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Hitchcock County Test Hole Logs

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HITCHCOCK COUNTY Test-Hole Logs

Duane A. Eversoll

**Nebraska Water Survey
Test-Hole Report No. 44**

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



February 2004



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UNIVERSITY OF NEBRASKA-LINCOLN CREDITS

UNIVERSITY OF NEBRASKA-LINCOLN

Harvey Perlman - Chancellor

INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES

John Owens - Vice Chancellor

CONSERVATION AND SURVEY DIVISION

Mark Kuzila - Director

The Conservation and Survey Division of the University of Nebraska is the agency designated by statute to investigate and interpret the geologically related natural resources of the state, to make available to the public the results of these investigations, and to assist in the development and conservation of these resources.

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.

The Conservation and Survey Division provides information and educational programs to all people without regard to race, color, national origin, sex or handicap.

Publication and price lists are furnished upon request.

February 2004

ACKNOWLEDGMENTS

The author gratefully acknowledges the contributions of the following Conservation and Survey Division personnel for production of this test-hole log book: Duane Mohlman, Les Howard and Rod Vasek for computer assistance, Melba Stemm and Ann Harding for typing the logs, and Ann Mack for drafting the illustrations.

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INTRODUCTION

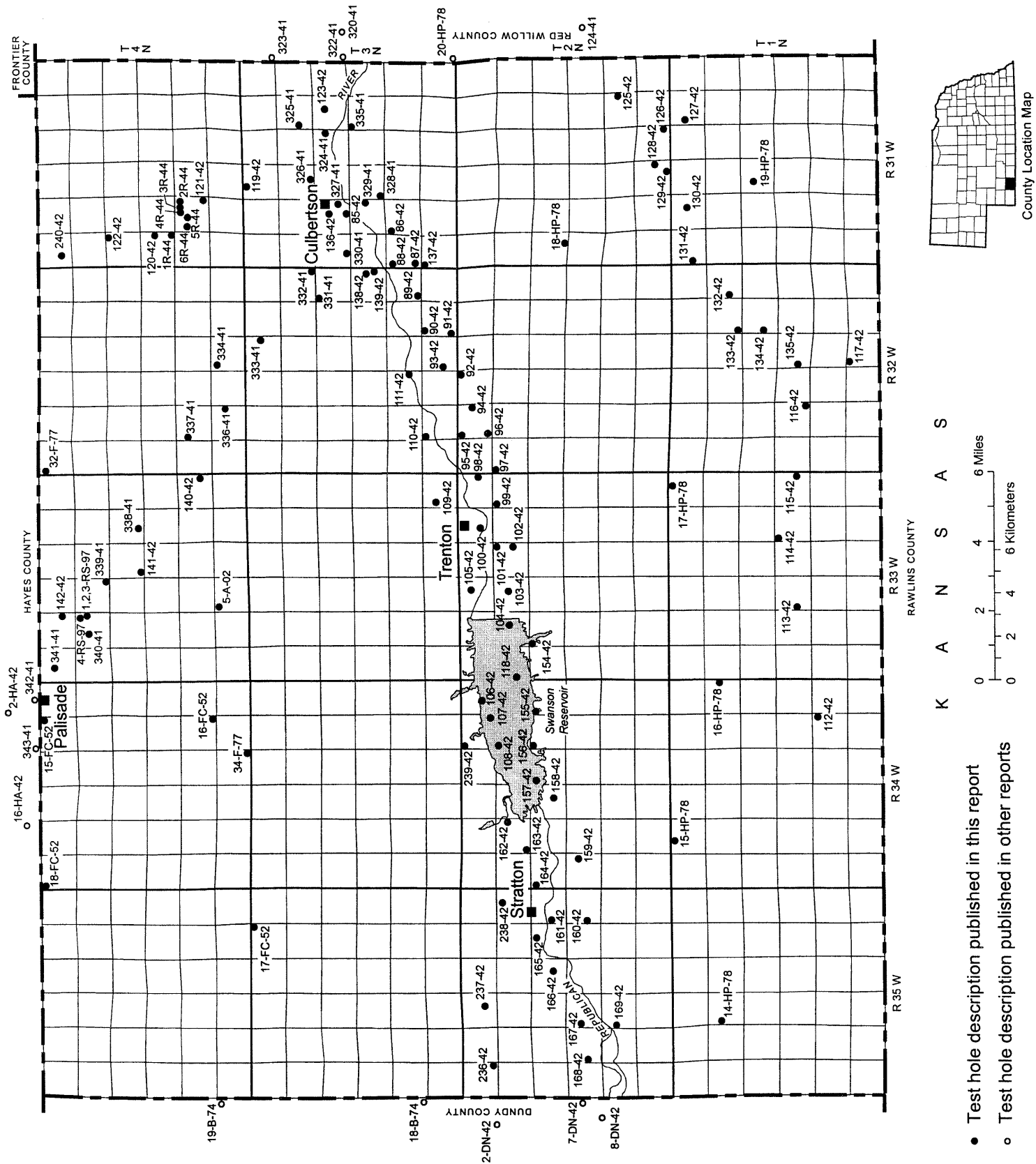
In 1930, the Conservation and Survey Division of the University of Nebraska and the U.S. Geological Survey began a program of cooperative groundwater studies in Nebraska. Since then test drilling by use of rotary drilling equipment has been an integral part of that program. This report contains logs 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 shows the location of all test holes drilled in Hitchcock County from 1941 to 2002 (Figure 1).

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, School of Natural Resources, 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 differences in rock types occur at the boundary from one formation to another. Figures 2a and 2b are examples of geophysical logs from Hitchcock County (test holes 16-HP-78 and 18-HP-78) with formation boundaries shown.

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 Hitchcock County, descriptions of the strata done in earlier test hole reports as well as formation names have been revised where necessary in this report.



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

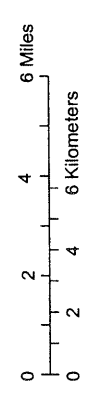
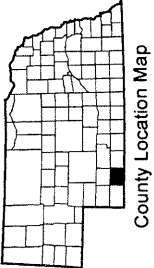


Figure 1. Test-hole location map of Hitchcock County.

Figure 2a. Hitchcock County sample geophysical log (16-HP-78)

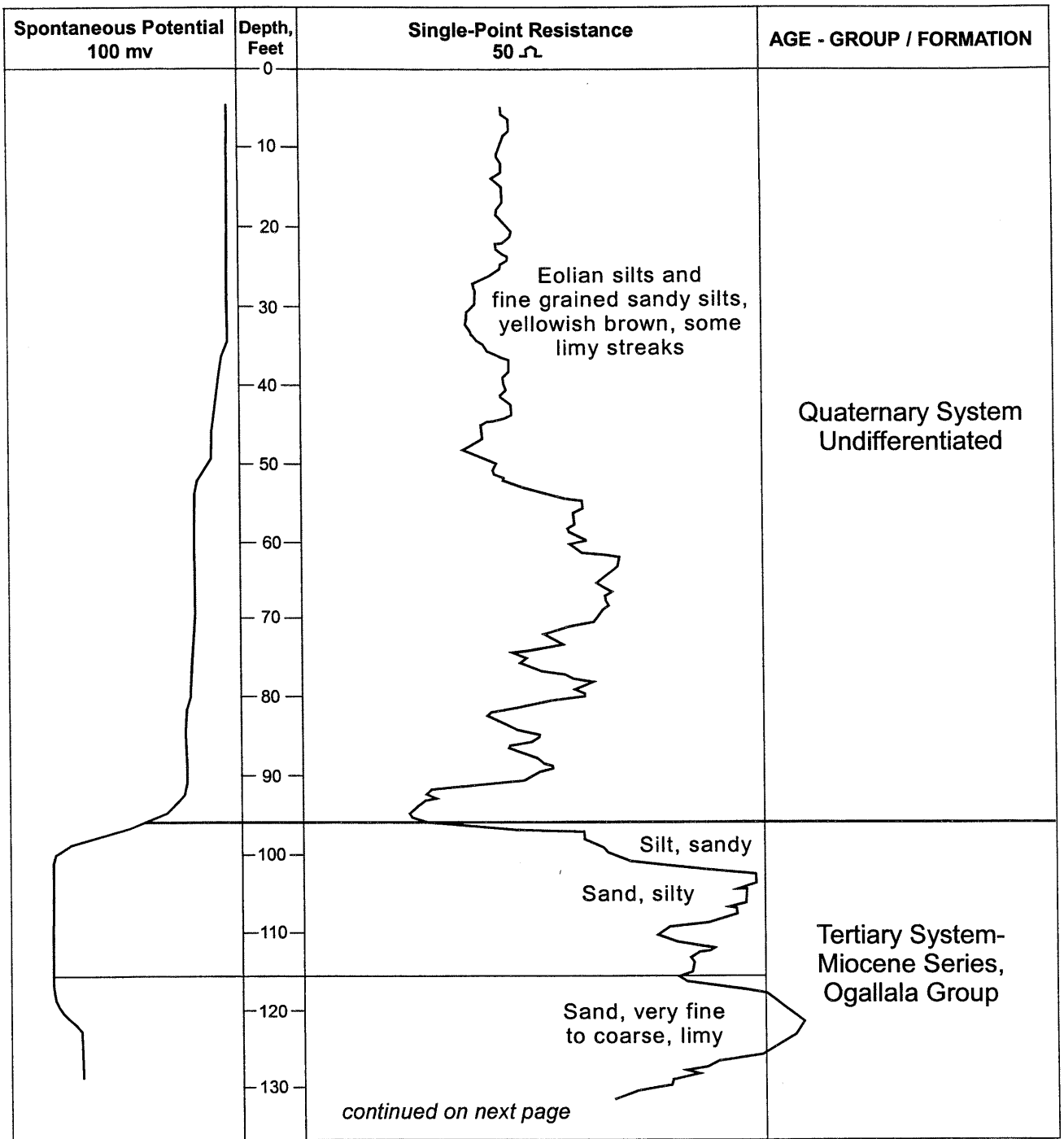


Figure 2a continued. Hitchcock County sample geophysical log (16-HP-78)

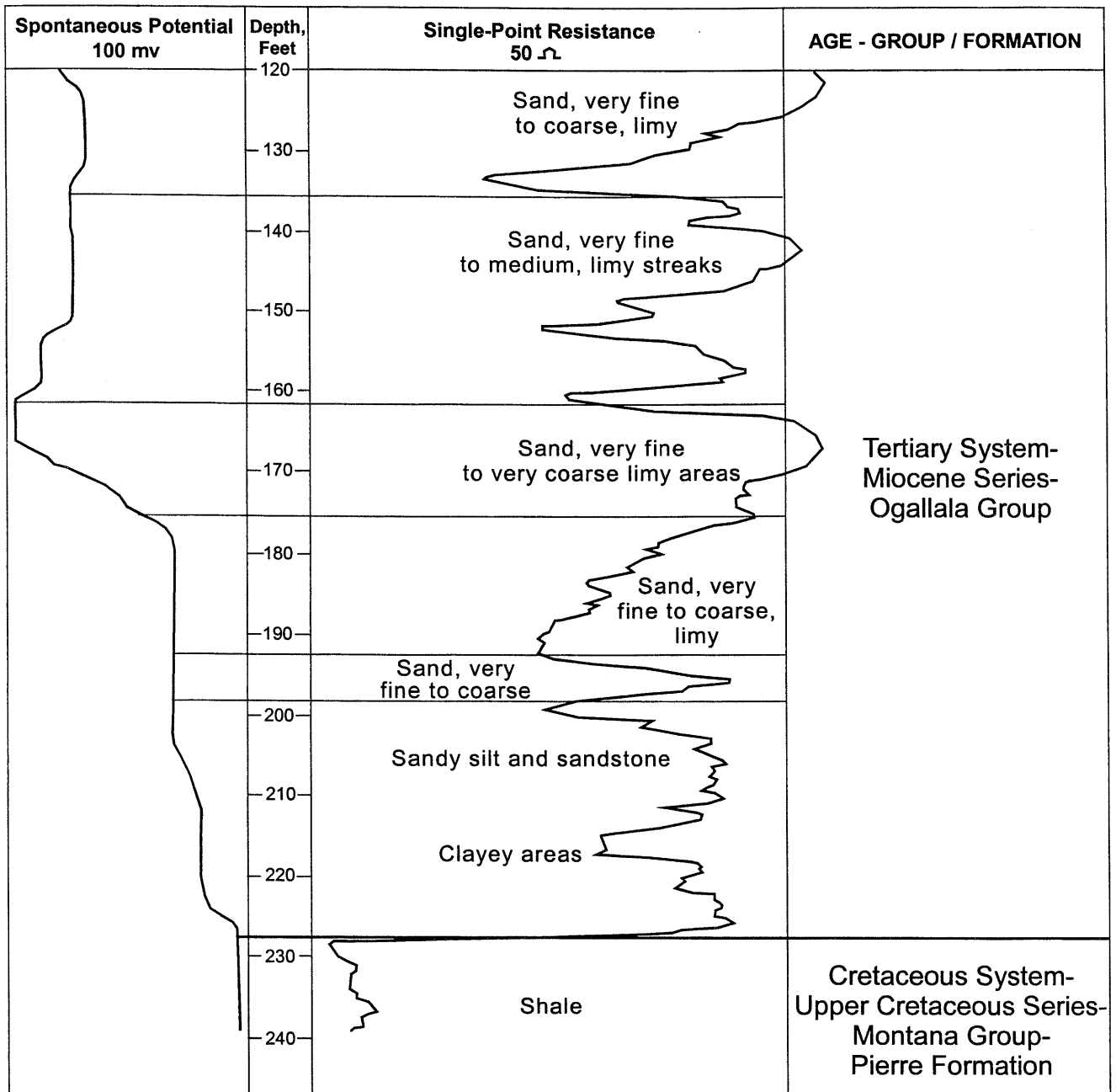


Figure 2b. Hitchcock County sample geophysical log (18-HP-78)

