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Morrill County Test Hole Logs

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MORRILL COUNTY Test-Hole Logs

by
**Vernon L. Souders
and
James B. Swinehart**

**Nebraska Water Survey
Test-Hole Report No. 62**

**Conservation and Survey Division
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln**



September 2000



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UNIVERSITY OF NEBRASKA-LINCOLN CREDITS

UNIVERSITY OF NEBRASKA-LINCOLN

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CONSERVATION AND SURVEY DIVISION

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The division is authorized to enter into agreements with federal agencies to engage in cooperative surveys and investigations in the state. Publications of the division and the cooperating agencies are available from the Conservation and Survey Division, University of Nebraska, Lincoln, Nebraska 68588-0517.

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Publication and price lists are furnished upon request.

September 2000

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INTRODUCTION

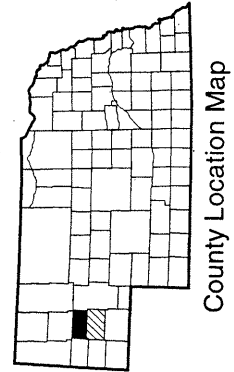
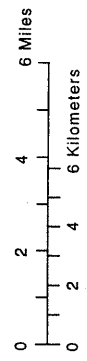
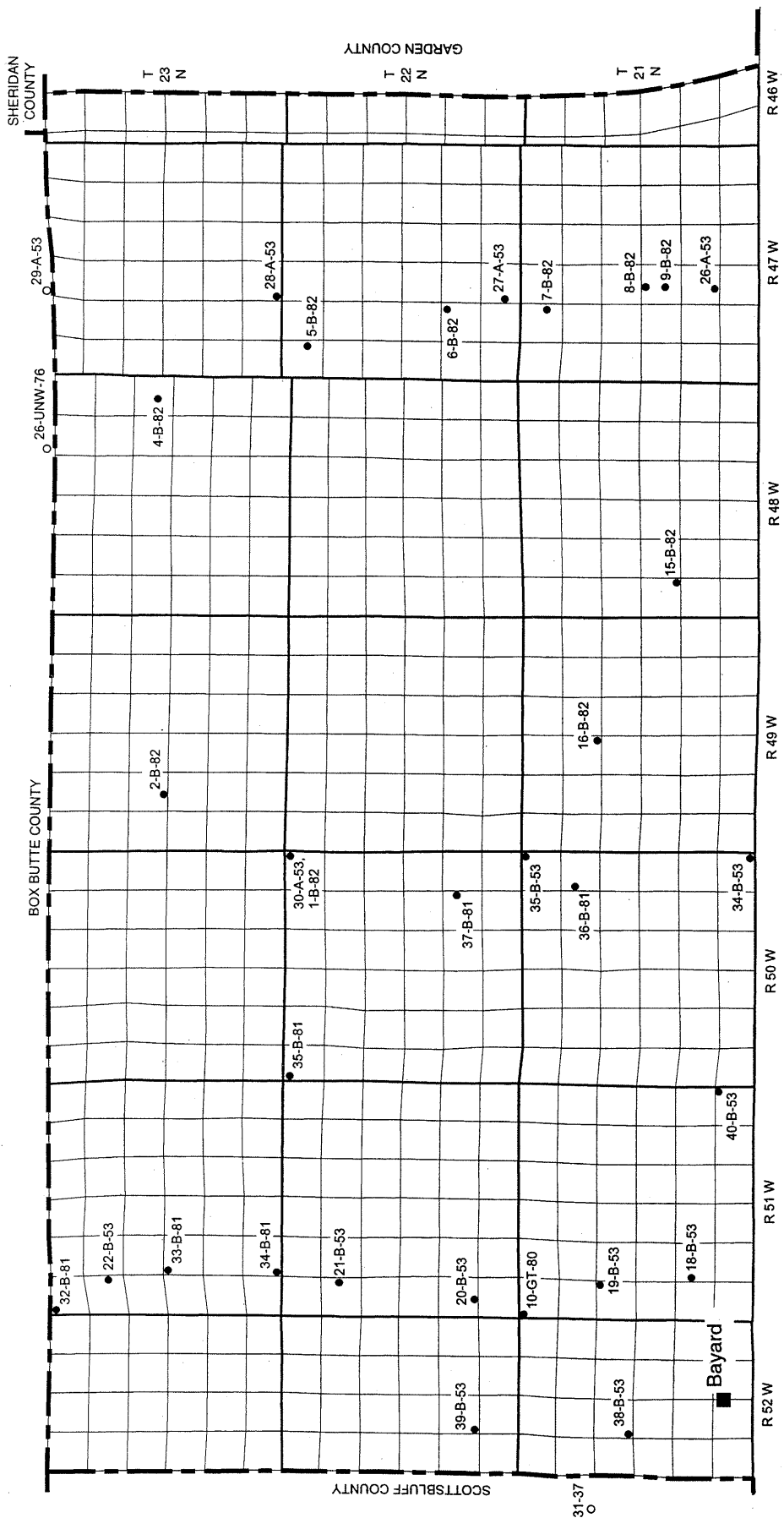
In 1930, the Conservation and Survey Division (CSD) of the University of Nebraska and the U.S. Geological Survey began a program of cooperative groundwater studies in Nebraska. Since then test drilling by use of rotary drilling equipment has been an integral part of that program. This report contains logs of all the test holes drilled in the county under the program as well as those drilled by the Conservation and Survey Division with financial assistance from other government agencies.

The map in this report (figure 1) shows the location of all test holes drilled in the county since 1934.

Present techniques of test hole logging and sampling include use of drilling mud suitable to drilling conditions, timing by stopwatch of the drilling of each 5-foot increment of depth, and removal of all cuttings from the test hole at intervals of 5 feet or less. During the drilling of the hole, cuttings from each interval are examined immediately; samples representing each 5-foot interval and each recognizable change in material are retained. After samples are washed, they are described lithologically and the color is evaluated by comparison with standard color charts. The samples then are dried, stored, and cataloged. All samples are processed and kept on open file in the offices of Conservation and Survey Division, 113 Nebraska Hall, University of Nebraska-Lincoln, 68588-0517.

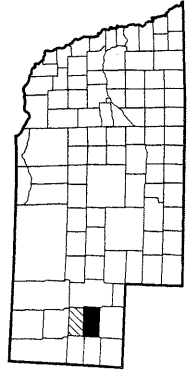
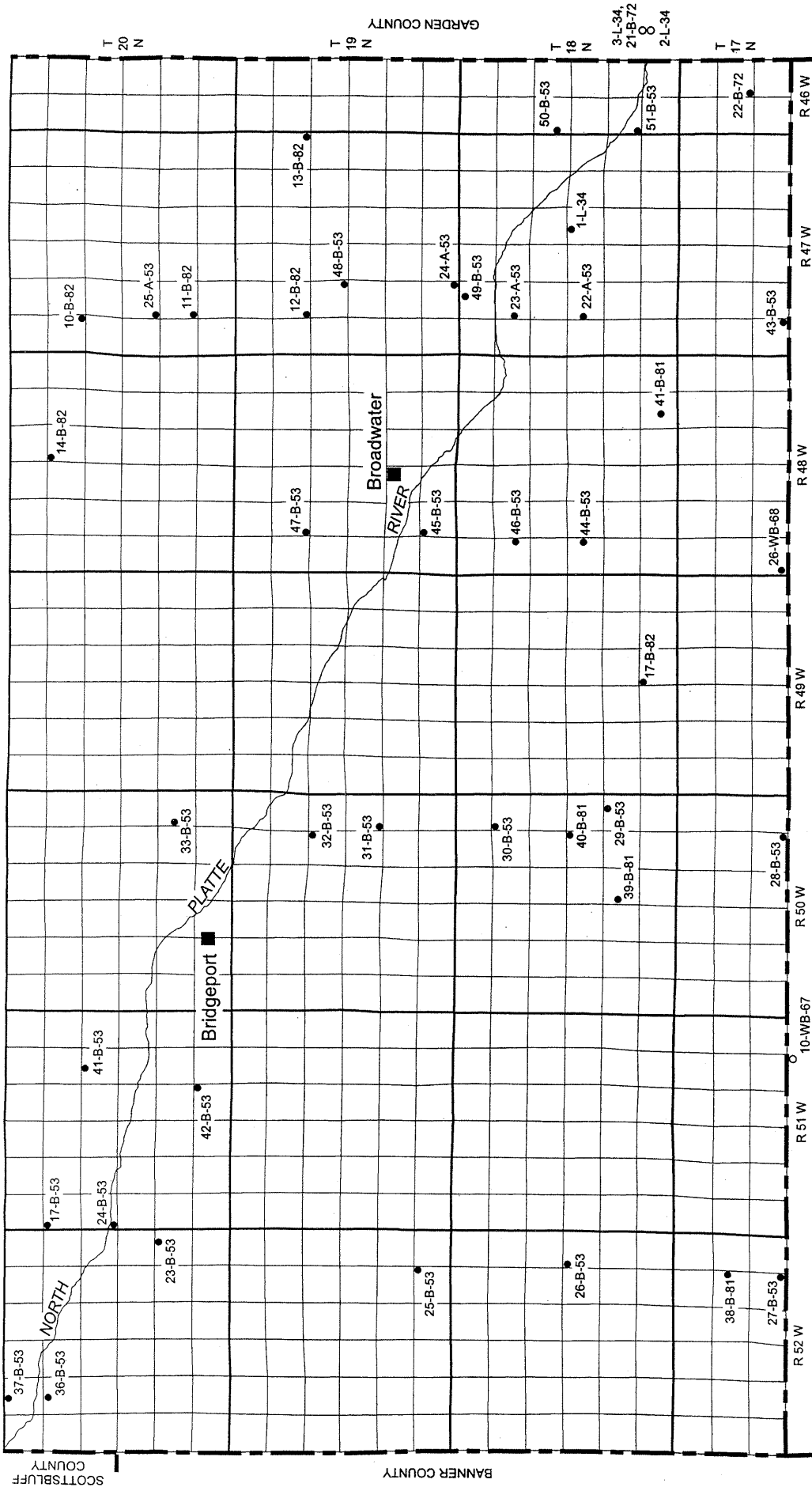
Beginning in September 1951, some of the test holes have been logged electrically. Geophysical logs (e-logs) often can be used to determine formation boundaries more precisely than by field sampling, especially where difference in rock types from the formation to another occur at the boundary. Figure 2 is an example of geophysical log of a test hole from Morrill County with formation boundaries shown. A notation on each test hole log indicates if geophysical logs are part of the original test hole data on file in the CSD office in Lincoln, Nebraska.

This publication is one of a series being issued to make more readily available the record of test holes drilled since 1930. The series of publications is made on a county basis and includes, with some exceptions, logs of all test holes drilled in each of the counties. The logs have not been reviewed for conformance with editorial standards and nomenclature. In the case of Morrill County, descriptions of strata done in earlier test hole reports are included with some revised formation information in this report.



- Test-hole description published in this report
- Test-hole description published in other reports

Fig. 1a. Test-hole location map of North Half of Morrill County



- Test-hole description published in this report
- Test-hole description published in other reports

Fig. 1b. Test-hole location map of South Half of Morrill County

Figure 2. Morrill County sample geophysical log (13-B-82)

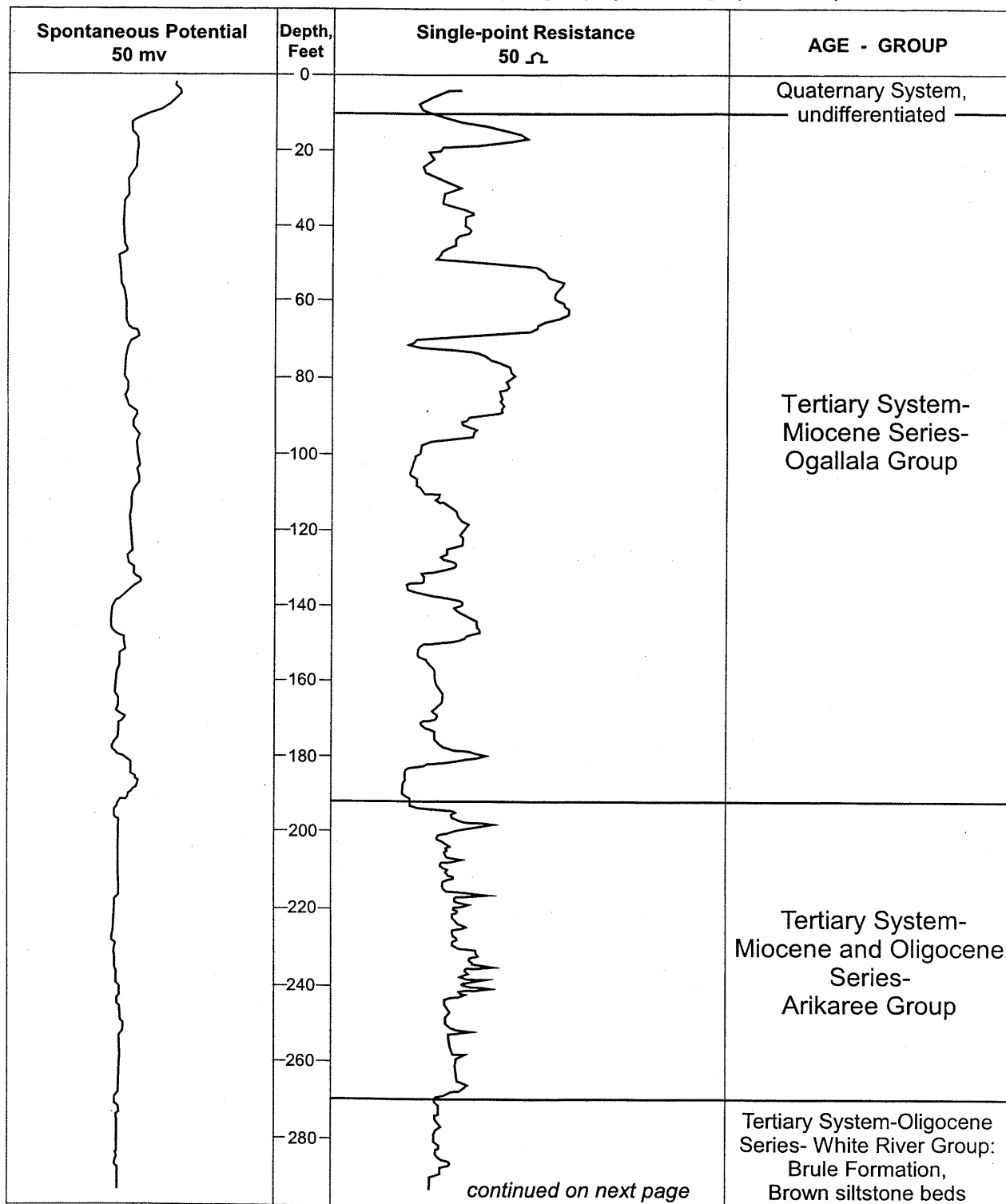
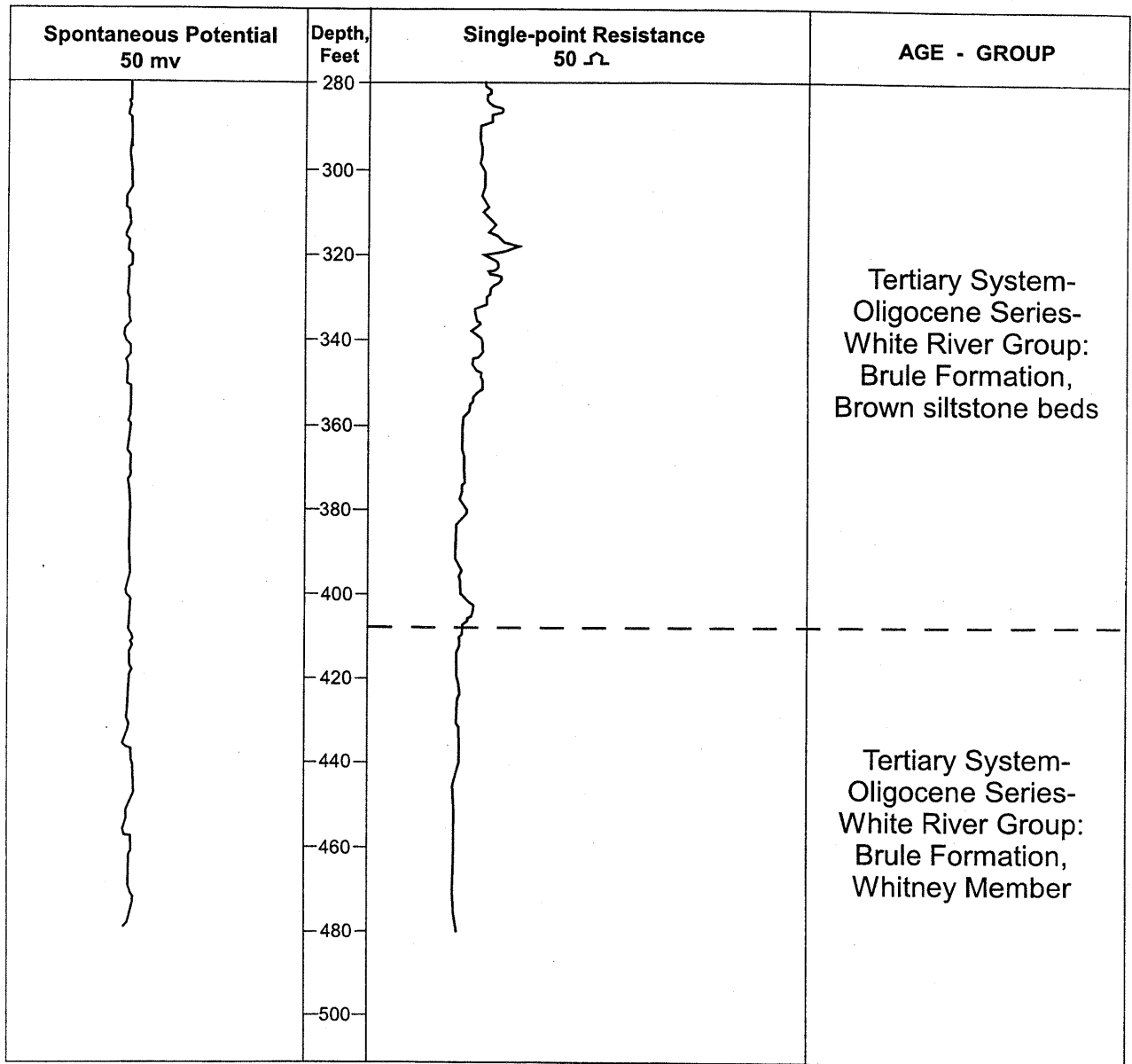


Figure 2 continued. Morrill County sample geophysical log (13-B-82)

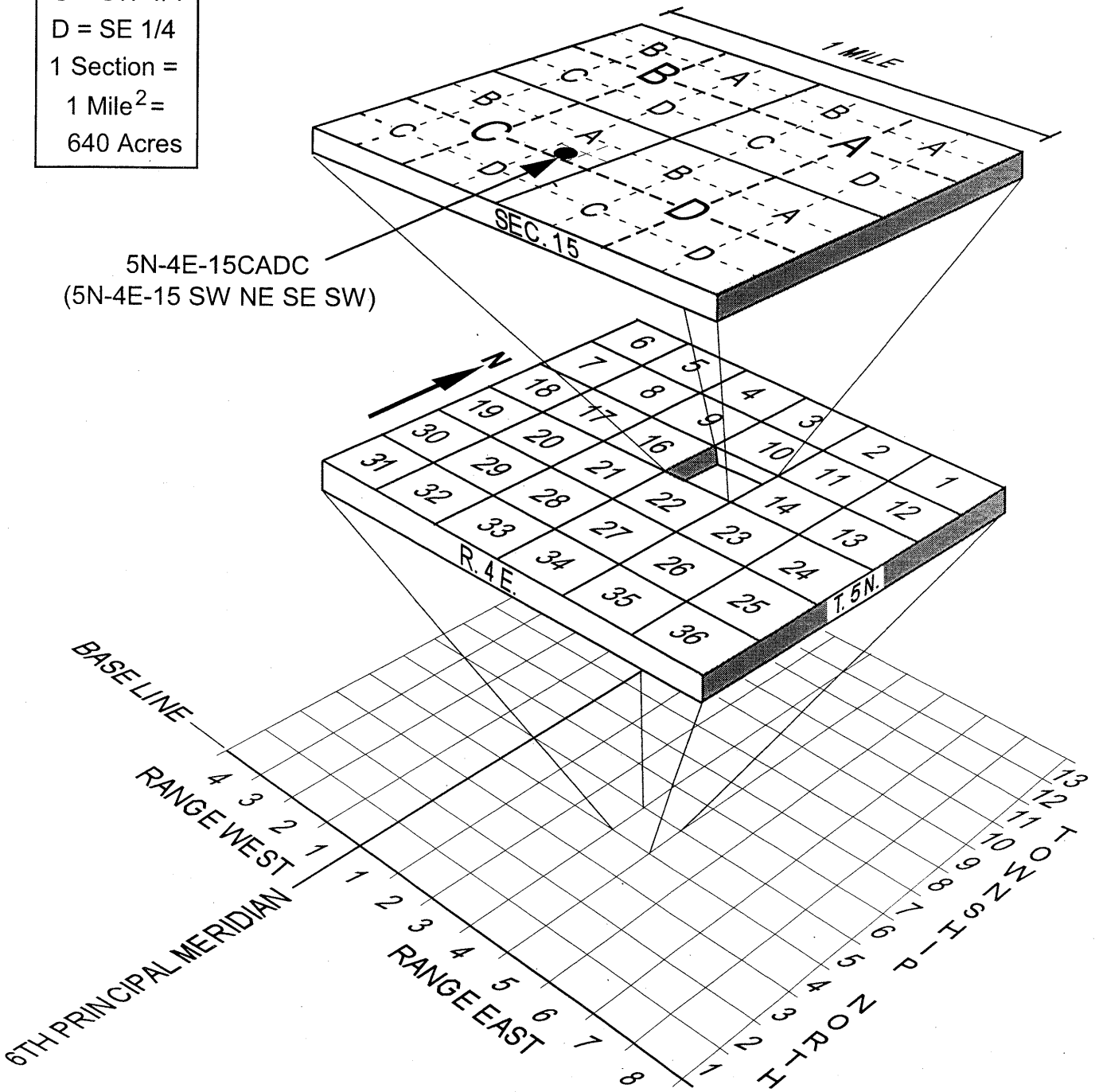


The method whereby the altitude of the land surface at test hole sites was determined is indicated in the heading of each log, as follows: a = altimeter, h = hand leveling, i = spirit leveling, t = estimated from topographic map.

The test hole records accurately reflect subsurface conditions only at the locations where the test holes were drilled. Interpretive data reflecting probable subsurface conditions between test holes are being compiled for publication in county reports and are available for inspection in the office of the Conservation and Survey Division.

