2007 SOUTH DAKOTA OIL & GAS UPDATE

BY

GERALD (MACK) McGILLIVRAY

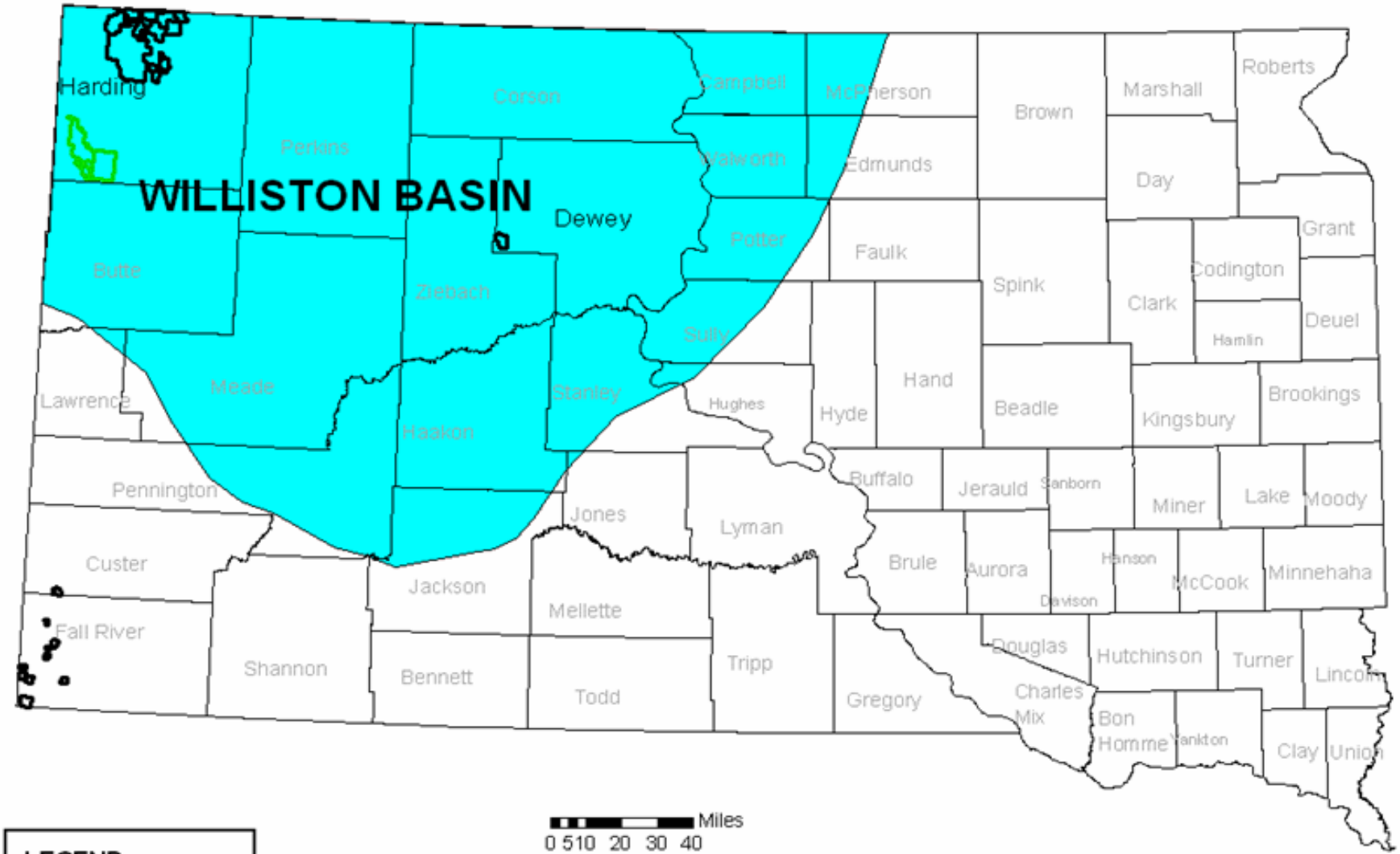
SIXTEENH WILLISTON BASIN

PETROLEUM CONFERENCE

APRIL 27 – 29, 2008

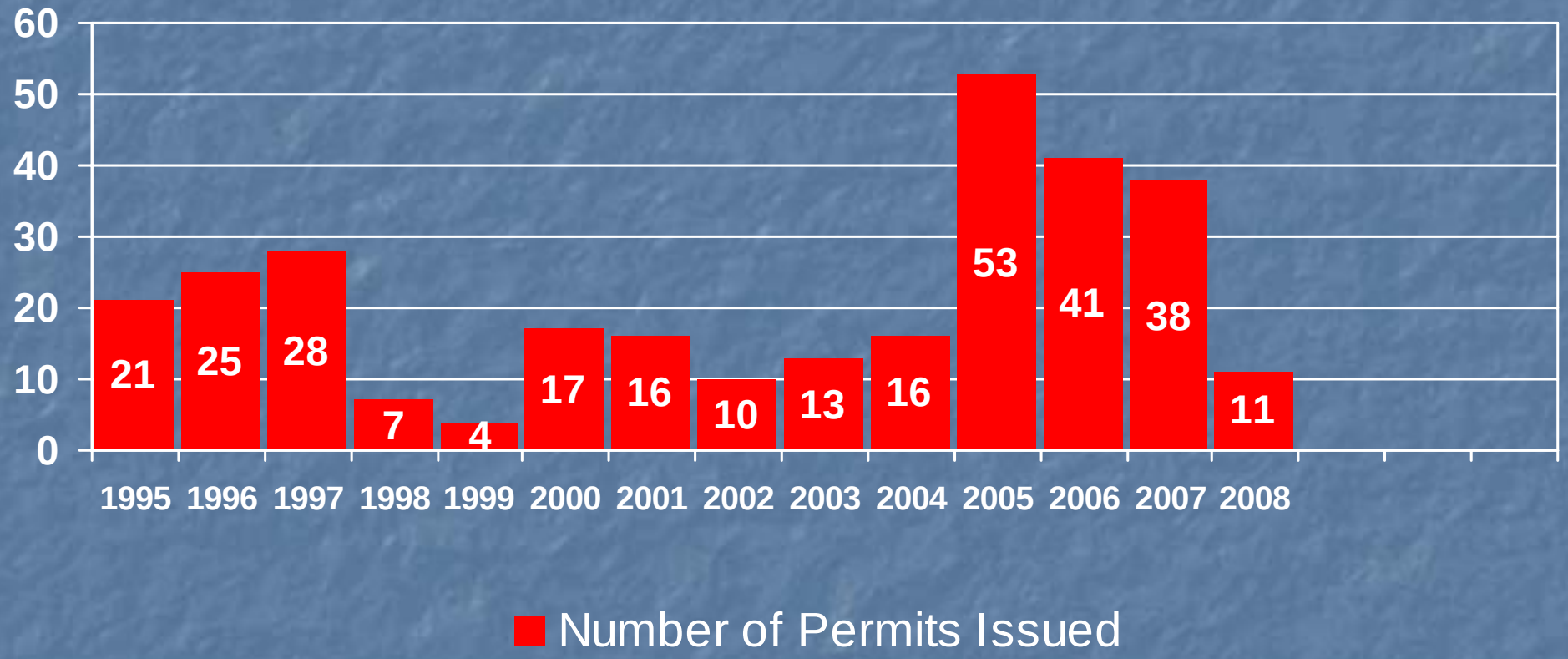
Saskatchewan
Manitoba
WILLISTON
BASIN
Montana
North Dakota
South Dakota
M

