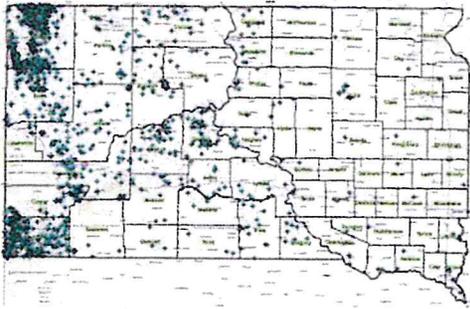
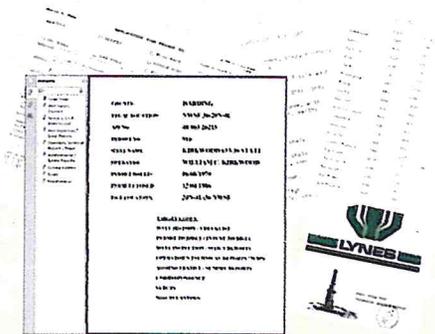


1. Interactive Maps

Available at sddenr.net/sdoil/oilgas_app.html



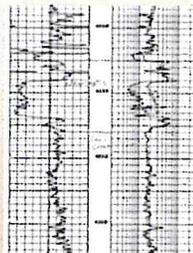
Interactive point-and-click maps for oil and gas permits, geophysical logs, and records of drilling & well completion



Click on a well to instantly get a complete oil and gas permit file, in bookmarked PDF format



Click on a well to instantly get a drilling record



Click on a well to instantly get geophysical logs

- Various **base maps** showing street, aerial, terrain, and topography are provided by ESRI's online mapping service and are readily changeable.
- There are several **data layers** that can be turned on and off.

Department of Environment and Natural Resources (DENR)

Oil and Gas Initiative

Promoting Exploration and Development of South Dakota's Oil and Gas Resources

DENR's One-Stop Shop for Oil and Gas Information

Available at sddenr.net/sdoil

Three ways to get information!

1. Browse, view, and download data using interactive maps.
2. Use online databases to search for and download data.
3. Download publications.

Plus

Regulations Streamlined in 2011

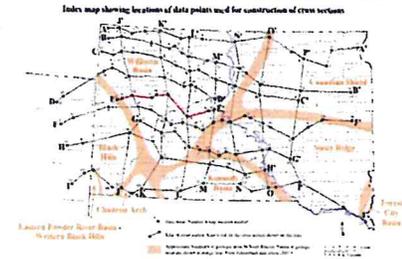
Unnecessary rules were eliminated and others were changed to expedite industry activity.

2. Online Databases for nearly 100,000 drill holes

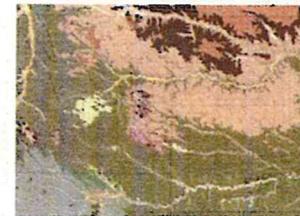
- **Records of oil and gas drilling** from ≈1,900 locations at sddenr.net/oil_gas/
- **Records of water well completion** from ≈62,245 locations at denr.sd.gov/des/wr/dblogsearch.aspx
- **Other records of test hole and well drilling** from ≈34,350 locations at sddenr.net/lithdb/
- **Records of DENR's observation well measurements** from 1,555 wells at denr.sd.gov/des/wr/dbobsearch.aspx

3. Examples of Publications

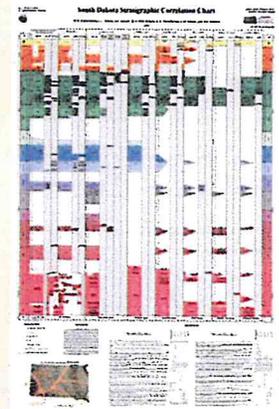
Order hard copy or get free downloads at www.sdgs.usd.edu



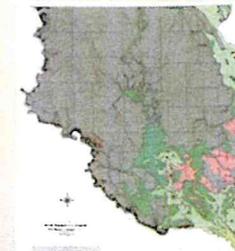
Statewide cross sections



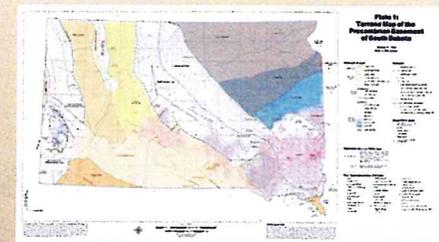
Surface geologic maps



Names and distribution of geologic units



Bedrock geologic map



Subdivisions of the Precambrian surface

South Dakota Oil and Gas Facts

- Oil production began in 1954.
- The discovery well was drilled in 1953 in Harding County by Shell Oil Company.
- The well was drilled to a depth of 9,332 feet.
- The producing geologic unit is the Red River Formation.
- The Red River Formation remains South Dakota's most productive geologic unit for oil.
- North Dakota's Bakken Formation does not exist in South Dakota.
- The Tyler Formation and Three Forks Shale being developed in North Dakota do exist in South Dakota but remain effectively unexplored.

State Oil and Gas Revenues

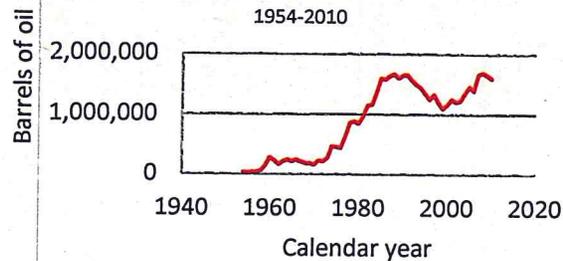
| Fiscal year | Conservation tax ¹ | Severance tax ² | Permit fees ³ |
|-------------|-------------------------------|----------------------------|--------------------------|
| 2011 | \$281,440 | \$5,276,994 | \$2,500 |
| 2010 | \$240,282 | \$4,505,530 | \$3,100 |
| 2009 | \$297,771 | \$5,596,540 | \$7,100 |
| 2008 | \$294,773 | \$5,526,990 | \$3,600 |
| 2007 | \$168,178 | \$3,152,890 | \$5,000 |
| 2006 | \$173,710 | \$3,255,856 | \$2,900 |

¹ SDCL 10-39B: 0.24% of the value of oil and gas produced; dedicated to DENR to carry out oil and gas activities.

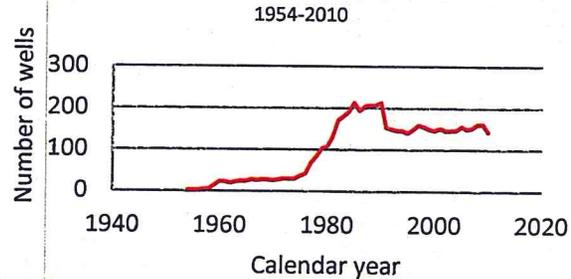
² SDCL 10-39A: 4.5% of the value of oil and gas produced; half goes to the state general fund and half goes to the county in which the production occurred.

³ Application fee of \$100 for a permit to drill an oil or gas well; dedicated to DENR to carry out oil and gas activities.