Each test hole is identified by a number assigned in the field (for example #13-B-82), and most are also identified by a number indicating its location within the land divisions of the U.S. Bureau of Land Management's survey of Nebraska (see USGS test hole identification in figure 3). Location numbers of test holes east of the 6th principal meridian, which passes through Columbus in a north-south direction, are preceded by the capital letter A; those west of the principal meridian have no preceding letter. The first numeral indicates the township, the second the range, and the third the section. As shown in figure 3, the letters that follow the section number indicate the location of the test hole within the section, the first letter indicating the quarter section and the second letter indicating the quarter-quarter section and so on to the quarter-quarter-quarter-quarter section. The letters A, B, C, and D are applied in counterclockwise direction beginning with A in the northeast quadrant. As shown in figure 3, the letters that follow the section number indicated the location of the test hole within the section, the first letters (NE) indicating the quarter section, the second letter (NW) indicating the quarter-quarter section, the third letter (SW) indicating the quarter-quarter-quarter section, and the fourth letter (SE) indicating the quarter-quarter-quarter-quarter section. The last numeral is the serial number of the test hole within the quarter-quarter-quarter-quarter section if more than one well is present in that area.

A = NE 1/4
 B = NW 1/4
 C = SW 1/4
 D = SE 1/4
 1 Section =
 1 Mile² =
 640 Acres



5N-4E-15CADC
 (5N-4E-15 SW NE SE SW)

Fig. 3. System for identifying test-hole according to its location

SELECTED REFERENCES

Some Publications that are Guides to Earth Resources in Morrill County

Some of the published references pertinent to an understanding of the geologic and hydrologic resources of Morrill County are included below. The interested reader will find citations of other studies in these reports.

- Souders, V. L., 1986, *Geologic Sections, Groundwater Maps, and Logs of Test Holes, Morrill County, Nebraska*: Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Open File Report, 90 p.
- Swinehart, J.B. and Diffendal, R.F., Jr., 1995, *Geologic map of Morrill County, Nebraska*: U.S. Geological Survey, Miscellaneous Investigations Series, Map I-2496.
- Swinehart, J.B., Souders, V.L., DeGraw, H.D., and Diffendal, R.F., Jr., 1985, *Cenozoic paleogeography of western Nebraska in Cenozoic Paleogeography of west-central United States* (R.M. Flores and S.S. Kaplan, editors): Rocky Mountain Section, Society of Economic Paleontologists and Mineralogists, Denver, Colorado, p. 209-229.

Morrill County
Test-Hole Logs Table of Contents

Legal Descrip Twp Rge Sec	Test-Hole Number	Page
17N 46W 08CCAB	22-B-72	1
17N 47W 18DDDD	43-B-53	3
17N 48W 18CCCC	26-WB-68	5
17N 50W 14DDDC	28-B-53	7
17N 52W 11ADAC	38-B-81	9
17N 52W 14DDDD	27-B-53	11
18N 46W 18CBBB	50-B-53	13
18N 46W 30CCCC	51-B-53	14
18N 47W 05ABDD	49-B-53	15
18N 47W 08CBBB	23-A-53	16
18N 47W 20BCCC	22-A-53	17
18N 47W 22BAAA	01-L-34	18
18N 48W 07DAAA	46-B-53	19
18N 48W 19ADDA	44-B-53	20
18N 48W 35CADD	41-B-81	22
18N 49W 34BBBC	17-B-82	24
18N 50W 12BBBB	30-B-53	25
18N 50W 23AAAA	40-B-81	27
18N 50W 25CCCD	29-B-53	28
18N 50W 27BCDD	39-B-81	29
18N 52W 24BBBB	26-B-53	30
19N 47W 08CCCC	12-B-82	31
19N 47W 12DDDA	13-B-82	33
19N 47W 17DDDD	48-B-53	35
19N 47W 32DDDA	24-A-53	36
19N 48W 08CCCD	47-B-53	38
19N 48W 32BBBB	45-B-53	39
19N 50W 14AAAD	32-B-53	40
19N 50W 24CCCC	31-B-53	41
19N 52W 26AAAA	25-B-53	42
20N 47W 07DDDD	10-B-82	43
20N 47W 20CCDC	25-A-53	45
20N 47W 29CCBC	11-B-82	47
20N 48W 10BBBC	14-B-82	50
20N 50W 25BCCC	33-B-53	52
20N 51W 07BBBA	17-B-53	53
20N 51W 14BAAB	41-B-53	54
20N 51W 18CCBC	24-B-53	55
20N 51W 34AAAB	42-B-53	56
20N 52W 05BAAB	37-B-53	57
20N 52W 08BADA	36-B-53	58

20N 52W 25ABAA 23-B-53	59
21N 47W 05DAAD 07-B-82	60
21N 47W 21BACD 08-B-82	62
21N 47W 21CADD 09-B-82	63
21N 47W 28CDDC 26-A-53	65
21N 48W 19DDDC 15-B-82	66
21N 49W 09DDDD 16-B-82	68
21N 50W 01AAAA 35-B-53	70
21N 50W 12BCCB 36-B-81	72
21N 50W 36DDCD 34-B-53	74
21N 51W 06BBBC 10-GT-80	75
21N 51W 18AAAA 19-B-53	76
21N 51W 29BCCC 18-B-53	77
21N 51W 36AAAA 40-B-53	78
21N 52W 15CCCC 38-B-53	79
22N 47W 06DABB 05-B-82	80
22N 47W 29AACA 06-B-82	82
22N 47W 33CBBB 27-A-53	84
22N 50W 01AAAB 30-A-53	85
22N 50W 01AAAB 01-B-82	86
22N 50W 06BBCB 35-B-81	88
22N 50W 26ADAA 37-B-81	90
22N 51W 07ADDD 21-B-53	92
22N 51W 30CDDC 20-B-53	93
22N 52W 27CCCC 39-B-53	94
23N 47W 33CCCC 28-A-53	95
23N 48W 13CABC 04-B-82	96
23N 49W 17CDBB 02-B-82	98
23N 51W 06BBBB 32-B-81	100
23N 51W 07DAAA 22-B-53	102
23N 51W 20BBBB 33-B-81	103
23N 51W 32CCCC 34-B-81	105

Test-holes are arranged in this publication by township, range and section.

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Test-Hole Logs Table of Contents

Arranged by year drilled, test-hole number.

1934

18N 47W 22BAAA	01-L-34	18
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1953

20N 51W 07BBBA	17-B-53	53
21N 51W 29BCCC	18-B-53	77
21N 51W 18AAAA	19-B-53	76
22N 51W 30CDDC	20-B-53	. . . . .	93
22N 51W 07ADDD	21-B-53	. . . . .	92
18N 47W 20BCCC	22-A-53	. . . . .	17
23N 51W 07DAAA	22-B-53	. . . . .	102
18N 47W 08CBBB	23-A-53	. . . . .	16
20N 52W 25ABAA	23-B-53	. . . . .	59
19N 47W 32DDDA	24-A-53	. . . . .	36
20N 51W 18CCBC	24-B-53	. . . . .	55
20N 47W 20CCDC	25-A-53	. . . . .	45
19N 52W 26AAAA	25-B-53	. . . . .	42
21N 47W 28CDDC	26-A-53	. . . . .	65
18N 52W 24BBBB	26-B-53	. . . . .	30
22N 47W 33CBBB	27-A-53	. . . . .	84
17N 52W 14DDDD	27-B-53	. . . . .	11
23N 47W 33CCCC	28-A-53	. . . . .	95
17N 50W 14DDDC	28-B-53	. . . . .	7
18N 50W 25CCCD	29-B-53	. . . . .	28
22N 50W 01AAAB	30-A-53	. . . . .	85
18N 50W 12BBBB	30-B-53	. . . . .	25
19N 50W 24CCCC	31-B-53	. . . . .	41
19N 50W 14AAAD	32-B-53	. . . . .	40
20N 50W 25BCCC	33-B-53	. . . . .	52
21N 50W 36DDCD	34-B-53	. . . . .	74
21N 50W 01AAAA	35-B-53	. . . . .	70
20N 52W 08BADA	36-B-53	. . . . .	58
20N 52W 05BAAB	37-B-53	. . . . .	57
21N 52W 15CCCC	38-B-53	. . . . .	79
22N 52W 27CCCC	39-B-53	. . . . .	94
21N 51W 36AAAA	40-B-53	. . . . .	78
20N 51W 14BAAB	41-B-53	. . . . .	54

20N 51W 34AAAB 42-B-53	56
17N 47W 18DDDD 43-B-53	3
18N 48W 19ADDA 44-B-53	20
19N 48W 32BBBB 45-B-53	39
18N 48W 07DAAA 46-B-53	19
19N 48W 08CCCD 47-B-53	38
19N 47W 17DDDD 48-B-53	35
18N 47W 05ABDD 49-B-53	15
18N 46W 18CBBB 50-B-53	13
18N 46W 30CCCC 51-B-53	14

1968

17N 48W 18CCCC 26-WB-68	5
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1972

17N 46W 08CCAB 22-B-72	1
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1980

21N 51W 06BBBC 10-GT-80	75
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1981

23N 51W 06BBBB 32-B-81	100
23N 51W 20BBBB 33-B-81	103
23N 51W 32CCCC 34-B-81	105
22N 50W 06BBCB 35-B-81	88
21N 50W 12BCCB 36-B-81	72
22N 50W 26ADAA 37-B-81	90
17N 52W 11ADAC 38-B-81	9
18N 50W 27BCDD 39-B-81	29
18N 50W 23AAAA 40-B-81	27
18N 48W 35CADD 41-B-81	22

1982

22N 50W 01AAAB 01-B-82	86
23N 49W 17CDBB 02-B-82	9
23N 48W 13CABC 04-B-82	96
22N 47W 06DABB 05-B-82	80
22N 47W 29AACA 06-B-82	82
21N 47W 05DAAD 07-B-82	60
21N 47W 21BACD 08-B-82	62
21N 47W 21CADD 09-B-82	63
20N 47W 07DDDD 10-B-82	43

Test Hole #22-B-72 (E-log)
(17N-46W-8ccab)
Morrill County

Location: NW NE SW SW sec. 8, T. 17 N., R. 46 W., 1057 ft. north and
 778 ft. east of the southwest corner of the section.
 Ground elevation: 3630 ft. (t). (Lisco NW 7.5 min. quadrangle).
 Depth to water: 40 ft. (July 6, 1972).

Depth, in feet
 From To

Quaternary System, undifferentiated:

Sand, very fine to very coarse, silty; gravelly from
 0 to 1.9 ft. and traces of fine gravel 1.9 to 16
 ft., sandy silt from 5 to 5.3 ft..... 0.0 16.0

Tertiary System - Miocene Series - Ogallala Group:

Sandstone, gravelly, limy; fine sand to fine gravel. 16.0 20.0

Sand and gravel; fine sand to medium gravel with
 trace of coarse gravel; slightly fine below 25 ft. 20.0 27.0

Silt, clayey, sandy, light brown..... 27.0 32.0

Sand, gravelly; fine sand to fine gravel..... 32.0 40.0

Sandstone, silty, limy, mostly brown to pale brown;
 sand is very fine to very coarse; silt and lime
 content vary with depth throughout interval;
 contains root casts in parts..... 40.0 64.0

Silt, clayey, slightly sandy, yellowish-brown; sand
 is very fine..... 64.0 65.0

Sandstone, slightly silty, limy, pale brown to brown;
 sand is very fine to fine with trace of medium to
 very coarse; contains root casts and fossil
 hackberry seeds in parts..... 65.0 80.0

As above but coarser grained and generally less lime
 content..... 80.0 95.0

Interbedded sandstone and silty sandstone, mostly
 pale brown; sand is very fine to very coarse but
 varies with beds; lime content generally slight to
 moderate; contains root casts and fossil hackberry
 seeds in parts..... 95.0 112.0

Sandstone, very fine to very coarse grained,
 slightly consolidated, pale brown; very to slightly
 limy from 133 to 145 ft.; root casts below 133 ft. 112.0 160.0

As above but less coarse to very coarse sand and
 slightly to moderately silty..... 160.0 190.0

Sandstone, slightly silty, slightly limy, pale brown;
 sand is very fine to medium with trace of coarse;
 contains root casts and fossil seeds in parts..... 190.0 205.0

As above but more lime content..... 205.0 223.0

As above but more silty..... 223.0 235.0

Sand, slightly silty, pale brown; sand is very fine
 to coarse with much medium; more coarse sand below
 240 ft..... 235.0 245.0

Sand, gravelly; very fine sand to fine gravel; contains rounded, brown and olive siltstone fragments in parts.....	245.0	262.0
Silt, moderately clayey, moderately sandy, brown and olive; sand grains are very fine.....	262.0	265.0
Sand, gravelly; very fine sand to fine gravel.....	265.0	273.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation: Whitney Member		
Siltstone, moderately clayey, yellowish-brown to brown.....	273.0	295.0
As above but slightly limy and probably mostly volcanic material (interpreted as the Lower Ash from electric log).		
Tertiary System - Oligocene Series - White River Group:		
Brule Formation: Orella Member		
Siltstone, moderately clayey, slightly sandy, yellowish-brown to brown; sand is very fine.....	300.0	330.0

Test Hole #43-B-53 (E-log)
(17N-47W-18dddd)
Morrill County

Location: SE SE SE SE sec. 18, T. 17 N., R. 47 W., 29 ft north and 60 ft west of southeast corner of section.
 Ground elevation: 4093 ft. (t). (Fairchild Ranch 7.5 min. quadrangle)
 Depth to water: Hole open to 311 ft. with no water cut (Sept. 7, 1953). Electric log indicates this depth may be about the water level.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, slightly sandy, dark grayish-brown.....	0.0	1.5
Silt, slightly clayey, dark grayish-brown to olive-brown.....	1.5	2.5
Silt, slightly sandy, pale yellow; sand is very fine to fine; thin layers of reworked Ogallala sandstone fragments at base of interval.....	2.5	5.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, slightly to well-consolidated, light brown to white; sand is very fine to fine; very limy in parts; siliceous cement in parts.....	5.0	40.0
Volcanic ash, gray to white; limy in parts.....	40.0	45.0
Sandstone, slightly to well-consolidated, mostly pale brown; sand is very fine to fine with some medium in parts; very limy in parts; moderately to very silty in parts.....	45.0	74.0
Silt, moderately sandy, light brown; sand is very fine to fine.....	74.0	78.0
Sandstone, slightly silty, light brown; sand is very fine to fine; very limy from 80 to 83 ft.....	78.0	85.0
Silt, clayey, sandy in parts, brown and pinkish-gray	85.0	94.0
Sandstone, very fine to fine-grained, light brown; very limy at base.....	94.0	104.0
Silt, slightly clayey, brown.....	104.0	107.0
Sandstone, very fine to medium-grained, brown and pinkish-gray; very limy below 110 ft.; no medium sand and moderately silty below 115 ft.....	107.0	123.0
Siltstone, clayey (bentonitic?), very pale brown....	123.0	125.0
Silt, slightly clayey, grading downward to very sandy, pale green and pale brown; sand is very fine to fine.....	125.0	130.0
Sandstone, fine to very coarse grained, slightly consolidated; limy in parts below 140 ft.....	130.0	145.0
Sandstone, slightly silty, with some interbedded light brown and olive silt; sand is very fine to fine; limy in parts; some medium sand below 170 ft	145.0	180.0

Sandstone, moderately to very silty, light brown; sand is very fine to fine; limy in upper part.....	180.0	188.0
Silt, sandy, brown; sand is very fine; slightly clayey from 190 to 195 ft.....	188.0	205.0
Sandstone, fine to very coarse grained.....	205.0	210.0
Sand, fine to very coarse with some fine gravel.....	210.0	215.0
Sand and gravel; mostly coarse sand to fine gravel with some medium gravel.....	215.0	224.0
Sand, mostly very silty, brown and olive; sand is very fine to fine but with some medium to very coarse from 227 to 230 ft.; very sandy silt below.	224.0	235.0
Sand and sandstone, mostly medium to very coarse grained; gravelly (fine gravel) below 240 ft.....	235.0	244.0
Silt, very sandy, brown; sand is very fine to fine..	244.0	250.0
Limestone, sandy, silty and limy sandstone, light gray to light brown; sand is very fine to fine....	250.0	258.0
Sand, slightly silty, brown; sand is very fine to fine; slightly clayey from 260 to 265 ft.....	258.0	270.0
Sand, gravelly; medium sand to fine gravel.....	270.0	278.0
Limestone, sandy, silty and limy sandstone, white to light brown; sand is very fine.....	278.0	293.0
Sand and sandstone, very fine to very coarse grained; lime-cemented and silty in parts.....	293.0	370.0
Sand, very fine to coarse; less coarse sand from 420 to 450 ft.; no coarse sand below 450 ft.....	370.0	460.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation:		
Interbedded sand, silty sand; and sandy silt, light brown and light olive-gray; sand is very fine to fine except from 494 to 495 ft., where it is fine to coarse; lime-cemented in parts; thickest bed is about 4 ft., most are 2 ft. or less.....	460.0	510.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member:		
Siltstone, slightly clayey, yellowish-brown to brown.....	510.0	550.0

Test Hole #26-WB-68 (E-log)
(17N-48W-18cccc)
Morrill County

Location: SW SW SW SW sec. 18, T. 17 N., R. 48 W., 180 ft. north and
 130 ft. east of southwest corner of section.
 Ground elevation: 4182 ft. (t). (Dalton 7.5 min. quadrangle).
 Depth to water: 297 ft. (May 20, 1968).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
No sample.....	0.0	4.0
Tertiary System - Miocene Series - Ogallala Group:		
Siltstone, sandy, limy, white to pale yellow; sand is very fine to fine.....	4.0	7.0
Sandstone, silty, clayey in parts, mostly light brown; very fine to medium sand; limy in parts....	7.0	22.0
Siltstone, very sandy and very silty sandstone, brown and light brown; sand is very fine to fine; contains some thin beds of silt and clayey silt; limy in parts.....	22.0	52.0
Sandstone, silty, light brown to white; sand is very fine to fine with some medium; limy in parts.....	52.0	69.0
Sand, fine to very coarse; some fine gravel in lower part.....	69.0	81.0
Sandstone, limy, silty and sandy, silty limestone, white; opalized in parts.....	81.0	92.0
Siltstone, very sandy, clayey in parts, mostly light brown; sand is very fine; limy in parts.....	92.0	128.0
Sand, very fine to fine but grading downward to very coarse with trace of fine gravel; slightly consolidated in upper part.....	128.0	140.0
Siltstone, moderately to very sandy, light yellowish- brown; sand is very fine to fine.....	140.0	149.0
Sand, mostly medium to coarse; silty in parts and with some silt seams.....	149.0	154.0
Silt, sandy (electric log).....	154.0	159.0
Sandstone, very fine to fine-grained with trace of medium sand, light brown to light gray; silty and limy in parts.....	159.0	176.0
Siltstone, moderately to very sandy, light brown; sand is very fine to fine.....	176.0	185.0
Sandstone, very silty, light brown; limy in parts...	185.0	194.0
Siltstone, moderately to very sandy, light brown....	194.0	206.0
Sandstone, slightly silty, light brown; sand is very fine to fine; very silty in parts, lower part generally more silty than upper part.....	206.0	229.0
Silt, sandy, clayey, light brown.....	229.0	238.0
Sandstone, silty, light brown; sand is very fine to fine.....	238.0	245.0

Siltstone, very sandy, light brown.....	245.0	248.0
Sandstone, moderately silty, light brown; very silty in parts.....	248.0	268.0
Siltstone, moderately to very sandy, clayey, mostly light brown; sand is very fine to fine.....	268.0	322.0
Silt, very sandy, probably clayey with some interbedded silty clay, mostly light brown; sand is very fine to very coarse.....	322.0	327.0
Sand, mostly medium to very coarse; slightly silty in uppermost 6 ft. and contains fine gravel in lower part.....	327.0	344.0
Silt, clayey, sandy, mostly light brown.....	344.0	362.0
Sand, mostly medium to coarse, some fine and very coarse sand, trace fine gravel; silty in upper 4 ft. and in lower part.....	362.0	377.0
Silt, clayey, sandy; more sandy in lower part.....	377.0	384.0
Sand, mostly medium to very coarse with some fine sand and gravel; silty and clayey in parts; probably contains some clayey silt seams and reworked fragment of siltstone and claystone, colors of these materials are greens, browns, and reds.....	384.0	406.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation:		
Silt, sandy, clayey with interbedded clay or claystone and sand; sand mostly very fine to medium but contains some coarse; colors are mostly brown but also has reddish brown and green.....	406.0	422.0
Sandstone, silty, light brown; sand mostly very fine to fine; limy in parts; contains thin beds of silt	422.0	432.0
Sand, very fine to very coarse; silty in parts and with thin beds of light brown and gray sandy silt and greenish clay; complexly bedded.....	432.0	450.0
Gravel, sandy, silty, limy; gravel consists mostly of pieces of quartz, siltstone, and claystone.....	450.0	460.0
Siltstone, very sandy, very hard, light brown with some white (basal part of Ogallala Group of top of Brule Formation).....	460.0	469.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, clayey, slightly sandy, light yellowish-brown to brown; sand is very fine.....	469.0	502.0

Test Hole #28-B-53 (No e-log)
(17N-50W-14dddc)
Morrill County

Location: SW SE SE SE sec. 14, T. 17 N., R. 50 W., approximately
 22 ft north and 570 ft west of southeast corner.
 Ground elevation: 4321 ft. (t). (Mud Springs 7.5 min. quadrangle).
 Depth to water: test hole caved or plugged at 242 ft. (August 4,
 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, sandy silt, and silty sand.....	0.0	3.5
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty in parts, mostly light brown; sand very fine to fine with medium in parts; limy from 3.5 to 10 ft.; contains root casts in parts.....	3.5	24.0
Silt, sandy, very limy, white to light green.....	24.0	29.0
Sandstone, very fine to fine-grained with trace of coarser grains; moderately limy for most of interval; more medium to coarse sand below 78.5 ft.	29.0	80.0
Sand and gravel, fine sand to fine gravel; silty and limy in parts.....	80.0	85.0
Sandstone, silty, moderately to very limy; poorly sorted sediments, sand mostly very fine to medium but contains coarser sand and gravel in parts.....	85.0	125.0
Sand and gravel, fine sand to fine gravel, limy.....	125.0	135.0
Sandstone, silty, limy; sand is mostly very fine to fine but contains some coarser sand and gravel.....	135.0	150.0
Sand and gravel, mostly coarse sand to fine gravel; less gravel and probably silty from 150 to 155 ft.; some medium gravel below 160 ft.....	150.0	163.0
Silt, slightly clayey, sand in parts, mostly pinkish-gray; limy in parts; top 2 ft. very sandy..	163.0	180.0
Sandstone, slightly silty, mostly very limy; mostly light gray with greenish tint in parts; sand is very fine to fine; grades to sandy, silty limestone in parts between 185 to 195 ft.; moderately to very silty below 206 ft.....	180.0	220.0
Silt, moderately clayey, slightly sandy in parts, brown to reddish-yellow; non- to slightly clayey in parts; sand is very fine; slightly limy below 250 ft.....	220.0	260.0
Sand, slightly silty, light brown; sand is very fine; siltier below about 210 ft., slightly limy.....	260.0	285.0
Sandstone, silty, limy and limestone, silty, sandy...	285.0	296.0
Interbedded silt, clayey, sandy and sand, silty, clayey, brown; pinkish-gray from 296 to 302 ft.; moderately limy from 300 to 302 ft. and from 305 to 310 ft.....	296.0	320.0

