H

Map location number 94
MALLOY 1
API 49 045 20745
SW NE sec. 11, T. 44 N., R. 66 W.
Weston County, Wyoming
Kelly bushing elevation: 4,324 ft
Ground surface elevation: 4,314 ft
Log types shown: spontaneous potential, resistivity, and conductivity

Map location number 95
ENGLE RANCH 1
API 49 045 07164
SW NE sec. 20, T. 45 N., R. 62 W.
Weston County, Wyoming
Kelly bushing elevation: 4,086 ft
Ground surface elevation: 4,075 ft
Log types shown: spontaneous potential, resistivity, and conductivity

Map location number 96
CITY OF BOX ELDER 4
API 40 103 60042
NW NW sec. 29, T. 2 N., R. 9 E.
Pennington County, South Dakota
Kelly bushing elevation: 3,055 ft
Ground surface elevation: 3,045 ft
Log types shown: spontaneous potential, resistivity, and conductivity

Map location number 97
MCCARTY COLEMAN 1 SHULL
API 40 103 05006
SW SW sec. 3, T. 1 S., R. 14 E.
Pennington County, South Dakota
Kelly bushing elevation: 2,713 ft
Ground surface elevation: 2,700 ft
Log type shown: lithologic log

Map location number 98
PETROLEUM ENERGY 10-8 FEDERAL
API 40 103 20006
SE NE sec. 10, T. 4 S., R. 16 E.
Pennington County, South Dakota
Kelly bushing elevation: 2,458 ft
Ground surface elevation: 2,447 ft
Log types shown: spontaneous potential, resistivity, and conductivity

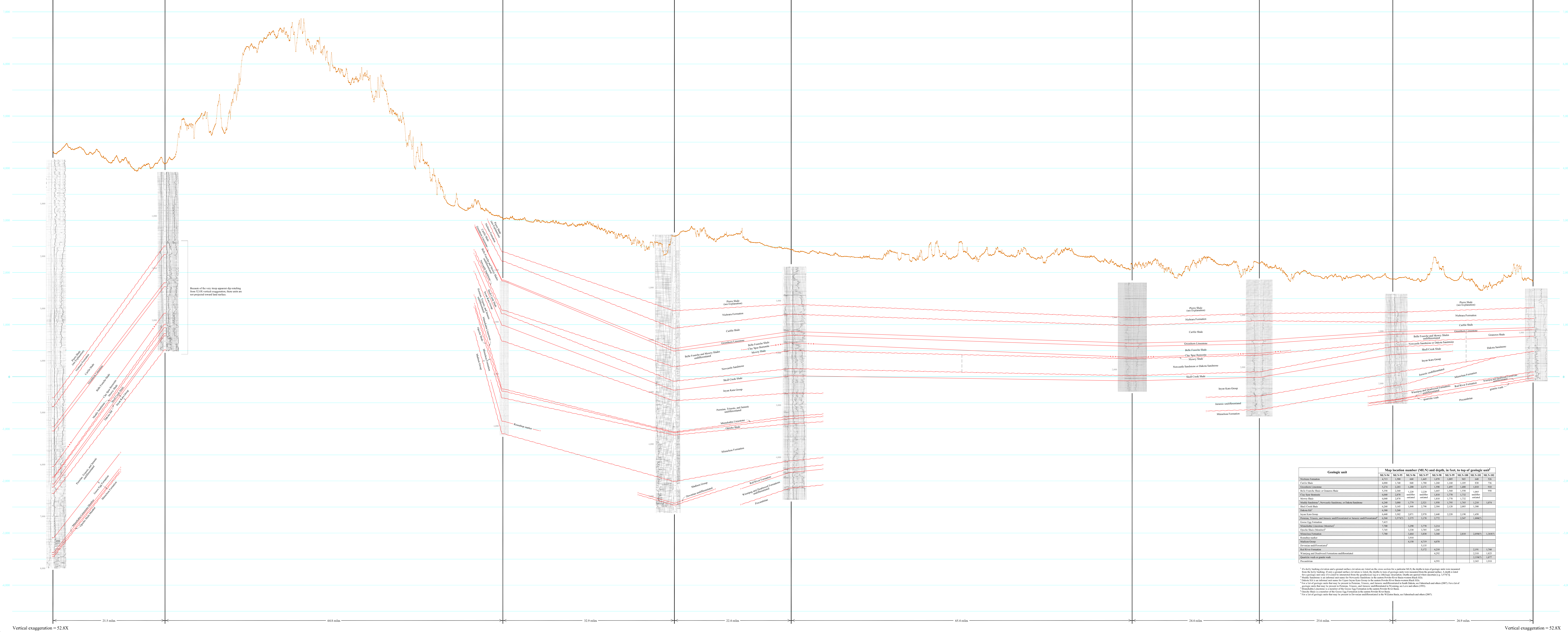
Map location number 99
WILLIAM JENSEN RANCH
API 40 095 60041
NW sec. 15, T. 42 N., R. 30 W.
Mellette County, South Dakota
Ground surface elevation: 2,140 ft
Log types shown: spontaneous potential and resistivity

