STATE OF SOUTH DAKOTA
Sigurd Anderson, Governor

STATE GEOLOGICAL SURVEY
E. P. Rothrock, State Geologist

REPORT OF INVESTIGATIONS

No. 75

WELL LOGS IN SOUTH DAKOTA EAST OF MISSOURI RIVER

by

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and

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Vermillion, South Dakota
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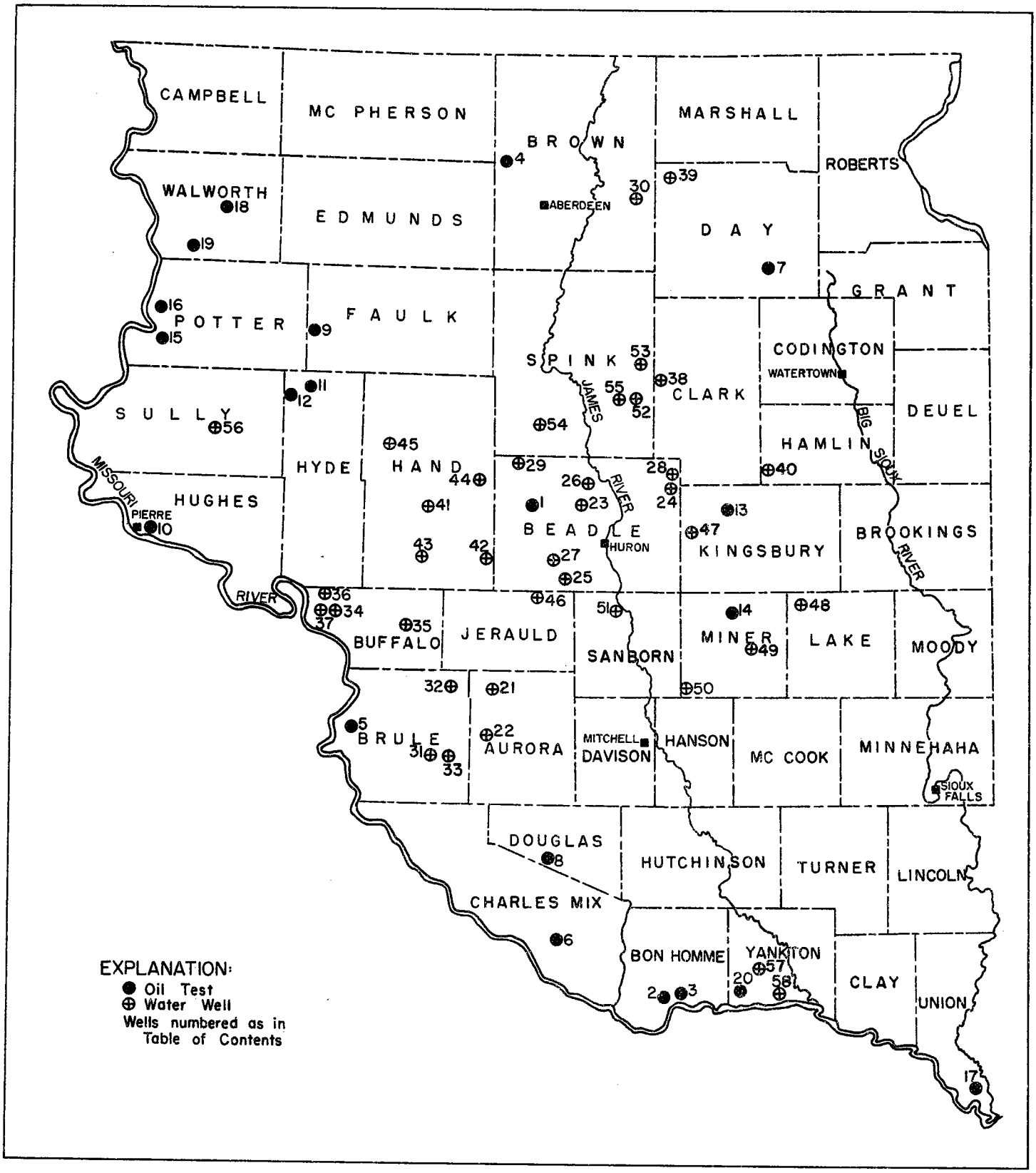

FIGURE 1 – INDEX MAP OF BORINGS IN EASTERN SOUTH DAKOTA

INTRODUCTION

Increased drilling activity in South Dakota during recent years has added greatly to the subsurface information available, and has also increased the demand for such information. As a result it is deemed advisable to publish this information on a regional basis for the convenience of those interested in developing the oil, gas, and water resources of the state. This report was prepared with this objective in mind, and includes all of the subsurface information compiled by the State Geological Survey for the area east of the Missouri River.

The first part of this report contains the logs of all the oil tests drilled in eastern South Dakota. These logs were prepared by various members of the State Geological Survey staff from cuttings which are now in the Survey sample library. Some of these logs were published in previous Reports of Investigations but they are included here to make this report complete for the area covered. Electric logs of most of these borings are available and these were used to supplement the sample studies, particularly in the picking of formation tops. Recent borings have made more accurate correlations possible, and some of C. L. Baker's logs were slightly revised in order to standardize the correlations used in this report.

Certain significant conclusions can be drawn from the information obtained through a study of samples from these oil test borings in eastern South Dakota. These can be aptly summarized as follows:

1. Big Snowy and Devonian strata are present east of the Missouri River in northern South Dakota, and were penetrated in the Carter-Stratigraphic Test No. 1, Dakota-Texas-Williams-Thompson No. 1, Pray-Kranzler No. 1, and Peppers-State No. 1 tests.

2. The sandstone between the Winnipeg shales and granite in the above borings may be Winnipeg sand, Deadwood, or both.

3. The Winnipeg shale extends eastward across northern South Dakota at least as far as Brown County, where it is penetrated in the Oil Hunters-Raetzman test.

4. The forty feet of probable Winnipeg sand which rests on granite gneiss in the Hunt-School Land No. 3 test wedges out before reaching the Hunt-School Land No. 2 test located 5½ miles to the east and 2 miles to the north. Winnipeg shale rests directly on the Pre-Cambrian in the latter boring.

5. There is a widespread grit or "detrital zone" across northeastern South Dakota which is questionably referred to the upper Pennsylvanian although it may represent any part of the interval from basal Sundance to upper Minnelusa. Red beds have not been penetrated in any boring in which this "detrital zone" is present as yet.

6. In southeastern South Dakota there is a rather widespread grit of unknown age resting on the irregular surface of the Sioux formation. This grit may be basal Lakota sand, or may represent some older formation.

Part II of this report consists of information derived from water wells in eastern South Dakota. According to records there are 107 water well drillers in South Dakota who operate as drilling companies or individual operators. The drilling industry is in continuous operation the year round, and undoubtedly many wells are completed each week. Samples are seldom taken by water well drillers, except when drilling for municipalities, but the sand record is usually available from either the owner of the well or the driller. The State Geological Survey obtained an electric well logging instrument early in 1952 for the purpose of obtaining additional subsurface information, and assisting the drillers in the completion of wells. Formation tops can usually be picked from these electric logs, and with the cooperation of the well drillers of South Dakota much subsurface information has been obtained during the last few years in this manner. The larger portion of this part of the report consists of information derived from a study of these electric logs made by the State Geological Survey. Lithologic logs are included in the few instances where samples were also available.

PART I

OIL TEST BORINGS IN SOUTH DAKOTA EAST OF THE MISSOURI RIVER

by

Edward J. Bolin

WOLSEY WELL

Location: SW¼ SE¼ Sec. 2, T. 111 N., R. 64 W., BEADLE COUNTY

Contractor: Norbeck Company
Altitude: 1352' Curbing
Total Depth: 1198'
Remarks: The driller's log which follows is the only record available. Two bottom hole samples were submitted to the State Geological Survey and these were examined. This test was drilled in 1927 on a doodle bug location on top of a terminal moraine.

0- 200	First yellow then blue clay with occasional streaks of gravel.
200- 500	Shale, first gray color and darkening with increasing depth.
500- 510	Limestone
510- 675	Dark shale
675	Thin streak water bearing sand known as mud flow.
675- 835	Dark shale
835- 875	Sandstone with few streaks of shale.
875-1191	Gray shale predominating, interspersed with several members of sandstone.
1191-1198	Granite

Note: Samples submitted were; 1: pink granite, 2: granite gneiss. These were taken with core drill.

BON OIL - JELSMA #1

Location: SE corner of SE¼, Sec. 10, T. 93 N., R. 60 W., BON HOMME COUNTY

Owner: Bon Oil Exploration Company, Tyndall, S. Dak.
Contractor: Independent Drilling Company, Aberdeen, S. Dak.
Commenced: September 26, 1952
Completed: October 7, 1952
Altitude: 1325' - Ground
Total Depth: 943'
Logged by: C. L. Baker, 1952, from cuttings and electric log.
Remarks: Dry hole, plugged and abandoned.

Formation Tops

Cretaceous System	
Niobrara formation	50'
Codell sandstone	200'
Greenhorn formation	450'
Graneros shale	494'
Dakota sandstone	600'
Fuson shale	650'
Lakota sand	690'
Pre-Cambrian	
Sioux formation	918'

Detailed Description of Cuttings

0- 50 Glacial till, stony

50- 146 Niobrara - Buff, weathered chalk, one sample received for entire interval.
146- 150 Sand, poorly sorted, brown, angular, medium grained.
150- 200' Blue gray chalk.

200- Codell - Dark gray, angular, fairly coarse sandstone with non-soluble cement.
260- 420 Top of buckshot concretions at 270? Zone of goethite, considerable light gray limestone. Many Inoceramus prisms below 340'
420- 450 Inoceramus prisms abundant.

450- 500 Greenhorn - Limestone, dark gray, chalk spotted, partly laminated, contains considerable clay.

500- 600 Graneros - Electric log top at 494'. Samples poor, consist entirely of glacial gravel and Greenhorn limestone. Some black shale which shows some bluish-white fluorescense at 510'-520'.

600- 610	Dakota - Light gray, fine grained sandstone, and very light gray siltstone, much lignite.
610- 650	Sand, clayey, medium grained, limy cement, much lignite.
650- 690	Fuson - Fe-Mn. pellets exceptionally numerous
690- 918	Lakota - Sand and sandstone, light brown, fine to medium, angular, loosely consolidated, very permeable, buff or cream below to light pink at bottom. Less sorted and with pink Sioux quartzite grains below 780'. Largely angular grit size and etched grains 856'-858' and 875'-879'. Partly consolidated below 840'.
918- 920	Probably Sioux quartzite.
940	Certainly Sioux quartzite.
940	Total Depth.

BON OIL - ISAACS AND BYRNE #1

Location: SW¼ SW¼ Sec. 8, T. 93 N., R. 59 W.,
BON HOMME COUNTY

Owner: Bon-Oil Exploration Company, Tyndall, S. Dak.
Contractor: Great Northern Drilling Company, Newcastle, Wyo.
Commenced: November 8, 1952
Completed: November 24, 1952
Altitude: 1372'-Ground
Total Depth: 876'
Logged by: E. J. Bolin, 1954, from cuttings and electric log.
Remarks: Dry hole, plugged and abandoned. Colors and symbols from Nat'l. Research Council Rock Color Chart, 1948. Sioux quartzite was reported by driller and is indicated on electric log at 852', however, none was recovered in cuttings. For some unknown reason the cuttings run higher than the electric log for some intervals.

Formation Tops

Cretaceous System	
Niobrara formation	
Carlile shale	190'
Greenhorn formation	420'
Graneros shale	505'
Dakota sandstone	638'
Fuson shale	662'
Lakota sand	742'
Pre-Cambrian	
Sioux formation	852'

Detailed Description of Cuttings

0- 130 No cuttings.

130- 190 Niobrara - Very light gray (N8), soft chalky marl with a little fine grained pyrite and small mica flakes. Shell fragments and Inoceramus prisms at 160'-170'.

190- 200 Carlile - Chiefly light gray (N7), fine to medium, slightly micaceous sandstone with a little calcareous cement, probably Codell sandstone member, a little medium gray (N5) shale and some limy claystone concretion fragments.

200- 210 Medium gray (N5), finely micaceous silty shale.

210- 240	No cuttings.
240- 250	Dark yellowish brown (10YR4/2) hard siltstone and very fine to fine, silty sandstone with mica, pyrite, and glauconite.
250- 260	Medium gray (N5) shale with a little pyrite, some fish bone fragments and black phosphate grains.
260- 280	Very fine grained, angular, calcareous sandstone with a little pyrite and mica.
280- 290	Moderate yellowish brown (10YR5/4) claystone.
290- 300	Medium light gray (N6) dense, argillaceous limestone, and medium gray (N5) shale.
300- 380	Medium gray (N5) and medium light gray (N6), finely micaceous shale, some fine pyrite, claystone concretion fragments from 310'-360'.
380- 410	Shale as above with some poorly sorted sand, becomes finer downwards.
410- 420	Greenhorn, electric log top at 420' - Medium gray (N5) silty marl with small, white chalk spots, Inoceramus prisms.
420- 440	Inoceramus prisms very abundant, a little fragmental limestone, shell fragments.
440- 460	Chalk spotted marl, chalk spots larger and more abundant than above, Inoceramus prisms.
460- 480	Medium light gray (N6) argillaceous limestone, and fragmental limestone, Inoceramus prisms, Globigerina.
480- 490	Medium light gray (N6) to light gray (N7) chalky marl, fish fragments, Inoceramus prisms.
490- 500	Medium gray (N5) chalky marl, and much fragmental limestone with Globigerina and Inoceramus prisms.
500- 510	Graneros, electric log top at 505' - Medium gray (N5), silty and calcareous, fissile shale with plant fragments.
510- 520	Shale as above with some micaceous, glauconitic, very fine to fine sandstone with lignite fragments and Inoceramus prisms.
520- 530	Medium gray (N5) shale, and moderate yellowish brown (10YR5/4), micaceous, glauconitic, lignitic, sandy claystone with much pyrite.
530- 540	Medium dark gray (N4) lignitic clay with some sandy claystone as above.
540- 550	Medium light gray (N6) and light gray (N7) finely micaceous shale, some glauconitic sand with much pyrite cement, and a little very light gray (N8) micaceous siltstone.
550- 570	Medium gray (N5) to light gray (N7) shale, moderate yellowish brown (10YR5/4) claystone concretions, and a little vitreous coal.
570- 590	Much yellow-brown fine sandstone with mica, glauconite, and lignite.
590- 690	No cuttings - Dakota on electric log from 638'-662'.

690- 700	Fuson, electric log top at 662' - Medium light gray (N6) shale, some vitreous coal.
700- 710	Shale as above and fine to medium loose sand and sandstone with pyrite, abundant yellow-brown, rounded Fe-Mn pellets, some coal.
710- 720	Varicolored, dusky red (5R3/4) and medium light gray (N6) clay, abundant large, warty Fe-Mn pellets.
720- 730	Medium light gray (N6) fissile shale, much vitreous coal and numerous Fe-Mn pellets.
730- 750	Lakota, electric log top at 742' - Medium grained loose sand, occasional grains to pebble size.
750- 780	Fine to medium, angular to subrounded sand, some grains to pebble size.
780- 810	Medium gray (N5) shale with a little medium sand.
810- 820	Shale as above with much poorly sorted, fine to very coarse, sand.
820- 830	Poorly sorted sand, some pebble sized grains, some poorly sorted, lignitic sandstone.
830- 860	Grit, fine to very coarse sand and pebble sized quartz grains, some pale pink, larger grains are subangular and pitted.
860- 870	Fine to medium, subangular to rounded sand, some pink grains.
870- 880	Poorly sorted sand, some pink grains, some hard sandstone with much pyrite, abundant fragments of hard, siliceous claystone concretions.
876	Total Depth.

OIL HUNTERS - RAETZMAN #1

Location: NE¼ NE¼ Sec. 33, T. 125 N., R. 65 E., BROWN COUNTY

Owner: Oil Hunters Inc., Oklahoma, Ft. Worth, Texas
Contractor: Independent Drilling Company, Aberdeen, S. Dak.
Commenced: July 15, 1952
Completed: August 7, 1952
Altitude: 1385'-Ground
Total Depth: 1522'
Logged by: C. L. Baker, 1952, from cuttings and electric log.
Remarks: Plugged to 1440' and cased for water well.

Formation Tops

Cretaceous System	
Pierre shale	Surface
Niobrara formation	260'
Carlile shale	420'
Greenhorn formation	660'
Graneros shale	700'
Dakota sandstone	970'
Fuson shale	1140'
Lakota sand (?)	1160'
Jurassic System	
Sundance formation (?)	1230'
Pennsylvanian System (?)	
Detrital zone	1347'
Minnelusa formation (?)	1400'
Ordovician System	
Winnipeg shale	1496'

Detailed Description of Cuttings

0- 200 Pierre - Clay, blue gray, weathered tan at top, ashy, soft, chippy, fossils at 140'.

200- 260 Bentonite and concretions with Inoceramus, some bentonite is bright green.

260- 420 Niobrara - Chalky marl, light blue gray, fish fossils.

420- 660 Carlile - Shale, dark blue gray, siltstone at 540'.

660- 700 Greenhorn - Limestone, angular grains, Inoceramus, Globigerina, fish.

700- 770 Graneros - Dark to medium gray shale, samples poor.