Silt, slightly sandy, mostly light green; sand is very fine to fine.....	320.0	325.0
Sand, fine to very coarse, with some thin sandy silt layers.....	325.0	333.0
Silt, very sandy, light brown; sand is fine to coarse	333.0	340.0
Sand and gravel, mostly coarse sand to fine gravel...	340.0	360.0
Interbedded sand, fine to very coarse and sandy silt.	360.0	370.0
Sand and gravel, medium sand to medium gravel; only trace of medium gravel from 370 to 380 ft.; contains interbedded sandy silt below 388 ft.....	370.0	395.0
Sand and gravel, fine sand to fine gravel; contains less fine sand below 410 ft.....	395.0	420.0
Sand, very fine to very coarse, silty in parts.....	420.0	435.0
Silt, very clayey, light green.....	435.0	440.0
Silt, slightly clayey, slightly sandy, light gray with yellow mottling; limy in parts (basal Ogallala? or Lower Ash of Whitney?).....	440.0	445.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member:		
Siltstone, slightly clayey, slightly granular, brown.	445.0	470.0

Test Hole #38-B-81 (E-log)
(17N-52W-11adac)
Morrill County

Location: SW NE SE NE sec. 11, 17 N., R. 42 W., approximately 1810 ft. south and about 450 ft. west of northeast corner of section.
 Ground elevation: 4520 ft. (t). (Potter 2 NE 7.5 min. quadrangle)
 Depth to water: test hole caved at 276 ft. (September 9, 1981).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	1.0
Tertiary System - Miocene Series - Ogallala Group:		
Siltstone, moderately sandy grading downward to very sandy, limy, light yellowish-brown; sand is very fine to fine.....	1.0	5.0
Sandstone, slightly silty, brown; sand is very fine to medium with some coarser sand grains and fine gravel; slightly limy at top and base and with some siliceous cement in parts.....	5.0	32.0
Sand, gravelly, silty; sand is mostly medium to very coarse; gravel is fine; less gravel below 35 ft....	32.0	40.0
Sand and gravel; fine sand to medium gravel.....	40.0	45.0
Gravel, sandy; medium sand to coarse gravel.....	45.0	51.0
Silt, sandy, clayey, yellowish-red; sand is very fine to fine with some coarser grains.....	51.0	53.0
Sandstone, mostly very silty, with some interbedded sandy silt, reddish-yellow, light brown, and light yellowish-brown; sand very fine to fine with some medium and trace of coarser grains; limy in parts..	53.0	100.0
Sandstone, slightly silty, limy parts; brown; sand is fine to coarse with some very fine and very coarse.....	100.0	105.0
Sandstone, non- to consolidated, yellowish-brown and brown; sand is medium to very coarse with some very fine and fine; silty from about 108 to 113 ft.; trace of fine gravel below 110 ft.....	105.0	121.0
Sand, very silty fine to fine with, slightly limy in parts from 121 to 130 ft. and from 134-135 ft.; very limy below 143 ft.....	121.0	145.0
Sand, very fine to very coarse; trace fine gravel below 150 ft.....	145.0	155.0
Volcanic ash, white.....	155.0	156.0
Sandstone, very silty, slightly limy, light brown....	156.0	160.0
Silt, moderately sandy, mostly brown; sand is very fine with some fine; silty sand layer from 168 to 170 ft.....	160.0	175.0
Sand, very fine to very coarse with trace of fine gravel.....	175.0	188.0

Sand, very silty, light brown; sand is very fine with some coarse grains; slightly limy.....	188.0	201.0
Sand, slightly silty; sand is very fine to very coarse with trace of very coarse; limy in parts.....	201.0	207.0
Sandstone, very silty, limy, pale yellow and pale olive; sand is very fine.....	207.0	218.0
Sand, very fine to coarse with some very coarse; slightly finer below 225 ft.....	218.0	228.0
Sand, very silty, and some interbedded sandy silt, mostly pale olive; sand is very fine to medium; clayey in top foot; limy and with only very fine sand below 238 ft.....	228.0	240.0
Sand, slightly silty; sand grades from very fine to fine downward to very fine to coarse; very silty from about 247 to 252 ft.....	240.0	256.0
Silt, very sandy, grading downward to very silty sand, pale olive; sand is very fine to fine.....	256.0	266.0
Silt, slightly clayey, moderately sandy, pale yellow; sand is very fine.....	266.0	272.0
Sand, slightly silty, pale olive; sand is mostly very fine to medium; more silty from 279 to 281 ft. and below 294 ft.....	272.0	295.0
Volcanic ash, light gray.....	295.0	302.0
Sand, very fine to medium with trace of coarse to very coarse; silty in parts.....	302.0	313.0
Silt, very sandy, pale yellow and brown; sand mostly very fine to fine with some medium sand to fine gravel; more coarse grains near base; limy in parts	313.0	318.0
Silt, slightly clayey, slightly sandy, pale olive and pale brown; sand is very fine; more sandy from 316-320 ft.; limy in parts from 330 to 335 ft.....	318.0	339.0
Sand, very fine to very coarse with trace of fine gravel.....	339.0	345.0
Sand, silty, with some interbedded sandy silt; sand is very fine to medium with some coarser grains....	345.0	350.0
Sand, mostly very fine to very coarse with trace of fine gravel; silty in parts.....	350.0	369.0
Sand, very silty, limy, very pale brown; sand is very fine to medium.....	369.0	371.0
Sand, very fine to very coarse with trace of fine gravel; silty in parts and with some thin beds of sandy silt.....	371.0	382.0
Siltstone, sandy and gravelly in parts, limy in parts, pale yellowish-brown (possibly weathered Whitney with crack and/or burrow fillings).....	382.0	388.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, slightly clayey, slightly sandy, yellowish-brown; sand is very fine.....	388.0	440.0

Test Hole #27-B-53 (E-log)
(17N-52W-14dddd)
Morrill County

Location: SE SE SE SE sec. 14, T. 17 N., R. 52 W., approximately
 15 ft. north and 128 ft. west of southeast corner of section.
 Ground elevation: 4551 ft. (t). (Potter 2 NE 7.5 min. quadrangle).
 Depth to water: approximately 280 ft. (July 27, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil and sandy silt, dark gray at top, yellowish-gray below.....	0.0	10.0
Gravel composed mostly of angular fragments of local rock.....	10.0	16.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to medium; slightly consolidated from 16 to 20 ft.; limy, clayey silt bed from 28 to 30 ft.....	16.0	47.0
Sandstone, very fine to fine-grained grading downward to fine- to coarse-grained; silty and limy in parts	47.0	67.0
Sand and gravel; mostly medium sand to fine gravel...	67.0	77.0
Silt, very sandy, limy in part.....	77.0	84.0
Sand and gravel; fine sand to fine gravel.....	84.0	108.0
Sand, very fine to very coarse with some fine gravel.	108.0	119.0
Sandstone, silty; sand very fine to coarse; limy in parts.....	119.0	135.0
Gravel and sand; mostly coarse sand to medium gravel; lime-cemented in parts and grades to silty, sandy, gravelly limestone below 165 ft.....	135.0	170.0
Sandstone, slightly silty to, in parts, very silty; sand mostly, very fine to fine; very to moderately limy in most parts.....	170.0	202.0
Sand and gravel; mostly medium sand to fine gravel; contains sandy silt beds at about 241 to 243 ft., 249 to 252 ft., 256 to 259 ft., 263 to 265 ft., and 268 to 270 ft.; silty in parts below 270 ft.....	202.0	280.0
Silt, very sandy, light brown; sand is very fine to fine.....	280.0	284.0
Sand, fine to very coarse.....	284.0	290.0
Sand, gravelly; fine sand to fine gravel; contains two thin sandy silt beds below 305 ft.....	290.0	310.0
Sand, fine to very coarse.....	310.0	315.0
Sand and gravel; mostly coarse sand to medium gravel; slightly finer and silty below 330 ft.....	315.0	335.0
Silt, very sandy.....	335.0	342.0
Sand and gravel; fine sand to fine gravel; slightly silty grading downward to very silty below 355 ft..	342.0	360.0
Silt, moderately clayey, light olive-gray.....	360.0	365.0
Sand, gravelly; fine sand to fine gravel.....	365.0	368.0

Silt, slightly sandy, brown; sand is very fine; more sandy with depth and grades downward to silty sand.	368.0	380.0
Sand, fine to very coarse.....	380.0	390.0
Sand and gravel; mostly medium sand to fine gravel; limy in parts.....	390.0	398.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, slightly clayey, slightly sandy, yellowish- brown; sand is very fine.....	398.0	420.0

Test Hole #50-B-53 (E-log)
(18N-46W-18cbbb)
Morrill County

Location: NW NW NW SW sec. 18, 18 N., R. 46 W., approximately 58 ft. south of half-section line and 7 ft. east of west section line.
 Ground elevation: 3,642 ft. (t). (Tar Valley SW 7.5 min. quadrangle)
 Depth to water: 87.2 ft (September 7, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	2.0
Sand, silty, yellowish-gray; sand is very fine to medium.....	2.0	5.0
Silt, very sandy, yellowish-gray; sand is very fine to fine.....	5.0	12.0
Sand, silty, yellowish-gray; sand is very fine to fine.....	12.0	20.0
Silt, sandy and sand, very silty; sand is very fine to fine.....	20.0	30.0
Sand and gravel; fine sand to fine gravel.....	30.0	34.0
Silt, sandy and clayey in parts, light brown; sand is very fine.....	34.0	40.0
Interbedded sand, gravel, sandy silt, and clayey silt; silt predominant from 41 to 44 feet and from 50 to 54 ft.....	40.0	60.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, moderately clayey, brown.....	60.0	70.0
Siltstone, slightly clayey, light brown (Upper Ash?).	70.0	73.0
Siltstone, moderately clayey, slightly sandy, brown..	73.0	100.0

**Test Hole #51-B-53 (No e-log)
(18N-46W-30cccc)
Morrill County**

Location: SW SW SW SW sec. 30, 18 N., R. 46 W., 168 ft. north and 8 ft. east of southwest corner of section.
 Ground elevation: 3,500 ft. (t). (Lisco NW 7.5 min. quadrangle).
 Depth to water: 5.9 ft. (September 5, 1953).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	1.0
Sand, silty, clayey in parts, brownish-gray; sand is very fine to fine; below 5 ft.; light yellowish-gray and some medium sand.....	1.0	8.0
Sand and gravel; medium sand to medium gravel with some coarse gravel; contains some siltstone and sandstone lithic fragments from 15 to 30 ft.; finer grained below 40 ft.....	8.0	50.0
Sand, fine to very coarse with trace of fine gravel..	50.0	65.0
Sand and gravel; medium sand to coarse gravel.....	65.0	85.0
Gravel, sandy; medium sand to coarse gravel.....	85.0	90.0
Sand and gravel; medium sand to fine gravel; medium and coarse gravel below 95 ft.....	90.0	110.0
Sand and gravel; fine sand to fine gravel; medium sand to medium gravel 115 to 120 ft.....	110.0	130.0
Sand, fine to very coarse.....	130.0	135.0
Sand and gravel; medium sand to fine gravel.....	135.0	140.0
Gravel, sandy; medium sand to coarse gravel; sandy silt from 146 to 147 ft.; contains some rounded sandstone and siltstone clasts.....	140.0	154.0
Silt, sandy, brown; sand is mostly very fine to fine; contains some lime-cemented sandstone pieces and small amount of sand and gravel; silt contains volcanic glass shards indicating most of sample may be from block of White River Group silt.....	154.0	160.0
Sand and gravel; medium sand to medium gravel; contains gravel pieces reworked from Ogallala and White River Group rocks.....	160.0	172.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, brown.....	172.0	180.0
Lost circulation, no sample return.....	180.0	185.0

Test Hole #49-B-53 (E-log)
(18N-47W-5abdd)
Morrill County

Location: SE SE NW NE sec. 5, 18 N., 47 W., approximately 1100 ft. south and 1600 ft. west of northeast corner of section.
 Ground elevation: 3550 ft. (t). (Broadwater 7.5 min. quadrangle).
 Depth to water: 16.7 ft. (September 7, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, very sandy; sand is very fine to medium.....	0.0	1.0
Sand and gravel composed mostly of rounded Brule fragments.....	1.0	4.0
Silt, moderately sandy, brown; sand is very fine to fine; contains a thin dark gray layer between 10 and 15 ft.....	4.0	15.0
Sand and gravel, medium sand to medium gravel.....	15.0	20.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, brown.....	20.0	50.0

Test Hole #23-A-53
(18N-47W-8cbbb)
Morrill County

Location: NW NW NW SW sec. 8, T. 18 N., R. 47 W, 91 ft. south of half section line and 8 ft. east of west section line.

Ground elevation: 3546 ft (t). (Broadwater 7.5 min. quadrangle).

Depth to water: 5.8 ft (September 20, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill, soil, and brown silt.....	0.0	2.0
Clay, silty, light brown and brownish-gray.....	2.0	4.0
Silt, slightly clayey, slightly sandy, light brownish-gray.....	4.0	6.0
Silt, slightly clayey, medium to dark gray; sand is very fine; much organic material.....	6.0	11.0
Sand and gravel; fine sand to medium gravel; coarser from 20 to 30 ft.; contains rounded Brule siltstone fragments from 35 to 45 ft.; fine sand to fine gravel below 40 ft.....	11.0	65.0
Sand, fine to very coarse, with trace of fine gravel.	65.0	70.0
Sand and gravel; fine sand to fine gravel; coarser from 75 to 85 ft.....	70.0	105.0
Sand and gravel; medium sand to medium gravel with some coarse gravel.....	105.0	120.0
Gravel, sandy; medium sand to coarse gravel.....	120.0	172.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, slightly sandy, light brown, brown, and yellowish-brown.....	172.0	180.0
Siltstone, moderately clayey, pinkish gray.....	180.0	200.0

Test Hole #22-A-53 (E-log)
(18N-47W-20bccc)
Morrill County

Location: SW SW SW NW sec. 20, 18 N., R. 47 W., 30 ft. north of half section line and 27 ft. east of west section line.
 Ground elevation: 3603 ft. (t). (Broadwater 7.5 min. quadrangle).
 Depth to water: 42 ft. (September 20, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, silty, brownish-gray; sand is very fine to medium.....	1.0	4.0
Sand and gravel; medium sand to coarse gravel; contains many sandstone fragments; silty in parts from 5 to 7 ft.....	4.0	10.0
Sand, fine to very coarse with a trace of gravel; some thin silt layers from 10 to 15 ft.; contains some sandstone fragments.....	10.0	25.0
Gravel and sand; coarse sand to fine gravel; principally sandstone fragments.....	25.0	30.0
Sand, very fine to coarse; coarser from 30-35 ft.; finer from 45 to 50 ft.; contains some sandstone fragments.....	30.0	65.0
Sand and gravel; fine sand to fine gravel.....	65.0	70.0
Sand, fine to very coarse.....	70.0	80.0
Sand and gravel; medium sand to medium gravel; contains Brule siltstone fragments.....	80.0	85.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, brown and light brown....	85.0	120.0

Test Hole #1-L-34 (No e-log)
(18N-47W-22baaa)
Morrill County

Location: NE NE NE NW sec. 22, T. 18 N., R. 47 W., no footages recorded.

Ground elevation: Approximately 3521 ft. (Tar Valley SW 7.5 min. quadrangle).

Depth to water: Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sandy loam.....	0.0	2.0
Silt, clayey, light colored.....	2.0	5.0
Silt, clayey, dark gray.....	5.0	9.0
Gravel, sandy, bluish.....	9.0	12.0
Gravel, sandy; contains Brule siltstone fragments in parts.....	12.0	81.0
Sand, mostly coarse.....	81.0	125.0
"Layers of hard rock and sand"	125.0	148.0

Test Hole #46-B-53 (E-log)
(18N-48W-7daaa)
Morrill County

Location: NE NE NE SE sec. 7, T. 18 N., R. 48 W., approximately 2400 ft. north and 8 ft. west of southeast corner of section.
 Ground elevation: 3699 ft. (t). (Broadwater SW 7.5 min. quadrangle)
 Depth to water: 64 ft. (September 7, 1953).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.1	1.0
Sand, slightly silty; sand is very fine to medium....	1.0	5.0
Sand, fine to coarse with trace of very coarse.....	5.0	8.0
Sand and gravel; fine sand to medium gravel.....	8.0	15.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, moderately silty, light brown; sand is very fine to fine with some medium; less silty below 20 ft....	15.0	25.0
Sand, very fine to medium.....	25.0	36.0
Sandstone, slightly silty, pale olive; sand is very fine to fine with some medium; lime-cemented with some iron-oxide stain in upper part; contains root casts.....	36.0	40.0
Sand and gravel; fine sand to fine gravel with some medium gravel below 45 ft.; contains some interbedded silty sand below 50 ft.....	40.0	55.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, brown and light brown.....	55.0	100.0

Test Hole #44-B-53 (E-log)
(18N-48W-19adda)
Morrill County

Location: NE SE SE NE sec. 19, T. 18 N., R. 48 W., 503 ft. north of
 half-section line and 5 ft. west of east section line.
 Ground elevation: 3857 ft. (t). (Broadwater SW 7.5 min. quadrangle)
 Depth to water: 108.5 ft. (September 7, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	1.0
Sand, silty; sand is fine to medium.....	1.0	5.0
Sand, fine to coarse.....	5.0	8.0
Sand, silty, light yellowish-gray; sand is very fine to fine.....	8.0	10.0
Sand, fine to coarse; trace very coarse sand below 15 ft.....	10.0	20.0
Sand, very fine to medium.....	20.0	25.0
Sand very fine to fine, silty, with small amount of interbedded sand and gravel.....	25.0	35.0
Sand and gravel; medium sand to medium gravel; silty in upper 2 ft. and from 42 to 44 ft.....	35.0	54.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty, limy, light gray; sand is very fine to fine.....	54.0	60.0
Sand, very fine to fine; silty in parts.....	60.0	70.0
Sand, fine to very coarse with trace of fine gravel..	70.0	75.0
Sand and gravel; medium sand to fine gravel with some medium gravel below 85 ft.....	75.0	87.0
Silt, moderately sandy, light brown; sand is very fine to fine.....	87.0	93.0
Sand and gravel; medium sand to medium gravel; more gravel below 105 ft.....	93.0	107.0
Sand, moderately silty, light brown; sand is very fine to fine.....	107.0	110.0
Sand and gravel; medium sand to medium gravel.....	110.0	116.0
Sand and sandstone, moderately silty, light brown; sand is mostly very fine to fine; lime-cemented in parts; light greenish gray below 134 ft.; clayey below 135 ft.....	116.0	136.0
Sand, medium to coarse; some very coarse sand and trace of gravel below 140 ft.....	136.0	146.0
Silt, very sandy, light brown; sand is very fine to fine.....	146.0	150.0
Sand, very fine to medium.....	150.0	155.0
Sand, fine to coarse; trace of very coarse sand below 165 ft.....	155.0	167.0

Sandstone, very silty, mostly light brown; sand is very fine to fine; lime-cemented from 194-195 ft., 203 to 205 ft., and in parts from 210 to 215 ft....	167.0	220.0
Silt, moderately sandy, light brown; sand is very fine to fine; limy in parts.....	220.0	230.0
Sand, fine to coarse; coarser below 235 ft.....	230.0	240.0
Sand and gravel; medium sand to fine gravel; contains a few thin silt layers.....	240.0	280.0
Sand, fine to very coarse; a few thin silt layers below 280 ft.....	280.0	294.0
Silt, slightly sandy, light brown, with some interbedded sand, fine to coarse.....	294.0	305.0
Interbedded sand, gravel, and silt; lime-cemented in parts.....	305.0	310.0
Sand, fine to very coarse with trace of fine gravel..	310.0	325.0
Sand and gravel; fine sand to fine gravel.....	325.0	330.0
Sand, fine to very coarse, and light brown sandy silt	330.0	335.0
Sand and gravel; fine sand to fine gravel; fine thin silt layers.....	335.0	340.0
Sand, fine to very coarse; a few thin silt layers....	340.0	347.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, pinkish-gray; light brown below 360 ft....	347.0	370.0

Test Hole #41-B-81 (E-log)
(18N-48W-35cadd)
Morrill County

Location: SE SE NE SW sec. 35, T. 18 N., R. 48 W., approximately 1540 ft. north and 2440 ft. east of southwest corner of section.
 Ground elevation: 3770 ft. (t). (Fairfield Ranch 7.5 min. quadrangle).
 Depth to water: 38.6 ft. (September 9, 1981).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	1.0
Gravel, sandy, with some interbedded sandy silt; medium sand to coarse gravel; most of the gravel composed of lime-cemented siltstone and sandstone fragments.....	1.0	17.0
Gravel and sand; medium sand to coarse gravel; much of the gravel is lime-cemented siltstone and sandstone fragments.....	17.0	39.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, brown; sand is very fine to very coarse.....	39.0	42.0
Silt, moderately clayey, slightly sandy, brown; sand is mostly very fine.....	42.0	47.0
Silt, slightly sandy grading downward to very sandy, mostly light brown; sand is very fine to medium with some coarser grains.....	47.0	51.0
Sand, medium to very coarse with some fine gravel....	51.0	70.0
Sand and gravel; medium sand to fine gravel.....	70.0	90.0
Sand, very fine to very coarse with trace of fine and medium gravel; contains a few thin silt layers from 90 to 110 ft.....	90.0	127.0
Silt, slightly clayey, very sandy, light brownish-gray, pale brown, and pale olive; sand is very fine to very coarse.....	127.0	135.0
Sandstone, slightly silty, pale brown; sand is very fine to medium.....	135.0	145.0
Sand, very fine to very coarse with trace of fine gravel, slightly silty; contains root casts and some lithic clasts from 145 to 155 ft.....	145.0	168.0
Sandy, siltstone and silty sandstone, lime-cemented in most parts, gray to pale brown; sand is mostly very fine to medium.....	168.0	172.0
Gravel, sandy, lime-cemented, gray; gravel mostly lithic clasts.....	172.0	174.0
Sandstone, very silty, limy, gray; sand is very fine to very coarse.....	174.0	176.0

Siltstone, moderately clayey, slightly sandy, pale yellow and pale olive sand is very fine; limy below 182 ft.....	176.0	183.0
Gravel, sandy, silty, limy, light olive-gray; gravel mostly composed of lithic clasts (possibly Ash Hollow Formation from 168 to 186 ft.....	183.0	186.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, moderately clayey, slightly sandy, light yellowish-brown to brown; sand is very fine.....	186.0	240.0

Test Hole #17-B-82 (E-log)
(18N-49W-34bbbc)
Morrill County

Location: SW NW NW NW sec. 34, T. 18 N., R. 49 W., 395 ft. south and 6 ft. east of northwest corner of section.
 Ground elevation: 3956 ft. (t). (Dalton 7.5 min. quadrangle).
 Depth to water: 68.2 ft. (August 4, 1982).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	3.0
Silt, slightly clayey, slightly mostly very fine with some fine and trace of medium.....	3.0	10.0
Sand and gravel, silty; very fine sand to fine gravel	10.0	12.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, moderately silty, brown and sandy silt; sand is mostly very fine to medium; coarser below 20 ft.....	12.0	22.0
Sand, gravelly; medium sand to fine gravel.....	22.0	27.0
Silt, slightly clayey, moderately sandy, mostly brown; sand is very fine to medium with some coarser grains from 27 to 35 ft.....	27.0	41.0
Sand, very fine to medium with trace of coarse.....	41.0	45.0
Sand, fine to very coarse with trace of fine gravel..	45.0	53.0
Silt, slightly clayey, very sandy, light brown and light olive-brown; sand is very fine to coarse.....	53.0	59.0
Sand, fine to coarse with some very coarse and trace of fine gravel; much medium to coarse sand.....	59.0	73.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, slightly clayey, slightly sandy, yellowish-brown to brown; sand is very fine; less sandy and slightly more clayey below 130 ft.; possibility of Upper Ash from 125 to 131 ft.....	73.0	200.0

Test Hole #30-B-53 (E-log)
(18N-50W-12bbbb)
Morrill County

Location: NW NW NW NW sec. 12, T. 18 N., R. 50 W., 60 ft. south and 18 ft. east of northwest corner of section.
 Ground elevation: 3814 ft. (t). (Courthouse Rock 7.5 min. quadrangle).
 Depth to water: 59 ft. (August 16, 1953).