EXTENT OF WILLISTON BASIN IN SOUTH DAKOTA

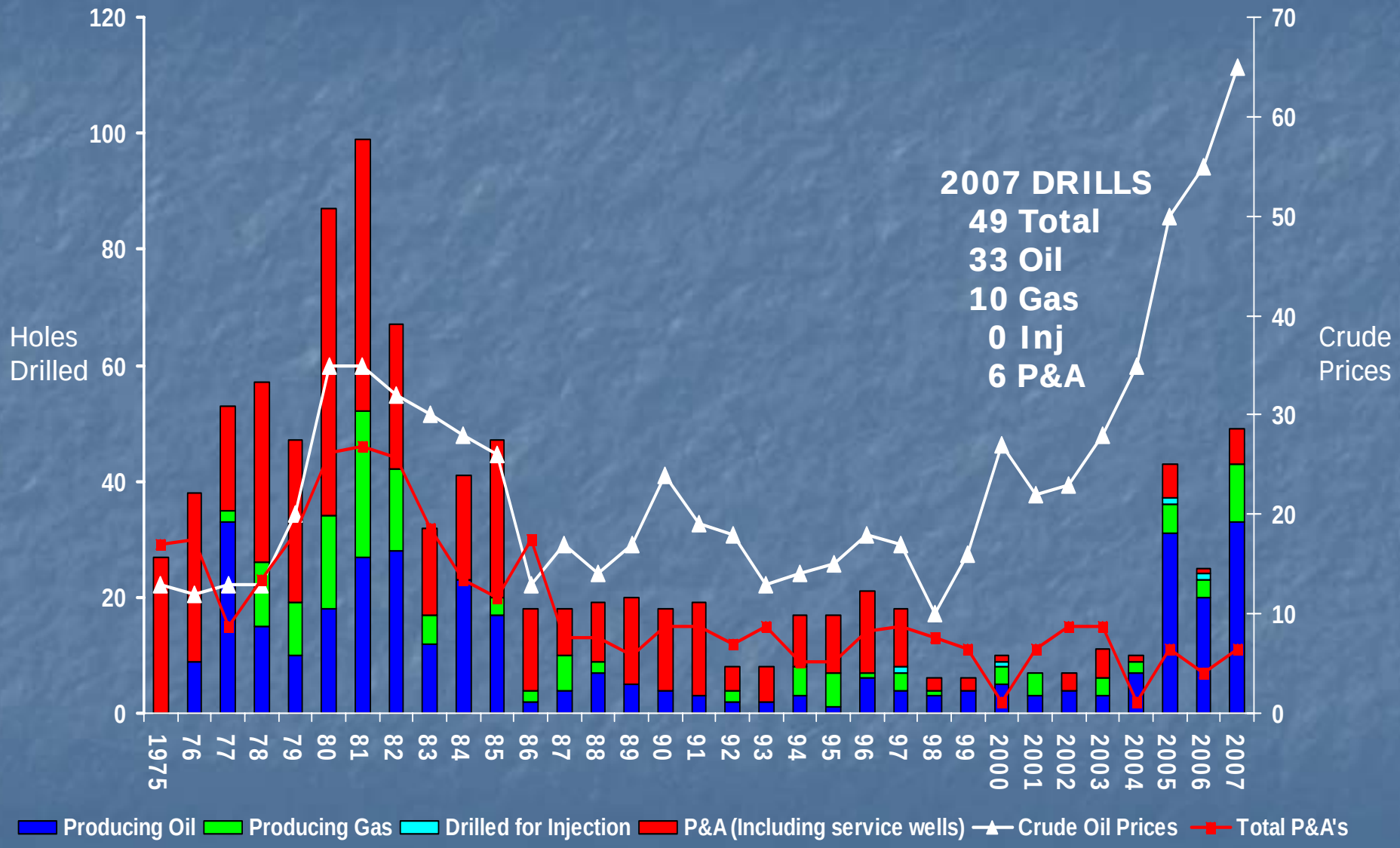


EXTENT OF THE BAKKEN FORMATION IN SOUTH DAKOTA

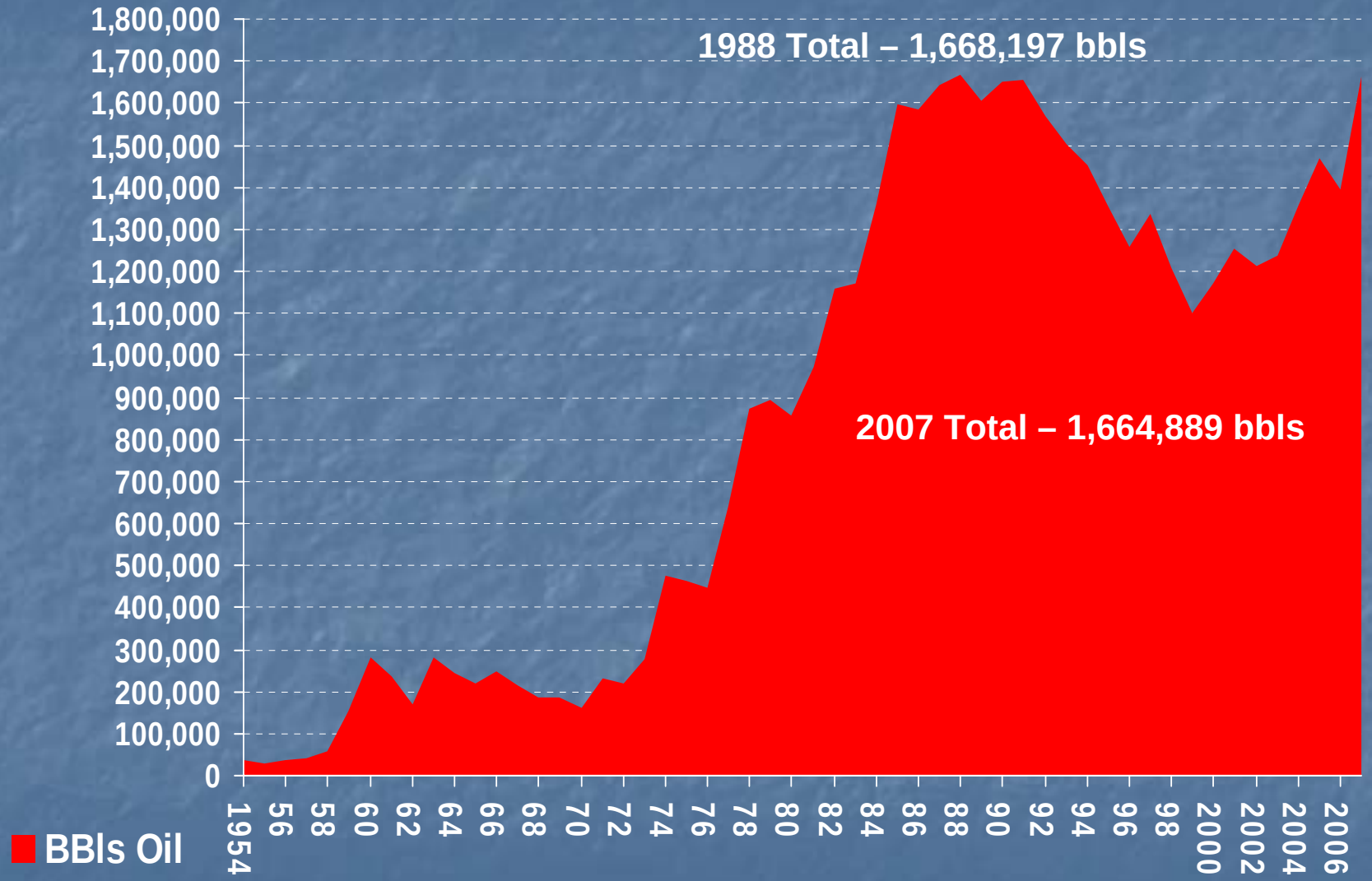
South Dakota Drilling Permits Issued
1995 – 4/20/2008



