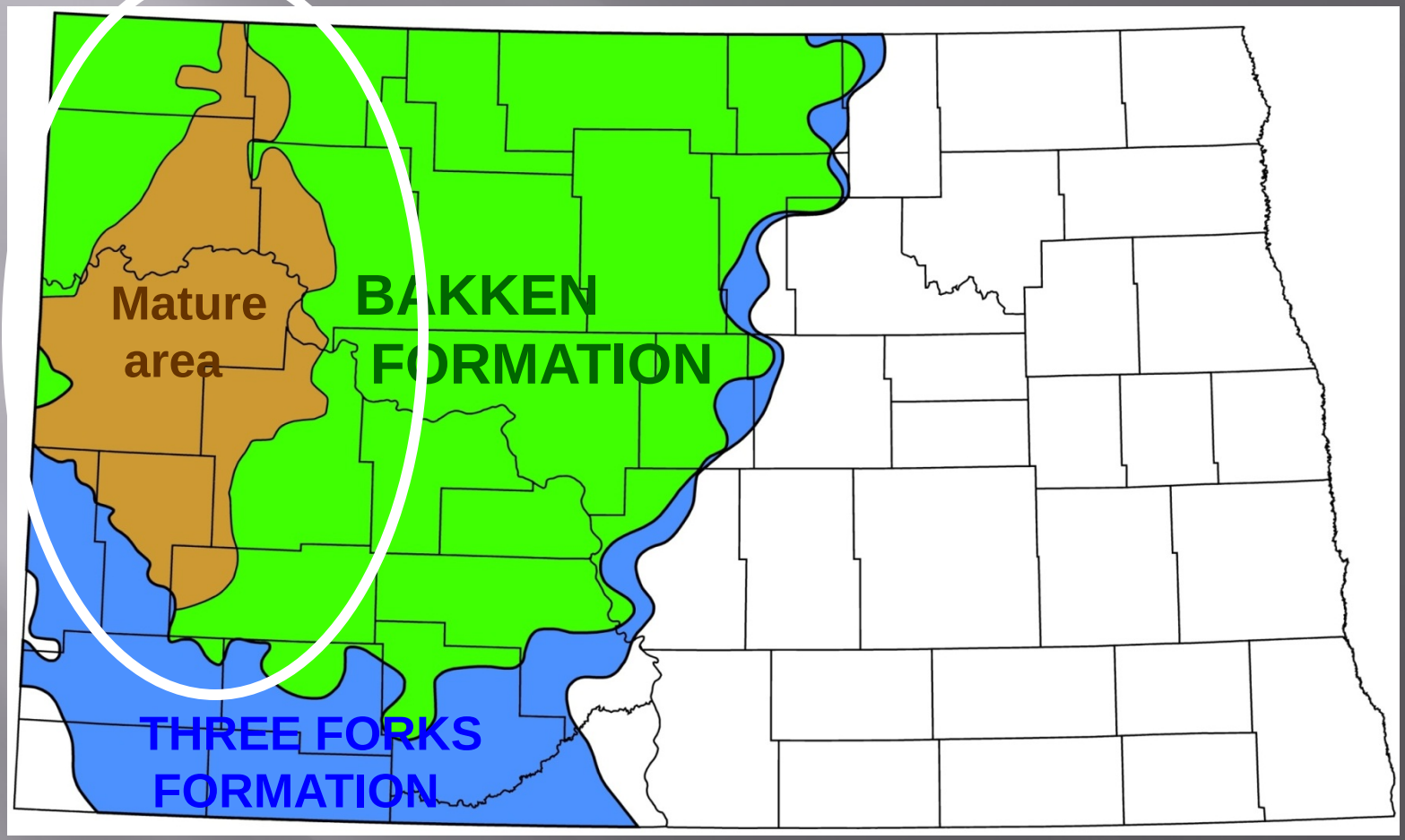

18,000 sq mi
9000 wells
1H/1280

Regionally Extensive

Area covered by Bakken source rocks in North Dakota

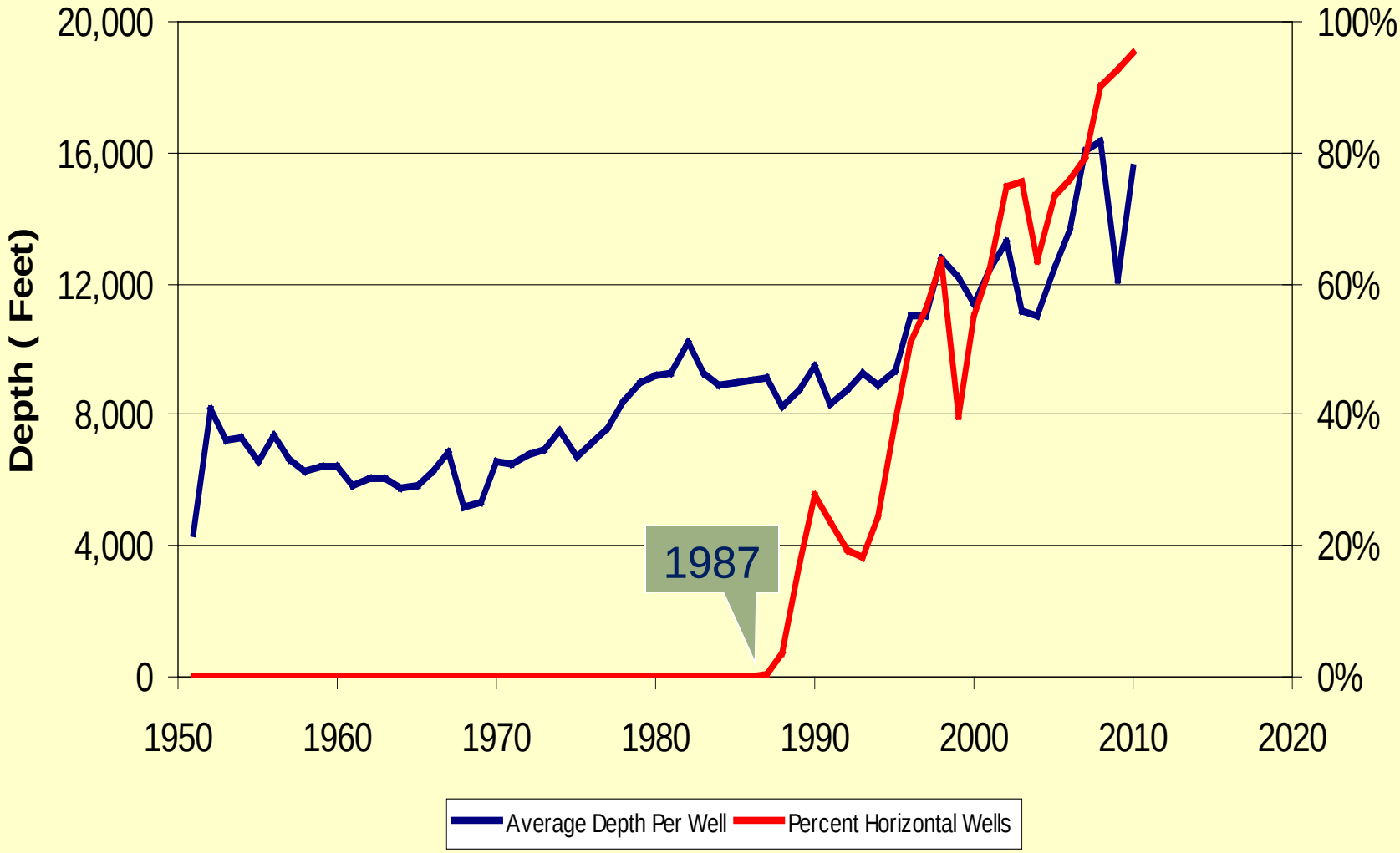


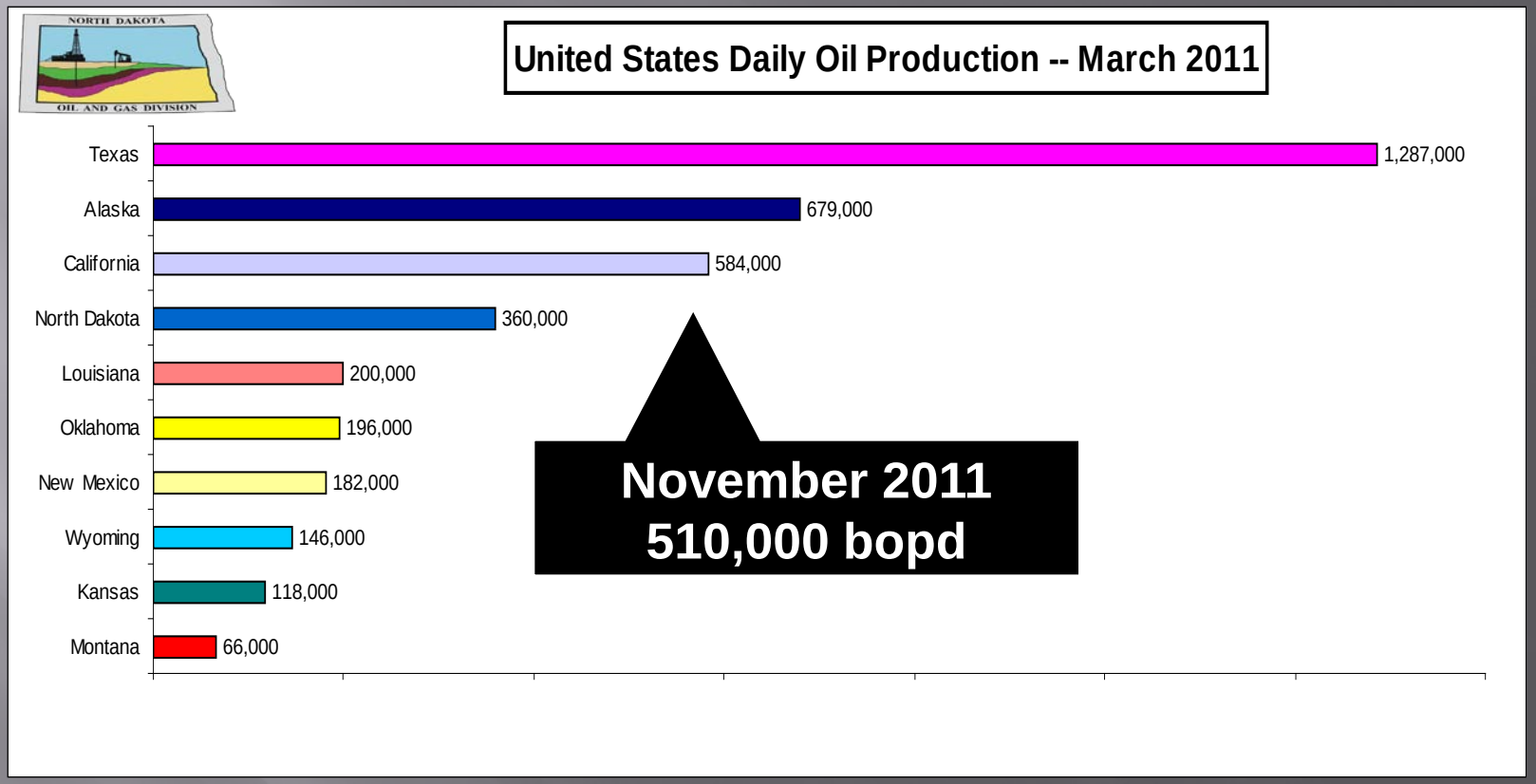
ESTIMATED MATURE AREA OF THE BAKKEN FORMATION



(Nordeng, 2010)

North Dakota Well Depth and % Horizontal




NORTH DAKOTA
OIL AND GAS DIVISION
United States Daily Oil Production -- March 2011
Texas
1,287,000
Alaska
679,000
California
584,000
North Dakota
360,000
Louisiana
200,000
Oklahoma
196,000
New Mexico
182,000
Wyoming
146,000
Kansas
118,000
Montana
66,000
November 2011
510,000 bopd

Oil and Gas Division

Lynn D. Helms - Director Bruce E. Hicks - Assistant Director

Department of Mineral Resources

Lynn D. Helms - Director

North Dakota Industrial Commission

www.dmr.nd.gov/oilgas/

For Immediate Release
January 10th, 2012
Contact Alison Ritter 328-8036

North Dakota Surpasses Half a Million Barrels of Oil per Day

BISMARCK- North Dakota has reached a milestone in oil production. Preliminary November data released today, indicates that North Dakota is now producing more than half a million barrels of oil per day, at approximately 510,000 barrels. That's an increase of about 22,000 barrels from October and an increase of more than 150,000 barrels a day from one year ago.

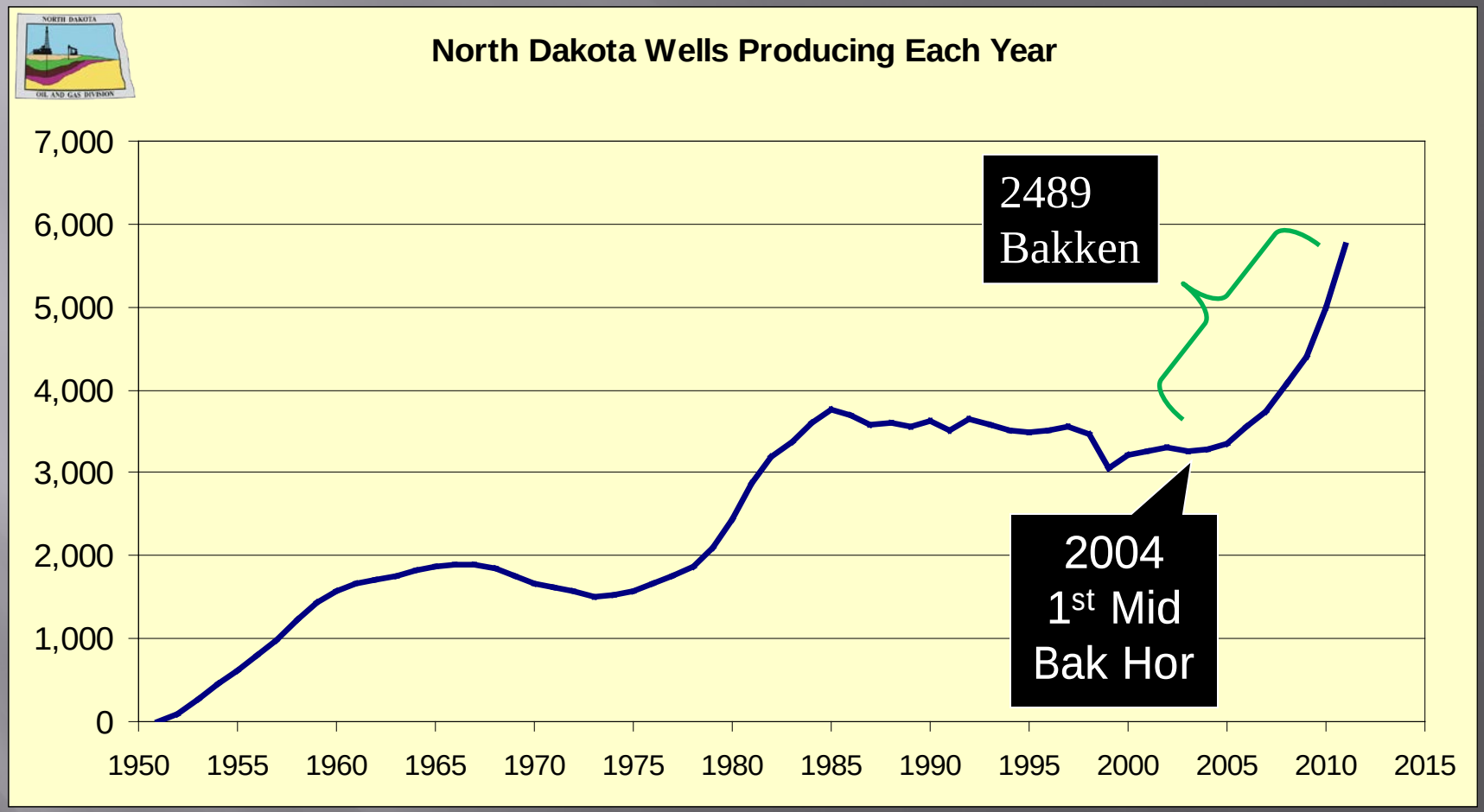
"Oil production in the state has increased anywhere from 8,000 to 40,000 barrels a day, every month since June," says Oil and Gas Division Director Lynn Helms.

Recent data from California, the number three oil-producing state in the country, is producing about 570,000 barrels a day.