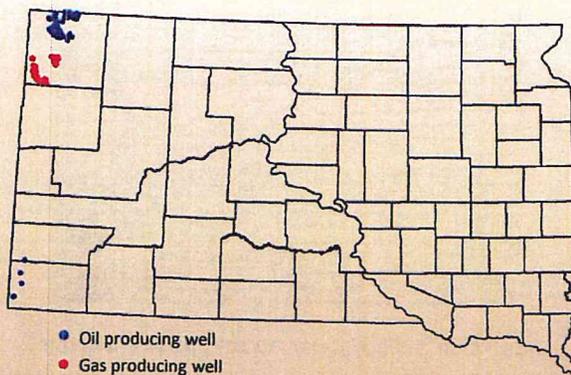
Barrels of Oil Produced



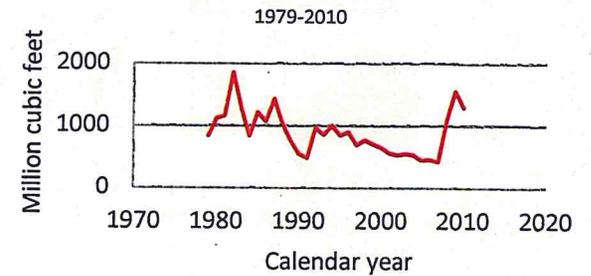
Number of Producing Oil Wells



Areas of Oil and Gas Production



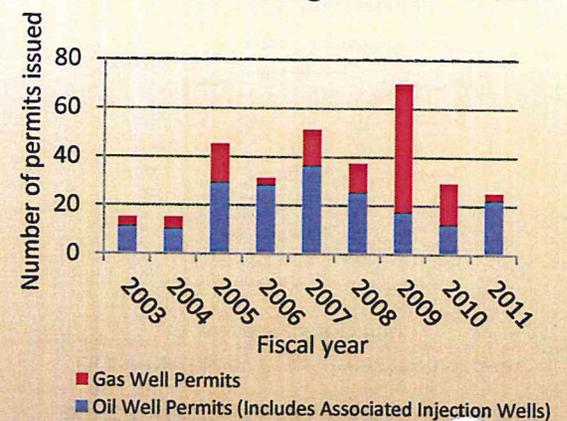
Marketable Gas Production



Number of Producing Gas Wells

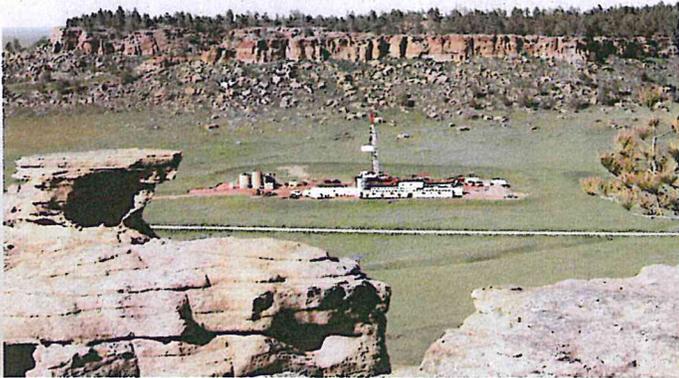


Oil & Gas Drilling Permits Issued



online

WHERE'S THE OIL?



March 23, 1927

IS THERE OIL IN SOUTH DAKOTA?

Some People Think There Is

If YOU are interested in what the future of South Dakota may be, come to the

CHAMBER OF COMMERCE

THURSDAY EVENING
MARCH 24—8 O'CLOCK

Hear the true facts of the pioneer well of our state

WHAT OIL HAS DONE FOR OTHERS IT MAY DO FOR US

We will never know until we complete the geological survey that is down 3508 ft. with 6-inch hole at Standing Butte near Ft. Pierre

IS IT WORTH THE EFFORT

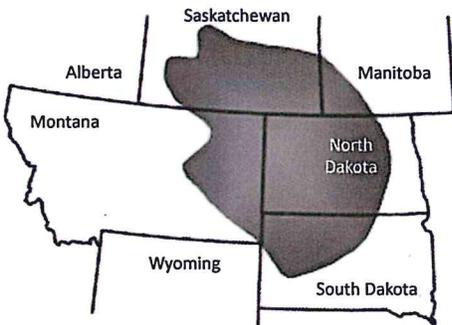
SOME OF US THINK SO

H. R. DENNIS
C. N. McILLIAN
A. F. LARSON

DON'T MISS THIS MEETING TOMORROW NIGHT

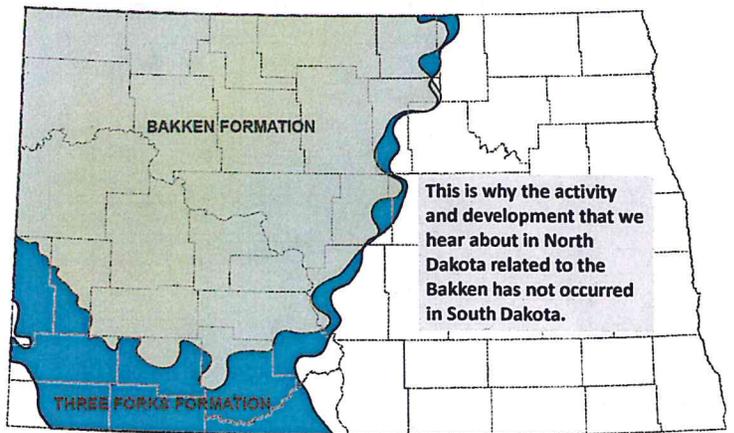
TORR TIEGEN
WILL A. BEACHT
CHAS. ROSS

Williston Basin

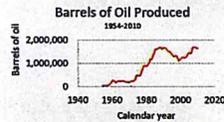
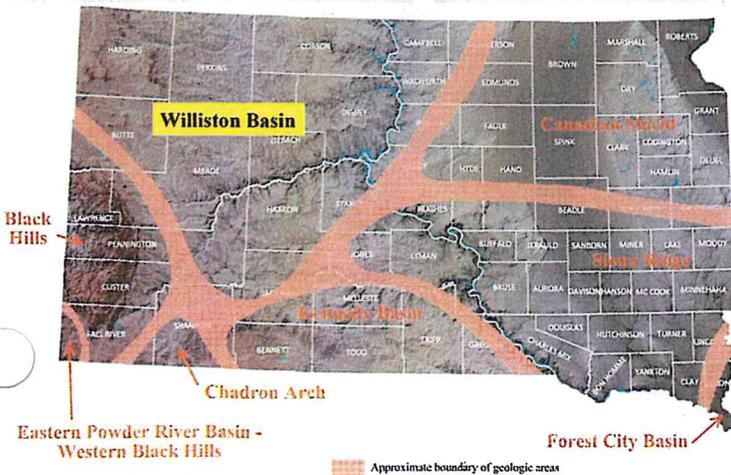


Modified from http://www.netl.doe.gov/technologies/oil_gas/Petroleum/projects/EP/ResChar/05672_BakkenResChar.html

Extent of Bakken and Three Forks Formations in North Dakota

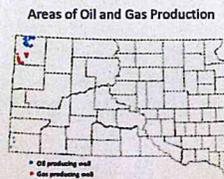
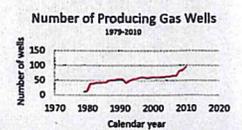
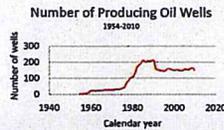
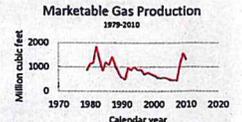


Map taken from North Dakota Geological Survey Geologic Investigation No. 64, published in 2003



South Dakota Oil and Gas Facts

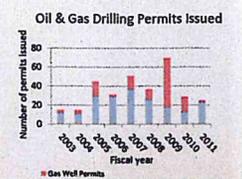
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| 2006 | \$173,710 | \$2,253,856 | \$2,900 |

¹ SOGL 10-948: 0.24% of the value of oil and gas produced; dedicated to OSM to carry out oil and gas activities.
² SOGL 10-394: 4.3% of the value of oil and gas produced; half goes to the state general fund and half goes to the county in which the production occurred.
³ Application fee of \$100 for a permit to drill an oil or gas well; dedicated to OSM to carry out oil and gas activities.



1. Interactive Maps

Available at sdderw.net/doi/oil/gas_app.html

Interactive point-and-click maps for oil and gas permits, geophysical logs, and records of drilling & well completion

Click on a well to instantly get a complete oil and gas permit file, in bookmarked PDF format

Click on a well to instantly get a drilling record

Click on a well to instantly get geophysical logs

- Various base maps showing street, aerial, terrain, and topography are provided by ESRI's online mapping services and are readily changeable.
- There are several data layers that can be turned on and off.

Department of Environment and Natural Resources (DENR)

Oil and Gas Initiative

Promoting Exploration and Development of South Dakota's Oil and Gas Resources

DENR's One-Stop Shop for Oil and Gas Information

Available at denr.act.sdsd

Three ways to get information!

1. Browse, view, and download data using interactive maps.
2. Use online databases to search for and download data.
3. Download publications.

Plus Regulations Streamlined in 2011

Unnecessary rules were eliminated and others were changed in a specific industry activity.