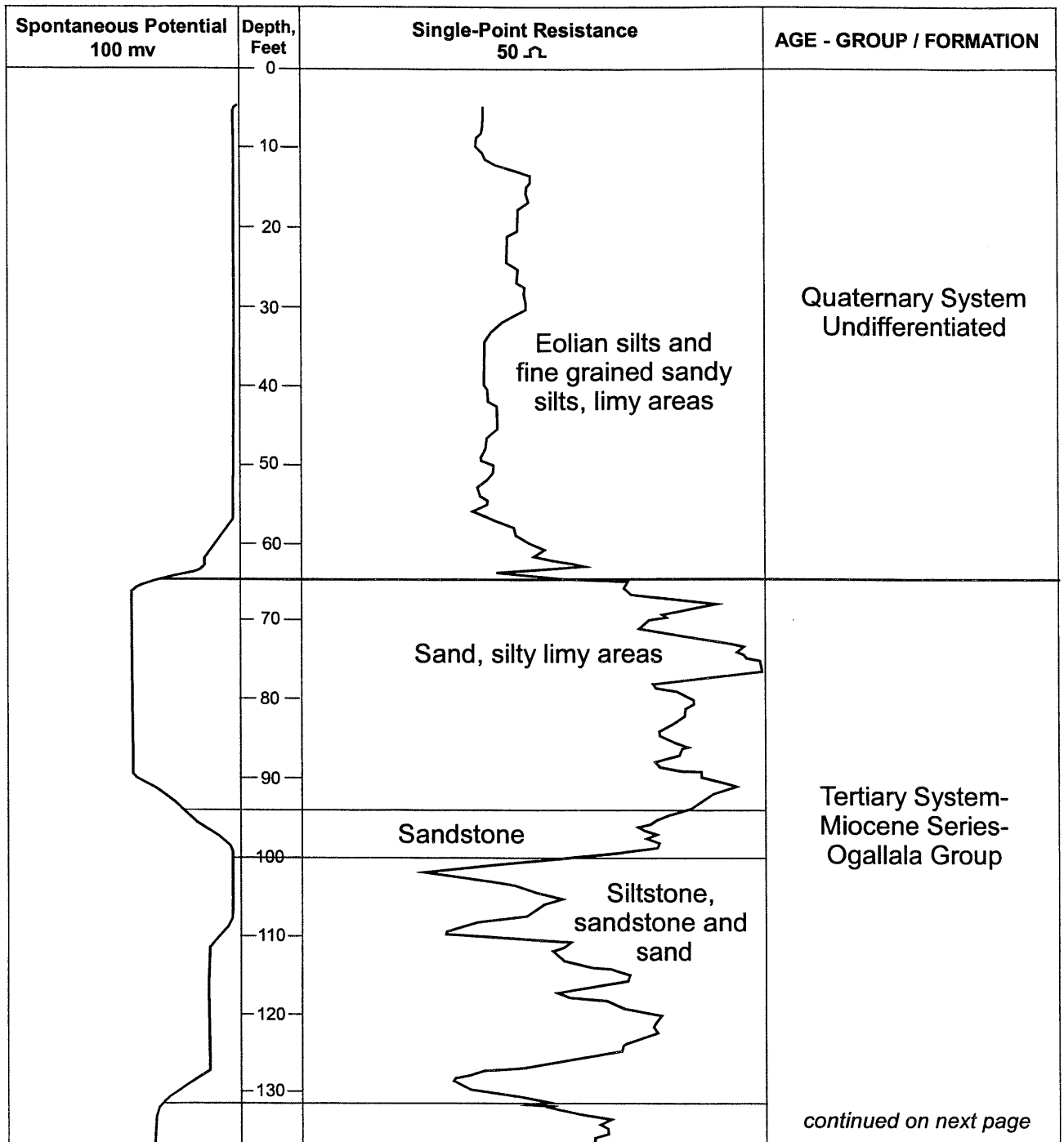
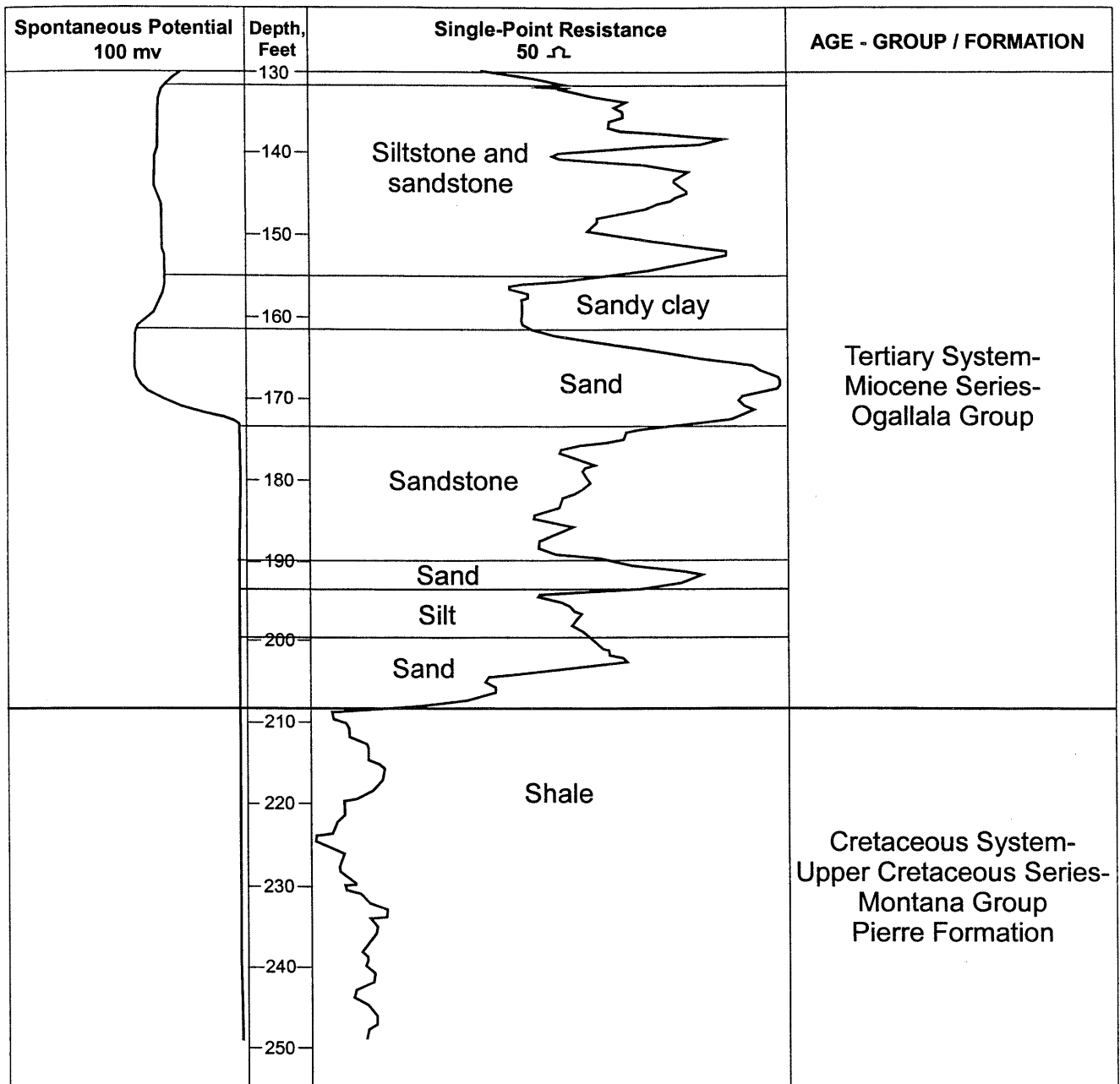


Figure 2b continued. Hitchcock County sample geophysical log (18-HP-78)



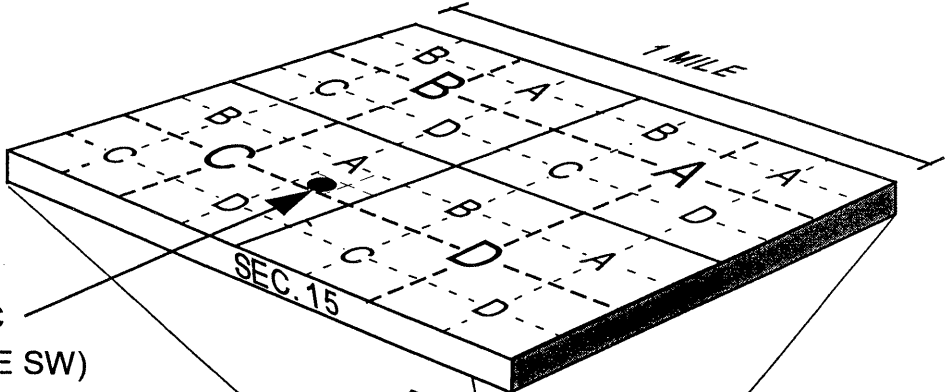
The method whereby the altitude of the land surface at test hole sites was determined is indicated in the heading of each log, as follows: a = altimeter, h = hand leveling, i = spirit leveling, t = estimated from topographic map. For each test hole log, the name of the 7.5 minute USGS topographic map on which the hole is located is also included in the heading.

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 #5-U-41, #297-41), and most are also identified by a number indicating their location within the land divisions of the U.S. Bureau of Land Management's survey of Nebraska. 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. The last numeral is the serial number of the test hole within the quarter-quarter-quarter-quarter section and is only utilized if more than one test hole is present in that area. This system of identification is also utilized by the USGS.

Another way of indicating a legal location for a test-hole is shown on figure 3. For example, 5N-4E-15CADC, could also be described as SW SE NE SW Section 15, T 5N, R4E; that is, the test hole is located in the Southwest quarter of the Southeast quarter of the Northeast quarter of the Southwest quarter of Section 15, Township 5 North, Range 4 East. This method to describe the subdivision of a section is used by most other people and agencies, including the CSD. Both methods are shown in Figure 3.

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)
 (SW 1/4 SE 1/4 NE 1/4 SW 1/4 sec. 15,
 T. 5 N., R. 4 E.)

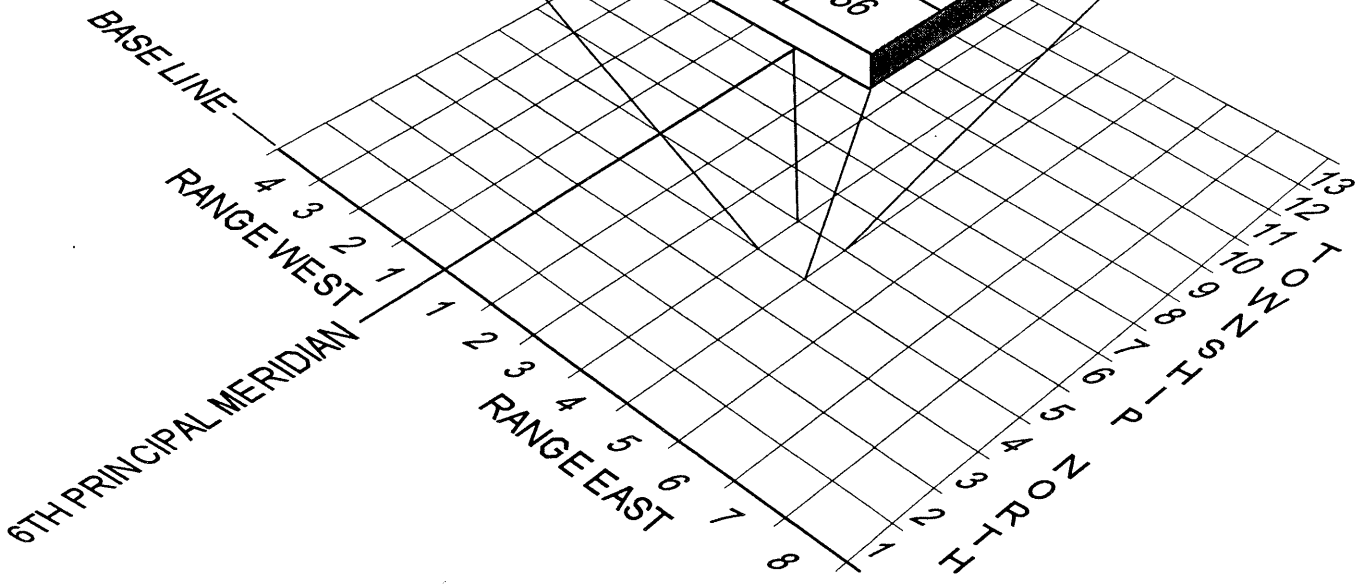
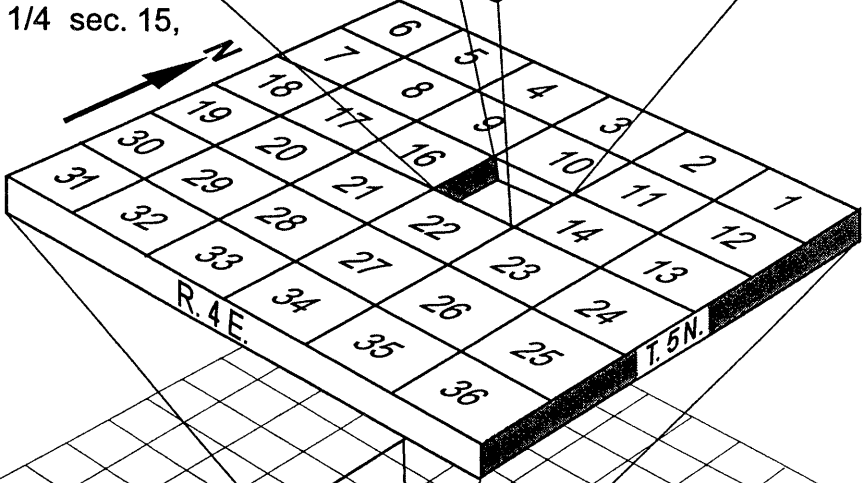


Fig. 2. System for identifying test-hole according to its location.