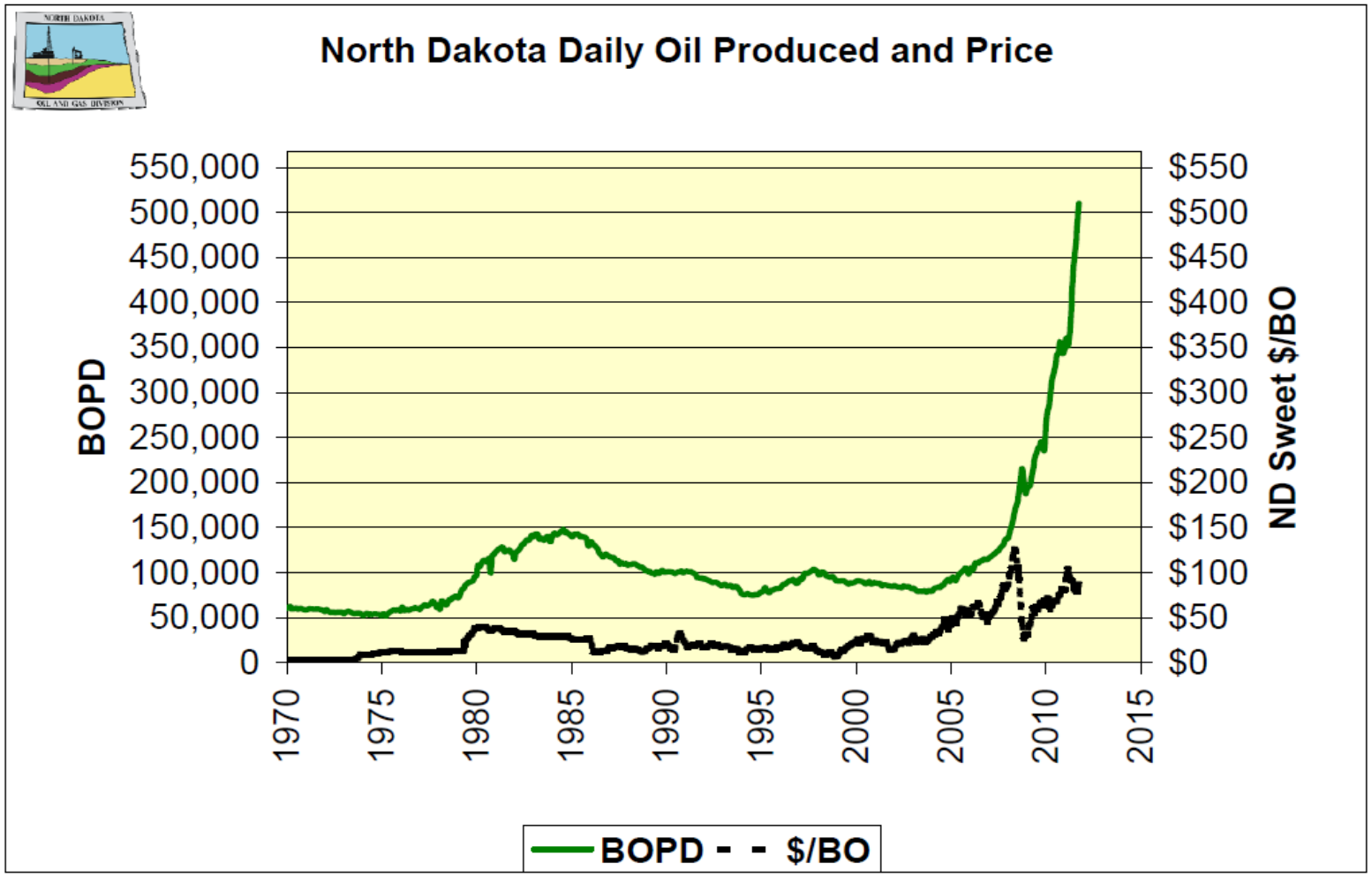
Production numbers for November show North Dakota producing nearly 15.3 million barrels for the month, as well as having 6,300 producing wells.

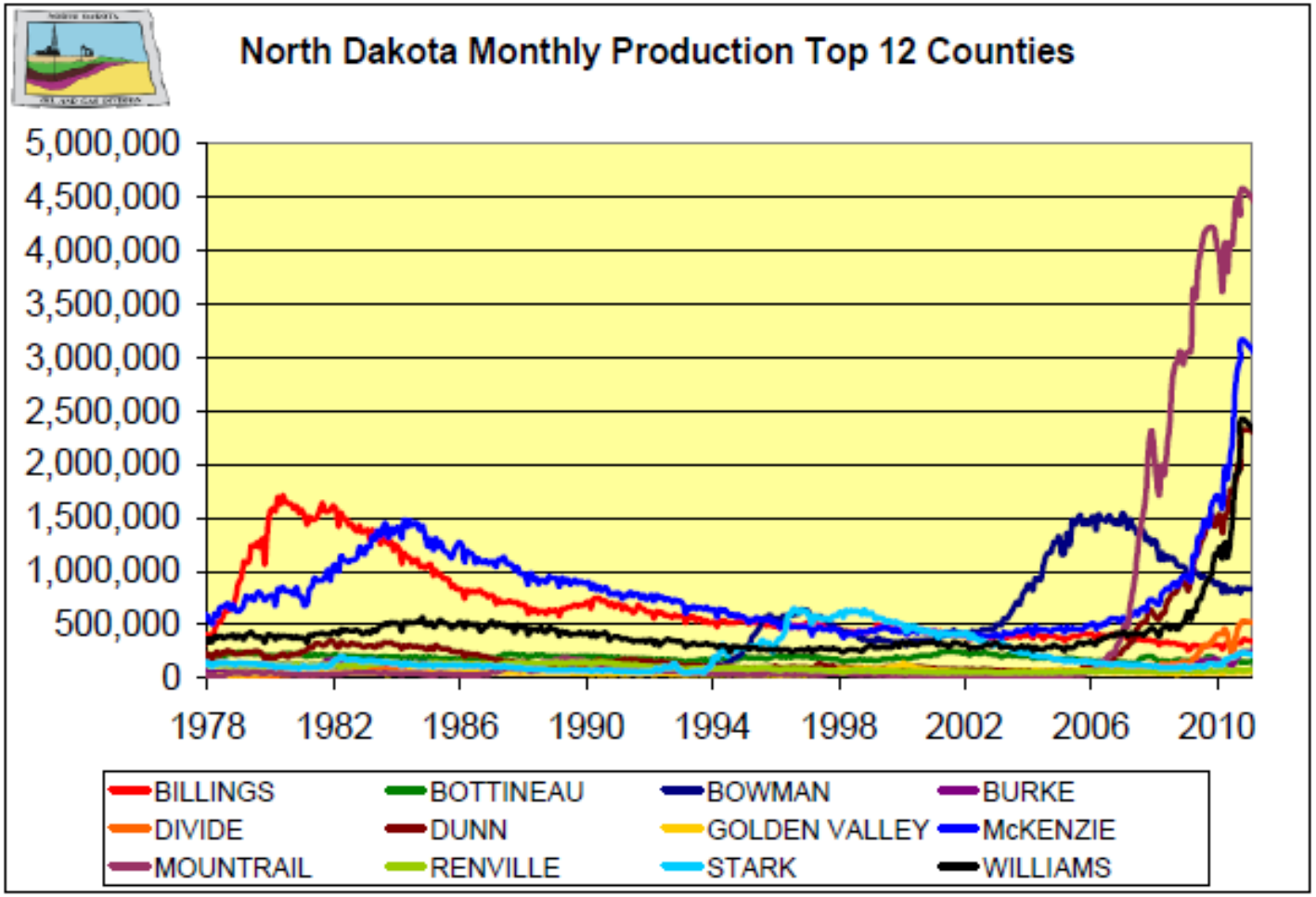
"This is big news for the state and the country. A half a million barrels a day represents about 10 percent of U.S. production. That's enough oil to displace imports from Iraq or Columbia," Helms said.

Data for December will not be released until February.

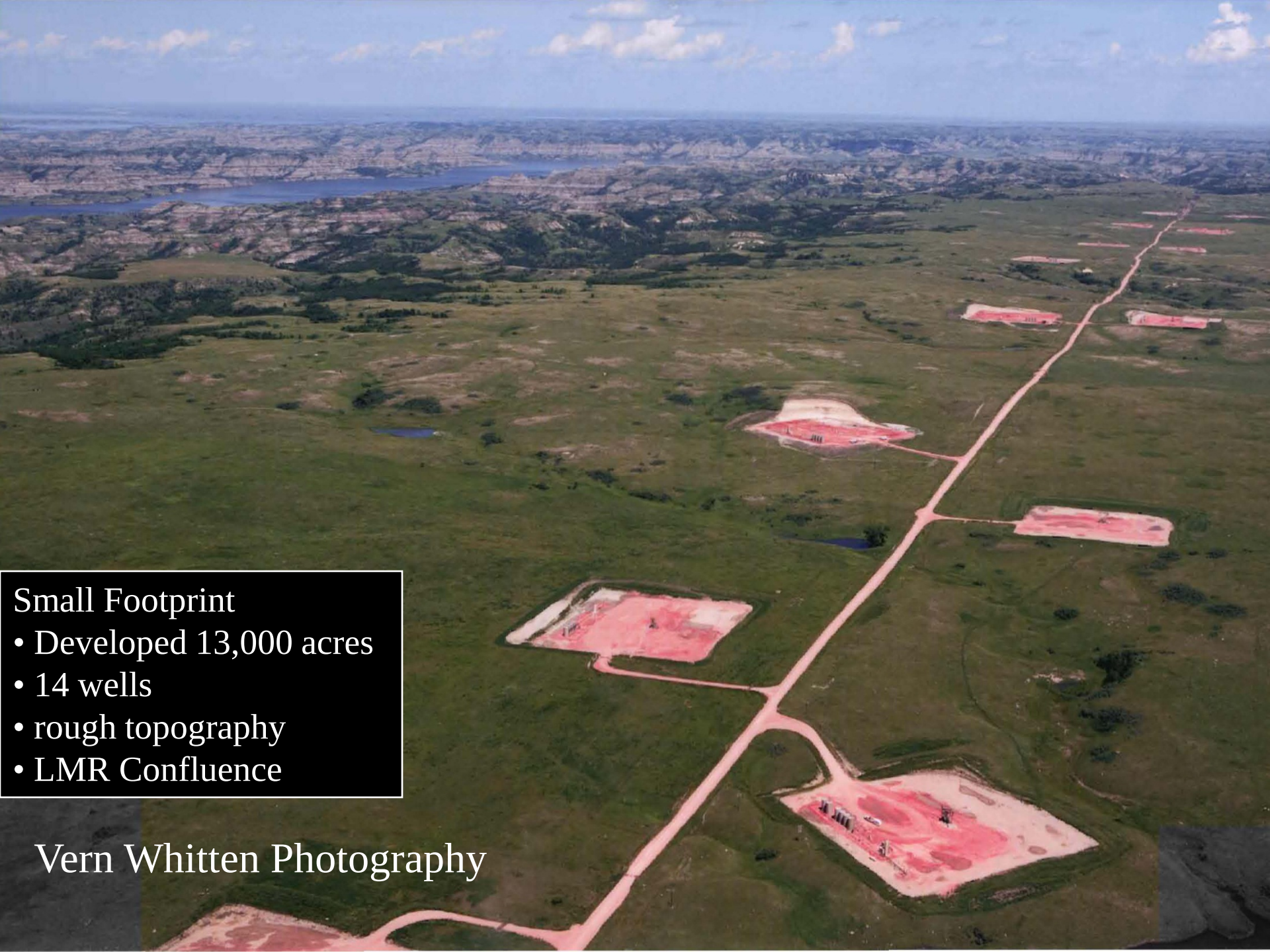


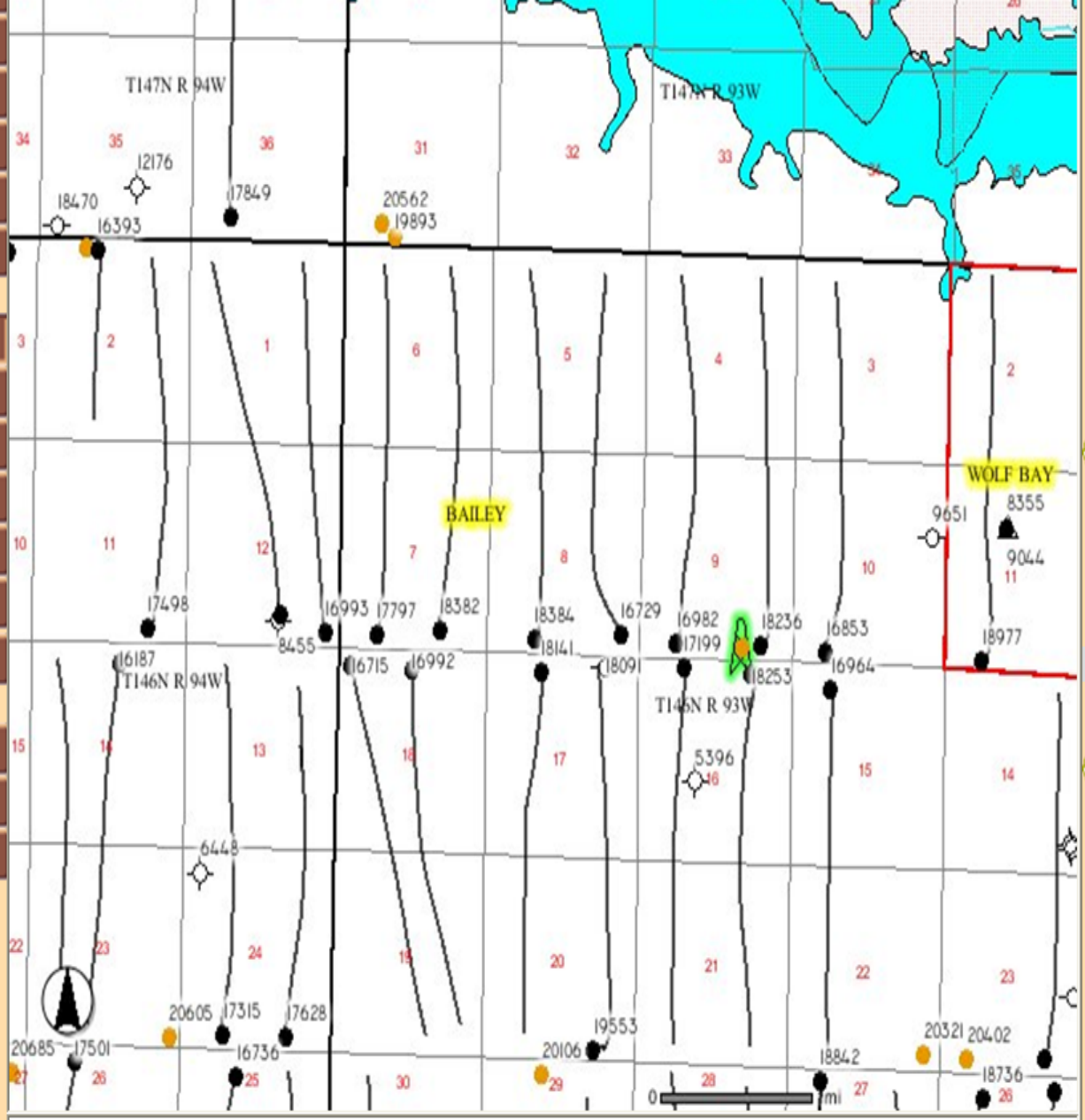
5756 total wells – 2489 Bakken horizontal (43.2%)


North Dakota Daily Oil Produced and Price
BOPD
550,000
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
$550
$500
$450
$400
$350
$300
$250
$200
$150
$100
$50
$0
ND Sweet $/BO
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
BOPD
$/BO


North Dakota Monthly Production Top 12 Counties
5,000,000
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1978
1982
1986
1990
1994
1998
2002
2006
2010
BILLINGS
BOTTINEAU
BOWMAN
BURKE
DIVIDE
DUNN
GOLDEN VALLEY
McKENZIE
MOUNTRAIL
RENVILLE
STARK
WILLIAMS


9. 17. 2005


Small Footprint
• Developed 13,000 acres
• 14 wells
• rough topography
• LMR Confluence
Vern Whitten Photography



Major Rivers
Selection cleared.

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

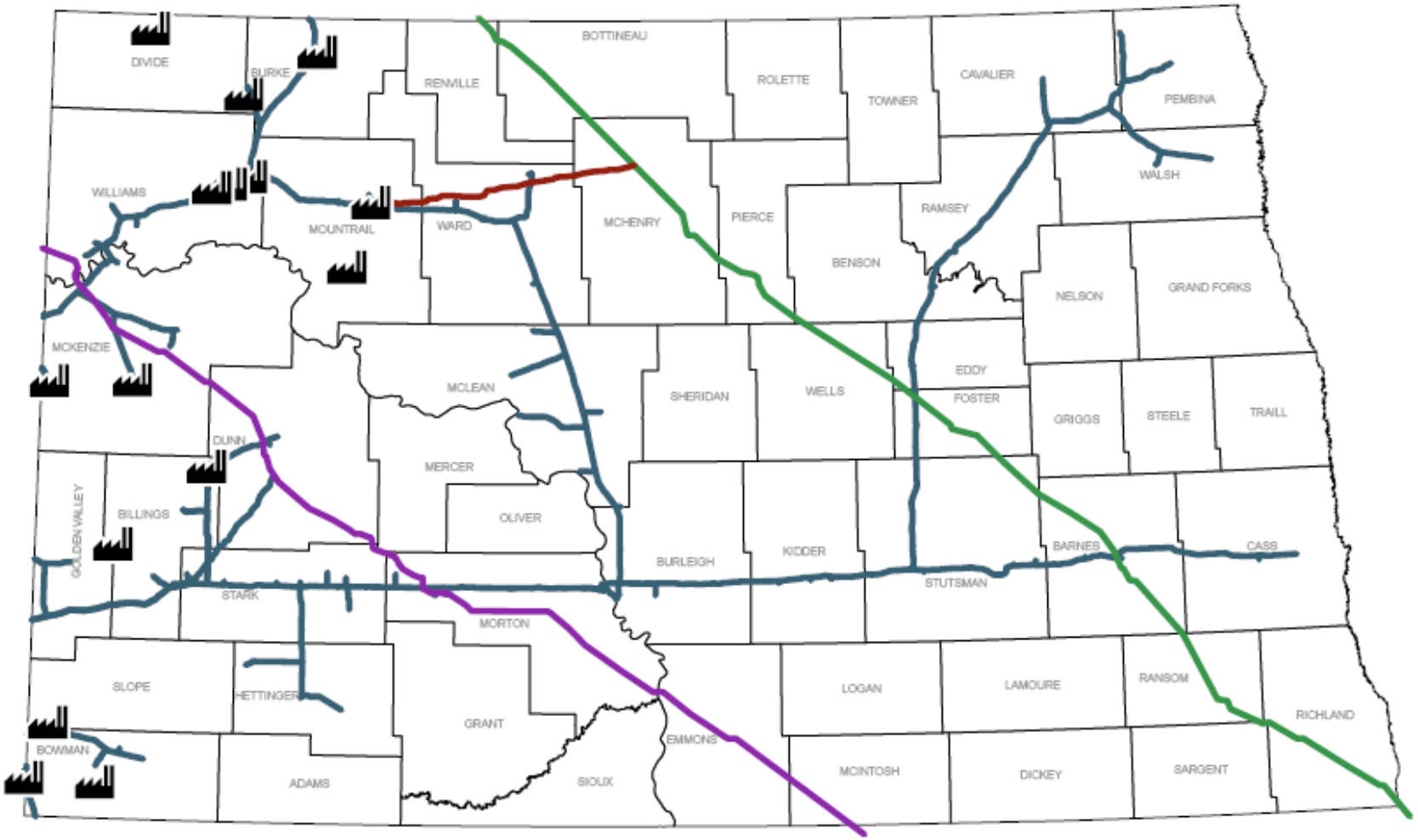
- Rig Location
- Directional Surveys
- Directional Legs
- Horizontal Surveys
- Horizontal Legs
- Cases Docketed
- Oil Fields
- Unit Boundaries
- Inspector Areas
- Drilling / Spacing
- Seismic
- Gas Plants
- Other
  - Reservations
  - Corporate Boundaries
  - Rivers and Roads
    - County Roads
    -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

