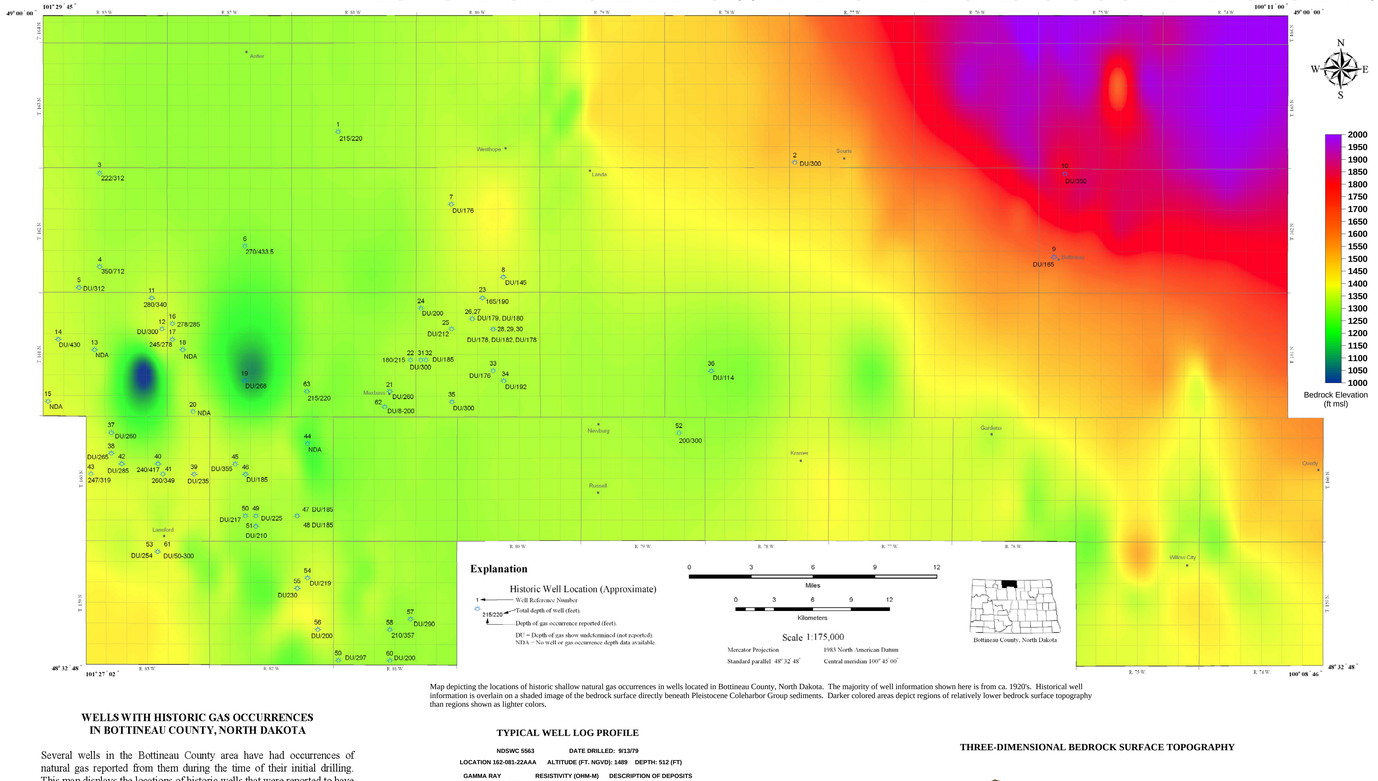
North Dakota Department of Mineral Resources
Lynn D. Helms, Director

HISTORICAL SHALLOW NATURAL GAS OCCURRENCES IN WELLS IN BOTTINEAU COUNTY, NORTH DAKOTA

Geological Investigations No. 28
North Dakota Geological Survey
Edward C. Murphy, State Geologist



Map depicting the locations of historic shallow natural gas occurrences in wells located in Bottineau County, North Dakota. The majority of well information shown here is from ca. 1920's. Historical well information is overlain on a shaded image of the bedrock surface directly beneath Pleistocene Coleharbor Group sediments. Darker colored areas depict regions of relatively lower bedrock surface topography than regions shown as lighter colors.