Depth, in feet
 From To

Quaternary System, undifferentiated:

Soil.....	0.0	2.0
Sand, fine to very coarse.....	2.0	26.0
Gravel, sandy; fine sand to coarse gravel.....	26.0	35.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Orella Member

Siltstone, slightly clayey, yellowish-brown to brown.	35.0	108.0
Siltstone, mostly moderately clayey; reddish-brown 108 to 111 ft. and 115 to 120 ft.; pinkish-gray 111 to 115 ft., 120 to 130 ft., and 140 to 147 ft.; medium brown 130-140 ft.; light brown below 147 ft.; thin layer of very fine grained sandstone between 179 to 180 ft.....	108.0	185.0
Siltstone, very clayey and clay, silty; light brown from 185 to 200 ft.; reddish-brown 200 to 206 ft.; light greenish-gray 206 to 208 ft.; pinkish-gray below 208 ft.....	185.0	225.0
Siltstone, slightly clayey, light brown; light yellowish-gray below 310 ft.....	225.0	315.0
Silt, micaceous, light gray to greenish gray.....	315.0	317.0
Siltstone, slightly clayey, granular, light brown; volcanic ash bed from approximately 368 to 380 ft..	317.0	420.0

Tertiary System - Eocene Series - White River Group:

Chadron Formation:

Siltstone, very clayey, light brown with some light greenish-gray.....	420.0	435.0
Clay, silty, mostly light gray with greenish tint in parts.....	435.0	454.0
Clay, silty; light brownish-gray from 454 to 465 ft.; light yellowish-gray 460 to 465 ft.; light gray be- low 465 ft.; sandy below 470 ft.; sand is fine to coarse.....	454.0	472.0
Sand, clayey, light gray to white; sand is fine to very coarse.....	472.0	483.0
Clayey sand and clay, gray with greenish tint; iron- oxide from 483 to 485 ft.; some interbedded sand below 485 ft.....	483.0	490.0
Sand, medium to very coarse; clayey from 490 to 493 ft.....	490.0	495.0

Clay, silty, light bluish to greenish-gray, iron stained at top.....	495.0	498.0
Sand, very fine to fine, light silty in parts; some thin (less than 1 foot) clay layers below 517 ft...	498.0	527.0
Sand, medium to very coarse.....	527.0	530.0
Clay, sandy, light bluish- to greenish-gray; sand is fine to very coarse; some iron stain.....	530.0	536.0
Sand, medium to very coarse.....	536.0	542.0
Clay, sandy, light bluish- to greenish-gray.....	542.0	544.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Shale Formation:

Clay, mostly light olive-gray with some iron stain; some medium and dark gray from 544 to 545 ft., 556 to 560 ft., and below 565 ft.....	544.0	566.0
Clay, dark gray with trace of purple and dark red....	566.0	570.0

Test Hole #40-B-81 (E-log)
(18N-50W-23aaaa)
Morrill County

Location: NE NE NE NE sec. 23, T. 18 N., R. 50 W., 54 ft. south and 8 ft. west of northeast corner of section.
 Ground elevation: 3884 ft. (t). (Courthouse Rock 7.5 min. quadrangle).
 Depth to water: ?Plugged at 106 ft.? (September 9, 1981).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	3.0
Silt, very sandy, light brown to brownish-gray; sand is very fine to fine.....	3.0	13.0
Gravel, sandy; fine sand to medium gravel; some siltstone and sandstone fragments.....	13.0	31.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty, pinkish-brown and pale brown; sand is very fine to very coarse; contains some thin layers of siltstone.....	31.0	43.0
Sand and gravel; fine sand to fine gravel.....	43.0	45.0
Interbedded light brown siltstone, sand, and gravel; very fine sand to fine gravel.....	45.0	55.0
Sand and sandstone, very fine to very coarse grained with some very fine gravel; contains some thin beds of light brown siltstone.....	55.0	69.0
Siltstone, moderately sandy, light brown; sand is very fine to medium; limy and coarser grained below 73 ft.....	69.0	75.0
Sand, very fine to very coarse with some fine gravel; contains some thin silt beds and silty zones.....	75.0	85.0
Sand and gravel, poorly sorted; very fine sand to fine gravel; trace medium gravel below 90 ft.....	85.0	93.0
Interbedded light brown siltstone, sand, and gravel; very fine sand to fine gravel; contains reworked siltstone fragments; limy from 100 to 101 ft.....	93.0	103.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, slightly sandy, light yellowish-brown to brown; sand is very fine.....	103.0	135.0
Siltstone, moderately clayey, mostly slightly sandy, mostly light brown but with some yellowish-red, reddish-yellow, and reddish-brown layers; sand is very fine; contains some thin claystone seams in parts.....	135.0	150.0

Test Hole #29-B-53 (E-log)
(18N-50W-25cccd)
Morrill County

Location: SW SW SW SE sec. 25, T. 18 N., R. 50 W., 9 ft. north and
 2561 ft. west of southeast corner of section.
 Ground elevation: 4130 ft. (t). (Mud Springs 7.5 min. quadrangle).
 Depth to water: 145.8 ft. (August 16, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	1.0
Sand, moderately silty.....	1.0	3.0
Sand, very fine to fine; silty below 35 ft.....	3.0	44.0
Sand and gravel; fine sand to fine gravel; contains reworked sandstone fragments.....	44.0	47.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty, limy; sand is very fine to fine....	47.0	50.0
Silt, sandy, olive-gray; clayey and yellowish-brown from 50 to 51 ft.....	50.0	58.0
Sandstone, slightly silty, light brown; sand is very fine to medium; limy in parts.....	58.0	65.0
Silt, slightly clayey, pinkish-gray.....	65.0	70.0
Silt, sandy, pinkish-gray; sand is very fine to fine.	70.0	75.0
Sand, very silty, granular, brown; sand is very fine.	75.0	80.0
Sandstone, silty, limy, light brown; sand is very fine to fine.....	80.0	85.0
Siltstone, clayey in parts, light brown.....	85.0	90.0
Sandstone, slightly silty; sand is very fine to fine; limy in parts.....	90.0	99.0
Siltstone, sandy, light olive-gray and light brown...	99.0	105.0
Sand, moderately silty; sand is very fine to medium..	105.0	109.0
Sandstone, very fine to fine-grained with trace of medium grains; limy in parts.....	109.0	116.0
Silt, slightly sandy, brown; sand is very fine to fine.....	116.0	121.0
Silt, clayey, brown.....	121.0	125.0
Sand, fine to very coarse; cemented below 133 ft....	125.0	135.0
Sand and gravel; fine sand to fine gravel; silty in parts.....	135.0	140.0
Sandstone, lime-cemented; sand is very fine to fine..	140.0	148.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, brown; electric log indicates Upper Ash possible from 212 to 221 ft.....	148.0	300.0

Test Hole #39-B-81 (E-log)
(18N-50W-27bcdd)
Morrill County

Location: SE SE SW NW sec. 27, 18 N., R. 50 W., 6.5 ft. north of half-section line and about 1085 ft. east of west section line.
 Ground elevation: 3890 ft. (t). (Courthouse Rock 7.5 min. quadrangle).
 Depth to water: 10.8 ft. (September 9, 1981).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	3.0
Sand, gravelly, very silty; fine sand to medium gravel	3.0	7.0
Sand and gravel; fine sand to medium gravel; trace of coarse gravel below 20 ft.; contains reworked sandstone and siltstone fragments.....	7.0	30.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, slightly clayey, slightly sandy, light yellowish-brown to brown; sand is very fine; below 60 ft. lighter colored and very ashy (Lower Ash)?..	30.0	64.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, moderately clayey, slightly sandy, light yellowish-brown to brown; sand is very fine.....	64.0	100.0

Test Hole #26-B-53 (E-log)
(18N-52W-24bbbb)
Morrill County

Location: NW NW NW NW sec. 24, T. 18 N., R. 52 W., 46 ft. south and 28 ft. east of northwest corner of section.
 Ground elevation: 4025 ft (t). (Redington 7.5 min. quadrangle).
 Depth to water: 45.5 ft (July 26, 1953).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty; sand is very fine to medium....	0.0	3.0
Silt, sandy, grayish-brown; sand is very fine to fine; more sand and light brown below 10 ft.....	3.0	15.0
Sand, medium to coarse with trace of very coarse.....	15.0	20.0
Sand, fine to medium.....	20.0	25.0
Sand, fine to very coarse with some fine gravel.....	25.0	30.0
Sand and gravel; medium sand to medium gravel.....	30.0	33.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, slightly clayey, light yellowish-brown to brown; very pale brown below 45 ft. (electric log indicates Lower Ash from about 45 to 54 ft).....	33.0	54.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, light yellowish-brown to brown; slightly granular from 54 to 85 ft. and more granular below 85 ft.; much drilling fluid loss from 54 to 70 ft. and below 80 ft. with less loss 70 to 80 ft.....	54.0	100.0

Test Hole #12-B-82 (E-log)
(19N-47W-8cccc)
Morrill County

Location: SW SW SW SW sec. 8, T. 19 N., R. 47 W., 68 ft. north and 64 ft. east of southwest corner of section.
 Ground elevation: 4019 ft. (t). (Broadwater NE 7.5 min. quadrangle)
 Depth to water: 170.2 ft. (July 6, 1982).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil and sand, moderately silty, dark grayish-brown; sand is very fine to fine.....	0.0	7.0
Sand, moderately silty, light brown to yellowish-brown; sand is very fine to fine with trace of medium.....	7.0	14.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand, very fine to very coarse with some fine and trace of medium gravel.....	14.0	17.0
Silt, slightly clayey, slightly sandy, pale yellow; sand is very fine.....	17.0	19.0
Sand, very fine to very coarse with trace of gravel..	19.0	28.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, moderately sandy, light yellowish-brown; sand is very fine.....	28.0	32.0
Sandstone, very silty, mostly yellowish-brown; sand is very fine; some iron stain below 40 ft.....	32.0	45.0
Siltstone, very sandy, yellowish-brown to brown; top 0.5 ft. of interval is pale yellow clayey silt; sand is very fine.....	45.0	58.0
Sandstone, very silty, light yellowish-brown; sand is very fine; less silty with depth; some hard limy concretions below 63 ft.....	58.0	85.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, moderately silty, light brownish-gray, light grayish-brown, and some brown; sand is mostly very fine, with some fine; hard lime-cemented zones occur throughout the interval.....	85.0	184.0
Limestone, sandy, white to gray; includes thin ash seam in lower foot.....	184.0	186.0
Tertiary System - Oligocene Series - Arikaree Group:		
Gering Formation		
Silt, sandy, grayish-brown.....	186.0	189.0
Sandstone, silty, very pale brown; sand is very fine; lime-cemented; hard; some drilling fluid loss 190 to 195 ft.....	189.0	195.0

No sample; electric logs indicate very sandy silt grading downward to sand, probably very fine.....	195.0	200.0
Sandstone, very fine to fine grained, mostly light gray with some grayish-brown; silty in parts below 215 ft.; intermittent, hard, lime-cemented zones below 210 ft.; some medium sand below 220 ft.....	200.0	230.0
Sand and sandstone, mostly brown; sandy mostly very fine.....	230.0	254.0
Silt, very sandy, very fine to fine sand; gray and limy.....	254.0	262.0
Mostly silt, very sandy, brown; sand is very fine to fine; contains sand-size particles of claystone....	262.0	267.0
Silt, very sandy, limy, gray; sand is very fine to fine with trace of medium to coarse.....	267.0	270.0
Silt, very sandy; sand is very fine to coarse; colors include gray, bluish-gray, olive and brown; contains rounded, sand-size particles of claystone and pumice.....	270.0	284.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Siltstone, ranges from slightly to very sandy, light yellowish-brown to light brown; sand is very fine; limy concretions in most parts; contains some rounded claystone particles from 294-300 ft.....	284.0	314.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, slightly sandy, yellowish-brown; sand is very fine.....	314.0	328.0
Siltstone, slightly sandy, yellowish-brown interbedded with three silty sand beds less than one foot thick; sand is very fine; contains rounded claystone particles.....	328.0	340.0
Sand, very silty, yellowish-brown; sand is very fine with some fine; heavy dark minerals common.....	340.0	344.0
Silt, slightly sandy, yellowish-brown; sand is very fine with some fine; contains some rounded claystone particles; some drilling fluid loss.....	344.0	349.0
Sand, ranges from slightly to very silty, mostly yellowish-brown; sand mostly very fine to fine; trace of medium sand from 360 to 370 ft.; dark minerals common to, in parts, abundant; contains rounded claystone particles in parts.....	349.0	380.0
Siltstone, slightly sandy, yellowish-brown to brown; sand is very fine.....	380.0	440.0
Siltstone, very ashy, light yellowish-brown (Upper Ash).....	440.0	444.0
Siltstone, slightly sandy, yellowish-brown to brown; sand is very fine.....	444.0	470.0

Test Hole #13-B-82 (E-log)
(19N-47W-12ddda)
Morrill County

Location: NE SE SE SE sec. 12, 19 N., R. 47 W., 374 ft. north and 36 ft. west of SE corner of section.
 Ground elevation: 3994 ft. (t). (Tar Valley 7.5 min. quadrangle).
 Depth to water: 143.7 ft. (July 26, 1982).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	5.0
Silt, very sandy, light brown; sand is very fine to fine with a trace of medium.....	5.0	8.0
Tertiary System - Pliocene Series:		
Broadwater Formation		
Sand, very fine to very coarse; slightly gravelly at top grading downward to trace of gravel; gravel is fine.....	8.0	18.0
Sand, slightly to, in parts, very silty, mostly light brownish-gray with some brown, gray, and olive-gray; sand is very fine to medium with trace of coarse; some interbedded very sandy silt; some iron stain below 45 ft.....	18.0	47.0
Sand, gravelly; fine sand to fine gravel; trace of medium gravel below 65 ft.; some drilling fluid loss from 60 to 65 ft.....	47.0	70.0
Tertiary System - Miocene Series - Ogallala Group:		
Duer Ranch beds		
Sandstone, mostly brown; sand is very fine to medium with trace of coarse; silty in parts, especially below 87 ft.....	70.0	96.0
Silt, moderately sandy, mostly pale yellow with some light brown; slightly and very sandy in parts; sand is very fine to medium.....	96.0	110.0
Sandstone, slightly silty, olive and olive-brown; sand is very fine to medium.....	110.0	120.0
Sandstone, slightly silty, pale brown; sand is very fine to coarse with trace of very coarse; some iron stain from 120 to 125 ft.....	120.0	129.0
Silt, very sandy, mostly pale olive; sand is very fine to coarse with trace of very coarse; trace of fine gravel below 130 ft.; slightly clayey and pale yellow below 133 ft.....	129.0	134.0
Sand, fine to very coarse with trace of fine gravel; much coarse and very coarse sand; gravelly below 145 ft.....	134.0	148.0
Silt, moderately sandy, pale olive; sand is very fine to very coarse; slightly clayey in parts.....	148.0	152.0

Sandstone, silty, olive brown; sand is very fine to medium with trace of coarse; root casts common below 155 ft.; some iron stain from 155 to 160 ft.; some rounded siltstone particles from 160 to 165 ft.....	152.0	168.0
Silt, moderately clayey, moderately sandy, pale yellow; sand is very fine to fine.....	168.0	170.0
Sandstone, silty, light brown; sand is very fine to fine; contains some reddish-yellow claystone and rounded siltstone particles.....	170.0	175.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Limestone, sandy, silty, white; sand is very fine....	175.0	177.0
Silt, mostly very clayey, slightly sandy, mostly brown; sand is very fine to fine; limy in parts....	177.0	192.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, slightly silty, light grayish-brown; light brownish-gray, and light gray; sand is mostly very fine; intermittent, hard, lime-cemented zones throughout.....	192.0	266.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds?:		
Sandstone, very silty, light grayish-brown to light brown; sand is very fine; limy in parts.....	266.0	288.0
Siltstone, mostly moderately sandy, light yellowish-brown to brown; sand is very fine; limy in parts.....	288.0	313.0
Siltstone, very sandy, mostly light brown; contains some interbedded silty sand; sand is very fine to fine with some medium; contains some claystone (?reworked or interbedded?).....	313.0	319.0
Sand, mostly very silty, light brown; sand is very fine to medium with trace of coarse to very coarse; contains dark minerals and rounded claystone particles; limy in parts.....	319.0	330.0
Siltstone, mostly moderately sandy, light yellowish-brown to brown; sand is very fine; limy in parts; contains dark minerals from 340 to 346 ft.....	330.0	356.0
Siltstone, slightly sandy, light-yellowish brown to brown; sand is very fine.....	356.0	405.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, slightly clayey, slightly sandy, yellowish-brown to brown; sand is very fine.....	405.0	480.0

Test Hole #48-B-53 (E-log)
(19N-47W-17dddd)
Morrill County

Location: SE SE SE SE sec. 17, 19 N., R. 47 W., 290 ft. north and 5 ft. west of southeast corner of section.
 Ground elevation: 4044 ft. (t). (Broadwater 7.5 min. quadrangle).
 Depth to water: 148 ft. (caved or plugged, September 7, 1953).

Depth, in feet
 From To

Quaternary System, undifferentiated:

Roadfill and soil.....	0.0	3.0
Silt, slightly sandy, yellowish-gray; sand is very fine.....	3.0	10.0

Tertiary System - Pliocene Series:

Broadwater Formation

Sand and gravel; fine sand to fine gravel.....	10.0	20.0
Sand, fine to coarse; silty with depth.....	20.0	25.0
Silt, very sandy, light olive-gray; sand is very fine to fine; less sandy with depth.....	25.0	35.0
Silt, clayey, some iron stain.....	35.0	36.0
Sand, fine to very coarse with trace of fine gravel..	36.0	45.0
Sand and gravel, silty; fine sand to fine gravel; siltier with depth.....	45.0	50.0
Silt, very sandy, light olive-gray; sand is very fine to fine.....	50.0	53.0
Sand and gravel, fine sand to fine gravel.....	53.0	56.0
Sand and gravel, medium sand to medium gravel; some coarse gravel below 65 ft.....	56.0	71.0

Tertiary System - Miocene Series - Ogallala Group:

Duer Ranch beds

Sandstone, silty; sand is very fine to medium; contains fossil seeds and root casts; less silty with depth.....	71.0	80.0
Sandstone, very fine to medium grained; contains root casts; very fine to fine grained below 100 ft.....	80.0	110.0

Tertiary System - Miocene Series - Arikaree Group:

Camp Clarke beds

Sandstone, very silty; sand is very fine to fine; grades to very sandy siltstone in parts.....	110.0	130.0
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Tertiary System - Miocene and Oligocene Series - Arikaree Group:

Monroe Creek and Harrison Formations, undivided

Sandstone, slightly silty?; sand is very fine to fine; intermittent hard, lime-cemented zones.....	130.0	208.0
Volcanic ash, silty, white.....	208.0	213.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Brown siltstone beds

Sandstone, very silty; sand mostly very fine.....	213.0	230.0
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Test Hole #24-A-53 (E-log)
(19N-47W-32ddda)
Morrill County

Location: NE SE SE SE sec. 32, 19 N., R. 47 W., about 450 ft. north and 200 ft. west of southeast corner of section.
 Ground elevation: 3605 ft. (t). (Broadwater 7.5 min. quadrangle).
 Depth to water: Artesian flow from Chadron sands, 66°F (September 19, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	2.0
Silt, slightly sandy, light brown; sand is very fine.	2.0	9.0
Sand and gravel, very silty; gravel composed mostly of reworked siltstone and sandstone fragments.....	9.0	12.0
Silt, slightly sandy, brownish-gray and grayish-brown; sand is very fine; slightly clayey in parts.....	12.0	25.0
Sand and gravel, very silty; gravel composed mostly of reworked siltstone and sandstone fragments.....	25.0	29.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation - Whitney Member		
Siltstone, yellowish-brown to brown.....	29.0	75.0
Volcanic ash, silty, pale to very pale brown (Lower Ash).....	75.0	81.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation - Orella Member		
Siltstone, yellowish-brown to brown.....	81.0	115.0
Siltstone, slightly sandy, yellowish-brown to brown; contains some pink siltstone and claystone.....	115.0	120.0
Siltstone, yellowish-brown to brown; light brown from 140 to 145 ft. and 155 to 157 ft.....	120.0	162.0
Siltstone, clayey in parts, sandy in parts, yellowish-brown to brown.....	162.0	184.0
Siltstone, yellowish-brown to brown with some reddish-brown; probably sandy in parts (to silty sand); some pink siltstone-claystone.....	184.0	195.0
Siltstone, slightly clayey, mostly light brown.....	195.0	205.0
Siltstone, yellowish-brown and light brown.....	205.0	210.0
Siltstone, slightly to, in parts, moderately clayey; brown and brownish-yellow.....	210.0	220.0
Siltstone, moderately to very clayey, reddish-brown..	220.0	231.0
Siltstone, slightly clayey, brown to reddish-brown with light greenish-gray mottling; contains some claystone.....	231.0	238.0
Siltstone, very clayey, mostly reddish-brown.....	238.0	252.0
Siltstone, moderately clayey, yellowish-brown to brown.....	252.0	315.0

Siltstone, moderately clayey, yellowish-gray; mica flakes common.....	315.0	320.0
Siltstone, moderately clayey, light brown.....	320.0	365.0
Siltstone, slightly clayey, more grayish than above (volcanic ash bed M).....	365.0	375.0
Siltstone, mostly moderately clayey, light brown.....	375.0	390.0
Siltstone, slightly to moderately clayey, light.....	390.0	400.0
Siltstone, moderately clayey, very pale brown.....	400.0	415.0
Siltstone, moderately clayey, mostly light brown; very clayey in parts; granular in parts and contains reworked siltstone fragments below 425.....	415.0	435.0
Tertiary System - Eocene Series - White River Group:		
Chadron Formation:		
Clay, silty, light bluish- and greenish-gray.....	435.0	462.0
Clay and claystone, silty, light olive-gray; granular in parts; trace of iron stain from 470 to 475; trace of very fine to fine sand below 475 ft.....	462.0	477.0
Clay, silty, slightly sandy, light yellowish-gray; sand is very fine to fine.....	477.0	490.0
Clay, silty, light olive-gray.....	490.0	500.0
Sand, slightly silty, light bluish- to greenish-gray; sand is very fine to medium.....	500.0	515.0
Sand, very fine to medium, light bluish- to greenish-gray; clayey from 522 to 526 ft. and below 529 ft.....	515.0	530.0
Silt, very sandy, clayey in parts, light bluish- to greenish-gray; sand is very fine to medium.....	530.0	541.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Shale		
Clay, dark gray to black.....	541.0	560.0

Test Hole #47-B-53 (E-log)
(19N-48W-8cccd)
Morrill County

Location: SE SW SW SW sec. 8, T. 19 N., R. 48 W., 14 ft. north and 654 ft. east of southwest corner of section.
 Ground elevation: 3718 ft. (t). (Broadwater NW 7.5 min. quadrangle).
 Depth to water: 75 ft? (September 7, 1953).