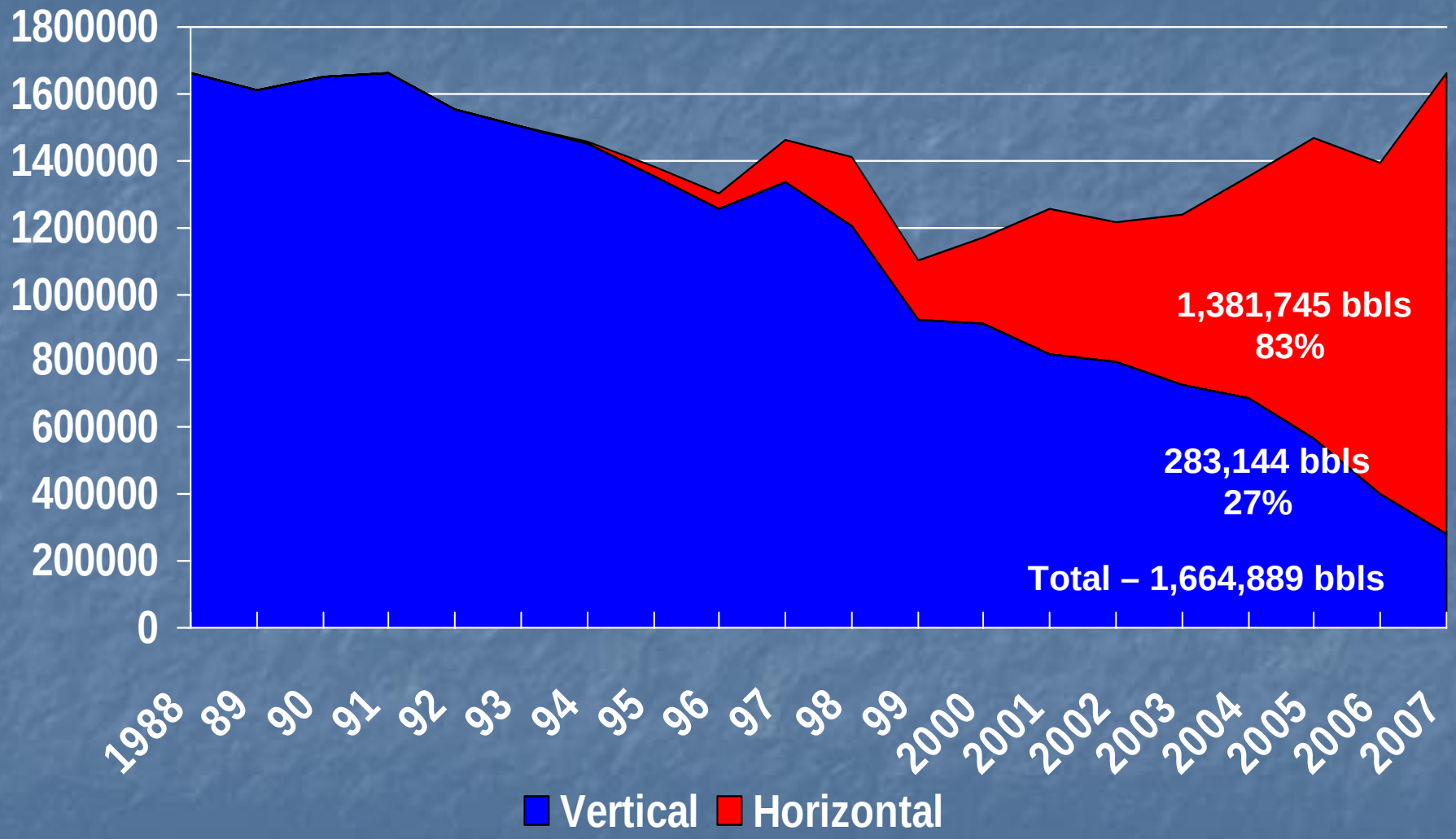
South Dakota Oil & Gas Tests/Plugs
1975-2007



South Dakota Crude Oil Production (bbls) 1954-2007

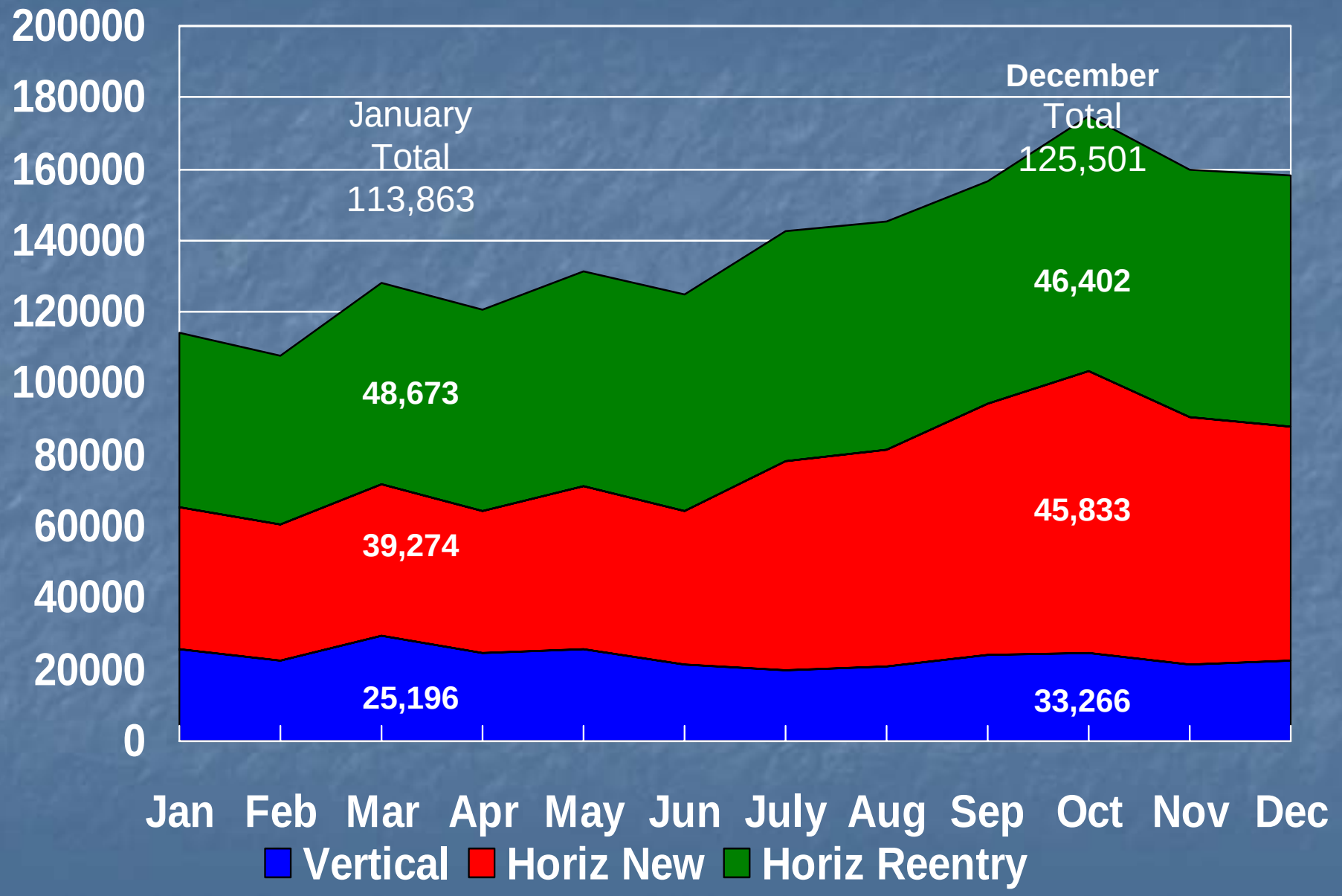


South Dakota 1988-2007
Yearly Oil Production (BBLS)

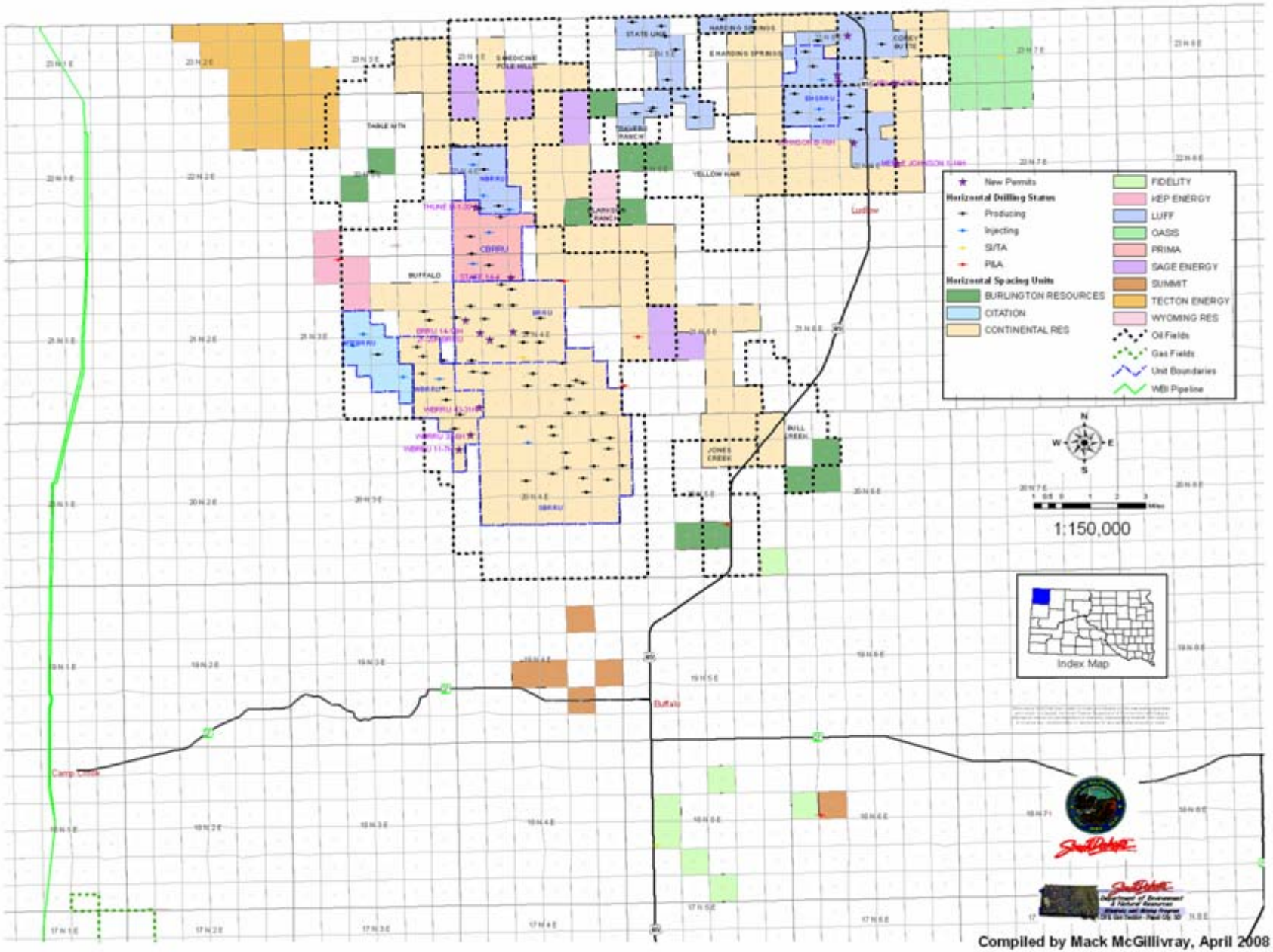


SD DENR - OIL & GAS SECTION 3/14/08

South Dakota 2007 Monthly Oil Production (BBLS)