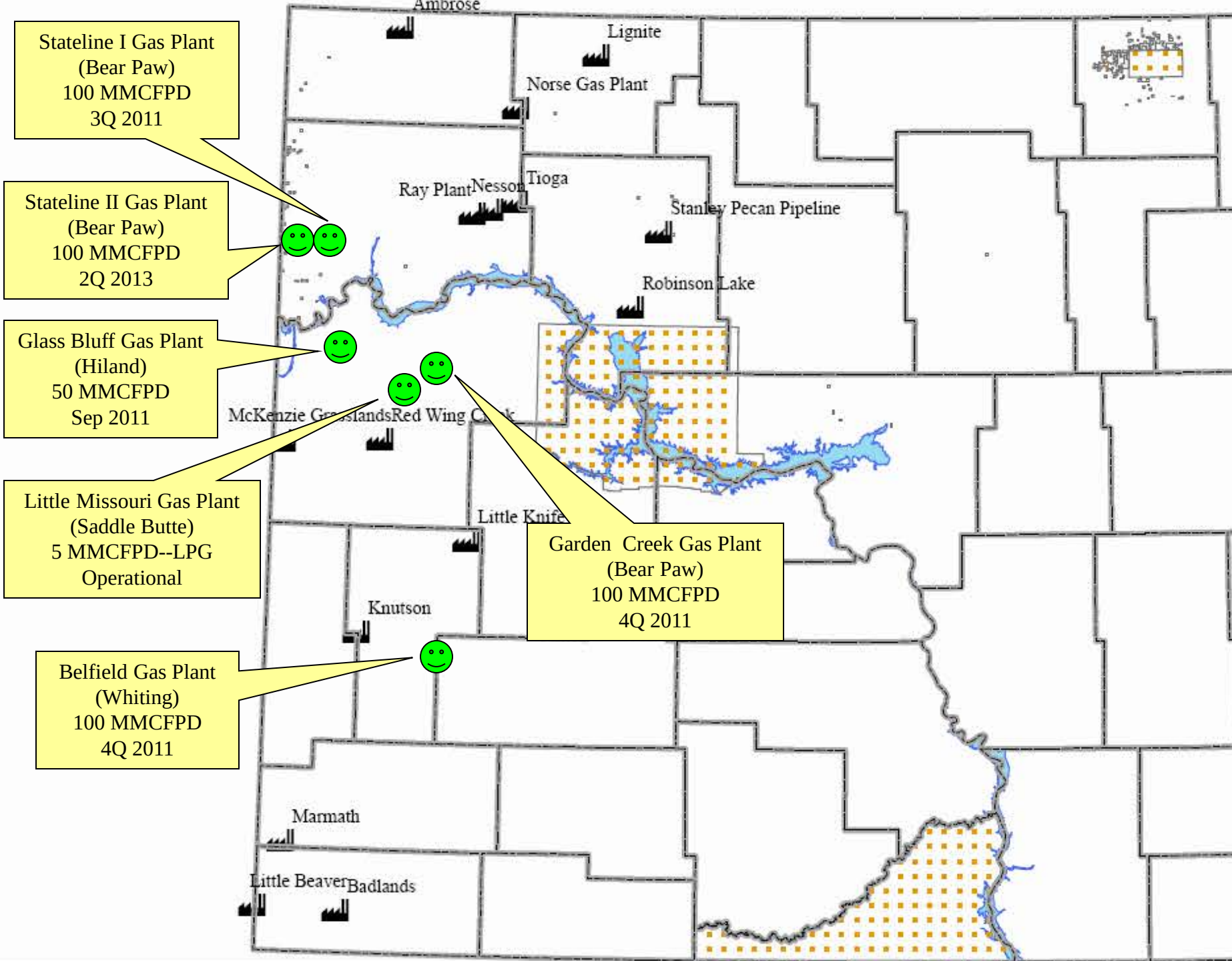
Refresh Map

Auto Refresh

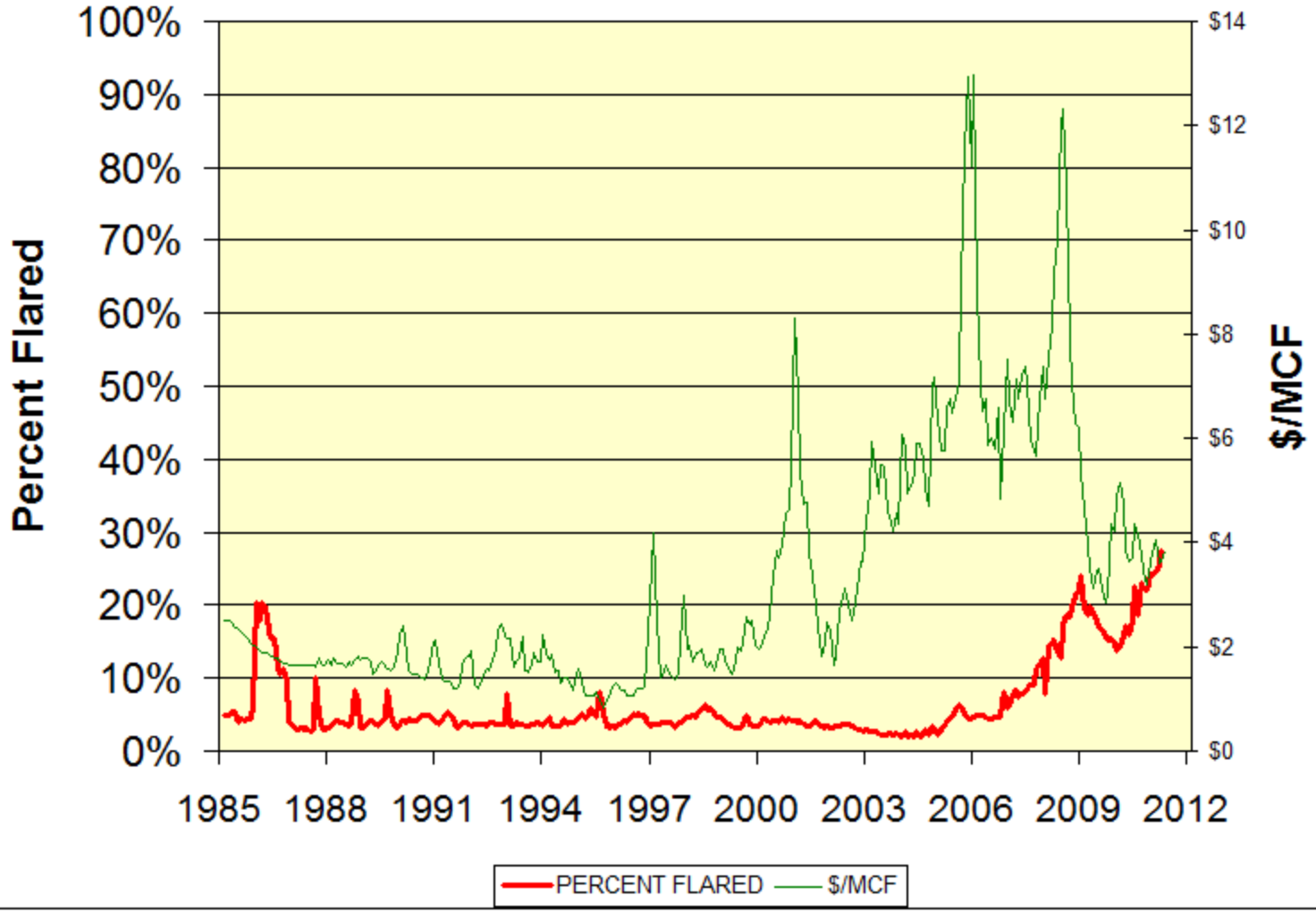
Help:
A closed group, click to open.
An open group, click to close.
A map layer.
A hidden group/layer, click to make visible.

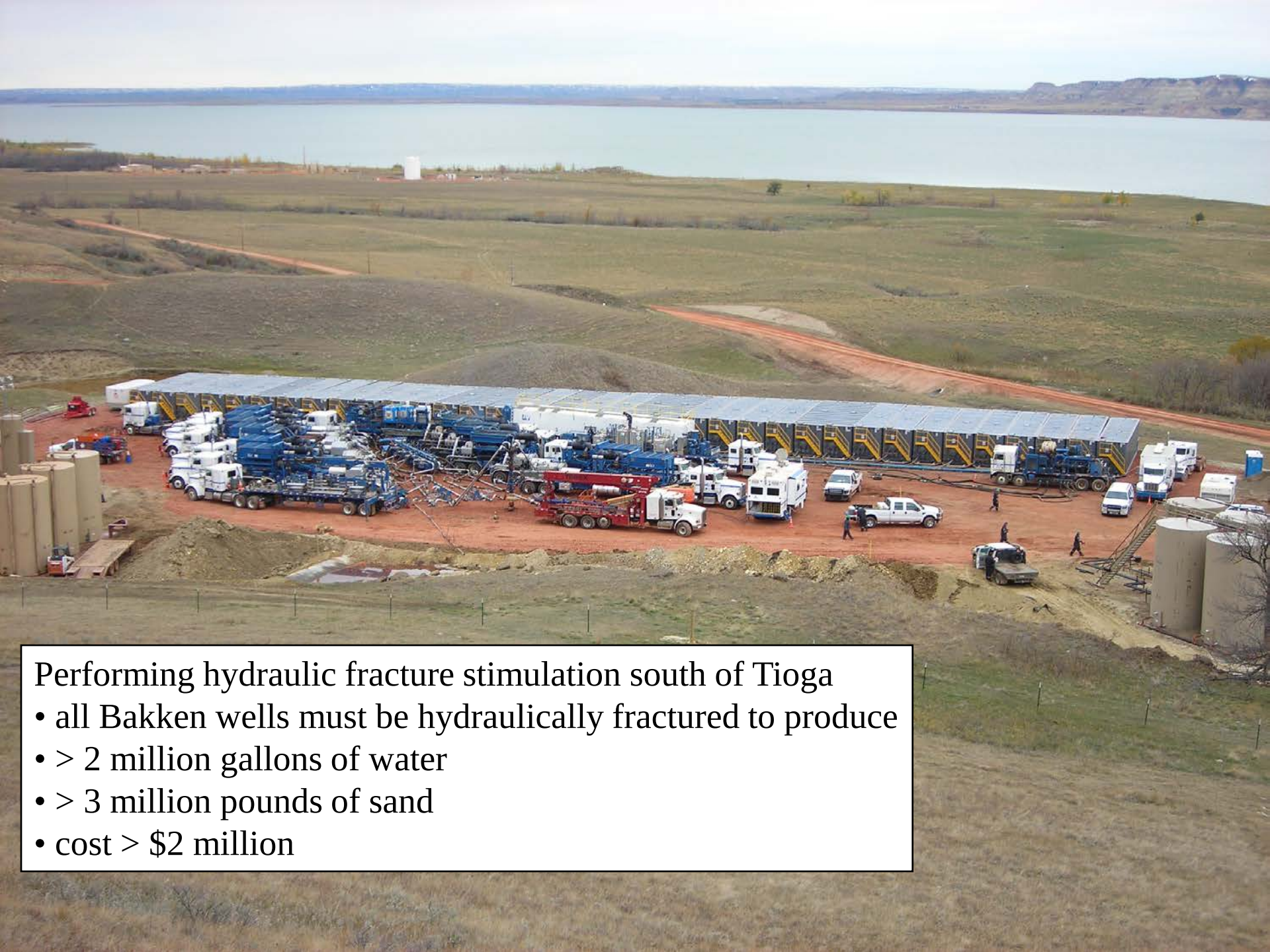
North Dakota Natural Gas Pipelines




Stateline I Gas Plant
(Bear Paw)
100 MMCFPD
3Q 2011
Stateline II Gas Plant
(Bear Paw)
100 MMCFPD
2Q 2013
Glass Bluff Gas Plant
(Hiland)
50 MMCFPD
Sep 2011
Little Missouri Gas Plant
(Saddle Butte)
5 MMCFPD--LPG
Operational
Belfield Gas Plant
(Whiting)
100 MMCFPD
4Q 2011
Garden Creek Gas Plant
(Bear Paw)
100 MMCFPD
4Q 2011
Ambrose
Lignite
Norse Gas Plant
Ray Plant
Nesson
Tioga
Stanley Pecan Pipeline
Robinson Lake
McKenzie Grasslands
Red Wing Creek
Little Knife
Knutson
Marmath
Little Beaver
Badlands

North Dakota Monthly Gas Flared





Performing hydraulic fracture stimulation south of Tioga

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- > 2 million gallons of water
- > 3 million pounds of sand
- cost > $2 million

BAKKEN PROVIDES ENERGY/JOBS

- 5,000 wells in next 2 yrs
  - will double our cur wells @ cur rigs
  - all require hydraulic stimulation
  - provides significant domestic energy
  - creates numerous jobs

Job Opportunities

- 170 – 225 rigs
  - 20,000 jobs in drilling
- 15 – 25 years
  - 28,000 additional wells
  - 28,000 long term jobs

NDSU Economic Impact Study

- Calendar Year 2009 Impact Study
  - $5 billion direct impact
  - $13 billion secondary impact
  - $822 million taxes
  - 18,328 direct jobs
    - 52 rigs + $52.35/bo
- Calendar Year 2010 Impact Study
    - 126 rigs + $69.74/bo

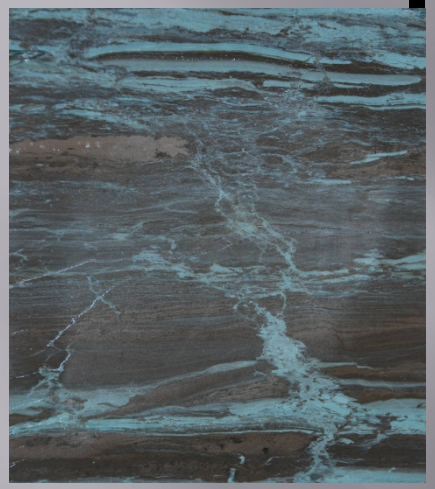
BAKKEN FORMATION

NDIC-DMR estimated

- **appr 200-300 billion bo in place in ND**
- **34-yr supply @ current US consumption**
  - **2.1 billion bo recovery in ND w/1well**
  - **4.2 billion bo recovery in ND w/2wells**
  - **1-7 horizontal wells / spacing unit**

USGS estimated (independent simultaneous study)

- **2.6 billion bo recovery in ND**
- **largest continuous resource they have assessed in lower 48 States**



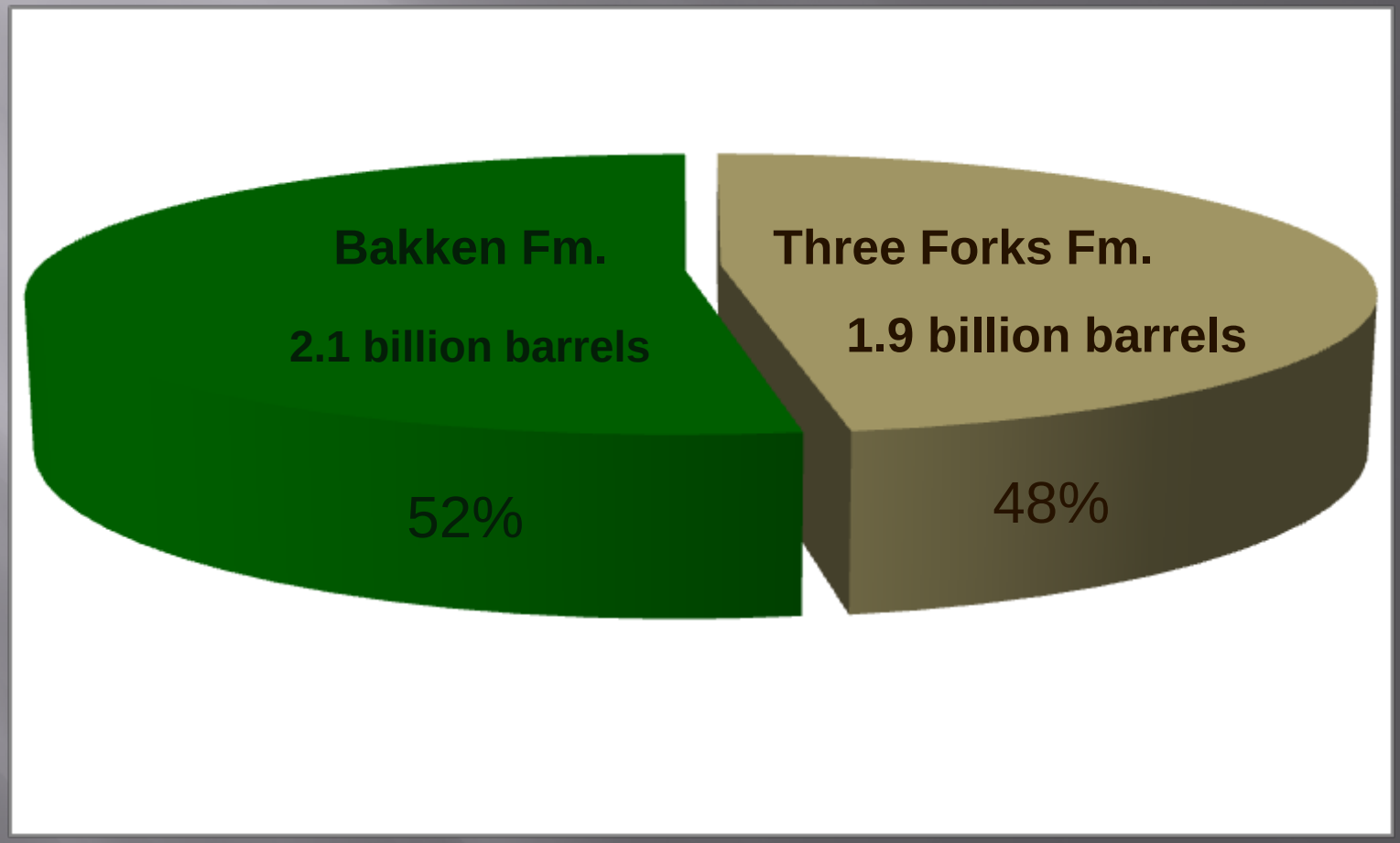
THREE FORKS FORMATION

NDIC-DMR estimated

- **1.9 billion bo recovery in ND w/1well**
- **3.8 billion bo recovery in ND w/2wells**