WELLS WITH HISTORIC GAS OCCURRENCES IN BOTTINEAU COUNTY, NORTH DAKOTA

Several wells in the Bottineau County area have had occurrences of natural gas reported from them during the time of their initial drilling. This map displays the locations of historic wells that were reported to have contained a gas "show" or occurrence during drilling in the early part of the 20th Century in north-central North Dakota (Simpson, 1929).

The majority of these wells are located in the western portion of Bottineau county and tend to be clustered into two distinct areas located northwest of the town of Maxbass and along a somewhat NW trending fairway northeast of the town of Lansford.

Most of the wells shown here were originally drilled for local water supply purposes. The average depth of these wells is 263 feet below land surface. Total well depths range from 114 -712 feet below land surface.

Depths of reported gas occurrence ranged from 165-350 feet below land surface. The average depth of the wells where a gas occurrence was reported is 232 feet below land surface.

Reported gas occurrences are dominantly from within basal sands and gravels located beneath the Pleistocene glacial sedimentary cover that overlies shallow Cretaceous bedrock and from within the uppermost units of shallow Cretaceous bedrock of the Fox Hills and Hell Creek Formations present in the subsurface throughout the county. Some of the wells with reported occurrences reported the presence of coal occurring at selected intervals within the well.

REFERENCES

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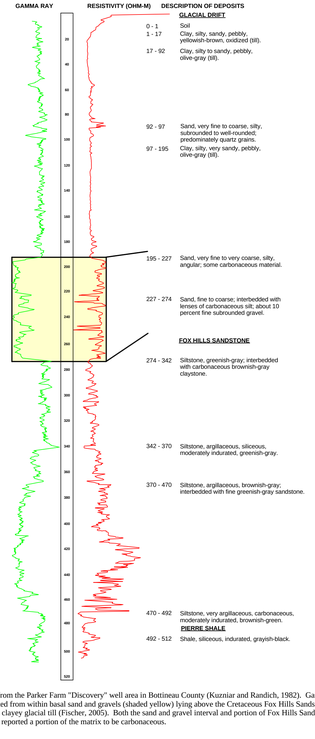
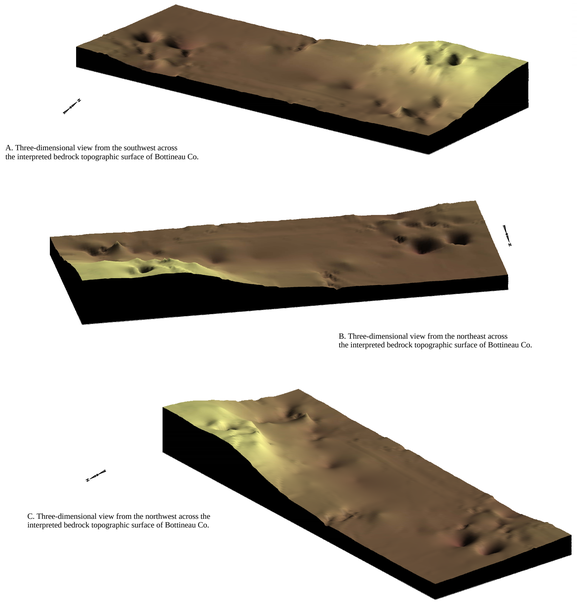
TYPICAL WELL LOG PROFILE



Type log from the Parker Farm "Discovery" well area in Bottineau County (Kuzniar and Randich, 1982). Gas occurrence was reported from within basal sand and gravels (shaded yellow) lying above the Cretaceous Fox Hills Sandstone and below clayey glacial till (Fischer, 2005). Both the sand and gravel interval and portion of Fox Hills Sandstone enc -ountered, reported a portion of the matrix to be carbonaceous.