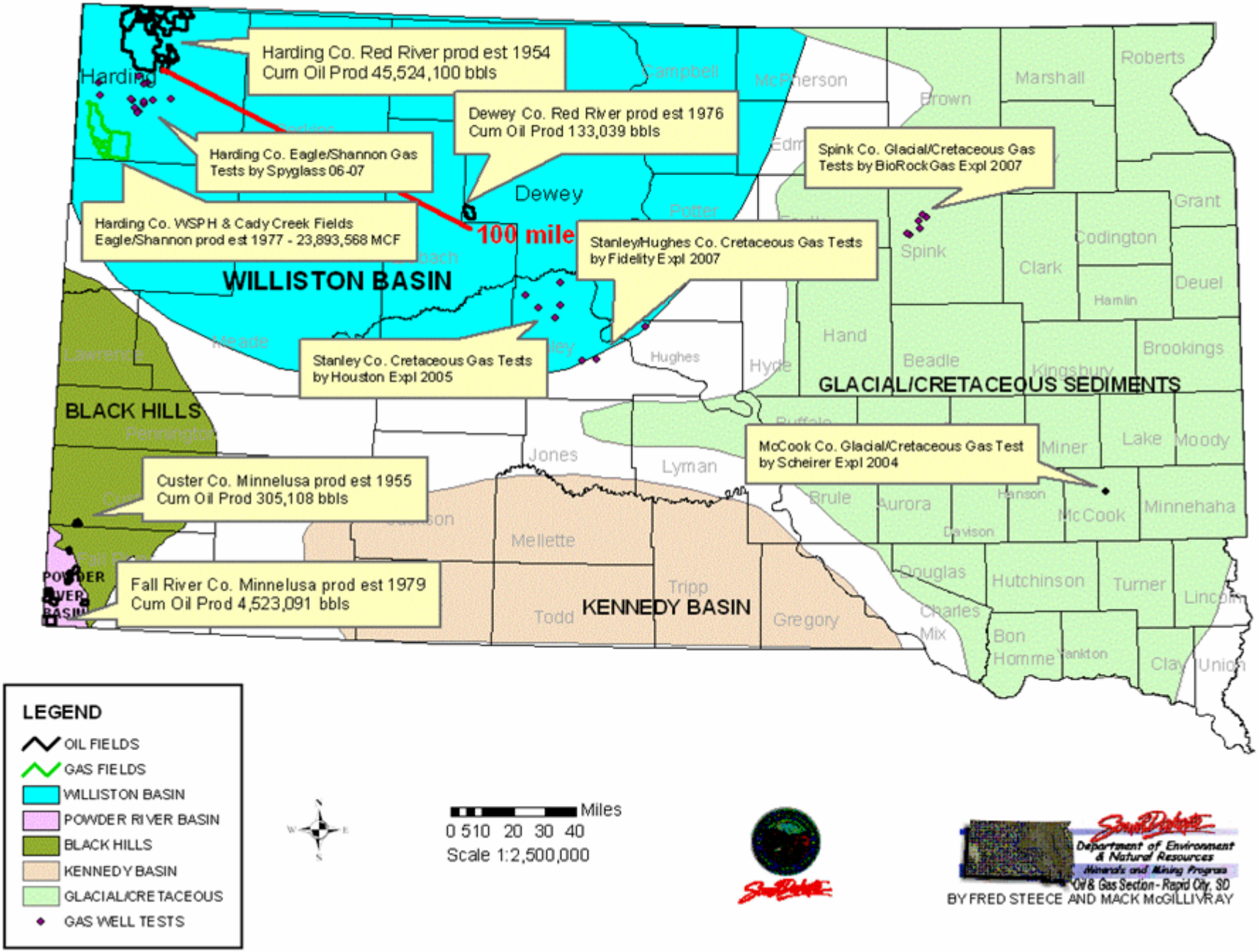


Harding County Horizontal Wells/Spacing Units



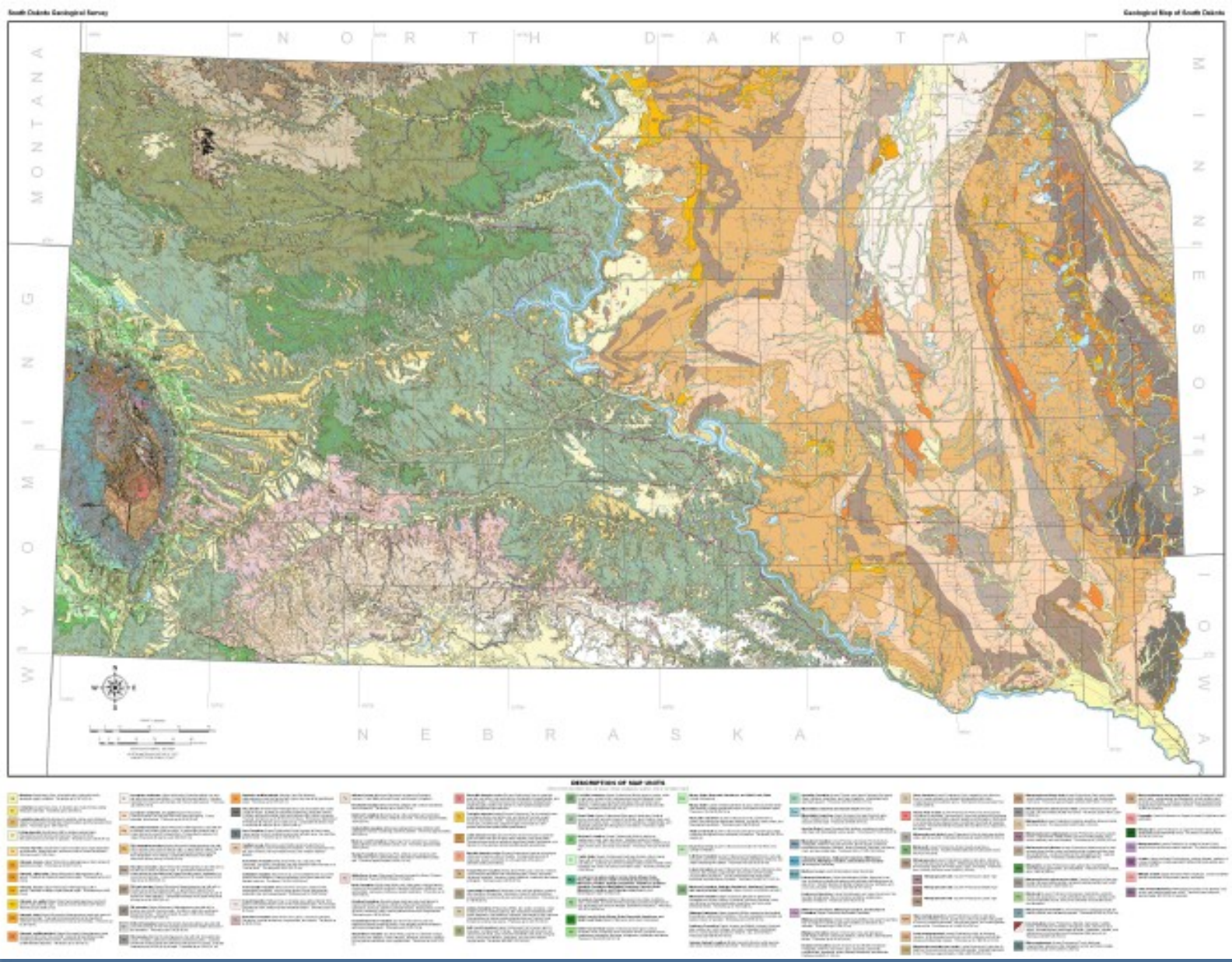
Compiled by Mack McGillivray, April 2008