770- 970	Dark gray shale, some dense, calcareous siltstone with muscovite and small specks of glauconite at 830-840' and 940-970'.
970-1030	Dakota - Light gray micaceous siltstone with a little pyrite, some lignite fragments at 1010'-1030'.
1030-1050	Dark gray, flaky shale with some siltstone.
1050-1080	Fine to medium, angular, gray sand, apparently some clay interbeds.
1080-1090	Light gray, micaceous, slightly glauconitic siltstone.
1090-1100	Chiefly loose sand with some siltstone to very fine sandstone.
1100-1120	Dark gray shale with some siltstone and very fine sandstone.
1120-1130	Yellow-brown and gray, very fine sandstone.
1130-1140	Very light gray siltstone.
1140-1150	Fuson - Dark gray, flaky shale with some small, light brown, Fe-Mn pellets.
1150-1160	Some larger pellets.
1160-1220	Lakota - Dark gray shale and light gray, micaceous siltstone and very fine sandstone with much pyrite.
1220-1230	Very fine to medium sandstone with much pyrite and abundant yellow-brown claystone concretions.
1230-1250	Sundance ? - Light gray, micaceous, calcareous siltstone and very fine sandstone with some glauconite and fish fragments.
1250-1280	Very light gray, highly calcareous siltstone to very fine sandstone with pale green glauconite and fish remains.
1280-1350	Light gray bentonitic clay.
1350-1360	"Detrital Zone"- Clay as above with some poorly sorted, fine to coarse sand.
1360-1400	Grit, angular quartz up to small pebble size, some rough grains are polished, some feldspar.
1400-1440	Minnelusa (?) - Variecolored bentonitic clay with abundant yellow-brown and red, rounded concretions.
1440-1460	Yellow and light gray silty clay with much limonite.
1460-1480	Variecolored, gray, red, and pink; argillaceous, silty limestone.
1480-1500	Brownish-gray, porous, argillaceous, coarsely crystalline limestone.
1500-1522	Winnipeg shale - Green, purple, and lavender, greasy, fissile shale.
1522	Total Depth

KUCERA - BISKEBORN #1

Location: NW¼ Sec. 14, T. 103 N., R. 71 W., BRULE COUNTY

Owner: Emil B. Kucera, Vermillion, S. Dak.
Contractor: L. W. Winkler and Son, Denver, Colo.
Commenced: April 12, 1948
Completed: August 17, 1952
Altitude: 1682' Derrick floor
Total Depth: 1365'
Source of Information: Report of Investigations 67
Logged by: C. L. Baker
Remarks: Dry hole, plugged and abandoned

Sample Log

0-	30	Glacial drift, crystalline and Cretaceous detritals, selenite.
33-	36	Gravel, considerable dolomite pebbles.
36-	50	Glacial drift
	55	Pierre (Sully) - Bentonitic clay, weathered olive drab, with black oxidized pyrolusite nodules. Many small brown gray crystalline pellets, numerous forams including Rhapydionina.
55-	60	Clay, bentonitic, light blue gray, manganese carbonate nodules from size of small sand grains to large, light gray.
60-	70	Clay, bentonitic, blue gray.
70-	85	Clay, bentonitic, blue gray, with fine silt and manganese-bearing concretions and pellets.
85-	100	Clay, bentonitic, blue gray, Cristellaria and Textularia.
100-	110	Silt, fine, limy cement.
110-	120	Textularia and Inoceramus prisms
120-	125	Limestone, light gray, buff, fine powdery texture, Inoceramus.
125-	150	Manganese carbonate concretions, light gray buff. Ammodiscus in clay.
150-	160	Clay with Textularia
160-	170	Crow-Creek - Marl, fine grained, sandy, bentonitic, light blue gray. Many forams, Textularia, Globigerina, some Cristellaria.
170-	180	Larger manganese-bearing concretions, white bentonite with biotite flakes.
180-	190	Larger manganese-bearing concretions, drab.
190-	200	Clay, light blue gray, bentonitic, Ammodiscus.

200- 220 Manganese concretions, light gray, a little hauerite.

220- 230 Sandstone, fine to medium, the fine angular, the medium rounded, lime and sulphide cement. Large amount worn and transported hauerite, pyrite crystallized in place, a little copper sulphide.

230 Manganese concretions, size of small sand grains, light gray, Inoceramus.

230- 240 Larger manganese concretions, light gray, hauerite, Inoceramus, Cristellaria.

240- 250 Largely Inoceramus prisms, cemented with hauerite, Globigerina, Rotalia and other forams.

250- 260 Marcasite in long slender branching rods, some hauerite, in clay, Sharon Springs?

260- 270 Same, but some small spherical marcasite concretions.

270- 278 A little chalky marl.

270- 280 Sharon Springs - Shale, very dark blue gray, bituminous, flaky, sparse chalk pellets, fish remains, gas show.

280- 300 Niobrara, Smoky Hill member - Chalk pellet marl, light gray, pellets flattened. Globigerina.

300- 330 Less chalky and more bentonitic, light slate gray, small black spheres, a few bornite cubes.

330- 400 Marl, more chalky.

400- 420 Fort Hays member - Purer chalky, light gray.

420- 460 Carlile - Marl, blue gray, with a few chalk pellets and bentonite, biotite flakes and fish remains.

460- 470 Many Textularia and Globigerina in clay, a little angular quartz sand and black hornstone, pyrite, marcasite, and bornite.

476-Circu. Limestone, gray, containing silt and bentonite.

476- 480 Codell - Some angular sand, some copper sulphide.

480- 500 Brown bentonite, sand, all size grains, considerable selenite.

500- 520 Marl, bentonitic, medium gray, with veins of brown and white calcite.

520- 530 Minute pellets, considerable medium grained sub-round sand.

530- 540 Rod sulphide concretions, marcasite spheres, minute light gray pellets.

540- 605 Sand, fine grained, angular, well sorted, light gray continues to about 605' with some clay, hauerite, copper sulphide, marcasite, and minute brown pellets. Upper 10' purer sand.

605- 610 Some limestone beds like Greenhorn, Inoceramus.

610- 620 Shale, bentonitic, slate gray, sandy, Inoceramus.

620- 630 Greenhorn - limestone, gray, largely Inoceramus prisms.

630- 640 Largely slate gray shale with flattened white forams, some limestone.

645- 665 Greenhorn - Limestone, brown to chalk spotted dark gray, at 650' with black films; limestone mainly composed of Inoceramus and Globigerina.

665- 690 Graneros - Shale, bentonitic, gray, with some fine sand and silt, apparently mostly fine sand at 670'-680'.

690- 700 Sandstone, fine grained and siltstone, gray. Much detrital sulphide and Inoceramus prisms cemented by $CaCO_3$, mostly hauerite, considerable copper sulphide, fish remains, a few fairly large sand grains.

700- 710 Mainly clay, bentonitic, slate gray.

710- 720 Largely sand, detrital bornite.

730- 740 Clay and light gray bentonite, fine sand and very minute pellets.

740- 750 Clay, dark slate gray.

750- 760 Clay, dark slate gray, with gray bentonite.

760- 770 Limestone, medium gray, very silty and bentonitic, copper sulphide.

770- 780 Clay, silty, dark gray.

780- 790 Clay, silty, dark gray and a little light gray siltstone.

790- 800 Clay, dark gray,

810- 820 Clay, dark gray, siltstone, light gray, bentonite, gray.

815?- 820 Considerable sandstone, limy cement, fine grained, also siltstone and clay, harder drilling from 815' down. Siltstone turns black in closed tube and yields a small amount of very light yellow oil.

820- 830 Sandstone, fine-grained, limy cement with the three sulphides.

830- 840 Siltstone, muscovitic, light gray, and sandstone.

840- 860 Shale with a little fine sand.

860- 865 Mainly brown concretionary limestone.

865- 870 A little sandstone, abundant sulphide, a little of which is detrital.

870- 875 Sandstone, carbonaceous, cemented with sulphides and $CaCO_3$.

875- 885 Considerable sand, much iron sulphide and some copper sulphide.

885- 890 Much less sandstone.

890- 895 Sandstone, carbonaceous, cemented with FeS_2 and $CaCO_3$, a little muscovite.

895- 905 Much muscovite, considerable sand, carbonaceous.

905- 910 Much sand and cemented sandstone, considerable lignite, marcasite, bornite and muscovite.

910- 920 Considerable detrital copper sulphide and some cementing sand.

920- 930 Less sand and that fine grained.

925- 938	Some dark blue covellite cementing sand.
950- 955	Much yellow copper sulphide.
955- 995	Sandstone, angular, medium to fine grained, light gray cemented with marcasite and $CaCO_3$, carbonaceous and lignitic.
995-1020	Sandstone with small pyrite cubes, a little muscovite, some grains from Sioux quartzite.
1020-1025	Some concretionary light brown siderite cementing sand.
1025-1030	Mostly sand, some muscovite.
1045-1050	Sandstone, calcite cemented, carbonaceous, yellow copper sulphide.
1062	Detrital copper sulphide and also as cement for sand.
1062-1065	Sandstone, gray, calcite cemented, poorly sorted, etched grains, carbonaceous, some coarse grains, some covellite and perhaps chalcocite. Some Sioux quartzite pink grains.
1065-1070	Yellow copper sulphide.
1070-1075	Sandstone, largely coarse rounded to subround grains.
1075-1080	Much loose coarse sand. Much pyrite and some marcasite cement. A little yellow copper sulphide.
1077-1079	Same with chalcopyrite and bornite.
1079-1110	Loose sand, coarse, buff, subangular to subround, some etched, some citrine and Sioux quartzite grains.
1110-1120	Considerable sulphide cemented sandstone, rest loose sand, large quantity chalcopyrite and bornite.
1120-1145	Much grit, angular to subround etched.
1145-1150	Grit up to 1/16 inch in size.
1150-1155	Sand, finer but coarse grained.
1160-1170	Sandstone, medium grained, mostly calcite cement, carbonaceous, mostly angular to subround grains, some round and etched.
1170-1175	Sand, light gray, fairly coarse, angular, subangular, and rounded, some pinkish to yellow, has dark gray clay matrix, pebbly light gray bentonite clay, some sand cemented with marcasite, larger grains etched.
1175-1190	Sand, gray, poorly cemented with calcite and marcasite. Larger grains etched and mostly angular. Some carbonized wood, a little muscovite, some grains larger than sand size, some grains partly recrystallized.
1190-1200	Sand and cemented sandstone, medium to fine grained, buff chalcopyrite, calcite and other sulphide cement, carbonaceous.
1200-1210	Large amount marcasite cement, much loose sand.
1215-1260	Much sulphide cemented sandstone, some chalcopyrite and covellite. Sand rather coarse, buff.
1260-1265	Grit up to 1/16 inch in size, mostly angular to subround, some Sioux quartzite grains.

1265-1300	Coarse sand with small Sioux quartzite pebbles, cemented with very small brown yellow siderite pellets, marcasitized wood, a little chalcopyrite.
1305-1310	Limestone, light brown fine grained, some cementing sandstone.
1310-1315	Bentonite, light blue.
1315-1325	Some large pitted sand grains.
1325-1335	Lignite, some marcasitized, light blue with white bentonite, sand a little chalcopyrite. Oil show at base.
1351-1353	Fuson - Manganese bearing pellets in blue white bentonite.
1353-1365	Fine Sioux quartzite pebbles, etched.
1365	Sioux q uartzite in place, probably reached at 1359'. Core shows sericite in fractures, harder drilling, cemented beds at 860'-935', 960'-980', especially hard 995'-1025' and 1045'-1065', also hard 1170'-1185', 1195'-1210', 1260'-1263', 1305'-1325'.
1365	Total Depth

WAGNER WELLS

Location: NW¼ SW¼ Sec. 15, T. 95 N., R. 64 W., CHARLES MIX COUNTY

Owner: J. E. Palensky et. al.
Contractors: R. H. Ewart, Weaver, and Nichols.
Commenced: September 14, 1928
Completed: July 4, 1944
Altitude: 1728' Curb at first test.
Total Depth: 2330' first test.
about 2600' second test.
5240' third test.
Source of Information: Reports of Investigations 4 and 61.
Remarks: Three tests were drilled at this same location. The first was also known as the Palensky-Tabor State Bank #1, the first and second as the Ewart or Palensky wells, and the third as the Palensky-Weaver #3. Log from 0-1300' taken from drillers log of first test by R. H. Ewart, from 1300' to 5240' from sample log of third test by C. L. Baker.

Drillers Log

0-	20	Glacial drift.
20-	30	Reddish brown clay.
30-	40	Blue clay, shaley.
40-	60	Gray shale.
60-	80	Blue shale, clayey.
80-	120	Gray sticky shale.
120-	200	Bluish gray shale.
200-	315	Gray shale.
315-	380	Dark gray shale.
380-	440	Light gray shale.
440-	500	Gray shale, caving.
500-	505	Light gray shale.
505-	520	Gray sand, water at 506', rose 90' to 100' in casing; first 10' soft, last 5' firm.
520-	532	Gray sand, firm.
532-	550	Brown sand, first half soft, second half hard.
550-	570	Gray sand.
570-	640	Light gray shale.
640-	680	Gray shale.
680-	720	Light gray shale.
720-	740	Gray shale.
740-	765	Dark gray shale.
765-	775	Blue sandy shale.
775-	800	Dark sandy shale.
800-	835	Dark brown shale.
835-	855	Light brown shale.

855- 865	Brown shale.
865- 875	Brown sand, very loose. Water rose to about 350' of top.
875- 890	Brown, fine, firmer (one very hard place 3' thick).
890- 900	Sticky gray shale.
900- 910	Sticky brown shale.
910- 925	Sticky gray shale.
925- 932	Light sand; water rose in casing within 300' of top.
932- 965	Light sand, water.
965- 967	Gray shale.
967- 990	Soft sand, light; water.
990-1020	Quicksand.
1020-1021	White shale or light gray.
1021-1026	Very hard sand.
1026-1030	Gray sandy shale.
1030-1108	Quicksand.
1108-1110	Hard shell, sandy lime.
1110-1115	Shale.
1115-1158	Quicksand.
1158-1160	Hard shell, sandy lime.
1160-1171	Sand.
1171-1174	Sand, shale.
1174-1180	Sand, light.
1180-1185	Gray shale.
1185-1200	Sand.
1200-1205	Sand.
1205-1215	Sand and shells, streaks of shale.
1215-1225	Hard sand.
1225-1240	Sand, shaley.
1240-1280	Light gray shale.
1280-1288	Various colors.
1288-1290	Very light gray slippery shale.
1290-1300	Brown shale with thin sandy streaks.

Sample Log

1300	Lakota, sand, buff, coarse, poorly sorted, etched, round to angular grains, some marcasite cemented, Greenhorn limestone fragments, lignite, manganese-bearing Fuson pellets.
Below 1453	Sioux quartzite, pink.
1600	Some small pebble-sized grains.
1959-1971	Phyllite.
2141-2147	Pink and purplish quartzite with sericite and biotite.
2147-2180	Phyllitic pipestone.
3745-3791	Quartzite with sericite and specularite.
4451-4455	Pipestone, purple, silty argillite to fine sandstone, greasy gray pyrophyllite.
4455-4460	Mainly pyrophyllite, pearly, translucent, honey color, beeswax lustre.
4460-4465	Pyrophyllite, fine grain dark maroon sandstone, pipestone.
4470-4480	Pyrophyllite, and translucent quartz.

4480-4490	Pyrophyllite, brown-gray, pearly, with quartz grains.
4490-5123	Quartzite and aluminum silicate, sericite or muscovite.
5136&5145	Some light-colored argillite.
5152&5159	Somewhat schistose purplish quartzite and pipestone, mica, pyrophyllite.
5160-5180	Some white kaolin or bauxite.
5180-5182	Some white kaolin or bauxite, brown-buff and pink.
5182-5240	Some white kaolin or bauxite, lavender.
5240	Total Depth.

Note: Remainder of cuttings below 1453' are Sioux quartzite.

OIL VENTURES - NAESSIG #1

Location: NE¼ SE¼ Sec. 32, T. 121 N., R. 55 W., DAY COUNTY

Owner: Oil Ventures Gas and Oil Company, Inc. Webster, S. Dak.
Contractor: F. W. Schultz, Aberdeen, S. Dak.
Commenced: November 2, 1953
Completed: November 14, 1953
Altitude: 1838' Ground
Total Depth: 1607'
Logged by: B. C. Petsch, 1954, from cuttings and electric log.
Remarks: Dry hole, plugged and abandoned.

Formation Tops

Cretaceous System	
Pierre shale	510
Niobrara formation	804
Carlile shale	874
Greenhorn formation	1094
Graneros shale	1160
Dakota	1354
Fuson	1400
Lakota	1430
Pre-Cambrian	1540

Detailed Description of Cuttings

0- 470	No samples
470- 510	Unsorted sand of all sizes, glacial.
510- 530	Pierre - White, calcareous, sandy marl or chalk.
530- 540	Gray micaceous clay.
540- 560	Gray clay, white marl, concretions of brown limestone and clay ironstone.
560- 580	Limestone and dolomite concretion material, and gray clays.
580- 620	Gray clays.
620- 630	Light and dark gray clay, concretion material.
630- 650	Gray clays.
650- 670	Buff limestone concretions, gray clays.
670- 720	Gray clays and concretion material.
720- 730	Light gray marl.
730- 770	Gray clays or shale.
770- 800	More shales.
800- 810	Light gray micaceous clay.

810- 880	Niobrara, electric log top at 804' - Light gray to white speckled chalk.
880- 890	Dark gray dense limestone, speckled chalk, trace of white coquina with biotite.
890- 910	Carlile, electric log top at 874' - Shales
910- 920	Forams, trace of quartz grains.
920- 930	Quartz grains, forams, light and dark gray clays.
930- 940	Trace of quartz, light and dark gray clay.
940- 950	Light and dark gray clay, pyrite, dark flattened clay, oolitic like.
950- 960	Gray clays.
960- 970	Light and dark gray clay, pyrite.
970-1000	Light and dark gray clay.
1000-1010	With trace of dark sandstone, calcareous.
1010-1020	Dark, calcareous sandstone, light and dark gray clay.
1020-1030	Dark calcareous sandstone, much pyrite.
1030-1040	Dark calcareous sandstone, dark limestone, trace of quartz grains.
1040-1050	As above with forams and calcite prisms.
1050-1060	As above with light and dark gray clay, some with flattened oolitic structure.
1060-1090	More shales.
1090-1120	Greenhorn, electric log top at 1094' - Prisms, coquina limestone.
1120-1150	Dark speckled limestone, light and dark coquina abundant.
1150-1170	Coquina and limestone.
1170-1180	Graneros, electric log top at 1160' - As above with some dark gray flaky shale.
1180-1190	Dark flaky shale with much Greenhorn cave.
1190-1230	Dark gray flaky shale.
1230-1250	Limes and gray shale.
1250-1270	Gray shale and some limes.
1270-1280	Light and dark gray shale, calcareous.
1280-1310	Dark gray, calcareous speckled shale.
1350-1360	Dakota, electric log top at 1354' - Trace of quartz grains.
1360-1400	Sand.
1400-1430	Fuson - Fe-Mn. pellets, abundant from 1410'-1420'.
1430-1440	Lakota - Clear, broken quartz sand
1440-1470	Sand.
1470-1510	Clear and frosted sand.
1510-1540	Coarse, frosted sand.
1540-1550	Trace of Pre-Cambrian.
1550-1607	Pre-Cambrian, feldspar, quartz, and chlorite.
1607	Total Depth.

