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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University of South Dakota  
Vermillion, South Dakota  
November, 1954
# TABLE OF CONTENTS

Figure 1 — Index Map of Borings in Eastern South Dakota

Frontispiece

Introduction

## PART I – OIL TEST BORINGS

<table>
<thead>
<tr>
<th>Well</th>
<th>County</th>
<th>Map No.</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wolsey Well</td>
<td>Beadle</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Bon Oil-Jelsma #1</td>
<td>Bon Homme</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Bon Oil-Isaacs &amp; Byrne #1</td>
<td>Bon Homme</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Oil Hunters-Raetzman #1</td>
<td>Brown</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Kucera-Biskeborn #1</td>
<td>Brule</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Wagner Wells</td>
<td>Charles Mix</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Oil Ventures-Naessig #1</td>
<td>Day</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Douglas-Clark #1</td>
<td>Douglas</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Hunt-Gutenkauf #1</td>
<td>Faulk</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>Kerlyn-Dry Run #1</td>
<td>Hughes</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Hunt-School Land #2</td>
<td>Hyde</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>Hunt-School Land #3</td>
<td>Hyde</td>
<td>12</td>
<td>31</td>
</tr>
<tr>
<td>Kingsbury-Dykstra #1</td>
<td>Kingsbury</td>
<td>13</td>
<td>33</td>
</tr>
<tr>
<td>Rocky Ridge Development-Hale #1</td>
<td>Miner</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>Carter-Stratigraphic Test #1</td>
<td>Potter</td>
<td>15</td>
<td>38</td>
</tr>
<tr>
<td>Dakota-Texas-Williams-Thompson #1</td>
<td>Potter</td>
<td>16</td>
<td>42</td>
</tr>
<tr>
<td>Sioux Valley-LaFluer #1</td>
<td>Union</td>
<td>17</td>
<td>48</td>
</tr>
<tr>
<td>Peppers-State #1</td>
<td>Walworth</td>
<td>18</td>
<td>51</td>
</tr>
<tr>
<td>Pray-Kranzler #1</td>
<td>Walworth</td>
<td>19</td>
<td>56</td>
</tr>
<tr>
<td>Oil Ventures-Schultz #1</td>
<td>Yankton</td>
<td>20</td>
<td>60</td>
</tr>
</tbody>
</table>