2. Online Databases for nearly 100,000 drill holes

- Records of oil and gas drilling from ~1,900 locations at sdderw.net/oil_gas/
- Records of water well completion from ~62,245 locations at denr.sd.gov/des/wr/rlbopssearch.aspx
- Other records of test hole and well drilling from ~34,355 locations at sdderw.net/other/
- Records of DENR's observation well measurements from 1,555 wells at denr.sd.gov/des/wr/rlbopssearch.aspx

3. Examples of Publications

Order hard copy or get free downloads at www.sdderw.edu

Statewide cross sections

Surface geologic maps

Bedrock geologic map

Names and distribution of geologic units

Subdivisions of the Precambrian surface

Department of Environment and Natural Resources (DENR)

Oil and Gas Initiative

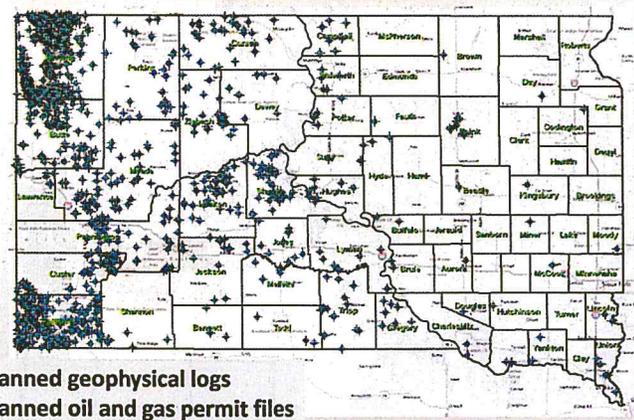
Promoting Exploration and Development of South Dakota's Oil and Gas Resources

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Three ways to get information!

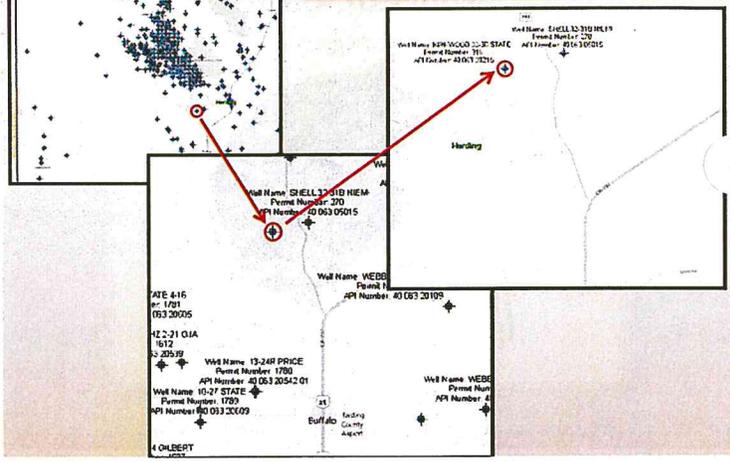
- 3 → Browse, view, and download data using interactive maps
- 2 → Use online databases to search for and download data for a single location or larger areas
- 1 → Download publications

"Oil and Gas Permits and Wells" data layer showing approximately 1,900 locations for which the Minerals and Mining Program has an oil and gas permit file.



- Scanned geophysical logs
- Scanned oil and gas permit files
- Database records of drilling

Identifying information appears when zoomed in sufficiently for data points in all but one data layer.



How to get information from the data layers

1. Click on a data point to retrieve information for that location.

Well Name: SHELL 32-318 NEM
Permit Number: 270
API Number: 40 063 09015

Oil and Gas Wells: KIRKWOOD 33-36 STATE (Permit# 916)

Permit# 916

Operator: WILLIAM C KIRKWOOD

Well Type: KIRKWOOD 33-36 STATE

Well Field: BUFFALO

Location: 284-4E-36 HWSE

County: HARDING

Cons. Available: N

City: Sinking Springs

Ground Surface Elevation: 3,032.00

Total Depth: 8,300.00

Case: DRY HOLE

Well Type: DRY HOLE

Status: PSA

Bottom Hole Formation: Red River Formation

Database Record: [View/Download/Print/Update](#)

Complete Form File: [View/Download/Print/Update](#)

Download Maps: [View/Download/Print/Update](#)

Date Entered: 6/8/1979 12:00:00 AM

Date Modified: 9/18/1979 12:00:00 AM

Date Plugged: 10/13/1979 12:00:00 AM

2. Click on available links to access more information.

Data layers are also searchable

Example of a record from the online oil and gas database

Oil and Gas Search for: [api_no_10 063 20215](#)

Download Database (Excel spreadsheet format)

Page: 1 of 1

Record 1 of 1

| Well Information | | | |
|------------------|----------------------|-------------------|----------------|
| API No: | 40 063 20215 | County: | HANDING |
| Well Name: | KIRKWOOD 33-36 STATE | Location: | HWSE 28-29H-4E |
| Permit No: | 916 | Total Depth: | 8300 |
| Operator Name: | WILLIAM C KIRKWOOD | Well Status: | DRY HOLE |
| Permit Date: | 06-08-1979 | DB Division: | 3343 |
| Spud Date: | 06-08-1979 | Ground Elevation: | 3032 |
| Plug Date: | 10-13-1979 | Latitude: | 43 17 44.2 |
| Well Type: | DRY HOLE | Longitude: | -103 07 00.9 |
| Well Status: | DRY HOLE | Status: | PSA |
| Class: | DRY HOLE | Type: | DRY HOLE |

| Production Types | |
|------------------|-------|
| Production Type | Count |
| Gas | 3343 |
| Oil | 4376 |
| Water | 8536 |
| Flow | 3215 |
| Flow Sub | 1563 |
| Nonflow | 1887 |
| Choke | 1936 |
| Shut-in | 8800 |
| Loss | 7200 |
| Other | 7733 |
| Unknown | 7308 |
| Shut-in | 8100 |
| Not Recd | 8275 |
| Not Recd | 8216 |
| Not Recd | 8303 |
| Not Recd | 8330 |
| Not Recd | 8423 |

Example of a scanned oil and gas permit file

Example of a scanned oil and gas permit file

COUNTY: HARDING
 LEGAL LOCATION: NWSW 36-30N-4E
 API NO: 40 863 20215
 PERMIT NO: 916
 WELL NAME: KIRKWOOD #33-36 STATE
 OPERATOR: WILLIAM C. KIRKWOOD
 PERMIT ISSUED: 06/08/1979
 PERMIT CLOSED: 12/04/1986
 FILE LOCATION: 30N-4E-36 NWSW

TARGET CODES:
 WELL HISTORY / CHECKLIST
 PERMIT TO DRILL / INTENT TO DRILL
 WELL INSPECTION / SCOUT REPORTS
 OPERATOR'S TECHNICAL REPORTS / MAPS
 ADMINISTRATIVE / STUDY REPORTS
 CORRESPONDENCE
 SURVEY
 MISCELLANEOUS

LYNES
DRILL DOWN TOOL TECHNICAL SERVICE COMPANY

- The complete oil and gas permit file
- Bookmarked for easy access to information

Example of a directory of scanned "Elogs" for a particular well, and a geophysical log

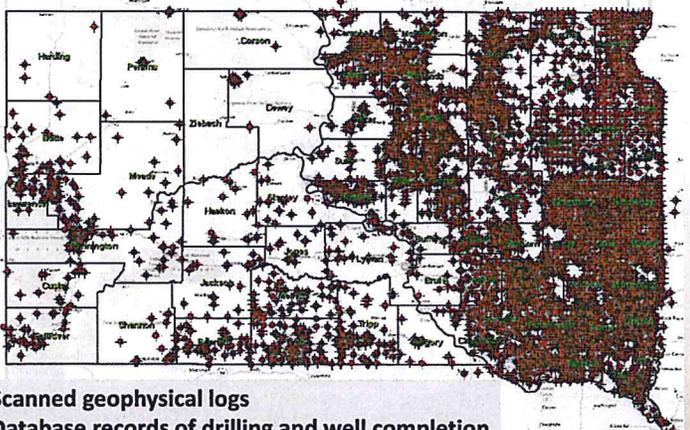
Wednesday, October 05, 2011 10:21 AM 141121254 [4086320215-916](#)
 Wednesday, October 05, 2011 10:36 AM 146765942 [4086320215-916](#)
 Wednesday, October 05, 2011 10:37 AM 21840076 [4086320215-916](#)

Click on a link to download a log.