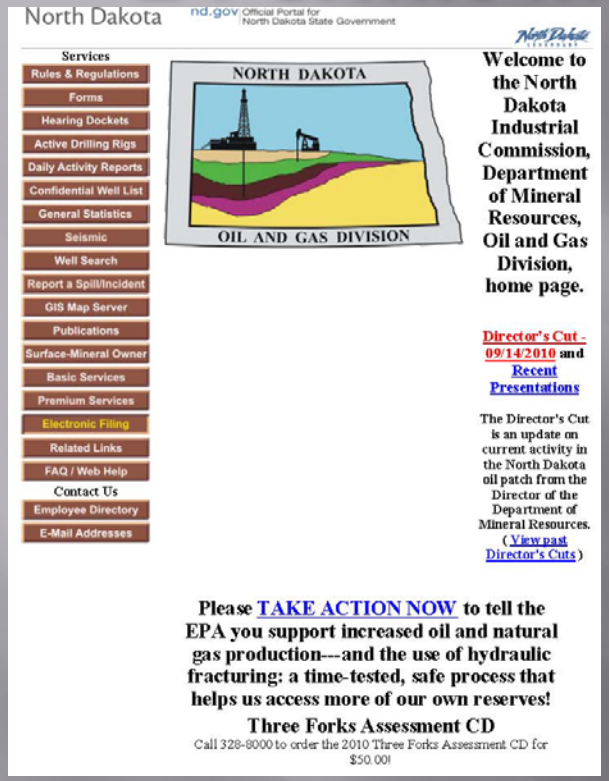
USGS: (No study)

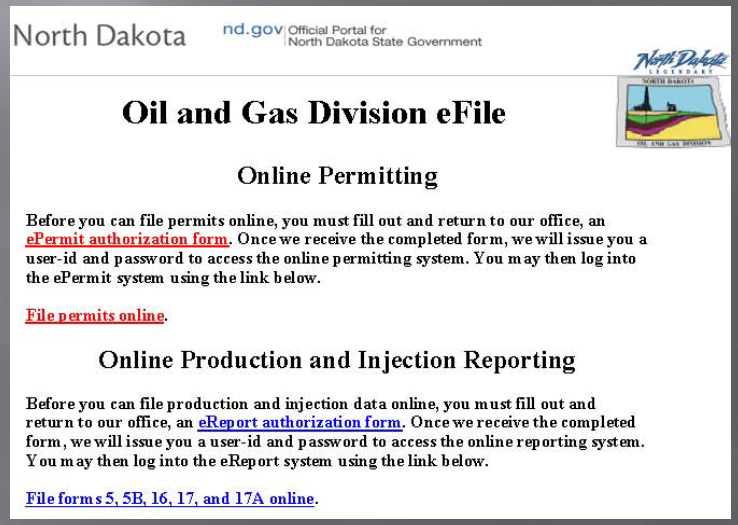
BAKKEN POOL: BAKKEN AND THREE FORKS ASSESSMENT
EXPECTED ULTIMATE RECOVERY

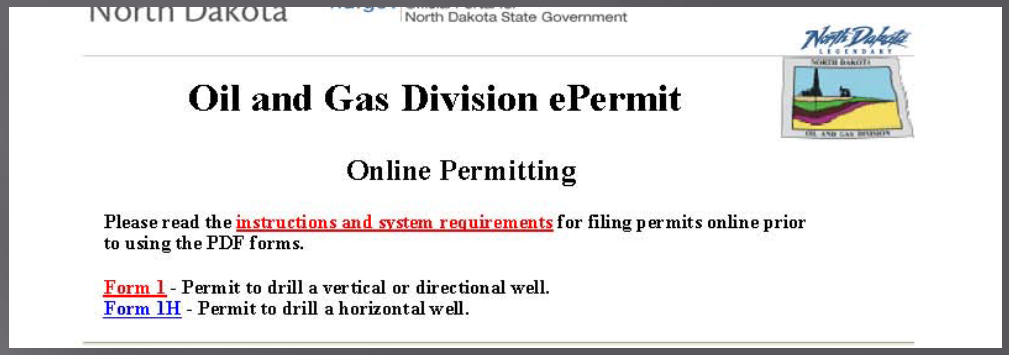


(Nordeng and Helms, 2010))

NDIC PERMITTING.
E-Permit info links on NDIC website







NDIC Form 1 & 1H authorization

North Dakota Industrial Commission
Department of Mineral Resources
Oil & Gas Division

FORM 1 – 1H

E-FILING AUTHORIZATION

COMPANY: _____

This form authorizes the person(s) listed below to access the Department of Mineral Resources E-Filing URL for the purpose of submitting for approval a Form 1 and/or Form 1H Application for Permit to Drill.

A new authorization will be required if any changes are to be made to the authorized individuals on the form.

The data submitted from the e-mail address(es) listed below have been checked and conform to the standards and procedures set forth by the NDIC Department of Mineral Resources.

Authorized Individuals	**E-Mail Address**

Authorized Signature: _____ Date: _____

Printed Name: _____

Witness Signature: _____ Date: _____

Printed Name: _____

e-Permitting instructions

North Dakota Oil and Gas Division
Form 1 and Form 1H Data Entry Procedures

- Prerequisites
  - Most current Adobe Reader – free download from Adobe.com
    - Adobe Reader Settings – Remove caching of previous entered forms data
      - Open Adobe Reader
      - Click Edit – Preferences
      - Remove the checkbox for "Keep forms data temporarily available on disk
      - Click OK to close Adobe Reader
  - Authorized UserID and Password from ND Oil and Gas
  - Internet connection – URL's below
    - Form 1H ("https://www.dmr.nd.gov/oilgas/webforms/wform1h.pdf"
    - Form 1 (https://www.dmr.nd.gov/oilgas/webforms/wform1.pdf
- Procedure
  - Templates
    - You do not have to create or use templates. You can simply enter permits entirely from scratch, save them until complete, and submit them when they are done being entered.
    - Templates do potentially save time, since core information can be saved and doesn't need to be re-entered in each permit.
  - Entering a Permit
    - Overview
      - Once permits are submitted, you will no longer be able to view them.
      - Although you can save a copy of every permit prior to submitting (Save As New (Copy), it may get confusing paging through permits already submitted and new permits.
      - It would be more advisable to "Print" hard copies or "Print" to an image file such as a pdf writer or Microsoft Office Image Writer which will digitally save the file. This will keep your number of web permits down to a manageable number.
    - Create a template
      - A template could contain the base information such as company information, type of work, type of well, email addresses you want the approved permit information emailed to, etc. This will allow you to not have to re-enter data that is common to "MOST" of the permits applied for.
      - After entering the common data – click "Save". This template will then be saved.
      - You can have multiple templates in your system.
    - Using a template to enter a new permit or click on "New Blank (Reset)" to start new.
      - Using "View Previous" or "View Next", browse to the template you would like to base your permit on
      - Click "Save As New (Copy)" to create a copy of the template.

Preliminary Permitting steps

- Form 1H e-Permit
- Email attachments to apd@nd.gov: Certified surveyor's plat, horizontal section plat, geo tops, proposed mud/cementing plans, directional plot/plan
  - $100 fee credit card or check
- Permit submitted into NDIC Queue

Addressing Permitting issues

- Form 1 vs. attachments. Correct?
- Plats-Well location, Horizontal section, C/F diagram
- Google Earth (topo)
- Proximity to map area reviews
- Bonding
- Pierre Shale (min. surface casing depth)
- Magnetic Declination
- Field Orders
- Setbacks/hard lines

Workflow Module Stages

- Stage 0: SUBMITTED TO NDIC
- Stage 1: RECEIVED: Are all attachments in?
- Stage 2: VERIFY: Attachments to FM 1, map features
- Stage 3: RESEARCH: Orders, Pierre top, hard lines
- Stage 4: PERMIT: Review & permit when satisfied.

Final APD approval

- e-Permit transferred to RBDMS (calc HL)
- APPROVE and system generates FM 1H & permit letter.
- Email to permit & MWD survey guidelines letter directly to operator immediately
- Send secretaries notification for permit fee.
- Required open hole logs: resistivity & porosity. May request log waiver if control in area.
- PERMIT STIPULATIONS

Permit Letter

NORTH DAKOTA
OIL AND GAS DIVISION

Oil and Gas Division

Lynn D. Helms - Director Bruce E. Hicks - Assistant Director

Department of Mineral Resources

Lynn D. Helms - Director

North Dakota Industrial Commission

www.oilgas.nd.gov

October 7, 2010

Angie M. Rawlinson
Engineering Technician
MUREX PETROLEUM CORPORATION
515 N. Sam Houston Pkwy East, Suite 485
Houston, TX 77060

RE: HORIZONTAL WELL
VANESSA ABIGAIL 33-28H
SWSW Section 33-157N-95W
Williams County
Well File # 19540

Dear Angie :

Pursuant to Commission Order No. 15059, approval to drill the above captioned well is hereby given. The approval is granted on the condition that all portions of the well bore not isolated by cement, be no closer than the 200' setback from the north & south boundaries and 500' setback from the east & west boundaries within the 1280 acre spacing unit consisting of sections 33 & 28, T157N, R95W.

PERMIT STIPULATIONS: Be advised the Nelson #13-28 SWD (5612) well is within 300 feet of the proposed wellbore for the Vanessa Abigail #33-28H well. Precautions must be taken while designing the frac job for the Vanessa Abigail #33-28H well as to not adversely affect the Nelson #13-28 SWD (5612) well. Tool error is not required pursuant to Order 15059.

New Policy

Operators shall not commence operations on a drill site until the 3rd business day following publication of the approved drilling permit on the NDIC - OGD Daily Activity Report. If circumstances require operations to commence before the 3rd business day following publication on the Daily Activity Report, the waiting period may be waived by the Director. Application for a waiver must be by sworn affidavit providing the information necessary to evaluate the extenuating circumstances, the factors of NDAC 43-02-03-16.2 (1), (a)-(f), and any other information that would allow the Director to conclude that in the event another owner seeks revocation of the drilling permit, the applicant should retain the permit.

Permit Fee & Notification

Payment was received in the amount of $100 via credit card .The permit fee has been received. It is requested that notification be given immediately upon the spudding of the well. This information should be relayed to the Oil & Gas Division, Bismarck, via telephone. The following information must be included: Well name, legal location, permit number, drilling contractor, company representative, date and time of spudding. Office hours are 8:00 a.m. to 12:00 p.m. and 1:00 p.m. to 5:00 p.m. Central Time. Our telephone number is (701) 328-8020, leave a message if after hours or on the weekend.

Survey Requirements for Horizontal, Horizontal Re-entry, and Directional Wells

NDAC Section 43-02-03-25 (Deviation Tests and Directional Surveys) states in part (that) the survey contractor shall file a certified copy of all surveys with the director free of charge within thirty days of completion. Surveys must be submitted as one electronic copy, or in a form approved by the director. However, the director may require the directional survey to be filed immediately after completion if the survey is needed to conduct the operation of the director's office in a timely manner. Certified surveys must be submitted via email in one adobe document, with a certification cover page to certsurvey@nd.gov.
Survey points shall be of such frequency to accurately determine the entire location of the well bore.

Reserve pit

Please be advised that conditions may be imposed on the use and reclamation of a drilling reserve pit on this site if specific site conditions warrant.

Surface casing cement

Tail cement utilized on surface casing must have a minimum compressive strength of 500 psi within 12 hours, and tail cement utilized on production casing must have a minimum compressive strength of 500 psi before drilling the plug or initiating tests.

Logs

NDAC Section 43-02-03-31 requires the running of a Cement Bond Log from which the presence of cement can be determined in every well in which production or intermediate casing has been set and a Gamma Ray Log must be run from total depth to ground level elevation of the well bore. All logs must be submitted as one paper copy and one digital copy in LAS (Log ASCII) format, or a format approved by the Director. Image logs that include, but are not limited to, Mud Logs, Cement Bond Logs, and Cyberlook Logs, cannot be produced in their entirety as LAS (Log ASCII) files. To create a solution and establish a standard format for industry to follow when submitting image logs, the Director has given approval for the operator to submit an image log as a TIFF (*.tif) formatted file. The TIFF (*.tif) format will be accepted only when the log cannot be produced in its entirety as a LAS (Log ASCII) file format. The digital copy may be submitted on a 3.5" floppy diskette, a standard CD, or attached to an email sent to digitallogs@nd.gov
Thank you for your cooperation.

Sincerely,

Dave McCusker
Petroleum Engineer

Permit Stipulations

- Based on environmental factors
  - Topography (rough terrain)
    - Closed system, no drilling pit
  - Aquifers in the area
  - Distance to a body of water
- Based on additional wells on the pad
  - Closed system, cuttings pit only.
- MULTI WELL PADS--We prefer operators submit only the wells which will be drilled consecutively on the pad. I.E. if 4 wells are noted on the pad we'll assume all will be drilled back to back.

FORM 1H

APPLICATION FOR PERMIT TO DRILL HORIZONTAL WELL - FORM 1H

INDUSTRIAL COMMISSION OF NORTH DAKOTA
OIL AND GAS DIVISION
600 EAST BOULEVARD DEPT 405
BISMARCK, ND 58505-0840
SFN 54269 (08-2005)

PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.
PLEASE SUBMIT THE ORIGINAL AND ONE COPY.

Type of Work	Type of Well	Approximate Date Work Will Start	Confidential Status
New Location	Oil & Gas	9 / 13 / 2010	No

Operator	Telephone Number
MUREX PETROLEUM CORPORATION	281-590-3313

Address	City	State	Zip Code
515 N. Sam Houston Pkwy East, Suite 485	Houston	TX	77060

☑ Notice has been provided to the owner of any permanently occupied dwelling within 1,320 feet.

☑ This well is not located within five hundred feet of an occupied dwelling.

WELL INFORMATION (If more than one lateral proposed, enter data for additional laterals on page 2)

Well Name	Well Number
VANESSA ABIGAIL	33-28H

Surface Footages	Qtr-Qtr	Section	Township	Range	County
300 F S L 570 F W L	SWSW	33	157 N	95 W	Williams

Longstring Casing Point Footages	Qtr-Qtr	Section	Township	Range	County
740 F S L 583 F W L	SWSW	33	157 N	95 W	Williams

Longstring Casing Point Coordinates From Well Head	Azimuth	Longstring Total Depth	
440 N From WH 13 E From WH	1.69 °	9981 Feet MD	9729 Feet TVD

Bottom Hole Footages From Nearest Section Line	Qtr-Qtr	Section	Township	Range	County
201 F N L 866 F W L	NWNW	28	157 N	95 W	Williams

Bottom Hole Coordinates From Well Head	KOP Lateral 1	Azimuth Lateral 1	Estimated Total Depth Lateral 1	
10068 N From WH 296 E From WH	9288 Feet MD	1.69 °	19612 Feet MD	9729 Feet TVD

Latitude of Well Head	Longitude of Well Head	NAD Reference	Description of (Subject to NDIC Approval)
48 ° 22 ' 24.08 "	-102 ° 58 ' 12.92 "	NAD83	Spacing Unit: sections 33 & 28, T157N, R95W

Ground Elevation	Acres in Spacing/Drilling Unit	Spacing/Drilling Unit Setback Requirement		Industrial Commission Order
2323 Feet Above S.L.	1280	200 Feet N/S	500 Feet E/W	15059

North Line of Spacing/Drilling Unit	South Line of Spacing/Drilling Unit	East Line of Spacing/Drilling Unit	West Line of Spacing/Drilling Unit
5281 Feet	5281 Feet	10565 Feet	10569 Feet

Objective Horizons	Pierre Shale Top
Bakken	1643

	Size	Weight	Depth	Cement Volume	
Proposed Surface Casing	9 - 5/8 "	36 Lb./Ft.	1720 Feet	500 Sacks	NOTE: Surface hole must be drilled with fresh water and surface casing must be cemented back to surface.

	Size	Weight(s)	Longstring Total Depth		Cement Volume	Cement Top	Top Dakota Sand
Proposed Longstring Casing	7 - "	29-32 Lb./Ft.	9981 Feet MD	9729 Feet TVD	720 Sacks	4000 Feet	4647 Feet

Base Last Charles Salt (If Applicable)	
8213 Feet	NOTE: Intermediate or longstring casing string must be cemented above the top Dakota Group Sand.

Proposed Logs
mudlogs / MWD GR / CBL w/GR to surf

Drilling Mud Type (Vertical Hole - Below Surface Casing)	Drilling Mud Type (Lateral)
Invert	Brine

Survey Type in Vertical Portion of Well	Survey Frequency: Build Section	Survey Frequency: Lateral	Survey Contractor
Gyro MS Every 100 Feet	30 Feet	90 Feet	Pathfinder

NOTE: A Gamma Ray log must be run to ground surface and a CBL must be run on intermediate or longstring casing string if set.

Surveys are required at least every 30 feet in the build section and every 90 feet in the lateral section of a horizontal well. Measurement inaccuracies are not considered when determining compliance with the spacing/drilling unit boundary setback requirement except in the following scenarios: 1) When the angle between the well bore and the respective boundary is 10 degrees or less and the well bore is within 150 feet of the respective setback requirement; or 2) If industry standard methods and equipment are not utilized. Consult the applicable field order for exceptions.

If measurement inaccuracies are required to be considered, a 2° MWD measurement inaccuracy will be applied to the horizontal portion of the well bore. This measurement inaccuracy is applied to the well bore from KOP to TD.

REQUIRED ATTACHMENTS: Certified surveyor's plat, horizontal section plat, estimated geological tops, proposed mud/cementing plan, directional plot/plan, $100 fee.
See Page 2 for Comments section and signature block.

COMMENTS, ADDITIONAL INFORMATION, AND/OR LIST OF ATTACHMENTS

This is the 2nd well in this spacing unit. The first is the LeAnn Rae #28-33H file #16035.