THREE-DIMENSIONAL BEDROCK SURFACE TOPOGRAPHY



A. Three-dimensional view from the southwest across the interpreted bedrock topographic surface of Bottineau Co.

B. Three-dimensional view from the northeast across the interpreted bedrock topographic surface of Bottineau Co.

C. Three-dimensional view from the northwest across the interpreted bedrock topographic surface of Bottineau Co.

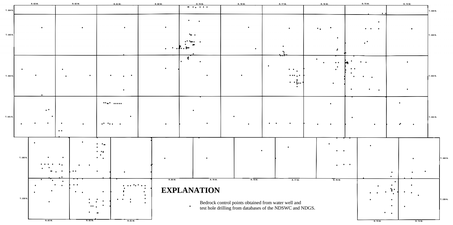
Conceptual three-dimensional interpretation of the shallow bedrock surface topography in Bottineau County. Darker colors depict lower elevations while lighter colors depict higher bedrock elevations. The orientation of lighting used here is from the southeast. The bedrock "core" of the Turtle Mountains, located in the northeastern corner of the model, is well characterized. Considerable vertical exaggeration has been used in order to enhance the morphology on the bedrock surface. Three distinct morphological areas can be visualized (from west to east): 1) An area of irregular depression and ridge-like topography, 2) flat glacially eroded bedrock plain, and 3) relatively higher bedrock topographic elevations of the Turtle Mountains.