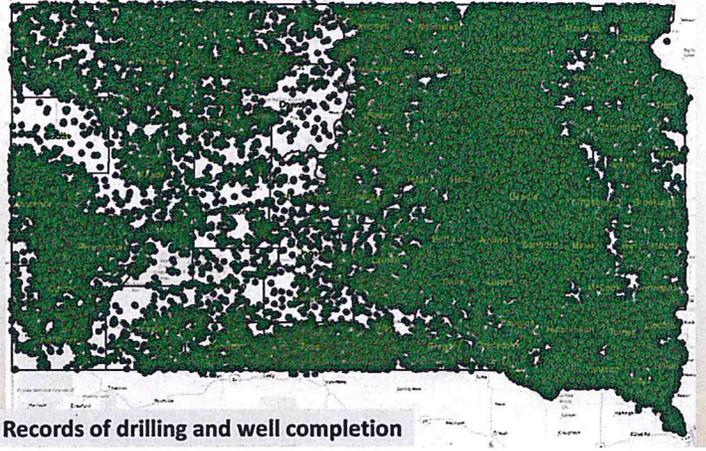
COMPANY: WILLIAM C. KIRKWOOD
 WELL: KIRKWOOD
 STATE: TEXAS
 COUNTY: HARDING
 PERMIT NO: 916
 WELL NAME: KIRKWOOD #33-36 STATE
 OPERATOR: WILLIAM C. KIRKWOOD
 PERMIT ISSUED: 06/08/1979
 PERMIT CLOSED: 12/04/1986
 FILE LOCATION: 30N-4E-36 NWSW

Well Depth (feet): 4000, 4100, 4200, 4300

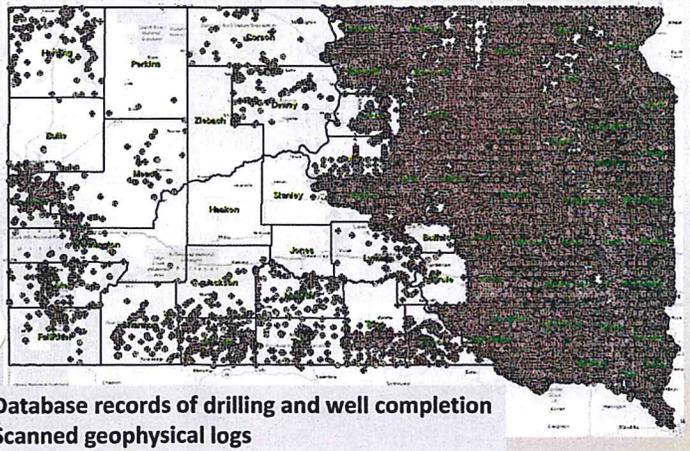
"Geophysical Logs from SDGS Database" data layer showing approximately 5,391 locations for which the Geological Survey Program has down-hole geophysical logs in its files.



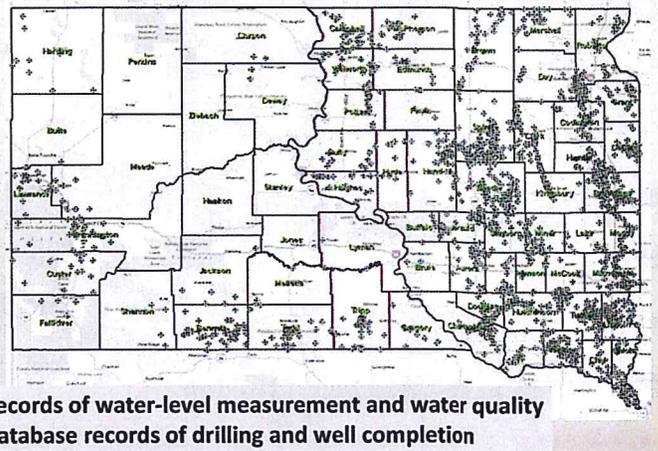
"Water Rights Water Well Completion Reports" data layer showing approximately 62,245 locations for which the Water Rights Program has a water well completion report.



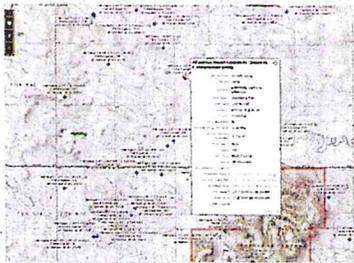
"Lithologic Logs from SDGS Database" data layer showing approximately 34,350 locations for which the Geological Survey Program has a lithologic log.



"Water Rights Observation Wells" data layer showing approximately 1,555 locations at which the Water Rights Program has an observation well.

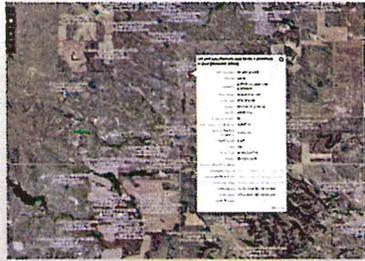


Examples of some of the available base layers for the map that can be turned on and off



3 different scales of topographic maps can be viewed and are dependent on the level of zoom

4 different "air photo" map bases are available



North Dakota's oil-producing units in 2011



North Dakota production statistics: <https://www.dmr.nd.gov/oilgas/stats/statisticsvw.asp>

South Dakota's oil-producing unit in 2011, in Harding County



Geologic column excerpted from SD Geological Survey Oil and Gas Investigation 3

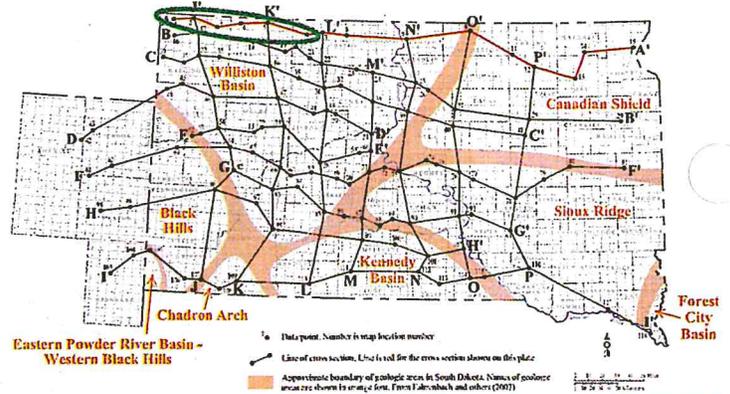
Three Forks
Three Forks



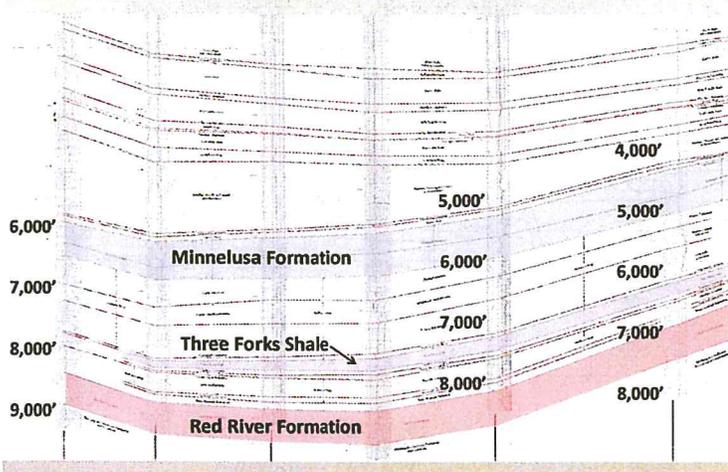
Tyler, Tyler A, Heath
Minnelusa

Red River
Red River

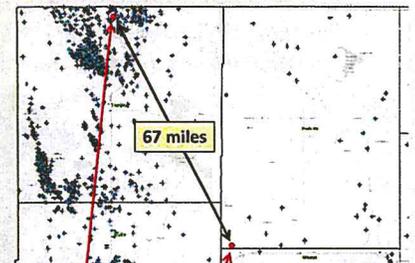
Index map showing locations of data points used for construction of cross sections