DOUGLAS - CLARK #1

Location: SW¼ NW¼ Sec. 5, T. 98 N., R. 64 E., DOUGLAS COUNTY

Owner: Douglas Development Company, Armour, S. Dak.
Contractor: H. S. Peckham, Clark, S. Dak.
Commenced: March 2, 1953
Completed: April 17, 1953
Altitude: App. 1500'-Ground
Total Depth: 1314'
Logged by: C. L. Baker, 1953, from cuttings and electric log.
Remarks: Dry hole, plugged and abandoned.

Formation Tops

Cretaceous System	
Niobrara formation	220'
Codell sand	390'
Carlile shale	530'
Greenhorn formation	638'
Graneros shale	675'
Dakota sand	745'
Fuson shale	886'
Lakota sand	900'
Age Unknown	
Coarse detrital material	1110'
Pre-Cambrian	
Sioux formation	1307'

Detailed Description of Cuttings

0- 32	Glacial till with large amount of selenite and alabaster.
32- 40	Finer, from grit size downwards, considerable selenite.
40- 108	Sand of all sizes, fragments of Niobrara and Pierre.
108- 120	Mostly sand.
120- 175	Coarser, largely Pierre fragments, some jet coal.
175- 200	Large amount of limestone and dolomite "erratic" granules.
200- 220	Perhaps mainly Pierre clay.
220- 225	Bentonite, light gray, on bit.
220- 280	Niobrara - Chalk spotted marl, light gray
280- 370	Glacial debris with chalk particles, some pink garnet.
370- 400	Codell - Sand, fine grained, angular, small sand

	sized particles of flattened and polished goethite, black, brown, and yellow-brown.
400- 410	Niobrara chalk particles and consolidated fine grained sandstone.
410- 530	Sand, brown, angular, with elongated, flattened, polished goethite pellets.
530- 550	Inoceramus prisms in sand and Carlile ashy gray clay. The sand may be flowing Codell quicksand.
550- 590	Mostly Inoceramus prisms with shell fragments and fish remains. Cemented sand at 570'--580'.
590- 630	Gray clay, slightly calcareous towards bottom.
630- 640	Dark gray calcareous shale with small flattened chalk spots.
640- 660	Sandstone, light brown, iron carbonate cement, fine angular grains.
660- 670	Greenhorn, electric log top at 638' - Dark gray chalk pellet marl with Globigerina and Inoceramus prisms.
680- 700	Finely fragmental limestone with dark gray chalk pellet marl.
700- 760	Graneros, electric log top at 675' - shale, dark gray.
760- 890	Dakota, electric log top at 745' - Sand, fine angular, some rounded very light cream tan grains.
890- 910	Fuson, electric log top at 886' - Clean fine sand with scattered small, brown Fe-Mn pellets.
910- 960	Sand as above.
960- 985	Sand as above with occasional pellets.
985- 990	Brown silty clay with light brown Fe-Mn pellets, larger than those above.
990-1000	No sample
1000-1015	Lakota, electric log top at 960' - Medium grained, subangular and subrounded sand, pyrite.
1015-1110	Fine angular sand, very likely water-saturated flowing quicksand.
1110-1155	Coarse detrital material - Sand, coarse, grains of intermediate size are rounded and either etched or polished, the large grains are sub-angular to angular. Some are pink coated (derived from Sioux quartzite). There are a few grains of chert, and of limestone and dolomite, the largest grains are angular. There is a large percentage of small angular grains. The various sizes and shapes of the sand grains indicate derivation from at least two sources, while the finer sand may have flowed in from higher up in the hole.

1166-	Bit sample, clay, blue gray with considerable light gray bentonite, mixed with sand from above.
1166-1172	(Core) Bentonite, light gray and light green, much sand, largely pink coated, fine grained, there are angular chunks (broken in drilling) of Sioux quartzite which may occur as detrital fragments.
1172-1195	There are red and brown pellets of iron-oxide cemented silt which may be derived from siltstone in the Sioux quartzite. These are mixed with sand, coarse to fine, round to angular grains.
1195	Broken-up Sioux quartzite and pipestone in the sand.
1226	Sandstone, cemented, poorly sorted, light gray. Cement is fine and clayey, cream colored, and may be hardened bentonite or pyrophyllite; it is not soluble in HCl.
1232-1244	As just above but with a larger percentage of Sioux quartzite and pipestone.
1245-1250	Same except with some bentonite, light gray or green.
1250-1260	Sand grains are coated and cemented.
1263	Largely coarse, etched, pink-coated subangular loose grains derived from the Sioux quartzite.
1263	Mostly sand, ground up fragments of Sioux quartzite, some yellow-brown and reddish concretionary aggregates.
1265	Light gray bentonite and sand, and medium and dark gray soft, thinly laminated bentonite, some concretionary aggregates, silty and sandy.
1267	Sandstone, angular unsorted grains, poorly cemented, large grains etched.
1273-1282	Bentonite and bentonitic clay, light green gray, some lavender and purplish.
1282-1307	Considerable flint and petrified wood, hyalite, chalcedony, very light blue gray volcanic ash, fine-grained. Probably mainly volcanic ash with bentonite at top. Much "opaline" silica in the ash.
1307	Sioux formation - Pipestone, old rose with the usual light green spots, color darkens down-ward to maroon-purple, has a little fine sericite.
1313'9"-1314'	Core of Sioux quartzite, glossy, dense, fine-grained, pink.
1314	Total Depth

HUNT - GUTENKAUF #1

Location: NE¼ NE¼ Sec. 2, T. 118 N., R. 72 W., FAULK COUNTY

Owner: N. B. Hunt, Dallas Texas
Contractor: Kirby Oil Industries, Omaha, Nebraska
Commenced: June 21, 1952
Completed: July 9, 1952
Altitude: 1940'
Total Depth: 2751'
Logged by: C. L. Baker, 1952, from cuttings and electric log.
Remarks: Dry hole, plugged and abandoned.

Formation Tops

Cretaceous System		
Pierre shale	250'	
Sharon Springs member	730'	
Niobrara formation	785'	
Fort Hays member	885'	
Carlile shale	900'	
Greenhorn formation	1170'	
Graneros shale	1215'	
Dakota sandstone	1540'	
Fuson shale	1630'	
Lakota sandstone	1700'	
Jurassic System		
Morrison shale	1800'	
Sundance formation	1865'	(?)
Pennsylvanian System (?)		
Detrital zone	1955'	(?)
Mississippian System		
Madison group	2240'	
Ordovician System		
Red River	2400'	
Winnipeg shale	2615'	
Winnipeg sand	2700'	
Pre-Cambrian		
Granite	2744'	

Detailed Description of Cuttings

0- 250 Glacial drift

250- 730 Pierre - Bentonitic clay, blue gray, Ammodiscus at 340', limestone concretions at 530', white bentonite at 600', Inoceramus prisms at 640' and downwards.

730- 800 Sharon Springs member - Black, bituminous shale, fish remains.

800- 885 Niobrara, electric log top at 785' - Dark gray, chalk-spotted marl.

885- 900 Fort Hays member - Light gray, chalky marl.

900-1170 Carlile - Blue gray, somewhat chalky shale, carbonized wood at 1070'.

1170-1190 Greenhorn - Limestone, with Globigerina and Inoceramus.

1190-1230 No cuttings

1230-1540 Graneros, electric log top at 1215' - Shale, gray siltstone at 1270', white bentonite at 1300'. Dark gray Mowry shale with carbonized wood at 1330', siltstone from 1500'-1540'. No cuttings from 1380'-1500'.

1540-1630 Dakota - Light brown gray, fine grained, carbonaceous sandstone, limy cement, most grains angular. Coal at 1590-1620', gray bentonite 1620'-1630'.

1630-1700 Fuson - Fe-Mn pellets at top.

1700-1800 Lakota - Light brown gray, fine grained sandstone.

1800-1920 Morrison (?) - Gray, bentonitic clay; sandstone, some coarse, 1850'-1860'.

1920-2010 Sundance - Dark blue gray clay, some glauconitic siltstone, top probably at 1865'. Bentonite at 1970'.

2010-2250 Detrital zone, electric log top at 1955 (?) - Grit, angular, quartz, carbonized wood, some chert and clouded quartz, a little limestone and dolomite, more rounded grains below. Pink potash feldspar and woody coal at 2240'-2250'. Limy cement at base.

2250-2275 Madison, electric log top at 2240'- limestone, cream, fine porcellaneous.

2275-2335 Limestone, white, oolitic.

2335-2355 Light yellow brown to pink, finely granular limestone, vuggy, some calcite.

2355-2365 Gray, honeycombed limestone.

2365-2385 Yellow-gray and pink limestone, coarser crystalline and porous.

2385-2400 Loose sand grains, rounded and etched, medium to

fine, eolian, limy cement.

2400-2450	Red River - Limestone, virtually a marble, many calcite rhombs, vuggy.
2450-2460	Dolomite, pink, rhombic.
2460-2550	Dolomite with milky chert, limestone in lower part.
2550-2610	Gray, fossiliferous limestone, earthy.
2610-2615	Siltstone, limy, with much chalcopyrite.
2615-2620	Fine to coarse, subangular to rounded, pitted sand.
2620-2640	Winnipeg shale, electric log top at 2615' - Gray, finely micaceous shale.
2640-2670	Pale green, fissile, silty, bentonitic shale, occasional black phosphate grains.
2670-2690	As above with abundant rounded iron-oxide pellets.
2690-2710	Green, flaky, bentonitic shale.
2710-2730	Winnipeg sand, electric log top at 2700' - Fine to medium, subangular to subrounded sand.
2730-2740	Fine to medium, subangular to rounded, polished quartz sand.
2744-2749	Pre-Cambrian - Orthoclase granite, epidote and chlorite.
2751	Total Depth

KERLYN - DRY RUN #1

Location: SW¼ NE¼ NE¼ Sec. 7, T. 110 N., R. 78 W., HUGHES COUNTY.

Owner: Kerlyn Oil Company, Oklahoma City, Oklahoma.
Contractor: Girdler and Wheeler Co., Houston, Texas.
Drilled: 1939
Altitude: 1452.6'
Logged by: Al Wynn, Geologist for Kerlyn Oil Company
Correlated by C. L. Baker.
Remarks: This is the only log available as the State Geological Survey did not receive a set of cuttings.

0- 70	Sand and gravel.
70- 80	Pierre - Light gray shale.
80- 175	Light gray limey shale.
175- 195	Dark gray chalk.
195- 215	Light gray speckled shale.
215- 275	Gray shale.
275- 300	Shaley chalk.
300- 325	Shale.
325- 355	Chalk.
355- 375	Gray shale.
375- 550	Niobrara - Chalk
550- 790	Shale.
790- 795	Fine sand.
799- 815	Shale.
815- 835	Sand.
835- 930	Shale.
930- 945	Sand.
945-1050	Shale.
1050-1055	Fine sand.
1055-1070	Shale.
1070-1160	Newcastle - Sand, flow water at 1100'.
1160-1170	Thermopolis - Shale.
1170-1210	Sand.
1210-1230	Shaley sand.
1230-1245	Lime and shale.
1250-1335	Dakota - Sand.
1335-1340	Shale
1340-1400	Sand.
1400-1405	Shale.

1405-1500	Lakota - Sand
1500-1520	Shale.
1520-1525	Lime.
1525-1535	Shale.
1535-1575	Sundance - Sand, flowed water 1540', 500 gallons per minute estimated.

HUNT - SCHOOL LAND #2

Location: SW¼ NE¼ Sec. 24, T. 116 N., R. 73 W., HYDE COUNTY

Owner: N. B. Hunt, Dallas, Texas.
Contractor: Omaha Drilling Corp., Omaha, Nebraska.
Commenced: April 17, 1952
Completed: May 20, 1952.
Altitude: 1880' Ground, 1889' Kelly Bushing.
Total Depth: 2618'
Logged by: C. L. Baker, 1952, from cuttings and electric log.
Remarks: Dry hole, plugged and abandoned. This boring is 300' east of the Hunt-School Land #1 which was abandoned because artesian water flow, probably from Sundance, could not be controlled.

Formation Tops

Cretaceous System		
Pierre shale	140'	
Sharon Springs member	630'	
Niobrara formation	760'	
Fort Hayes member	830'	
Carlile shale (?)	905'	
Greenhorn formation	1200'	
Graneros shale	1250'	
Newcastle (?)	1290'	
Dakota sandstone	1525'	
Fuson shale	1560'	
Lakota sandstone	1660'	
Jurassic System		
Sundance formation	1805'	(?)
Pennsylvanian System (?)		
Detrital zone	1875'	
Ordovician System		
Red River (?)	2265'	
Winnipeg shale	2435'	
Cambro-Ordovician	2520'	
Pre-Cambrian	2555'	

Detailed Description of Cuttings

0- 140	Glacial till
140- 225	Pierre - Blue gray, bentonitic clay
225- 260	Clay, limy, lighter gray (Mobridge?); Ammodiscus, Bulimina, Globigerina, etc.
260- 630	Clay, becomes more compact downwards, somewhat flaky below 450'. White bentonite at 505'-510'.

630- 760	Sharon Springs member - Black, bituminous, shaly clay, crumbly.
760- 790	Niobrara - Chalk, spotted marl.
790- 830	More chalky.
830- 905	Fort Hayes member - Purer chalk
905-1080	Carlile? - Dark blue gray clay, laminated; many forams 925'-935', shell fragments 935', forams abundant 950' down.
1080-1110	Marcasite, forams, quartz grains, sparse serpentine and glauconite.
1110-1200	Dark blue gray claystone. Magnetic silt fairly abundant from 1120'-1125' and 1185'-1190'.
1200-1250	Greenhorn - Gray, finely crystalline limestone, dirty, a lot of dark blue gray crumbly clay; Inoceramus prisms.
1250-1290	Graneros - Dark gray clay.
1290-1300	Gray siltstone with limy cement, may be Newcastle.
1300-1350	Dark gray clay.
1350-1355	Light blue gray, flaky clay.
1355-1430	Some light gray siltstone.
1430-1450	Some dark gray stilstone.
1450-1470	Dark gray clay with some siltstone.
1470-1490	Some red clay and siltstone.
1490-1525	Clay, reddish, vesicular (burned in drying?)
1525-1535	Dakota - gray siltstone, limy cement; angular unsorted sand.
1535-1555	Increase in siltstone.
1555-1560	Much magnetic siltstone.
1560-1565	Fuson - Mostly clay, vesicular, various shades of red (burned?), considerable siltstone, some fine sandstone, pinkish Mn pellets.
1565-1575	Burned vesicular clay, some silty; fine angular sand grains, some cemented with siderite.
1575-1660	Clay, light green gray, bentonitic; large amount fine grained sand and silt; some yellow brown clay ironstone. Most of sand cemented with siderite, some rounded etched quartz grains but most are angular and poorly sorted, some are of jasper, citrine, green and rose quartz.
1660-1680	Lakota - Buff, fine, angular sandstone, probably siderite cement, carbonaceous at top.
1680-1720	Light gray sandstone, carbonaceous, fine angular, poorly sorted, limy cement.
1720-1725	Some gray clay and coarse sand, some grains etched.

1725-1745	Sand, with considerable percentage well polished grains, mostly small. Considerable pyrite cement in the Lakota.
1745-1750	Some coarse sand.
1750-1785	Fragments of lignite. Light green joint clay from here downwards.
1785-1805	Large amount pyrite cemented sand.
1805-1815	Sundance? - Fine, granular, silty limestone
1815-1855	Gray, glauconitic siltstone, limy cement; some light bluish gray, finely granular limestone. The siltstone has biotite, phlogopite, and muscovite. Both rocks interbedded.
1855-1880	Dark gray, fine grained, glauconitic sandstone.
1880-1900	Much light green gray clay, probably caving from Fuson as Fe-Mn pellets occur.
1900-1915	Cavings.
1915-2055	Detrital zone - Grit, carrying much water under high head, angular quartz fragments up to granule size, some pinkish and some polished, rounded to subrounded.
2055-2095	Some small pebbles of yellow and red quartzite, chert, quartz shows wind polish.
2095-2155	Microcline, a few fragments of crystalline rock, some weak clayey cement.
2155-2165	Some albite.
2165-2185	Well polished quartz grit.
2185-2195	Some limy cement from here down, worn quartz bipyramid, fragments of granite.
2195-2205	Pieces of coal.
2205-2215	Considerable milky chert pebbles.
2215-2235	Orange felsite, different kinds of chert and crystalline rocks; pebbles up to $\frac{1}{4}$ inch in size.
2235-2245	Increase in size of pebbles and kinds of rock, including granite.
2245-2255	Some red and terra cotta clay in the gravel.
2255-2265	Considerable detrital chert.
2265-2275	Red River? - Dolomite, large rhombs, vuggy, cream.
2275-2285	Largely cavings, including Sundance.
2285-2365	Pink to buff dolomite, smaller rhombs, considerable porosity, milky chert.
2365-2375	Dolomitic limestone, darker pink, fine textured, dolomite rhombs in a calcite matrix.
2375-2435	Limestone, light gray, fine somewhat powdery texture forming matrix for small rhombs, some clay; water 1700 lbs. per sq. in. below hole pressure.
2435-2485	Winnipeg shale - Light greenish gray bentonitic clay, with small, scattered angular quartz grains.
2485-2495	Sand, coarse, rounded to subangular, highly polished, some pink grains.
2495-2520	Shale, green, paper thin, fissile, splintery, bentonitic.

2520-2550 Cambro-Ordovician?- Siltstone and claystone, limy, green gray and light gray, grading into light gray silty limestone.

2555-2618 Pre-Cambrian - Diabase, greatly propylitized (Chloritized), ophitic texture of plagioclase, which is white and clouded at top, much magnetite, resembles Keewatin greenstone, cut by fractures containing marcasite, sides of which are slickensided and also mylonitized to phyllite.

2618 Total Depth.

HUNT - SCHOOL LAND #3

Location: SW¼ NW¼ Sec. 31, T. 116 N., R. 73 W., HYDE COUNTY

Owner: N. B. Hunt, Dallas, Texas
Contractor: Omaha Drilling Corp., Omaha, Nebraska
Commenced: May 28, 1952
Completed: June 14, 1952
Altitude: 1864' Ground
Total Depth: 2705'
Logged by: C. L. Baker, 1952, from cuttings and electric log.
Remarks: Dry hole, plugged and abandoned.