Appendix

## PART II – WATER WELLS

<table>
<thead>
<tr>
<th>Farm</th>
<th>County</th>
<th>Map No.</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knigge Farm</td>
<td>Aurora</td>
<td>21</td>
<td>63</td>
</tr>
<tr>
<td>White Lake City</td>
<td>Aurora</td>
<td>22</td>
<td>64</td>
</tr>
<tr>
<td>Corcoran Farm</td>
<td>Beadle</td>
<td>23</td>
<td>66</td>
</tr>
<tr>
<td>Glanzer Farm</td>
<td>Beadle</td>
<td>24</td>
<td>66</td>
</tr>
<tr>
<td>Meyer Farm</td>
<td>Beadle</td>
<td>25</td>
<td>67</td>
</tr>
<tr>
<td>Tschetter Farm</td>
<td>Beadle</td>
<td>26</td>
<td>68</td>
</tr>
<tr>
<td>Virgil City</td>
<td>Beadle</td>
<td>27</td>
<td>69</td>
</tr>
<tr>
<td>Waldner Farm</td>
<td>Beadle</td>
<td>28</td>
<td>69</td>
</tr>
<tr>
<td>Zybell Farm</td>
<td>Beadle</td>
<td>29</td>
<td>70</td>
</tr>
<tr>
<td>Neuman Farm</td>
<td>Brown</td>
<td>30</td>
<td>71</td>
</tr>
<tr>
<td>Ekstrum Farm</td>
<td>Brule</td>
<td>31</td>
<td>72</td>
</tr>
<tr>
<td>Gould Farm</td>
<td>Brule</td>
<td>32</td>
<td>72</td>
</tr>
<tr>
<td>Olson Farm</td>
<td>Brule</td>
<td>33</td>
<td>73</td>
</tr>
<tr>
<td>Knippling Ranch</td>
<td>Buffalo</td>
<td>34</td>
<td>74</td>
</tr>
<tr>
<td>Stensbol Farm</td>
<td>Buffalo</td>
<td>35</td>
<td>74</td>
</tr>
<tr>
<td>Thompson Farm</td>
<td>Buffalo</td>
<td>36</td>
<td>75</td>
</tr>
<tr>
<td>Farm Name</td>
<td>Town</td>
<td>Year 1</td>
<td>Year 2</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>Truman Ranch</td>
<td>Buffalo</td>
<td>37</td>
<td>75</td>
</tr>
<tr>
<td>Johnson Farm</td>
<td>Clark</td>
<td>38</td>
<td>76</td>
</tr>
<tr>
<td>Torguson Farm</td>
<td>Day</td>
<td>39</td>
<td>77</td>
</tr>
<tr>
<td>Bryant City</td>
<td>Hamlin</td>
<td>40</td>
<td>78</td>
</tr>
<tr>
<td>Olson Ranch</td>
<td>Hand</td>
<td>41</td>
<td>79</td>
</tr>
<tr>
<td>Palmer Ranch</td>
<td>Hand</td>
<td>42</td>
<td>79</td>
</tr>
<tr>
<td>Sheldon Reese Co.</td>
<td>Hand</td>
<td>43</td>
<td>80</td>
</tr>
<tr>
<td>Snodgrass Farm</td>
<td>Hand</td>
<td>44</td>
<td>80</td>
</tr>
<tr>
<td>Steptoe Sisters' Farm</td>
<td>Hand</td>
<td>45</td>
<td>81</td>
</tr>
<tr>
<td>Neumeyer Farm</td>
<td>Jerauld</td>
<td>46</td>
<td>82</td>
</tr>
<tr>
<td>Cadwell Farm</td>
<td>Kingsbury</td>
<td>47</td>
<td>83</td>
</tr>
<tr>
<td>Carmody Farm</td>
<td>Lake</td>
<td>48</td>
<td>84</td>
</tr>
<tr>
<td>Howard City</td>
<td>Miner</td>
<td>49</td>
<td>85</td>
</tr>
<tr>
<td>Shave Farm</td>
<td>Miner</td>
<td>50</td>
<td>86</td>
</tr>
<tr>
<td>Loring Farm</td>
<td>Sanborn</td>
<td>51</td>
<td>87</td>
</tr>
<tr>
<td>Levson Farm</td>
<td>Spink</td>
<td>52</td>
<td>88</td>
</tr>
<tr>
<td>Ottenbacher Farm</td>
<td>Spink</td>
<td>53</td>
<td>88</td>
</tr>
<tr>
<td>Schmidt Farm</td>
<td>Spink</td>
<td>54</td>
<td>89</td>
</tr>
<tr>
<td>Wurtz Farm</td>
<td>Spink</td>
<td>55</td>
<td>89</td>
</tr>
<tr>
<td>Onida City</td>
<td>Sully</td>
<td>56</td>
<td>90</td>
</tr>
<tr>
<td>Utica Town</td>
<td>Yankton</td>
<td>57</td>
<td>95</td>
</tr>
<tr>
<td>Yankton Park</td>
<td>Yankton</td>
<td>58</td>
<td>95</td>
</tr>
</tbody>
</table>
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: SE ¼ SW ¼ 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
675-835  Thin streak water bearing sand known as mud flow.
835-875  Dark shale
875-1191  Sandstone with few streaks of shale.
1191-1198  Gray shale predominating, interspersed with several members of sandstone.

Note: Samples submitted were; 1: pink granite, 2: granite gneiss. These were taken with core drill.
Location: SE corner of SE 1/4, Sec. 10, T. 93 N., R. 60 W.,
BON HOMME COUNTY

Owner: Bon Oil Exploration Company, Tyndall, 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 fluorescence 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: SW1/4 SW1/4 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
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'
Fusion 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 con-
cretion 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.
Location: NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 33, T. 125 N., R. 65 E.,
                 BROWN COUNTY

Owner: Oil Hunters Inc., Oklahoma, Ft. Worth, Texas
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 (?) - Variegated bentonitic clay with abundant yellow-brown and red, rounded concretions.
1440-1460 Yellow and light gray silty clay with much limonite.
1460-1480 Variegated, 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
Location: NW 1/4 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. Bayer
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 Rhapsydionina.
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.
Manganese concretions, light gray, a little
hauerite.