Depths of the Red River Formation, Three Forks Shale, and Minnelusa Formation along part of the North Dakota-South Dakota border

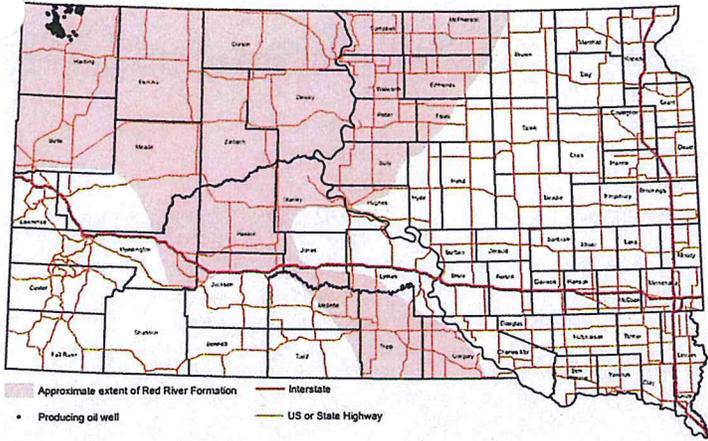


Examples of differences in depths of selected geologic units

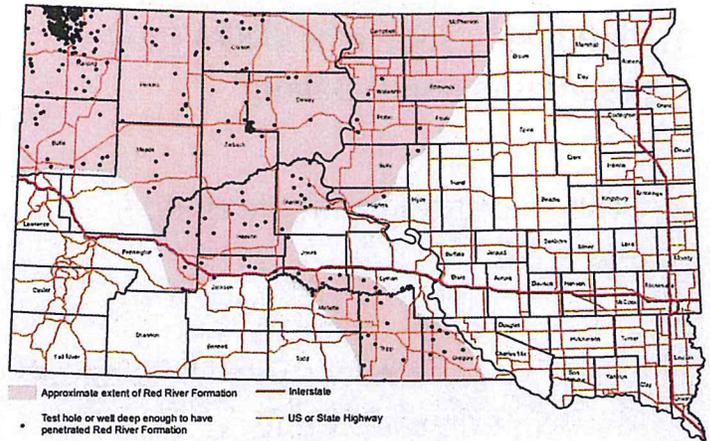


| Formation | North Dakota | Harding Co. | Perkins Co. |
|-------------------|---------------|-------------|-------------|
| | Depth (ft) | | |
| Minnelusa (Tyler) | 7,500-8,200 | 6,170 | 4,642 |
| Bakken | 9,000-10,000 | Not present | |
| Three Forks Shale | 10,000-10,500 | 8,228 | 6,310 |
| Red River | 14,000 | 8,826 | 6,752 |

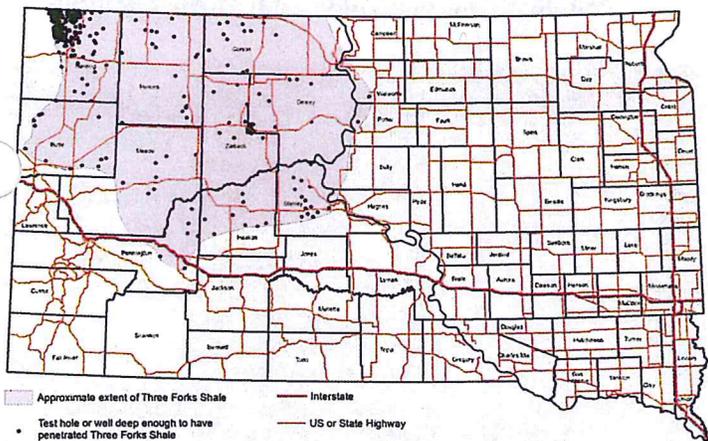
Approximate extent of the Red River Formation and wells producing from it



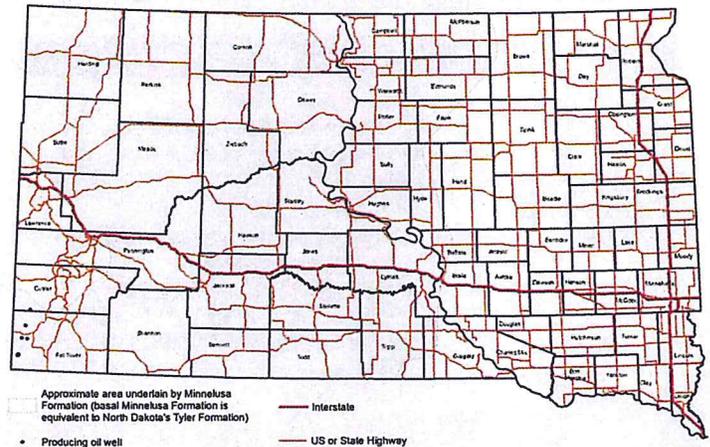
Approximate extent of the Red River Formation and locations of ≈540 test holes and wells deep enough to have penetrated it



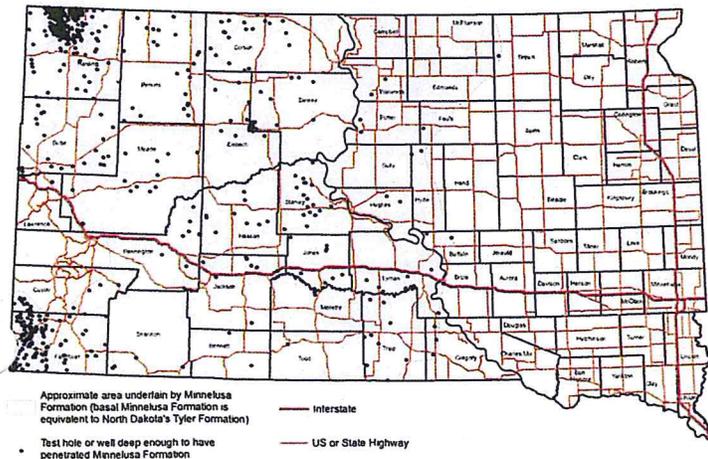
Approximate extent of the Three Forks Shale and ≈438 test holes or wells deep enough to have penetrated it



Approximate extent of the Minnelusa Formation and wells producing from it



Approximate extent of the Minnelusa Formation and ≈904 test holes or wells deep enough to have penetrated it



Oil staining in the basal Minnelusa Formation Drilled in 1957 Central Meade County



CONCLUSIONS

1. Red River – source of KNOWN oil reserves in South Dakota
2. Other formations remain under-explored
3. Red River – for now, most likely target for future development

Public Drinking Water Systems in Butte, Harding, Meade, and Perkins Counties

| Municipal System/Rural Water System | Drinking Water Capacity |
|--|--|
| City of Belle Fourche | Excess capacity with upgrades to system |
| Town of Bison | Little or no excess capacity |
| Town of Buffalo | Little or no excess capacity |
| City of Faith | Little or no excess capacity |
| City of Lemmon | Little or no excess capacity with Perkins County source Excess capacity with old city wells but water quality is poor |
| City of Newell | Excess capacity with upgrades to system |
| Town of Nisland | Excess capacity with upgrades to system |
| Butte/Meade Rural Water | Excess capacity with upgrades to system |
| Perkins County Rural Water (purchases water from North Dakota) | Little or no excess capacity with current source from ND Potential excess capacity with new treatment plant |

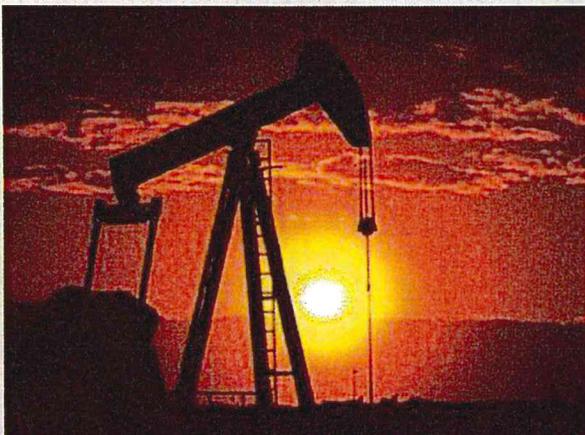
Municipal Wastewater Systems in Butte, Harding, Meade, and Perkins Counties

| Municipal System | Wastewater Capacity |
|-----------------------|---|
| City of Belle Fourche | Little or no excess capacity |
| Town of Bison | Little or no excess capacity currently |
| Town of Buffalo | May have some excess capacity with operational changes |
| Town of Camp Crook | Likely some excess capacity |
| City of Faith | May have excess capacity but needs to evaluate inflows during heavy precipitation |
| City of Lemmon | Likely has excess capacity, but would need to be confirmed with the city or the state of North Dakota |
| City of Newell | May have some additional capacity with operational changes |
| Town of Nisland | No excess capacity |