Formation Tops

Cretaceous System	
Niobrara formation	700'
Carlile shale	835'
Greenhorn formation	1155'
Graneros shale	1195'
Dakota sandstone	1500'
Fuson shale	1650'
Lakota sandstone (?)	1700'
Jurassic System	
Sundance formation	1810'
Pennsylvanian System	
Detrital zone	2030'
Ordovician System	
Red River (?)	2300'
Winnipeg shale	2575'
Winnipeg sand (?)	2660'
Pre-Cambrian	
Granite gneiss	2700'

Detailed Description of Cuttings

0- 890 No cuttings. Electric log shows top of Niobrara at 700' and top of Carlile at 835'.

890-1155 Carlile - Shale.

1155-1195 Greenhorn - Limestone (according to electric log, Greenhorn cuttings from 1180-1220)

1195-1500 Graneros - Dark blue gray shale.

1500-1650 Dakota - Sandstone (cuttings give top at 1550')

1650-1700 Fuson - Fe-Mn pellets at top. Light gray bentonite at 1740'.

1700-1810	Lakota? - Sandstone and siltstone.
1810-1940	Sundance - Top according to electric log. Cuttings at 1860' show glauconitic siltstone.
1940-1950	Brick red claystone.
1950-1970	Fine grained, glauconitic sandstone with pyrite.
1970-1990	Sand, medium and coarse grained, some pink grains.
1990-2030	Unusually hard glauconitic siltstone with iron sulphide
2030-2300	Detrital zone - Grit, unsorted, angular, red clay at top. Mostly coarse grit size. Some red clay at 2120', below which is considerable yellowish small pebble size. Pink-coated 2150'-2160'. Bluish chert at 2250'.
2300-2380	Red River? - Light gray dolomite, finely crystalline, vuggy. Cored from 2310'-2330' where it is cavernous and water bearing.
2380-2480	White milky chert in dolomite. Largely white porcellanite below 2420'.
2480-2505	Large amount of yellow coated, polished and rounded, medium grained sand, very likely cavings.
2505-2575	Light gray limestone, finely granular, with rather common orthids.
2575-2660	Winnipeg shale - Top according to electric log, first appears in cuttings at 2615'.
2660-2700	Probably sandstone, possibly Winnipeg sand.
2700-2705	Pre-Cambrian - Granite gneiss with orthoclase and chloritized biotite (cored).
2705	Total Depth.

KINGSBURY - DYKSTRA #1

Location: SW¼ NE¼ Sec. 35, T. 112 N., R. 57 W., KINGSBURY COUNTY
Owner: Kingsbury Oil Development Co., Inc.
Contractor: H. S. Peckham, Clark, South Dakota.
Commenced: October 31, 1953
Completed: November 6, 1953
Altitude: 1770' - Ground
Total Depth: 1095'
Logged by: Aaron Stoley, 1954, from cuttings
Remarks: Dry hole, plugged and abandoned. Colors and symbols from Nat'l. Research Council Rock Color Chart, 1948.

Formation Tops

Cretaceous System	
Pierre formation	350'
Sharon Springs member (?)	490'
Niobrara formation	655'
Carlile shale	810'
Greenhorn formation	990'
Graneros formation	1020'

Detailed Description of Cuttings

0- 110	No cuttings.
110- 120	Glacial drift - Unsorted sands and gravels of all sizes.
120- 350	Sand and gravel as above with some gray clay. Shell fragments and concretions at 150'-160'. Coarser gravels at 170'-200' and at 280'. Glauconite from 270'-350'.
350- 360	Pierre - Medium gray (N5) sandy marl speckled with buff chalk, occasional Gumbelina, Bulimina and Planulina throughout Pierre. (may be Gregory member).
360- 390	Marl as above, more abundant pyrite.
390- 400	Medium gray (N5) sandy marl, less calcareous and less speckled than above, rounded shale pellets, iron concretions, Inoceramus shell fragments.
400- 440	Medium light gray (N6) sandy marl, iron concretions, calcite prisms.
440- 490	Medium gray (N5) sandy marl, fewer concretions than above, fish bone fragments at 480'
490- 500	Sharon Springs member - Medium dark gray (N4) shale, Inoceramus shell fragments, fish bone fragments, glauconite, buff limestone concretions, slightly glauconitic.

500- 580	Shale as above with occasional calcareous shale pellets. Ammodiscus at 540', 570'.
580- 655	Dark gray (N3), slightly bentonitic shale, shell fragments, fish remains, glauconite, more buff limestone concretions.
655- 665	Niobrara - Light gray (N7) speckled chalk, pyrite, calcite, shell fragments and forams throughout Niobrara.
665- 685	Medium light gray (N6) speckled chalk, more abundant shell fragments.
685- 790	Light gray (N7) speckled chalk.
790- 810	Medium light gray (N6) chalk, sparse speckled particles.
810- 820	Carlile - Light gray (N7) shale, fine mica flakes, sparse pyrite, calcite and glauconite.
820- 830	Medium gray (N5) shale, pyrite, calcite, glauconite.
830- 850	Shale as above, fish bone fragments, with much unsorted sand of all sizes, possibly Codell sand (cuttings poor from 830'-940').
850- 860	Medium light gray (N6) shale, occasionally calcareous; buff limestone fragments, occasional forams.
860- 870	Medium light gray (N6) slightly calcareous shale, some buff chalk and light gray marl particles.
870- 900	Shale as above, less calcareous, fewer chalk particles, fish teeth.
900- 990	Medium gray (N5) shale, pyrite and calcite.
990-1000	Greenhorn - Medium light gray (N6) fragmental limestone, abundant Inoceramus shell fragments, pyrite.
1000-1010	Some limestone with small specks of black carbonaceous material.
1010-1020	Medium gray (N5) limestone with black carbonaceous specks, abundant shell fragments and pyrite, fish remains.
1020-1040	Graneros - Medium gray (N5) shale, occasionally speckled with calcareous material and mica, fish bone fragments, abundant pyrite, shell fragments.
1040-1080	Medium dark gray (N4) shale, fish remains, pyrite, shell fragments.
1080-1096	Very coarse, unsorted sand and gravel, mostly feldspar and quartz, abundant pyrite, rock fragments. Drillers claimed to have reached Dakota but interval suggests a sand in the Graneros.
1095	Total Depth

ROCKY RIDGE DEVELOPMENT - HALE #1

Location: NE¼ NE¼ Sec. 25, T. 108 N., R. 57 W., MINER COUNTY.

Owner: Rocky Ridge Development Association, De Smet, S. Dak.
Contractor: Exploration Drilling Co., Tulsa, Oklahoma.
Commenced: August 12, 1953
Completed: August 17, 1953
Altitude: 1539' Ground. 1547' Derrick floor.
Total Depth: 1328'
Logged by: Paul Doran, 1954, from cuttings and electric log.
Remarks: Dry hole, plugged and abandoned. Colors and symbols from Nat'l Research Council Rock Color Chart, 1948.

Formation Tops

Cretaceous System	
Pierre formation	180' (?)
Niobrara formation	390'
Carlile shale	615'
Greenhorn formation	736'
Graneros shale	764'
Dakota sandstone	900'
Fuson shale	1058'
Lakota sand	1075'
Age Unknown	
Basal grit	1240'
Pre-Cambrian	
Sioux formation	1310'

Detailed Description of Cuttings

0- 110	Glacial drift - Poorly sorted glacial sand
110- 180	No cuttings.
180- 220	Pierre - Olive gray (5Y4/1), calcareous, bentonitic shale, few shell fragments, organic flakes.
220- 230	Shale as above with some calcareous, ironstone concretion fragments.
230- 280	Shale as above with some yellowish gray (5Y8/1) chalk.
280- 370	No cuttings.
370- 380	Medium gray (N5) platy shale, organic flakes, light gray (N7) lime concretion fragments.
380- 390	Medium dark gray (N4) bentonitic shale, light gray (N7) lime concretions.

390- 410 Niobrara - Light gray (N7) marl with white chalk specks, some bituminous specks.
410- 440 Marl as above with fish remains.
440- 470 Olive gray (5Y4/1) siliceous shale, flat bentonite pellets, shell fragments.
470- 500 Light gray (N7) marl with chalk pellets, some biotite.
500- 600 Light gray (N7) chalk, poor recovery from 530'-550', small biotite flakes from 550'-600'.
600- 610 Light gray (N7) chalky marl.
610- 630 Very light gray (N8) silty marl, spotted with black organic flakes.
630- 640 No cuttings.

640- 660 Carlile, electric log top at 615' - Olive gray (5Y4/1) silty bentonitic shale, fish teeth at 650'.
660- 700 Shale as above, light gray (N7) silty concretion fragments, pyrite, bentonite, abundant marcasite at bottom.
700- 710 Shale as above with some quartz sand, subangular to rounded, medium well sorted.
710- 720 Sand as above, poorly sorted.
720- 740 Medium gray (N5), silty, calcareous shale.

740- 750 Greenhorn, electric log top at 736' - Olive gray (5Y4/1) chalk spotted shale and fragmental limestone, abundant Inoceramus prisms.
750- 770 Shale as above, mica, fish scales, chalcopyrite.

770- 780 Graneros, electric log top at 764' - Olive gray (5Y4/1) shale, abundant fish vertebrae, scales, and teeth, pyrite, shell fragments.
780- 800 Medium gray (N5) calcareous shale, fish fragments.
800- 810 Yellowish gray (5Y8/1) sandy chalk, fish fragments.
810- 820 Olive gray (5Y4/1) siltstone.
820- 850 Very light gray (N8) calcareous siltstone, shell fragments at 840'.
850- 870 Light olive gray (5Y6/1) claystone, slightly calcareous.
870- 880 Claystone as above, bentonite, organic flakes.
880- 890 Light olive gray (5Y6/1) siltstone, coal fragments.
890- 900 Medium gray (N5) calcareous shale with coal fragments, light olive gray (5Y6/1), angular, fine grained sandstone, loose, coarse, angular to rounded quartz sand.

900- 910 Dakota - Gray frosted quartz sand, fair to medium sorted, coarse, some fine to medium grains, bituminous particles.
910- 930 Sand as above, subangular to rounded, fine to coarse.

930- 960	Sand as above and light olive gray (5Y6/1) shale, much lignite at 950'.
960-1020	Sand as above and olive gray (5Y4/1) calcareous shale, mica, pyrite, marcasite, lignite.
1020-1030	Some pale reddish brown (10R5/4) siltstone
1030-1060	Sand as above, and dark yellowish brown (10Y4/2) and pale reddish brown (10R5/4) siltstone. Some white bentonite at 1040'-1050'.
1060-1090	Fuson, electric log top at 1058' - Dark gray (N3) shale, lignite.
1090-1160	Lakota; electric log top at 1075' - Quartz sand, white to pink, medium to coarse, angular to sub-rounded, some lignite fragments. Somewhat finer below 1100'.
1160-1180	Sand as above and light olive gray (5Y6/1), fine grained sandstone.
1180-1190	Sand as above, some white and green bentonite
1190-1200	Sand as above.
1200-1220	Sand as above, some cemented with white calcareous bentonite, and very light gray (N8) siltstone.
1220-1240	Some chert and lignite.
1240-1310	Coarse detrital material - Chiefly Pre-Cambrian wash, quartzite and granite fragments, siltstone, sandstone, and limestone fragments.
1310-1320	Sioux formation - Pink quartzite.
1328	Total Depth.

CARTER - STRATIGRAPHIC TEST #1

Location: C. NE¼ NW¼ Sec. 34, T. 118 N., R. 78 W., POTTER COUNTY

Owner: Carter Oil Company
Commenced: July 1940
Completed: August 1940
Altitude: 1865' Curb
Total Depth: 3611'
Source of Information: Report of Investigations 57
Logged by: C. L. Baker
Remarks: Correlation was revised by E. J. Bolin.

Lithologic Log

0- 10	Pierre - Clay, bentonitic, green-gray, white satin spar gypsum.
10- 790	Pierre clay, bentonitic, with details as follows: much selenite, 60'-70', satin spar and some fine sand 80'-90', quartz, jasper, chert, hornblende, rose quartz, grossularite or andradite, almandite, biotite, chlorite, serpentine, potash and plagioclase feldspar and fragments of holocrystalline igneous at 90'-100' may be cavings from the surface. Inoceramus prisms, 90'-100' and 140'-150', some sandstone, 140'-150', shell fragments, 180', chalk, light gray with Haploporella and Ammodiscus, 265'-70'; mudstone, blue gray, 310'-420', greenish bentonite, 420'-50', small oval tan concretions, 580'-90', light tan brown limestone concretions and hauerite (?), 590'-700', Sharon Springs shale, very dark blue gray, bituminous, 710'-90'.
790- 910	Niobrara - Marl, gray, chalk specked, bituminous, brownish, more compact and chalkier 830'-40'.
910-1240	Carlile - Shale, dark gray, with silty gray limestone, 980'-90', chalk, light cream-gray, small black dots, 1030'-40', sandstone, gray, fine, biotitic, 1040', brown iron carbonate, 1170', shale nearly black, 1200'-40'.
1240-1250	Greenhorn - Limestone, gray, sandy, porous, crystalline, packed with Inoceramus prisms and fish remains.
1250-1260	Bentonite, light green gray, Cribrobulimina.

1260-1330	Limestone, light and dark gray, coarsely crystalline, bituminous, with flattened pyrite pebbles, Globigerina, Inoceramus prisms, fish remains.
1330-1380	Graneros - Marl, chalky, dark gray, spotted, bituminous.
1380-1390	Bentonite, light gray.
1400-1510	Sandstone, light gray, fine grained, biotite and a little glauconite, limy cement, fish remains.
1510-1590	Shale, dark blue gray, bituminous.
1590-1730	Dakota - Sandstone, medium grained, subround to subangular, a little cement, apparently nearly all sandstone, 1640'-1730'.
1730-1760	Fuson - Shale, dark blue gray, bituminous.
1760-1770	Manganosiderite (or rhodochrosite) pellets in loose sand.
1810-1850	Lakota (?) - Mostly sandstone with considerable mudstone, light green gray, bentonitic, some interbeds of white bentonite with small quartz and biotite fragments.
1850-1900	Sandstone, brown gray, arkosic, fine grained.
1900-1910	Sundance (?)- Sandstone, light gray, glauconitic, mudstone with Haploporella.
1910-1930	Some bentonite, light green, sandy.
1930-1940	Sandstone, light brown and gray, fine grained, micaceous.
1940-1950	Limestone, rich brown.
1950-1990	Sandstone, mostly, medium grained, brown siltstone cemented with iron carbonate.
1990-2000	Sandstone, gray, fine grained, part with much glauconite.
2000-2010	Clay ironstone, dark brown gray, fine texture, nodular.
2010-2040	Sandstone, dark gray, fine grained, glauconitic, micaceous, partly quartzite, 2030'-40'.
2040-2070	Clay ironstone, dark brown, fine sugary texture, probably some bentonite, brown, 2050'-70'.
2070-2110	Sandstone, brown to gray, medium to coarse well polished grains, subangular to subround, limy cement, also pyrite cement, high porosity, abundant lignite fragments.
2110-2120	Sandstone, gray brown, coarse.
2120-2150	Residual soil of cream to light brown kaolin or bauxite with maroon to crimson mottlings, silty to sandy, some small pebbles. Lowest 10' is partly pink and lavender, bentonite, orange, tan and yellow, 2130'-40'. Probably top of Paleozoic (Minnelusa?) or basal Sundance.

2150-2200	Minnelusa - Sandstone, cream, poorly sorted, medium grained, subangular to subround, limy cement to porous.
2200-2220	Sandstone as above but with some jasper grains, stained with yellow ochre.
2220-2235	Clay, brown red, bentonitic.
2235-2240	Considerable milky chert, weathered selenite, siltstone, pink.
2240-2250	Siltstone, dove, magnesium-calcium carbonate cement, with some shale, dark blue gray, bituminous.
2250-2260	Siltstone and fine sandstone, light gray, recrystallized quartz.
2260-2270	Shale, black, very bituminous.
2270-2300	Limestone, magnesian, light brown gray, sugary, porous.
2300-2310	Dolomite, light brown gray, fine sugary.
2310-2320	Limestone, magnesian, cream to light dove, fine sugary.
2320-2330	Sandstone, white, fine grained, limy cement.
2330-2340	Mudstone and siltstone, maroon.
2340-2360	Cavings but perhaps in light gray limestone.
2360-2370	Bentonite, light gray, green gray, pink and yellow, some nautiloid.
2370-2380	Limestone, cream, lithographic, calcite fillings of vugs.
2380-2400	Bentonite, pink yellow, brown, light green and light gray.
2400-2420	Limestone, light gray and cream streaked, lithographic, much secondary calcite.
2420-2435	Limestone, dark blue gray, bituminous, fine powdery texture.
2435-2445	Big Snowy (?)- Shale, black, bituminous, limy.
2450-2470	Limestone, cream, lithographic to powdery texture, chalcopyrite.
2470-2500	Limestone, finely crystalline and vuggy, magnesian in lower beds.
2500-2520	Limestone, cream, obscurely oolitic, porous, finely crystalline, possible unconformity.
2520-2570	Madison - Limestone, magnesian, light brown, crystalline, very porous and vuggy, dolomite rhombs in calcite matrix. Some conglomerate, dark brown bituminous streaks and stains, porosity decreases downwards.
2570-2600	Limestone, light dove, very dense, minute dolomite rhombs.
2600-2620	Dolomite, gray, very vuggy, crystalline.
2620-2640	Limestone, light brown and gray, obscurely oolitic, very fine, ostracodes.
2640-2645	Limestone, cream, oolitic.
2645-2655	Limestone, dark gray, fine, porous and vuggy.
2655-2670	Limestone, light brown gray, large oolites with pores between, secondary calcite, alabaster, 2665'.
2670-2690	Limestone, gray, coarse, abundant sand grains.