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.

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

Larger manganese concretions, light gray, hauerite,
*Inoceramus*, *Cristeillaria*.

Largely *Inoceramus* prisms, cemented with hauerite,
*Globigerina*, *Rotalia* and other forams.

Marcasite in long slender branching rods, some
hauerite, in clay, *Sharon Springs?*

Same, but some small spherical marcasite concretions.
A little chalky marl.

*Sharon Springs* - Shale, very dark blue gray, bitumin-
ous, flaky, sparse chalk pellets, fish remains, gas
show.

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

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

Marl, more chalky.

*Fort Hays member* - Purer chalky, light gray.

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

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

*Limestone, gray, containing silt and bentonite.*

*Codell* - Some angular sand, some copper sulphide.

Brown bentonite, sand, all size grains, considerable
selenite.

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

Minute pellets, considerable medium grained sub-
round sand.

Rod sulphide concretions, marcasite spheres, minute
light gray pellets.

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.

*Shale, bentonitic, slate gray, sandy, *Inoceramus*.

*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 CaCO₃, 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.

860-885 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 CaCO₃.

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

885-890 Much less sandstone.

890-895 Sandstone, carbonaceous, cemented with FeS₂ and CaCO₃, 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.
Some dark blue covellite cementing sand.
Much yellow copper sulphide.
Sandstone, angular, medium to fine grained, light gray cemented with marcasite and CaCO₃, carbonaceous and lignitic.
Sandstone with small pyrite cubes, a little muscovite, some grains from Sioux quartzite.
Some concretionary light brown siderite cementing sand.
Mostly sand, some muscovite.
Sandstone, calcite cemented, carbonaceous, yellow copper sulphide.
Detrital copper sulphide and also as cement for sand.
Sandstone, gray, calcite cemented, poorly sorted, etched grains, carbonaceous, some coarse grains, some covellite and perhaps chalcocite. Some Sioux quartzite pink grains.
Yellow copper sulphide.
Sandstone, largely coarse rounded to subround grains.
Much loose coarse sand. Much pyrite and some marcasite cement. A little yellow copper sulphide.
Same with chalcopyrite and bornite.
Loose sand, coarse, buff, subangular to subround, some etched, some citrine and Sioux quartzite grains.
Considerable sulphide cemented sandstone, rest loose sand, large quantity chalcopyrite and bornite.
Much grit, angular to subround etched.
Grit up to 1/16 inch in size.
Sand, finer but coarse grained.
Sandstone, medium grained, mostly calcite cement, carbonaceous, mostly angular to subround grains, some round and etched.
Sand, light gray, fairly coarse, angular, sub-angular, and rounded, some pinkish to yellow, has dark gray clay matrix, pebbly light gray Bentonite clay, some sand cemented with marcasite, larger grains etched.
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.
Sand and cemented sandstone, medium to fine grained, buff chalcopyrite, calcite and other sulphide cement, carbonaceous.
Large amount marcasite cement, much loose sand.
Much sulphide cemented sandstone, some chalcopyrite and covellite. Sand rather coarse, buff.
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 Fusion - Manganese bearing pellets in blue white bentonite.

1353-1365 Fine Sioux quartzite pebbles, etched.

1365 Sioux quartzite 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: NW ¼ SW ¼ 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.
965-987 Gray shale.
987-990 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.
1158-1180 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: NE 1/4 SE 1/4 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.

- 18 -
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.
Bit sample, clay, blue gray with considerable light gray bentonite, mixed with sand from above.

(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.

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.

Broken-up Sioux quartzite and pipestone in the sand. 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.

As just above but with a larger percentage of Sioux quartzite and pipestone.

Same except with some bentonite, light gray or green.

Sand grains are coated and cemented.

Largely coarse, etched, pink-coated subangular loose grains derived from the Sioux quartzite.

Mostly sand, ground up fragments of Sioux quartzite, some yellow-brown and reddish concretionary aggregates.

Light gray bentonite and sand, and medium and dark gray soft, thinly laminated bentonite, some concretionary aggregates, silty and sandy.

Sandstone, angular unsorted grains, poorly cemented, large grains etched.

Bentonite and bentonitic clay, light green gray, some lavender and purplish.

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.