Lateral 2

KOP Lateral 2 Feet MD	Azimuth Lateral 2 °	Estimated Total Depth Lateral 2 Feet MD / Feet TVD	KOP Coordinates From Well Head From WH / From WH
Formation Entry Point Coordinates From Well Head From WH / From WH		Bottom Hole Coordinates From Well Head From WH / From WH	From WH

KOP Footages From Nearest Section Line	Qtr-Qtr	Section	Township	Range	County
F L F L			N	W	

Bottom Hole Footages From Nearest Section Line	Qtr-Qtr	Section	Township	Range	County
F L F L			N	W	

Lateral 3

KOP Lateral 3 Feet MD	Azimuth Lateral 3 °	Estimated Total Depth Lateral 3 Feet MD / Feet TVD	KOP Coordinates From Well Head From WH / From WH
Formation Entry Point Coordinates From Well Head From WH / From WH		Bottom Hole Coordinates From Well Head From WH / From WH	From WH

KOP Footages From Nearest Section Line	Qtr-Qtr	Section	Township	Range	County
F L F L			N	W	

Bottom Hole Footages From Nearest Section Line	Qtr-Qtr	Section	Township	Range	County
F L F L			N	W	

Lateral 4

KOP Lateral 4 Feet MD	Azimuth Lateral 4 °	Estimated Total Depth Lateral 4 Feet MD / Feet TVD	KOP Coordinates From Well Head From WH / From WH
Formation Entry Point Coordinates From Well Head From WH / From WH		Bottom Hole Coordinates From Well Head From WH / From WH	From WH

KOP Footages From Nearest Section Line	Qtr-Qtr	Section	Township	Range	County
F L F L			N	W	

Bottom Hole Footages From Nearest Section Line	Qtr-Qtr	Section	Township	Range	County
F L F L			N	W	

Lateral 5

KOP Lateral 5 Feet MD	Azimuth Lateral 5 °	Estimated Total Depth Lateral 5 Feet MD / Feet TVD	KOP Coordinates From Well Head From WH / From WH
Formation Entry Point Coordinates From Well Head From WH / From WH		Bottom Hole Coordinates From Well Head From WH / From WH	From WH

KOP Footages From Nearest Section Line	Qtr-Qtr	Section	Township	Range	County
F L F L			N	W	

Bottom Hole Footages From Nearest Section Line	Qtr-Qtr	Section	Township	Range	County
F L F L			N	W	

I hereby swear or affirm the information provided is true, complete and correct as determined from all available records. Date: 8 / 30 / 2010

ePermit	Printed Name	Title
	Angie M. Rawlinson	Engineering Technician

FOR STATE USE ONLY

Permit and File Number	API Number
19540	33 - 105 - 01958
Field: MIDWAY	
Pool: BAKKEN	Permit Type: DEVELOPMENT

FOR STATE USE ONLY

Date Approved	By	Title
9 / 14 / 2010	Dave McCusker	Petroleum Engineer

PLAT REQUIREMENTS

NDIC Oil & Gas Division requires

- Certified well location plat,
- Certified Horizontal Section plat
- Certified Bottom Hole Location plat
- Certified Cut and Fill Diagrams
  - Pad Layout Design.
  - Pad layout volumetrics (Cubic yards used, acreage of pad).
- Good and Bad Examples of each.

Well Location Plat requirements

- Prepared in accordance with NDCC 40-50.1.
  - MONUMENTS—"EXCECUTED WITH GREAT CARE"
    - NDPLS guidelines: "Ascertain that the monuments used to determine section lines are the section corner monuments according to the rules as defined by the BLM Manual of Instructions. Land Surveyor is responsible for rehabilitating monuments and corner recordation.
- Plat Must have ND Stamp. Must be RLS in ND Per NDCC 43-19.1-01
- Must depict ground level at well head.
- Plats referenced to True North.

Needs True North Reference

WELL LOCATION PLAT

FAX. 307-875-3640

Scale: 1"= 1000'

1675 FEET FROM

2000 FEET FROM

E LOCATION)

E LOCATION)

MCLEAN COUNTY, NORTH DAKOTA

COMPANY
4-9H
E LOCATION)
27"
.03"
95"
NAD 83
GROUND
23"
.41"
36"
NAD 27

COMPANY
4-9H
LOCATION)
98"
5.93"
48"
94"
4.32"
00"
NAD 83
NAD 27

MEAS. 270°01'21" 2637.7
REC. WEST 39.98 CH.
FOUND 2.5" BRASS CAP

MEAS. 270°00'29" 2640.1
REC. WEST 39.98 CH.
FOUND 2" IRON PIPE

FOUND 2.5" BRASS CAP

MEAS. 359°53'59" 2640.1
REC. N 00°04' W 40.00 CH.

1/16 LINE
1/4 LINE
1/16 LINE

1/16 LINE
NW1/4
NE1/4

1/4 LINE
FOUND STONE

T150N R90W
9

1/16 LINE
SW1/4
SE1/4

MEAS. 359°57'32" 2639.6
REC. N 00°04' W 40.00 CH.

REC. N 00°03' W 40.00 CH.
MEAS. 359°57'06" 5279.0

REC. N 00°03' W 40.00 CH.
MEAS. 359°57'06" 5279.0

GRADED ELEV. AT WELL PAD 2109.2'
MEAN SEA LEVEL
EX. GND. EL. AT WELL SITE 2109.2'

291' FSL
1675' FEL
90°
90°

LEGEND
- FOUND CORNER
- CALCULATED CORNER
- NOTHING FOUND

FOUND 2.5" BRASS CAP
MEAS. 270°01'13" 2637.3
REC. N 89°57' W 39.97 CH.

FOUND 2.5" BRASS CAP
MEAS. 269°59'46" 2638.4
REC. N 89°57' W 39.97 CH.

FOUND 2" IRON PIPE

thin

being of the 5th P.M., Mclean County, State of North Dakota.
Surface Hole Elevation of ungraded ground is 2109.2 ft

Notes: All Azimuths are based on the South line of the Southeast Quarter of Section 4, T150N R90W of the 5th P.M., being an Azimuth of 269°59'46" using GPS observations, occupying a WHS contro point (5/8"rebar) and having the Location and Elevation derived from an OPUS Solution. Azimuths shown have been rotated 1°16'05.36010" West from SPC Grid bearings to Geodetic North, based o convergence angle provided by a conversion using Corpscon.
Vertical Datum used is of NAVD 88.
Control Point is located 271°16'16" 1032.72 ft. from the SW Section Corner of Section 4, T150N R of the 5th P.M.

RED LAND SU

Horizontal Section Plats

- Prepared in accordance with NDCC 40-50.1.
  - Monuments.
- Plat Must have ND Stamp. Must be RLS in ND Per NDCC 43-19.1-01
- Boundary Survey.
  - Submit all plats which define the spacing unit. (i.e.: 2- “640” acre plats if “1280” acre spacing unit).
- Depict all ¼ section distances.

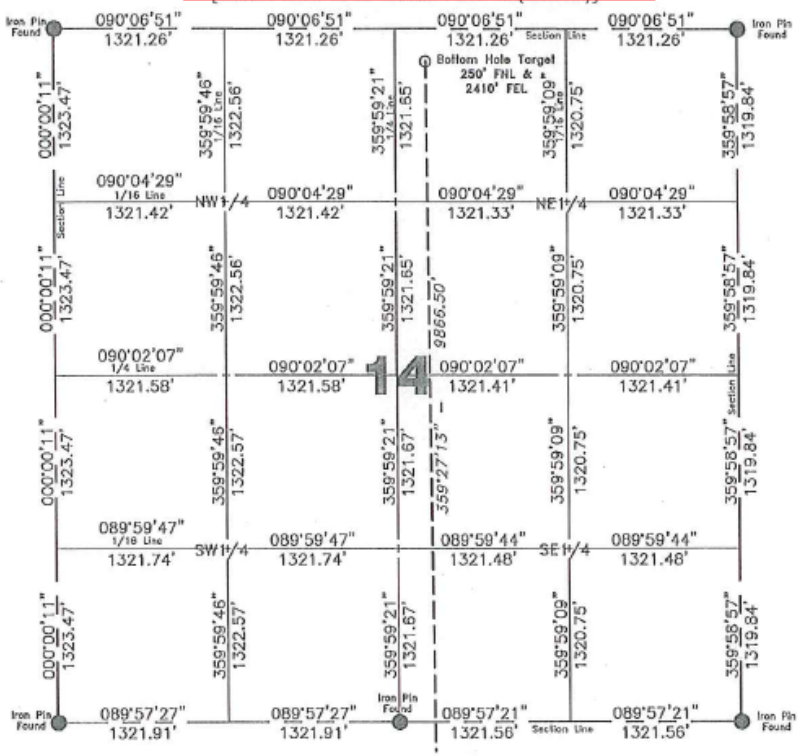
HORIZONTAL SECTION PLAT

6300 Brid [redacted] 78730

450 feet from [redacted] ce location)

250 feet from t[redacted] hole target)

Latitude 48°18[redacted] e location)
Latitude 48°20[redacted] hole target)



Scale 1"=1000'

Confidentiality Notice: The information contained on this plat is legally privileged and confidential information intended only for the use of recipients. If you are not the intended recipients, you are hereby notified that any use, dissemination, distribution or copying of this information is strictly prohibited.

I, Alvin R. Lombert, Professional Land Surveyor, N.D. No. 1241, do hereby certify that the survey plat shown hereon was made by me, or under my direction, from notes made in the field, and the same is true and correct to the best of my knowledge and belief.

All corners shown on this plat were found in the field during Brigham Oil & Gas, LP Barstad 23-14 #2H oil well survey on 04/11/2011. Distances to all others are calculated. All azimuths are based on the west line of Section 23, being on an azimuth of 000°02'36".

[redacted]

[redacted]

[redacted]

NORTH DAKOTA

4/27/11
DATE

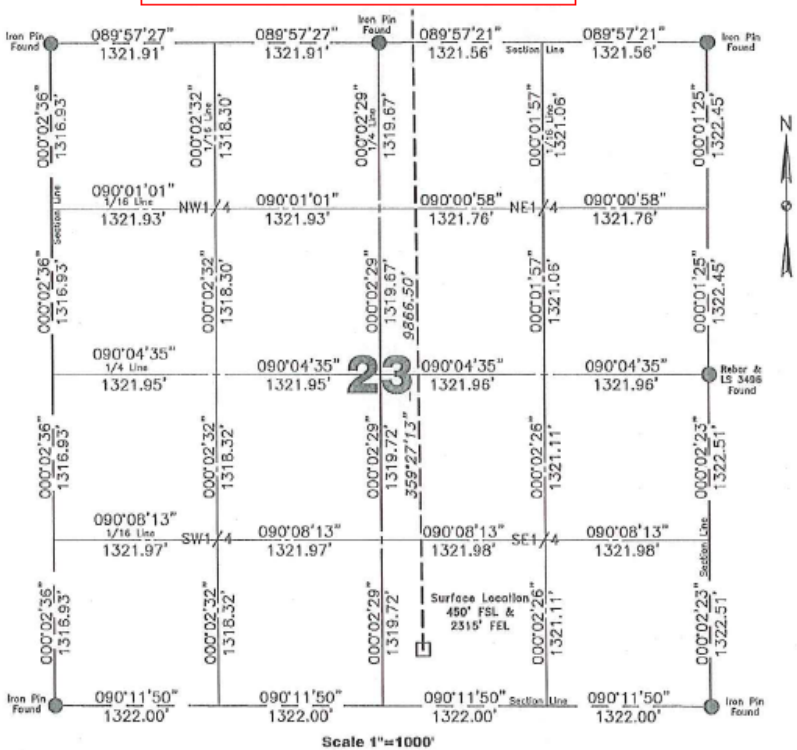
HORIZONTAL SECTION PLAT

6300 B[redacted]xas 78730

450 feet fro[redacted]surface location)

250 feet from[redacted]ottom hole target)

Latitude 48[redacted]urface location)
Latitude 48[redacted]om hole target)



Scale 1"=1000'

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I, Alvin R. Lambert, Professional Land Surveyor, N.D. No. 1241, do hereby certify that the survey plat shown hereon was made by me, or under my direction, from notes made in the field, and the same is true and correct to the best of my knowledge and belief.

All corners shown on this plat were found in the field during Brigham Oil & Gas, LP Barstad 23-14 #2H oil well survey on 04/11/2011. Distances to all others are calculated. All azimuths are based on the west line of Section 23, being on an azimuth of 000°02'36".

[redacted]

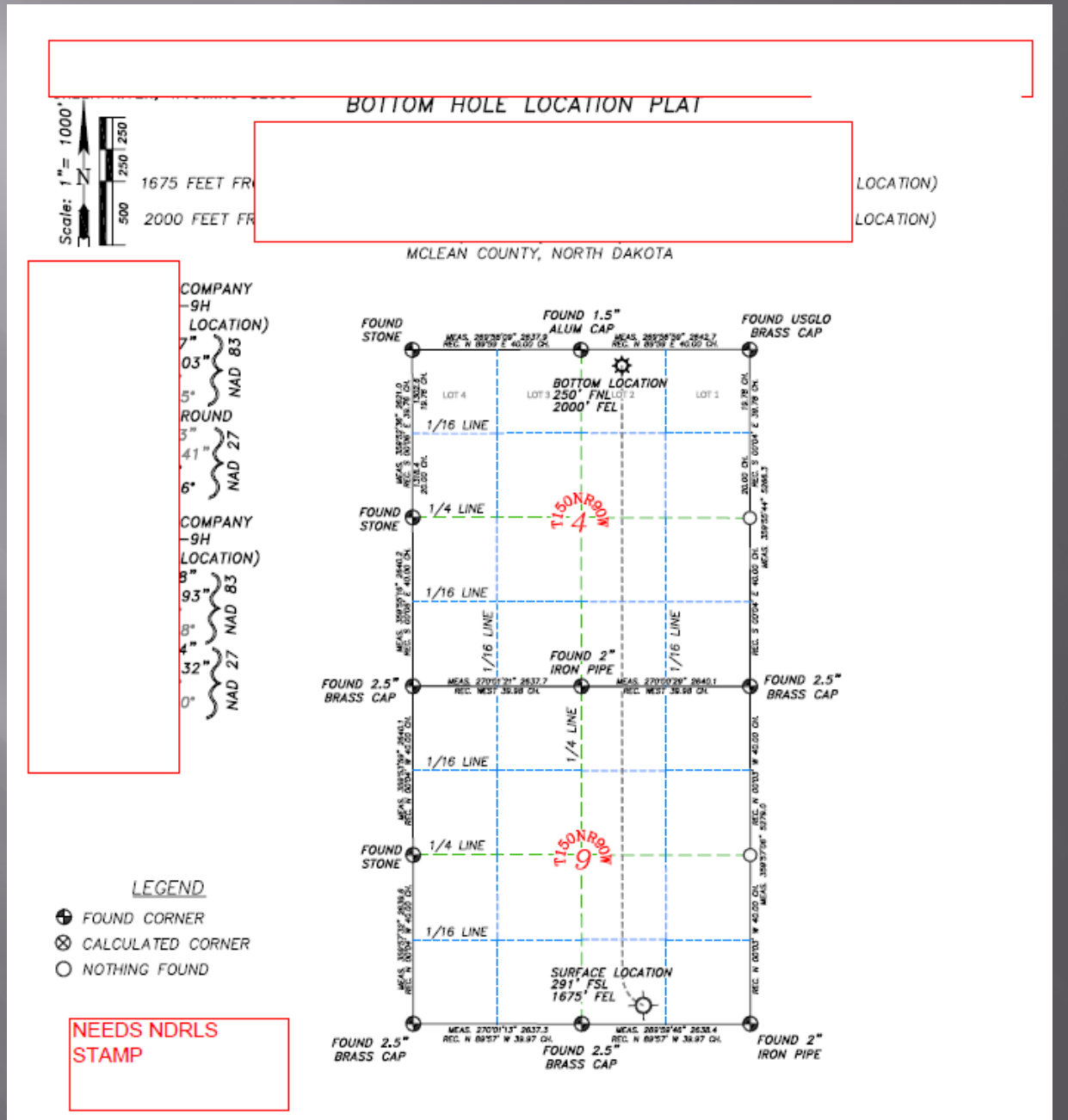
NORTH DAKOTA

4/27/11
DATE

[redacted]

[redacted]

Bottom Hole Location Plat



Cut and Fill Diagram

- Prepared in accordance with NDCC 40-50.1.
  - Must be stamped by a registered land surveyor or engineer.
- Pad cannot be located in a drainage or hazardously near a body of water.
  - Pad Layout Design
  - Typical Cross Sections
- Cut and Fill diagram
  - Depict Cut and Fill on corners of pit
    - NO FILL in Pit (or corners) per NDAC 43-02-03-19
  - Depict Cut and Fill on corners of the location
  - Depict Cut and Fill at the well head