Quaternary System, undifferentiated:

Roadfill and soil.....	0.0	3.0
Silt, slightly clayey, slightly sandy, yellowish-gray	3.0	5.0
Sand and gravel, medium sand to medium gravel, some coarse gravel; contains reworked sandstone fragments	5.0	20.0
Sand, very silty; sand is fine to very coarse.....	20.0	25.0
Silt, sandy, clayey in parts, light brown; sand is very fine to fine.....	25.0	36.0
Sand, silty in parts; sand is very fine to coarse....	36.0	55.0
Sand and gravel; medium sand to fine gravel.....	55.0	67.0
Gravel, sandy; medium sand to coarse gravel.....	67.0	74.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Whitney Member

Siltstone, slightly clayey, yellowish-brown to brown.	74.0	100.0
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Test Hole #45-B-53 (E-log)
(19N-48W-32bbbb)
Morrill County

Location: NW NW NW NW sec. 32, T. 19 N., R. 48 W., 15 ft. south and
 161 ft. east of northwest corner of section.
 Ground elevation: 3594 ft. (t). (Broadwater SW 7.5 min. quadrangle).
 Depth to water: 11.2 ft. (September 7, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil.....	0.0	5.0
Silt, slightly sandy, brown and yellowish-brown; sand is very fine to medium.....	5.0	10.0
Silt, moderately clayey, brown and brownish-gray.....	10.0	15.0
Silt, slightly clayey, gray.....	15.0	17.0
Sand and gravel; medium sand to fine gravel; some medium gravel and trace of coarse gravel below 35 ft	17.0	30.0
Sand and gravel; fine sand to fine gravel, trace of medium gravel.....	30.0	35.0
Sand, fine to very coarse with trace of gravel; contains reworked Brule siltstone fragments below 45 ft.....	35.0	50.0
Sand and gravel; fine sand to fine gravel; contains medium gravel below 60 ft; contains reworked Brule siltstone fragments in parts.....	50.0	70.0
Sand, fine to very coarse; contains a trace of gravel in parts.....	70.0	100.0
Sand, fine to coarse with a trace of very coarse.....	100.0	105.0
Sand, fine to very coarse with trace of fine gravel; contains rounded Brule fragments.....	105.0	115.0
Sand, fine to coarse with trace of very coarse.....	115.0	120.0
Sand, fine to very coarse with trace of fine gravel; coarser below 125 ft.....	120.0	130.0
Sand and gravel; medium sand to fine gravel.....	130.0	135.0
Sand and gravel; medium sand to medium gravel; contains cobbles composed of Brule siltstone below 150 ft.....	135.0	154.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation: Orella Member		
Siltstone, slightly to moderately clayey, light brown	154.0	200.0

**Test Hole #32-B-53 (No e-log)
(19N-50W-14aaad)
Morrill County**

Location: SE NE NE NE sec. 14, T. 19 N., R. 50 W., 478 ft south and 20 ft. west of northeast corner of section.
Ground elevation: 3655 ft. (t). (Bridgeport 7.5 min. quadrangle).
Depth to water: 13.0 ft. (August 16, 1953).

Depth, in feet
From To

Quaternary System, undifferentiated:

Sand, very silty, brownish-gray; sand is very fine to fine.....	0.0	6.0
Silt, slightly clayey, brownish-gray and brown.....	6.0	11.0
Silt, slightly sandy, yellowish-gray.....	11.0	13.0
Sand and gravel; medium sand to fine gravel; contains reworked sandstone.....	13.0	15.0
Gravel, sandy; coarse sand to medium gravel; contains reworked sandstone fragments.....	15.0	20.0
Sand and gravel; medium sand to medium gravel.....	20.0	30.0
Sand gravel; fine sand to fine gravel.....	30.0	40.0
Sand, fine to coarse; contains some very coarse sand and trace of gravel.....	40.0	65.0
Sand and gravel; fine sand to coarse gravel; reworked Brule siltstone fragments common.....	65.0	70.0
Sand, fine to very coarse; much very coarse sand.....	70.0	80.0
Sand, fine to coarse with trace of very coarse; trace of fine gravel below 90 ft and trace of reworked Brule fragments below 110 ft.....	80.0	115.0
Sand, fine to very coarse with trace of fine gravel; contains reworked Brule fragments.....	115.0	120.0
Sand and gravel; fine sand to fine gravel.....	120.0	135.0
Sand and gravel; medium sand to medium gravel.....	135.0	140.0
Sand and gravel; fine sand to fine gravel; some medium gravel below 145 ft.....	140.0	150.0
Sand and gravel; medium sand to medium gravel with some coarse gravel in parts.....	150.0	165.0
Gravel, sandy; coarse sand to coarse gravel with cobbles in parts; slightly finer below 180 ft.....	165.0	187.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, light brown to brown.....	187.0	210.0

Test Hole #31-B-53 (E-log)
(19N-50W-24cccc)
Morrill County

Location: SW SW SW SW sec. 24, T. 19 N., R. 24 W., 144 ft. north and 16 ft. east of southwest corner of section.
 Ground elevation: 3675 ft (t). (Courthouse Rock 7.5 min. quadrangle).
 Depth to water: 15.1 ft. (August 16, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil and silty sand, yellowish-gray; sand is very fine to fine.....	0.0	4.0
Sand, slightly silty; sand is fine to very coarse....	4.0	8.0
Silt, slightly clayey in parts, slightly sandy in parts, light brown; sand is very fine to fine; brownish-gray below 12 ft.....	8.0	17.0
Sand and gravel; medium sand to fine gravel with some medium gravel; contains reworked sandstone fragments.....	17.0	25.0
Gravel, sandy; medium sand to cobbles; contains reworked sandstone fragments; more sand below 30 ft	25.0	35.0
Sand and gravel; medium sand to medium gravel; some coarse gravel from 45 to 55 ft., 65 to 80 ft., and below 110 ft.; contains reworked Brule siltstone fragments from 40 to 45 ft and 90 to 105 ft.....	35.0	110.0
Gravel, sandy; medium sand to coarse gravel.....	110.0	116.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, yellowish-brown to brown.	116.0	150.0

Test Hole #25-B-53 (E-log)
(19N-52W-26aaaa)
Morrill County

Location: NE NE NE NE sec. 26, T. 19 N., R. 52 W., 73 ft. south and 24 ft. west of northeast corner of section.

Ground elevation: 3859 ft. (t). (Redington 7.5 min. quadrangle).

Depth to water: 3.8 ft. (July 26, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Sand, slightly silty, sand is very fine to fine.....	1.0	5.0
Sand, very fine to coarse with trace of very coarse..	5.0	10.0
Sand and gravel; medium sand to medium gravel.....	10.0	15.0
Gravel, sandy; medium sand to coarse gravel; many reworked limy sandstone fragments.....	15.0	25.0
Pebbles, with many reworked Brule siltstone fragments	25.0	28.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, brown.....	28.0	35.0
Siltstone, moderately clayey, pinkish-gray and reddish-brown.....	35.0	50.0
Siltstone, slightly clayey, brown; light brown below 70 ft; lost much drilling fluid below 70 ft.....	50.0	80.0

Test Hole #10-B-82 (E-log)
(20N-47W-7dddd)
Morrill County

Location: SE SE SE SE sec. 7, T. 20 N., R. 47 W., 103 ft. north and 80 ft. west of southeast corner of section.
 Ground elevation: 4184 ft. (t). (Broadwater NE 7.5 min. quadrangle).
 Depth to water: caved at 92.2 ft. (July 26, 1982). Electric log indicates about 182 ft. (July 13, 1982).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	2.0
Sand, very silty, dark grayish-brown and brown; sand is very fine to medium with a trace of coarse.....	2.0	4.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Sand, very fine to medium with some coarse.....	4.0	10.0
Sand, very fine to coarse with trace of very coarse..	10.0	15.0
Sand, very fine to very coarse with trace of fine gravel.....	15.0	20.0
Sand, very fine to medium with trace of coarse.....	20.0	33.0
Sand to sandstone, silty, pale olive; sand mostly very fine to fine.....	33.0	40.0
Sand, very fine to medium.....	40.0	60.0
Sand to sandstone, silty in parts, yellowish-brown; sand is very fine with some fine.....	60.0	86.0
Sand, very fine to medium with trace of coarse.....	86.0	97.0
Silt, moderately to very clayey, sandy, mostly brownish-yellow with some yellowish-brown and pale yellow; sand is mostly very fine to fine; contains thin, interbedded sand seams.....	97.0	125.0
Silt, moderately to very clayey, slightly sandy, pale olive; sand is very fine.....	125.0	131.0
Sand, silty with some interbedded sandy silt, very light brown and pale yellow; sand is very fine to medium with trace of coarser grains.....	131.0	139.0
Silt, slightly sandy, mostly yellowish-brown; sand is very fine; clayey in parts.....	139.0	146.0
Sand, silty, yellowish-brown, brown, and light gray; sand is very fine to medium with some coarser grains; slightly clayey below 153 ft.....	146.0	155.0
Sand, gravelly; fine sand to fine gravel.....	155.0	160.0
Sand, very fine to very coarse; less very coarse sand from 165 to 175 ft.; no very coarse sand below 180 ft.....	160.0	182.0
Sand, slightly silty, light yellowish-brown and light gray; sand is mostly very fine; more silty with depth.....	182.0	193.0

Sand, very fine to very coarse; contains some thin silty layers.....	193.0	212.0
Silt, very sandy, yellowish-brown interbedded with white diatomaceous silt; sand is mostly very fine..	212.0	215.0
Sand, very fine to very coarse with trace of fine gravel.....	215.0	228.0
Sand, very silty, light brown and gray, very sandy silt; sand is very fine with some coarser grains...	228.0	248.0
Sand, very fine to coarse with some very coarse.....	248.0	255.0
Sand, very fine to very coarse; more coarse to very coarse sand below 280 ft.....	255.0	285.0
Sand, very fine to coarse with some coarser grains...	285.0	295.0
Sand, very fine to medium with some coarse to very coarse.....	295.0	300.0
Sand, very fine with some medium and trace of coarser grains; more medium sand below 325 ft.....	300.0	332.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, slightly silty, mostly brownish-gray; sand is mostly very fine; contains intermittent, hard, lime-cemented zones throughout; moderately silty in parts.....	332.0	416.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Sandstone, moderately to very silty, mostly brown; sand is very fine; contains limy concretions.....	416.0	435.0
Siltstone, very sandy, yellowish-brown to brown; sand is very fine; limy in parts.....	435.0	470.0
Siltstone, moderately sandy, yellowish-brown to brown; sand is very fine; limy in parts.....	470.0	488.0
Siltstone, slightly sandy, pale yellow and olive; sand is very fine; trace of iron stain in parts....	488.0	504.0
Siltstone, slightly sandy, mostly light brown; sand is very fine; yellowish-brown below 520 ft.....	504.0	524.0
Volcanic ash, silty, very pale brown (Nonpareil volcanic ash beds).....	524.0	536.0
Siltstone, slightly sandy, light brown with some yellowish-brown; limy in a few parts.....	536.0	581.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, slightly sandy, yellowish-brown to brown; sand is very fine; electric log indicates Upper Ash from 690 to 694 ft.....	581.0	700.0

Test Hole #25-A-53 (E-log)
(20N-47W-20ccdc)
Morrill County

Location: SW SE SW SW sec. 20, T. 20 N., R. 47 W., 8 ft. north and 677 ft. east of southwest corner of section.
 Ground elevation: 4135 ft. (t). (Broadwater NE 7.5 min. quadrangle).
 Depth to water: caved at 161 ft. (September 28, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Silt, sandy, brown to yellowish-brown; sand is very fine to medium.....	1.0	4.0
Tertiary System - Miocene Series - Ogallala Group:		
Angora sand and gravel beds		
Sand, very fine to coarse; finer grained and silty from 4 to 5 ft.....	4.0	10.0
Sand, very fine to very coarse.....	10.0	17.0
Gravel, sandy; medium sand to coarse gravel.....	17.0	20.0
Sand, very fine to coarse; grades to very coarse below 25 ft.....	20.0	30.0
Sand and gravel; fine sand to fine gravel.....	30.0	43.0
Silt, sandy; sand is very fine to fine.....	43.0	45.0
Sand, fine to very coarse with some fine to medium gravel in parts; contains some thin sandy silt beds in parts.....	45.0	78.0
Tertiary System - Miocene Series - Ogallala Group:		
Duer Ranch beds		
Sandstone, very fine to medium-grained; contains many root casts.....	78.0	105.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Silt, sandy, light olive-gray; sand is very fine to fine with some medium.....	105.0	115.0
Sand and sandstone, silty; mostly very fine to medium	115.0	131.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, very limy, very light gray.....	131.0	151.0
Siltstone, sandy, mostly light brown; sand is very fine; limy in parts.....	151.0	171.0
Siltstone, slightly clayey, slightly sandy, light olive-gray; sand is very fine.....	171.0	175.0
Siltstone, sandy, light brown; sand is very fine and sand content increases with depth; limy in parts with conspicuous lime-cemented zone from 115-121 ft	175.0	230.0

**Tertiary System - Miocene and Oligocene Series - Arikaree Group:
Monroe Creek and Harrison Formations, undivided**

Sandstone, silty, mostly light gray; contains
intermittent lime-cemented zones..... 230.0 250.0

Test Hole #11-B-82 (E-log)
(20N-47W-29ccbc)
Morrill County

Location: SW NW SW SW sec. 29, T. 20 N., R. 47 W., 686 ft. north and
 12 ft. east of southwest corner of section.
 Ground elevation: 4140 ft. (t). (Broadwater NE 7.5 min. quadrangle).
 Depth to water: 192.8 ft. (July 26, 1982).

	<u>Depth, in feet</u>	
	From	To
Quaternary Section, undifferentiated:		
Soil.....	0.0	2.0
Silt, very sandy, dark grayish-brown and brown; sand is very fine to coarse.....	2.0	9.0
Sand, silty, light brown; sand is mostly very fine to fine with scattered particles of gravel.....	9.0	12.0
Tertiary System - Miocene Series - Ogallala Group:		
Angora sand and gravel beds		
Sand, gravelly; fine sand to fine gravel with some medium gravel; slightly coarser below 30 ft.....	12.0	40.0
Gravel, sandy; fine sand to medium gravel.....	40.0	45.0
Sand, fine to very coarse with trace of gravel.....	45.0	50.0
Gravel, sandy; fine sand to fine gravel with trace of medium gravel.....	50.0	55.0
Sand, fine to very coarse with trace of gravel.....	55.0	80.0
Tertiary System - Miocene Series - Ogallala Group:		
Duer Ranch beds		
Sandstone, very fine to coarse-grained, mostly light brown; contains many root casts; some iron stain from 85 to 90 ft.; some olive tint below 98 ft.; mostly light olive-brown below 105 ft.....	80.0	121.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Sandstone, mostly moderately silty, olive with some pale olive and light gray; sand is very fine to fine; contains some thin layers of sandy silt.....	121.0	138.0
Silt, very sandy, pale yellow and pale olive; sand is very fine.....	138.0	141.0
Silt, slightly clayey, mostly moderately sandy, pale yellow, pale olive, and light gray; sand is very fine; limy zones, probably nodules, below 143 ft...	141.0	151.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, sandy, limy, very pale brown; sand is very fine.....	151.0	173.0
Siltstone, slightly sandy, pale olive to olive; sand is very fine; limy in parts.....	173.0	177.0

Siltstone, slightly sandy, light olive-brown; sand is very fine.....	177.0	185.0
Siltstone, slightly to moderately sandy, mostly light brown; sand is very fine; contains two prominent limy zones from 190 to 200 ft.....	185.0	210.0
Siltstone, moderately to very sandy grading downward to sandstone, very silty; brown to yellowish-brown; sand is very fine; some limy zones in parts.....	210.0	227.0
Sandstone, mostly moderately silty, mostly light brownish-gray to light grayish-brown; sand is very fine; contains intermittent lime-cemented zones....	227.0	319.0
Sandstone, slightly silty, brown; sand is very fine; contains some lime-cemented zones (fewer than above).....	319.0	372.0
Tertiary System - Oligocene Series - Arikaree Group:		
Gering Formation		
Interbedded silt, sand, and limestone; brown, light brown, and white; sand is very fine.....	372.0	383.0
Sand, silty, light gray; sand is very fine; pale olive below 396 ft.....	383.0	398.0
Silt, slightly clayey, slightly sandy, pale yellow and light gray; sand is very fine; limy in parts...	398.0	408.0
Silt, very sandy, pale olive and light olive-brown; sand is very fine.....	408.0	414.0
Silt, very sandy, light yellowish-brown; grades to very silty sand in parts; sand is very fine; contains some thin layers of siltstone to claystone in parts; contains some rounded claystone and pumice particles.....	414.0	433.0
Tertiary System - Oligocene Series - White River Group:		
Brown siltstone beds		
Siltstone, moderately sandy, mostly yellowish-brown; sand is very fine; limy in parts; questionable electric log characteristics indicate base of Nonpareil volcanic ash beds may occur at about 350 ft.....	433.0	477.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, slightly clayey, slightly sandy, yellowish-brown to brown; sand is very fine.....	477.0	498.0
Siltstone, slightly clayey, pale olive to white; limy in lower part.....	498.0	500.0
Siltstone, slightly clayey, slightly sandy, pale olive; sand is very fine.....	500.0	508.0
Siltstone, slightly to moderately sandy, light olive-gray; sand is very fine.....	508.0	514.0
Siltstone, slightly clayey, slightly sandy, light olive-gray and pale yellow; sand is very fine.....	514.0	532.0

Siltstone, non- to moderately clayey, non- to slightly sandy, mostly pale olive; sand is very fine.....	532.0	577.0
Siltstone, slightly clayey, slightly sandy, yellowish-brown to brown; sand is very fine.....	577.0	610.0
Volcanic ash, silty, light yellowish-brown (Upper Ash).....	610.0	630.0

Test Hole #14-B-82 (E-log)
(20N-48W-10bbbc)
Morrill County

Location: SW NW NW NW sec. 10, T. 20 N., R. 48 W., 410 ft. south and 4 ft. east of northwest corner of section.
 Ground elevation: 4282 ft. (t). (Broadwater NE 7.5 min. quadrangle).
 Depth to water: 141 ft. (July 26, 1982). Hole caved at 141.5 ft.
 Electric log indicates the preceding is a perched water level and regional water level appears to be at about 255 ft. (July 19, 1982).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	3.0
Tertiary System - Miocene Series - Ogallala Group:		
Angora sand and gravel beds		
Sand, silty; sand is very fine to very coarse.....	3.0	5.0
Sand, gravelly, silty; fine sand to fine gravel.....	5.0	10.0
Sand and gravel; fine sand to medium gravel.....	10.0	15.0
Gravel, sandy; fine sand to medium gravel.....	15.0	26.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation:		
Silt, very sandy, light yellowish-brown; sand is very fine to very coarse.....	26.0	40.0
Sand and some sandstone, silty in parts, light brown; sand is very fine to very coarse; contains a trace of root casts in parts.....	40.0	51.0
Silt, moderately clayey, slightly sandy, brown and gray; sand is very fine to fine.....	51.0	54.0
Sandstone, slightly silty, light brown; sand is very fine to fine.....	54.0	58.0
Sand, very silty, light yellowish-brown; sand is very fine to fine; grades to very sandy silt in parts...	58.0	80.0
Silt, moderately clayey, slightly sandy, mostly pale yellow; sand is very fine; slightly and very clayey in parts; light gray at top and some pale olive near base.....	80.0	97.0
Sand, very fine to very coarse; trace of very coarse sand from 105 to 110 ft and below 115 ft; a thin olive silt layer at about 106 ft; slightly consolidated in parts.....	97.0	142.0
Silt, moderately to very clayey, slightly to very sandy, yellowish-brown; sand is mostly very fine to fine.....	142.0	167.0
Sand, silty, yellowish-brown; sand is very fine to very coarse; less sand below 170 ft.....	167.0	172.0
Silt, moderately clayey, slightly sandy, yellowish-brown and brown; sand is very fine to fine; slightly clayey in parts.....	172.0	179.0

Sand, very fine to very coarse; trace of gravel below 185 ft.....	179.0	190.0
Silt, clayey, slightly sandy, yellowish-brown; sand is very fine to medium.....	190.0	193.0
Sand, very fine to very coarse.....	193.0	195.0
Silt, clayey, slightly sandy; yellowish-brown and olive; sand is very fine to fine.....	195.0	197.0
Sand, very fine to very coarse with trace of fine gravel; silt layer from 201-202 ft.; slightly finer below 220 ft; electric log indicates probably silty to varying amounts from 222 to 245 ft and below 252 ft.....	197.0	260.0
Sand, gravelly, silty; fine sand to fine gravel.....	260.0	265.0
Sand, very fine to coarse with trace of very coarse; silty in parts.....	265.0	275.0
Sand, very fine to very coarse with trace of fine gravel; silty in parts.....	275.0	280.0
Gravel, sandy; fine sand to fine gravel.....	280.0	285.0
Sand, very fine to coarse with trace of coarser grains; silty in parts.....	285.0	290.0
Sand, gravelly; fine sand to fine gravel; trace of medium gravel below 295 ft.....	290.0	300.0
Sand, very fine to very coarse with trace of fine gravel.....	300.0	310.0
Gravel, sandy; fine sand to fine gravel.....	310.0	315.0
Sand, very fine to very coarse with trace of fine gravel; silty in parts.....	315.0	325.0
Sand, gravelly; fine sand to fine gravel.....	325.0	330.0
Sand, very fine to coarse with trace of coarser grains; silty in parts.....	330.0	337.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, slightly silty, light brownish-gray to light grayish-brown with some light gray; sand is mostly very fine; contains intermittent lime-cemented zones throughout.....	337.0	425.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Siltstone, moderately sandy, yellowish-brown to brown; sand is very fine; less sandy and slightly clayey below 446 ft; contains some limy zones throughout..	425.0	480.0