CURRENT AND POTENTIAL OIL & GAS PRODUCING BASINS/AREAS IN SOUTH DAKOTA

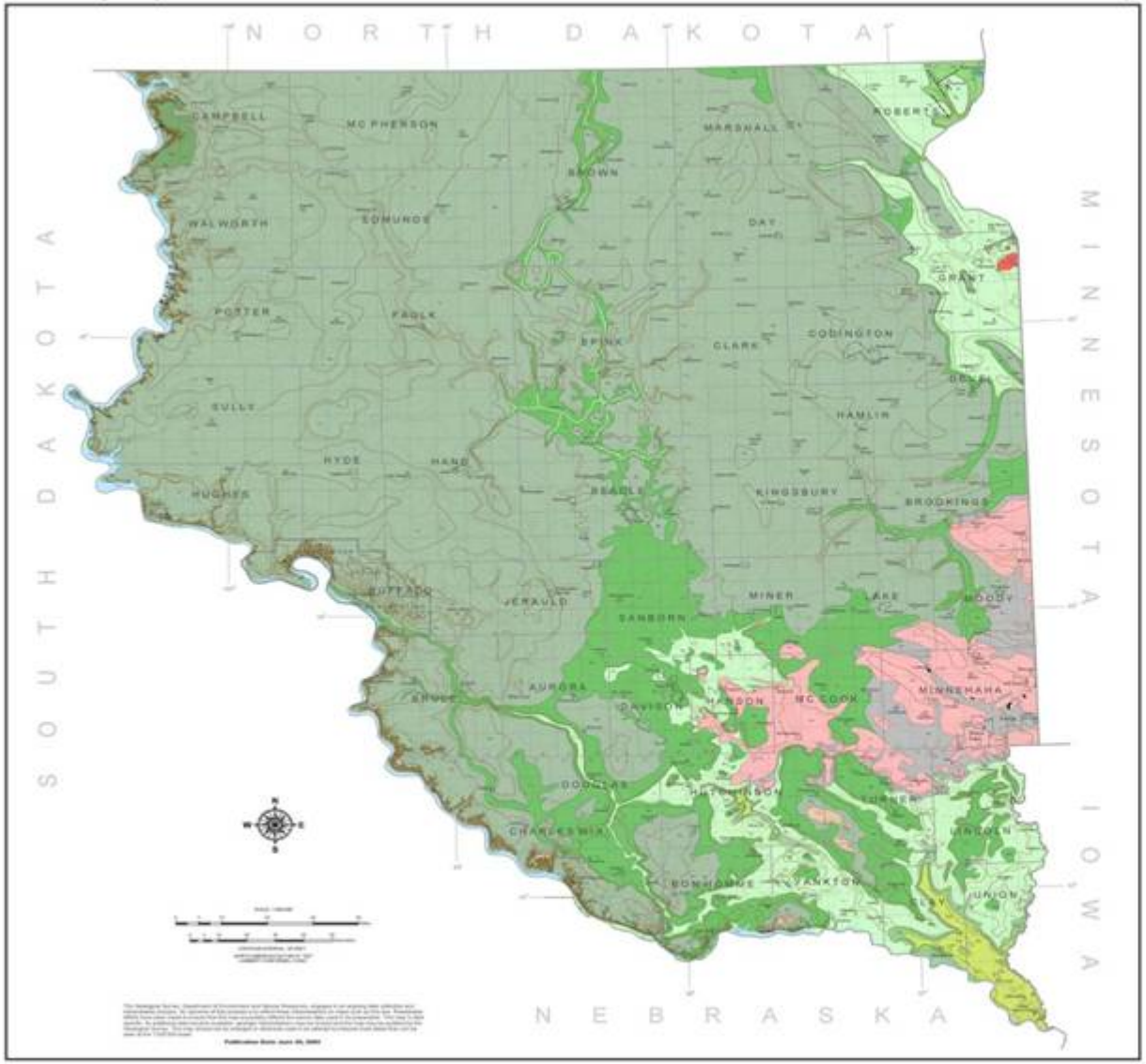


BY FRED STEECE AND MACK McGILLIVRAY

CURRENT PUBLICATIONS AND SERVICES


South Dakota Geological Survey
Geological Map of South Dakota
NORTH DAKOTA
MONTANA
WYOMING
MINNESOTA
IOWA
NEBRASKA
DESCRIPTION OF MAP UNITS

GEOLOGIC MAP OF
SOUTH DAKOTA
2004



STATE OF SOUTH DAKOTA
M. Michael Rounds, Governor

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
Steven M. Pirner, Secretary

DIVISION OF FINANCIAL AND TECHNICAL ASSISTANCE
David Tompkins, Director

GEOLOGICAL SURVEY
Duane G. Naz, State Geologist

Bedrock Geologic Map Showing Configuration of the Bedrock Surface in South Dakota East of the Missouri River

Dennis W. Tomhave and Layne D. Schulz

2004

MAP AREA

SHADED RELIEF MAP OF THE BEDROCK SURFACE EAST OF THE MISSOURI RIVER

DESCRIPTION

The mapped area is within the glaciated part of South Dakota east of the Missouri River. The bedrock surface is modified by Pleistocene-age glacial sediment of many genetic origins throughout most of the map area. The mantle included areas which contain the glacial sediment in many areas. Additionally, the mantle layer includes Holocene-age alluvial, colluvial, and eolian sediments. The combined thicknesses ranged from a few inches to more than 1,000 feet thick, on the Dakota and Prairie in northeastern South Dakota.

Bedrock deposits known on the map include, from oldest to youngest, Late Ordovician to Early Pleistocene-age Maquoketa Shale, Decorah Shale, Stonehenge and Kimmswick Formations, Cretaceous-age Dakota Formation, Graneros Shale, Greenhorn Formation, Carlile Shale, Niobrara Formation, Pierre Shale, and Fox Hills Sandstone, and unidifferentiated Tertiary-age Ogallala Group formations, and included in the map unit, in areas surrounding or near the Black Hills, Oligocene-age Brule Formation and unconsolidated silicic and Paleozoic-age Paleozoic and Precambrian-age Sioux Quartzite and Precambrian-age Pierre Formation.

Bedrock crops out along the Missouri River bluffs, along many creeks and coulees, and other areas where the glacial sediment has been removed by erosion. Maquoketa Shale crops out in Knox County, Sioux Quartzite crops out in Clay County, Pierre Shale crops out in Clay, Douglas, Hutchinson, Roberts, and Union Counties, Niobrara Formation crops out in Union and Clay Counties, Carlile Shale crops out in Clay, Douglas, Hutchinson, Roberts, and Union Counties, Graneros Formation crops out in Clay, Douglas, Hutchinson, Roberts, and Union Counties, Dakota Formation crops out in Clay, Douglas, Hutchinson, Hanson, Aurora, Lincoln, Roberts, and Hamlin Counties, Pierre Shale crops out in Bon Homme, Brule, Buffalo, Charles Mix, Clay, Davison, Hanson, Douglas, Edmunds, Hughes, Hyde, Jerauld, Marshall, McPherson, Potter, Roberts, Sanborn, Sully, Walworth, and Yankton Counties, Fox Hills Sandstone crops out in Brule, Charles Mix, Jerauld, and Yankton Counties, and unidifferentiated Tertiary sediment crops out in Bon Homme, Brule, Charles Mix, Jerauld, and Yankton Counties.

The topography of the bedrock surface is very varied in a complex geographical and glacial history. Prior to glaciation, the mapped area was dissected by a network of north-draining river systems, and would resemble much of the land west of the Missouri River as it is today. Rivers such as the James River, Vermillion River, and Choteau Creek flowed south into present-day Nebraska and into the ancestral Missouri River. Rivers such as the Big and White Lake Valleys flowed north into the Red River systems, and on to Hudson Bay. Rivers such as the Big and White Lake Valleys of an ancestral river system which flowed southeast to the Ancestral River Valley and on to the Gulf of Mexico. Glaciation changed the landscape with glaciers scouring the rock surface and redirected drainage cutting deeply incised channels in some of the excavated river valleys. These deep channels are very narrow, at times less than a quarter of a mile wide. Bedrock elevations of less than 500 feet are common in the north-central and southeastern portions of the mapped area. An alternate valley made by completely buried deep-bedrock channels. The Missouri River valley is an example of a deeply incised non-glacial bedrock channel. Early glaciation did indeed redirect drainage across the Missouri River valley, evidenced only by isolated deposits and glacial erratics.