SELECTED REFERENCES

A few of the most recently published selected references to geology, soils and groundwater resources of Hitchcock County, Nebraska, are included below. The interested reader may find citations to earlier published studies noted in these references.

Some Publications That Are Guides to Earth Resources of Hitchcock County

- Cardwell, W.D.E., and Jenkins, E.D., *Ground-Water Geology and Pump Irrigation in Frenchman Creek Basin above Palisade, Nebraska* with a section on The Chemical Quality of the Water by Jochens, E.R., and Krieger, R.A., U.S. Geological Survey Water-Supply Paper 1577, 1963.
- Eversoll, D.A., Dreeszen, V.H., Burchett, R.R., and Prichard, G.E., *Bedrock Map Showing the Configuration of the Bedrock Surface, McCook 1°x2° Quadrangle, Nebraska and Kansas and part of the Sterling 1°x2° Quadrangle, Nebraska and Colorado*, U.S. Geological Survey Map I-1878, 1988.
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Keech, C.F., *Logs of Test Holes, Frenchman Creek Basin, Nebraska*, Conservation and Survey Division, University of Nebraska, Lincoln, 1957.

Lappala, E.G., *Quantitative Hydrogeology of the Upper Republican Natural Resources District, Southwest Nebraska*, U.S. Geological Survey Water-Resources Investigations 78-73, 1978.

Swinehart, J.B. and others, *Quaternary Geologic Map of the Platte River 4°x6° Quadrangle, United States*, U.S. Geological Survey, Map I-1420 (NK-14), 1994.

Waite, H. A., Reed, E. C., and Jones, D. S., *Ground Water in the Republican River Basin in Nebraska: Part III, Red Willow and Frontier Counties, Nebraska*. Water Resources Survey, Water Supply Paper 1, Conservation and Survey Division, University of Nebraska-Lincoln, 1945.

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01N 31W 05ACCC	130-42	2
01N 31W 06CBBB	131-42	3
01N 31W 16BDCA	19-HP-78	4
01N 32W 11CCCC	133-42	5
01N 32W 12CBBB	132-42	6
01N 32W 14CBBB	134-42	7
01N 32W 20DDAD	116-42	8
01N 32W 22CBBB	135-42	9
01N 32W 34BBAA	117-42	10
01N 33W 01ABBB	17-HP-78	11
01N 33W 21CBBB	113-42	12
01N 33W 23BBBB	114-42	13
01N 33W 24DADD	115-42	14
01N 34W 05BABA	15-HP-78	15
01N 34W 12ADDD	16-HP-78	16
01N 34W 26AADD	112-42	17
01N 35W 09BCBC	14-HP-78	18
02N 31W 18DCDD	18-HP-78	19
02N 31W 26ADDD	125-42	20
02N 31W 33DAAD	128-42	21
02N 31W 33DCDD	129-42	22
02N 31W 34DDAA	126-42	23
02N 32W 04AAAA	92-42	24
02N 32W 05ADDA	94-42	25
02N 32W 05BBBB	95-42	26
02N 32W 05CCBB	96-42	27
02N 32W 07BBBB	97-42	28
02N 33W 01DAAA	98-42	29
02N 33W 02CADD	100-42	30
02N 33W 04ACAA	105-42	31
02N 33W 07CBBB	118-42	32
02N 33W 08ACCC	104-42	33
02N 33W 09ACCD	103-42	34
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02N 33W 10DAAA	102-42	36
02N 33W 12BBBB	99-42	37
02N 33W 17BBBB	154-42	38
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02N 34W 02DDAA	107-42	40

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02N 34W 08CCCC 163-42	43
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02N 34W 14BBBB 156-42	46
02N 34W 15BBCC 157-42	47
02N 34W 16DBBB 158-42	48
02N 34W 18BBCB 164-42	49
02N 34W 19ADBA 159-42	50
02N 35W 04DBDA 237-42	51
02N 35W 06DDAA 236-42	52
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02N 35W 14ABCB 165-42	55
02N 35W 15DBBC 166-42	56
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02N 35W 21BCBC 167-42	58
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02N 35W 28BCCC 169-42	60
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03N 31W 11CBBB 325-41	63
03N 31W 14ACBC 123-42	64
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03N 31W 17DACC 327-41	66
03N 31W 17DCCC 85-42	67
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03N 31W 20ADDD 329-41	70
03N 31W 21CCCC 328-41	71
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03N 31W 30CCBB 87-42	74
03N 31W 30BBCC 88-42	75
03N 31W 31BBBB 137-42	76
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03N 32W 12DDDD 332-41	78
03N 32W 13BBBB 331-41	79
03N 32W 24ADCC 138-42	80
03N 32W 24DADC 139-42	81
03N 32W 25CCDC 89-42	82
03N 32W 28DAAA 111-42	83
03N 32W 32BBBB 110-42	84
03N 32W 34CBBB 93-42	85
03N 32W 35BBAB 90-42	86

03N 32W 35CCBB 91-42	87
03N 33W 36ACDD 109-42	88
03N 35W 02AAAA 17-FC-52	89
04N 31W 06CBCC 240-42	91
04N 31W 18AABB 122-42	92
04N 31W 19ADDD 120-42	93
04N 31W 19DDCC 1R-44	94
04N 31W 29AACA 2R-44	95
04N 31W 29ABDD 3R-44	96
04N 31W 29ABCD 4R-44	97
04N 31W 29BDAA 5R-44	98
04N 31W 29BCAD 6R-44	99
04N 31W 29DDAA 121-42	100
04N 32W 06BBCC 32-F-77	101
04N 32W 29BCBB 337-41	103
04N 32W 32ADDC 336-41	104
04N 32W 34BBCC 334-41	105
04N 33W 05DADA 142-42	106
04N 33W 06BDDA 341-41	107
04N 33W 08ADBB 01-RS-97	108
04N 33W 08ADBB 02-RS-97	109
04N 33W 08ADBB 03-RS-97	110
04N 33W 08ABDD 04-RS-97	111
04N 33W 08BDDA 340-41	112
04N 33W 09DDDA 339-41	113
04N 33W 14CDCD 338-41	114
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04N 33W 25DAAA 140-42	116
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Test-holes are arranged in this publication by township, range and section.

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Arranged by year drilled, test-hole number

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03N 31W 15ADAA 324-41	65
03N 31W 11CBBB 325-41	63
03N 31W 09DCCD 326-41	62
03N 31W 17DACC 327-41	66
03N 31W 21CCCC 328-41	71
03N 31W 20ADDD 329-41	70
03N 31W 18CDDD 330-41	69
03N 32W 13BBBB 331-41	79
03N 32W 12DDDD 332-41	78
03N 32W 03ADDD 333-41	77
04N 32W 34BBCC 334-41	105
03N 31W 23BBBB 335-41	72
04N 32W 32ADDC 336-41	104
04N 32W 29BCBB 337-41	103
04N 33W 14CDCD 338-41	114
04N 33W 09DDDA 339-41	113
04N 33W 08BD DA 340-41	112
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1942

03N 31W 17DCCC 85-42	67
03N 31W 29BBCC 86-42	73
03N 31W 30CCBB 87-42	74
03N 31W 30BBCC 88-42	75
03N 32W 25CCDC 89-42	82
03N 32W 35BBAB 90-42	86
03N 32W 35CCBB 91-42	87
02N 32W 04AAAA 92-42	24
03N 32W 34CBBB 93-42	85
02N 32W 05ADDA 94-42	25
02N 32W 05BBBB 95-42	26
02N 32W 05CCBB 96-42	27
02N 32W 07BBBB 97-42	28
02N 33W 01DAAA 98-42	29
02N 33W 12BBBB 99-42	37
02N 33W 02CADD 100-42	30

02N 33W 10AAAA	101-42	. . . . .	35
02N 33W 10DAAA	102-42	. . . . .	36
02N 33W 09ACCD	103-42	. . . . .	34
02N 33W 08ACCC	104-42	. . . . .	33
02N 33W 04ACAA	105-42	. . . . .	31
02N 34W 01DAAA	106-42	. . . . .	39
02N 34W 02DDAA	107-42	. . . . .	40
02N 34W 11BBBB	108-42	. . . . .	44
03N 33W 36ACDD	109-42	. . . . .	88
03N 32W 32BBBB	110-42	. . . . .	84
03N 32W 28DAAA	111-42	. . . . .	83
01N 34W 26AADD	112-42	. . . . .	17
01N 33W 21CBBB	113-42	. . . . .	12
01N 33W 23BBBB	114-42	. . . . .	13
01N 33W 24DADD	115-42	. . . . .	14
01N 32W 20DDAD	116-42	. . . . .	8
01N 32W 34BBAA	117-42	. . . . .	10
02N 33W 07CBBB	118-42	. . . . .	32
03N 31W 04BABB	119-42	. . . . .	61
04N 31W 19ADDD	120-42	. . . . .	93
04N 31W 29DDAA	121-42	. . . . .	100
04N 31W 18AABB	122-42	. . . . .	92
03N 31W 14ACBC	123-42	. . . . .	64
02N 31W 26ADDD	125-42	. . . . .	20
02N 31W 34DDAA	126-42	. . . . .	23
01N 31W 02BCDA	127-42	. . . . .	1
02N 31W 33DAAD	128-42	. . . . .	21
02N 31W 33DCDD	129-42	. . . . .	22
01N 31W 05ACCC	130-42	. . . . .	2
01N 31W 06CBBB	131-42	. . . . .	3
01N 32W 12CBBB	132-42	. . . . .	6
01N 32W 11CCCC	133-42	. . . . .	5
01N 32W 14CBBB	134-42	. . . . .	7
01N 32W 22CBBB	135-42	. . . . .	9
03N 31W 17ACCC	136-42	. . . . .	68
03N 31W 31BBBB	137-42	. . . . .	76
03N 32W 24ADCC	138-42	. . . . .	80
03N 32W 24DADC	139-42	. . . . .	81
04N 33W 25DAAA	140-42	. . . . .	116
04N 33W 15CCDA	141-42	. . . . .	115
04N 33W 05DADA	142-42	. . . . .	106
02N 33W 17BBBB	154-42	. . . . .	38
02N 34W 13BBBB	155-42	45
02N 34W 14BBBB	156-42	46
02N 34W 15BBCC	157-42	47
02N 34W 16DBBB	158-42	48

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02N 35W 24CBBB 160-42	59
02N 35W 13CBBB 161-42	54
02N 34W 08ADAA 162-42	42
02N 34W 08CCCC 163-42	43
02N 34W 18BBCB 164-42	. . . . .	49
02N 35W 14ABCB 165-42	. . . . .	55
02N 35W 15DBBC 166-42	. . . . .	56
02N 35W 21BCBC 167-42	. . . . .	58
02N 35W 20CBBB 168-42	. . . . .	57
02N 35W 28BCCC 169-42	. . . . .	60
02N 35W 06DDAA 236-42	. . . . .	52
02N 35W 04DBDA 237-42	. . . . .	51
02N 35W 12ABCC 238-42	. . . . .	53
02N 34W 02BBBC 239-42	. . . . .	41
04N 31W 06CBCC 240-42	. . . . .	91

1944

04N 31W 19DDCC 1R-44	. . . . .	94
04N 31W 29AACA 2R-44	. . . . .	95
04N 31W 29ABDD 3R-44	. . . . .	96
04N 31W 29ABCD 4R-44	. . . . .	97
04N 31W 29BDAA 5R-44	. . . . .	98
04N 31W 29BCAD 6R-44	. . . . .	99

1952

04N 34W 02AAAA 15-FC-52	. . . . .	119
04N 34W 26DDDD 16-FC-52	. . . . .	122
03N 35W 02AAAA 17-FC-52	. . . . .	89
04N 34W 06BBBB 18-FC-52	. . . . .	120

1977

04N 32W 06BBCC 32-F-77	. . . . .	101
04N 34W 34DDDD 34-F-77	. . . . .	124

1978

01N 35W 09BCBC 14-HP-78	. . . . .	18
01N 34W 05BABA 15-HP-78	. . . . .	15
01N 34W 12ADDD 16-HP-78	. . . . .	16
01N 33W 01ABBB 17-HP-78	. . . . .	11
02N 31W 18DCDD 18-HP-78	. . . . .	19
01N 31W 16BDCA 19-HP-78	. . . . .	4

1997

04N 33W 08ADBB 01-RS-97	. . . . .	108
04N 33W 08ADBB 02-RS-97	. . . . .	109
04N 33W 08ADBB 03-RS-97	110
04N 33W 08ABDD 04-RS-97	111

2002

04N 33W 33BBDA 05-A-02	117
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**Test Hole #127-42
1N 31W 2bcda
Hitchcock County**

Location: NE SE SW NW sec. 2, T. 1 N., R. 31 W., approximately 150 feet west of bridge on south edge of road.