NDGS Ref. No.	Historic Well Owner (Last, First)		Location of Well: Latitude	Longitude	Township	Range	Section	1/4 Section	Gas Occurrence Depth (feet)	Well Depth (feet)	Well Diameter (in)	Source of Supply	Water Level Below Surface (feet)	Remarks
1	Larter	Robert	48.91882	-101.18514	163	81	28	NW	215	220	2	Gravel	--	On low ground near marsh and coulee. Boulder clay to 215 feet; gravel 5 feet, Gas.
2	Yearn	T.A.	48.89735	-100.70336	163	77	31	SW	DU	300	--	--	--	Dry. Gas present.
3	Van Wort	Della	48.88887	-101.43683	162	83	4	NE	222	312	--	--	--	Gas at 222 feet, hard layer at 258 feet, shale with hard layer at 270 feet, little sand and gravel, hard layer at 278 feet.
4	Wittman	A.	48.82468	-101.43664	162	83	28	SE	350	712	--	--	--	A little gas at 350 feet, a little water at 400 feet.
5	McKechnie	J.C.	48.81029	-101.45849	162	83	32	SE	DU	312	3	--	--	30 gallons a minute. Blows gas whenever pumped down.
6	Price	C.M.	48.83912	-101.28349	162	82	22	SE	270	433.5	3	--	--	Gravel at 220 feet, sand at 224 feet, shale at 232 feet, sand at 242 feet, shale at 246 feet; sand, gravel, 270 feet; shale, 3 feet, at 278 feet; blue sand at 280 feet; shale; coarse gray sand at 392 feet, hard layer with sand at 418 feet. Gas sufficient to burn at probably 270 feet. Highly mineralized.
7	Reep	John	48.86815	-101.06584	162	80	8	SE	DU	176	4	Sand	50	Gas flows strongly when water is pumped. Drift 155 feet, shale 15 feet, sand 60 feet.
8	Link	W.W.	48.81746	-101.01076	162	80	35	NW	DU	145	--	--	--	Water well. A gas well on farm also.
9	White	Daniel	48.83148	-100.42953	162	75	30	NE	DU	165	2.5	--	20	Cased 106 feet to shale. Water from 1-foot sand bed in shale. Not enough. Flowed two hours; gas burned.
10	Beyer	C.W.	48.88931	-100.41819	162	75	5	NW	DU	350	--	--	--	Water at several depths. Some gas.
11	Williams	H.	48.80283	-101.38181	161	83	1	NW	280	340	--	Sandy shale	--	Trace of gas. Sand at 280 feet, coal at 318 feet, fine sandy shale.
12	Roach	John	48.78121	-101.37085	161	83	12	SE	DU	300	--	--	--	Gas.
13	Wander	J.B.	48.76682	-101.44207	161	83	16	S 1/2	NDA	--	--	--	--	Gas.
14	Land	Nels	48.77411	-101.48033	161	83	18	NE	DU	430	3	Sand	--	Much gas and water in blue-gray sand among hard layers.
15	Henton	U.G.	48.73093	-101.49111	161	83	31	NW	NDA	--	--	--	--	Intermittent gas flow.
16	Lofthus	O.A.	48.78485	-101.35992	161	82	7	W 1/2	278	285	--	--	--	Gas at 278-feet. Blew water after 30 days and was then capped and make into a water well.
17	Nicholson	W.W.	48.77403	-101.35994	161	82	18	NW	245	278	3	Sand	--	Gas at 245 feet in 5 feet of sand.
18	Gilbertson	O.J.	48.76680	-101.34909	161	82	18	SE	NDA	--	--	--	--	Gas from this well used to heat and light house.
19	Painter	W.T.	48.74502	-101.28365	161	82	27	NE	DU	268	3	--	Gas lift	Gas and water in sand.
20	Dawnen	John	48.72343	-101.33814	161	82	32	SW	NDA	--	--	--	Gas lift	Intermittent flow due to gas.
21	Village of	Maxbass	48.73761	-101.13044	161	82	32	SW	DU	260	3	Sand	10	Little gas. First vein at 150 feet in clay. A little water in sand at 260 feet.
22	Flemming	R.H.	48.75947	-101.10861	161	81	24	NE	180	215	--	--	30, gas lift.	Gas in sand at 180 feet.
23	McKaney	W.A.	48.80288	-101.03272	161	80	3	NW	165	190	4	Green Sand	--	Very hard layer at 165 feet overlies green gas sand.
24	Fees	C.E.	48.79570	-101.09767	161	80	6	SW	DU	200	3	--	Gas lift	Flows intermittently grom gas pressure
25	Thompson	A.T.	48.78118	-101.08542	161	80	8	SE	DU	212	--	Blue Sand	Gas lift	Gas pressure, 40 pounds. Gas occurs in 25 or 30 feet of fine blue sand beneath a hard shale, passes into lighter and coarser water sand below overlying light gray shale, probably Pierre.
26	Brander	Charles	48.78835	-101.04359	161	80	9	NE	DU	179	6	Sand	--	Gas occurs in fine green sand just below hard layer with water and sand overlying.
27	Brander	Charles	48.78835	-101.04359	161	80	9	NE	DU	180	4	Sand	--	Dry gas found in sand but without hard layer. After 1 month water entered, filled casing 100 feet. Gas appears as strong as ever when wetor is pumped out.