Sioux formation - Pipestone, old rose with the usual light green spots, color darkens down-ward to maroon-purple, has a little fine sericite.

Core of Sioux quartzite, glossy, dense, fine-grained, pink.

Total Depth
HUNT - GUTENKAUF #1

Location: NE$_{1}$ NE$_{2}$ 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
  Sharon Springs member 730'
Niobrara formation 785'
  Fort Hays member 885'
Carlile shale 900'
Greenhorn formation 1170'
Graneros shale 1215'
Dakota sandstone 1540'
Fusion 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 Granger, 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 Fugon - Fe-Mn pellets at top.

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

1800-1920 Morrison (?) - Gray, bentonitic clay; sandstone, some coarse, 1850'-1880'.

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 porcellanous.

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: SW ¼ NE ¼ NE ½ 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.
275- 300. Shaley chalk.
300- 325. Shale.
355- 375. Gray shale.

375- 550. Niobrara - Chalk
550- 790. Shale.
790- 795. Fine sand.
795- 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.
Location: SW_{1/4} NE_{1/4} 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'
Fusion 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, Buliminia, Globigerina, etc.
260- 630 Clay, becomes more compact downwards, somewhat flaky below 450'. White bentonite at 505'-510'.

- 27 -
Sharon Springs member - Black, bituminous, shaly clay, crumbly.

Niobrara - Chalk, spotted marl.
More chalky.

Fort Hayes member - Purer chalk

Carlisle? - Dark blue gray clay, laminated; many forams 925'-935', shell fragments 935', forams abundant 950' down.

Marcasite, forams, quartz grains, sparse serpentine and glauconite.

Dark blue gray claystone. Magnetic silt fairly abundant from 1120'-1125' and 1185'-1190'.

Greenhorn - Gray, finely crystalline limestone, dirty, a lot of dark blue gray crumbly clay; Inoceramus prisms.

Graneros - Dark gray clay.

Gray siltstone with limy cement, may be Newcastle.

Dark gray clay.

Light blue gray, flaky clay.

Some light gray siltstone.

Some dark gray siltstone.

Dark gray clay with some siltstone.

Some red clay and siltstone.

Clay, reddish, vesicular (burned in drying?)

Dakota - gray siltstone, limy cement; angular unsorted sand.

Increase in siltstone.

Much magnetic siltstone.

Fuson - Mostly clay, vesicular, various shades of red (burned?), considerable siltstone, some fine sandstone, pinkish Mn pellets.

Burned vesicular clay, some silty; fine angular sand grains, some cemented with siderite.

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.

Lakota - Buff, fine, angular sandstone, probably siderite cement, carbonaceous at top.

Light gray sandstone, carbonaceous, fine angular, poorly sorted, limy cement.

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 ¼ 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 slicken-sided 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

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'.
    Glaucounite 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.

- 33 -
500-530 Shale as above with occasional calcareous shale pellets. *Ammociduncus* at 540', 570'.

530-640 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 foram s 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

- 34 -
ROCKY RIDGE DEVELOPMENT - HALE #1

Location: NE ¼ NE ¼ 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.

Formation Tops

Cretaceous System
Pierre formation 180' (?)
Niobrara formation 390'
Carlile shale 615'
Greenhorn formation 736'
Graneros shale 764'
Dakota sandstone 900'
Fusion 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.

- 35 -
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.
<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>930-960</td>
<td>Sand as above and light olive gray (5Y6/1) shale, much lignite at 950'.</td>
</tr>
<tr>
<td>960-1020</td>
<td>Sand as above and olive gray (5Y4/1) calcareous shale, mica, pyrite, marcasite, lignite.</td>
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<tr>
<td>1020-1030</td>
<td>Some pale reddish brown (10R5/4) siltstone</td>
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<tr>
<td>1030-1060</td>
<td>Sand as above, and dark yellowish brown (10Y4/2) and pale reddish brown (10R5/4) siltstone. Some white bentonite at 1040'-1050'.</td>
</tr>
<tr>
<td>1060-1090</td>
<td>Fuson, electric log top at 1058' - Dark gray (N3) shale, lignite.</td>
</tr>
<tr>
<td>1090-1160</td>
<td>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'.</td>
</tr>
<tr>
<td>1160-1180</td>
<td>Sand as above and light olive gray (5Y6/1), fine grained sandstone.</td>
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<tr>
<td>1180-1190</td>
<td>Sand as above, some white and green bentonite</td>
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<tr>
<td>1190-1200</td>
<td>Sand as above.</td>
</tr>
<tr>
<td>1200-1220</td>
<td>Sand as above, some cemented with white calcareous bentonite, and very light gray (N8) siltstone.</td>
</tr>
<tr>
<td>1220-1240</td>
<td>Some chert and lignite.</td>
</tr>
<tr>
<td>1240-1310</td>
<td>Coarse detrital material - Chiefly Pre-Cambrian wash, quartzite and granite fragments, siltstone, sandstone, and limestone fragments.</td>
</tr>
<tr>
<td>1310-1320</td>
<td>Sioux formation - Pink quartzite.</td>
</tr>
<tr>
<td>1328</td>
<td>Total Depth.</td>
</tr>
</tbody>
</table>
CARTER - STRATIGRAPHIC TEST #1