Ground elevation: 2,635.0 ft. (t). (Culbertson SE 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 31.8 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy.....	0.0	9.0
Gravel, fine to coarse, some lime and clay.....	9.0	12.0
Gravel, medium to coarse, some lime and clay.....	12.0	31.0
Clay and gravel, some lime.....	31.0	40.0
Clay and sand, yellow.....	40.0	52.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	52.0	57.0

**Test Hole #130-42
1N 31W 5accc
Hitchcock County**

Location: SW SW SW NE sec. 5, T. 1 N., R. 31 W.
 Ground elevation: 2,680.0 ft. (t). (Culbertson SE 7.5 min. quadrangle)
 Depth to water: 38.6 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, dark.....	0.0	5.0
Clay, sandy, yellow.....	5.0	32.0
Clay and sand, yellow.....	32.0	42.0
Gravel, some clay and lime.....	42.0	51.0
Gravel, some lime and dark clay.....	51.0	53.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	53.0	58.0

**Test Hole #131-42
1N 31W 6cbbb
Hitchcock County**

Location: NW NW NW SW sec. 6, T. 1 N., R. 31 W., approximately
130 feet southeast of hog house.

Ground elevation: 2,640.0 ft. (a). (Culbertson SE 7.5 min.
quadrangle)

Depth to water: Unknown. Test hole caved at 14.2 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, dark.....	0.0	2.0
Clay, yellow.....	2.0	17.0
Gravel, medium to coarse, limy.....	17.0	28.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	28.0	39.0

Test Hole #19-HP-78
1N 31W 16bdca
Hitchcock County

Location: NE SW SE NW sec. 16, T. 1 N., R. 31 W., approximately 56 feet west of road, 2.5 miles south of intersection to north.

Ground elevation: 2,855.0 ft. (t). (Culbertson SE 7.5 min. quadrangle).

Depth to water: Unknown. Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, topsoil, very dark grayish brown.....	0.0	2.0
Silt, brown.....	2.0	38.0
Silt, slightly sandy, fine to medium, limy, light brown.....	38.0	45.0
Sand, very fine to coarse.....	45.0	53.0
Tertiary System - Miocene Series - Ogallala Group:		
Siltstone and sandstone, very fine to fine, some silt, light yellowish brown.....	53.0	70.0
Sand, very fine to medium, silty lenses, some limy lenses, some very fine sand to medium gravel lenses 89 to 91 ft. and 94 to 96 ft.....	70.0	102.0
Silt, slightly sandy, some siltstone and sandstone lenses, limy, clayey lenses, white, light olive gray and light gray.....	102.0	195.0
Sand and gravel, fine sand to medium gravel, claystone from 204 to 207 ft.....	195.0	211.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, orange to gray, clayey, weathered.....	211.0	227.0
Shale, gray to black.....	227.0	235.0

**Test Hole #133-42
1N 32W 11cccc
Hitchcock County**

Location: SW SW SW SW sec. 11, T. 1 N., R. 32 W., approximately
0.1 mile north of bridge.

Ground elevation: 2,696.0 ft. (a). (Culbertson SW 7.5 min.
quadrangle)

Depth to water: 14.4 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	7.0
Sand, clay and lime.....	7.0	34.0
Sand and clay.....	34.0	38.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	38.0	49.0

**Test Hole #132-42
1N 32W 12cbbb
Hitchcock County**

Location: NW NW NW SW sec. 12, T. 1 N., R. 32 W., approximately
60 feet east of center of turn in road, on south side of road.
Ground elevation: 2,683.0 ft. (t). (Culbertson SW 7.5 min.
quadrangle)
Depth to water: 16.4 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, dark.....	0.0	7.0
Clay, sandy, yellow.....	7.0	13.0
Sand and medium to coarse gravel, some clay.....	13.0	23.0
Clay, gray.....	23.0	25.0
Sand and fine to coarse gravel, some lime.....	25.0	35.0
Sand, gravel and clay.....	35.0	44.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	44.0	49.0

**Test Hole #134-42
1N 32W 14cbbb
Hitchcock County**

Location: NW NW NW SW sec. 14, T. 1 N., R. 32 W., approximately 100 yards south of bridge, on east edge of road.

Ground elevation: 2,710.0 ft. (t). (Culbertson SW 7.5 min. quadrangle)

Depth to water: 14.9 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, dark.....	0.0	2.0
Clay, sandy, yellow.....	2.0	11.0
Sand, gravel and clay.....	11.0	32.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	32.0	39.0

**Test Hole #116-42
1N 32W 20ddad
Hitchcock County**

Location: SE NE SE SE sec. 20, T. 1 N., R. 32 W., approximately
77 yards north of bridge, on west edge of road.
Ground elevation: 2,705.0 ft. (t). (Culbertson SW 7.5 min.
quadrangle)
Depth to water: 12.8 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, light, some clay and silt.....	0.0	6.0
Sand and fine to medium gravel, some clay.....	6.0	10.0
Sand and fine to coarse gravel, some water-worn Ogallala.....	10.0	21.0
Gravel, fine, some clay and shale.....	21.0	24.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light colored.....	24.0	29.0

**Test Hole #135-42
1N 32W 22cbbb
Hitchcock County**

Location: NW NW NW SW sec. 22, T. 1 N., R. 32 W., approximately 125 feet south of bridge, on east edge of road.

Ground elevation: 2,722.0 ft. (t). (Culbertson SW 7.5 min. quadrangle)

Depth to water: 12.0 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	7.0
Sand, gravel and clay, some lime.....	7.0	18.0
Sand, gravel and clay.....	18.0	33.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	33.0	39.0

**Test Hole #117-42
1N 32W 34bbaa
Hitchcock County**

Location: NE NE NW NW sec. 34, T. 1 N., R. 32 W.
 Ground elevation: 2,752.0 ft. (t). (Culbertson SW 7.5 min. quadrangle)
 Depth to water: 12.0 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, clayey, silty.....	0.0	9.0
Clay, sandy, yellow.....	9.0	19.0
Sand and fine to medium ravel, some clay and water-worn Ogallala.....	19.0	29.0
Sand and fine to coarse gravel, some lime.....	29.0	34.0
Gravel, fine to medium, some clay and lime.....	34.0	44.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	44.0	49.0

**Test Hole #17-HP-78
1N 33W 1abbb
Hitchcock County**

Location: NW NW NW NE sec. 1, T. 1 N., R. 33 W., approximately 10 feet east of fence line and 79 feet south of center of road.

Ground elevation: 2,975.0 ft. (t). (Culbertson SE 7.5 min. quadrangle).

Depth to water: Unknown. Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, trace of clay, very dark grayish brown.....	0.0	5.0
Silt, some very fine sand from 15 to 20 ft. and 25 to 30 ft; brown.....	5.0	45.0
Silt, slightly clayey, brown.....	45.0	55.0
Silt, trace of clay, limy, light yellowish brown....	55.0	62.0
Silt, some very fine to fine sand, brown, less sand below 81 ft; limy at 83 ft; very limy from 87 to 90 ft; slightly cemented from 98 to 100 ft.....	62.0	103.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt and very fine sand, brown, some lime.....	103.0	127.0
Silt to very fine sand, pale brown, some medium sand below 133 ft. and limy.....	127.0	140.0
Silt and very fine to very coarse sand, slightly clayey, very limy, pale brown.....	140.0	159.0
Sand, very fine, very silty, clayey between 133 and 166 ft; pale brown.....	159.0	166.0
Silt to very fine sand, some medium, pale brown, some sandstone from 170 to 180 ft.....	166.0	188.0
Sandstone, very fine to medium, limy.....	188.0	193.0
Sand and gravel, fine sand to fine gravel.....	193.0	198.0
Clay, very silty, light olive gray and light yellowish brown below 200 ft.....	198.0	203.0
Sand, fine to medium, some clay, light yellowish brown.....	203.0	208.0
Clay, slightly silty, yellowish brown.....	208.0	213.0
Sand, fine, some interbedded clay.....	213.0	219.0
Clay, slightly silty, some claystone, light olive gray to yellowish brown.....	219.0	238.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, orange and greenish gray, clayey, weathered..	238.0	254.0
Shale, gray to black.....	254.0	271.0

Test Hole #113-42
1N 33W 21cbbb
Hitchcock County

Location: NW NW NW SW sec. 21, T. 1 N., R. 33 W., approximately 100 yards south of bridge, off shoulder of road, 17 feet east of center of road.

Ground elevation: 2,869.0 ft. (a). (Trenton SE 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 24.8 ft. (9-19-42).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, some yellow clay.....	0.0	7.0
Clay, yellow, some very fine sand.....	7.0	19.0
Sand and fine to coarse gravel, some water-worn Ogallala.....	19.0	22.0
Sand and fine to medium gravel, some clay and water- worn Ogallala.....	22.0	29.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, yellow, and sand, very little lime.....	29.0	33.0
Clay, gray and yellow ochre.....	33.0	34.0
Shale, light colored.....	34.0	43.0

**Test Hole #114-42
1N 33W 23bbbb
Hitchcock County**

Location: NW NW NW NW sec. 23, T. 1 N., R. 33 W., approximately 300 feet south of northwest corner of section, on east edge of road.
Ground elevation: 2,812.0 ft. (t). (Trenton SE 7.5 min. quadrangle)
Depth to water: 10.6 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, clayey, some silt.....	0.0	6.0
Gravel, fine to coarse, some clay and water-worn Ogallala.....	6.0	11.0
Gravel, fine to coarse, some gray clay.....	11.0	16.0
Gravel, fine to medium, some sand and water-worn Ogallala.....	16.0	25.0
Sand and fine to medium gravel, some clay and water-worn Ogallala.....	25.0	26.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	26.0	32.0

**Test Hole #115-42
1N 33W 24dadd
Hitchcock County**

Location: SE SE NE SE sec. 24, T. 1 N., R. 33 W., approximately
600 feet south of bridge, 8 feet west of center of road.

Ground elevation: 2,783.0 ft. (t). (Culbertson SW 7.5 min.
quadrangle)

Depth to water: 14.3 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, clayey, some silt.....	0.0	9.0
Clay, sandy, yellow.....	9.0	14.0
Sand and fine to medium gravel, some water-worn Ogallala.....	14.0	28.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	28.0	33.0

**Test Hole #15-HP-78
1N 34W 5baba
Hitchcock County**

Location: NE NW NE NW sec. 5, T. 1 N., R. 34 W., approximately 60 feet south of driveway and 1,850 feet east of section road.
 Ground elevation: 2,962.0ft.(t). (Trenton SW 7.5 min. quadrangle).
 Depth to water: Unknown. Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, loam, dark grayish brown.....	0.0	5.0
Silt, clayey, trace of very fine to coarse sand, yellowish brown.....	5.0	15.0
Silt, slightly clayey, some sand.....	15.0	24.0
Silt, slightly sandy, very fine to fine.....	24.0	36.0
Silt, clayey, yellowish brown, some very fine to medium sand.....	36.0	55.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to very coarse, slightly silty and clayey.....	55.0	61.0
Clay, silty, some fine to medium sand, limy below 65 ft; light yellowish brown.....	61.0	69.0
Silt, very sandy, very fine to medium.....	69.0	75.0
Sand, slightly silty, very fine to very coarse.....	75.0	80.0
Sand and gravel, very fine sand to fine and medium gravel, clayey between 92 and 98 ft.....	80.0	108.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, yellow, gray and orange, clayey, weathered...	108.0	127.0
Shale, gray to black.....	127.0	133.0

Test Hole #16-HP-78
1N 34W 12addd
Hitchcock County

Location: SE SE SE NE sec. 12, T. 1 N., R. 34 W., approximately 215 feet north of fence line and 23 feet west of center of road 10 feet east of fence line.

Ground elevation: 3,036.0 ft. (t). (Trenton SE 7.5 min. quadrangle).

Depth to water: Unknown. (195 from E-Log VHD).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt and loam, very dark grayish brown.....	0.0	2.0
Silt, slightly sandy, very fine, brown.....	2.0	26.0
Silt, slightly clayey, yellowish brown.....	26.0	35.0
Silt, some very fine sand.....	35.0	50.0
Silt, clayey and limy, some fine to medium sand, dark brown.....	50.0	61.0
Silt, sandy, very fine to medium, yellowish brown; contains limy streaks.....	61.0	97.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately sandy, very fine to medium, yellow- ish brown.....	97.0	100.0
Sand, silty, very fine to medium, some fine to med- ium gravel from 108 to 110 ft; limy below 111 ft..	100.0	117.0
Sand, very fine to coarse, limy, white.....	117.0	136.0
Sand, very fine to medium, fine gravel between 139 and 148 ft; limy streaks from 148 to 161 ft.....	136.0	161.0
Sand, very fine to very coarse, medium to coarse gravel below 165 ft; some lime below 172 ft.....	161.0	175.0
Sand, very fine to coarse, limy.....	175.0	192.0
Sand, very fine to coarse.....	192.0	198.0
Sandy silt and sandstone, very fine to medium; some very sandy clay from 214 to 217 ft.....	198.0	228.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, orange to gray and olive, clayey, weathered..	228.0	232.0
Shale, gray to black.....	232.0	240.0

**Test Hole #112-42
1N 34W 26aadd
Hitchcock County**

Location: SE SE NE NE sec. 26, T. 1 N., R. 34 W., approximately 300 feet north of bridge and 700 feet south of school house, 4 feet west of center of road.