Sources of data used in compiling the map include the following: (1) Lithologic logs of test holes and wells on file with the Geological Survey and Water Rights Programs, Department of Environment and Natural Resources; (2) Published and unpublished geologic maps of the Geological Survey Program, Department of Environment and Natural Resources; and (3) U.S. Geological Survey 1:24,000 scale digital elevation data.

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South Dakota
Department of Environment & Natural Resources
Geological Survey

General Maps

Get Acrobat Reader

The files provided are relatively large in size and should be downloaded by "right-clicking" the download link and selecting "Save as...".

General Map No. 2: Coal fields of northwestern South Dakota
Map (14.6 Mb)

General Map No. 3: Panel diagram of subsurface formations in South Dakota
Map (36.4 Mb)

General Map No. 4: Structure map of South Dakota, Greenhorn datum
Map (43.7 Mb)

General Map No. 8: Recorded earthquakes in South Dakota
Map (0.4 Mb)

NEW **General Map No. 9:** Bedrock geologic map showing configuration of the bedrock surface in South Dakota east of the Missouri River
Map (12.5 Mb) Shapefiles

NEW **General Map No. 10:** Geologic map of South Dakota
Map (10.6 Mb) Text (0.1 Mb) Shapefiles

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http://www.state.sd.us/denr/DES/Mining/Oil&Gas/O&Ghome.htm

O&G Dev

RULES & REGS

NEW PERMITS

FORMS

PROD/INJ

MAPS

WELL DATA

LINKS

South Dakota
Department of Environment & Natural Resources
Minerals and Mining Program
Oil & Gas Section - Rapid City, SD

Fred Steece - Oil & Gas Supervisor/Geology Specialist (E-mail)

Gerald (Mack) McGillivray - Senior Geologist/Web Page Developer (E-mail)

Welcome to the South Dakota Oil & Gas Section homepage. The Oil & Gas Section is under the Minerals & Mining Program, Division of Environmental Services, Department of Environment and Natural Resources, and is located at 2050 W. Main, Suite #1, Rapid City, SD 57701. PH: (605) 394-2229.

What We Do

The purpose of the Oil & Gas Section is to provide environmental regulation in a customer service oriented manner, and to promote the development of oil and gas resources in the state in a manner that will prevent waste, encourage the greatest economic recovery of oil and gas, and protect correlative rights, ground water resources, the environment and human health.

Local intranet

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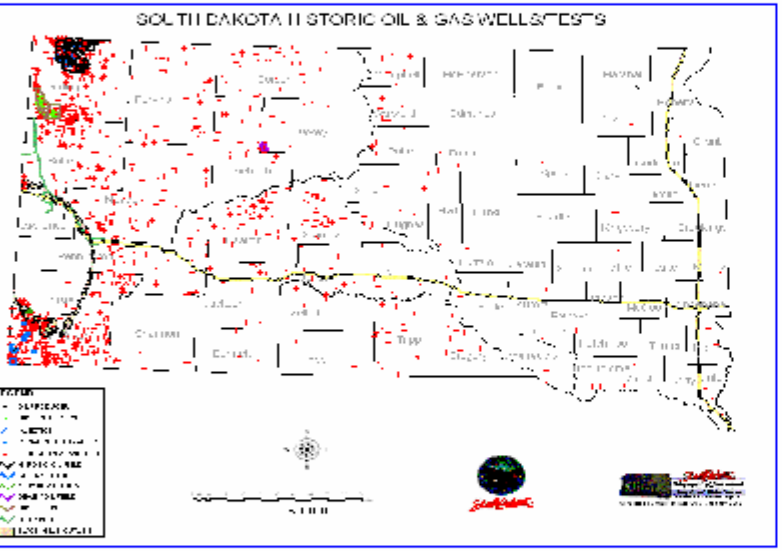
http://www.state.sd.us/denr/DES/Mining/Oil&Gas/o&g-maps.htm

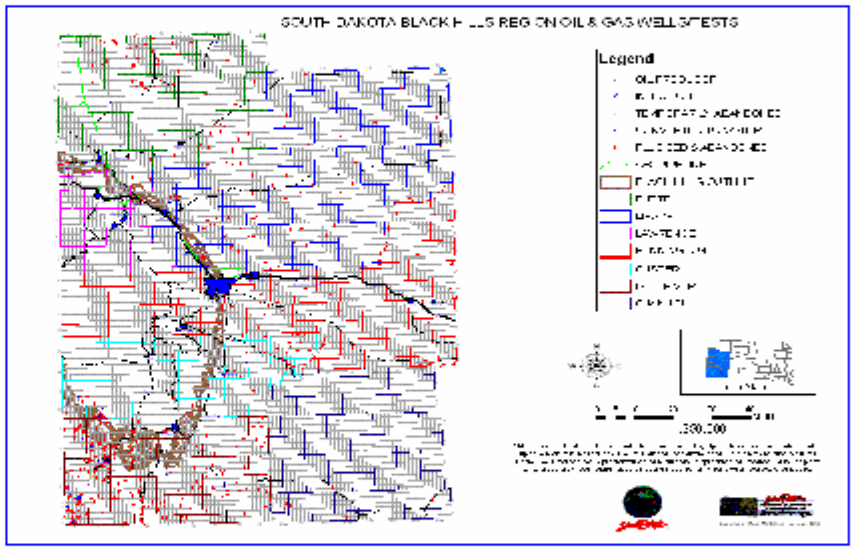
maps are updated on a monthly, or as needed, basis. They are also available by mail order (including key with well locations and data) from our office. The er sizes and costs are listed below. Costs for larger scale plots will be determined on a case-by-case basis.

x11 in. $1.00 - 11x17 in. $1.25 - 17x22 in. $2.50 - 22x34 in. $5.00 - 34x44 in. $10.00

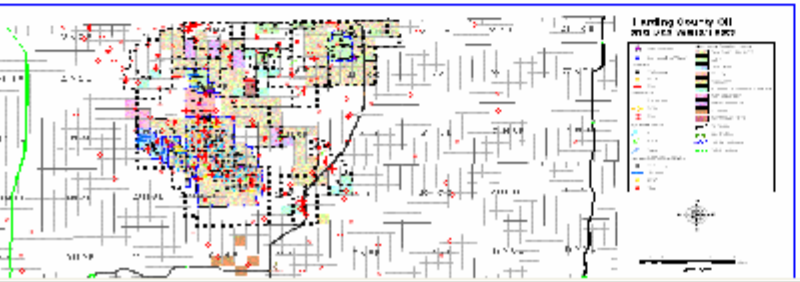
order, please contact Mack McGillivray at mack.mcgillivray@state.sd.us or call 605-394-2229.

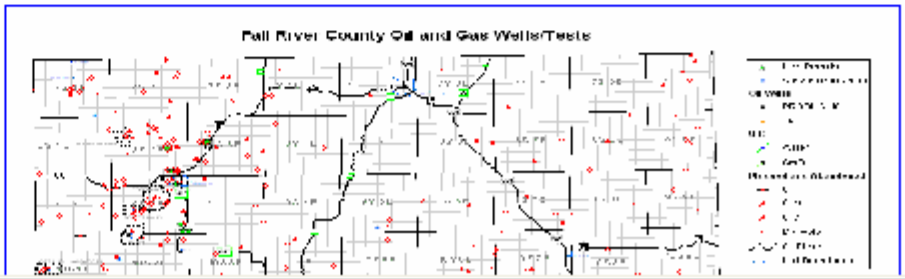


th Dakota Statewide



Black Hills Region





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South Dakota
Department of Environment & Natural Resources
Minerals and Mining Program
Oil & Gas Section - Rapid City, SD

ENTER SEARCH CRITERIA

Search Tips

Search Field		Value
Well Field	equals	Buffalo
	Simple	
	AND	
	OR	
Location	equals	%22N-4E%

Search Reset

Help on Fields About

Internet

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http://jurassic2.sdgs.usd.edu/cold_fusion/oil_gas/search_results_oil_gas.cfm

Oil and Gas Search for: *well_field like 'Buffalo' AND loc like '%22N-4E%'*

Record 1 of 20

Well Information

API No:	40 063 20056	**County:**	HARDING
Well Name:	PHILLIPS 1 B THOMAS	**Location:**	NWSW 32-22N-4E
Permit No:	659	**Total Depth:**	8790
Operator Name:	PHILLIPS PETROLEUM CO	**Bottom Hole:**	Red River
Permit Date:	1972-05-02	**KB Elevation:**	3046
Spud Date:	1972-06-03	**Ground Elevation:**	3034
Plug Date:	1982-08-18	**Latitude:**	45.825545
		Longitude:	-103.661939
Well Field	BUFFALO	**Status**	P&A
Class:	OIL	**Type:**	