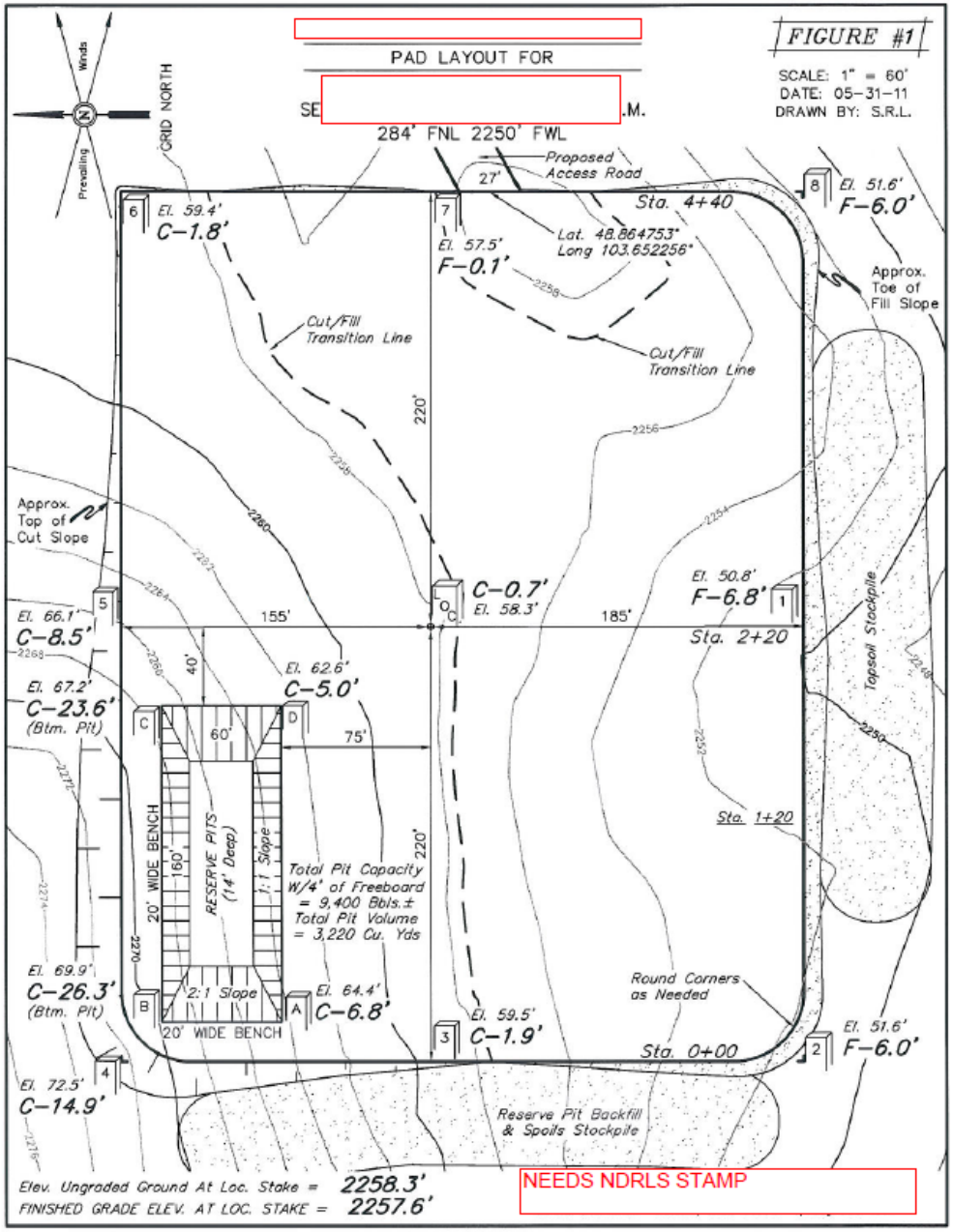


FIGURE #1
SCALE: 1" = 60'
DATE: 05-31-11
DRAWN BY: S.R.L.
PAD LAYOUT FOR
SE .M.
284' FNL 2250' FWL
GRID NORTH
Winds
Prevailing
Proposed Access Road
27'
Sta. 4+40
Lat. 48.864753°
Long 103.652256°
El. 59.4'
C-1.8'
El. 57.5'
F-0.1'
El. 51.6'
F-6.0'
Approx. Toe of Fill Slope
Cut/Fill Transition Line
Cut/Fill Transition Line
220'
Approx. Top of Cut Slope
El. 66.1'
C-8.5'
155'
C-0.7'
El. 58.3'
185'
El. 50.8'
F-6.8'
Sta. 2+20
Topsoil Stockpile
El. 62.6'
C-5.0'
40'
El. 67.2'
C-23.6'
(Btm. Pit)
60'
75'
20' WIDE BENCH
160'
RESERVE PITS
(14' Deep)
1:1 Slope
Total Pit Capacity
W/4' of Freeboard
= 9,400 Bbls.±
Total Pit Volume
= 3,220 Cu. Yds
220'
Sta. 1+20
El. 69.9'
C-26.3'
(Btm. Pit)
220'
2:1 Slope
El. 64.4'
C-6.8'
20' WIDE BENCH
Round Corners as Needed
El. 59.5'
C-1.9'
Sta. 0+00
El. 51.6'
F-6.0'
El. 72.5'
C-14.9'
Reserve Pit Backfill & Spoils Stockpile
Elev. Ungraded Ground At Loc. Stake = 2258.3'
FINISHED GRADE ELEV. AT LOC. STAKE = 2257.6'
NEEDS NDRLS STAMP

Typical Cross Section/volumetrics

- Must contain volume of dirt disturbed
- Must contain acreage of the pad

FIGURE #2

TYPICAL CROSS SECTIONS FOR

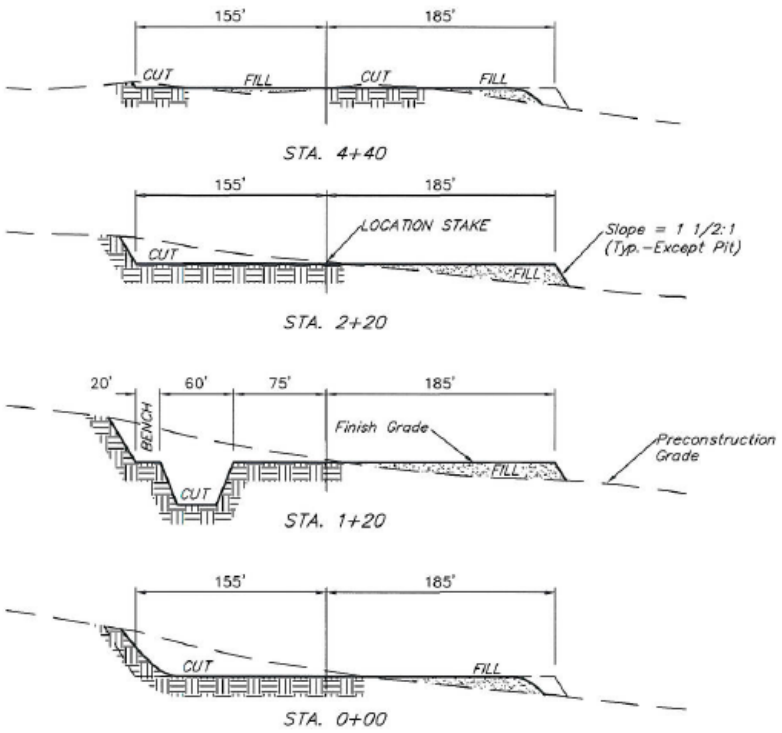
[redacted]

284' FNL 2250' FWL

1" = 40' X-Section Scale

1" = 100'

DATE: 05-31-11
DRAWN BY: S.R.L.
REVISED: 6-6-11



APPROXIMATE ACREAGES

WELL SITE DISTURBANCE = ± 3.714 ACRES
ACCESS ROAD DISTURBANCE = ± 1.480 ACRES
TOTAL = ± 5.194 ACRES

* NOTE:
FILL QUANTITY INCLUDES
5% FOR COMPACTION

APPROXIMATE YARDAGES

(6") Topsoil Stripping	=	3,080 Cu. Yds.
Remaining Location	=	9,670 Cu. Yds.
Reserve Pit Cut	=	3,220 Cu. Yds.
TOTAL CUT	=	15,970 CU.YDS.
FILL	=	10,030 CU.YDS.

EXCESS MATERIAL	=	5,940 Cu. Yds.
Topsoil & Pit Backfill (1/2 Pit Vol.)	=	4,690 Cu. Yds.
EXCESS UNBALANCE (After Interim Rehabilitation)	=	1,250 Cu. Yds.

[redacted]

Bars[redacted]2H

Sect[redacted].M.

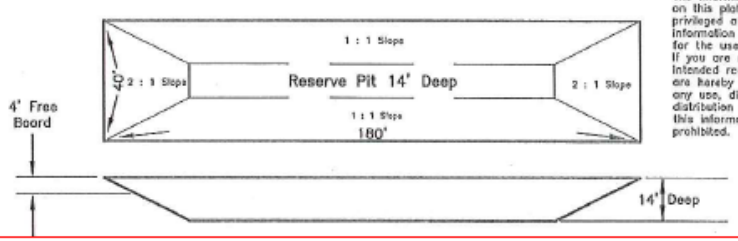
Mountrail County, North Dakota

Barstad 23-14 #1H	2324.4' MSL
Barstad 23-14 #2H	2324.9' MSL
Barstad 23-14 #3H	2325.6' MSL
Well Pad Elevation	2321.1' MSL

Excavation	17,440 C.Y.
Plus Pit	2,050 C.Y.
	19,490 C.Y.
Embankment	9,485 C.Y.
Plus Shrinkage (+30%)	2,845 C.Y.
	12,330 C.Y.
Stockpile Pit	2,050 C.Y.
Stockpile Top Soil (6")	4,765 C.Y.
Road Embankment & Stockpile from Pad	345 C.Y.
Disturbed Area From Pad	5.91 Acres

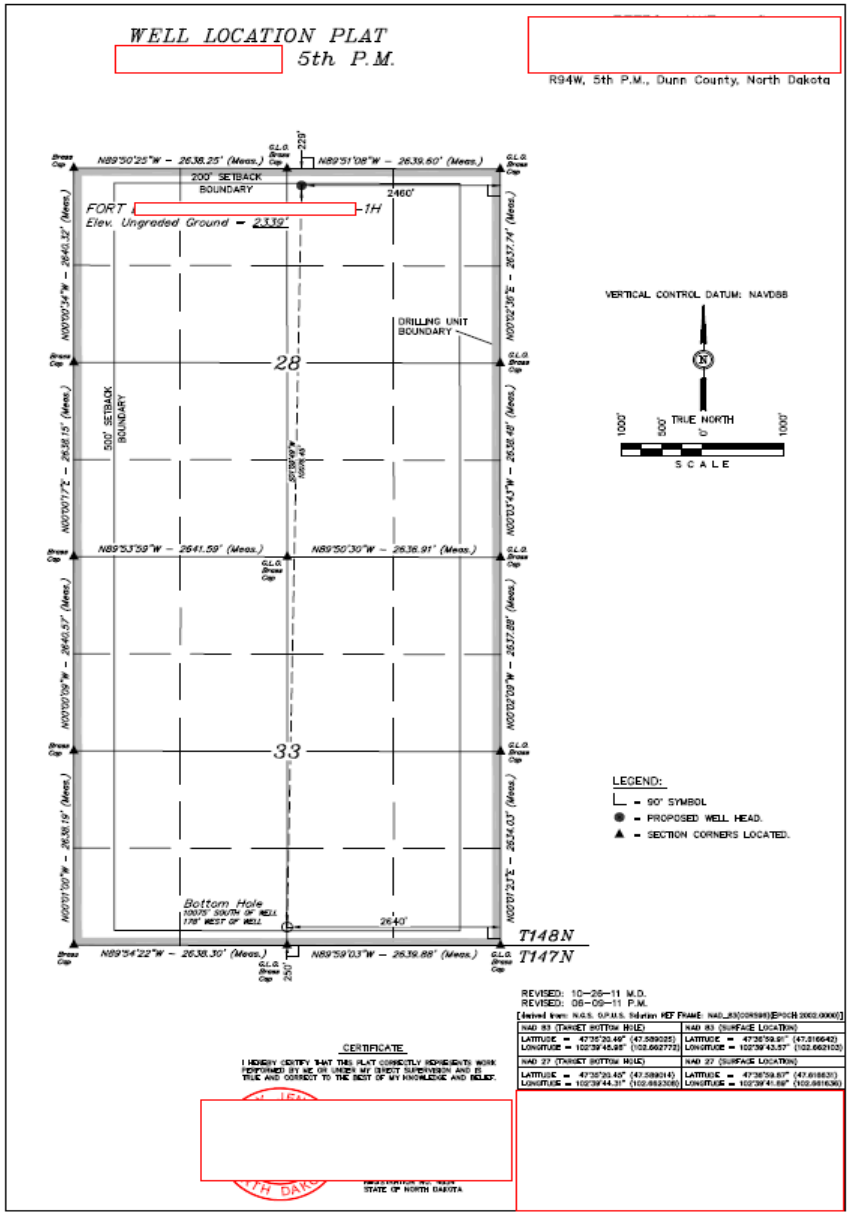
NOTE :
All cut end slopes are designed at 1:1 slopes & all fill end slopes are designed at 1 1/2:1 slopes

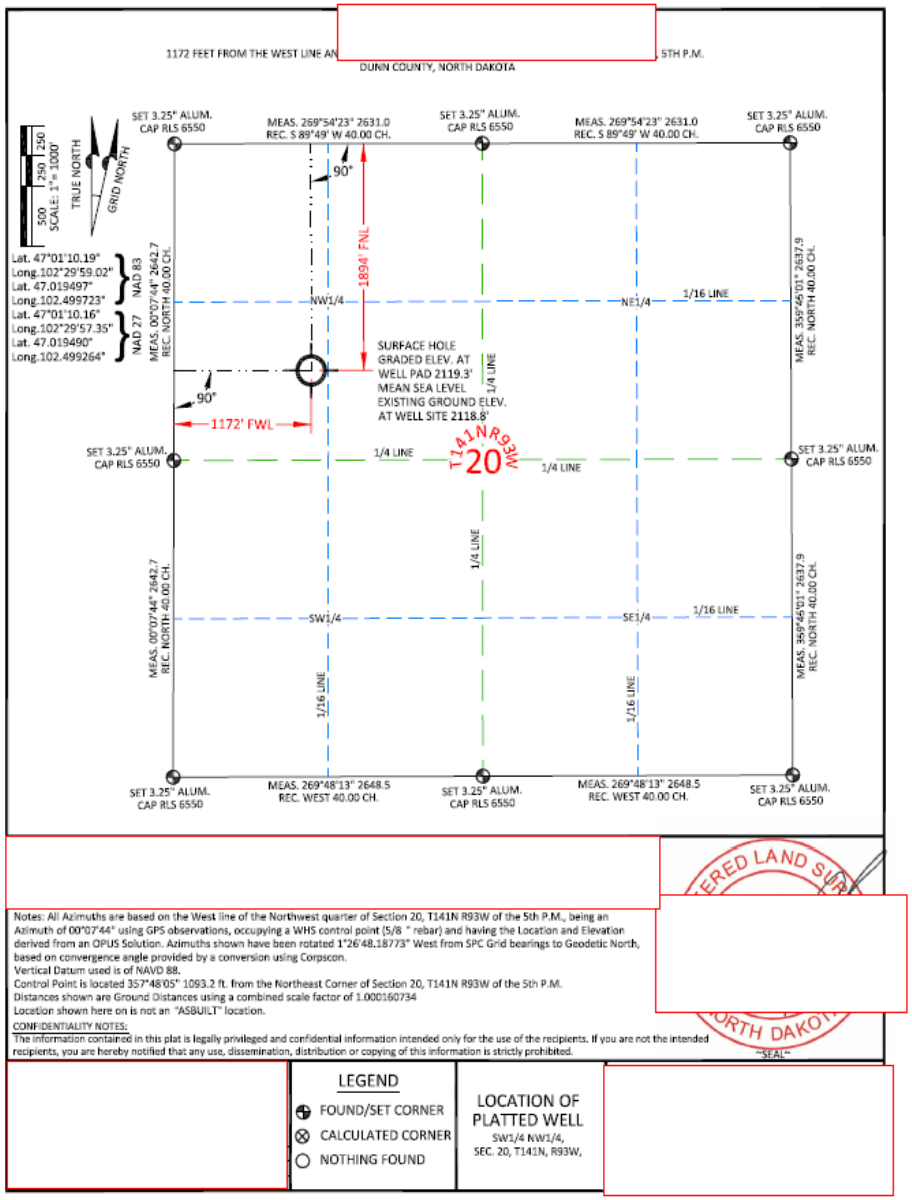
Barstad 23-14 #1H	Barstad 23-14 #2H	Barstad 23-14 #3H
450' FSL	450' FSL	450' FSL
2340' FEL	2315' FEL	2290' FEL



[redacted]

“Good” well location plats



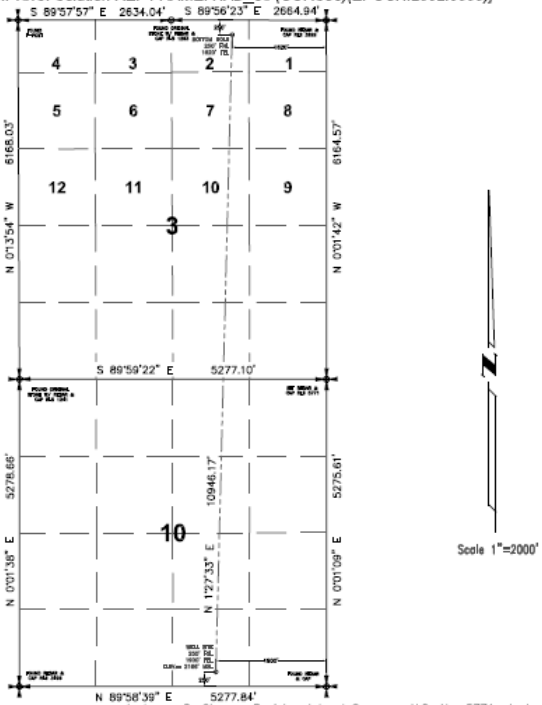


“Good” well location Plat

WELL LOCATION PLAT

250 feet from the south line and 1900 feet from the east line (surface location Section 10)
250 feet from the north line and 1620 feet from the east line (bottom hole target Section 3)
5th Principal Meridian
orth Dakota
pen
Latitude ***(surface location Section 10)***
Latitud *(bottom hole target Section 3)*
[derived from N.G.S. O.P.U.S. Solution REF FRAME: NAD_83 (CORS96)(EPOCH:2002.0000)]

*MONUMENTS NOTED AS "FOUND".