Test Hole #33-B-53 (E-log)
(20N-50W-25bccc)
Morrill County

Location: SW SW SW NW sec. 25, T. 20 N., R. 50 W., 11 ft. north of half-section line and 128 ft. east of west section line.
 Ground elevation: 3770 ft. (t). (Bridgeport 7.5 min. quadrangle).
 Depth to water: caved at 18.4 ft. (August 16, 1953).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil.....	0.0	2.0
Silt, very sandy, to, in parts, silty sand, mostly light yellowish-brown; sand is very fine.....	2.0	18.0
Sand, silty, very fine to fine grading downward to sand, fine to coarse.....	18.0	26.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, slightly clayey, yellowish-brown to brown; apparently fractured from 26 to 37 ft. (drilled fast).....	26.0	45.0
Siltstone, clayey, ashy grading downward to volcanic ash, silty; brown grading downward to light brown; (Lower Ash).....	45.0	57.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, yellowish-brown to brown; lost much drilling fluid below 75 ft.....	57.0	100.0

Test Hole #17-B-53 (E-log)
(20N-51W-7bbba)
Morrill County

Location: NE NW NW NW sec. 7, T. 20 N., R. 51 W., 17 ft. south and 373 ft. east of northwest corner of section.
 Ground elevation: 3733 ft. (t). (South Bayard 7.5 min. quadrangle).
 Depth to water: 8.1 ft (July 26, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	4.0
Silt, very sandy, brown and light brown; sand is very fine.....	4.0	8.0
Silt, clayey, sandy in parts, light brown; sand is very fine; brownish-gray from 12 to 14 ft. and below 17 ft.....	8.0	18.0
Sand, fine to very coarse.....	18.0	20.0
Sand and gravel; medium sand to medium gravel; contains some coarse gravel below 30 ft.....	20.0	36.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, light brown; contains some interbedded clayey siltstone and claystone.....	36.0	53.0
Siltstone, clayey, light brown.....	53.0	75.0
Siltstone, slightly sandy, light brown; grades to very sandy in parts; sand is very fine; contains some thin layers of pink claystone below 83 ft.....	75.0	90.0
Siltstone, clayey, reddish-brown; granular.....	90.0	95.0
Siltstone, light brown.....	95.0	100.0

**Test Hole #41-B-53 (No e-log)
(20N-51W-14baab)
Morrill County**

Location: NW NE NE NW sec. 14, T. 20 N., R. 14 W., about 600 ft. west of half-section line and 20 ft. south of north section line.
 Ground elevation: 3704 ft. (t). (Bridgeport NW 7.5 min. quadrangle).
 Depth to water: 3.2 ft. (August 30, 1953).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil.....	0.0	2.0
Silt, slightly clayey, moderately to very sandy, light brown and light yellowish-gray; sand is very fine to fine.....	2.0	10.0
Silt, very clayey, gray and dark gray; much less clayey below 15 ft.....	10.0	16.0
Sand and gravel; fine sand to fine gravel.....	16.0	25.0
Sand and gravel; medium sand to medium gravel.....	25.0	40.0
Sand, fine to very coarse with trace of fine gravel..	40.0	65.0
Sand and gravel; fine sand to fine gravel; contains some rounded Brule siltstone fragments.....	65.0	68.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, light brown; light yellowish-brown to brown below 85 ft; lost much drilling fluid below 80 ft.....	68.0	100.0

Test Hole #24-B-53 (E-log)
(20N-51W-18ccbc)
Morrill County

Location: SW NW SW SW sec. 18, T. 20 N., R. 51 W., about 650 ft. north and 60 ft. east of southwest corner of section.
 Ground elevation: 3723 ft. (t). (South Bayard 7.5 min. quadrangle).
 Depth to water: 6.1 ft. (July 26, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil.....	0.0	3.0
Silt, slightly clayey, slightly sandy, yellowish-gray and gray.....	3.0	5.0
Sand, slightly silty, brownish-yellow; sand is very fine to medium.....	5.0	7.0
Sand and gravel; fine sand to coarse gravel; no coarse gravel from 7 to 10 ft; probably silty from 15 to 20 ft and in parts from 20 to 30 ft; slightly finer grained below 20 ft.....	7.0	40.0
Sand, gravelly; fine sand to medium gravel.....	40.0	50.0
Sand, gravelly; fine sand to fine gravel.....	50.0	60.0
Sand, fine to very coarse; contains some reworked Brule siltstone fragments from 65 to 70 ft.....	60.0	70.0
Sand and gravel; medium sand to fine gravel; contains some coarser gravel below 79 ft; contains reworked Brule siltstone fragments.....	70.0	84.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, light brown; clayey below 100 ft.....	84.0	110.0

Test Hole #42-B-53 (E-log)
(20N-51W-34aaab)
Morrill County

Location: NW NE NE NE sec. 34, T. 20 N., R. 51 W., 50 ft. south and 357 ft. west of northeast corner of section.
 Ground elevation: 3775 ft (t). (Bridgeport NW 7.5 min. quadrangle).
 Depth to water: Caved at 57 ft. (August 28, 1953).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium; silty at top.....	0.0	5.0
Sand, silty; sand is very fine to coarse; very silty from 6 to 14 ft.....	5.0	20.0
Sand and gravel; fine sand to medium gravel; generally coarser with depth.....	20.0	35.0
Gravel, sandy; coarse sand to coarse gravel.....	35.0	40.0
Sand and gravel; coarse sand to coarse gravel.....	40.0	50.0
Sand and gravel; medium sand to fine gravel.....	50.0	55.0
Sand and gravel; coarse sand to medium gravel.....	55.0	75.0
Sand, fine to very coarse; contains trace of gravel below 80 ft; contains reworked Brule siltstone fragments.....	75.0	90.0
Sand, fine to coarse; coarser below 95 ft with trace of gravel and some cobbles composed of Brule siltstone.....	90.0	99.0
Tertiary System - Oligocene Series, White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, light brown; grayish from 110 to 125 ft.....	99.0	140.0
Siltstone, sandy, very pale brown; sand is very fine to fine.....	140.0	142.0
Siltstone, slightly clayey, yellowish-brown to brown.	142.0	150.0

Test Hole #37-B-53 (E-log)
(20N-52W-5baab)
Morrill County

Location: NW NE NE NW sec. 5, T. 20 N., R. 52 W., 8 ft. south and 2258 ft. east of northwest corner of section.
 Ground elevation: 3756 ft. (t). (South Bayard 7.5 min. quadrangle).
 Depth to water: 2.1 ft. (August 16, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferenatiated:		
Roadfill and soil.....	0.0	3.0
Sand, gravelly; fine sand to fine gravel; silty at top.....	3.0	5.0
Sand and gravel; medium sand to medium gravel; some coarse gravel from 5 to 10 ft.....	5.0	15.0
Sand, gravelly; fine sand to fine gravel; silty from 24 to 28 ft.....	15.0	30.0
Sand and gravel; fine sand to medium gravel; contains some reworked Brule siltstone fragments from 30 to 35 ft; some coarse gravel below 35 ft.....	30.0	40.0
Sand, fine to very coarse with trace of fine gravel and gravel; fine sand to fine gravel.....	40.0	45.0
Sand, fine to very coarse with trace of gravel.....	45.0	50.0
Sand, fine to coarse with some very coarse.....	50.0	60.0
Sand, fine to very coarse with trace of gravel.....	60.0	65.0
Sand, very fine to medium; contains some reworked Brule siltstone fragments.....	65.0	80.0
Sand, fine to very coarse with trace of gravel.....	80.0	90.0
Gravel, sandy; coarse sand to coarse gravel; 50% of sample is reworked Brule siltstone fragments.....	90.0	95.0
Sand and gravel; fine sand to fine gravel with trace of medium gravel; contains reworked Brule siltstone fragments.....	100.0	110.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, light brown; moderately clayey in parts from 125 to 135 ft.....	110.0	150.0

Test Hole #36-B-53 (E-log)
(20N-52W-8bada)
Morrill County

Location: NE SE NE NW sec. 8, T. 20 N., R. 52 W., 11 ft. west of half section line and 855 ft. south of north section line.

Ground elevation: 3754 ft. (t). (South Bayard 7.5 min. quadrangle).

Depth to water: 1.5 ft. (August 16, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil.....	0.0	1.0
Sand, very silty and silty, very sandy; sand is very fine to fine.....	1.0	4.0
Sand, slightly silty; sand is fine to very coarse with some fine gravel.....	4.0	6.0
Silt, slightly clayey, moderately sandy, bluish to grayish-green; sand is fine to medium.....	6.0	8.0
Sand and gravel; fine sand to fine gravel; slightly coarser and contains trace of Brule siltstone fragments below 10 ft.....	8.0	15.0
Sand and gravel; medium sand to medium gravel.....	15.0	21.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, light brown.....	21.0	40.0
Siltstone, slightly to, in parts, moderately clayey; yellowish-brown and light brown.....	40.0	50.0
Siltstone, slightly clayey, yellowish-brown to brown.....	50.0	70.0

Test Hole #23-B-53 (E-log)
(20N-52W-25abaa)
Morrill County

Location: NE NE NW NE sec. 25, T. 20 N., R. 52 W., 30 ft. south and about 1530 ft. west of northeast corner of section.
 Ground elevation: 3732 ft. (t). (South Bayard 7.5 min. quadrangle).
 Depth to water: 5.6 ft. (July 26, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	1.0
Sand, silty, brownish-gray; sand is very fine.....	1.0	3.0
Silt, slightly clayey, slightly sandy, light yellowish-gray; sand is very fine; moderately clayey and yellowish-brown from 6 to 8 ft; moderately sandy below 8 ft.....	3.0	9.0
Sand, very fine to medium.....	9.0	10.0
Sand, fine to coarse with trace of very coarse.....	10.0	15.0
Sand, very fine to medium with trace of coarse; silty in parts below 17 ft.....	15.0	23.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, light brown; granular....	23.0	30.0
Siltstone, light brown; coarse-grained silt with some very fine sand.....	30.0	50.0
Siltstone, slightly clayey, light brown; considerable loss of drilling fluid.....	50.0	100.0

Test Hole #7-B-82 (E-log)
(21N-47W-5daad)
Morrill County

Location: SE NE NE SE sec. 5, 21 N., R. 47 W., about 2200 ft. north
and 56 ft. west of SE corner of section.
Ground elevation: 3949 ft. (t). (Lynn 15 min. quadrangle).
Depth to water: 15.5 ft. (July 5, 1982).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very silty, brown; sand is very fine to fine with some medium.....	0.0	0.3
Sand, gravelly, silty; very fine sand to fine gravel; contains reworked rock fragments.....	3.0	7.0
Tertiary System - Miocene Series - Ogallala Group:		
Duer Ranch beds		
Sand and sandstone, silty, gravelly; very fine sand to fine gravel; contains bone fragments, lime concretions, and opalized fragments.....	7.0	15.0
Gravel, sandy, silty, possibly clayey, pale brown; contains lime concretions and opalized fragments; above-average loss of drilling fluid.....	15.0	20.0
Sandstone, very fine to medium-grained with some coarse sand to fine gravel; olive from 20 to 25 ft and bluish- to greenish-gray below 25 ft.....	20.0	40.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Sandstone, mostly moderately silty, gray with some greenish-gray; sand mostly very fine to fine; some medium sand from 50 to 57 ft; finer grained and olive-gray below 57 ft; contains some limy zones...	40.0	65.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, sandy, limy, light gray to white; sand is mostly very fine to fine.....	65.0	78.0
Siltstone, very sandy, dark grayish-brown; sand is mostly very fine.....	78.0	85.0
Siltstone, sandy, very limy, light gray and white; sand is very fine; less limy and very pale brown below 93 ft.....	85.0	95.0
Siltstone, very sandy, pale brown and brown; sand is very fine; light gray and lime-cemented in parts, especially below 106 ft.....	95.0	116.0
Sandstone, very silty, yellowish-brown to brown; sand is very fine; lime-cemented (thin zones) in parts..	116.0	145.0

Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, moderately silty, brown; sand is very fine with some fine; contains intermittent lime-cemented zones.....	145.0	160.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Siltstone, very sandy, grading to very silty sandstone in parts, brown to yellowish-brown; sand is very fine; contains thin limy zones or concretions which are more abundant from 160 to 250 ft; less sandy below 345 ft.....	160.0	366.0
Siltstone, slightly to moderately sandy, yellowish-brown to brown; sand is very fine; contains few limy zones.....	366.0	404.0
Siltstone, slightly sandy, pale brown; sand is very fine; probably Nonpareil volcanic ash beds.....	404.0	414.0
Siltstone, slightly sandy, yellowish-brown to brown; sand is very fine.....	414.0	450.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, slightly clayey, slightly sandy, yellowish-brown to brown; sand is very fine.....	450.0	550.0

Test Hole #8-B-82 (No e-log)
(21N-47W-21bacd)
Morrill County

Location: SE SW NE NW sec. 21, T. 21 N., R. 47 W., about 1050 ft. south and 1800 ft. east of northwest corner of section.
 Ground elevation: 3980 ft. (t). (Lynn 15 min. quadrangle).
 Depth to water: 23.1 ft. (July 6, 1982).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	1.0
Sand, very fine to medium with some coarser grains; slightly silty below 25 ft.....	1.0	26.0
Sand, very fine to fine with some medium and some thin silt layers.....	26.0	30.0
Sand, very fine to coarse with trace of very coarse..	30.0	47.0
Tertiary System - Miocene Series - Ogallala Group:		
(Duer Ranch beds?)		
Sandstone, slightly silty, gray and brown; sand is very fine to fine with some medium to very coarse..	47.0	50.0
Tertiary System - Miocene Series - Ogallala Group:		
(Ash Hollow Formation?)		
Sandstone, mostly very silty, grays, olive-grays, and browns; sand mostly very fine to fine; limy in parts.....	50.0	90.0
Tertiary System - Miocene Series - Arikaree Group:		
(Camp Clarke beds?)		
Sandstone, silty, limy, mostly gray; sand is very fine to fine with some coarser grains; large loss of drilling fluid 75 to 105 ft. and excessive loss below 105 ft causing hole to be aborted.....	90.0	110.0

Test Hole #9-B-82 (E-log)
(21N-47W-21cadd)
Morrill County

Location: SE SE NE SW sec. 21, T. 21 N., R. 47 W., about 1400 ft. north and 2450 ft. east of southwest corner of section.
 Ground elevation: 3960 ft. (t). (Lynn 15 minute quadrangle).
 Depth to water: 10.1 ft. (July 7, 1982).

Depth, in feet
 From To

Quaternary System, undifferentiated:

Sand, very fine to medium with trace of coarse; silty in parts below 12 ft and with some greenish-gray colors..... 0.0 30.0

Tertiary System - Miocene Series - Ogallala Group:

Duer Ranch beds

Sand, very fine to very coarse with some gravel; finer grained from 30 to 35 ft; gray from 30 to 40 ft..... 30.0 44.0

Tertiary System - Miocene Series - Ogallala Group:

Ash Hollow Formation

Sandstone, slightly silty; sand is very fine to fine; colors range from brown through olive-gray to olive; moderately to very silty in parts; limy in parts; some medium sand below 71 ft..... 44.0 88.0

Tertiary System - Miocene Series - Arikaree Group:

Camp Clarke beds

Siltstone, very sandy, limy, white to pale yellow; sand is very fine..... 88.0 96.0

Siltstone, very sandy, colors range from olive through pale yellow to brown; sand is very fine; limy in parts..... 96.0 114.0

Siltstone, very sandy, limy, white to very pale brown; sand is very fine..... 114.0 120.0

Sandstone, very silty, olive; sand is very fine; limy and very pale brown below 128 ft..... 120.0 130.0

Sandstone, very silty, brown to yellowish-brown; sand is very fine with some fine; gray and limy in parts..... 130.0 150.0

Siltstone, slightly sandy, yellowish-brown to brown; sand is very fine..... 150.0 160.0

Tertiary System - Miocene and Oligocene Series - Arikaree Group:

Monroe Creek and Harrison Formations, undivided

Sandstone, slightly silty, light gray to grayish-brown; sand is very fine with some fine; intermittent lime-cemented zones throughout..... 160.0 187.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Brown siltstone beds

Sandstone, very silty, brown and yellowish-brown; sand is very fine; lime-cemented in parts.....	187.0	240.0
Siltstone, very sandy, yellowish-brown to brown; sand is very fine; lime-cemented in parts.....	240.0	287.0
Siltstone, moderately sandy, yellowish-brown to brown; sand is very fine; limy in a few parts; more sandy toward base.....	287.0	360.0
Sandstone, very silty, yellowish-brown to brown; sand is very fine.....	360.0	370.0
Siltstone, sandy, ashy, mostly light yellowish-brown (samples and electric log indicate this zone is probably the Nonpareil volcanic ash beds).....	370.0	385.0
Siltstone, moderately sandy, mostly light yellowish-brown; sand is very fine. Above normal losses of drilling fluid below 91 ft. with large drilling fluid losses from 91 to 150 ft and below 350 ft.....	385.0	400.0

Test Hole #26-A-53 (No e-log)
(21N-47W-28cddc)
Morrill County

Location: SW SE SE SW sec. 28, T. 21 N., R. 47 W., less than 100 ft. north of south section line and about 660 ft. west of half section line.

Ground elevation: 3975 ft. (t). (Lynn 15 min. quadrangle).

Depth to water: 5.8 ft. (September 23, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	3.0
Sand, very fine to medium with trace of coarse.....	3.0	5.0
Sand, very fine to very coarse with trace of fine gravel.....	5.0	9.0
Tertiary System - Miocene Series - Ogallala Group:		
Duer Ranch beds		
Silt, clayey, light olive-gray.....	9.0	10.0
Sand, silty; sand is very fine to medium.....	10.0	15.0
Sandstone, very fine to medium-grained; contains many root casts.....	15.0	22.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Sandstone, silty, mostly yellowish gray; sand is very fine to fine; olive gray from 22-26 ft.; limy in parts below 32 ft.....	22.0	55.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, sandy, limy, white to light brown.....	55.0	77.0
Sandstone, silty and sandy siltstone, mostly light brown; sand is very fine to fine; limy in parts....	77.0	140.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, silty; sand is mostly very fine; intermittent hard, lime-cemented zones throughout..	140.0	210.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Sandstone, silty, and sandy siltstone, yellowish-brown to brown; sand is very fine; limy in parts.....	210.0	280.0

Test Hole #15-B-82 (E-log)
(21N-48W-19dddc)
Morrill County

Location: SW SE SE SE sec. 19, T. 21 N., R. 48 W., 6 ft. north and 578 ft. west of southeast corner of section.

Ground elevation: 4225 ft. (t). (Lynn 15 min. quadrangle).

Depth to water: 137 ft. (August 4, 1982).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, silty; sand is very fine to medium with trace of coarse; less silty with depth.....	0.0	5.0
Sand, very fine to medium with some coarse and trace of very coarse.....	5.0	10.0
Sand, very fine to fine with some medium and trace of coarse; silty in parts.....	10.0	25.0
Tertiary System - Miocene Series - Ogallala Group:		
(Angora sand and gravel beds?)		
Sand, very fine to medium with some coarse and very coarse; contains some interbedded gravelly and silty zones.....	25.0	30.0
Sand, very fine to medium with some coarse and very coarse; contains some root casts from 30 to 35 ft..	30.0	41.0
Tertiary System - Miocene Series - Ogallala Group:		
Duer Ranch beds		
Sandstone, very fine to medium-grained, yellowish-brown; contains some coarse and trace of very coarse sand; contains root casts in parts; some iron stain below 55 ft.; silty below 60 ft....	41.0	80.0
As above but not silty, more medium sand.....	80.0	105.0
Sandstone, very fine to fine-grained, pale brown, yellowish-brown and some olive; contains some medium sand, root casts, and iron stain in parts; silty in parts.....	105.0	146.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, sandy, very limy, white and pale yellow; sand is very fine.....	146.0	160.0
Siltstone, sandy, and sandstone, silty, olive; sand is very fine with some fine in parts; intermittent hard limy zones below 181 ft.....	160.0	203.0
Sandstone, very silty, and siltstone, very sandy; sand is very fine; brown from 203 to 235 ft. and light yellowish-brown below 235 ft; intermittent lime-cemented zones.....	203.0	257.0

**Tertiary System - Miocene and Oligocene Series - Arikaree Group:
 Monroe Creek and Harrison Formations, undivided**

Sandstone, slightly silty, light gray and brown; sand is very fine; lime- cemented in parts; some fine sand and root casts in upper part.....	257.0	280.0
Sandstone, moderately silty, yellowish-brown and gray; sand mostly very fine with some fine sand and trace of coarser grains; lime-cemented in parts.....	280.0	307.0
Sandstone, very silty, limy, brownish-gray; sand is very fine; more silt below 310 ft.....	307.0	312.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Brown siltstone beds

Siltstone, moderately sandy, yellowish-brown and brown; sand is very fine; intermittent limy zones..	312.0	430.0
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Test Hole #16-B-82 (E-log)
(21N-49W-9ddddd)
Morrill County

Location: SE SE SE SE sec. 9, T. 21 N., R. 49 W., 15 ft. north and 117 ft. west of southeast corner of section.