Formation Tops

Formation	Depth (ft.)
Piper	5316
Pine Salt	5602
Minnekahta	5944
Opeche	5990
Minnelusa	6099
1st Leo	6256

Internet

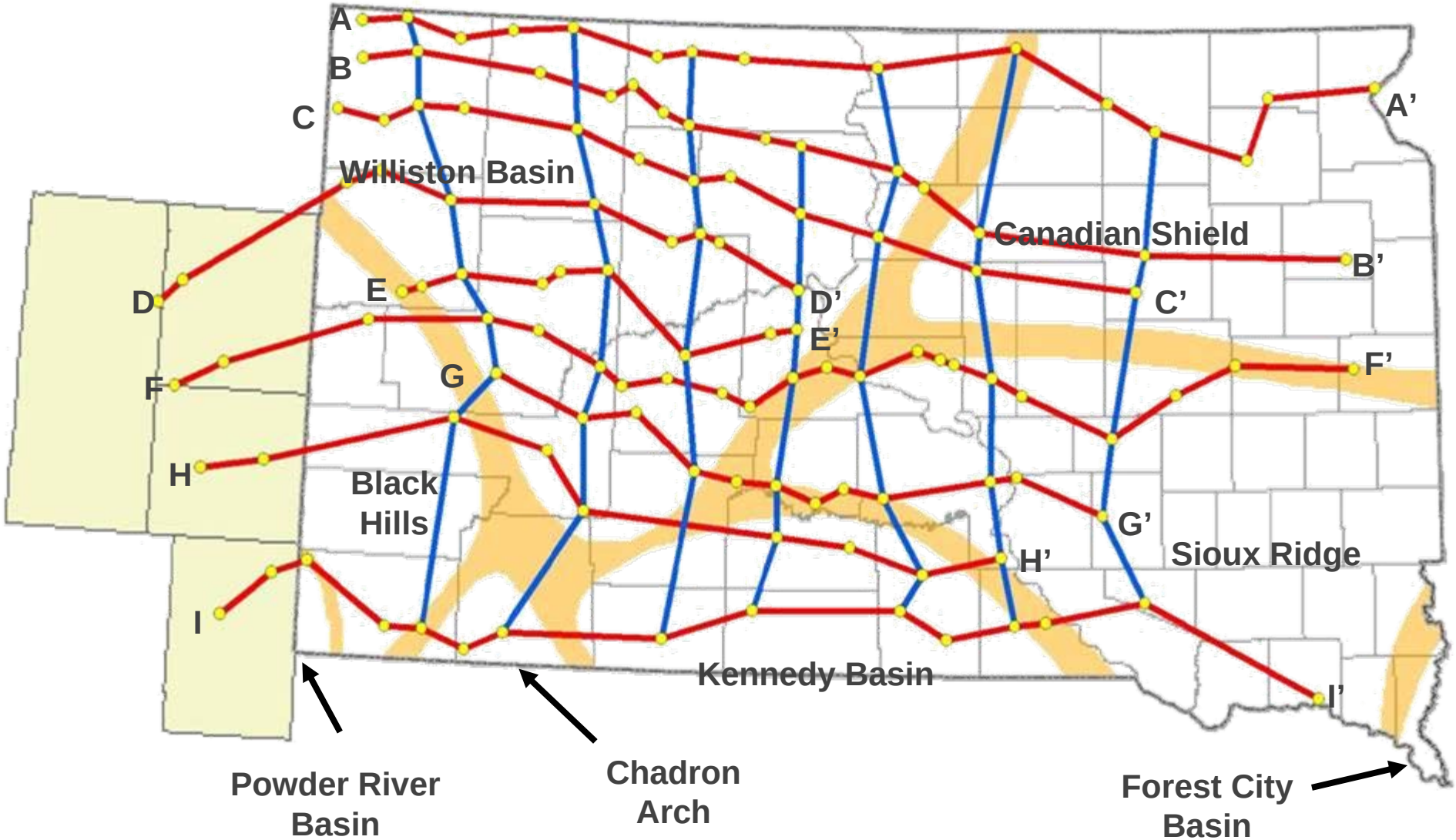
NEW STUFF!!

REVISED RULES

Revise 74:10:03:16. Procedures for setting surface casing and production casing.
The rule currently requires a minimum of 100 feet of surface casing to protect shallow aquifers in all oil and gas wells. Operators that are exploring for shallow oil and gas in the state asked the department to change the current rule because some of the oil and gas they are targeting is at depths of less than 100 feet. In addition, there are areas in the state where 100 feet of surface casing is not necessary due to the surface geology (shale, glacial till). This rule change will eliminate the minimum 100 feet of surface casing requirement and allow the department to determine how much surface casing is required on a case-by-case basis as we do now when more than 100 feet is required.

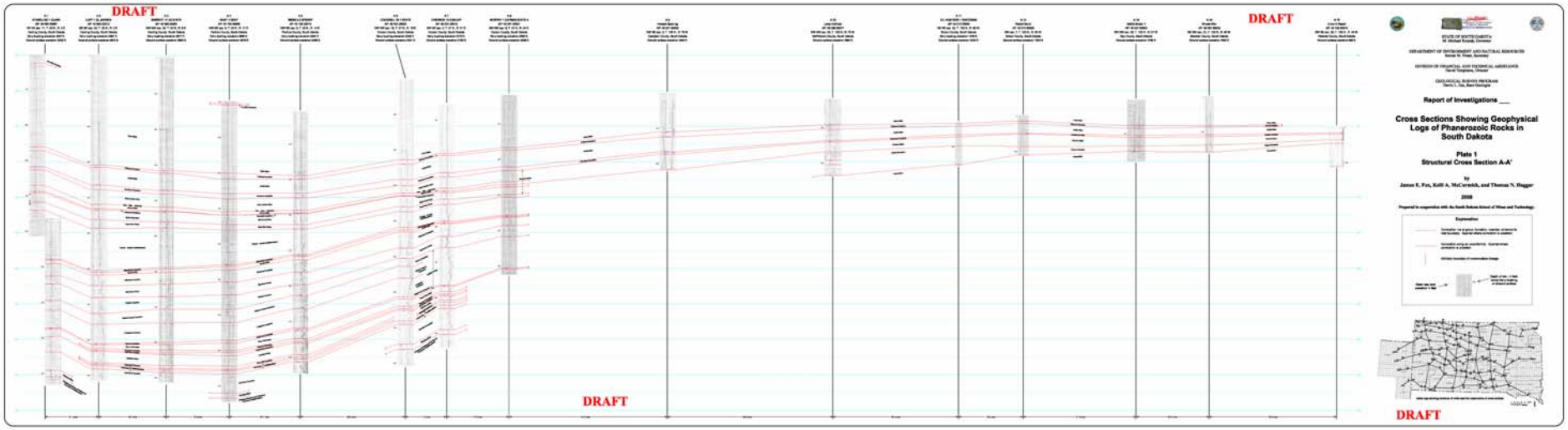
Revise 74:10:09:12. Secretary to set maximum injection pressure.
As the rule was written, the maximum injection pressure could not cause new fractures in the formation into which the fluid is injected. The DENR changed the rule so the maximum injection pressure does not cause new fractures in the confining zone. We believe this change is protective of potential underground sources of drinking water, and it is consistent with the surrounding states' Class II requirements and EPA guidance.