2690-2700	Dolomite, dark gray, fine sugary, calcite matrix.
2700-2750	Dolomite, gray, crystalline, considerable fine sand and silt.
2750-2910	Limestone, cream, oolitic in part, porous, lithographic to crystalline, looks like Madison.
2910-2930	Limestone, cream, medium sized crystals, porous and vuggy.
2930-2990	Limestone, light brown, crystals in fine powdery matrix.
2990-3000	Siltstone, salmon, some claystone, brick red.
3000-3010	Devonian (?)- Sand, loose, coarse, unsorted, subround to subangular.
3010-3050	Dolomite, dark brown, coarsely crystalline, very porous.
3050-3070	Dolomite, white and light green gray, fine sugary, with scattered large sand grains.
3070-3080	Dolomite, light green gray, fine sugary.
3080-3091	Dolomite, brown, fine sugary, vuggy.
3091-3100	Dolomite, gray, fine sugary, with scattered small and larger quartz grains.
3100-3120	Sandstone, gray and green gray, grains fine to coarse.
3120-3200	Red River - Dolomite, light brown gray, sugary, vuggy, secondary quartz crystals.
3200-3270	Dolomite, darker brown, secondary quartz crystals.
3270-3320	Dolomite, light brown, milky white chert, secondary quartz crystals.
3320-3380	Dolomite rhombs in calcite crystals, light blue chert, some siltstone.
3380-3440	Limestone, cream, fine texture, white matrix of abraded calcite crystals.
3440-3460	Limestone, cream, with fine detritus.
3460-3490	Winnipeg shale - Shale, light dull green, bentonitic, some fine sandstone in upper and numerous small quartz grains below.
3490-3560	Shale, dull green, unctuous, bentonitic, flaky, hard, probably chloritic.
3560-3580	Winnipeg sand - Sandstone, gray, porous, poorly sorted, varying size grains, finer above.
3580-3611	Pre-Cambrian - Granodiorite or quartz monzonite, extensively chloritized, contains quartz, biotite, plagioclase, some orthoclase, hornblende feldspars are kaolinized.
3611	Total Depth

DAKOTA-TEXAS - WILLIAMS-THOMPSON #1

Location: NW¼ SE¼ Sec. 27, T. 119 N., R. 78 W., POTTER COUNTY

Owner: Dakota-Texas Oil Co., Sioux Falls, So. Dak.
Contractor: Earl F. Wakefield, Wichita, Kansas
Commenced: May 27, 1953
Completed: June 21, 1953
Altitude: 1899'- Kelly Bushing
Total Depth: 3715'
Logged by: E. J. Bolin, 1954, from cuttings and electric log.
Remarks: Dry hole, plugged and abandoned. Colors and symbols from Nat'l Research Council Rock Color Chart, 1948.

Formation Tops

Cretaceous System	
Pierre formation	310' (?)
Sharon Springs member	760'
Niobrara formation	790'
Carlile shale	955'
Greenhorn formation	1330'
Graneros shale	1355'
Dakota sandstone	1657'
Fuson shale	1770'
Lakota sandstone (?)	1890'
Jurassic System	
Morrison formation	1940'
Sundance formation	2065'
Pennsylvanian System	
Detrital zone	2195'
Minnelusa formation	2270'
Mississippian System	
Big Snowy (?)	2450'
Madison group	2550'
Devonian System (?)	3055'
Ordovician System	
Red River formation	3215'
Winnipeg shale	3585'
Cambro-Ordovician sand	3658'
Pre-Cambrian	
Granite	3715'

Detailed Description of Cuttings

0- 310 No samples.

310- 380 Pierre - Medium gray (N5) and medium light gray (N6),

	finely micaceous, bentonitic shale, limy concretions.
380- 420	Medium light gray (N6) and pale yellowish brown (10YR6/2) shale, some bentonite.
420- 760	Medium light gray (N6), light gray (N7), and yellowish gray (5Y8/1), finely micaceous, bentonitic shale, limestone concretions, scattered forams and calcite prisms.
760- 800	Sharon Springs member - Dark gray (N3) and grayish black (N2) fissile shale, a little selenite and mica, some pyrite, fish fragments.
800- 820	Dark gray (N3) and medium dark gray (N4) fissile shale, fish remains.
820- 840	No cuttings.
840- 950	Niobrara, electric log top at 790' - Medium gray (N5) and medium light gray (N6), chalk-spotted marl, shell fragments and fish remains.
950- 960	Very light gray (N8) chalk, biotite, forams, pyrite.
960-1010	Carlile, electric log top at 955' - Dark gray (N3) to medium gray (N5), soft, finely micaceous shale.
1010-1040	Medium gray (N5), hard, argillaceous limestone, calcite veinlets, pyrite.
1040-1060	No cuttings.
1060-1320	Medium dark gray (N4) and medium gray (N5), soft, finely micaceous shale. Dark red, clay-ironstone concretions at 1170'-1180'. Pale yellowish brown (10YR6/2) calcareous siltstone concretions at 1300'-1310'.
1320-1330	No sample.
1330-1350	Greenhorn - Dirty gray fragmental limestone with partings of dark gray (N3) shale, chalk spots in shale.
1350-1360	No cuttings.
1360-1370	Fragmental limestone, Globigerina abundant.
1370-1530	Graneros, electric log top at 1355' - Dark gray (N3) and medium dark gray (N4), soft, fissile shale with scattered white specks, fish remains, Inoceramus prisms, becomes less calcareous downwards. A little fine to coarse sand at 1480'-1490'.
1530-1580	Dark gray (N3), slightly calcareous, soft, fissile shale with occasional light spots, and dirty gray, finely fragmental, silty limestone with fish remains, pyrite, and glauconite.
1580-1620	Dark gray (N3), non-calcareous and slightly calcareous, soft, fissile shale with a little siltstone and very fine sandstone.

1620-1630 Dark gray (N3), soft, fissile shale.
1630-1660 Medium dark gray (N4) and dark gray (N3) fissile shale with some medium gray (N5) slightly calcareous shale.

1660-1690 Dakota, electric log top at 1657' - Very fine to medium grained, angular to subrounded sandstone
1690-1730 Pale yellowish brown (10YR6/2) and pale reddish brown (10R5/4) siltstone and sandy siltstone, and medium light gray (N6) shale.
1730-1760 Light gray (N7), very fine to fine, calcareous sandstone.
1760-1770 Pale yellowish brown (10YR6/2), micaceous siltstone, much carbonaceous material.

1770-1810 Fuson - Siltstone with some sandy streaks, abundant small Fe-Mn pellets, clay ironstone concretions.
1810-1840 Fine to medium sand, abundant Fe-Mn pellets, much larger than above.
1840-1850 No cuttings.
1850-1860 Light olive gray (5Y6/1) siltstone, plant fragments.
1860-1890 Dark gray (N3) to very light gray (N8) silty clay and argillaceous silt, some Fe-Mn pellets; much loose sand from 1870'-1890'.
1890-1900 No cuttings.

1900-1930 Lakota (?), electric log top at 1890' - Pale yellowish brown (10YR6/2) siltstone, carbonaceous material, ironstone concretions.
1930-1940 As above with some red and yellowish, very fine to fine sandstone with much pyrite.
1940-1960 Morrison - Medium gray (N5) to light gray (N7) clay shale.

1960-1970 Medium gray (N5) and medium light gray (N6), dense limestone.
1970-1980 Limestone and clay shale.
1990-2000 No cuttings
2000-2050 Medium gray (N5) and medium light gray (N6) limestone, and dark gray (N3) to light gray (N7) shale.
2050-2070 Medium dark gray (N4) smooth shale, and yellowish gray (5Y7/2) to medium light gray (N6) sandy shale.
2070-2090 Sundance, electric log top at 2065'- Glauconitic shale and calcareous siltstone.

2090-2100 Dark gray (N3) to medium gray (N5) shale.
2100-2109 Shale as above and light gray (N7) siltstone.
2110-2130 Siltstone
2130-2140 Very light gray (N8) siltstone and very fine sandstone, calcareous.
2140-2160 Siltstone as above.

2160-2190 Siltstone and medium dark gray (N4) shale.
2190-2200 Medium dark gray (N4) and medium gray (N5) shale, and some grayish red (5R6/2), ferruginous, sandy siltstone.
2200-2210 Siltstone as above.
2210-2220 No cuttings
2220-2230 Detrital zone, electric log top at 2195'-Grit; ~~fine to very~~ coarse and conglomeratic, some ferruginous cement.
2230-2270 Loose sand, fine to very coarse, orange and clear quartz grains, amount of finer material increases downwards.
2270-2280 Minnelusa - Pale reddish brown (10R5/4), argillaceous, sandy silt.

2280-2290 Fine to coarse, orange sand.
2290-2310 Pale reddish brown (10R5/4) argillaceous silt.
2310-2320 White (N9), fine to medium, calcareous, iron stained sandstone, some argillaceous, silty limestone.
2320-2330 No cuttings.
2330-2350 Light gray (N7), very light gray (N8), and pale red (5R6/2 and 10R6/2) dolomitic limestone.
2350-2360 Gray black (N2) shale, some slightly calcareous, and very light gray (N8) limestone.
2360-2450 Light gray (N7) and very light gray (N8) limestone. Somewhat sandy at 2410'-2420', some variecolored shale at 2430'-2440', and some chalky marl at 2440'-2450'.
2450-2480 Big Snowy (?) -Pale red (10R6/2), pale reddish brown (10R5/4) and moderate reddish orange (10R6/6), greasy, calcareous shale, and a little soft limestone or chalky marl.
2480-2490 Moderate reddish brown (10R4/6) and pale reddish brown (10R5/4) argillaceous limestone.
2490-2540 Dark gray (N3) to very light gray (N8) limestone, ostracodes.
2540-2550 Pale reddish brown (10R5/4) and moderate reddish orange (10R6/6), argillaceous siltstone and very fine to medium sandstone.

2550-2560 Madison - White (N9) limestone with some anhydrite.

2560-2600 Very light gray (N8) to white (N9) limestone, ostracodes at 2590'.
Cores from 2600'-2613'.
2600-2606 Light gray (N7), brecciated limestone, some pyrite.
2606-2613 Medium light gray (N6) and yellowish gray (5Y8/1), finely sucrose, dolomitic limestone.
2613-2620 Trip sample light gray (N7) and yellowish gray (5Y8/1) sucrose limestone with some plant fragments.
2620-2670 Light gray (N7) and very light gray dense limestone, occasional ostracodes at 2640' and 2660'.
2670-2680 Light gray (N7), quite porous limestone, some pyrite.
2680-2690 Light gray (N7) and very light gray (N8) dense

limestone.

2690-2700 Pale yellowish brown (10YR6/2) limestone with some crystalline anhydrite.

2700-2730 Medium gray (N5) to light gray (N7) oolitic limestone.

2730-2750 Medium light gray (N6) and light gray (N7) porous limestone, some chalky limestone.

2750-2760 Very light gray (N8) oolitic limestone and white (N9) chalky limestone.

2760-2800 Light gray (N7) dense limestone.

2800-2840 Mottled, gray to white, fossiliferous limestone.

2840-2850 Light gray (N7) dense limestone.

2850-2880 Yellowish gray (5Y8/1) imperfectly oolitic limestone.

2880-2940 Very light gray (N8) and very pale orange (10YR8/2) oolitic limestone, fossiliferous, some dense limestone at 2920'-2940'.

2940-3020 Yellowish gray (5Y8/1) and very pale orange (10YR8/2), sucrose and oolitic limestone, and white (N9) chalky limestone. Some pale yellowish brown (10YR6/2) crystalline dolomite at 3010'-3020'.

3020-3040 Grayish brown (5YR3/2) to pale yellowish brown (10YR6/2), porous, crystalline dolomite.

3040-3050 Very light gray (N8) and yellowish gray (5Y8/1) dolomitic limestone, and white (N9) chalky limestone.

3050-3070 Light gray (N7) and very light gray (N8) dolomitic limestone.

3070-3103 Devonian (?), electric log top at 3055' - Light greenish gray (5GY8/1) and yellowish gray (5Y8/1), calcareous, silty clay with embedded rounded, frosted and pitted, fine to coarse sand grains. Cores from 3103'-3130'.

3103-3111 Light greenish gray (5GY8/1), slightly calcareous, argillaceous siltstone with sandy streaks.

3111-3114 White (N9) limestone.

3114-3117 Banded, greenish gray (5GY6/1) and light gray (N7) shaly limestone.

3117-3121 Brown, porous dolomite.

3121-3123 Greenish gray (5GY6/1) dense dolomite.

3123-3130 Brown, finely crystalline, vuggy dolomite.

3130-3150 Brown, porous and vuggy, crystalline dolomite.

3150-3170 Pale yellowish brown (10YR6/2) sucrose dolomite.

3170-3190 Pale brown (5YR5/2) to pale yellowish brown (10YR6/2) dolomite.

3190-3200 Some brownish black (5YR2/1) argillaceous dolomite.

3200-3210 Poorly sorted, frosted sand in a calcareous matrix, shale partings.

3210-3220 Argillaceous limestone, ostracodes abundant.

3220-3230 Red River, electric log top at 3215' - Light gray

(N7) to white (N9) limestone with dolomite rhombs.

3230-3330	Very light gray (N8) dolomite, somewhat vuggy.
3330-3380	Light gray (N7) dense dolomite and very light gray (N8) to yellowish gray (5Y8/1) slightly porous dolomite. Samples poor from 3380'-3620'.
3380-3390	Medium dark gray (N4) calcareous shale, and dark reddish brown (10R3/4) sandy shale.
3390-3400	Varicolored sandy shale, and very light gray (N8) limestone.
3400-3430	Very light gray (N8) to yellowish gray (5Y8/1) dolomite and dolomitic limestone, with some chert.
3430-3440	Light gray (N7) silty shale.
3440-3450	No cuttings.
3450-3460	Medium dark gray (N4) fissile shale.
3460-3470	Very fine to medium sand with occasional coarse and very coarse grains, angular to rounded, some frosted, much orange stain.
3470-3480	Medium dark gray (N4) shale.
3480-3520	Pale yellowish brown (10YR6/2) and yellowish gray (5Y8/1) dolomite with some chert, fossiliferous.
3520-3530	No cuttings.
3530-3580	Dolomite as above, a little chert from 3550'-3580'.
3580-3600	No cuttings.
3600-3610	Fine to medium, subangular to subrounded sand (?)
3610-3620	Winnipeg shale, electric log top at 3585' - Light olive gray (5Y6/1) fissile shale with sandy streaks.
3620-3660	Dark yellowish brown (10YR4/2), light olive gray (5Y6/1), and greenish gray (5GY6/1), greasy, fissile shale.
3660-3710	Cambro-Ordovician, electric log top at 3658' - Poorly sorted quartz sand, angular to rounded, some frosted grains, some ferruginous staining. Sand becomes finer downwards.
3715	Pre-Cambrian - Biotite granite with some chlorite, some is badly weathered.
3715	Total Depth.

SIOUX VALLEY - LA FLUER #1

Location: SE¼ SW¼ Sec. 18, T. 90 N., R. 48 W., UNION COUNTY

Owner: Sioux Valley Oil and Refining Company, Sioux Falls, S. Dak.
Contractor: H. F. Speaker, McPherson, Kansas
Commenced: August 1939
Completed: October 1942
Altitude: 1150' Ground
Total Depth: 2752'
Source of Information: Report of Investigations 61
Logged by: C. L. Baker, from cuttings
Remarks: Dry hole, plugged and abandoned.

Sample Log

60 or 70	Sand, alluvial, light brown, with black chert particles, fairly coarse, subround.
70- 125	Alluvial gravel and sand, with dolomite, amethyst and Pre-Cambrian rock fragments.
243- 352	Dakota - Sand, buff, angular, mostly non-sorted, coarse to fine, some etched grains.
352- 380	Fuson - Colloidal suspensoid bentonite, medium gray and light green.
380- 390	Manganese bearing pellets, varigated, tawny, light green, brown and red orange.
390- 405	Paleozoic - Limestone, dolomitic, dove gray, fine sugary texture, much fine quartz silt, vuggy.
405- 409	Darker gray limestone.
409- 413	Limestone, buff crystalline, magnesian, marcasite.
413- 418	Limestone, vuggy, mostly buff magnesian crystalline, chalcopyrite.
418- 430	Limestone, magnesian, dove, rhombic, vuggy, dolomite rhombs in calcite matrix.
430- 434	Limestone, fine powdery texture, silty.
458- 461	Limestone, light gray dove, silty.
461- 464	Limestone, magnesian, dark gray, fine grained, quite clayey.
464- 473	Limestone, brown gray.
473- 477	Limestone, light buff, very fine powdered sugar texture, silty, stylolites.
477- 496	Limestone, brown dove, fine rhombic, small dolomite rhombs.
496- 513	Limestone, coarser rhombs and grayer.
513- 518	Limestone, magnesian, dark brown gray, rhombic, vuggy, clay residue.

518- 531 Chalcedony, white to bluish white, vuggy and drusy with small quartz crystals, opaque, some translucent, may be weathered.

531- 560 Limestone, dolomitic, gray, coarse rhombic, virtually a fine grained marble, chalcopyrite, covellite.

560- 570 More chalcedony, with marcasite in cavities.

570- 580 May be cavings, some material like Sioux quartzite.

580- 592 Dolomite, brown gray, rhombic, vuggy, crinoid stem and plicated brachiopod in chalcedony.

592- 610 Dolomite, light gray, fine powdered sugar texture.

610- 655 Sandstone, light gray, cemented, angular coarse etched grains, some of dark chert.

655- 666 Limestone, magnesian, rhombic, quite vuggy, 400' of 12½ inch casing run.

666- 707 Decorah-Platteville (Mid-Ordovician) - Shale, gray-green, bentonitic, silty, with rhombic magnesian limestone.

707- 710 Dolomite, light gray, fine rhombic.

710- 720 Shale, green.

720- 730 Sandstone, buff, very fine grained, virtually a siltstone.

730- 740 Shale, green, some sandy with coarse grains, sandier and siltier below.

750- 755 Siltstone, brown gray, limy cement.

755- 765 Shale, green, flaky, bentonitic, with black phosphate nodules.

765- 805 St. Peter - Sandstone, all size grains, etched, round to subround, some light pink grains probably derived from Sioux quartzite.

805- 815 Sandstone, light gray, fine, dolomite cement, glauconite, black phosphate.

815- 825 Largely gray green bentonitic clay.

825- 835 Upper Cambrian, probably - Dolomite, light gray, fine rhombic.

835- 860 Dolomite, light gray, rhombic, with subangular dark glauconite particles.

860- 875 Dolomite, light gray, with some fine sand grains.