Scale 1"=2000'

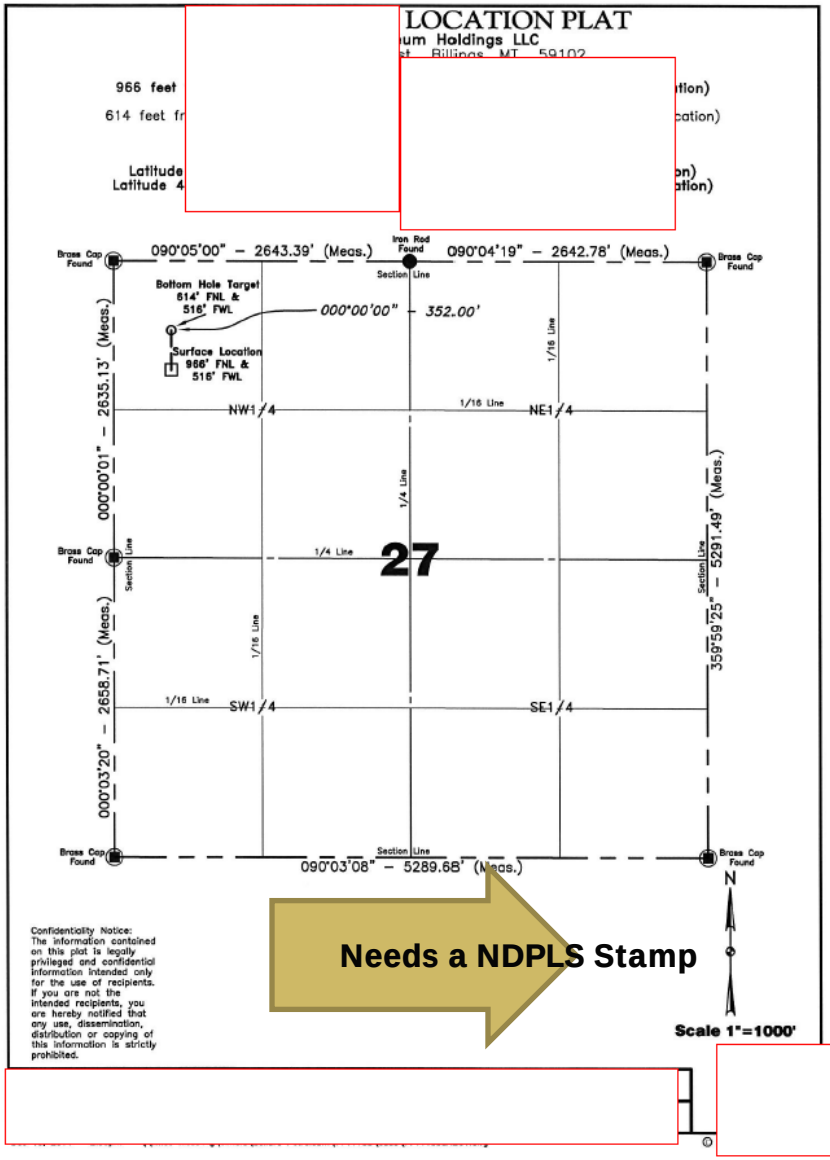
NOTE: All land corners are assumed unless otherwise noted. Location shown hereon is a preliminary staked location and is not an as-built.

I, James D. Glasser, Registered Land Surveyor, N.D. No. 5771, do hereby certify that the well plat shown hereon was made by me, or under my direction, and is true and correct to the the best of my knowledge and belief.

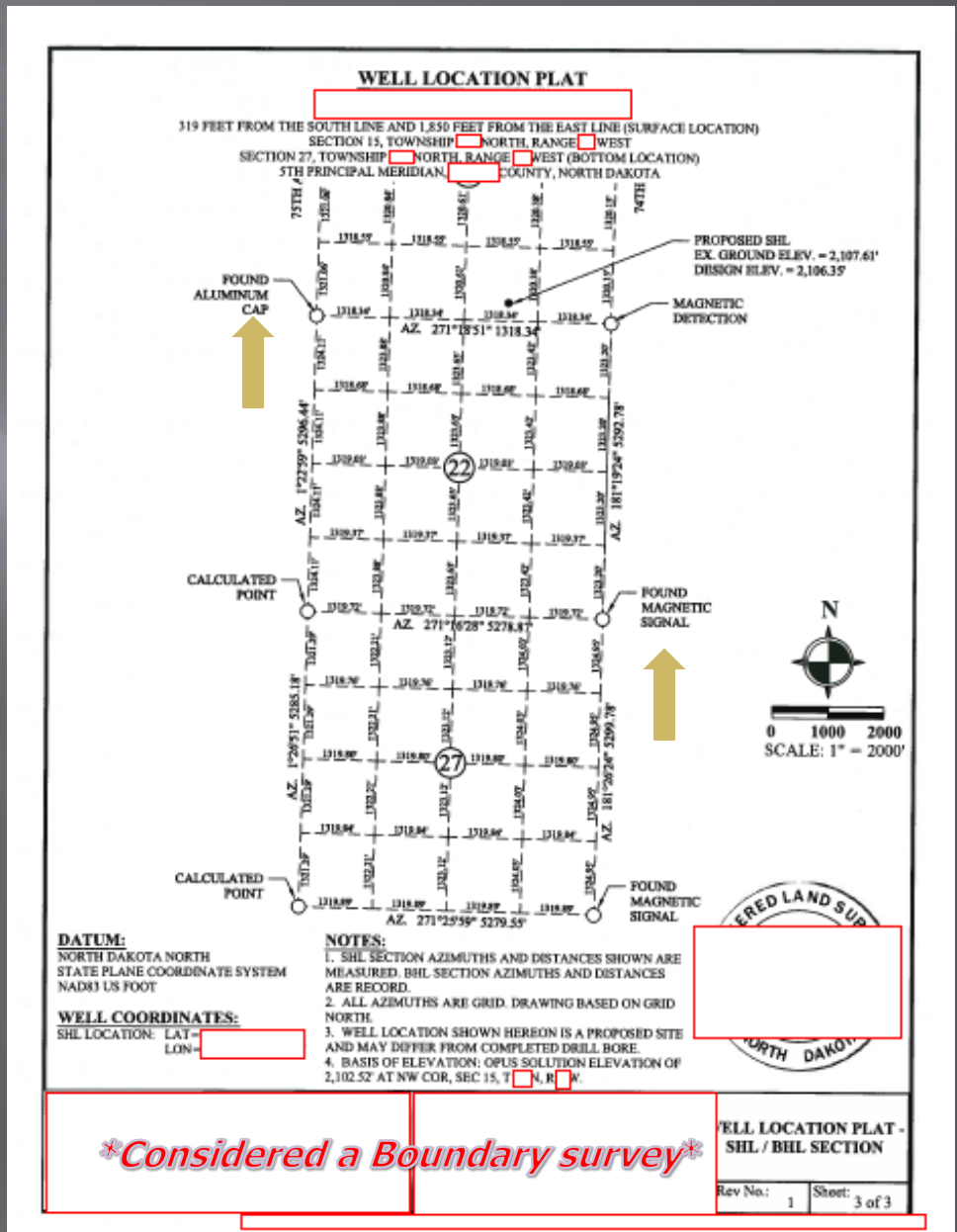
10/27/11
DATE

PROJECT NO. 112798

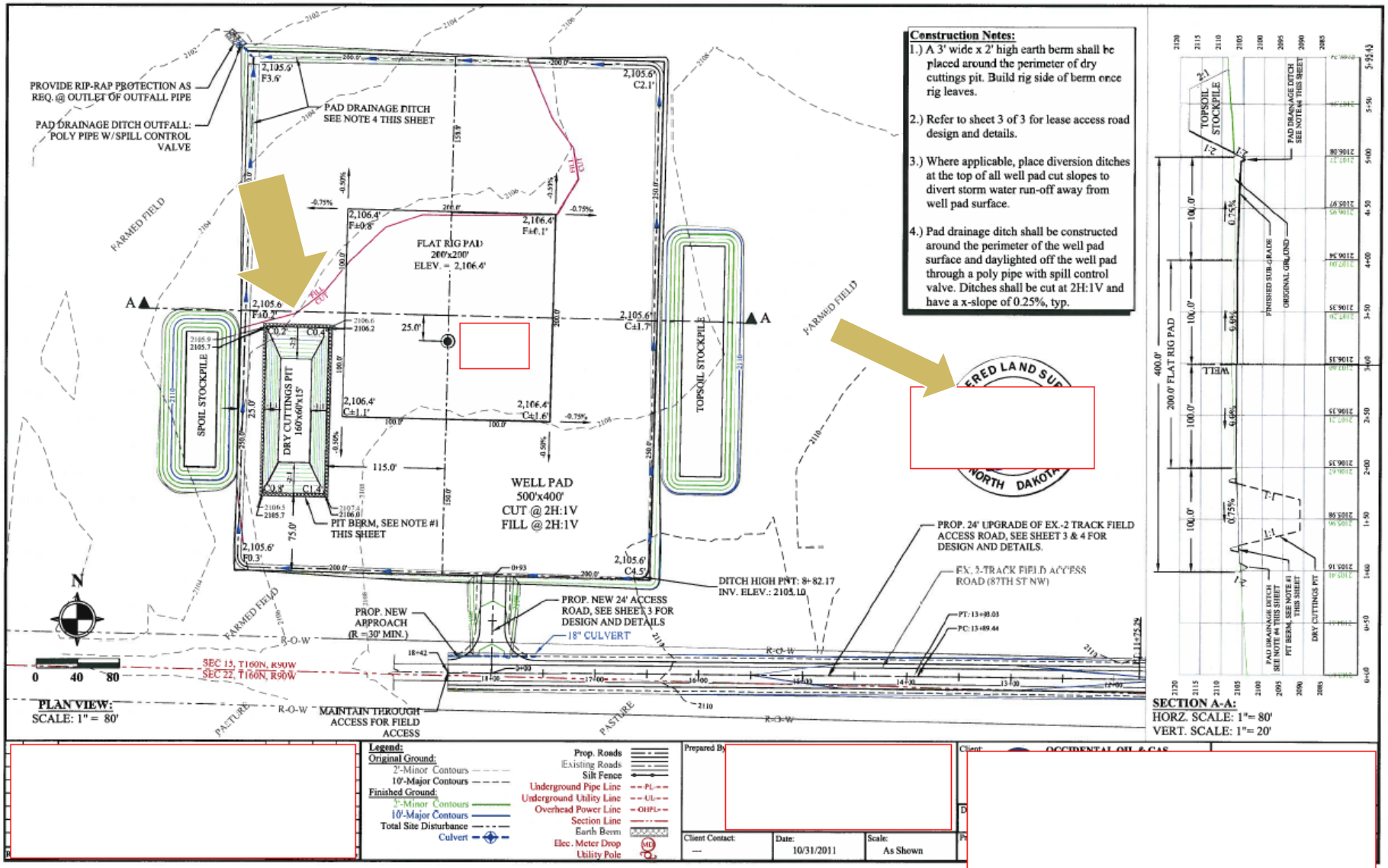
“Poor” well Location Plat



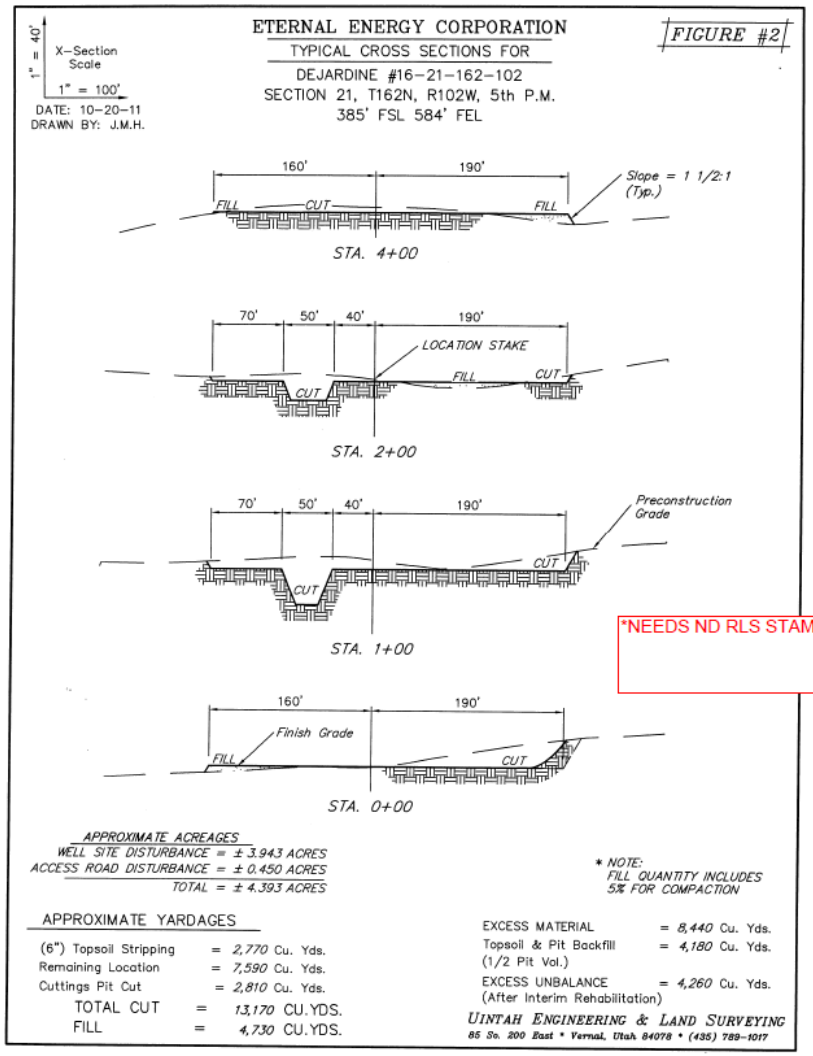
"Poor" horizontal section plats



“acceptable” Pad Layout Plat



Cross Sections



ETERNAL ENERGY CORPORATION

FIGURE #2

TYPICAL CROSS SECTIONS FOR
DEJARDINE #16-21-162-102
SECTION 21, T162N, R102W, 5th P.M.
385' FSL 584' FEL

1" = 40'
X-Section Scale
1" = 100'
DATE: 10-20-11
DRAWN BY: J.M.H.

160' 190' Slope = 1 1/2:1 (Typ.)
FILL CUT FILL
STA. 4+00

70' 50' 40' 190' LOCATION STAKE
CUT FILL CUT
STA. 2+00

70' 50' 40' 190' Preconstruction Grade
CUT CUT
STA. 1+00

160' 190' Finish Grade
FILL CUT
STA. 0+00

*NEEDS ND RLS STAMP.

APPROXIMATE ACREAGES
WELL SITE DISTURBANCE = ± 3.943 ACRES
ACCESS ROAD DISTURBANCE = ± 0.450 ACRES
TOTAL = ± 4.393 ACRES

* NOTE:
FILL QUANTITY INCLUDES 5% FOR COMPACTION

APPROXIMATE YARDAGES

(6") Topsoil Stripping	=	2,770 Cu. Yds.
Remaining Location	=	7,590 Cu. Yds.
Cuttings Pit Cut	=	2,810 Cu. Yds.
TOTAL CUT	=	13,170 CU.YDS.
FILL	=	4,730 CU.YDS.

EXCESS MATERIAL	=	8,440 Cu. Yds.
Topsoil & Pit Backfill (1/2 Pit Vol.)	=	4,180 Cu. Yds.
EXCESS UNBALANCE (After Interim Rehabilitation)	=	4,260 Cu. Yds.

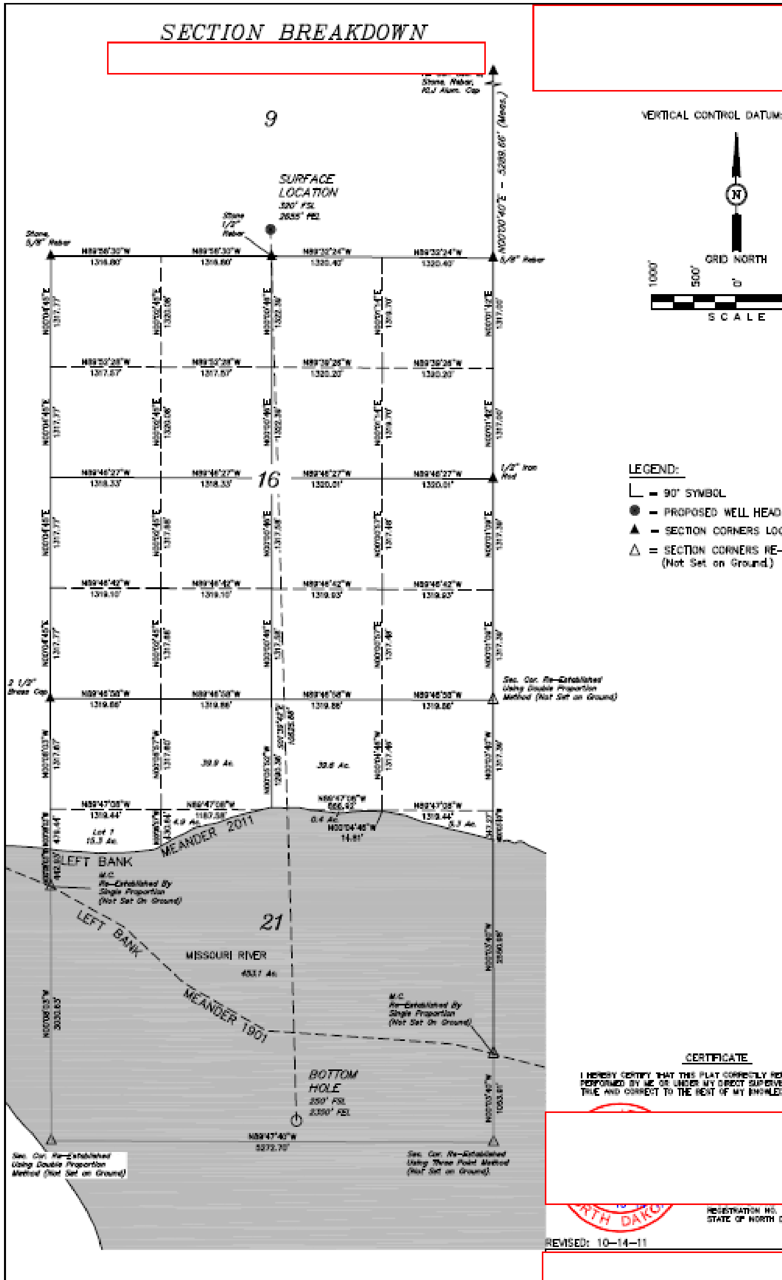
UINTAH ENGINEERING & LAND SURVEYING
85 So. 200 East * Vernal, Utah 84078 * (435) 789-1017

CHANGES?

- Section Corner MONUMENTATION-reviewing plats much closer.
- Monument reference notes & symbols.
- Plats Referenced to True North (always required).
- April 2010 adopted rule in NDAC which requires Cut/Fill Diagrams.
  - Cut/Fill needs to be noted in corner of Pad as well as Drilling Pit Corners
- CERTIFICATION STAMP
  - All "well location" plats need to be stamped by a licensed land surveyor
  - All Cut/Fill diagram plats need to be stamped by either a licensed land surveyor or licensed professional engineer.