Cross Sections of Geophysical Logs of Phanerozoic Rocks in South Dakota



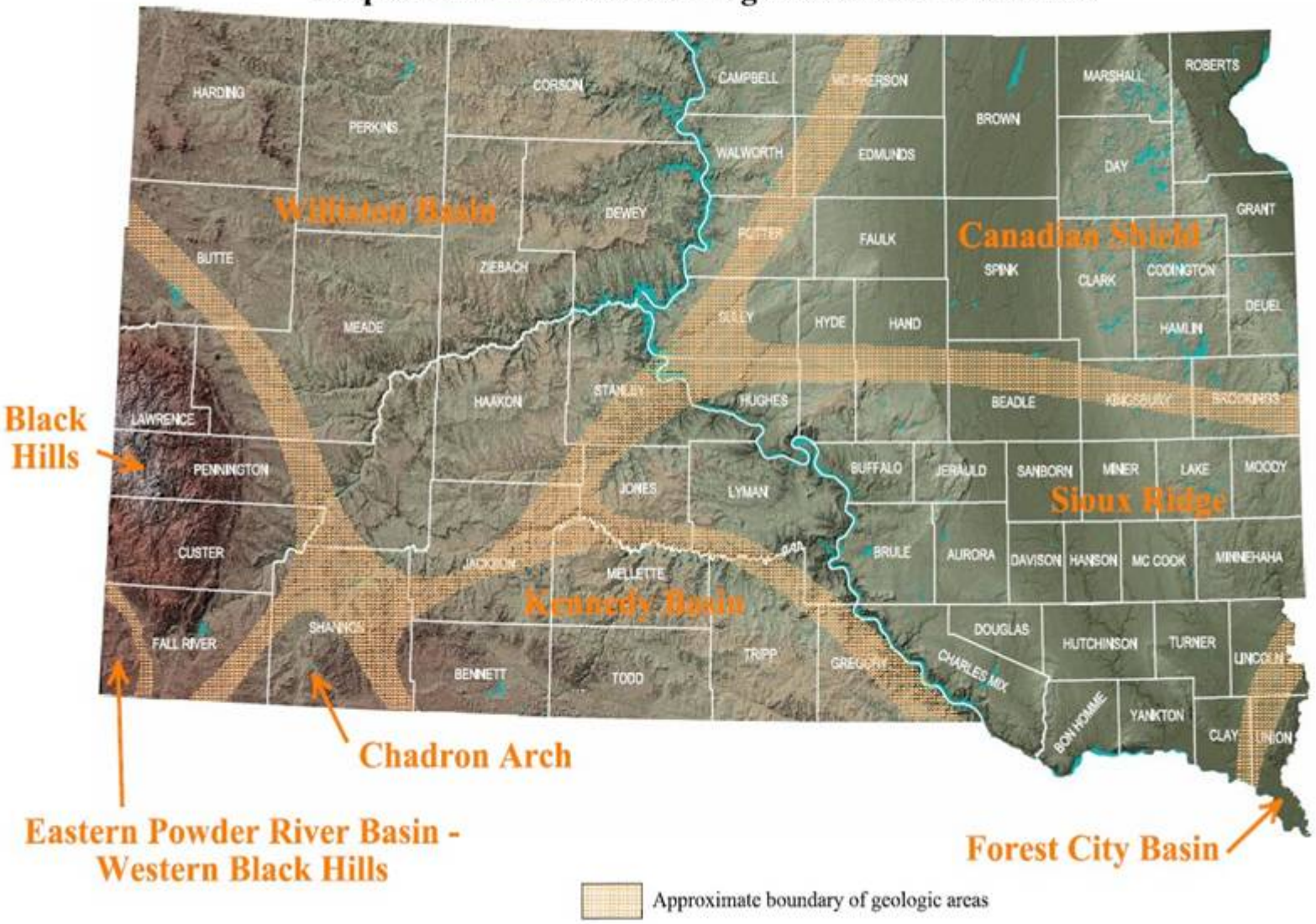
Cross Section Showing Geophysical Logs of Phanerozoic Rocks In the Northern Portion of the Williston Basin in South Dakota

By J.E. Fox (SDSMT) and K.A. McCormick and T.N. Haggar (SDGS)



Currently under Construction and will be available as a SDGS publication July, 2008

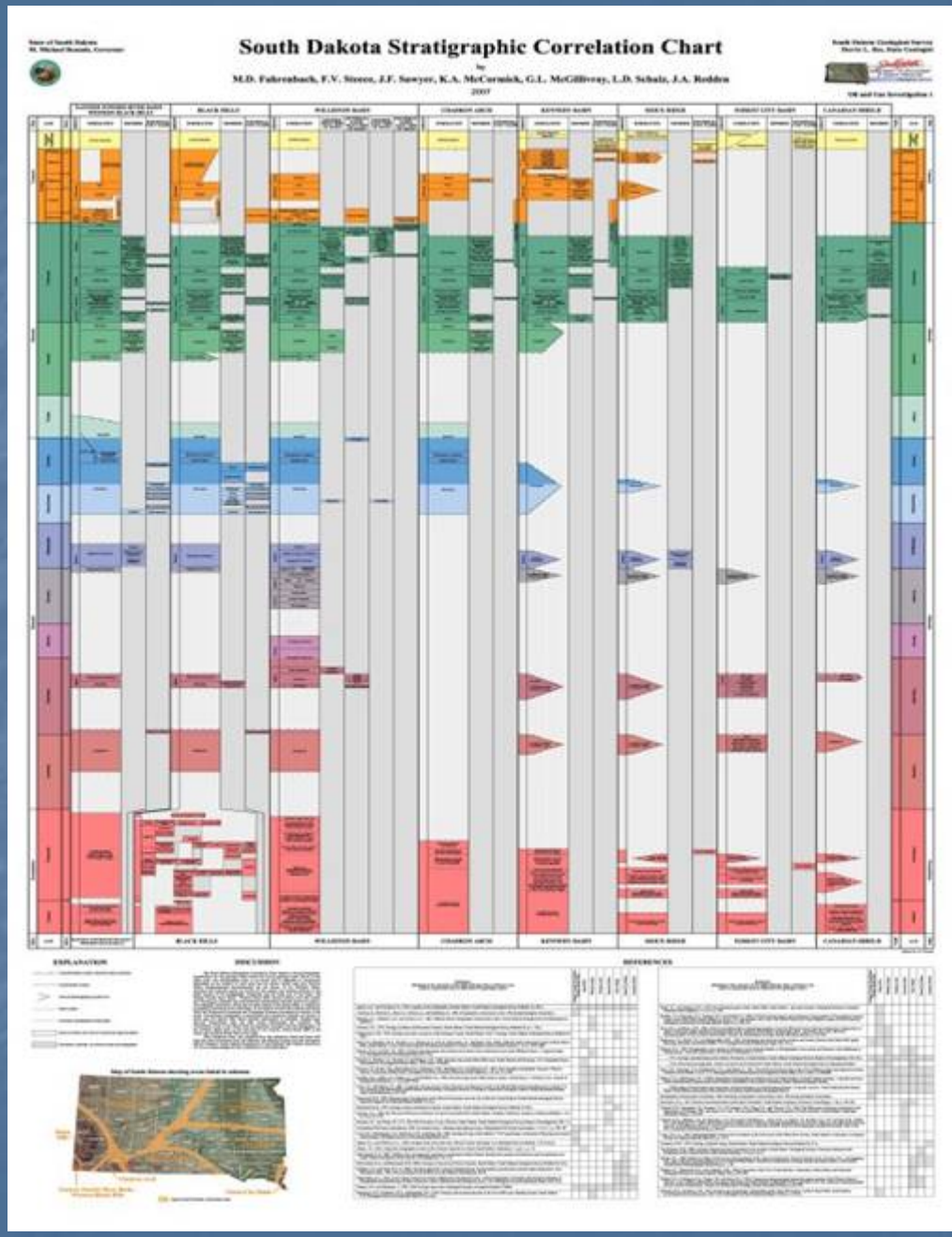
Map of South Dakota showing areas listed in columns



Stratigraphic Correlation Chart of South Dakota

Joint effort by DENR
Oil & Gas Section
And
South Dakota Geological Survey

Became available
as a SDGS publication
(Oil & Gas Investigation 1)
July, 2007



DresserAtlas

Gamma Ray Neutron

NO. 659

COMPANY PHILLIPS PETROLEUM COMPANY

WELL THOMAS "B" NO. 1

FIELD BUFFALO

COUNTY HARDING STATE SOUTH DAKOTA

LOCATION:

850' FWL - 1900' FSL 12

SEC 32 TWP 22N RGE 4E

Other Services

ACBL-SIGNATURE

anent Datum BH FLANGE Elev. 3034

Measured from KB 12 Ft. Above Permanent Datum

ing Measured from KB

Elevations:
KB 3046
DF 3045
GL 3034

e	7-11-72
No.	ONE
Log	G/R - N/N
th-Driller	8790
th-Logger	8749
om Logged Interval	8748
Logged Interval	SURFACE
Fluid in Hole	WATER
linity Ppm Cl.	FRESH
ensity Lb./Gal.	
vel	824
Rec. Temp. Deg. F	
Rig Time	4 HOURS
rded By	BAKER
essed By	MR. RATCLIFF
	MR. MITCHELL

South Dakota Geological Survey
Western Field Office
308 West Blvd.
Rapid City, S. Dak. 57701

Bore Hole Record				Casing Record			
	Bit	From	To	Size	Wgt.	From	To
1	7 7/8			5 1/2	17	SURFACE	8778

Equipment Data

Gamma Ray		Neutron	
Run No.	ONE	ONE	
Tool Model No.	2403	N-EN	
Diam.	3 1/2"	2403	
Detect. Model No.	D6G4	3 1/2"	
Type	SCINT.	D6N3	
Length	6"	SCINT.	

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File Edit View Window Help

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BW Mode

4006320056A

8500

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Ready

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OR CONTACT:

FRED STEECE (SUPERVISOR) email: fred.steece@state.sd.us

MACK MCGILLIVRAY (SENIOR GEOLOGIST) email: mack.mcgillivray@state.sd.us

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