875- 890 Dolomite, light gray, coarser rhombs.

890- 900 Dolomite, light gray, very glauconitic, some quite coarsely rhombic.

900- 933 Sand, light cream, etched, round to subround, poorly sorted, all sizes of grains, some light pink, likely from Sioux quartzite.

933- 936 Sand with fairly large subrounded pellets of glauconite.

936- 950 Sand with small and sparser glauconite particles.

950- 957 Sand, limy, smaller amount glauconite.

957- 980 Calcareous rhombs of limestone, gray, glauconite, quartz sand.

980-1000	Fine sandy.
1000-1007	Largely lime-cemented fine glauconitic sandstone.
1007-1015	Sandstone, with round concentric limonite pellets, angular to subangular grains, some turgite cement, large grains of Sioux quartzite.
1015-1027	Sandstone, buff, coarse, etched, subangular to subround, some pink and rose grains.
1027-1029	Pre-Cambrian - Granite with pink feldspar and quartz.
1029-1033	Quartz, pink feldspar, chlorite and biotite fragments.
1033-1035	Biotite granite (granitite), some epidote and plagioclase, probably quartz monzonite.
1039	Granodiorite, mostly white plagioclase.
1043	Considerable black hornblende.
1046	Amphibolite-biotite-quartz schist.
1058-1069	Mostly granodiorite.
1709-1750	Some hornblende.
1757-1766	Light granite with orthoclase, plagioclase and biotite.
1866-1900	Some chlorite schist.
1900-1914	Quartz monzonite.
1932	Drill entered a shear zone, considerable light green chlorite in largely pink granite, sericite, water encountered at 2040', salinity 1777 parts per million, mainly sodium sulphate and chloride.
2090-2140	Shear zone, with quartzite, slickensided, caving, very fine matrix with large angular quartz particles, green and purplish, quite possibly a mylonite (crushed quartz vein), also chunks of chlorite, matrix is fine silicate.
2140-2155	Crushed pegmatite, matrix of fine sericite.
2155-2169	Pegmatite and schist fragments.
2169-2200	Some fine-grained dark gray, somewhat talcose, hornfels-like rock with pyrite.
2200-2206	"Greenstone", fine texture.
2216-2224	Fine chloritic schist, dark green, shattered pegmatite.
2479	Reddish water found, salinity 3720 parts per million, 7 parts fluoride.
	Note: Apparently the drill followed the shear zone to the total depth of 2752 feet.
2752	Total Depth.

PEPPERS - STATE #1

Location: NE¼ SE¼ Sec. 36, T. 123 N., R. 76 W., WALWORTH COUNTY.

Owner: Peppers Refining Co., Oklahoma City, Oklahoma.
Contractor: Barnett Drilling, Inc., Wichita, Kansas.
Commenced: June 9, 1952
Completed: July 2, 1952
Altitude: 2064' - Kelly Bushing. 2056' - Ground.
Total Depth: 3922'
Logged by: C. L. Baker, 1952, from cuttings and electric log.
Remarks: Plugged and abandoned. Oil staining in Madison at 2814' and in Devonian at 3140' to 3160'.

Formation Tops

Cretaceous System	
Pierre shale	140'
Sharon Springs member	930'
Niobrara formation	960'
Carlile shale	1065'(?)
Greenhorn formation	1497'
Graneros shale	1530'
Dakota sandstone	1884'
Fuson shale	1946'
Lakota sandstone	1992'
Jurassic System	
Sundance formation	2100'
Pennsylvanian System	
Detrital zone	2385'
Minnelusa formation	2417'
Mississippian System	
Madison group	2620'
Devonian System (?)	3130'
Ordovician System	
Red River formation	3320'
Winnipeg shale	3688'
Cambro-Ordovician sandstone	3823'
Pre-Cambrian	3910'

Detailed Description of Cuttings

0- 140 Glacial till, stony.

140- 170 Pierre - Clay, much glacial till caving.
170- 200 Clay, ashy.

200- 300	No cuttings.
300- 510	Blue gray clay, silty or ashy, small specks sericite. Fossils from 390' downwards.
510- 610	Finer textured, some white silty marl.
610- 810	Hard siliceous shale, some fish remains.
810- 930	Whitish bentonite, yellow limestone concretions at 850' and downwards.
930- 960	Sharon Springs member - Dark blue gray shale.
960-1020	Niobrara - Dark gray chalk spotted marl.
1020-1065	Lighter gray chalk spotted marl.
1065-1450	Carlile - Blue gray clay.
1450-1490	Sand, Coarse, etched, angular to rounded grains, some grains of dolomite and limestone, red and pink garnet.
1490-1530	Greenhorn - Light gray, porous limestone, fish remains, Inoceramus, Globigerina, with dark gray, in part bituminous, laminae.
1530-1810	Graneros - Dark gray shale, scarce glauconite and silt below 1600'.
1810-1900	Bentonite, light greenish suspensoid, probably Mowry, sand and silt below 1830' (Newcastle?)
1900-1960	Dakota, electric log top at 1884' - Fine, angular sand.
1960-1990	Fuson, electric log top at 1946' - Light brown Fe-Mn pellets abundant at top.
1990-2100	Lakota, electric log top at 1992' - Sand
2100-2160	Sundance - Dark gray clay.
2160-2240	Bentonitic mudstone, with glauconite.
2240-2280	Sandstone, light gray, fine grained, very carbonaceous, limy.
2280-2380	Dolomite, light brown, hard, fine powdery texture, in sandstone.
2380-2430	Detrital zone, electric log top at 2385' - Grit, loose, unsorted, coarse to fine to grit and small pebble size, grains well polished, mostly angular, coarser at base, cemented with lime or copper sulphides. Larger grains are etched, some are of dark gray chert.
2430-2470	Minnelusa, electric log top at 2417' - Clay, red, which may be matrix of sandstone.

2470-2500	Dolomite, buff, finely granular, dense with light brown chert.
2500-2510	Salmon colored red with secondary green copper mineral.
2510-2550	Dolomite, gray.
2550-2570	Siltstone, limy, buff.
2570-2580	Sandstone, buff, very fine, angular grains.
2580-2610	Limestone, dark gray, fine, granular, fossiliferous, ostracodes. May be Big Snowy.
2610-2620	Black shale.
2620-2640	Madison - Light cream limestone, soft, powdery, cavernous, ostracodes, cherty. Cores from 2640-2697.
2640-2649	Light gray, finely crystalline limestone, fossiliferous, stylolitic, partly dense, porcellaneous. Lower 3' solution brecciated and recemented.
2649-2661	A little blue chert, layers of shell breccia, thin layers of light gray limy bentonite, irregularly laminated. Black bituminous cave earth and collapsed cave breccia, 2657'. Half of core 2658'-2661' is light green gray limy bentonite full of glass shards.
2661-2664	Limestone, darker gray, clayey, showing 45° dip.
2664-2667	Largely mudstone, medium gray.
2667-2677	Limestone, hydraulic, earthy, light gray, slakes when wetted.
2677-2680	Gray bentonitic clay and hydraulic limestone, top much brecciated, more limy at base. Some thin sandstone layers and light brownish lithographic limestone.
2680-2683	Clay, bentonitic.
2683-2686	Much collapsed solution breccia of gray earthy limestone, locally stained brown-red, finely granular.
2686-2689	Clay, slaking, bentonitic, dark gray.
2689-2692	Limestone, light gray, porcellaneous, passing down into red mottled.
2692-2695	Limestone collapse breccia. Dark gray bentonitic clay at base.
2695-2697	Limestone collapse breccia, finely granular.
2697-2740	Light cream limestone, soft powdery, cavernous, ostracodes, cherty. Altered oolitic at 2720'.
2740-2810	Limestone, cream, oolitic.
2814	Dolomite, brown, bituminous, ether shows paraffin, fine powdery texture, porous.
2820-2830	Limestone, brown cream, oolitic.
2830-2920	Dolomite, fine sugary, porous, medium gray, mottled and in part limy below, brachiopods.
2920-3020	Limestone, cream, oolitic, fossils.
3020-3137	Limestone, dolomite rhombs in calcite matrix.
3137	Devonian (?), electric log top at 3130' - Brown dolomite, cavernous, stained heavily with oil.

3140-3160 Dolomite, brown, vuggy, oil stained.
3160-3180 Dolomite, pink, vuggy, fairly crystalline.
3180-3230 Dolomite, pink, some greenish, some sandy, limestone in part.
3230-3260 Dolomite, brown.

3260-3300 Red River, electric log top at 3262' - Anhydrite, light bluish gray, especially at 3290'-3300', with etched sand grains, fossils.
3300-3310 Some bituminous shale.
3310-3320 Dark gray, argillaceous limestone.
3320-3329 Medium grained, angular sand in a calcareous matrix, much pyrite.
3329-3330 Dolomite, light gray, sugary, vuggy.
3330-3340 Dolomite, buff, vuggy.
3340-3480 A little white chert.
3480-3590 Limestone, cream, much white chert, crinoid stems.
3590-3610 Limestone, light brown, vuggy, fine granular.
3610-3720 Limestone, light blue gray but brownish below, vuggy, finely crystalline, some white chert at 3650'-3660'.

3720-3772 Winnipeg shale, electric log top at 3688' - Greenish bentonite, some silty, black phosphate nodules, some brown shale. Cores from 3772' - 3817'.
3772-3789 Shale, bentonitic, dull green, fissile.
3789' Graptolites
3790 Brown gray disc-like mottlings.
3791 Obolus
3792-3793 Shale, dark dull green, becoming mottled downwards.
3793-3796 Shale, dark brown, with Obolus.
3796-3800 Graptolites common.
3800-3811 Shale, green, bentonitic.
3811-3817 Claystone, bentonitic, lime cemented, partly mottled brown and green, most of rest greenish. Mottles lie flattened parallel with bedding. Resserella at 3813'.
3817-3820 Green, greasy shale.
3820-3833 No cuttings.
cores from 3833-3870'.

3833-3870 Cambro-Ordovician - Sandstone with abundant glauconite, medium grained, etched, rounded to subangular, little cement, very porous, brachiopod fragments, probably eolian, thin green slaking clay laminae. Coarser, less sorted and with potash feldspar lower down (below 3840'). Large grains prevalent at 3859'. Mainly quartzose and more rounded at base. Lower 6 inches free of glauconite but fossiliferous, less reworking of a wind deposit. Virtually without any cement and red-brown.
3870 Sandstone, glauconitic, arkosic
3890 Sandstone, glauconitic, feldspathic, quartz grains etched and rounded, sorting poor.

3920-3922	Pre-Cambrian, electric log top at 3910' - Pegmatite, pink orthoclase and a little biotite.
3922	Total Depth.

PRAY - KRANZLER #1

Location: NW¼ NW¼ Sec. 14, T. 121 N., R. 77 W., WALWORTH COUNTY

Owner: Max Pray, Chicago, Illinois
Contractor: Barnett Drilling, Inc., Wichita, Kansas.
Commenced: August 23, 1952
Completed: September 9, 1952
Altitude: 1881' - Kelly Bushing
Total Depth: 3808'
Logged by: C. L. Baker, 1952, from cuttings and electric log.
Remarks: Plugged and abandoned. Oil staining in Big Snowy at 2480'-2490' and 2500'-2510', and in Madison at 2520'-2530', and at 2551' and 2988'.

Formation Tops

Cretaceous System	
Pierre shale	Surface
Sharon Springs member	750'
Niobrara formation	823'
Carlile shale	940'
Greenhorn formation	1322'
Graneros shale	1350'
Dakota sandstone	1712'
Fuson shale (?)	1860'
Lakota sandstone	1920'
Jurassic System	
Sundance formation	1935'
Pennsylvanian System	
Detrital zone (?)	2170'
Minnelusa formation	2310'
Mississippian System	
Big Snowy group?	2470'
Madison group	2515'
Devonian System?	3062'
Ordovician System	
Red River formation	3210'
Winnipeg shale	3615'
Cambro-Ordovician sandstone	3740'
Pre-Cambrian	3780'

Detailed Description of Cuttings

0- 500 No cuttings

500- 740 Pierre - Blue gray, bentonitic clay, ashy texture, with limy concretions at 560', Inoceramus prisms at 610'.

740- 750 Chalk spotted marl.

750- 820 Sharon Springs member - Black shale, fish remains, some light gray bentonite.

820- 940 Niobrara, electric log top at 823' - Dark gray chalk spotted marl.

940-1322 Carlile - Blue gray shale, apparently grading downwards from chalk.

1322-1350 Greenhorn - Light brown gray limestone, small crystals, thin laminae of black shale, Inoceramus and Globigerina.

1350-1712 Graneros - Dark gray shale. Dark gray fissile Mowry shale with fish scales at 1470', silt at 1640', and tan siltstone at 1700'.

1712-1860 Dakota - Fine, angular sandstone, some small glauconite particles in siltstone, muscovitic, light brown.

1860-1920 Fuson - Very small Fe-Mn pellets

1920-1935 Lakota - Dark brown sandstone, a little coarser and with some rounded grains, carbonaceous.

1935-2080 Sundance - Sandstone with glauconite and some dark gray glauconitic siltstone.

2080-2170 Copper sulphides, with peacock oxidation colors, cementing sand, below is apparently light gray sandy siltstone.

2170-2230 Detrital zone - Coarse sand and grit with some small polished and etched pebbles.

2230-2250 As above with pinkish cement.

2250-2260 Partly silt, bright orange.

2260-2270 Silt to medium sand, brown-scarlet to purple or maroon, considerable turgite.

2270-2280 Sand and silt, orange coated and red orange clay cement.

2280-2290 Poorly sorted sand.

2290-2300 Red-orange and white, very fine sandstone

2300-2310 No cuttings.

2310-2330 Minnelusa - Siltstone, pink and rose, very limy, sandy.

2330-2350 Siltstone, light tan and light gray, limy.

2350-2370 Siltstone, light to medium gray.

2370-2440 Siltstone, light to medium gray, with a little anhydrite.

2440-2450 Perhaps sand.

2450-2460	Bentonite, with siltstone
2460-2470	Considerable sand, fine grained
2470-2480	Big Snowy (?)-Limestone, dove gray, lithographic
2480-2490	Mottled, dark and light gray, argillaceous limestone, smells of oil, shows film on wash water. Fluoresces and gives ether test for oil, which may have spilled on sample log. Identical lithologically to Big Snowy in Youngblood-Macheel well at 4910'-4915'.
2490-2500	Limestone, gray, earthy.
2500-2510	Claystone, dark gray, calcareous, oily.
2510-2530	Madison, electric log top at 2515'- Limestone, cream, earthy or powdery, fossiliferous, vuggy, a little chert, some fluorescence and paraffin at 2520-2530'.
2533-2551	Core of light dove gray, fine lithographic, magnesian limestone, with inclined and wavy laminae which are caused by solution, in part porous. Some dark silt-like layers of ether insoluble residue or shale.
2551-2560	Limestone, brittle, lithographic, cream, some vugs. Some brownish, fluorescent, porous, oil stained.
2560-2590	Limestone, porous, earthy, cream-gray.
2590-2620	Limestone, light brown, earthy, fluorescent, porous.
2620-2650	Limestone, light brown, earthy, some dark shaly laminae.
2650-2660	Limestone, cream, porcellaneous.
2660-2670	Limestone, fine, granular.
2670-2700	Limestone, fine granular, some cavernous, some small oolites, fossils.
2700-2740	Limestone, light gray, finely granular, fossiliferous, altered oolites.
2740-2750	Limestone, gray, very oolitic.
2750-2780	Limestone, medium gray, finely crystalline, some oolites.
2780-2790	Limestone, gray, with milky chert.
2790-2840	Limestone, gray, fossils.
2840-2930	Limestone, cream, oolitic, porcellaneous, fossils.
2930-2988	Limestone, cream, finely granular, fossils, altered oolites in upper part.
2988 circu.	Limestone, brown, finely granular and porous, fluorescent and shows oil with ether.
2988-3023	Core of limestone showing contortions of dark, nearly black, insoluble residue zones, fossils, especially horn corals, upper 8 inches brown and bituminous. Beneath limestone is finely granular, some nodular chert.
3023-3070	Limestone, light gray, granular.
3070-3080	No cuttings.

3080-3100	Devonian (?) electric log top at 3062'-Some sandstone, fine, etched grains, a little galena and sphalerite in the limestone.
3100-3190	Limestone, light brown, small crystals, vuggy, vitreous.
3190-3210	Limestone, gray, clayey, abundant ostracodes.
3210-3230	Red River - Limestone, cream, porcellaneous.
3230-3250	Anhydrite, light gray bluish, with dolomite, brown cream, vuggy
3250-3270	Dolomite, brown cream, vuggy, vitreous.
3270-3310	Dolomite, light gray.
3310-3400	Dolomite, light brown gray.
3400-3500	Dolomite, with blue white chert.
3500-3620	Limestone, dove gray, finely granular, fossils, silty below 3580'.
3620-3740	Winnipeg shale, electric log top at 3615'- Shale, green and brown, bentonitic, fissile, black, with graptolites 3710'-3720'.
3740-3750	Cambro-Ordovician - Sandstone, limy cement, with black chert and quartz grains, some copper sulphide cement and partly with bentonite matrix.
3751-3780	Sandstone, arkosic, glauconitic, mainly fine-grained but with some large, etched, partly rounded grains, there are thin green gray siltstone laminae, some feldspar, both white and flesh color, increasing below 3765' where sand becomes coarser and some authigenic feldspar, Dicellamus; probably Deadwood.
3780-3808	Pre-Cambrian- Orthoclase- biotite granite, biotite chloritized. However, bottom circulation sample at 3808' is quartz- biotite schist.
3808	Total Depth

OIL VENTURES - SCHULTZ #1

Location: SE¼ SW¼ Sec. 4, T. 93 N., R. 57 W., YANKTON COUNTY

Owner: Oil Ventures Development Company, Inc., Webster, S. Dak.
Contractor: H. S. Peckham, Clark, S. Dak.
Commenced: July 1, 1953
Completed: July 15, 1953
Altitude: 1569'-Ground
Total Depth-930'
Logged by: E. J. Bolin, 1954, from cuttings
Remarks: Plugged and abandoned.
Reported oil show in Greenhorn at 640'-648'.