Location: C. NE 1/4 NW 1/4 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 sati
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 plagioclas-
nefeldspar and fragments of holocrystalline
igneous at 90'-100' may be cavgings from the surface.
Inoceramus prisms, 90'-100' and 140'-150', some
sandstone, 140'-150', shell fragments, 180', chalk,
ligh gray with Haplopora and Ammodiscus, 265'-
70'; mudstone, blue gray, 310'-420', greenish ben-
tonite, 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 speckled, bituminous,
brownish, more compact and chalkier 830'-40'.

910-1240 Carlile - Shale, dark gray, with silty gray lime-
stone, 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, crystal-
line, packed with Inoceramus prisms and fish re-
mains.

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, subrounded 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 Haplonorella.

1910-1930 Some bentonite, light green, sandy.
1930-1940 Sandstone, light brown and gray, fine grained, micaeous.

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 subrounded, 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 subrounded, 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, silt-
stone, 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, magnesium, light brown gray, sugary, porous.
2300-2310  Dolomite, light brown gray, fine sugary.
2310-2320  Limestone, magnesium, 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, magnesium in
lower beds.
2500-2520  Limestone, cream, obscurely oolitic, porous, finely
crystalline, possible unconformity.
2520-2570  Madison - Limestone, magnesium, light brown, crystal-
line, very porous and vuggy, dolomite rhombs in cal-
cite matrix. Some conglomerate, dark brown bitumin-
ous 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, litho-
graphic 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, ex-
tensively chloritized, contains quartz, biotite, plagioclase, some orthoclase, hornblende feldspars are kaolinized.
3611 Total Depth
DAKOTA-TEXAS - WILLIAMS-THOMPSON #1

Location: NW ¼ SE ¼ 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.

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'
Fusion 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 con-
cretions.

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, benton-
itic 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
mari, shell fragments and fish remains.

950-960 Very light gray (N8) chalk, biotite, foram, py-
rite.

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 down-
wards. 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 re-
 mains, pyrite, and glauconite.

1580-1620 Dark gray (N3), non-calcareous and slightly cal-
careous, soft, fissile shale with a little silt-
stone 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 cal- careous shale.
1660-1690 Dakota, electric log top at 1857' - 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 silt- stone, 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.
1990-2000 No cuttings
2000-2050 Medium gray (N5) and medium light gray (N6) lime- stone, 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'- Glaucconitic 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 sand- stone, 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'.
2600-2606 Cores from 2600'-2613'.
2606-2613 Light gray (N7), brecciated limestone, some pyrite.
2613-2620 Medium light gray (N6) and yellowish gray (5Y8/1), finely sucrose, dolomitic limestone.
2620-2670 Trip sample light gray (N7) and yellowish gray (5Y8/1) sucrose limestone with some plant fragments.
2670-2680 Light gray (N7) and very light gray dense limestone, occasional ostracodes at 2640' and 2660'.
2680-2690 Light gray (N7), quite porous limestone, some pyrite.
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.

3450-3480
Medium dark gray (N4) fissile shale.

3480-3470
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 3058' - 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.

- 47 -
SIoux Valley - La FluER #1

Location: SE\(\frac{1}{4}\) SW\(\frac{1}{4}\) 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, subrounded.
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, variegated, tawny,
light green, brown and red orange.
390-405  Paleozoic - Limestone, dolomitie, 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 crystall-
line, 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 dolo-
mite rhombs.
496-513  Limestone, coarser rhombs and grayer.
513-518  Limestone, magnesian, dark brown gray, rhombic,
vuggy, clay residue.