28	Parker	W.B.	48.78104	-101.02149	161	80	10	SE	DU	178	--	Sand	--	"Original Well." In drilling for water a sand vein was encountered somewhat below 178 feet. Gas, water, and mud were blown out and over the farm buildings. Casing pulled and abandoned.
29	Parker Co. No. 1	W.B.	48.78104	-101.02149	161	80	10	SE	DU	182	6	Sand	--	Great Northern Oil & Gas Pipe Line Co.; 100 feet north of original well; produced gas. Soil 5 feet, yellow clay and gravel 41 feet, blue clay 34 feet, gravel 6 feet, sand 3 feet, blue clay 48 feet, shale 2 feet, gas sand 12 feet, total 170 feet.
30	Parker Co. No. 2	W.B.	48.78104	-101.02149	161	80	10	SE	DU	178	--	Sand	--	Water and gas in sand.
31	Poisson	Joe	48.75947	-101.09780	161	80	19	NW	DU	300	--	--	Gas lift	--
32	Brosseau	H.	48.75946	-101.09248	161	80	19	N 1/2	DU	185	2.5	Sand	Gas lift	--
33	Dahl	Nels, J	48.75210	-101.02143	161	80	22	SE	DU	176	--	--	--	Trace of gas in water well.
34	Aurew	Andrew	48.74489	-101.01036	161	80	26	NW	DU	192	3	Sand	Gas lift	Gas with water in fine dark-blue sand.
35	Hamel	W.H.	48.73033	-101.06496	161	80	32	NE	DU	300	--	--	Gas lift	--
36	Walters	A.V.	48.75198	-100.79123	161	78	21	SW	DU	114	--	Sand	--	Much gas in fine white sand with much water.
37	Lee	John	48.70890	-101.42439	160	83	5	SW	DU	260	--	--	--	Gas with water.
38	Blowers	R.H.	48.69435	-101.42436	160	83	8	SW	DU	265	--	--	--	Some gas and a little water.
39	Norris	Walter	48.67967	-101.33697	160	83	13	SW	DU	235	--	--	--	Abandoned on account of gas.
40	Waul	Walter	48.68706	-101.37521	160	83	15	N 1/2	240	417	--	Sand	--	No water. Gas at 240 feet.
41	Murray	M.J.	48.67981	-101.36990	160	83	15	SE	260	349	--	--	--	Gas near 260 feet.
42	Gibbs	J.H.	48.68708	-101.41346	160	83	17	NE	DU	285	--	--	--	Some gas.
43	Robbins	Brent	48.67991	-101.44580	160	83	18	SW	247	319	--	Sand	--	Hard sandy shale at 247 feet. Strong gas in 3-foot layer, fine dark sand below.
44	Svee	O.S.	48.70119	-101.21740	160	82	11	NE	NDA	--	--	--	--	Gas present.
45	Schoening	A.	48.68680	-101.29377	160	82	17	NW	DU	355	4	Sand	3.5	Gas. Sand causes trouble by filling. Some coal.
46	McLean	Robert	48.67957	-101.28277	160	82	17	SE	DU	185	4	White Sand	Flow	Yields2.5 gallons a minute. Some gas.
47	King	Bert	48.65058	-101.22832	160	82	26	SW	DU	185	5	--	--	Gas cased off and water well formed.
48	King	Bert	48.65058	-101.22832	160	82	26	SW	DU	185	--	--	--	Gas well. Pressure 65 pounds. Gas used 1 year until bluish mud filled well. Water is bitter.
49	Bales	J.D.	48.65056	-101.27190	160	82	28	SW	DU	225	5	Sand	--	Gas well.
50	Convis	H.D.	48.65057	-101.28281	160	82	29	SE	DU	217	4	Sand	25	Water with small amount of gas at first.
51	Danberg	John	48.64331	-101.27190	160	82	33	NW	DU	210	4	Sand	--	Gas pressure reported 100 pounds.
52	LaPorte	George	48.70864	-100.82530	160	79	2	SE	200	300	4	--	--	Gas at 200 feet. Dry hole.
53	Lansford	City of	48.62548	-101.37543	159	83	3	--	DU	254	4	Sand and gravel	20	Gas and water.
54	Keefe	E.P.	48.60708	-101.21758	159	82	11	SE	DU	219	--	Sand	45	Gas and water.
55	Simomege	J.B.	48.59984	-101.22823	159	82	14	NW	DU	230	4	Gravel	--	Gas and water. First water at 186 feet in coal; second water at 219 feet; and third water at 320-feet in 2 feet of coarse gravel.
56	Goldberg	Bros.	48.57094	-101.20845	159	82	25	NW	DU	200	--	--	--	Gas.
57	Mikkleson	Nels	48.57807	-101.10864	159	81	22	SE	DU	290	--	--	--	Water and also gas.
58	Simpkins	Ed	48.57084	-101.13050	159	81	28	NE	210	357	3	Sand	12	White shale at 180 feet. Gas at 210 feet and 300 feet. Shale below 300 feet. Water at 357 feet.
59	Aitkin	A.	48.54921	-101.18477	159	81	31	SW	DU	297	4	--	Gas lift	Sometimes gas jets from pump after pumping.
60	Brace	Ed	48.54912	-101.13057	159	81	33	SE	DU	200	--	Sand	Gas lift	Gas burns at pump. Gushes water, which freezes about pump in winter.
61	Lansford	Town of	48.62548	-101.37543	159	83	3	--	DU	50-300	--	--	--	All wells have some gas.
62	Maxbass	Town of	48.72679	-101.13597	161	81	35	--	DU	8-200	--	Sand and Silt	--	Little gas in deeper wells. Very shallow wells yield abundant water from lake sands.
63	NDGS		48.73763	-101.21793	161	81	30	SE	215	220	--	Sand and Gravel	--	Gas forcing well casing to rise whitin the drillhole. Gas bubbles also occur within the drillhole.