State and Federal Financial Assistance Programs for Water, Wastewater, and Solid Waste Facilities

| Agency | Program |
|------------------------|---|
| Revenue and Regulation | County in which production occurs gets 50% of severance tax |
| DENR | Small community planning grants |
| DENR | Consolidated Water Facilities Construction Program |
| DENR | State Water Resources Management System |
| DENR | Drinking Water State Revolving Loan Fund Program |
| DENR | Clean Water State Revolving Loan Fund Program |
| DENR | Solid Waste Management Program |
| GOED | Community Development Block Grants |
| USDA | Rural Development Program |

DENR's Oil and Gas Initiative – Making South Dakota Open for Drilling



Oil and Gas Rules and Permitting

Article 74:12

Oil & Gas Conservation Rules

- 10 Chapters
- Definitions, drilling, operation, plugging and abandonment, underground injection, unitization, record keeping, notice of recommendation process, and risk compensation
- The rules supplement the Oil and Gas Conservation Laws in SDCL 45-9

Oil and Gas Rule Update

- Part of the Department's Oil and Gas Initiative to encourage more development
- Objective - fewer, shorter, and simpler regulatory requirements
- Last comprehensive update in 1996

Adoption of Revised Rules

- The Board of Minerals and Environment repealed the former oil and gas rules in Article 74:10 and adopted the revised rules in Article 74:12 on November 16, 2011
- Interim Rules Review Committee approved the rules on December 20, 2011
- Rules provisionally effective on January 12, 2012

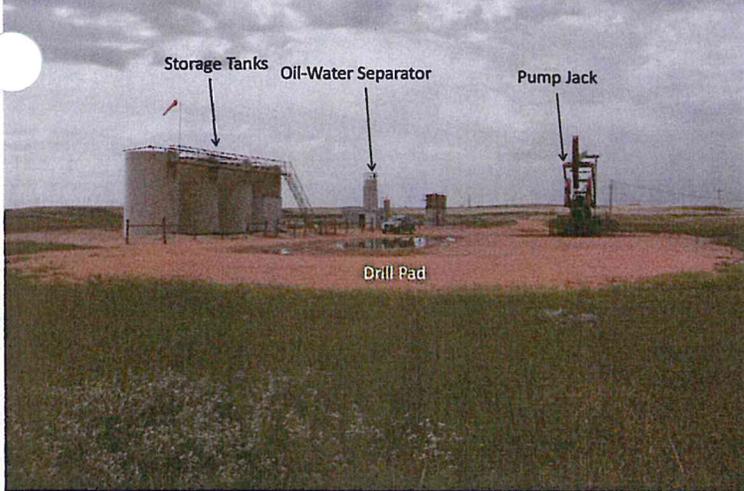
Streamlining Efforts

- Repealed Article 74:10 and replaced with 74:12
- Eliminates about 11 pages of "clutter" and one unnecessary chapter
 - Including previously transferred or repealed rules

Streamlining Efforts

- Eliminated rule for directional well and consolidated with horizontal well rule
- Consolidated all required administrative approvals and submission requirements under one rule
- Eliminated rule requiring monthly produced water reporting - repeated in another rule
- Eliminated two redundant rules related to pits and bird/wildlife protection
- Eliminated part of rule requiring gas transport facilities to report gas produced
- Eliminated rule on drilling for CO₂ and steam

Typical Producing Oil Well in Harding County



Drilling Permits

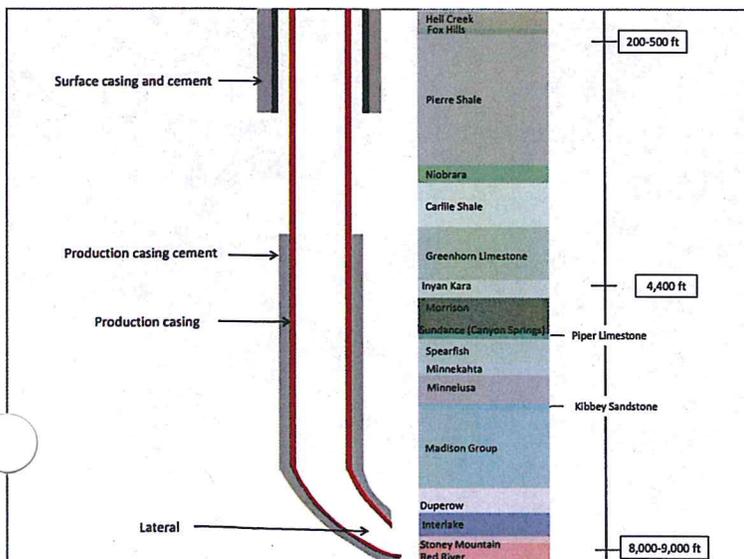
- Drilling permits issued by DENR administratively
- Permits issued in 14 days or less
- Conditions attached to the permit cover such things as plugging, pit construction, and final abandonment
- Applications for horizontal wells must also include subsurface coordinates and detailed information on casing, cementing, and mud program

Well Construction

- Surface casing (steel pipe) must be installed and cemented to surface to protect shallow aquifers
- The hole for surface casing must be drilled with fresh water
- In Harding County, the Fox Hills Formation must be covered – depths typically 200 to 500 feet
- Operators generally install 1500 to 2000 feet to protect hole integrity
- After surface casing is installed, the hole is drilled to the target – Red River B Formation in Harding County at depths of 8000 to 9000 feet

Well Construction

- After testing, the decision is made to case the well for production or plug and abandon the well
- If the decision is to produce, production casing is installed and cement is emplaced between the casing and hole wall to isolate other potential fresh water aquifers
- Once the production casing is installed, it is perforated through the target formation to allow oil to flow into the casing



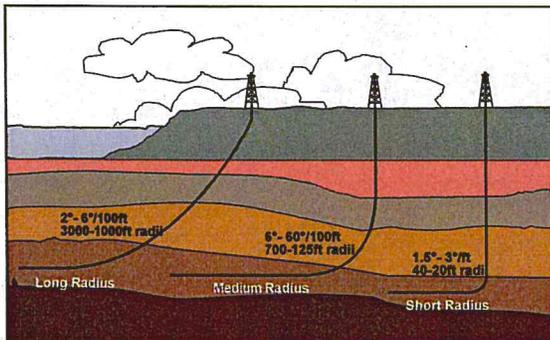
Well Construction

- If it is a horizontal well, a window is milled in the casing above the target formation so there is room for the special drilling tools to make the curve into the target
- The horizontal component of the well is called a lateral
- Laterals may extend for a mile or more
- Laterals drilled into the Red River Formation in Harding County are generally run without casing
- Nearly all oil wells drilled in Harding County currently are horizontal wells

Applications of Directional Drilling



Horizontal Drilling - Long, Medium, and Short Radii



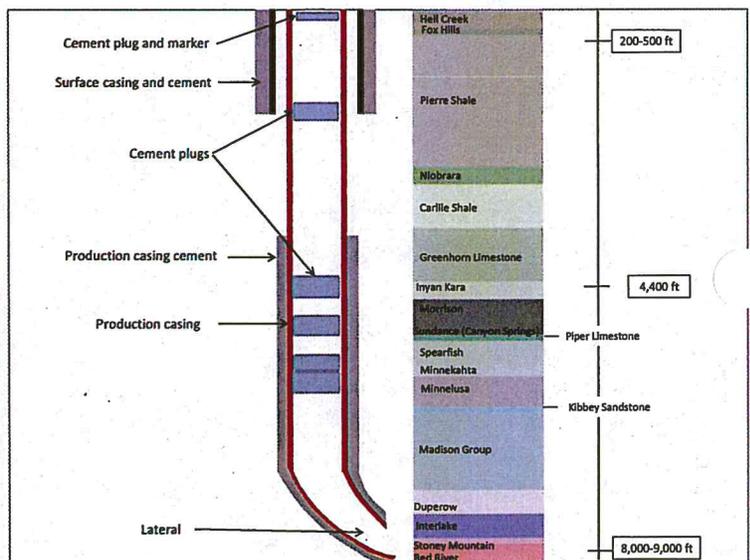
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Well Plugging