Ground elevation: 2,921.0 ft. (a). (Trenton SE 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 35.6 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, light, some clay and silt.....	0.0	9.0
Clay, sandy, yellow.....	9.0	19.0
Clay, sandy, yellow, and sand.....	19.0	27.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, limy, clayey.....	27.0	35.0
Clay, greenish gray.....	35.0	40.0
Sand and medium gravel, some clay.....	40.0	44.0
Gravel, fine to medium, and yellow clay.....	44.0	46.0
Sand and fine to medium gravel.....	46.0	54.0
Gravel, fine to coarse, and yellow ochre.....	54.0	56.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, gray, sandy.....	56.0	60.0
Shale, dark.....	60.0	65.0

Test Hole #14-HP-78
1N 35W 9bcbc
Hitchcock County

Location: SW NW SW NW sec. 9, T. 1 N., R. 35 W., approximately 18 feet east of road center-line and .35 mile south of NW corner.

Ground elevation: 3,072.0 ft. (t). (Max SE 7.5 min. quadrangle).

Depth to water: Unknown. Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, trace of coarse sand, gray to brown.....	0.0	10.0
Silt, sandy, yellowish brown.....	10.0	24.0
Silt, clayey, some traces of very fine sand.....	24.0	48.0
Silt, sandy, yellowish brown.....	48.0	52.0
Clay and silt, yellowish brown.....	52.0	75.0
Silt, clayey, some lime, yellowish brown.....	75.0	78.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, slightly limy, traces of fine sand, yellowish brown.....	78.0	106.0
Silt, clayey, some very fine sand.....	106.0	112.0
Silt and sand, very fine to medium.....	112.0	142.0
Clay, limy, rootlets.....	142.0	153.0
Sand, very fine to very coarse.....	153.0	163.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, gray and orange, weathered.....	163.0	172.0
Shale, dark gray to black.....	172.0	180.0

**Test Hole #18-HP-78
2N 31W 18dcdd
Hitchcock County**

Location: SE SE SW SE sec. 18, T. 2 N., R. 31 W., approximately 85 feet north of center of E-W road and 1,615 feet west of of N-S road.

Ground elevation: 2,841.0 ft. (t). (Culbertson 7.5 min. quadrangle).

Depth to water: Unknown. Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, topsoil, very dark grayish brown.....	0.0	3.0
Silt, trace of fine sand from 13 to 33 ft; trace of clay from 46 to 50 ft; brown.....	3.0	56.0
Silt, slightly clayey and limy, some fine to coarse sand.....	56.0	65.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to coarse, very silty, some claystone layers, limy areas, very pale brown to white	65.0	94.0
Sandstone, very fine to fine, some siltstone, greenish.....	94.0	100.0
Siltstone, some claystone, very silty and sandy from 103 to 107 ft; olive.....	100.0	111.0
Sand, very fine to medium, slightly silty, light yellowish brown; silt to siltstone from 127 to 132 ft.....	111.0	132.0
Siltstone and sandstone, very fine to medium, limy, some claystone, some fine to medium sand lenses, light yellowish brown to white.....	132.0	155.0
Sandy clay, very fine to medium, trace of coarse sand, pale brown.....	155.0	162.0
Sand, very fine to very coarse, medium to coarse gravel from 164 to 170 ft.....	162.0	174.0
Sandstone, very fine to fine, some clayey lenses, silty from 181 to 189 ft; olive.....	174.0	190.0
Sand, very fine to very coarse.....	190.0	193.0
Silt, clayey and sandy, fine to coarse, pale olive..	193.0	199.0
Sand, very fine to coarse, trace of gravel, silty, limy and clayey from 206 to 208 ft.....	199.0	208.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, orange to gray, clayey, weathered.....	208.0	215.0
Shale, gray to very dark gray.....	215.0	248.0
Shale, black.....	248.0	250.0

**Test Hole #125-42
2N 31W 26addd
Hitchcock County**

Location: SE SE SE NE sec. 26, T. 2 N., R. 31 W., approximately
85 feet west of windmill.

Ground elevation: 2,557.0 ft. (a). (Culbertson SE 7.5 min.
quadrangle)

Depth to water: Unknown. Test hole caved at 29.3 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, dark, silt and sand.....	0.0	6.0
Clay, yellow.....	6.0	34.0
Sand and fine to coarse gravel, some lime.....	34.0	44.0
Gravel and lime, fine to coarse.....	44.0	53.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	53.0	59.0

**Test Hole #128-42
2N 31W 33daad
Hitchcock County**

Location: SE NE NE SE sec. 33, T. 2 N., R. 31 W., approximately 185 feet south of bridge, on west edge of road.

Ground elevation: 2,601.0 ft. (t). (Culbertson SE 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 10.3 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy.....	0.0	6.0
Sand and fine to medium gravel, some lime and clay..	6.0	17.0
Gravel, fine to coarse, some lime and blue clay.....	17.0	22.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	22.0	27.0

**Test Hole #129-42
2N 31W 33dcdd
Hitchcock County**

Location: SE SE SW SE sec. 33, T. 2 N., R. 31 W., approximately 54 feet east of fourth pole from corner on north edge of road.

Ground elevation: 2,639.0 ft. (a). (Culbertson SE 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 48.1 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy, dark.....	0.0	6.0
Clay, yellow.....	6.0	14.0
Clay and lime rock.....	14.0	19.0
Clay, brown.....	19.0	39.0
Clay, yellow.....	39.0	68.0
Clay, sandy, gray.....	68.0	73.0
Sand and fine gravel.....	73.0	75.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	75.0	79.0

**Test Hole #126-42
2N 31W 34ddaa
Hitchcock County**

Location: SE SE NE NE sec. 34, T. 2 N., R. 31 W., approximately 0.2 mile north of corner, on west edge of road.

Ground elevation: 2,621.0 ft. (t). (Culbertson SE 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 47.0 ft. (9-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy.....	0.0	4.0
Clay, yellow, some sand.....	4.0	51.0
Sand and fine to medium gravel, some clay and lime..	51.0	63.0
Gravel, fine to medium, some clay and lime.....	63.0	67.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	67.0	72.0

**Test Hole #92-42
2N 32W 4aaaa
Hitchcock County**

Location: NE NE NE NE sec. 4, T. 2 N., R. 32 W., approximately 300 feet of northeast corner of section and 106 feet north of bridge, on west edge of road.

Ground elevation: 2,657.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 31.5 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy.....	0.0	2.0
Loam, sandy, dark, some clay and silt.....	2.0	12.0
Clay, sandy, yellow.....	12.0	24.0
Sand to fine gravel and yellow clay.....	24.0	32.0
Sand and fine to medium gravel, some water-worn Ogallala.....	32.0	43.0
Sand and fine to coarse gravel, some water-worn Ogallala.....	43.0	46.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	46.0	51.0

**Test Hole #94-42
2N 32W 5adda
Hitchcock County**

Location: NE SE SE NE sec. 5, T. 2 N., R. 32 W., approximately 0.4 mile south of northeast corner of section, on west edge of road.
 Ground elevation: 2,662.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)
 Depth to water: Unknown. Test hole caved at 29.0 ft. (8-14-42).

Depth, in feet
 From To

Quaternary System, undifferentiated:

Loam, silty, sandy.....	0.0	4.0
Clay, sandy, yellow.....	4.0	14.0
Clay, yellow.....	14.0	19.0
Clay and gravel, yellow.....	19.0	25.0
Sand and fine to medium gravel, some water-worn Ogallala.....	25.0	35.0
Sand and fine to medium gravel.....	35.0	42.0
Gravel, fine to medium, clayey.....	42.0	45.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, dark.....	45.0	49.0
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**Test Hole #95-42
2N 32W 5bbbb
Hitchcock County**

Location: NW NW NW NW sec. 5, T. 2 N., R. 32 W., approximately 18 feet northwest of center of road, on edge of curve.

Ground elevation: 2,653.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)

Depth to water: 14.7 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, silty, sandy, light.....	0.0	2.0
Clay and silt, yellow.....	2.0	7.0
Clay, sand and silt, gray.....	7.0	12.0
Sand and fine to medium gravel, some water-worn Ogallala.....	12.0	22.0
Sand and fine to coarse gravel, some water-worn Ogallala.....	22.0	32.0
Gravel, fine to coarse, some water-worn Ogallala....	32.0	43.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	43.0	49.0

**Test Hole #96-42
2N 32W 5ccbb
Hitchcock County**

Location: NW NW SW SW sec. 5, T. 2 N., R. 32 W., approximately 0.2 mile north of southwest corner of section, on east edge of curve.
 Ground elevation: 2,682.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)
 Depth to water: Unknown. Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, light, some silt.....	0.0	2.0
Sand, fine, yellow, some clay.....	2.0	9.0
Clay, yellow.....	9.0	18.0
Clay, solid, gray.....	18.0	24.0
Clay, solid, reddish.....	24.0	29.0
Sand and fine gravel, some clay, compact.....	29.0	39.0
Gravel, fine to coarse, some water-worn Ogallala, compact.....	39.0	47.0
Gravel, fine to medium, clayey.....	47.0	51.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	51.0	57.0

**Test Hole #97-42
2N 32W 7bbbb
Hitchcock County**

Location: NW NW NW NW sec. 7, T. 2 N., R. 32 W., approximately
16 feet south of center of road.

Ground elevation: 2,696.0 ft. (i). (Culbertson SW 7.5 min.
quadrangle)

Depth to water: Unknown. Test hole caved at 38.6 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, silty, sandy.....	0.0	6.0
Clay, sandy, yellow.....	6.0	29.0
Sand and fine gravel, some clay.....	29.0	39.0
Sand and fine to medium gravel, some clay.....	39.0	49.0
Sand and fine to coarse gravel, some clay.....	49.0	58.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	58.0	65.0

**Test Hole #98-42
2N 33W 1daaa
Hitchcock County**

Location: NE NE NE SE sec. 1, T. 2 N., R. 33 W., approximately 150 feet south of northeast corner of quarter, on west side of road.
Ground elevation: 2,681.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)
Depth to water: 31.1 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, silty.....	0.0	6.0
Clay, sandy, yellow, some sand and silt.....	6.0	16.0
Clay, sandy, yellow.....	16.0	25.0
Clay, sandy and fine gravel.....	25.0	29.0
Gravel, fine to medium, some water-worn Ogallala, compact.....	29.0	39.0
Gravel, fine to medium, some water-worn Ogallala....	39.0	49.0
Sand and fine gravel, some clay.....	49.0	58.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale.....	58.0	59.0

**Test Hole #100-42
2N 33W 2cadd
Hitchcock County**

Location: SE SE NE SW sec. 2, T. 2 N., R. 33 W., approximately 27 feet northeast of third large cottonwood tree north of south bridge, 14 feet west of center of highway.

Ground elevation: 2,670.0 ft. (i). (Trenton 7.5 min. quadrangle)

Depth to water: 6.9 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, solid, yellow, some silt.....	0.0	5.0
Sand and fine to coarse gravel, some clay.....	5.0	15.0
Gravel, fine to coarse, water-worn Ogallala and some clay.....	15.0	25.0
Gravel, fine to coarse, and water-worn Ogallala.....	25.0	35.0
Gravel, fine to coarse, water-worn Ogallala and some clay.....	35.0	39.0
Sand and fine to medium gravel, some clay.....	39.0	41.0
Sand and fine to coarse gravel, some clay.....	41.0	47.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	47.0	52.0

**Test Hole #105-42
2N 33W 4acaa
Hitchcock County**

Location: NE NE SW NE sec. 4, T. 2 N., R. 33 W., approximately 0.25 mile south and 0.25 mile west of Mollison railroad crossing.
Ground elevation: 2,692.0 ft. (i). (Trenton 7.5 min. quadrangle)
Depth to water: 12.1 ft. (8-22-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy.....	0.0	2.0
Clay, sandy, yellow.....	2.0	11.0
Sand and fine to medium gravel, some water-worn Ogallala.....	11.0	19.0
Gravel, fine to coarse, and water-worn Ogallala.....	19.0	39.0
Gravel, fine to medium, dark clay and water-worn Ogallala.....	39.0	50.0
Gravel, fine to medium, and clay.....	50.0	51.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	51.0	56.0

**Test Hole #118-42
2N 33W 7cbbb
Hitchcock County**

Location: NW NW NW SW sec. 7, T. 2 N., R. 33 W., approximately 90 feet east of culvert, at end of east and west road, on south edge of road.

Ground elevation: 2,722.0 ft. (i). (Trenton 7.5 min. quadrangle)

Depth to water: 5.9 ft. (8-22-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy, road fill.....	0.0	6.0
Sand and fine to coarse gravel and water-worn Ogallala.....	6.0	36.0
Sand and fine to coarse gravel and water-worn Ogallala, more coarse gravel than above and some shale.....	36.0	50.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	50.0	55.0

**Test Hole #104-42
2N 33W 8accc
Hitchcock County**

Location: SW SW SW NE sec. 8, T. 2 N., R. 33 W., approximately 8 feet north of center of road, on edge of road grade.