Map location number 100
MILO KOSKEN RANCH
API 40 095 60033
NW NE sec. 34, T. 42 N., R. 26 W.
Mellette County, South Dakota
Ground surface elevation: 2,178 ft
Log types shown: spontaneous potential and resistivity

Map location number 101
KUCERA 1 BARTELS
API 40 123 05005
SW SE sec. 23, T. 100 N., R. 77 W.
Tripp County, South Dakota
Kelly bushing elevation: 1,874 ft
Ground surface elevation: 1,872 ft
Log types shown: spontaneous potential and resistivity

Map location number 102
SCHALIKJER 1 WINTERS
API 40 085 20002
NW NE sec. 24, T. 101 N., R. 72 W.
Lyman County, South Dakota
Kelly bushing elevation: 1,850 ft
Ground surface elevation: 1,846 ft
Log types shown: spontaneous potential, resistivity, and conductivity

H'



Vertical exaggeration = 52.8X

Geologic unit	Map location number (MLN) and depth, in feet, to top of geologic unit[1]								
	MLN-94	MLN-95	MLN-96	MLN-97	MLN-98	MLN-99	MLN-100	MLN-101	MLN-102
Niobrara Formation	4,713	1,580	660	1,445	1,070	1,005	965	640	526
Carlile Shale	4,880	1,740	840	1,780	1,260	1,160	1,105	830	736
Greenhorn Limestone	5,274	2,283	1,200	2,171	1,590	1,495	1,480	1,010	910
Belle Fourche Shale or Graneros Shale	5,358	2,360	1,220 undiffer-entiated	2,220 undiffer-entiated	1,665	1,560	1,550	1,065 undiffer-entiated	950
Clay Spur Bentonite	6,040	2,870			1,810	1,770	1,732		
Mowry Shale	6,040	2,870			1,810	1,770	1,732		
Muddy Sandstone[2], Newcastle Sandstone, or Dakota Sandstone	6,240	3,080	1,779	2,521	1,958	1,795	1,765	1,210	1,074
Skull Creek Shale	6,260	3,145	1,848	2,798	2,304	2,120	2,085	1,300	
Dakota Silt[3]	6,380	3,260							
Inyan Kara Group	6,440	3,302	2,071	2,970	2,440	2,220	2,190	1,450	
Permian, Triassic, and Jurassic undifferentiated or Jurassic undifferentiated[4]	6,560	3,575(?)	2,375	3,170	2,772		2,547	1,800(?)	
Goose Egg Formation	7,415								
Minnekahta Limestone (Member)[5]	7,700		3,290	3,770	3,214				
Opeche Shale (Member)[6]	7,745		3,330	3,785	3,260				
Minnelusa Formation	7,780		3,464	3,830	3,360		2,810	2,050(?)	1,365(?)
Roundtop marker			3,910						
Madison Group			4,150	4,719	4,070				
Devonian undifferentiated[7]				5,135					
Red River Formation				5,172	4,210			2,191	1,760
Winnipeg and Deadwood Formations undifferentiated					4,292			2,318	1,825
Quartzite wash or granite wash								2,338(?)	1,877
Precambrian					4,593			2,365	1,918

[1] If a kelly bushing elevation and a ground surface elevation are listed on the cross section for a particular MLN, the depths to tops of geologic units were measured from the kelly bushing. If only a ground surface elevation is listed, the depths to tops of geologic units were measured from the ground surface. A depth is listed for a geologic unit only if it could be interpreted from the geophysical log or a lithologic description. Depths are queried where uncertain [e.g. 3,575(?)].
[2] Muddy Sandstone is an informal unit name for Newcastle Sandstone in the eastern Powder River Basin-western Black Hills.
[3] Dakota Silt is an informal unit name for Upper Inyan Kara Group in the eastern Powder River Basin-western Black Hills.
[4] For a list of geologic units that may be present in Permian, Triassic, and Jurassic undifferentiated in South Dakota, see Fahrenbach and others (2007). For a list of geologic units that may be present in Permian, Triassic, and Jurassic undifferentiated in Wyoming, see Love and others (1993).
[5] Minnekahta Limestone is a member of the Goose Egg Formation in the eastern Powder River Basin.
[6] Opeche Shale is a member of the Goose Egg Formation in the eastern Powder River Basin.
[7] For a list of geologic units that may be present in Devonian undifferentiated in the Williston Basin, see Fahrenbach and others (2007).