-- = No Data Available
DU = Depth of shallow gas occurrence unavailable (not reported).
NDA = No well depth or shallow gas occurrence data available for this well.

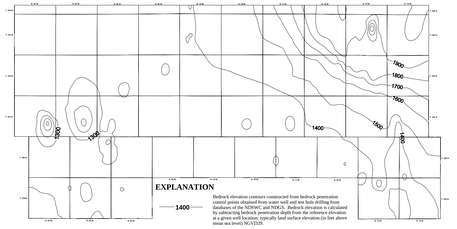
Historical well information table for wells with a reported shallow natural gas occurrence or "show" within the well. All reported information is included. Well location information originated in Public Land Survey System notation. Latitude and longitude determined from PLSS data are approximate and are accurate only to the original land survey references.

BEDROCK CONTROL POINTS



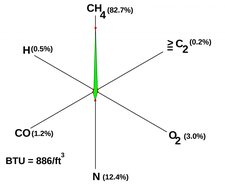
The bedrock control points dataset used for this investigation consists of bedrock depth and elevation data from 395 individual bedrock penetrations in the county. Bedrock penetration data was determined from wells and testholes compiled from NDGS and NDSWC data -bases. Bedrock penetration data is representative of wells and test holes drilled from 1947 to 2003. The control points tend to be clustered in the northeastern and southwestern portions of the county with less control in the central portion of the county.

BEDROCK TOPOGRAPHY



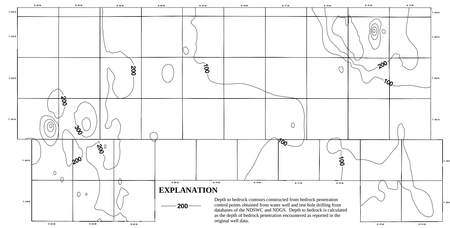
The bedrock topography of the county is as interpreted from computer-assisted contouring of bedrock elevation values determined for the county. Structure contours delineate ares of highest bedrock elevations in the northeast portion of the county, in the vicinity of the Turtle Mountains, and slope away from this feature towards the southwest into the relatively flat central portion of the county. Local structural relief is present in the western portion of the county.

GAS COMPOSITION ANALYSIS



Star diagram of gas composition analysis from shallow gas occurrence in well located on the Parker Farm (Barry, 1908) in T.161N., R.80W.

DEPTH TO BEDROCK



The depth to bedrock in the county is depicted as interpreted from computer-assisted contouring of depth to bedrock values determined from original well data. Depth to bedrock in the county ranges in depth from 5 to 769 feet below land surface (bls) with an average depth, based on the bedrock penetration data, of 145 feet bls. Bedrock depths are generally greater in the northeast and southwestern portions of the county.

Fred J. Anderson
2006

The mission of the North Dakota Geological Survey Division of the North Dakota Department of Mineral Resources is to Investigate and report on the geology of North Dakota, emphasizing the state's energy resources and stressing applied research leading to economic benefits or quality of life improvements for residents of the state; Provide public service, and to collect, create, and disseminate geologic and map-related information, and; to Administer regulatory programs and act in an advisory capacity to other state, federal, and local agencies.