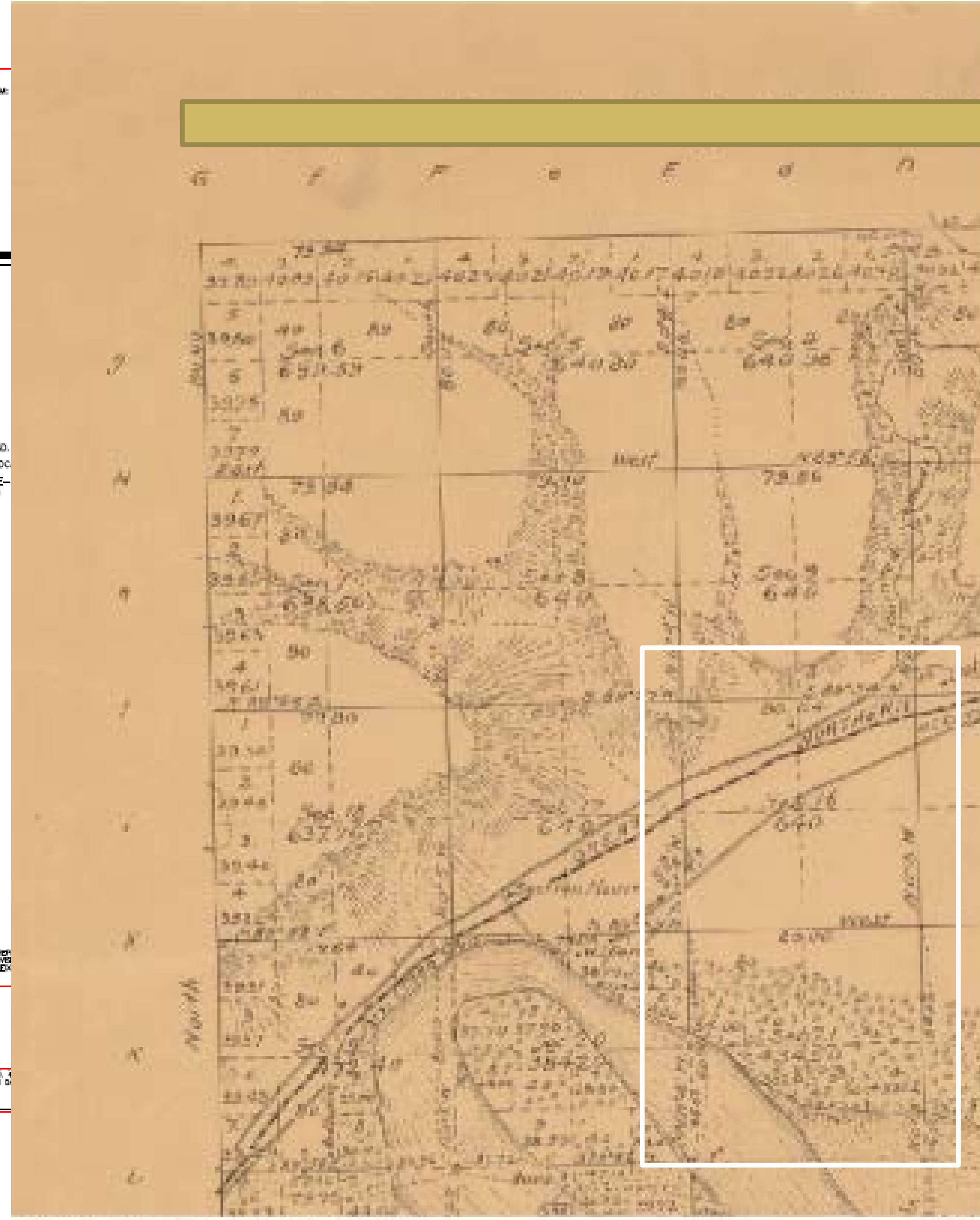
Riparian Issues

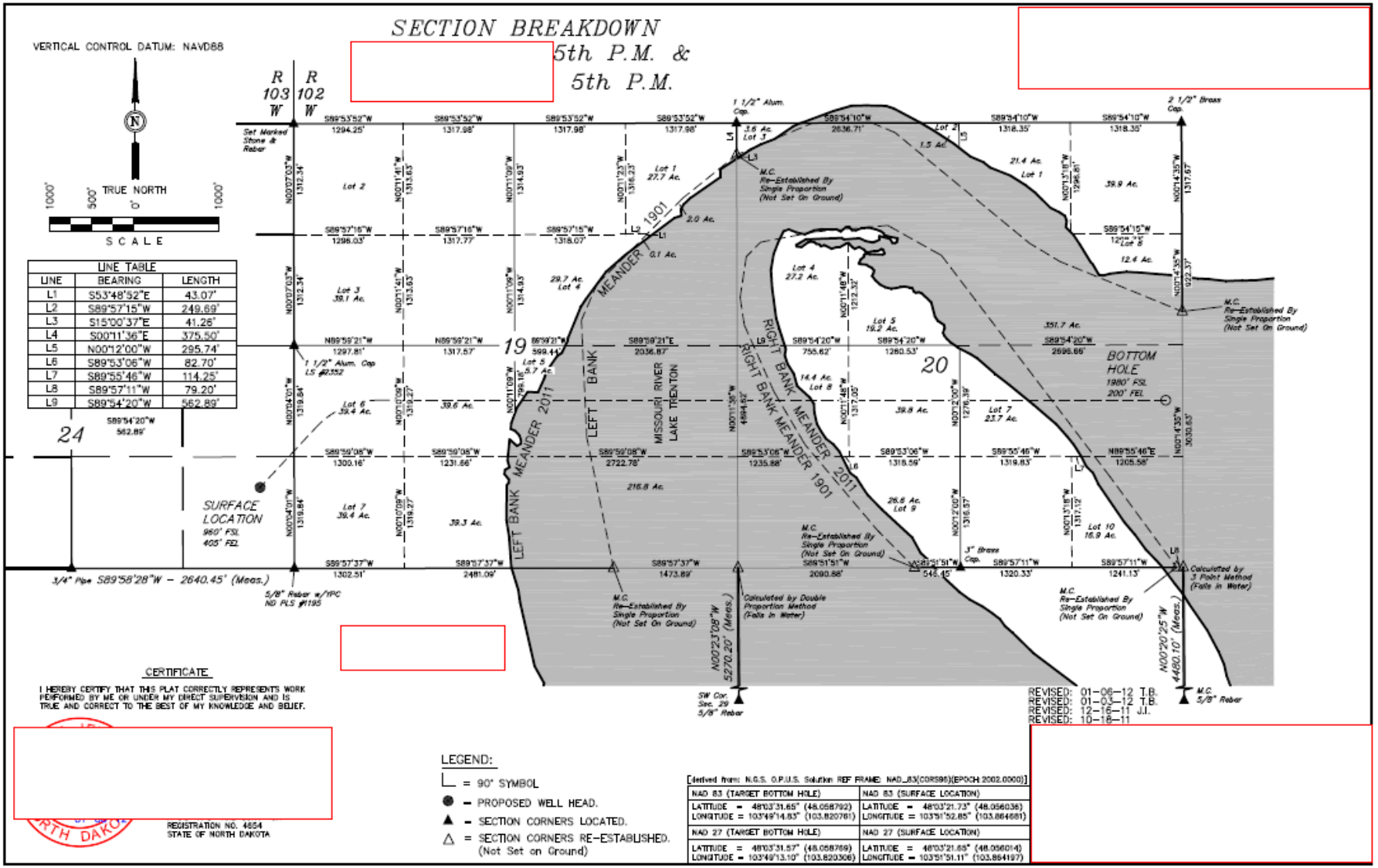
- Should review original GLO plats as they relate to the current actual water mark.
- Each situation may be different.
- Make sure to note all Lots and original GLO water mark.
- Find original monuments or set if necessary.
- Original GLO plats online at the State Water Commission website: http://survey.swc.nd.gov/

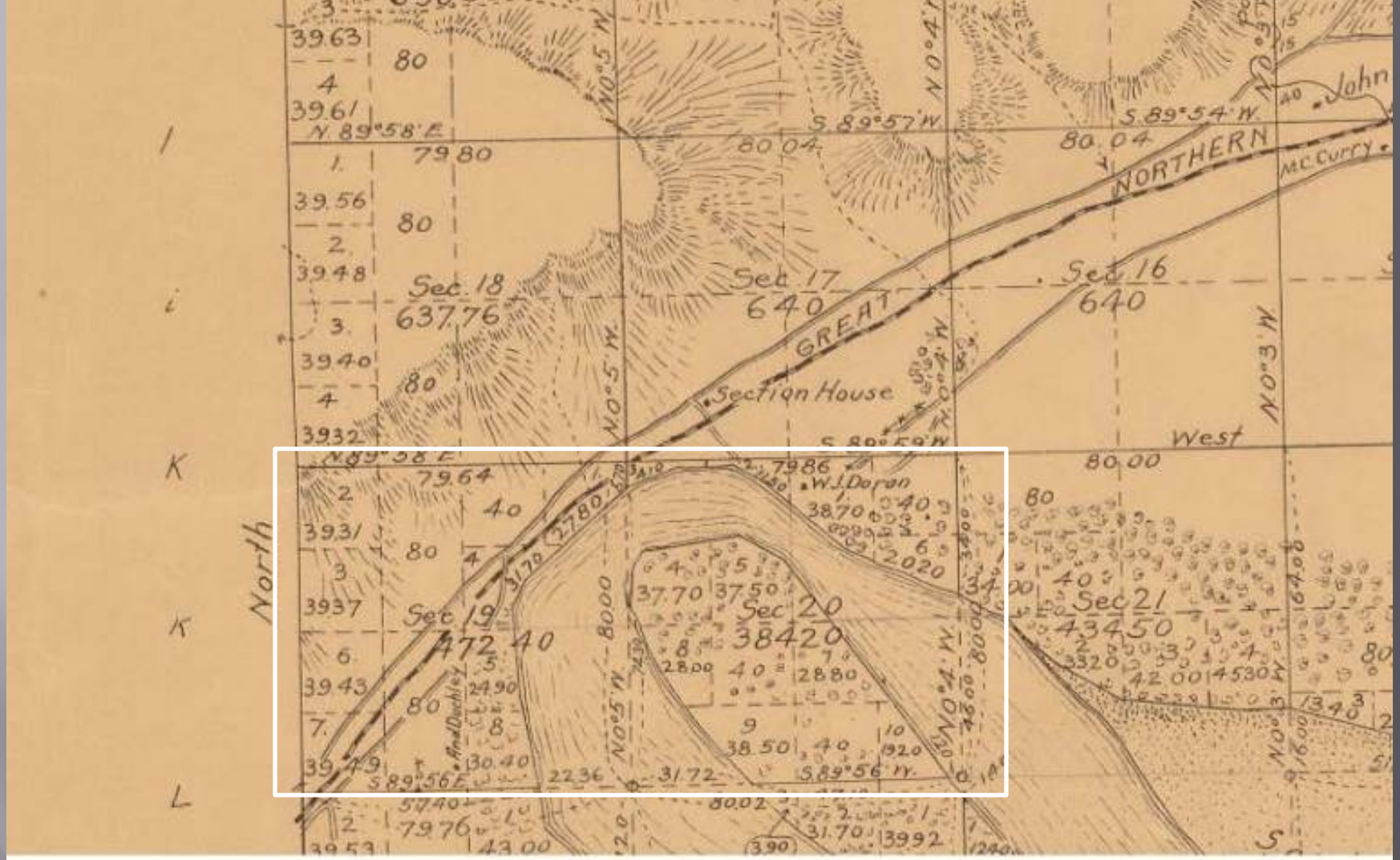


[derived from: N.G.S. O.P.U.S. Solution REF FRAME: NAD_83(CORS96)(EPOCH:2002.0000)]

NAD 83 (TARGET BOTTOM HOLE)	NAD 83 (SURFACE LOCATION)
LATITUDE = 48°03'14.45" (48.054014) LONGITUDE = 103°48'28.83" (103.808008)	LATITUDE = 48°04'59.25" (48.083125) LONGITUDE = 103°48'33.21" (103.809225)
NAD 27 (TARGET BOTTOM HOLE)	NAD 27 (SURFACE LOCATION)
LATITUDE = 48°03'14.37" (48.053992) LONGITUDE = 103°48'27.10" (103.807528)	LATITUDE = 48°04'59.17" (48.083103) LONGITUDE = 103°48'31.48" (103.808744)




SECTION BREAKDOWN
5th P.M. &
5th P.M.
VERTICAL CONTROL DATUM: NAVD88
TRUE NORTH
SCALE
LINE TABLE
LINE | BEARING | LENGTH
L1 | S53°48'52"E | 43.07'
L2 | S89°57'15"W | 249.69'
L3 | S15°00'37"E | 41.26'
L4 | S00°11'36"E | 375.50'
L5 | N00°12'00"W | 295.74'
L6 | S89°53'06"W | 82.70'
L7 | S89°55'46"W | 114.25'
L8 | S89°57'11"W | 79.20'
L9 | S89°54'20"W | 562.89'
R 103 W
R 102 W
LEFT BANK MEANDER 2011
LEFT BANK
MISSOURI RIVER
LAKE TRENTON
RIGHT BANK MEANDER 1901
RIGHT BANK MEANDER 2011
MEANDER 1901
SURFACE LOCATION
960' FSL
405' FEL
BOTTOM HOLE
1980' FSL
200' FEL
3/4" Pipe S89°58'28"W – 2640.45' (Meas.)
5/8" Rebar w/YPC
ND PLS #1195
SW Cor. Sec. 29 5/8" Rebar
N00°23'08"W 5270.20' (Meas.)
N00°20'25"W 4480.10' (Meas.)
M.C. Re-Established By Single Proportion (Not Set On Ground)
Calculated by Double Proportion Method (Falls in Water)
Calculated by 3 Point Method (Falls in Water)
CERTIFICATE
I HEREBY CERTIFY THAT THIS PLAT CORRECTLY REPRESENTS WORK PERFORMED BY ME OR UNDER MY DIRECT SUPERVISION AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.
REGISTRATION NO. 4654
STATE OF NORTH DAKOTA
REVISED: 01-06-12 T.B.
REVISED: 01-03-12 T.B.
REVISED: 12-16-11 J.J.
REVISED: 10-18-11
LEGEND:
= 90° SYMBOL
= PROPOSED WELL HEAD.
= SECTION CORNERS LOCATED.
= SECTION CORNERS RE-ESTABLISHED. (Not Set on Ground)
[derived from: N.G.S. O.P.U.S. Solution REF FRAME: NAD_83(CORS96)(EPOCH:2002.0000)]
NAD 83 (TARGET BOTTOM HOLE)
LATITUDE = 48°03'31.65" (48.058792)
LONGITUDE = 103°49'14.83" (103.820761)
NAD 83 (SURFACE LOCATION)
LATITUDE = 48°03'21.73" (48.056036)
LONGITUDE = 103°51'52.85" (103.864681)
NAD 27 (TARGET BOTTOM HOLE)
LATITUDE = 48°03'31.57" (48.058769)
LONGITUDE = 103°49'13.10" (103.820306)
NAD 27 (SURFACE LOCATION)
LATITUDE = 48°03'21.65" (48.056014)
LONGITUDE = 103°51'51.11" (103.864197)



http://survey.swc.nd.gov/glos/153102/ndglo153102a.png 1/17/2012

Riparian Issues: Ordinary High Water Mark

- Commission heard Case 15892. Brigham Vs. Hess per NDAC 43-02-03-16.2.
- Hess requested to suspend Brigham permit.
- Dispute of mineral acreage underlying Missouri River from OHWM. ND Dept. of Trust Lands owns minerals w/in ordinary high water mark of navigable lakes & streams.
  - Testimony provided.
    - Both Operators have similar experience in Bakken drilling and operating wells.

Ordinary High Water Mark Cont.

- Pursuant to NDAC Section 43-02-03-16.2, in deciding whether to revoke or limit a permit, if the amount of the interest owned by the permitholder and its partners is a majority of the ownership, the Commission will presume that the permit should be retained. However, if the amount of the interest owned by the owner seeking revocation or limitation and its supporters are a majority of the ownership, the Commission will presume that the permit should be revoked.
- Brigham owns 62% based on riparian land owners also claiming WI in 1280. Hess 59% owns or controls.
- The Commission does not have jurisdiction to settle the dispute of mineral ownership in this matter. The Commission concludes that Hess has not supplied sufficient evidence to overcome the presumption that Brigham holds a majority of the working interest in the spacing unit.
- ***Based on Working Interest: The Commission decided Brigham***

Distance Restrictions and Notices

- Section Lines
- Notice issues for occupied dwellings
- Distance to an occupied dwelling regulated by NDIC
- Notice to stake a well.

Section Line Setback

- **Well will not be permitted by NDIC which overlaps a section line within 33′ of R/W.**
- **NDCC 24-06-28. Obstruction of section lines prohibited - Exception - Certain fences not considered obstructions - Obstructions and traffic safety hazards - Penalty.**
  - *1. A person may not place or cause to be placed any permanent obstruction within the vertical plane of thirty-three feet [10.06 meters] of any section line or within the right of way of any highway, unless written permission is first secured from the board of county commissioners or the board of township supervisors, as appropriate.* The permission must be granted where the section line has been closed pursuant to section 24-07-03 or where the topography of the land along the section line is such that in the opinion of the board of county commissioners or board of township supervisors, as the case may be, the construction of a road on the section line is impracticable.

NDIC Occupied Dwelling restrictions

- Applicant (O&G operator) shall provide notice to the owner of any permanent occupied dwelling within *one quarter mile. Per NDCC 38-08-05.*
- continued…"the commission may not issue a drilling permit for an oil and gas well that will be located within 500 feet"
  - Noted on Form 1 & 1H.
  - If less than 500' commission requires an affidavit and certified plat distances from the well to the occupied dwelling.

Notice to Stake Location

- Notice of Operations—per NDCC 38-11.1-04.1 "before the initial entry upon the land for activities including inspections, staking, surveys, measurements,…***shall provide at least seven days notice*** by registered mail or hand delivery to the surface owner unless waived by mutual agreement by both parties".
  - Operator would typically take care of "notice", but surveyor should verify that it has been done.

PLAT requirement Overview

- NDIC reviews all submitted plats with a critical eye.
- True North. (Not Grid or "assumed").
- Monuments--Boundary Survey-KNOW YOUR SPACING UNIT.
- "Stamp" all plats to include well location, horizontal section plats, pad layout, cross-sections
- Riparian Issues—NDIC does not regulate.
- ***Surveyors are first on site so take care to examine the area. Let operator know about potential topo issues, landowner dwellings, etc.***

Overview continued

-NDSPLS Recommended Guidelines for the Practice of Land Surveying in ND.

Section 51-1.10.

-File Corner Recordation in accordance with NDCC 47-20.1.

-Previously approved NDIC permits available online via Basic Service. View with GIS Map Server.

-NDIC expects plats to be filed accordance with NDCC 40-50.1.