STATE OF SOUTH DAKOTA
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Steven M. Pirner, Secretary

DIVISION OF FINANCIAL AND TECHNICAL ASSISTANCE
David Templeton, Director

GEOLOGICAL SURVEY
Derric L. Iles, State Geologist

OIL AND GAS INVESTIGATION 2

Cross Sections Showing Geophysical Logs of Phanerozoic Rocks in South Dakota

Plate 8. Structural Cross Section H-H'

J.E. FOX, K.A. MCCORMICK, AND T.N. HAGGAR

2009

Prepared in cooperation with the Department of Geology and Geological Engineering, South Dakota School of Mines and Technology

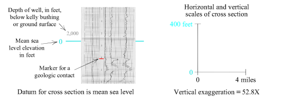
Explanation

The youngest geologic contact interpreted in areas west of the Missouri River is the contact between the Niobrara Formation and the Pierre Shale. It is recognized that younger geologic units often exist above the Pierre Shale, but they were not interpreted for this cross section.

- Correlation line at a conformable geologic contact. Interpreted from a geophysical log or lithologic description. Queried where uncertain
- Correlation line at an unconformable geologic contact. Interpreted from a geophysical log or lithologic description. Queried where uncertain

Correlation lines are not intended to show detailed structure or actual elevation of a geologic unit between data points. Correlation lines are not projected to land surface near the Black Hills even though some geologic units crop out. The generalized nature of the cross section does not lend itself to illustration of these outcrop areas.

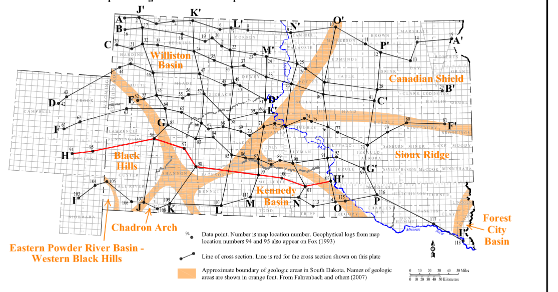
- Profile of land surface derived from U.S. Geological Survey digital elevation models
- Bentonite bed
- Boundary of nomenclature change. Boundary shown in orange on index map below. Boundary and nomenclature generally coincide with Fahrenbach and others (2007)



Datum for cross section is mean sea level

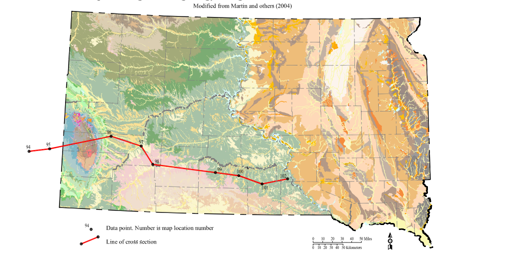
Vertical exaggeration = 52.8X

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



Index map showing surface geology along the line of cross section in South Dakota

Modified from Martin and others (2004)



Map location number	Surface geologic unit
94	Residuum, slope wash, alluvium[1]
95	Alluvium, terrace deposits[1]
96	Alluvium
97	Eolian deposits
98	Terrace deposits
99	Pierre Shale
100	Eolian deposits
101	Pierre Shale
102	Pierre Shale

[1] From Case and others (1998)

References

Case, J.C., Arneson, C.S., and Hallberg, L.L., 1998, *Preliminary 1:500,000-scale digital surficial geology map of Wyoming:* Wyoming State Geological Survey, Geologic Hazards Section Digital Map 98-1 (HDSM 98-1), scale 1:500,000.

Fahrenbach, M.D., Steece, F.V., Sawyer, J.F., McCormick, K.A., McGillivray, G.L., Schulz, L.D., and Redden, J.A., 2007, *South Dakota stratigraphic correlation chart:* South Dakota Geological Survey Oil and Gas Investigation 1.

Fox, J.E., 1993, *Stratigraphic cross sections M-M' through R-R', showing electric logs of Upper Cretaceous and older rocks, Powder River basin, Wyoming:* U.S. Geological Survey Oil and Gas Investigations Chart OC-0137.

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Martin, J.E., Sawyer, J.F., Fahrenbach, M.D., Tomhave, D.W., and Schulz, L.D., 2004, *Geologic map of South Dakota:* South Dakota Geological Survey General Map 10, scale 1:500,000.

Vertical exaggeration = 52.8X