Formation Tops

Cretaceous System	
Pierre formation	
Niobrara formation	250'
Carlile shale	420'
Greenhorn formation	620'
Graneros shale (sample at top missing)	
Dakota sand	730'
Fuson shale	750'
Lakota sand	780'

Detailed Description of Cuttings

0- 30 Glacial till - Yellowish gray (5Y7/2) sandy clay

30- 40 No cuttings
40- 50 Fine to coarse sand, probably river sand
50- 80 Fine to very coarse sand as above.
80- 90 Sand as above with numerous pale yellowish orange (10YR8/6) chalk fragments.
90-100 Pierre - Dark gray (N3) bentonitic clay with some fine pyrite.

100-130 Clay as above and medium dark gray (N4) marl with minute chalk spots.
130-140 Dark gray (N4) bentonitic clay, occasional Inoceramus prisms.
140-150 No cuttings.
150-160 Medium gray (N5) and medium light gray (N6) chalky marl, Inoceramus prisms common.
160-200 Medium dark gray (N4) and dark gray (N3) bentonitic clay. A little bluish white (5B9/1) at 190'.

200- 210	Clay as above and some light gray (N7) shaly chalk with fish remains.
210- 220	Mottled, light gray (N7) and grayish yellow (5Y8/4), bentonitic shale, Inoceramus prisms abundant.
220- 230	Light gray (N7) sandy marl.
230- 250	Medium dark gray (N4) flaky shale.
250- 300	Niobrara - Medium light gray (N6) and light gray (N7) marl with abundant small white chalk spots, fish scales rare.
300- 340	Light gray (N7) marl with chalk spots, some fish remains, pyrite, a few forams and ostracodes.
340- 400	Very light gray (N8) chalk, much aragonite with brown staining on surface. Shell fragments and Inoceramus prisms below 380'.
400- 420	White chalk (N9), a few shell fragments and Inoceramus prisms, some pyrite.
420- 430	Carlile - Medium dark gray (N4) and medium gray (N5) calcareous shale.
430- 440	Non-calcareous shale as above.
440- 480	Medium gray (N5), fissile, bentonitic, finely micaceous shale.
480- 620	Medium gray (N5) and medium light gray (N6), finely micaceous, fissile shale with shell fragments, fish remains, some pyrite. Some black phosphate grains from 540'-560'.
620- 630	Greenhorn - Medium dark gray (N4) calcareous shale with white chalk spots.
630- 640	No cuttings.
640- 648	Core. Argillaceous, fragmental limestone, with Globigerina and shell fragments.
648- 680	No cuttings.
680- 690	Graneros - Medium dark gray (N4), soft, fissile, finely micaceous shale.
690- 700	Medium gray (N5), argillaceous, very fine to fine crumbly sandstone.
700- 710	Dark gray (N3) to medium dark gray (N4), soft, finely fissile shale.
710- 730	Medium dark gray (N4) and medium gray (N5) soft shale or clay.
730- 750	Dakota - Very fine to fine, angular sand with some medium light gray (N6) fissile shale, some pyrite and fish bone fragments.
750- 760	Fuson - Medium dark gray (N4) and medium gray (N5) finely micaceous, fissile shale.
760- 770	Shale as above with numerous small, light brown, rounded Fe-Mn pellets.
770- 780	Fe-Mn pellets rare.
780- 800	Lakota - Fine grained, angular sand with some medium dark gray (N4) shale, abundant fish bone fragments.
800- 930	Fine angular sand, slightly coarser than above, many reddish-orange grains.
930	Total Depth

APPENDIX

Insufficient information is available on the following oil test borings in eastern South Dakota for the preparation of the lithologic logs, but they are listed here to make this report as complete as possible.

1. M. & M.-Hoefort No. 1 Location : NW¼ NW¼ Sec. 28, T. 104 N., R. 63 W., Aurora County. Total depth 1082'(?). Drilled in 1943-1945. Drilling in Sioux quartzite at 953', hit granite between 953' and 1082'.

2. Capitol No. 2 Well. Location: NW corner, NE¼ Sec. 4, T. 110 N., R. 79 W., Hughes County. Total depth 1430'. Altitude 1468.8'. Drilled in 1943-1945 for gas.

3. Peter Wagner No. 1. Location: SE¼ SE¼ Sec.15, T. 99 N., R. 61 W., Hutchinson County. Total depth 925'(?). Drilled June 1940 to April 1943. Hit Sioux quartzite at 678'.

4. Canton Well (Wildcat Oil Test). Location: Sec. 2, T. 97 N., R. 49 W., Lincoln County. Drilled in 1939 Fuson at 625', probably hit Pre-Cambrian at 649'.

5. Redetzke-Schoeberl. Location: SW¼ NW¼ Sec. 5, T. 103 N., R. 54 W., McCook County. Drilled in July 1930. Two tests were drilled to depths of approximately 200', gas was hit at 172'.

6. "Fox Well". Location: C. SW¼ Sec. 18, T. 118 N., R. 76 W., Potter County. Total depth 2260'. Drilled in 1910-1911.

7. Schoof-Thompson No. 1 (Exploration No. 1), Location: NE corner, SW¼ Sec. 5, T. 118 N., R. 78 W., Potter County. Total depth 1551'. Altitude 1669'. Drilled in 1943.

8. Tiezen-Albrecht No. 1 (Marion Well). Location: Sec. 3, T. 99 N., R. 55 W., Turner County. Drilled in 1939. Hit quartzite at about 400'.

PART II

WATER WELL LOGS IN SOUTH DAKOTA EAST OF MISSOURI RIVER

BY

Bruno C. Petsch

KNIGGE FARM

Location: SE¼ Sec. 24, T. 105 N., R. 66 W.
AURORA COUNTY

Owner: Mr. Knigge
Contractor: Carl Meier and Son
Completed: November 1952
Altitude: 1614'
Total Depth: 956'
Electric log by: Bruno Petsch
Remarks: Surface pipe to 288'.

Formation Tops

Cretaceous System	
Niobrara	378'
Carlile	480'
Greenhorn	630'
Graneros	670'
Newcastle	780 to 798'
Dakota	908'

WHITE LAKE

Location: SW¼ Sec. 11, T. 103 N., R. 66 W.
AURORA COUNTY

Owner: White Lake City
Contractor: Independent Drilling Company
Completed: May 2, 1953
Altitude: 1644'
Total Depth: 869.7'
Logged by: C. L. Baker
Electric log by: Bruno Petsch

Formation Tops

Cretaceous System	
Pierre	
Sharon Springs	280'
Niobrara	317'
Codell	448'
Carlile	470'
Greenhorn	550'
Graneros	586'
Dakota	788'
Fuson	840'
Pre-Cambrian	
Sioux	856'

Detailed Description of Cuttings

0- 190? Mainly rather fine glacial or lacustrine detritus, varying from clay and silt up to small pebble sizes, mainly q uartz, but also both orthoclase and plagioclase feldspars, pegmatite, alabaster, rounded limestone and dolomite, chert, chalcedony, pink garnet, epidote, chlorite, iron oxide buckshot concretions, nephite, Inoceramus prisms, foraminifera, with increase downward in metamorphic fragments and cretaceous clay and chalk.

190- 290 Pierre clay, bentonitic, light blue gray, with light gray bentonite at 275'.

290- 315 Sharon Springs shale, soft, punky, laminated, bituminous, fish remains, dark brown grey.

315- 330 Niobrara- marl, light blue gray, some of it spotted with chalk.

330- 380 Marl, chalk-spotted
380- 445 Softer chalk
445- 450 Ft. Hays chalk, white

450- 470 Codell sand, fine angular grained, poorly consolidated, clay matrix.

470- 550 Carlile shale, with large amount of sand, probably from Codell.

550- 582 Greenhorn limestone, in part sand, from resistivity, however, cuttings are of Greenhorn from 595' to 715'. Evidently 24 sample bags filled at same time at about base of Greenhorn.

582- 800 Graneros shale, which, however, is found in cutting labeled 715' to 800'. Apparently there are two thin limy siltstones at 725' and 755'.

800- 840 Dakota sandstone, light gray, fine angular grains, carbonaceous, limy and usual pyritic cement. Lower 20' has concretionary brown clay ironstone.

840- 850 Fuson with light brown Fe Mn pellets abundant.

850- 855 Sand coarse, grit and granules, quartzose, rough, angular particles. Last sample Sioux quartzite and conglomerate cored.

869'7" Total Depth

CORCORAN FARM

Location: NW¼ Sec. 29, 112 N., 62 W.
BEADLE COUNTY

Owner: C. E. Corcoran
Contractor: Huron Drilling Company
Completed: October 15, 1953
Altitude: 1300'
Total Depth: 840'
Electric log by: Bruno Petsch

Formation Tops

Cretaceous System	
Pierre	250'
Greenhorn	580'
Dakota	780'

GLANZER FARM

Location: SE¼ Sec. 3, T. 112 N., R. 57 W.
BEADLE COUNTY

Owner: Joe A. Glanzer
Contractor: Huron Drilling Company
Completed: July 30, 1952
Altitude: 1393'
Total Depth: 903'
Electric log by: Bruno Petsch

Formation Tops

Cretaceous System	
Niobrara	280'
Carlile	360'
Greenhorn	572'
Graneros	600'
Dakota	840'

MEYER FARM

Location: NE¼ NW¼ Sec. 22, T. 109 N., R. 63 W., BEADLE COUNTY

Owner: Fred Meyer
Contractor: Huron Drilling Company
Completed: June 6, 1952
Altitude: 1413' Plane table
Total Depth: 1044
Logged by: C. L. Baker from samples
Electric log by: Bruno Petsch
Remarks: 27 gallons per minute flow.

FORMATION TOPS

Cretaceous System	
Pierre	100'
Niobrara	210'
Carlile	300'
Greenhorn	494'
Graneros	522'
Dakota	820'
Fuson	920'
Lakota	946'

Detailed Description of Cuttings

0- 290	No cuttings
290- 300	base Niobrara chalk
300- 520	Cavings of chalk and Lake Dakota sands, a good many forams at top. Top Graneros clay. Lake Dakota sands include particles up to granule size from crystalline rocks.
380- 400	Large amount pyrite.
520	Greenhorn limestone, light grey crystalline, largely Inoceramus prisms. The usual coquina, some fine quartz sand grains in it.
620- 660	Large amount shell fragments.
660- 700	Siltstone, limy with a little glauconite.
760- 780	Clay, light blue grey.
780	Some limestone perhaps.
840- 920	Dakota siltstone, limy cement, carbonaceous, some coarser below.
920- 930	Fuson FeMg pellets common
945-1042	Lakota sandstone

According to resistivity log
upper part of section is as follows:

0- 15	Loess
15- 80	Lake Dakota sand
80- 210	Pierre bentonitic clay, blue grey
210- 300	Niobrara chalk.

TSCHETTER FARM

Location: SW¼ SE¼, Sec. 32, T. 113 N., R. 62 W.,
BEADLE COUNTY

Owner: Tschetter
Contractor: Huron Drilling Company
Completed: July 24, 1952
Altitude: 1316'
Total Depth: 910'
Electric log by: Bruno Petsch
Remarks: No Greenhorn kick on electric log.

FORMATION TOPS

Pleistocene	0'
Cretaceous System	
Pierre	150'
Niobrara	170'
Carlile	250'
Dakota	772'

VIRGIL CITY

Location: Center Sec. 32, T. 110 N., R. 63 W., BEADLE COUNTY

Owner: City of Virgil, S. Dak.
Contractor: Huron Drilling Company
Completed: August 20, 1952
Altitude: 1343'
Total Depth: 1120'
Logged by: C. L. Baker from samples
Electric log by: Bruno Petsch

FORMATION TOPS

Pleistocene	0'
Cretaceous System	
Pierre	74'
Niobrara	228'
Carlile	328'
Codell	340'
Greenhorn	572'
Graneros	596'
Dakota	820'
Fuson	880'
Lakota	980'

WALDNER FARM

Location: NE¼ Sec. 27, T. 113 N., R. 59 W. BEADLE COUNTY

Owner: John Waldner
Contractor: Huron Drilling Company
Completed: October 28, 1953
Altitude: 1413'
Total Depth: 1008'
Electric log by: Bruno Petsch

FORMATION TOPS

Cretaceous System	
Niobrara	330'
Codell	420 - 436'
Carlile	400'
Greenhorn	618'
Graneros	650'
Dakota	890'

ZYBELL FARM

Location: NE¼ Sec. 12, T. 113 N., R. 65 W., BEADLE COUNTY

Owner: C. H. Zybell
Contractor: Huron Drilling Company
Completed: September 30, 1953
Altitude: 1362'
Total Depth: 1122'
Electric log by: Harold D. Erickson
Remarks: Electric log to 920' only.
Fuson Pellet horizon was observed.

FORMATION TOPS

Pleistocene	0'
Cretaceous System	
Pierre	92'
Niobrara	266'
Carlile	380'
Greenhorn	542'
Graneros	570'
Dakota	872'
Fuson	920'

EUGENE C. NEUMAN

Location: SW¼ Sec. 7, T. 123 N., R. 60 W., BROWN COUNTY

Owner: Eugene C. Neuman
Contractor: Independent Drilling Company
Commenced: August 7, 1954
Completed: August 10, 1954
Altitude: 1303.1'
Total Depth: 974'
Electric log by: H. D. Erickson
Remarks: Had trouble making well flow.

FORMATION TOPS

Pleistocene	0'
Cretaceous System	
Pierre	85'
Niobrara	152'
Carlile	268'
Greenhorn	536'
Graneros	575'
Dakota	790'

ECKSTRUM FARM

Location: SE¼ Sec. 3, T. 102 N., R. 68 W.,
BRULE COUNTY

Owner: Carl L. Eckstrum
Contractor: Carl Meier & Son
Completed: October 28, 1952
Altitude: 1685'
Total Depth: 940'
Electric log by: Bruno Petsch
Remarks: Electric log to 822'

FORMATION TOPS

Cretaceous System	
Niobrara	342'
Carlile	460'
Greenhorn	670'
Graneros	717'
Dakota	890'

GOULD FARM

Location: SE corner Sec. 20, T. 105 N., R. 67 W.,
BRULE COUNTY

Owner: Gould
Contractor: Carl Meier & Son
Completed: July 29, 1952
Altitude: 1699'
Total Depth: 945'
Electric log by: Bruno Petsch

FORMATION TOPS

Pleistocene	0
Cretaceous System	
Pierre	90'
Niobrara	350'
Carlile	500'
Greenhorn	648'
Graneros	686'
Dakota	904'

OLSON FARM

Location: SE SW¼, Sec. 8, T. 102 N., R. 67 W., BRULE COUNTY

Owner: F. H. Olson
Contractor: Jake Deisch
Altitude: 1637'
Total Depth: 865'
Electric log by: Bruno Petsch
Remarks: Electric log to 766' only. Base of Surface Pipe 280'.

FORMATION TOPS

Cretaceous System	
Codell	380 - 392'
Greenhorn	487'
Graneros	518'
Dakota	732'

KNIPPLING RANCH

Location: NE¼ Sec. 36, T. 108 N., R. 72 W., BUFFALO COUNTY

Owner: Knippling
Contractor: Carl Meier & Sons
Completed: July 16, 1952
Altitude: 1633'
Total Depth: 1152'
Electric log by: Bruno Petsch
Remarks: Base of Surface pipe 414'. Fuson pellets were observed 1118 to 1128'.

FORMATION TOPS

Cretaceous System	
Pierre	0
Carlile	436'
Greenhorn	650'
Graneros	690'
Dakota	1034'
Fuson	1118'
Lakota	1128'

STENSBOL FARM

Location: SE¼, Sec. 15, T. 107 N., R. 69 W., BUFFALO COUNTY

Owner: Jens Stensbol
Contractor: Huron Drilling Company
Completed: July 8, 1953
Altitude: 1776'
Total Depth: 1205'
Electric log by: Bruno Petsch
Remarks: Logger refused to go below 630'.

FORMATION TOPS

Pleistocene	0
Cretaceous System	
Pierre	46'
Niobrara	564'

THOMPSON FARM

Location: SW¼ Sec. 3, T. 108 N., R. 72 W.
BUFFALO COUNTY

Owner: Bert Thompson
Contractor: Huron Drilling Company
Completed: August 28, 1953
Altitude: 1747'
Total Depth: 1284'
Electric log by: Bruno Petsch

Formation Tops

Cretaceous System	
Niobrara	454'
Carlile	560'
Greenhorn	822'
Dakota	1186'

TRUMAN RANCH

Location: Sec. 33, T. 108 N., R. 72 W.
BUFFALO COUNTY

Owner: Truman
Contractor: Huron Drilling Company
Completed: August 17, 1953
Total Depth: 1075'
Electric log by: Bruno Petsch
Remarks: Flowed 100 gallons per minute.
Electric log to 700'.

Formation Tops

Cretaceous System		
Niobrara	176'	
Carlile	310'	
Greenhorn	588'	
Graneros	616'	
Dakota	950'	driller's record

LLOYD H. JOHNSON

Location: NE¼ Sec. 6, T. 116 N., R. 59 W., CLARK COUNTY

Owner: Lloyd H. Johnson
Contractor: H. S. Peckham
Completed: Sept. 15, 1954
Total Depth: 1059'
Electric log by: Harold D. Erickson
Remarks: Could only log to 878' because of cave in.