- Purpose is to confine all fluids to the geologic units in which they originally occurred to protect ground water resources
- If the well is plugged without production casing, all aquifers or fluid-bearing formations must be sealed or separated by individual cement plugs
- A 100 foot cement plug must be placed half in and half out of the bottom of the surface casing
- A 25 foot cement plug must be set at the surface
- Heavy drilling mud must be placed between all plugs

Well Plugging

- Production casing may be left in the hole but it must demonstrate mechanical integrity (no leaks)
- Casing perforations must be cemented or isolated with a bridge plug with at least 20 feet of cement above
- Additional cementing and plugs may be required
- If a portion of the production casing is removed, a 100 foot cement plug must be placed half in and half out of the stub
- The remainder of the hole is plugged in the same manner as one without production casing

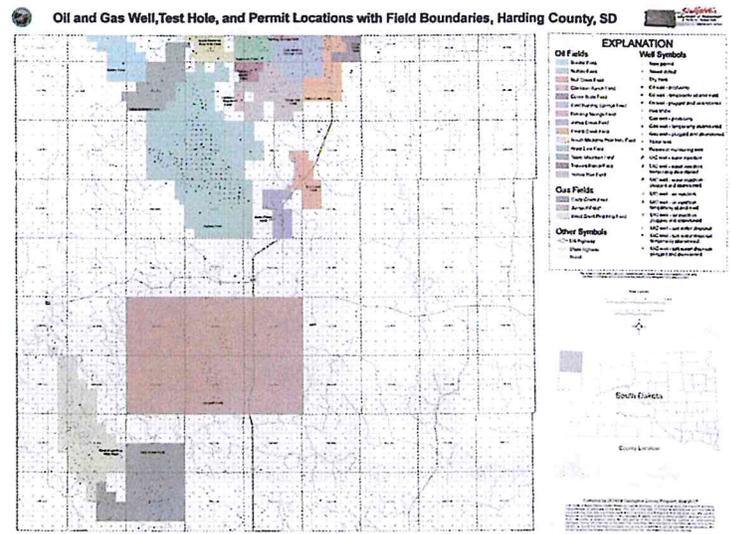
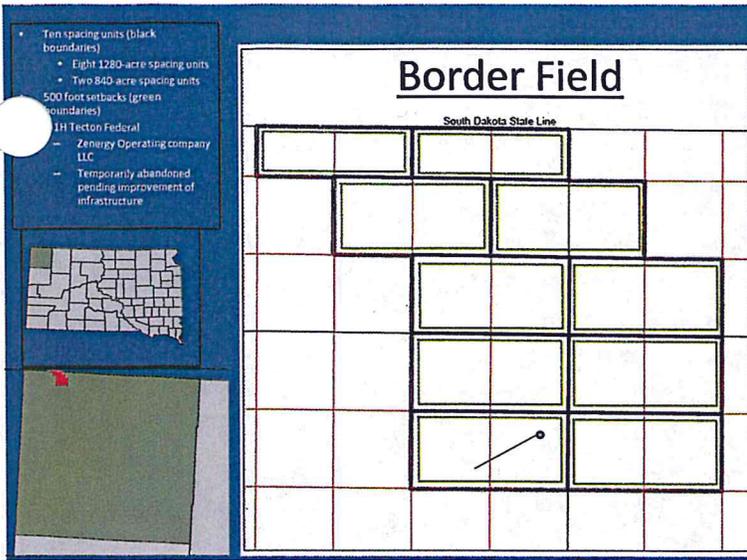


Well Spacing

- Well spacing defines the area (spacing unit) in which a well may be drilled and the distances that must be maintained from the spacing unit boundary and other wells (setbacks)
- The purpose is to provide for orderly development, protect correlative rights (don't drain your neighbor's oil), and prevent the drilling of unnecessary wells
- All mineral owners share in the production from a spacing unit
- Statewide spacing is set by rule at 40 acres for oil wells and 640 acres for gas wells
- Statewide setback from spacing unit boundaries is 500 feet for both oil and gas wells
- Statewide setback from other wells is 1000 feet for oil wells and 3750 feet for gas wells

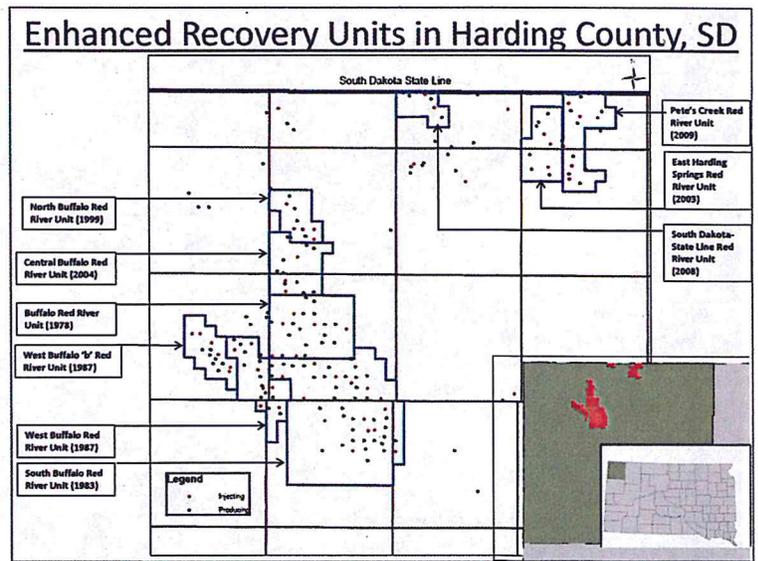
Well Spacing

- Spacing can be changed by applying for an order specifying the proposed spacing and setbacks
- The proposed spacing must be justified by geologic and other technical information
- A proposed spacing pattern may cover the entire area suspected to be underlain by a pool of oil or gas – this area is termed a "field"
- Spacing units may not be smaller than the area that can be drained by one well
- We have fields that range from 10 to 1280 acre spacing – larger spacing units are generally for horizontal wells
- We have 28 oil fields and three gas fields in SD



Unitization

- Unitization brings together or unites all or parts of a productive area so it can be operated as a single operating unit, primarily for the purposes of enhanced recovery
- Enhanced recovery in South Dakota involves injecting water (water flood) or air (fireflood) into the producing formation to drive oil to production wells
- There are six water flood units and three fireflood units in Harding County that collectively produce about 88 percent of the state's oil
- A hearing will be held before the Board of Minerals and Environment this coming Thursday on a new water flood unit in Harding County to be operated by Luff Exploration Company of Denver