Ground elevation: 2,718.0 ft. (i). (Trenton 7.5 min. quadrangle)

Depth to water: 20.2 ft. (8-22-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, yellow.....	0.0	1.0
Clay, sandy, yellow, some silt.....	1.0	10.0
Clay and sand, yellow.....	10.0	17.0
Gravel, fine to coarse, and water-worn Ogallala.....	17.0	39.0
Gravel, fine to coarse, some lime.....	39.0	48.0
Gravel, fine to coarse, some water-worn Ogallala....	48.0	49.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	49.0	54.0

Test Hole #103-42
2N 33W 9accd
Hitchcock County

Location: SE SW SW NE sec. 9, T. 2 N., R. 33 W., approximately 0.1 mile east of southwest corner of quarter, on north edge of road.
 Ground elevation: 2,719.0 ft. (i). (Trenton 7.5 min. quadrangle)
 Depth to water: Unknown. Test hole caved at 31.3 ft. (8-22-42).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, yellow.....	0.0	2.0
Sand, fine, and silt.....	2.0	9.0
Quicksand.....	9.0	19.0
Sand, fine, some quicksand and coarse sand.....	19.0	29.0
Gravel, fine to medium.....	29.0	40.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	40.0	45.0

**Test Hole #101-42
2N 33W 10aaaa
Hitchcock County**

Location: NE NE NE NE sec. 10, T. 2 N., R. 33 W., approximately
33 feet south of center of highway.

Ground elevation: 2,681.0 ft. (i). (Trenton 7.5 min. quadrangle)

Depth to water: 10.3 ft. (8-22-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, fine, some silt.....	0.0	3.0
Clay, sandy, yellow, some silt.....	3.0	9.0
Gravel, fine to medium, some clay.....	9.0	18.0
Sand and fine to medium gravel, some clay and water- worn Ogallala.....	18.0	27.0
Gravel, fine to coarse, and water-worn Ogallala.....	27.0	39.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	39.0	44.0

Test Hole #102-42
2N 33W 10daaa
Hitchcock County

Location: NE NE NE SE sec. 10, T. 2 N., R. 33 W., on west edge of road.

Ground elevation: 2,722.0 ft. (t). (Trenton 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 39.9 ft. (8-22-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, dark.....	0.0	2.0
Sand, yellow.....	2.0	9.0
Clay, sandy, yellow.....	9.0	19.0
Clay, sandy, dark.....	19.0	28.0
Clay, sandy, yellow.....	28.0	39.0
Sand and fine gravel, some clay.....	39.0	55.0
Clay and gravel, gray.....	55.0	58.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	58.0	63.0

**Test Hole #99-42
2N 33W 12bbbb
Hitchcock County**

Location: NW NW NW NW sec. 12, T. 2 N., R. 33 W., approximately
14 feet east of center of road.

Ground elevation: 2,676.0 ft. (i). (Trenton 7.5 min. quadrangle)

Depth to water: 14.8 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, light, very little silt.....	0.0	3.0
Clay, sandy, light to dark.....	3.0	14.0
Sand and fine gravel.....	14.0	19.0
Sand and fine to medium gravel, some clay.....	19.0	29.0
Sand and fine to medium gravel, more compact.....	29.0	39.0
Gravel, fine, and clay.....	39.0	44.0
Gravel, fine to coarse, some clay.....	44.0	45.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	45.0	49.0

**Test Hole #154-42
2N 33W 17bbbb
Hitchcock County**

Location: NW NW NW NW sec. 17. T. 2 N., R. 33 W., approximately
9 feet east of center of road.

Ground elevation: 2,765.0 ft. (i). (Trenton 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 27.4 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	34.0
Sand, gravel and lime.....	34.0	73.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	73.0	79.0

**Test Hole #106-42
2N 34W 1daaa
Hitchcock County**

Location: NE NE NE SE sec. 1, T. 2 N., R. 34 W., approximately
150 feet south of railroad.

Ground elevation: 2,718.0 ft. (i). (Trenton 7.5 min. quadrangle)

Depth to water: 10.0 ft. (8-22-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy.....	0.0	2.0
Clay, sandy, gray.....	2.0	8.0
Sand and fine to coarse gravel, some water-worn Ogallala.....	8.0	17.0
Gravel, fine to coarse, clay and water-worn Ogallala	17.0	27.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	27.0	32.0

Test Hole #107-42
2N 34W 2ddaa
Hitchcock County

Location: NE NE SE SE sec. 2, T. 2 N., R. 34 W., approximately 105 feet south of center of abandoned railroad bed.

Ground elevation: 2,724.0 ft. (i). (Trenton 7.5 min. quadrangle)

Depth to water: 7.3 ft. (8-22-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, light.....	0.0	2.0
Clay, sandy, yellow.....	2.0	6.0
Gravel, fine to coarse, bluish, some water-worn Ogallala.....	6.0	19.0
Gravel, fine to coarse, reddish, some water-worn Ogallala, more compact.....	19.0	29.0
Gravel, fine to medium, very little water-worn Ogallala.....	29.0	34.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	34.0	39.0

Test Hole #239-42
2N 34W 2bbbc
Hitchcock County

Location: NW NW NW SW sec. 2, T. 2 N., R. 34 W., approximately 500 feet south of northwest corner of section, 115 feet south of concrete culvert, on east edge of road.

Ground elevation: 2,766.0 ft. (i). (Stratton 7.5 min. quadrangle)

Depth to water: 11.8 ft. (12-18-42).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	11.0
Gravel, fine to medium, some clay and lime.....	11.0	24.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	24.0	29.0

Test Hole #162-42
2N 34W 8adaa
Hitchcock County

Location: NE NE SE NE sec. 8, T. 2 N., R. 34 W., approximately 200 feet north of highway on east edge of road.

Ground elevation: 2,780.0 ft. (i). (Stratton 7.5 min. quadrangle)

Depth to water: 32.2 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	20.0
Clay and gravel.....	20.0	24.0
Gravel, fine to coarse, some clay.....	24.0	52.0
Sand and fine to medium gravel.....	52.0	61.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	61.0	67.0

**Test Hole #163-42
2N 34W 8cccc
Hitchcock County**

Location: SW SW SW SW sec. 8, T. 2 N., R. 34 W.
 Ground elevation: 2,772.0 ft. (i). (Stratton 7.5 min. quadrangle)
 Depth to water: 13.0 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, dark.....	0.0	10.0
Clay and gravel, yellow.....	10.0	19.0
Gravel, fine to coarse, some lime.....	19.0	29.0
Gravel, fine to medium, some lime.....	29.0	47.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	47.0	52.0

Test Hole #108-42
2N 34W 11bbbb
Hitchcock County

Location: NW NW NW NW sec. 11, T. 2 N., R. 34 W., approximately
 45 feet south of center of highway.

Ground elevation: 2,736.0 ft. (i). (Stratton 7.5 min. quadrangle)

Depth to water: 9.6 ft. (8-22-42).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, silty.....	0.0	2.0
Sand, some gravel and clay.....	2.0	7.0
Sand and fine to coarse gravel, some water-worn Ogallala.....	7.0	19.0
Sand and fine to medium gravel.....	19.0	29.0
Gravel, fine to medium, some water-worn Ogallala....	29.0	37.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	37.0	42.0

**Test Hole #155-42
2N 34W 13bbbb
Hitchcock County**

Location: NW NW NW NW sec. 13, T. 2 N., R. 34 W., approximately
75 feet south of corner.

Ground elevation: 2,734.0 ft. (i). (Trenton 7.5 min. quadrangle)

Depth to water: 13.5 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, clayey, dark.....	0.0	9.0
Sand and fine to medium gravel, some clay.....	9.0	52.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	52.0	57.0

**Test Hole #156-42
2N 34W 14bbbb
Hitchcock County**

Location: NW NW NW NW sec. 14, T. 2 N., R. 34 W., approximately
65 feet south of center of road.

Ground elevation: 2,765.0 ft. (i). (Stratton 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 36.0 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	31.0
Gravel, fine to coarse.....	31.0	51.0
Sand and fine to medium gravel.....	51.0	64.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	64.0	69.0

**Test Hole #157-42
2N 34W 15bbcc
Hitchcock County**

Location: SW SW NW NW sec. 15, T. 2 N., R. 34 W., approximately 0.25 mile south of northwest corner, 125 feet south of fence corner, on east edge of road.

Ground elevation: 2,750.0 ft. (i). (Stratton 7.5 min. quadrangle)

Depth to water: 8.7 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	12.0
Sand and fine to medium gravel, some lime.....	12.0	33.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	33.0	39.0

**Test Hole #158-42
2N 34W 16dbbb
Hitchcock County**

Location: NW NW NW SE sec. 16, T. 2 N., R. 34 W., approximately 75 feet east of corner telephone pole, on south edge of road.

Ground elevation: 2,760.0 ft. (i). (Stratton 7.5 min. quadrangle)

Depth to water: 13.0 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, yellow and sand.....	0.0	10.0
Gravel and clay.....	10.0	37.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	37.0	43.0

**Test Hole #164-42
2N 34W 18bbcb
Hitchcock County**

Location: NW SW NW NW sec. 18, T. 2 N., R. 34 W., approximately 0.15 mile south of northwest corner of section, on east edge of road.
 Ground elevation: 2,786.0 ft. (i). (Stratton 7.5 min. quadrangle)
 Depth to water: 17.1 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	10.0
Clay, sandy, dark.....	10.0	19.0
Gravel, fine to coarse.....	19.0	39.0
Gravel, fine to medium, some clay.....	39.0	44.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	44.0	48.0

**Test Hole #159-42
2N 34W 19adba
Hitchcock County**

Location: NE NW SE NE sec. 19, T. 2 N., R. 34 W., approximately 200 feet south and 400 feet east of northwest corner of forty.
Ground elevation: 2,773.0 ft. (i). (Stratton 7.5 min. quadrangle)
Depth to water: 5.5 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, gravelly.....	0.0	9.0
Sand and fine to medium gravel.....	9.0	19.0
Gravel and shale.....	19.0	30.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	30.0	36.0

**Test Hole #237-42
2N 35W 4dbda
Hitchcock County**

Location: NE SE NW SE sec. 4, T. 2 N., R. 35 W.

Ground elevation: 2,859.0 ft. (i). (Max NE 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 22.9 ft. (12-18-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow, and silt.....	0.0	36.0
Sand and fine to medium gravel, some clay.....	36.0	43.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	43.0	49.0

**Test Hole #236-42
2N 35W 6ddaa
Hitchcock County**

Location: NE NE SE SE sec. 6, T. 2 N., R. 35 W., approximately 90 feet north of foot of hill.

Ground elevation: 2,879.0 ft. (i). (Max NE 7.5 min. quadrangle)

Depth to water: 8.8 ft. (12-18-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	17.0
Gravel, fine to medium, and clay.....	17.0	24.0
Clay and gravel.....	24.0	35.0
Gravel, fine to medium, and lime.....	35.0	45.0
Gravel, clay, some shale.....	45.0	49.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale.....	49.0	57.0

**Test Hole #238-42
2N 35W 12abcc
Hitchcock County**

Location: SW SW NW NE sec. 12, T. 2 N., R. 35 W., approximately
6 feet east of center of road.

Ground elevation: 2,820.0 ft. (i). (Stratton 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 19.9 ft. (12-18-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	37.0
Gravel, fine to medium, some clay.....	37.0	39.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	39.0	45.0

**Test Hole #161-42
2N 35W 13cbbb
Hitchcock County**

Location: NW NW NW SW sec. 13, T. 2 N., R. 35 W., approximately
290 feet south of bridge, on east edge of road.

Ground elevation: 2,787.0 ft. (i). (Stratton 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 4.9 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam.....	0.0	10.0
Sand and fine to medium gravel, some lime.....	10.0	20.0
Gravel, fine to coarse, some lime.....	20.0	36.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	36.0	42.0

**Test Hole #165-42
2N 35W 14abcb
Hitchcock County**

Location: NW SW NW NE sec. 14, T. 2 N., R. 35 W., approximately 130 feet southwest of highway bridge.
 Ground elevation: 2,802.0 ft. (i). (Stratton 7.5 min. quadrangle)
 Depth to water: 15.1 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	10.0
Gravel, fine to medium, some clay.....	10.0	20.0
Gravel, fine to coarse, some clay.....	20.0	27.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	27.0	34.0

**Test Hole #166-42
2N 35W 15dbbc
Hitchcock County**

Location: SW NW NW SE sec. 15, T. 2 N., R. 35 W., approximately 100 feet west of railroad mile post number 323 and 36 feet south of center of highway.

Ground elevation: 2,804.0 ft. (i). (Max NE 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 5.2 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	6.0
Sand and fine to medium gravel, some clay.....	6.0	16.0
Gravel, fine to medium.....	16.0	23.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	23.0	29.0

**Test Hole #168-42
2N 35W 20cbbb
Hitchcock County**

Location: NW NW NW SW sec. 20, T. 2 N., R. 35 W., approximately 60 feet south of highway.

Ground elevation: 2,833.0 ft. (i). (Max NE 7.5 min. quadrangle)

Depth to water: 10.5 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	10.0
Gravel, fine to coarse, some clay.....	10.0	33.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	33.0	39.0

**Test Hole #167-42
2N 35W 21bcbc
Hitchcock County**

Location: SW NW SW NW sec. 21, T. 2 N., R. 35 W., between highway and railroad.

Ground elevation: 2,831.0 ft. (i). (Max NE 7.5 min. quadrangle)

Depth to water: 19.7 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, dark.....	0.0	9.0
Clay, sandy, yellow.....	9.0	22.0
Gravel, fine to coarse.....	22.0	44.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	44.0	49.0

**Test Hole #160-42
2N 35W 24cbbb
Hitchcock County**

Location: NW NW NW SW sec. 24, T. 2 N., R. 35 W., on east side of road.

Ground elevation: 2,802.0 ft. (i). (Stratton 7.5 min. quadrangle)

Depth to water: 19.3 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, dark.....	0.0	10.0
Clay and fine gravel.....	10.0	20.0
Sand and fine to medium gravel.....	20.0	39.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	39.0	45.0

**Test Hole #169-42
2N 35W 28bccc
Hitchcock County**

Location: SW SW SW NW sec. 28, T. 2 N., R. 35 W., approximately 120 feet north of bottom of hill.