Ground elevation: 4273 ft. (t). (Lynn 15 min. quadrangle)

Depth to water: 160.5 ft. (August 4, 1982).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, silty, dark gray to dark grayish-brown; sand is very fine to medium with some coarse and very coarse.....	0.0	4.0
Tertiary System - Miocene Series - Ogallala Group:		
(Angora sand and gravel beds?)		
Sand, very fine to very coarse; gravelly below 10 ft.....	4.0	30.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Sand, very fine to fine with trace of coarser grains.	30.0	35.0
Sand, very fine to medium with trace of coarse.....	35.0	46.0
Silt, slightly sandy, light yellowish-brown; sand is very fine.....	46.0	56.0
Sand, gravelly, fine sand to fine gravel with much coarse and very coarse sand; silty at top; finer grained below 60 ft.....	56.0	62.0
Silt, slightly clayey, mostly slightly sandy, pale brown and light yellowish-brown; sand mostly very fine.....	62.0	71.0
Sand, gravelly, very fine sand to fine gravel with some medium gravel; much medium to very coarse sand; silty in parts, especially below 90 ft.....	71.0	100.0
Sand, very fine to coarse; much medium to coarse sand	100.0	120.0
Sand, silty, and some sandy silt; sand is very fine to very coarse.....	120.0	125.0
Sand, fine to very coarse with some gravel; much medium to very coarse sand.....	125.0	135.0
Gravel, sandy; fine sand to fine gravel.....	135.0	140.0
Sand, very fine to very coarse; much medium to very coarse sand.....	140.0	150.0
Gravel, sandy, medium sand to medium gravel; contains some thin silt beds.....	150.0	175.0
Sand, very fine to very coarse with trace of gravel; much medium to very coarse sand; finer grained and silty in parts below 200 ft.....	175.0	205.0
Silt, very sandy, pale yellow; sand is very fine to fine.....	205.0	208.0
Sand, fine to coarse with trace of coarser grains....	208.0	227.0

Tertiary System - Miocene Series - Arikaree Group:

Camp Clarke beds

Silt, clayey, sandy, pale brown; sand is very fine...	227.0	240.0
Siltstone, slightly sandy, limy, mostly white; sand is very fine; slightly clayey in parts; pale olive below 252 ft (beds from 227 to 260 ft could also belong to Ogallala Ash Hollow Formation or to a post-Upper Harrison-pre-Ogallala set of beds).....	240.0	260.0
Siltstone, slightly sandy, mostly pale brown; sand is very fine; limy in parts; more sandy below 270 ft..	260.0	280.0
Siltstone, moderately sandy, brown to yellowish-brown; sand is very fine.....	280.0	290.0
Sandstone, very silty, brown to pale brown; sand is very fine; limy in parts.....	290.0	299.0

Tertiary System - Miocene and Oligocene Series - Arikaree Group:

Monroe Creek and Harrison Formations, undivided

Sandstone, moderately silty, olive to pale yellow; sand is very fine; limy in parts; pale brown and some fine to medium sand below 307 ft.....	299.0	310.0
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Tertiary System - Oligocene Series - White River Group:

Brule Formation, Brown siltstone beds

Siltstone, very sandy, limy, pale brown; sand is very fine.....	310.0	315.0
Siltstone, slightly and moderately sandy, mostly yellowish brown to brown; sand is very fine; intermittent limy zones; pale brown to brown below 330 ft.....	315.0	370.0
Siltstone, mostly slightly sandy, yellowish-brown to brown; sand is very fine, some limy zones; very slightly clayey and generally increasing clay with depth.....	370.0	460.0

**Test Hole #35-B-53 (No e-log)
(21N-50W-1aaaa)
Morrill County**

Location: NE NE NE NE sec. 1, T. 21 N., R. 50 W., 126 ft. south and 8 ft. west of northeast corner of section.

Ground elevation: 4250 ft. (t). (Angora SE 7.5 min. quadrangle).

Depth to water: uncertain, estimated to be about 90 ft., summer, 1982.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil.....	0.0	3.0
Sand, very fine to fine with gravel and sandstone fragments.....	3.0	6.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Sandstone, very fine to fine-grained, light olive gray and light gray.....	6.0	16.0
Sandstone, silty and siltstone, sandy, light olive gray, yellowish-gray and gray; sand is very fine to fine; limy in parts.....	16.0	46.0
Sandstone, moderately silty, light yellowish-gray; sand is very fine to fine.....	46.0	54.0
Siltstone, sandy, grading downward to sandstone, silty, mostly light yellowish-gray; sand is very fine to fine; limy in parts.....	54.0	66.0
Siltstone, mostly very clayey, slightly sandy, mostly yellowish-gray with some brown and olive gray; limy in parts.....	66.0	95.0
Siltstone, mostly moderately sandy, mostly light yellowish-gray; sand is very fine; limy in parts...	95.0	108.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, moderately and very sandy, mostly light brown; sand is very fine; limy in parts.....	108.0	126.0
Siltstone, very sandy, light brown; much coarse silt to very fine sand; hard limy zones in parts.....	126.0	150.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, mostly moderately silty, light brown, light brownish-gray and light gray; sand is very fine to fine; intermittent hard limy zones throughout.....	150.0	225.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Siltstone, mostly moderately sandy, brown; sand is very fine; intermittent hard limy zones in parts...	225.0	390.0

Siltstone, abundant volcanic glass shards, light gray to light brownish-gray (Nonpareil volcanic ash beds).....	390.0	405.0
Siltstone, slightly sandy, brown; sand is very fine..	405.0	410.0

Test Hole #36-B-81 (E-log)
(21N-50W-12bccb)
Morrill County

Location: NW SW SW NW, sec. 12, T. 21 N., R. 50 W., about 2030 ft. south and 6 ft. east of northwest corner of section.
 Ground elevation: 4250 ft. (t). (Angora SE 7.5 min. quadrangle).
 Depth to water: 141.6 ft. (August 26, 1981).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	2.0
Tertiary System - Miocene Series - Ogallala Group:		
Angora sand and gravel beds		
Sand, silty; sand is fine to coarse with some gravel below 3 ft.....	2.0	5.0
Sand, gravelly; medium sand to medium gravel.....	5.0	15.0
Sand and gravel; medium sand to medium gravel, some coarse gravel; some thin interbedded silt in parts.	15.0	22.0
Sand, very fine to coarse; much fine sand; silty in parts.....	22.0	25.0
Silt, slightly clayey, slightly sandy, pale yellow; sand is very fine.....	25.0	32.0
Sand, gravelly; fine sand to coarse gravel.....	32.0	36.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Sandstone, silty, pale brown; sand is very fine to fine.....	36.0	41.0
Siltstone, very sandy, pale yellow and pale brown; sand is very fine.....	41.0	47.0
Sandstone, very silty, light yellowish-brown; sand is very fine to fine; limy in parts.....	47.0	60.0
Siltstone, moderately and very clayey, sandy, mostly light brown; sand is very fine to fine; contains white lime concretions in parts.....	60.0	75.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, very sandy, light yellowish-brown to brown; sand is very fine with some fine; lime-cemented in parts.....	75.0	89.0
Sandstone, very silty, limy, mostly light yellowish-brown; sand is very fine with some fine..	89.0	93.0
Siltstone, very sandy, brownish-yellow and yellowish-brown; sand is very fine with some fine..	93.0	101.0
Sandstone, moderately silty, yellowish-brown; sand is very fine to fine; limy in parts.....	101.0	105.0

Tertiary System - Miocene and Oligocene Series - Arikaree Group:

Monroe Creek and Harrison Formations, undivided

Sandstone, slightly to moderately silty, pale brown and light gray; sand is very fine to fine; hard lime-cemented zones in parts.....	105.0	147.0
Siltstone, very sandy, mostly pale brown and grayish-brown; sand is very fine; contains some lime-cemented zones.....	147.0	165.0
Sandstone, mostly very silty, mostly very pale brown with some brown; grades to very sandy siltstone in parts; sand is very fine with some fine; contains some hard limy zones.....	165.0	215.0
Sandstone, slightly silty, pale brown and brown; sand is very fine to fine with some medium; limy in parts; finer grained and very silty from 222-226 ft	215.0	234.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Brown siltstone beds

Siltstone, mostly very sandy, mostly brown; sand is mostly very fine; intermittent hard limy zones.....	234.0	353.0
As above but slightly finer grained; few limy zones..	353.0	380.0
Silt, very pale brown to brown; mostly volcanic ash (Nonpareil volcanic ash beds).....	380.0	394.0
Siltstone, mostly moderately sandy, slightly clayey in parts, brown; sand is very fine.....	394.0	455.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Whitney Member

Siltstone, moderately to slightly sandy, slightly to moderately clayey, brown and yellowish-brown; sand is very fine.....	455.0	541.0
Siltstone, sandy, clayey, very ashy, light yellowish-brown to pale brown (Upper Ash).....	541.0	545.0
Siltstone, slightly sandy, moderately clayey, brown..	545.0	560.0

Test Hole #34-B-53 (E-log)
(21N-50W-36ddcd)
Morrill County

Location: SE SW SE SE sec. 36, T. 21 N., R. 50 W., 7 ft. north and 863 ft. west of southeast corner of section.
 Ground elevation: 3870 ft. (t). (Bridgeport 7.5 min. quadrangle).
 Depth to water: Hole open to 14.0 ft. with no water cut (August 16, 1953). Electric log indicates water level from 17 to 20 ft. (August 11, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil and roadfill.....	0.0	2.0
Sand, silty, and some sandy silt, brownish-gray and olive-gray; sand is very fine to fine.....	2.0	12.0
Sand, very fine to medium.....	12.0	20.0
Gravel composed mostly of Brule fragments.....	20.0	25.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, brown; broken and fractured from 36 to 38 ft.....	25.0	70.0

Test Hole #10-GT-80 (E-log)
(21N-51W-6bbbc)
Morrill County

Location: SW NW NW NW sec. 6, T. 21 N., R. 51 W., 590 ft. south and
 123 ft. east of northwest corner of section.
 Ground elevation: 3930 ft. (t). (Bayard 7.5 min. quadrangle).
 Depth to water: not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	3.0
Silt, light yellowish-brown and pale brown.....	3.0	20.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, mostly moderately clayey, brown to yellowish-brown; (electric log indicates Lower Ash from 106 to 110 ft).....	20.0	110.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, moderately clayey, yellowish-brown.....	110.0	210.0
Interbedded slightly clayey, sandy siltstone and moderately clayey siltstone; light yellowish-brown and brown.....	210.0	245.0
Siltstone, moderately clayey, yellowish-brown and brown.....	245.0	265.0
Sandstone, very fine to fine-grained and some siltstone, brown.....	265.0	274.0
Siltstone, moderately clayey, yellowish-brown to brown and some interbedded reddish-brown claystone.	274.0	310.0
Siltstone, moderately clayey, yellowish-brown to brown.....	310.0	340.0
As above and brown sandy, clayey siltstone; sand is very fine.....	340.0	358.0
Sandstone, clayey with some siltstone, sandy, yellowish-brown to brown; sand is very fine to fine.....	358.0	367.0
Siltstone, moderately clayey, slightly sandy, yellowish-brown with pinkish tint; sand is very fine to fine.....	367.0	371.0
Sand, silty, clayey, grayish-brown; sand is very fine to fine.....	371.0	380.0
Interbedded clayey siltstone, silty claystone, and silty sandstone, yellowish-brown and greenish-gray.	380.0	417.0
Siltstone, moderately clayey, pale brown with olive tint and some greenish-gray.....	417.0	500.0

Test Hole #19-B-53 (No e-log)
(21N-51W-18aaaa)
Morrill County

Location: NE NE NE NE sec. 18, T. 21 N., R. 51 W., 7 ft. south and 45 ft. west of northeast corner of section.
 Ground elevation: 3842 ft. (t). (Bayard 7.5 min. quadrangle).
 Depth to water: 9.0 ft. (July 26, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	2.0
Silt, sandy and some silty sand, light brownish-gray; sand is very fine.....	2.0	5.0
Silt, granular, very pale brown.....	5.0	19.0
Sand, very fine to very coarse with some gravel and Brule fragments.....	19.0	24.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, light yellowish-brown.....	24.0	41.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Claystone and clay, silty, light brown.....	41.0	48.0
Siltstone, slightly to very clayey, very pale brown and brown; thin claystone beds in parts.....	48.0	76.0
Claystone, silty, mostly light brown with some pinkish-gray.....	76.0	86.0
Silt, sandy with some silty sand, light brown; sand is very fine.....	86.0	90.0
Claystone, silty, mostly light brown; some gray and green tint.....	90.0	97.0
Siltstone, mostly slightly clayey, pink.....	97.0	115.0
Siltstone, sandy grading down to silty sand, pink; sand is very fine.....	115.0	120.0

Note: Large circulation loss 19.5 to 23.5 ft and gradual loss below 23.5 ft

Test Hole #18-B-53 (E-log)
(21N-51W-29bccc)
Morrill County

Location: SW SW SW NW sec. 29, T. 21 N., R. 51 W., 145 ft. north of half-section line and 8 ft. east of west section line.
 Ground elevation: 3832 ft. (t). (Bayard 7.5 min. quadrangle).
 Depth to water: Hole open to 15.2 ft. and no water cut (July 26, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	1.0
Sand and gravel; medium sand to medium gravel with trace of coarse gravel; some siltstone pebbles below 15 ft.....	1.0	19.0
Tertiary System - Oligocene Series, White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, pale brown.....	19.0	100.0

Test Hole #40-B-53 (E-log)
(21N-51W-36aaaa)
Morrill County

Location: NE NE NE NE sec. 36, T. 21 N., R. 51 W., 140 ft. south and
 12 ft. west of northeast corner of section.
 Ground elevation: 3815 ft. (t). (Angora 7.5 min. quadrangle).
 Depth to water: 28.2 ft. (August 30, 1953).

Quaternary System, undifferentiated:

Roadfill.....	0.0	1.0
Silt, sandy, mostly light yellowish-brown; sand is very fine to fine.....	1.0	22.0
Silt, slightly sandy, dark grayish-brown; sand is very fine to fine		
Silt, moderately clayey, pale brown.....	22.0	23.0
Sand and gravel composed mostly of Brule fragments...	30.0	32.0

Tertiary System - Oligocene Series - White River Group:**Brule Formation, Whitney Member**

Siltstone, slightly clayey, light yellowish-brown; fractured in parts from 35 to 40 ft.....	32.0	40.0
Siltstone, slightly sandy, very pale brown (sample and electric log indicate this bed is the Lower Ash)...	40.0	45.0

Tertiary System - Oligocene Series - White River Group:**Brule Formation, Orella Member**

Siltstone, slightly clayey, slightly to moderately sandy, light yellowish-brown; sand is very fine to fine.....	45.0	85.0
Siltstone, slightly clayey, very pale brown.....	85.0	100.0

Test Hole #38-B-53 (E-log)
(21N-52W-15cccc)
Morrill County

Location: SW SW SW SW sec. 15, T. 21 N., R. 52 W., 19 ft. north and 68 ft. east of southwest corner of section.
 Ground elevation: 3854 ft. (t). (Bayard 7.5 min. quadrangle).
 Depth to water: 26.5 ft. (August 30, 1953).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	2.0
Sand, fine to very coarse with some fine gravel; more and coarser gravel from 2 to 5 ft.....	2.0	10.0
Sand and gravel; medium sand to medium gravel.....	10.0	15.0
Sand, fine to very coarse with some fine gravel.....	15.0	20.0
Sand and gravel; medium sand to fine gravel with some medium to coarse gravel; mostly coarse sand to fine gravel from 25 to 30 ft.....	20.0	35.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, slightly clayey, pale brown; slightly sandy from 53 to 65 ft; moderately sandy below 90 ft; sand is mostly very fine.....	35.0	100.0

Test Hole #5-B-82 (E-log)
(22N-47W-6dabb)
Morrill County

Location: NW NW NE SE sec. 6, T. 22 N., R. 47 W., approximately 2500 ft. north and 1100 ft. west of southeast corner of section.
 Ground elevation: 3970 ft. (t). (Lynn 15 min. quadrangle).
 Depth to water: 8.2 ft. (June 28, 1982)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	3.0
Sand, very fine to medium with rare coarse and very coarse.....	3.0	10.0
Sand, fine to medium with trace of coarser grains....	10.0	35.0
Sand, fine to coarse with trace of very coarse.....	35.0	40.0
Tertiary System - Miocene Series - Ogallala Group:		
Duer Ranch beds		
Sandstone, very fine to fine-grained, very poorly consolidated, gray.....	40.0	50.0
Sandstone, fine to very coarse grained, poorly consolidated, gray; contains some root casts; finer grained below 60 ft.....	50.0	62.0
Sand, silty, greenish-gray; sand is very fine to fine with trace of medium.....	62.0	65.0
Sandstone, very fine to medium-grained, dark greenish-gray.....	65.0	78.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Sandstone, silty, light and dark gray sand is very fine to fine; limy and clayey in parts.....	78.0	88.0
Sandstone, silty, light gray with some dark gray and light brown and interbedded with sandy limestone; sand is very fine to fine; moderately clayey in parts; large drilling fluid loss at 123 ft.....	88.0	123.0
Siltstone, mostly very sandy, yellowish-brown; sand is very fine; limy in parts, especially from 123 to 145 ft. and below 167 ft.....	123.0	171.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Siltstone, moderately and very sandy, yellowish-brown to brown; sand is very fine; intermittent hard limy zones, especially from 171 to 310 ft; electric log indicates less sandy below 400 ft.....	171.0	430.0
Siltstone, slightly sandy, very pale brown and pale brown, sand is very fine; uniform grain size; much volcanic ash (Nonpareil volcanic ash beds).....	430.0	440.0
Siltstone, moderately sandy, brown; sand is very fine	440.0	490.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Whitney Member

Siltstone, mostly slightly clayey, mostly slightly sandy, pale brown and light yellowish-brown.....	490.0	587.0
Siltstone, slightly clayey, slightly sandy, very ashy, very pale brown; sand is very fine (Upper Ash).....	587.0	590.0
Siltstone, moderately clayey, slightly sandy, yellowish-brown; sand is very fine.....	590.0	610.0

Test Hole #6-B-82 (E-log)
(22N-47W-29aaca)
Morrill County

Location: NE SW NE NE sec. 29, T. 22 N., R. 47 W., approximately 750 ft. south and 800 ft. west of northeast corner of section.
 Ground elevation: 3962 ft. (hand-level measurement from bench mark near northeast corner of section. (t) (Lynn 15 min. quadrangle).
 Depth to water: 10.6 ft. (June 19, 1982).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine with some medium; some organic matter 0-0.5 ft.; mostly greenish-gray.....	0.0	30.0
Interbedded sand, very fine to medium and silt; mostly greenish-gray; rare coarse sand below 35 ft.	30.0	38.0
Tertiary System - Miocene Series - Ogallala Group:		
Duer Ranch beds		
Sandstone, very fine to fine-grained, greenish-gray; contains some medium sand, thin interbedded silts, and lime cementation in parts.....	38.0	46.0
Siltstone, very sandy, greenish-gray; sand is very fine to fine; lime-cemented in parts.....	46.0	51.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, very sandy and sandstone, very silty, limy, light gray and very pale brown; sand is very fine.....	51.0	65.0
Siltstone, very sandy, grayish-brown and brown; sand is very fine with some fine; limy in parts.....	65.0	100.0
Sandstone, very silty, limy, light gray; sand is very fine.....	100.0	106.0
Siltstone, very sandy, yellowish-brown; sand is very fine; limy in few parts.....	106.0	145.0
Sandstone, very silty, yellowish-brown; sand is very fine; limy in few parts.....	145.0	156.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, moderately and very silty, light gray and some yellowish-brown; sand is very fine to fine with trace of medium; mostly lime-cemented.....	156.0	168.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Sandstone, very silty, yellowish-brown and some brown; sand is very fine; lime-cemented in parts, especially from 176 to 185 ft and below 193 ft.....	168.0	202.0

Siltstone, moderately to very sandy, brown; sand is
very fine..... 202.0 210.0
(Above-normal loss of drilling mud from 60 to 130 ft.
Equipment problems at 210 ft).

Test Hole #27-A-53 (E-log)
(22N-47W-33cbbb)
Morrill County

Location: NW NW NW SW sec. 33, T. 22 N., R. 47 W., approximately 500 ft. south of half-section line and 37 ft. east of west section line.

Ground elevation: 3,940 ft. (t). (Lynn 15 min. quadrangle).

Depth to water: 5.3 ft. (September 28, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil.....	0.0	3.0
Silty sand and some sandy silt, brownish-gray and, below 7 ft, bluish-gray; sand is very fine to medium.....	3.0	12.0
Tertiary System - Miocene Series - Ogallala Group:		
Duer Ranch beds		
Sand and sandstone, bluish-gray in upper part and yellowish-gray in lower part; sand is very fine to medium (contacts uncertain).....	12.0	33.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Silt, clayey, sandy, limy, light gray with some light olive-gray and white; sand is very fine to medium..	33.0	45.0
Sandstone, silty, limy, mostly light brown; sand is very fine to medium (contacts uncertain).....	45.0	65.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Sandstone, silty, mostly light brown; sand is very fine; contains hard limy zones.....	65.0	100.0

Test Hole #30-A-53 (No e-log)
(22N-50W-1aaab)
Morrill County

Location: NW NE NE NE sec. 1, T. 22 N., R. 50 W., 60 ft. south and about 350 ft. west of northeast corner of section.
 Ground elevation: 4200 ft. (t). (Angora NE 7.5 min. quadrangle).
 Depth to water: 9.6 ft. (September 26, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil and silty sand.....	0.0	5.0
Sand, fine to very coarse; gravelly from 8 to 10 ft and below 20 ft.; some interbedded silt from 8 to 10 ft.....	5.0	22.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Silt, slightly sandy, clayey in parts, mostly light olive-gray; sand is very fine to fine.....	22.0	36.0
Siltstone, limy, white.....	36.0	45.0
Sandstone, limy, hard; sand is very fine to fine.....	45.0	55.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds(?)		
Mostly sandstone, silty, brown; sand is very fine to fine..... (Lost much drilling fluid starting at 40 ft)	55.0	100.0

Test Hole #1-B-82 (E-log)
(22N-50W-1aaab)
Morrill County

Location: NW NE NE NE sec. 1, T. 22 N., R. 50 W., 216 ft. south and about 500 ft. west of northeast corner of section.
 Ground elevation: 4200 ft. (t). (Angora NE 7.5 min. quadrangle).
 Depth to water: 15.3 ft. (June 8, 1982).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, fine to coarse, brown and grayish-brown; silty in parts; trace gravel from 9 to 15 ft.....	0.0	22.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Sandstone, very silty, grayish-brown and light brown; sand is very fine to fine with some medium..	22.0	28.0
Silt, moderately clayey, moderately sandy, mostly light gray; sand mostly very fine; more sandy from 30 to 33 ft and below 36 ft.....	28.0	38.0
Sandstone, very silty, light brownish-gray and light gray; sand is very fine with some fine to medium, lime-cemented in most parts.....	38.0	51.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, very sandy, mostly brown; sand is very fine with some fine.....	51.0	67.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, mostly moderately silty, light grayish-brown and pale brown; sand is very fine with some fine; hard limy zones in parts; trace medium sand in parts.....	67.0	190.0
Tertiary System - Oligocene Series - Arikaree Group:		
Gering Formation		
Sandstone, mostly slightly silty, mostly light grayish-brown; sand is very fine to fine with some medium; limy zones in parts.....	190.0	207.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Siltstone, mostly moderately sandy, brown; sand is very fine; limy zones in parts; varies from slightly to very sandy in parts below 305 ft.....	207.0	392.0
Silt, mostly grayish-brown with gray and pale yellowish-brown; mostly volcanic ash (Nonpareil volcanic ash beds).....	392.0	423.0

Siltstone, slightly sandy, very slightly clayey,
brown; sand is very fine..... 423.0 440.0
(Excessive drilling fluid loss from 90 to 110 ft,
moderate to large losses thereafter).