- 48 -
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 subrounded, 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 subrounded, 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: NE\textsuperscript{\frac{1}{4}} SE\textsuperscript{\frac{1}{4}} 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
- Sharon Springs member 930'
Niobrara formation 960'
Carlinite shale 1065' (?)
Greenhorn formation 1497'
Graneros shale 1530'
Dakota sandstone 1884'
Fuson shale 1946'
Lakota sandstone 1992'

Jurassic System
Sundance formation 2100'

Pennsylvaniaian System
Detrital zone 2385'
Minnelusa formation 2417'

Mississippian System
Madison group 2620'
Devonian System (?) 3130'

Ordovician System
Red River formation 3320'
Winnipeg shale 3688'
Cambr-o-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.

- 51 -
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 Fucson, 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 Bentonite 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.
<table>
<thead>
<tr>
<th>Core Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2470-2500</td>
<td>Dolomite, buff, finely granular, dense with light brown chert.</td>
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<tr>
<td>2500-2510</td>
<td>Salmon colored red with secondary green copper mineral.</td>
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<tr>
<td>2510-2550</td>
<td>Dolomite, gray.</td>
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<tr>
<td>2550-2570</td>
<td>Siltstone, limy, buff.</td>
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<tr>
<td>2570-2580</td>
<td>Sandstone, buff, very fine, angular grains.</td>
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<tr>
<td>2580-2610</td>
<td>Limestone, dark gray, fine, granular, fossiliferous, ostracodes. May be Big Snowy.</td>
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<tr>
<td>2610-2620</td>
<td>Black shale.</td>
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<tr>
<td>2620-2640</td>
<td>Madison - Light cream limestone, soft, powdery, cavernous, ostracodes, cherty. Cores from 2640-2697.</td>
</tr>
<tr>
<td>2640-2649</td>
<td>Light gray, finely crystalline limestone, fossiliferous, stylolitic, partly dense, porcellaneous. Lower 3' solution brecciated and recemented.</td>
</tr>
<tr>
<td>2649-2661</td>
<td>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.</td>
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<tr>
<td>2661-2664</td>
<td>Limestone, darker gray, clayey, showing 45° dip.</td>
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<tr>
<td>2664-2667</td>
<td>Largely mudstone, medium gray.</td>
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<tr>
<td>2667-2677</td>
<td>Limestone, hydraulic, earthy, light gray, slakes when wetted.</td>
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<tr>
<td>2677-2680</td>
<td>Gray bentonitic clay and hydraulic limestone, top much brecciated, more limy at base. Some thin sandstone layers and light brownish lithographic limestone.</td>
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<tr>
<td>2680-2683</td>
<td>Clay, bentonitic.</td>
</tr>
<tr>
<td>2683-2686</td>
<td>Much collapsed solution breccia of gray earthy limestone, locally stained brown-red, finely granular.</td>
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<tr>
<td>2686-2689</td>
<td>Clay, slaking, bentonitic, dark gray.</td>
</tr>
<tr>
<td>2689-2692</td>
<td>Limestone, light gray, porcellaneous, passing down into red mottled.</td>
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<tr>
<td>2692-2695</td>
<td>Limestone collapse breccia. Dark gray bentonitic clay at base.</td>
</tr>
<tr>
<td>2695-2697</td>
<td>Limestone collapse breccia, finely granular.</td>
</tr>
<tr>
<td>2697-2740</td>
<td>Light cream limestone, soft powdery, cavernous, ostracodes, cherty. Altered oolitic at 2720'.</td>
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<tr>
<td>2740-2810</td>
<td>Limestone, cream, oolitic.</td>
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<tr>
<td>2814</td>
<td>Dolomite, brown, bituminous, ether shows paraffin, fine powdery texture, porous.</td>
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<tr>
<td>2820-2830</td>
<td>Limestone, brown cream, oolitic.</td>
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<tr>
<td>2830-2920</td>
<td>Dolomite, fine sugary, porous, medium gray, mottled and in part limy below, brachiopods.</td>
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<tr>
<td>2920-3020</td>
<td>Limestone, cream, oolitic, fossils.</td>
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<tr>
<td>3020-3137</td>
<td>Limestone, dolomite rhombs in calcite matrix.</td>
</tr>
<tr>
<td>3137</td>
<td>Devonian (?), electric log top at 3130' - Brown dolomite, cavernous, stained heavily with oil.</td>
</tr>
</tbody>
</table>
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.
Location: NW 1/4 NW 1/4 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
Sharon Springs member 750'
Niobrara formation 823'
Carlile shale 940'
Greenhorn formation 1323'
Graneros shale 1350'
Dakota sandstone 1712'
Fuson shale (?) 1880'
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?