Ground elevation: 2,822.0 ft. (i). (Max SE 7.5 min. quadrangle)

Depth to water: 16.7 ft. (11-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, silty, dark.....	0.0	8.0
Gravel, fine to medium.....	8.0	18.0
Sand and fine to medium gravel.....	18.0	37.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	37.0	43.0

**Test Hole #119-42
3N 31W 4babb
Hitchcock County**

Location: NW NW NE NW sec. 4, T. 3 N., R. 31 W., approximately 0.3 mile east of northwest corner of section, 150 feet west of timber bridge.

Ground elevation: 2,617.0 ft. (i). (Burger Canyon SE 7.5 min. quadrangle)

Depth to water: 11.7 ft. (9-20-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy.....	0.0	2.0
Clay and sand, dark.....	2.0	9.0
Clay, silt, and sand, yellow.....	9.0	21.0
Clay, yellow.....	21.0	31.0
Clay, sandy, yellow, some sand.....	31.0	41.0
Sand and fine to medium gravel, some lime and clay..	41.0	51.0
Sand and fine to medium gravel, some clay.....	51.0	61.0
Sand and fine to coarse gravel, some clay.....	61.0	71.0
Sand and fine to coarse gravel, some lime and clay..	71.0	74.0
Sand and fine to coarse gravel, some lime.....	74.0	79.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, yellow, very hard.....	79.0	85.0

**Test Hole #326-41
3N 31W 9dccc
Hitchcock County**

Location: SE SW SW SE sec. 9, T. 3 N., R. 31 W., approximately 0.1 mile east of southwest corner of quarter, 65 feet west of irrigation lateral, in ditch north of highway.

Ground elevation: 2,589.0 ft. (a). (Culbertson 7.5 min. quadrangle)

Depth to water: 23.2 ft. (11-1-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown.....	0.0	1.0
Clay, sandy, grayish tan.....	1.0	9.0
Clay, indurated, light tan.....	9.0	13.0
Sand, fine, red.....	13.0	18.0
Gravel, medium to coarse, red, some fine sand and very coarse gravel.....	18.0	31.0
Gravel, medium to coarse, red, reworked, olive drab shale.....	31.0	34.0
Gravel, medium to coarse, red, clean.....	34.0	57.0
Gravel, medium to coarse, red, some very coarse and limy pebbles, streak of yellowish pink sandy clay at 65.0 ft.....	57.0	70.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray.....	70.0	74.0

Test Hole #325-41
3N 31W 11cbbb
Hitchcock County

Location: NW NW NW SW sec. 11, T. 3 N., R. 31 W., approximately 35 feet south of northwest corner of quarter, on east edge of road.
 Ground elevation: 2,595.0 ft. (t). (Culbertson 7.5 min. quadrangle)
 Depth to water: 32.9 ft. (11-1-41).

Depth, in feet
 From To

Quaternary System, undifferentiated:

Road fill and dark brown sandy soil.....	0.0	5.0
Sand, silty to clayey, buff.....	5.0	20.0
Sand, silty to clayey, reddish brown.....	20.0	32.0
Sand, clayey, dark brown.....	32.0	36.0
Gravel, fine to medium, red, some lime, dirty.....	36.0	39.0
Clay, sandy, tannish brown.....	39.0	43.0
Gravel, fine, dirty, much lime and sandy clay.....	43.0	44.0
Gravel, fine to coarse, red, clean, compact.....	44.0	53.0

Tertiary System - Miocene Series - Ogallala Group:

Lime, hard.....	53.0	54.0
Gravel, fine to medium, red, clean.....	54.0	60.0
Gravel, fine to coarse, compact, clean, white limy pebbles.....	60.0	71.0
Gravel, fine, greenish red, much sandstone and lime.	71.0	74.0
Clay, sandy, greenish, soft sandstone.....	74.0	76.0
Clay, sandy, hard, greenish gray.....	76.0	78.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, dark bluish gray to black, compact, rubbery..	78.0	79.0
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**Test Hole #123-42
3N 31W 14acbc
Hitchcock County**

Location: SW NW SW NE sec. 14, T. 3 N., R. 31 W., approximately 0.5 mile east along highway from west section line, 33 feet west of driveway, 120 feet north of center of highway.
Ground elevation: 2,551.0 ft. (i). (Culbertson 7.5 min. quadrangle)
Depth to water: 5.3 ft. (8-26-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	3.0
Gravel, fine to coarse, some clay.....	3.0	13.0
Gravel, fine to coarse, some lime.....	13.0	33.0
Gravel, medium to coarse, some lime.....	33.0	43.0
Gravel, fine to coarse, some clay.....	43.0	48.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	48.0	53.0

**Test Hole #324-41
3N 31W 15adaa
Hitchcock County**

Location: NE NE SE NE sec. 15, T. 3 N., R. 31 W., approximately 0.31 mile south of northeast corner of section, 120 feet southwest of railroad track, on west edge of trail.

Ground elevation: 2,565.0 ft. (t). (Culbertson 7.5 min. quadrangle)

Depth to water: 15.1 ft. (11-1-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Top soil, medium brown, sandy soil.....	0.0	5.0
Soil, sandy, dark grayish brown.....	5.0	7.0
Clay, sandy, grayish tan, slightly darker at bottom.	7.0	17.0
Clay, sandy, grayish blue.....	17.0	20.0
Gravel, medium to coarse, grayish red.....	20.0	25.0
Gravel, medium to very coarse, red.....	25.0	31.0
Gravel, medium to coarse, red, some reworked shale pebbles.....	31.0	35.0
Gravel, coarse to very coarse, red, some limy pebbles and reworked shale, compact.....	35.0	46.0
Gravel, medium to coarse, some very coarse, red, much limy material and reworked shale.....	46.0	55.0
Gravel, coarse, red, dirty, some soft sandy gray clay and reworked shale.....	55.0	59.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray.....	59.0	65.0

**Test Hole #327-41
3N 31W 17dacc
Hitchcock County**

Location: SW SW NE SE sec. 17, T. 3 N., R. 31 W., approximately
0.12 mile south of Frenchman Creek bridge, on east edge of highway.
Ground elevation: 2,571.0 ft. (a). (Culbertson 7.5 min. quadrangle)
Depth to water: 13.8 ft. (11-1-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	2.0
Sand, silty to clayey, buff.....	2.0	7.0
Gravel, fine to coarse, gray, dirty.....	7.0	10.0
Clay, hard, gray.....	10.0	13.0
Gravel, fine to coarse, red, some small limy pebbles	13.0	18.0
Gravel, very coarse, thin clay streak.....	18.0	19.0
Gravel, fine to coarse, red, clean, some limy pebbles.....	19.0	47.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray, compact.....	47.0	49.0

**Test Hole #85-42
3N 31W 17dccc
Hitchcock County**

Location: SW SW SW SE sec. 17, T. 3 N., R. 31 W., approximately
75 feet south of center of railroad, 50 feet east of concrete
corner post.

Ground elevation: 2,576.0 ft. (i). (Culbertson 7.5 min. quadrangle)

Depth to water: 8.9 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy, light colored.....	0.0	6.0
Loam and silt, sandy, dark.....	6.0	8.0
Clay, dark, and medium gravel.....	8.0	10.0
Clay, blue, and some sand.....	10.0	17.0
Sand, and fine to medium gravel, some water-worn Ogallala and dark clay.....	17.0	27.0
Sand, and fine to medium gravel, some water-worn Ogallala.....	27.0	41.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	41.0	46.0

**Test Hole #136-42
3N 31W 17acc
Hitchcock County**

Location: SW SW SW NE sec. 17, T. 3 N., R. 31 W., approximately 150 feet north and 50 feet east of the southwest corner of quarter.
Ground elevation: 2,582.0 ft. (i). (Culbertson 7.5 min. quadrangle)
Depth to water: 13.8 ft. (9-20-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, dark.....	0.0	5.0
Clay, sandy, yellow.....	5.0	16.0
Sand, fine, and fine to coarse gravel, some lime....	16.0	26.0
Sand and medium to coarse gravel, some lime.....	26.0	57.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	57.0	63.0

**Test Hole #330-41
3N 31W 18cddd
Hitchcock County**

Location: SE SE SE SW sec. 18, T. 3 N., R. 31 W., approximately 50 feet west of southeast corner of quarter, on north edge of road.
Ground elevation: 2,601.0 ft. (a). (Culbertson 7.5 min. quadrangle)
Depth to water: 19.6 ft. (11-1-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown.....	0.0	3.0
Soil, sandy, dark grayish buff.....	3.0	11.0
Clay, sandy, grayish yellow, some coarse red gravel.	11.0	16.0
Gravel, medium to coarse, some very coarse, red, slightly dirty, compact, some reworked lime.....	16.0	20.0
Gravel, coarse, red, dirty, very compact, much reworked lime.....	20.0	30.0
Gravel, medium to coarse, red.....	30.0	41.0
Gravel, coarse to very coarse, red.....	41.0	50.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray.....	50.0	55.0

**Test Hole #329-41
3N 31W 20add
Hitchcock County**

Location: SE SE SE NE sec. 20, T. 3 N., R. 31 W., approximately 200 feet north of southeast corner of quarter and 240 feet north of house which is east of highway, on west edge of road.

Ground elevation: 2,581.0 ft. (a). (Culbertson 7.5 min. quadrangle)

Depth to water: 9.9 ft. (11-1-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, silty, buff red.....	0.0	6.0
Gravel, red.....	6.0	7.0
Sand, clayey, buff gray.....	7.0	9.0
Gravel, fine to coarse, red, clean, good.....	9.0	18.0
Gravel, fine to coarse, red, some black and green...	18.0	30.0
Gravel, very compact, some gray clay or probably gravel embedded in shale.....	30.0	31.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light gray to rusty colored.....	31.0	33.0
Shale, lead gray to dark bluish gray, compact, rubbery.....	33.0	36.0

**Test Hole #328-41
3N 31W 21cccc
Hitchcock County**

Location: SW SW SW SW sec. 21, T. 3 N., R. 31 W., approximately 100 feet east of southwest corner of section, on north edge of road.
Ground elevation: 2,589.0 ft. (t). (Culbertson 7.5 min. quadrangle)
Depth to water: 15.4 ft. (11-1-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill, dark brownish black sandy soil.....	0.0	5.0
Clay, sandy, grayish tan.....	5.0	15.0
Gravel, medium to coarse, some very coarse, green, red clay streak at 18.0 ft.....	15.0	21.0
Gravel, medium to coarse, red, some fine and very coarse.....	21.0	36.0
Gravel, coarse to very coarse, red.....	36.0	45.0
Gravel, medium to coarse, red, some reworked shale..	45.0	52.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark grayish blue.....	52.0	56.0

Test Hole #335-41
3N 31W 23bbbb
Hitchcock County

Location: NW NW NW NW sec. 23, T. 3 N., R. 31 W., approximately 45 feet south of northwest corner of section, on east edge of road.
 Ground elevation: 2,552.0 ft. (t). (Culbertson 7.5 min. quadrangle)
 Depth to water: 4.4 ft. (11-3-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, sandy.....	0.0	3.0
Sand, clayey, gray.....	3.0	6.0
Gravel, fine to coarse, gray.....	6.0	10.0
Gravel, fine to very coarse.....	10.0	17.0
Gravel, fine to coarse, red, many water-worn shale pebbles.....	17.0	24.0
Gravel, medium to coarse, red, good, some lime pebbles below 35.0 ft.....	24.0	37.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray, tough.....	37.0	39.0

**Test Hole #86-42
3N 31W 29bbcc
Hitchcock County**

Location: SW SW NW NW sec 29, T. 3 N., R. 31 W.
 Ground elevation: 2,606.0 ft. (i). (Culbertson 7.5 min. quadrangle)
 Depth to water: 26.5 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy.....	0.0	4.0
Clay and silt, yellow.....	4.0	12.0
Sand and yellow clay.....	12.0	24.0
Sand and fine to medium gravel, some yellow clay, lime, and a very little Ogallala.....	24.0	34.0
Sand and fine to medium gravel, some Ogallala.....	34.0	45.0
Sand and fine to medium gravel, streak of shale and water-worn Ogallala.....	45.0	49.0
Sand and fine to coarse gravel, some shale.....	49.0	59.0
Sand and fine to medium gravel.....	59.0	70.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	70.0	76.0

**Test Hole #87-42
3N 31W 30ccbb
Hitchcock County**

Location: NW NW SW SW sec. 30, T. 3 N., R. 31 W., approximately
33 feet northwest of corn crib.

Ground elevation: 2,617.0 ft. (i). (Culbertson 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 24.6 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy.....	0.0	5.0
Clay and silt, sandy, yellow.....	5.0	15.0
Clay, sandy, yellow.....	15.0	23.0
Sand and fine to medium gravel, very little Ogallala	23.0	32.0
Gravel, medium to coarse, some clay and shale.....	32.0	38.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	38.0	43.0

**Test Hole #88-42
3N 31W 30bbcc
Hitchcock County**

Location: SW SW NW NW sec. 30, T. 3 N., R. 31 W., approximately 42 feet southwest of small cluster of cottonwood trees.