Test Hole #35-B-81 (E-log)
(22N-50W-6bbcb)
Morrill County

Location: NW SW NW NW sec. 6, T. 22 N., R. 50 W., about 680 ft. south and 300 ft. east of northwest corner of section.
 Ground elevation: 4315 ft. (t). (Angora NW 7.5 min. quadrangle).
 Depth to water: 55.3 ft. (August 26, 1981).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil and fill.....	0.0	4.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation:		
Silt, very clayey, slightly sandy, light olive-gray, pale yellow, and some light brown and white; sand mostly very fine; lime concretions in parts.....	4.0	35.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, very sandy, olive grading downward to brown; sand is very fine to fine; some limy zones..	35.0	40.0
Sandstone, very silty, brown; sand is very fine to medium; few limy zones many root casts below 70 ft.	40.0	76.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, slightly to moderately silty, mostly pale brown; sand is very fine to fine; hard limy zones in parts; brown from 91 to 105 ft, olive from 105 to 115 ft., and grayish-brown below 155 ft.....	76.0	188.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Sandstone, very silty, and siltstone, very sandy, brown and yellowish-brown; sand is very fine; limy zones in parts.....	188.0	270.0
Siltstone, very sandy, brown; sand is very fine; limy zones in parts.....	270.0	300.0
Sandstone, very silty, brown; sand is very fine; limy zones in parts.....	300.0	328.0
Siltstone, mostly moderately sandy, brown and pale brown; sand is very fine; few limy zones.....	328.0	372.0
Silt, -moderately sandy, very ashy, very pale brown (Nonpareil volcanic ash beds).....	372.0	382.0
Siltstone, moderately sandy, mostly pale brown; very sandy in parts below 405 ft; sand is very fine; few limy zones.....	382.0	423.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Whitney Member

Siltstone, slightly clayey, slightly sandy, brown; sand is very fine.....	423.0	508.0
Siltstone, slightly clayey, moderately sandy, light yellowish-brown; contains many mica flakes (Upper Ash).....	508.0	512.0
Siltstone, moderately clayey, slightly sandy, brown; sand is very fine.....	512.0	560.0

Test Hole #37-B-81 (E-log)
(22N-50W-26adaa)
Morrill County

Location: NE NE SE NE sec. 26, T. 22 N., R. 50 W., 1366 ft. south and
 9 ft. west of northeast corner of section.

Ground elevation: 4190 ft. (t). (Angora SE 7.5 min. quadrangle).

Depth to water: 17.7 ft. (August 26, 1981).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	3.0
Sand, silty, grayish-brown; sand is very fine to coarse.....	3.0	7.0
Gravel, sandy; contains many sandstone fragments.....	7.0	10.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Silt, clayey, sandy, pale brown; sand is very fine to fine; contains lime concretions.....	10.0	19.0
Siltstone, very sandy, mostly light-brownish-gray; sand is very fine to fine.....	19.0	30.0
Sandstone, moderately silty, light brownish-gray and brown; sand is very fine to fine; much lime cementation.....	30.0	40.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, very sandy, brown; sand is very fine to fine; much lime cementation from 51 to 59 ft.....	40.0	80.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, moderately silty; very pale brown, brown, and brownish-gray; sand is very fine to fine; contains intermittent hard limy zones.....	80.0	149.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Siltstone, mostly moderately sandy, brown and some yellowish-brown; sand is very fine; grades from slightly sandy to, in parts, very sandy; hard limy zones in parts.....	149.0	260.0
Sandstone, very silty, pale brown and brown; sand is very fine.....	260.0	288.0
Siltstone, moderately sandy grading downward to very sandy, mostly pale brown; sand is very fine; limy zones in parts.....	288.0	313.0
Impure volcanic ash (Nonpareil volcanic ash beds)....	313.0	330.0
Siltstone, moderately sandy, brown and some yellowish-brown; sand is very fine; slightly clayey in most parts; more sandy below 360 ft.....	330.0	370.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Whitney Member

Siltstone, moderately clayey, slightly sandy, brown
to yellowish-brown; sand is very fine..... 370.0 420.0
(Significant loss of drilling fluid below 40 ft)

**Test Hole #21-B-53 (No e-log)
(22N-51W-7add)
Morrill County**

Location: SE SE SE NE sec. 7, T. 22 N., R. 51 W., about 2,300 ft. south and 300 ft. west of northeast corner of section.
Ground elevation: 4386 ft. (t). (Bayard NE 7.5 min. quadrangle).
Depth to water: Hole caved at 86 ft.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil and yellowish-gray silty sand.....	0.0	5.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand and gravel; contains many sandstone fragments...	5.0	8.0
Tertiary System - Miocene Series - Arikaree Group:		
(Camp Clarke beds?)		
Sandstone, very silty, mostly pale yellow to yellowish-gray; sand is very fine; limy in parts...	8.0	70.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, slightly silty, mostly olive-brown; sand is very fine.....	70.0	146.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Siltstone, very sandy, mostly yellowish-brown; sand is very fine; grades to very silty sandstone in parts; hard limy zones in parts.....	146.0	230.0
(No electric log, formation contacts questionable; large loss of drilling fluid at 18 ft)		

**Test Hole #20-B-53 (No e-log)
(22N-51W-30cddc)
Morrill County**

Location: SW SE SE SW sec. 30, T. 22 N., R. 51 W., 14 ft. north and about 2050 ft. east of southwest corner of section.
Ground elevation: 4192 ft. (t). (Bayard 7.5 min. quadrangle).
Depth to water: Dry to 80 ft.

**Tertiary System - Oligocene Series - White River Group:
Brule Formation, Brown siltstone beds**

Siltstone, very sandy; sand is very fine; hard limy zones in parts; grades to very silty sandstone in parts..... 0.0 80.0
(Lost drilling-fluid circulation at 22, 50, 74, 78, and 80 ft. so abandoned hole)

Test Hole #39-B-53 (E-log)
(22N-52W-27cccc)
Morrill County

Location: SW SW SW SW sec. 27, T. 22 N., R. 52 W., 71 ft. north and 8 ft. east of southwest corner of section.
 Ground elevation: 4029 ft. (t). (Bayard 7.5 min. quadrangle).
 Depth to water: 53.1 ft. (August 31, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill and sandy silt, brownish-gray and brown.....	0.0	4.0
Sand, very silty; sand is very fine to fine.....	4.0	8.0
Sand and gravel; mostly coarse sand to medium gravel.	8.0	15.0
Gravel, sandy; coarse sand to coarse gravel; contains many sandstone fragments.....	15.0	30.0
Sand and gravel; coarse sand to coarse gravel.....	30.0	60.0
Gravel, sandy; mostly fine to coarse gravel; mostly sandstone fragments below 65 ft.....	60.0	66.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, (?Whitney Member?)		
Siltstone, slightly clayey, yellowish-brown.....	66.0	100.0

Test Hole #28-A-53 (E-log)
(23N-47W-33cccc)
Morrill County

Location: SW SW SW SW sec. 33, T. 23 N., R. 47 W., about 200 ft. north and 200 ft. east of southwest corner of section.
 Ground elevation: 3945 ft. (t). (Lynn 15 min. quadrangle).
 Depth to water: Caved at 5 ft. (September 25, 1953).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	1.0
Sand, very fine to medium.....	1.0	35.0
As above but slightly fine and with some dark organic material in places.....	35.0	45.0
Sand, very fine to medium with a trace of coarse.....	45.0	50.0
Sand, very fine to coarse; trace of very coarse below 60 ft.....	50.0	73.0
Tertiary System - Miocene Series - Ogallala Group:		
Duer Ranch beds		
Sandstone, very fine to medium-grained, light greenish-gray; contains root casts; trace of coarse sand below 90 ft.; some lime cementation in parts below 100 ft.....	73.0	124.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation?		
Sandstone, silty, mostly gray; sand is very fine to fine; limy in parts and grades to sandy limestone; contains a few root casts in parts.....	124.0	160.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Sandstone, very silty, pale brown; sand is mostly very fine; less silty below 185 ft.....	160.0	195.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds?		
Siltstone, very sandy, pale brown to light yellowish-brown; sand is very fine; hard limy zones in parts.....	195.0	230.0

Test Hole #4-B-82 (E-log)
(23N-48W-13cab)
Morrill County

Location: SW NW NE SW sec. 13, T. 23 N., R. 48 W., about 600 ft. south of half-section line and about 1,550 ft. east of West section line.
 Ground elevation: 3965 ft. (t). (Lynn 15 min. quadrangle).
 Depth to water: 4.5 ft. (June 16, 1982).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	2.0
Sand, fine to medium.....	2.0	20.0
Sand, very fine to fine and trace of medium; silty in parts.....	20.0	25.0
Sand, very fine to medium with trace of coarse and very coarse; contains interbedded clayey silt in parts, mostly grayish-green; below 35 ft, trace of gravel and sediments stained green.....	25.0	40.0
Interbedded sandy silt, clayey silt, and sand, greenish-gray to dark green; sand is fine to coarse with trace of very coarse.....	40.0	45.0
Tertiary System - Miocene Series - Ogallala Group:		
Duer Ranch beds		
Sandstone, very slightly consolidated, gray and greenish-gray; sand is fine to medium with some coarse; contains some root casts and some interbedded silt.....	45.0	62.0
Sandstone, moderately silty, olive-gray; sand is very fine to fine; less silty from 72 to 78 ft; grayish-brown and greenish-gray in parts; contains root casts.....	62.0	85.0
Sandstone, very fine to medium-grained, olive- and greenish-gray; contains some root casts; contains some coarser grains from 90 to 93 ft.; silty in parts below 93 ft.....	85.0	97.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation		
Clay, silty, pale olive; some interbedded sandy and limy zones.....	97.0	102.0
Sandstone, moderately silty, and some sandy siltstone, olive and yellowish-brown; sand is very fine to fine.....	102.0	110.0
Silt, very clayey, moderately sandy, light gray.....	110.0	112.0
Limestone, silty, sandy, white and light gray.....	112.0	117.0
Sandstone, mostly very silty, mostly olive; sand is very fine to fine with some medium in parts; limy zones in parts.....	117.0	132.0

Tertiary System - Miocene Series - Arikaree Group:

Camp Clarke beds

Limestone, very sandy, silty and limy sandstone, mostly pale yellow; sand is very fine.....	132.0	140.0
Siltstone, very sandy, mostly olive; sand is very fine; hard limy zones in parts; grades to very silty sandstone in lower part.....	140.0	170.0

Tertiary System - Miocene and Oligocene Series - Arikaree Group:

Monroe Creek and Harrison Formations, undivided

Sandstone, very silty, grayish-brown; sand is very fine; intermittent hard limy zones in most parts; light gray and more lime below 204 ft.....	170.0	206.0
Sandstone, moderately silty, mostly pale brown; many hard limy zones from 206 to 245 ft and below 270 ft.....	206.0	280.0

Tertiary System - Oligocene Series - White River Group:

Brown siltstone beds

Siltstone, very sandy, light brownish-gray and brown; sand is very fine; intermittent hard limy zones throughout; grades to very silty sandstone in parts.....	280.0	365.0
Siltstone, mostly moderately sandy, colors range from pale brown to yellowish-brown; sand is very fine; hard limy zones in parts.....	365.0	425.0
Siltstone, slightly sandy, mostly yellowish-brown; sand is very fine; few limy zones.....	425.0	475.0
Siltstone, very slightly sandy, very ashy, mostly very pale brown; sand is very fine (Nonpareil volcanic ash beds).....	475.0	493.0
Siltstone, slightly sandy, mostly yellowish-brown; sand is very fine.....	493.0	550.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Whitney Member

Siltstone, slightly clayey, slightly sandy, light yellowish-brown; sand is very fine (electric log indicates Upper Ash may occur from 616 to 623 ft....	550.0	630.0
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Test Hole #2-B-82 (E-log)
(23N-49W-17cdbb)
Morrill County

Location: NW NW SE SW sec. 17, T. 23 N., R. 49 W., 1279 ft. north and about 1600 ft. east of southwest corner of section.
 Ground elevation: 4180 ft. (t). (Angora NE 7.5 min. quadrangle).
 Depth to water: 23.3 ft. (June 8, 1982).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	1.0
Tertiary System - Miocene Series - Ogallala Group:		
Ash Hollow Formation:		
Sandstone, very silty, limy, mostly gray; sand is very fine to coarse; some siliceous material in parts.....	1.0	11.0
Sandstone, very fine to coarse-grained, poorly consolidated.....	11.0	18.0
Sandstone, moderately to very silty, mostly gray and grayish-brown; sand is very fine to fine with some medium in parts; lime-cemented in most parts.....	18.0	52.0
Siltstone, sandy, mostly grayish-brown and pale brown; sand is very fine to fine.....	52.0	70.0
Sandstone, very silty, pale brown and light gray; sand is very fine to fine; limy below 80 ft.....	70.0	92.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, very sandy, light brown; sand is very fine to fine; limy in a few parts.....	92.0	120.0
Sandstone, very silty, light brown and light grayish-brown; sand is mostly very fine; limy in parts.....	120.0	150.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, fine to very fine grained, mostly gray and light gray; silty and contains some medium sand in parts; hard limy zones and root casts common.....	150.0	227.0
Tertiary System - Oligocene Series - Arikaree Group:		
Gering Formation?		
Sandstone, fine to very fine grained with some medium and trace of coarse to very coarse sand, mostly brownish-gray; contains trace of lithic fragments and some iron-stained cuttings, especially below 250 ft.....	227.0	262.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Brown siltstone beds

Siltstone, very sandy, light brown; sand is very fine with some fine; grades to very silty sandstone in parts; hard limy zones common.....	262.0	410.0
Sandstone, slightly to very silty, light brown; sand mostly very fine with some fine; limy zones in parts.....	410.0	435.0
Siltstone, mostly moderately sandy, light yellowish-brown; sand is very fine.....	435.0	458.0
Siltstone and volcanic ash, sandy, gray, pale brown and light grayish-brown; sand is very fine (Nonpareil volcanic ash beds).....	458.0	480.0
Siltstone, slightly clayey, slightly to moderately sandy, light yellowish-brown; sand is very fine; much sandier and light grayish-brown below 515 ft..	480.0	520.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Whitney Member

Siltstone, slightly clayey, slightly sandy, light yellowish-brown; sand is very fine; more clayey below 595 ft; lighter colored and very uniform grain size from 614 to 618 ft (Upper Ash).....	520.0	640.0
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Test Hole #32-B-81 (E-log)
(23N-51W-6bbbb)
Morrill County

Location: NW NW NW NW sec. 6, T. 23 N., R. 51 W., 6 ft. south and 302 ft. east of northwest corner of section.
 Ground elevation: 4370 ft. (t). (Kilpatrick Lake 15 min. quadrangle).
 Depth to water: 107.1 ft. (August 17, 1981).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill and silty sand.....	0.0	3.0
Sand, moderately silty, yellowish-brown; sand is very fine to medium.....	3.0	6.0
Sand, fine to medium; some coarse to very coarse sand below 10 ft and rare gravel grains at base.....	6.0	16.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, very sandy, grading downward to sandstone, very silty, pale brown to yellowish-brown and brown; sand is very fine to fine with trace of medium in parts; some limy zones at top and below 30 ft; slightly silty, grayish-brown, and contains root casts below 40 ft.....	16.0	50.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, mostly slightly silty, grayish-brown; sand is very fine to fine with trace of medium in most parts; hard limy zones in parts from 50 to 90 ft, at 110 ft, and below 120 ft; contains some root casts in parts.....	50.0	176.0
Sandstone, very silty, mostly brown; sand is very fine to fine.....	176.0	195.0
Sandstone, very fine to medium-grained with trace of coarse sand; brown, grayish-brown, and gray; lime-cemented in parts; contains some ironstone and rounded siliceous claystone fragments (interval may be Gering Formation).....	195.0	201.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Siltstone, very sandy, yellowish-brown; sand is very fine; contains thin, hard limy zones.....	201.0	260.0
Siltstone, mostly moderately silty, brown and pale brown; sand is very fine; contains thin, hard limy zones.....	260.0	300.0
Sandstone, very silty, pale brown; sand is very fine with some fine; contains thin, hard limy zones.....	300.0	317.0
Siltstone, moderately sandy, yellowish-brown; sand is very fine.....	317.0	325.0

Sand, very silty, very ashy, pale brown; sand is very fine (Nonpareil volcanic ash beds?).....	325.0	336.0
Siltstone, slightly clayey, slightly sandy, yellowish-brown; sand is very fine.....	336.0	355.0
Interbedded clayey siltstone, sandy siltstone, and some sandstone and claystone; colors are brown, yellowish-brown, and light brown; sand is mostly very fine to fine with trace of coarser grains in parts; beds range from less than 1 ft to 5 ft in thickness.....	355.0	451.0
Sandstone, mostly very fine to fine-grained, interbedded with thin layers of sandy and clayey siltstone, mostly light brown; some medium sand in parts; some rounded claystone fragments of very coarse sand to fine gravel size; beds are less than 2 ft thick.....	451.0	470.0
Sandstone, fine to coarse-grained, and some very thin beds of siltstone, light brown and some pale olive; contains rounded claystone fragments up to fine gravel size.....	470.0	480.0
Sandstone, silty, clayey in parts and some interbedded siltstone, mostly light brown; sand is fine to medium with some coarse.....	480.0	502.0
Sandstone, grayish-brown; sand is very fine to fine with trace of medium; silty in parts.....	502.0	507.0
Sandstone, fine to medium-grained with some coarser grains, and some interbedded siltstone and claystone, mostly pale brown; sandstone is silty in parts.....	507.0	517.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Whitney Member		
Siltstone, moderately clayey, very slightly sandy, yellowish-brown; sand is very fine; lighter colored and very uniform grain size below 572 ft (Lower Ash).....	517.0	580.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Orella Member		
Siltstone, moderately clayey, mostly light yellowish-brown and pale brown.....	580.0	640.0

Test Hole #22-B-53 (No e-log)
(23N-51W-7daaa)
Morrill County

Location: NE NE NE SE sec. 7, T. 23 N., R. 51 W., 67 ft. south of half-section line and 6 ft. west of east section line.
 Ground elevation: 4406 ft. (t). (Bayard NE 7.5 min. quadrangle).
 Depth to water: Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Roadfill and sandy silt.....	0.0	3.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Siltstone, very sandy, and sandstone, very silty, mostly light yellowish-brown; sand mostly very fine; lime-cemented from 3 to 24 ft and hard limy zones in parts from 22 to 55 ft.....	3.0	75.0
(Complete loss of drilling fluid at 75 ft. and unable to recover circulation).		

Test Hole #33-B-81 (E-log)
(23N-51W-20bbbb)
Morrill County

Location: NW NW NW NW sec. 20, T. 23 N., R. 51 W., 22 ft. south and 13 ft. east of northwest corner of section.

Ground elevation: 4418 ft. (t). (Bayard NE 7.5 min. quadrangle).

Depth to water: 136.3 ft. (August 17, 1981).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Sandstone, very silty, light yellowish-brown; sand is very fine to fine; limy in parts.....	1.0	6.0
Limestone, sandy, silty, white; sand is very fine to fine; less lime below 11 ft and contains trace of root casts.....	6.0	15.0
Siltstone, very sandy, light yellowish-brown; sand is very fine to fine.....	15.0	20.0
Sandstone, very silty; sand is very fine to fine; limy zones common; mostly light yellowish-brown from 20 to 36 ft, light brownish-gray from 36 to 45 ft, olive-yellow and white from 45 to 56 ft, and mostly pale brown below 56 ft.....	20.0	75.0
Sandstone, very silty grading downward to moderately silty, mostly pale brown; sand is very fine to fine; some limy zones below 90 ft.....	75.0	95.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, slightly silty, light brownish-gray and grayish-brown; sand is very fine to fine; root casts in parts; hard limy zones in parts.....	95.0	170.0
Sandstone, very silty, grayish-brown; sand is very fine to fine; hard limy zones in parts; pale brown below 190 ft.....	170.0	195.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Siltstone, very sandy, mostly pale brown and yellowish-brown; sand is very fine; hard limy zones in parts.....	195.0	322.0
Siltstone, moderately sandy and mostly pale brown....	322.0	362.0
Siltstone, very pale brown and very well sorted (Nonpareil volcanic ash beds).....	362.0	376.0
Siltstone, slightly sandy, brown; sand is very fine; more sand below 415 ft.....	376.0	424.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Whitney Member

Siltstone, slightly clayey, mostly yellowish-brown;
sand is very fine, very well sorted and lighter

colored from about 517 to 521 ft (Upper Ash)..... 424.0 540.0

Test Hole #34-B-81 (E-log)
(23N-51W-32cccc)
Morrill County

Location: SW SW SW SW sec. 32, T. 23 N., R. 51 W., 6 ft. north and 265 ft. east of southwest corner of section.
 Ground elevation: 4373 ft. (t). (Bayard NE 7.5 min. quadrangle).
 Depth to water: 108.3 ft. (August 26, 1981).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Roadfill and sandy silt.....	0.0	5.0
Tertiary System - Miocene Series - Arikaree Group:		
Camp Clarke beds		
Sandstone, very silty, pale brown and pale yellow; sand is very fine to fine with some medium; lime-cemented in most parts.....	5.0	30.0
Sandstone, moderately and slightly silty, pale olive, light brownish-gray, and light gray; sand is very fine to fine with trace of medium; lime-cemented in many parts and especially below 45 ft.....	30.0	60.0
Sandstone, slightly to moderately silty, grayish-brown; sand is very fine to fine with some medium; limy in parts.....	60.0	100.0
Tertiary System - Miocene and Oligocene Series - Arikaree Group:		
Monroe Creek and Harrison Formations, undivided		
Sandstone, moderately silty, light and dark grayish-brown; sand is very fine to fine with some medium in parts; hard limy zones common except below 120 ft.....	100.0	138.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation, Brown siltstone beds		
Sandstone, very silty, pale brown; sand is very fine; hard limy zones common.....	138.0	150.0
Siltstone, moderately and very sandy, pale brown and brown; sand is very fine; hard limy zones in parts.	150.0	235.0
As above, but less sandy.....	235.0	255.0
Sand, very silty, brown; sand is very fine.....	255.0	264.0
Siltstone, moderately sandy, brown; sand is very fine	264.0	275.0
Well-sorted coarse silt to very fine sand, brown and pale brown; (Nonpareil volcanic ash beds).....	275.0	285.0
Siltstone, moderately sandy, brown; slightly clayey in parts; sand is very fine; few limy zones.....	285.0	340.0
Siltstone, very sandy, brown and pale brown; sand is very fine; few limy zones.....	340.0	358.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Whitney Member

Siltstone, slightly clayey, slightly sandy, brown to yellowish-brown; sand is very fine; lighter colored 448 to 552 ft (Upper Ash)..... 358.0 552.0

Silt, very well sorted, lighter colored than above (Lower Ash)..... 552.0 559.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation, Orella Member

Siltstone, moderately clayey, slightly sandy, brown; sand is very fine..... 559.0 580.0