Ordovician System
Red River formation 3210'
Winnipeg shale 3615'

Cambro-Ordovician sandstone 3740'
Pre-Cambrian

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'.

1712-1880 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, magnesium 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.
Devonian (?) electric log top at 3062'. Some sandstone, fine, etched grains, a little galena and sphalerite in the limestone.

Limestone, light brown, small crystals, vuggy, vitreous.
Limestone, gray, clayey, abundant ostracodes.
Red River - Limestone, cream, porcellaneous.

Anhydrite, light gray bluish, with dolomite, brown cream, vuggy.
Dolomite, brown cream, vuggy, vitreous.
Dolomite, light gray.
Dolomite, light brown gray.
Dolomite, with blue white chert.
Limestone, dove gray, finely granular, fossils, silty below 3580'.

Winnipeg shale, electric log top at 3615'-Shale, green and brown, bentonitic, fissile, black, with graptolites 3710'-3720'.

Cambro-Ordovician - Sandstone, limy cement, with black chert and quartz grains, some copper sulphide cement and partly with bentonite matrix.

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, Dicollamhus; probably Deadwood.

Pre-Cambrian - Orthoclase-biotite granite, biotite chloritized. However, bottom circulation sample at 3808' is quartz-biotite schist.

Total Depth
OIL VENTURES - SCHULTZ #1

Location: SE$_1^2$ SW$_1^1$ 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'
Carliile 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'.

- 60 -
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, \textit{Inoceramus} prisms abundant.
220-230 Light gray (N7) sandy marl.
230-250 Medium dark gray (N4) flaky shale.
250-300 \textit{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 \textit{Inoceramus} prisms below 380'.
400-420 White chalk (N9), a few shell fragments and \textit{Inoceramus} prisms, some pyrite.
420-430 \textit{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 \textit{Greenhorn} — Medium dark gray (N4) calcareous shale with white chalk spots.
630-640 No cuttings.
640-648 Core. Argillaceous, fragmental limestone, with \textit{Globigerina} and shell fragments.
648-680 No cuttings.
680-690 \textit{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 \textit{Dakota} — Very fine to fine, angular sand with some medium light gray (N6) fissile shale, some pyrite and fish bone fragments.
750-760 \textit{Fusion} — 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 \textit{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.-Hoeft No. 1 Location: NW ¼ NW ¼ 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, NE ¼ 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: SE ¼ SE ¼ 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 Fusion at 625', probably hit Pre-Cambrian at 649'.

5. Redetzke-Schoeberl. Location: SW ¼ NW ¼ 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'.


7. Schoof-Thomson No. 1 (Exploration No. 1). Location: NE corner, SW ¼ 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'.

- 62 -
PART II

WATER WELL LOGS IN SOUTH DAKOTA EAST OF MISSOURI RIVER

BY

Bruno C. Petsch

KNIGGE FARM

Location: SE_{4} 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'

- 63 -
Location: SW1/4 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'
Cedell 448'
Carlile 470'
Greenhorn 550'
Graneros 586'
Dakota 788'
Fusion 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 quartz, 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, foraminifer, 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

- 65 -
CORCORAN FARM

Location: NW \( \frac{1}{4} \) Sec. 29, T. 112 N., R. 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: SE \( \frac{1}{4} \) 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'

- 66 -
MEYER FARM

Location: NE\(\frac{1}{4}\) NW\(\frac{1}{4}\) 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.