Formation Tops

Cretaceous System	
Pierre	207'
Niobrara	321'
Carlile	403'
Greenhorn	630'
Graneros	653'

TORGUSON FARM

Location: SE cor. Sec. 15, T. 124 N., R. 59 W.,
DAY COUNTY

Owner: Helmer Torguson
Contractor: Independent Drilling Company
Completed: Fall of 1952
Altitude: 1440'
Total Depth: 1174'
Electric log by: Bruno Petsch

Formation Tops

Cretaceous System		
Pierre	54'	
Niobrara	312'	
Carlile	348'	
Greenhorn	570'	
Graneros	590'	
Dakota	894'	
Millstone grit	1032'	(Baker) from sample

BRYANT CITY

Location: SW¼ Sec. 17, T. 113 N., R. 55 W.
HAMLIN COUNTY

Owner: Bryant City Well
Contractor: Huron Drilling Company
Commenced: December 1952
Completed: December 1952
Altitude: 1845'
Total Depth: 1360'
Logged by: C. L. Baker
Electric log by: Bruno Petsch

Formation Tops

Cretaceous System	
Pierre	370'
Niobrara	732'
Carlile	870'
Greenhorn	1054'
Graneros	1088'
Dakota	1246'

OLSON RANCH

Location: SE¼ Sec. 33, T. 112 N., R. 68 W., HAND COUNTY

Owner: Lewis Olson
Contractor: Huron Drilling Company
Completed: August 6, 1953
Altitude: 1683'
Total Depth: 1435'
Electric log by: Bruno Petsch
Remarks: Electric log to 1290'. Red mud in bottom of hole. (Driller's record)

Formation Tops

Cretaceous System	
Pierre	230'
Niobrara	574'
Carlile	646'
Greenhorn	852'
Graneros	882'
Dakota	1190'
Fuson	1240'
Lakota	1260'

PALMER RANCH

Location: NE corner Sec. 35, T. 110 N., R. 66 W., HAND COUNTY

Owner: Ross Palmer
Contractor: Huron Drilling Company
Completed: August 11, 1952
Altitude: 1664'
Total Depth: 1250'
Electric log by: Bruno Petsch
Remarks: Electric log to 1084'

Formation Tops

Cretaceous System		
Pierre	122'	
Niobrara	510'	
Carlile	622'	
Greenhorn	768'	
Graneros	786'	
Dakota	1140'	Driller's record
Fuson	1225'	" "

SHELDON-REESE COMPANY

Location: SE cor. NE¼ Sec. 29, T. 110 N., R. 68 W., HAND COUNTY

Owner: Sheldon-Reese Company
Contractor: Huron Drilling Company
Completed: July 12, 1952
Altitude: 1970'
Total Depth: 1532'
Electric log by: Bruno Petsch
Remarks: 100 foot sand section of Dakota

Formation Tops

Cretaceous System	
Pierre	280'
Niobrara	752'
Carlile	846'
Greenhorn	1048'
Graneros	1076'
Dakota	1410'
Fuson	1528'

SNODGRASS FARM

Location: SE¼ Sec. 32, T. 113 N., R. 66 W., HAND COUNTY

Owner: Howard Snodgrass
Contractor: Huron Drilling Company
Completed: September 30, 1952
Altitude: 1444'
Total Depth: 1262'
Electric log by: Bruno Petsch
Remarks: Fuson pellet horizon was observed.

Formation Tops

Cretaceous System	
Pierre	80'
Niobrara	340'
Carlile	430'
Greenhorn	636'
Graneros	666'
Dakota	968'
Fuson	1089'
Lakota	1141'

STEPTOE FARM

Location: E½ Sec. 19, T. 114 N., R. 69 W.,
HAND COUNTY

Owner: Steptoe Sisters
Contractor: Huron Drilling Company
Completed: October 25, 1953
Altitude: 1613'
Total Depth: 1373'
Electric log by: Bruno Petsch

Formation Tops

Cretaceous System	
Pierre	208'
Niobrara	520'
Carlile	584'
Greenhorn	828'
Graneros	858'
Dakota	1180'
Fuson	1220'
Lakota	1270'

NEUMEYER FARM

Location: SE¼ Sec. 3, T. 108 N., R. 64 W., JERAULD COUNTY

Owner: M. Neumeyer
Contractor: Huron Drilling Company
Completed: July 7, 1952
Altitude: 1420'
Total Depth: 921'
Electric log by: Bruno Petsch

Formation Tops

Cretaceous System	
Pierre	60'
Niobrara	274'
Carlile	394'
Greenhorn	616'
Graneros	658'
Dakota	822'

CADWELL FARM

Location: SW¼ Sec. 27, T. 111 N., R. 58 W., KINGSBURY COUNTY

Owner: Cadwell
Contractor: Huron Drilling Company
Completed: October 9, 1953
Altitude: 1480'
Total Depth: 984'
Electric log by: Bruno Petsch

Formation Tops

Cretaceous System		
Pierre	124'	
Niobrara	332'	
Codell	414'	
Carlile	440'	
Greenhorn	628'	
Graneros	650'	
Newcastle	812'	-826'
Dakota	880'	

CARMODY FARM

Location: SW¼ Sec. 15, T. 108 N., R. 54 W., LAKE COUNTY

Owner: Raymond Carmody
Contractor: Huron Drilling Company
Completed: September 11, 1952
Altitude: 1774'
Total Depth: 760'
Electric log by: Bruno Petsch

Formation Tops

Cretaceous System	
Pierre	80'
Niobrara	194'
Carlile	246'
Greenhorn	320'
Graneros	344'
Dakota	570'
Fuson	682'
Lakota	702'

HOWARD CITY

Location: Sec. 11, T. 106 N., R. 56 W.,
MINER COUNTY

Owner: Howard City Well
Contractor: Paulson and Hinker
Commenced: May 1953
Completed: August 1953
Altitude: 1569'
Total Depth: 402
Electric log by: Bruno Petsch and Edward J. Bolin

Detailed Description of Cuttings

0- 10	Glacial drift. Poorly sorted sand and yellow, calcareous, sandy clay; fragments of white gypsum.
10- 20	Gypsum fragments abundant.
20- 50	Poorly sorted glacial sand.
50- 60	Glacial sand with much medium gray (N5) and medium light gray (N6) shale and sandy clay.
60-150	Poorly sorted glacial sand and gravel with some shale as above.
150-170	As above with much lignite, and some shiny coal.
170-180	Glacial gravel, pebble and granule size material.
180-190	Glacial sand and gravel with much lignite.
190-200	Niobrara - Medium light gray (N6) to light gray (N7) marl with abundant small white chalk spots, with abundant lignite which may be cavings.
200-260	Chalk spotted marl as above.
260-270	Scattered Inoceramus prisms and shell fragments.
270-280	Chalk spotted marl as above and very light gray (N8) chalk with some lignite.
280-290	Very light gray (N8) chalk with abundant lignite and coal.
290	Carlile (?)
290-300	Poorly sorted, fine to very coarse, angular to subrounded loose sand and calcareous, argillaceous sandstone.
300-320	Poorly sorted sand and calcareous sandstone and medium dark gray (N4) bentonitic shale, some pyrite.
320-340	Abundant yellow-brown siltstone and sandy siltstone concretion fragments, some slightly calcareous.
340-350	Medium dark gray (N4), finely micaceous, sandy shale, and very fine to fine friable sandstone and loose sand, some pyrite.
350-360	Very light gray (N8) to white (N9), very fine grained, calcareous, micaceous, glauconitic, lignitic sandstone.

360-370 Medium dark gray (N4) shale.
370-380 Some sandy clay or shale.
380-400 Sandy, partially bentonized volcanic ash with fish remains.
402 Sioux Quartzite

SHAVE FARM

Location: NW¼ Sec. 19, T. 105 N., R. 58 W., MINER COUNTY

Owner: L. Shave
Contractor: A. F. Kuborn
Completed: August 4, 1952
Altitude: 1308'
Total Depth: 365'
Electric log by: Bruno Petsch

Formation Tops

Pleistocene	0 - 148'	
Cretaceous System		
Greenhorn	234'	Cored
Graneros	247'	
Dakota	270'	
Pre-Cambrian		
Sioux	350'	top pink sand
	365'	top Sioux Quartzite

LORING FARM

Location: SW¼ SE¼ Sec. 27, T. 108 N., R. 61 W., SANBORN COUNTY

Owner: Mrs. Loring
Contractor: A. F. Kuborn
Completed: August 16, 1952
Altitude: 1322'
Total Depth: 950'
Electric log by: Bruno Petsch
Remarks: Electric log to 674' only.
Surface pipe to 175'.

FORMATION TOPS

Cretaceous System		
Carlile	232'	
Greenhorn	438'	
Graneros	468'	
Dakota	895'	(driller's record)

RUSSELL W. LEVSEN FARM

Location: SE¼ Sec. 31, T. 116 N., R. 60 W.,
SPINK COUNTY

Owner: Russell W. Levsen
Contractor: H. S. Peckham
Commenced: August 29, 1954
Completed: September 4, 1954
Altitude: 1350'
Total Depth: 996'
Electric log by: H. D. Erickson
Remarks: Had to run log three times to get to bottom. Couldn't get top of Dakota.

FORMATION TOPS

Cretaceous System	
Pierre	119'
Niobrara	272'
Carlile	324'
Greenhorn	563'
Graneros	585'
Dakota	?
Fuson	909'
Lakota	916'

OTTENBACHER FARM

Location: NW¼ Sec. 13, T. 117 N., R. 61 W.,
SPINK COUNTY

Owner: Arthur A. Ottenbacher
Contractor: Independent Drilling Company
Completed: August 27, 1954
Altitude: 1319'
Total Depth: 1061'
Electric Log by: H. D. Erickson
Remarks: Well just flows.

FORMATION TOPS

Cretaceous System	
Pierre	15'
Niobrara	223'
Carlile	291'
Greenhorn	526'
Graneros	543'
Dakota	867'
Fuson	881'
Lakota	898'

SCHMIDT FARM

Location: NE¼ Sec. 26, T. 115 N., R. 64 W.
SPINK COUNTY

Owner: Ernest Schmidt
Contractor: Huron Drilling Company
Completed: October 19, 1953
Altitude: 1325'
Total Depth: 1085'
Electric log by: Bruno Petsch

Formation Tops

Cretaceous System	
Pierre	120'
Niobrara	210'
Carlile	334'
Greenhorn	466'
Graneros	480'
Dakota	822'
Fuson	953'
Lakota	974'
Pre-Cambrian	1024' (chlorite schist)

WURTZ FARM

Location: NW¼ Sec. 34, T. 116 N., R. 61 W.,
SPINK COUNTY

Owner: David Wurtz
Contractor: Huron Drilling Company
Completed: July 17, 1953
Altitude: 1300'
Total Depth: 950'
Electric log by: Bruno Petsch
Remarks: Fuson pellet horizon was observed.

Formation Tops

Cretaceous System	
Pierre	88'
Niobrara	202'
Carlile	260'
Greenhorn	500'
Graneros	530'
Dakota	830'
Fuson	864'
Lakota	884'

ONIDA CITY

Location: SW¼ SE¼ Sec. 2, T. 114 N., R. 77 W.,
SULLY COUNTY

Owner: City of Onida
Contractor: Independent Drilling Company, Aberdeen, South Dakota
Completed: July 11, 1954
Altitude: 1868.3' (by Altimeter)
Total Depth: 2111'
Logged by: H. D. Erickson
Electric log by: H. D. Erickson
Remarks: Well flowed over 400 gallons per minute with a pressure of much over 200#/ sq. in.
Surface pipe to 416'.

FORMATION TOPS

Cretaceous System	
Niobrara	687'
Carlile	828'
Greenhorn	1130'
Graneros	1178'
Dakota	1517'
Fuson	1573'
Lakota	1602'
Sundance	1794'

Detailed Description of Cuttings

0- 300	No samples.
300- 320	Pierre, Shale light gray (N7), bentonitic micaceous, firm with some limy concretionary fragments.
320- 420	Shale as above, with varying amounts of concretion fragments more abundant from 360'-380', and from 400'-420'.
420- 430	Shale as above, with much white impure, micaceous, slightly bentonitic chalk.
430- 450	Shale, fissile, light gray (N7), micaceous, bentonitic, with some white impure silty bentonitic chalk. No chalk from 440'-450'.
450- 500	Shale, medium light gray (N6), calcareous, with some fragments of septarian concretions.
500- 590	Shale as above, with some light olive gray (5Y6/1), slightly calcareous, argillaceous siltstone concretion fragments.
590- 620	Shale, medium light gray (N6) calcareous, with some concretion fragments.
620- 690	Sharon Springs, Shale, dark gray (N3), bituminous, soft, fissile, with fish fragments.
690- 820	Niobrara Chalk, (Electric log top at 687') Chalk, medium light gray (N6), speckled, soft, lighter gray and less speckled below 740', fish fragments.
820- 870	Carlile, (Electric log top at 828'). Shale, medium dark gray (N4), fissile, with some fish remains, slightly micaceous and bentonitic, some claystone and septarian concretions from 850'-860'.

870- 880 Shale as above, with much medium dark gray (N4) siliceous shale and a little medium light gray (N6) micaceous shale.

880- 890 Shale, medium light gray (N6), micaceous fissile, some darker shale as above.

890- 900 Shale, medium gray (N5), slightly micaceous, fissile, with some light gray (N7) bentonitic shale carrying an abundance of biotite flakes; some claystone and septarian concretion fragments.

900- 930 Shale, medium gray (N5) as above, but slightly calcareous with some calcareous claystone and septarian concretions.

930- 960 Shale, medium dark gray (N4), slightly micaceous, fissile, with some concretionary fragments.

960-1050 Shale, medium light gray (N6), micaceous, very fissile, slightly calcareous, bentonitic, with Dentalium from 990'-1000'.

1050-1090 Shale, mostly medium dark gray (N4) slightly micaceous, fissile with a small amount of pure white bentonite.

1090-1130 Shale, as above, with some medium light gray (N6), slightly micaceous fissile shale.

1130-1180 Greenhorn, (Electric log top at 1130'.) Limestone, light gray (N7) sucrose to very slightly fragmental, fine textured with Inoceramus prisms.

Graneros, (Electric log top at 1178').

1180-1230 Shale, medium dark gray (N4), fissile, with numerous fish remains.

1230-1380 Shale, light gray (N7) slightly calcareous, very fissile, with some darker shale as above, some pure white bentonite from 1310'-1340' and from 1370'-1380'.

1380-1390 Shale, medium dark gray (N4) fissile to splintery, slightly bentonitic, with much fish remains.

1390-1400 Shale as above, with some light gray (N7) to medium light gray (N6) very fine siltstone, argillaceous and glauconitic, slightly calcareous.

1400-1410 Siltstone as above.

1410-1420 Shale, medium dark gray (N4) fissile, slightly bentonitic.

1420-1430 Shale, as above with some siltstone as from 1400'-1410'.

1430-1440 Siltstone as above.

1440-1490 Shale, medium dark gray (N4) fissile, with some very fine grained, medium light gray calcareous siltstone. Some very fine grained glauconitic sandstone from 1480'-1490'.

1490-1510 Shale, medium dark gray (N4), fissile.

Dakota (Electric log top at 1517')

1510-1520 Shale as above, with some light gray (N7) micaceous siltstone.

1520-1550 Siltstone, as above, more arenaceous from 1540'-1550'.

1550-1570 Sandstone, fine grained to very fine grained, light gray (N7), poorly sorted angular to subangular.

1570-1600 Fuson, (Electric log top at 1573')
Shale, light gray (N7) bentonitic FeMn pellets, small and smooth, some pale yellowish brown (10YR6/2) siltstone.

1600-1620 Lakota? (Electric log top at 1602?)
Sandstone, very fine grained, pale yellowish brown (10YR6/2) angular to subangular grains, pyrite. Some fissile shale from 1610-1620'.

1620-1630 Sandstone as above.

1630-1640 Sandstone, carbonaceous, poorly sorted, fine grained.

1640-1670 Sandstone, yellowish gray (5Y7/2), poorly sorted, angular, fine grained, more claystone concretions from 1660'-1670'.

1670-1700 Sandstone, light olive gray (5Y6/1), poorly sorted, angular, calcareous, very fine to fine grained.

1700-1720 Mostly a light gray (N7) siltstone and shale, with a little sandstone.

1720-1740 Sandstone, yellowish gray (5Y7/2), poorly sorted, angular grains slightly calcareous, and pyritized. Some calcareous siltstone.

1740-1760 Sandstone as above, with some light gray (N7) shale, and some very fine white to light gray siltstone.

1760-1780 Mostly a medium gray (N5), micaceous shale, fissile, with some medium light gray highly calcareous, slightly glauconitic siltstone, some concretion fragments. Some very fine grained white sandstone from 1770'-1780'.

1780-1790 Shale and siltstone, light gray.

1790-1820 Sundance, (Electric log top at 1794')
Sandstone, white (N9), with scattered glauconite grains, calcareous cement, fine grained, poorly sorted.

1820-1830 Sandstone, very slightly glauconitic, more tightly cemented with lime.

1830-1840 Siltstone and shale with some light brownish gray (5YR6/1) claystone.

1840-1850 Mostly a medium gray shale, calcareous, with some siltstone.

1850-1860 Mostly siltstone, light gray (N7), with some yellowish gray (5Y8/1) argillaceous limestone.

1860-1870 Limestone as above.

1870-1880	Mostly a greenish gray (5GY6/1) calcareous siltstone, with abundant glauconite.
1880-1890	Siltstone as above with some limestone.
1890-1900	Same as above.
1900-1910	Sandstone and siltstone, greenish gray (5GY6/1) calcareous.
1910-1920	Claystone, light olive gray (5Y6/1).
1920-1940	Sandstone, fine grained, white, glauconitic, grains are fairly well rounded.
1940-1950	Claystone.
1950-1980	Siltstone, medium light gray (N6), pyritized, highly calcareous.
1980-1990	Claystone, pale brown (5YR6/2), and light olive gray (5Y6/1).
1990-2000	Same as above, with some fine grained white, limonite stained sandstone.
2000-2020	Sandstone, mostly fine to medium grained, poorly sorted, some grains are well rounded and etched, much limonite staining.
2020-2030	Sandstone, coarse to very coarse, some granules, chert and quartz pebbles. Mostly angular, white, to reddish, much limonite staining.
2030-2060	Sandstone as above (grit).
2060-2070	Some grit as above, with some fine white sandstone loosely cemented. (Maybe top of Minnelusa?).
2070-2080	Sandstone, fine white limonite stained, loosely cemented.
2080-2111	No samples Total Depth

UTICA TOWN

Location: NE corner Sec. 7, T. 94 N., R. 56 W., YANKTON COUNTY

Owner: Utica Town
Contractor: Huron Drilling Company
Completed: Logged September 14, 1953
Altitude: 1362'
Total Depth: 760'
Electric log by: Bruno Petsch
Remarks: Surface pipe to 412'

Formation Tops

Cretaceous System	
Greenhorn	450'
Graneros	480'
Dakota	652'

YANKTON PARK

Location: SE¼ Sec. 13, T. 93 N., R. 56 W., YANKTON COUNTY

Owner: Yankton Town (Park)
Contractor: Huron Drilling Company
Completed: September 4, 1953
Altitude: 1246'
Total Depth: 678'
Electric log by: Bruno Petsch
Remarks: Surface pipe to 220'.

Formation Tops

Cretaceous System	
Greenhorn	314'
Graneros	340'
Dakota	480'
Fuson	520'
Lakota	556'