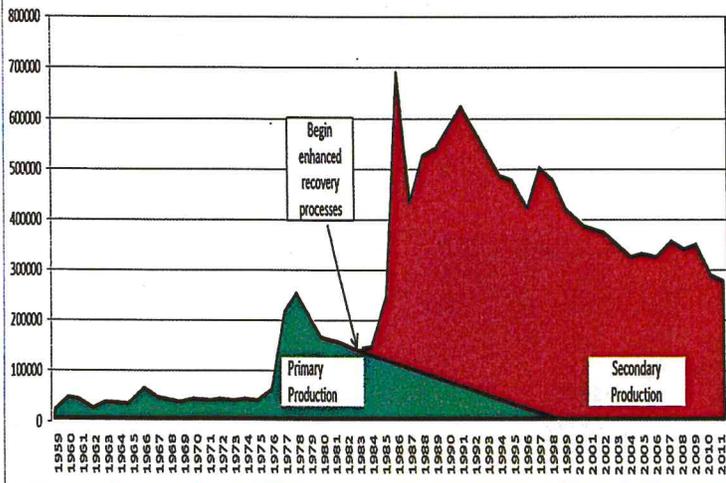
| SOUTH DAKOTA UNITIZED AREAS | | | | | | | |
|--|--------------------------------|---------------------|-------------------|---------------------------|-------------------------------|--|------------------------------------|
| Unit Name | Current Operator | Year of Unitization | Unit Size (Acres) | Number of Producing Wells | Number of Air Injection Wells | Number of Water Injection and Disposal Wells | **2011 Total Oil Production (bbls) |
| Buffalo Red River | Continental Resources, Inc. | 1981 | 7,670 | 17 | 8 | 1 | 132,423 |
| South Buffalo Red River | Continental Resources, Inc. | 1983 | 20,800 | 36 | 12 | 2 | 281,618 |
| West Buffalo Red River | Continental Resources, Inc. | 1987 | 4,640 | 11 | 6 | 1 | 110,441 |
| West Buffalo 'B' Red River | Citation Oil & Gas Corporation | 1987 | 3,380 | 7 | 0 | 4 | 77,822 |
| North Buffalo Red River | Luff Exploration Corporation | 1999 | 2,880 | 6 | 0 | 4 | 54,874 |
| Central Buffalo Red River | Prima Exploration, Inc. | 2004 | 4,480 | 9 | 0 | 7 | 225,379 |
| East Harding Springs Red River | Luff Exploration Corporation | 2003 | 3,980 | 8 | 0 | 3 | 206,408 |
| Pete's Creek Red River | Luff Exploration Corporation | 2009 | 4,870 | 11 | 0 | 5 | 148,671 |
| South Dakota-State Line Red River | Luff Exploration Corporation | 2008 | 1,950 | 3 | 0 | 2 | 179,799 |
| Harding County Total | | | 54,650 | 108 | 26 | 29 | 1,417,435 |
| Alum Creek | Citation Oil & Gas Corporation | 1982 | 1,040 | 6 | 0 | 5 | 17,863 |
| Igloo | L&J Operating, Inc. | 1992 | 120 | 1 | 0 | 0 | 110 |
| Indian Creek | None (No Active Wells) | 1979 | 960 | 0 | 0 | 0 | 0 |
| Fall River County Total | | | 2,120 | 7 | 0 | 5 | 17,973 |
| Enhanced Recovery Unit Total | | | 56,770 | 115 | 26 | 34 | 1,435,408 |
| State Total | | | | | | | 1,633,729 |
| <i>Enhanced recovery unit production accounts for 88% of total state oil production.</i> | | | | | | | |

**Production data is approximate, and currently under review by DENR.

Unitization

- All mineral owners (working interest and royalty) share in the production based on an agreed upon formula
- Working interests are generally the oil companies that have leased the mineral rights from the owner
- Royalty owners are the mineral right owners who lease the mineral rights to the oil companies
- At least 60 percent of the working interest owners and 60 percent of the royalty owners must approve or ratify the unit for it to go forward
- The following graph shows the effect of unitization and enhanced recovery on production in one of our fireflood units operated by Continental Resources

South Buffalo Red River Unit Production (bbls) per Year



Unitization

- Unitization is accomplished by submitting an application for an order to DENR
- The application must include, for example, the legal location of land, the target formation, information on geology and economics, unit operating plans, and agreements on cost sharing
- Newer units are set up so that wells can be drilled anywhere as long as they maintain a 500 foot setback from the unit boundary

Underground Injection Control

- Federal Safe Drinking Water Act regulates underground injection related to oil and gas activities through EPA's Underground Injection Control Class II program.
- DENR has been delegated authority to run this program from EPA and administers it through ARSD 74:12:07

Underground Injection Control

- The goal of DENR's Class II Underground Injection Control Program is to prevent degradation of freshwater resources while facilitating the orderly development of oil and gas resources in South Dakota.

Underground Injection Control

- ARSD 74:12:07 requires a permit for the injection of any substance for the purpose of:
 - maintaining reservoir pressure,
 - enhanced recovery operations,
 - disposal of production and exploration wastes, or
 - storage of hydrocarbons which are liquid at standard temperature and pressure

Underground Injection Control

- As of June 1, 2012 there are 122 permitted Class II injection wells in South Dakota
 - 13 Active salt water disposal wells
 - 25 Active Air injection wells
 - 24 Active water injection wells
 - Remaining wells are either producing, plugged and abandoned, or temporarily abandoned

Oil & Gas Approval Processes

Administrative

- Routine approval of actions authorized by rule or order
- Drilling permits, sundry requests for minor changes/actions
- No hearings required

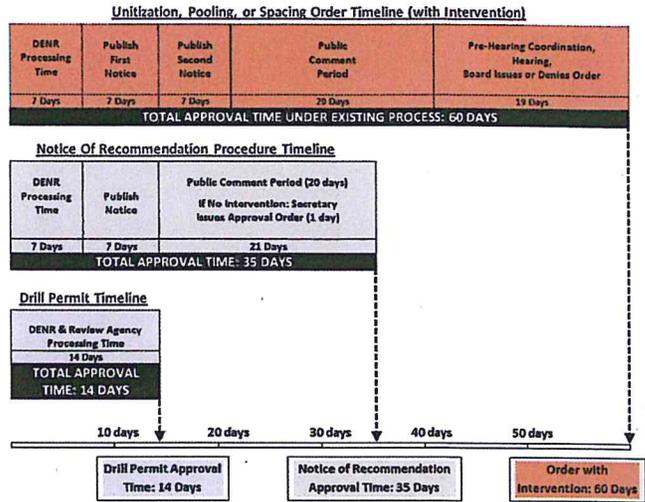
• Notice of Recommendation Process

- Approval of allowable exceptions to rule or order
- Exception locations, minor modifications, underground injection
- Public notice required, but hearing only if contested

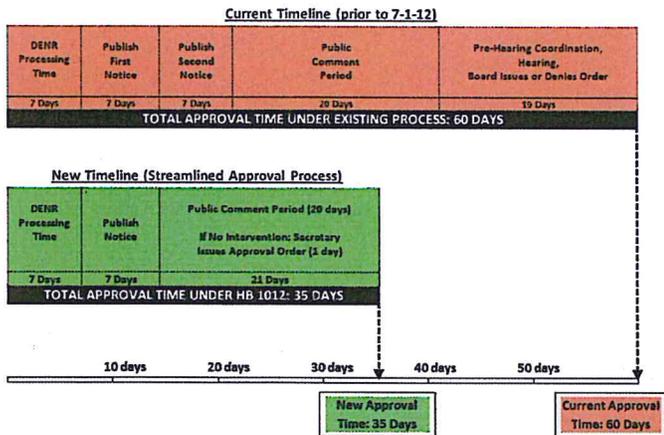
• Oil & Gas Orders

- Orders establish approved framework for oil & gas development
- Spacing, pooling, unitization
- Public notice and hearing required until July 1

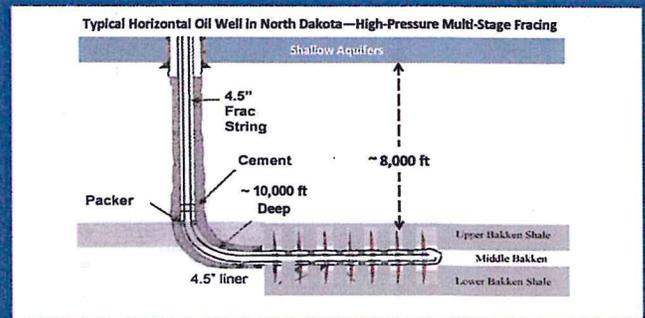
Oil & Gas Approval Timelines



Comparison of Oil & Gas Order Approval Time Current vs. New Streamlined Process



Hydraulic Fracturing (Fracing)



Large scale fracing performed on most North Dakota Bakken wells
3 to 5 million gallons

Large scale fracing allowed in South Dakota, but not currently used

EPA studies underway to determine if regulation of fracing is needed

THE END

See our website at:

<http://denr.sd.gov/des/og/oghome.aspx>