TSCHEFTER FARM

Location:  SW_{1/4} SE_{1/4}, 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'

- 68 -
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
Cretaceous System
Pierre 74'
Niobrara 228'
Carlile 328'
Codell 340'
Greenhorn 572'
Graneros 596'
Dakota 820'
Fuson 880'
Lakota 980'

WALDNER FARM

Location: NE 1/4 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: NE½ 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**

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleistocene</td>
<td>0'</td>
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<tr>
<td>Cretaceous System</td>
<td></td>
</tr>
<tr>
<td>Pierre</td>
<td>92'</td>
</tr>
<tr>
<td>Niobrara</td>
<td>266'</td>
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<tr>
<td>Carlile</td>
<td>380'</td>
</tr>
<tr>
<td>Greenhorn</td>
<td>542'</td>
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<tr>
<td>Graneros</td>
<td>570'</td>
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<td>Dakota</td>
<td>872'</td>
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<tr>
<td>Fuson</td>
<td>920'</td>
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</table>
Location:  SW 1/4 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 480'
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 SW\(\frac{1}{4}\), 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

<table>
<thead>
<tr>
<th>Cretaceous System</th>
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<tbody>
<tr>
<td>Codell</td>
<td>380 - 392'</td>
</tr>
<tr>
<td>Greenhorn</td>
<td>487'</td>
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<tr>
<td>Graneros</td>
<td>518'</td>
</tr>
<tr>
<td>Dakota</td>
<td>732'</td>
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</table>
KNIPPLING RANCH

Location: NE\(\frac{1}{4}\) 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
Carlile 436'
Greenhorn 650'
Graneros 690'
Dakota 1034'
Fuson 1118'
Lakota 1128'

STENSBOL FARM

Location: SE\(\frac{1}{4}\), 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 584'

- 74 -
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

- 75 -
LLOYD H. JOHNSON

Location: NE ¼ 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

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pierre</td>
<td>207'</td>
</tr>
<tr>
<td>Niobrara</td>
<td>321'</td>
</tr>
<tr>
<td>Carlile</td>
<td>403'</td>
</tr>
<tr>
<td>Greenhorn</td>
<td>630'</td>
</tr>
<tr>
<td>Graneros</td>
<td>653'</td>
</tr>
</tbody>
</table>
TORGISON 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: SW 1/4 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: SE 1/4 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'  

- 79 -
SHELDON-REESE COMPANY

Location: SE cor. NE ¼ 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: SE ¼ 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 963'
Fuson 1089'
Lakota 1141'
STEPTOE FARM

Location: E 3/4 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: SE$_{\frac{1}{4}}$ 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'

- 83 -
CARmody Farm

Location: SW\(\frac{1}{4}\) 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'
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, cal- careous, 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 sub- rounded 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: SW\(\frac{1}{4}\) SE\(\frac{1}{4}\) Sec. 27, T. 108 N., R. 61 W., SANBORNE 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

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carlile</td>
<td>232'</td>
</tr>
<tr>
<td>Greenhorn</td>
<td>438'</td>
</tr>
<tr>
<td>Graneros</td>
<td>468'</td>
</tr>
<tr>
<td>Dakota</td>
<td>895' (driller's record)</td>
</tr>
</tbody>
</table>
RUSSELL W. LEVSEN FARM

Location: SE$\frac{1}{4}$ Sec. 31, T. 116 N., R. 60 W., SPINK COUNTY

Owner: Russell W. Levens
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'

OTTEBACHER FARM

Location: NW$\frac{1}{4}$ 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: NE ¼ 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: NW ¼ 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: SW\(\frac{1}{4}\) SE\(\frac{1}{4}\) 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

<table>
<thead>
<tr>
<th>Formation</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niobrara</td>
<td>687'</td>
</tr>
<tr>
<td>Carlile</td>
<td>828'</td>
</tr>
<tr>
<td>Greenhorn</td>
<td>1130'</td>
</tr>
<tr>
<td>Graneros</td>
<td>1178'</td>
</tr>
<tr>
<td>Dakota</td>
<td>1517'</td>
</tr>
<tr>
<td>Fusion</td>
<td>1573'</td>
</tr>
<tr>
<td>Lakota</td>
<td>1602'</td>
</tr>
<tr>
<td>Sundance</td>
<td>1794'</td>
</tr>
</tbody>
</table>
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.

1180-1230  Graneros, (Electric log top at 1178'). 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.
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 680'
Dakota 652'

YANKTON PARK

Location: SE1/4 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'