Ground elevation: 2,594.0 ft. (i). (Culbertson 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 6.9 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy.....	0.0	4.0
Clay, sand and silt, yellow.....	4.0	6.0
Gravel, fine to medium, some clay.....	6.0	16.0
Gravel, fine to medium, some water-worn Ogallala....	16.0	36.0
Gravel, fine to coarse, some water-worn Ogallala....	36.0	46.0
Sand and fine to coarse gravel.....	46.0	51.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	51.0	56.0

**Test Hole #137-42
3N 31W 31bbbb
Hitchcock County**

Location: NW NW NW NW sec. 31, T. 3 N., R. 31 W., approximately 300 feet east of north and south road.

Ground elevation: 2,696.0 ft. (i). (Culbertson 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 67.7 ft. (9-28-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt.....	0.0	4.0
Clay, sandy, yellow.....	4.0	55.0
Lime and some clay.....	55.0	67.0
Gravel and lime.....	67.0	76.0
Lime and clay.....	76.0	84.0
Clay and lime.....	84.0	95.0
Gravel, fine.....	95.0	105.0
Gravel, fine to coarse.....	105.0	118.0
Soapstone.....	118.0	124.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	124.0	129.0

**Test Hole #333-41
3N 32W 3addd
Hitchcock County**

Location: SE SE SE NE sec. 3, T. 3 N., R. 32 W., approximately 50 feet west of corner, on north edge of road.
 Ground elevation: 2,620.0 ft. (t). (Beverly 7.5 min. quadrangle)
 Depth to water: 11.2 ft. (11-1-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy soil.....	0.0	5.0
Sand and fine to coarse red gravel.....	5.0	10.0
Clay and gravel, gray.....	10.0	11.0
Gravel, fine to coarse, red, dirty.....	11.0	13.0
Gravel, fine to very coarse, red, water-worn lime and sandy lime pebbles, slightly compact.....	13.0	41.0
Gravel, fine to coarse, lime and sandy lime pebbles, green sandy clay from 41.0 to 43.0 ft.....	41.0	51.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray, compact, rubbery, rusty at top.....	51.0	55.0

Test Hole #332-41
3N 32W 12dddd
Hitchcock County

Location: SE SE SE SE sec. 12, T. 3 N., R. 32 W., approximately 130 feet north of southeast corner of section, on west edge of road.
 Ground elevation: 2,594.0 ft. (t). (Culbertson 7.5 min. quadrangle)
 Depth to water: 5.8 ft. (11-1-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and dark grayish brown sandy soil.....	0.0	7.0
Sand, fine, green, and medium to coarse green gravel, some reworked lime.....	7.0	11.0
Silt, sandy, grayish blue.....	11.0	17.0
Gravel, medium to coarse, some very coarse, red.....	17.0	24.0
Gravel, medium to coarse, red, some reworked lime...	24.0	27.0
Gravel, coarse to very coarse, red, much reworked sandy lime, compact.....	27.0	31.0
Gravel, medium to coarse, red, some reworked lime and shale.....	31.0	48.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray.....	48.0	49.0

**Test Hole #331-41
3N 32W 13bbbb
Hitchcock County**

Location: NW NW NW NW sec. 13, T. 3 N., R. 32 W., approximately 200 feet south of northwest corner of section, on east edge of road.

Ground elevation: 2,620.0 ft. (a). (Culbertson SW 7.5 min. quadrangle)

Depth to water: 23.0 ft. (11-1-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	3.0
Sand, silty to clayey, brownish buff.....	3.0	5.0
Sand, silty, dark brown.....	5.0	7.0
Sand, clayey, buff.....	7.0	10.0
Clay, sandy, brown.....	10.0	14.0
Gravel, fine to medium, some coarse, red, dirty, some lime.....	14.0	26.0
Gravel, fine to coarse, red, compact, slightly dirty, much lime and lime pebbles.....	26.0	37.0
Gravel, medium to coarse, some fine, red, fairly clean, some sandy lime pebbles.....	37.0	40.0
Gravel, fine to coarse, more lime than above, quite a little fine gravel, good.....	40.0	68.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray to black, compact, tough....	68.0	69.0

**Test Hole #138-42
3N 32W 24adcc
Hitchcock County**

Location: SW SW SE NE sec. 24, T. 3 N., R. 32 W.

Ground elevation: 2,710.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 77.7 ft. (9-28-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	10.0
Clay, sandy, dark yellow.....	10.0	60.0
Clay, sandy, light yellow.....	60.0	70.0
Clay, sandy, light yellow, some sand.....	70.0	80.0
Sand and light clay.....	80.0	99.0
Tertiary System - Miocene Series - Ogallala Group:		
Lime, sand and clay.....	99.0	116.0
Gravel and clay.....	116.0	126.0
Gravel and clay, very hard.....	126.0	133.0
Sand, gravel and clay, very hard.....	133.0	136.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	136.0	139.0

**Test Hole #139-42
3N 32W 24dadc
Hitchcock County**

Location: SW SE NE SE sec. 24, T. 3 N., R. 32 W., approximately 0.1 mile west of east section line, about 300 feet south of railroad.
 Ground elevation: 2,594.0 ft. (i). (Culbertson 7.5 min. quadrangle)
 Depth to water: 3.1 ft. (9-28-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Gravel and clay.....	0.0	9.0
Gravel, fine to coarse, some lime.....	9.0	24.0
Gravel, medium to coarse, some lime and clay.....	24.0	35.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	35.0	42.0

**Test Hole #89-42
3N 32W 25ccdc
Hitchcock County**

Location: SW SE SW SW sec. 25, T. 3 N., R. 32 W., approximately 0.15 mile east of southwest corner of section, on north edge of road.

Ground elevation: 2,617.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 15.7 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, light, some silt.....	0.0	2.0
Clay, sandy, yellow, very little silt.....	2.0	12.0
Sand and fine to medium gravel, some Ogallala.....	12.0	22.0
Gravel, fine to coarse, some water-worn Ogallala....	22.0	25.0
Gravel, fine to coarse, some water-worn Ogallala and clay.....	25.0	35.0
Gravel, fine to coarse, some water-worn Ogallala....	35.0	45.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	45.0	49.0

**Test Hole #111-42
3N 32W 28daaa
Hitchcock County**

Location: NE NE NE SE sec. 28, T. 3 N., R. 32 W., on south edge of road.

Ground elevation: 2,643.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 17.8 ft. (8-22-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sand, light, some clay.....	0.0	7.0
Sand and fine to medium gravel, some lime.....	7.0	19.0
Sand and fine to coarse gravel, some water-worn Ogallala.....	19.0	23.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Ochre, yellow.....	23.0	25.0
Clay, gray, hard.....	25.0	28.0
Shale, dark.....	28.0	33.0

**Test Hole #110-42
3N 32W 32bbbb
Hitchcock County**

Location: NW NW NW NW sec 32, T. 3 N., R. 32 W., on west edge of road.

Ground elevation: 2,645.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)

Depth to water: 9.7 ft. (8-22-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and clay, sandy, some silt.....	0.0	8.0
Sand and fine to coarse gravel, some clay.....	8.0	19.0
Sand and fine gravel, some clay.....	19.0	29.0
Sand and fine to medium gravel.....	29.0	34.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	34.0	39.0

**Test Hole #93-42
3N 32W 34cbbb
Hitchcock County**

Location: NW NW NW SW sec 34, T. 3 N., R. 32 W., approximately 47 feet southeast of lone cottonwood tree on east edge of road.

Ground elevation: 2,634.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)

Depth to water: 15.7 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy.....	0.0	3.0
Loam, dark, clay and silt.....	3.0	9.0
Clay, yellow, some silt.....	9.0	17.0
Sand and fine to coarse gravel, some water-worn Ogallala.....	17.0	29.0
Sand and fine to medium gravel, very little water- worn Ogallala.....	29.0	39.0
Sand and fine to medium gravel, some clay.....	39.0	44.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	44.0	49.0

**Test Hole #90-42
3N 32W 35bbab
Hitchcock County**

Location: NW NE NW NW sec. 35, T. 3 N., R. 32 W., approximately 30 feet north of northwest corner cottonwood tree.

Ground elevation: 2,619.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)

Depth to water: 13.0 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand and silt.....	0.0	2.0
Sand, fine, yellow.....	2.0	8.0
Clay, yellow.....	8.0	12.0
Sand and fine to medium gravel.....	12.0	22.0
Sand and fine to medium gravel, some water-worn Ogallala.....	22.0	32.0
Gravel, fine to coarse, some water-worn Ogallala....	32.0	39.0
Gravel, fine to coarse, some water-worn Ogallala and shale.....	39.0	46.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	46.0	51.0

**Test Hole #91-42
3N 32W 35ccbb
Hitchcock County**

Location: NW NW SW SW sec. 35, T. 3 N., R. 32 W., approximately 16 feet southeast of center of road, in bend of road.

Ground elevation: 2,662.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)

Depth to water: Unknown. Test hole caved at 48.1 ft. (8-14-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy.....	0.0	6.0
Clay and silt, sandy, dark.....	6.0	13.0
Clay, sticky, yellow.....	13.0	34.0
Clay, dark, some sand.....	34.0	39.0
Clay, yellow, some sand.....	39.0	43.0
Sand and fine to medium gravel, compact.....	43.0	53.0
Sand and fine to medium gravel, some clay.....	53.0	60.0
Sand and fine to medium gravel, a little more clay..	60.0	62.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	62.0	68.0

Test Hole #109-42
3N 33W 36acdd
Hitchcock County

Location: SE SE SW NE sec. 36, T. 3 N., R. 33 W., approximately 0.25 mile west of east section line, 66 feet north of center of highway.
 Ground elevation: 2,656.0 ft. (i). (Culbertson SW 7.5 min. quadrangle)
 Depth to water: 10.1 ft. (8-22-42).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, fine, some silt.....	0.0	2.0
Clay, sandy, yellow.....	2.0	7.0
Sand and fine to coarse gravel, some clay.....	7.0	19.0
Sand and fine to medium gravel, some water-worn Ogallala.....	19.0	25.0
Sand and fine to medium gravel, some dark clay.....	25.0	37.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	37.0	42.0

Test Hole #17-FC-52
3N 35W 2aaaa
Hitchcock County

Location: NE NE NE NE sec. 2, T. 3 N., R. 35 W.

(U.S. Bureau of Reclamation test hole)

Ground elevation: 3,145.9 ft. (i). (Palisade SW 7.5 min. quadrangle)

Depth to water: 293.0 ft. (1952).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, clayey, soft, tan.....	0.0	102.0
Silt, clayey, soft, tan; contains thin streaks of caliche.....	102.0	112.0
Silt, clayey, soft, tan.....	112.0	132.0
Silt, clayey, soft, tan; contains very fine sand....	132.0	162.0
Silt, soft; contains very fine to fine sand.....	162.0	172.0
Silt, soft; contains very fine sand to very fine gravel and some caliche.....	172.0	193.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine, to gravel, fine, slightly cemented.	193.0	199.5
Caliche, soft, white.....	199.5	199.8
Limestone, white, hard.....	199.8	202.0
Silt and caliche, hard, white.....	202.0	223.0
Sand, very fine, to gravel, very fine, silty; contains some cemented zones.....	223.0	232.0
Sand, very fine, to gravel, fine, loose.....	232.0	235.2
Sand, very fine, to gravel, fine, well cemented....	235.2	241.0
Silt, sandy, soft, tan, and caliche, silty, sandy, hard.....	241.0	264.5
Sand, very fine to coarse, loose, interbedded with gray soft sandy silt and very fine to very coarse sand.....	264.5	282.0
Caliche and silt, sandy, gray.....	282.0	292.0
Silt, sandy, soft, tan to gray.....	292.0	302.0
Sand, very fine, to gravel, very fine, light green; contains silt and some caliche.....	302.0	305.0
Silt, soft, gray to light green.....	305.0	312.0
Sand, very fine, to gravel, fine, interbedded with layers of silt.....	312.0	330.0
Silt, clayey, sandy, some caliche, yellow to tan, interbedded with thin layers of sand.....	330.0	366.5
Sand, very fine to coarse, silty, light green to tan, and silt, sandy, gray.....	366.5	382.0
Sand, very fine to very coarse, well cemented, interbedded with silt and caliche.....	382.0	388.0
Sand, very fine, to gravel, fine, silty, loose, light green.....	388.0	392.0

Sand, very fine, to gravel, fine, interbedded with light green silt.....	392.0	403.7
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, yellow to light bluish gray, soft, plastic....	403.7	410.3

Test Hole #240-42
4N 31W 6cbcc
Hitchcock County

Location: SW SW NW SW sec. 6 T. 4 N., R. 31 W., approximately 0.3 mile north of southwest corner of section, 65 feet south of north bridge, on east edge of road.

Ground elevation: 2,683.0 ft. (i). (Burger Canyon SE 7.5 min. quadrangle)

Depth to water: 6.2 ft. (12-19-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, dark.....	0.0	8.0
Clay, yellow.....	8.0	54.0
Gravel, fine to medium, some lime and clay.....	54.0	78.0
Tertiary System - Miocene Series - Ogallala Group:		
Soapstone and gravel.....	78.0	88.0
Gravel, fine to medium, some soapstone and lime.....	88.0	108.0
Gravel, fine to medium, solid.....	108.0	128.0
Sand and gravel, fine to medium.....	128.0	139.0

**Test Hole #122-42
4N 31W 18aabb
Hitchcock County**

Location: NW NW NE NE sec. 18, T. 4 N., R. 31 W., approximately 0.3 mile west of northeast corner of section, 200 feet west of bridge on south edge of road.

Ground elevation: 2,668.0 ft. (i). (Burger Canyon SE 7.5 min. quadrangle)

Depth to water: 17.1 ft. (9-20-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam and silt, sandy.....	0.0	10.0
Clay, sandy, dark.....	10.0	20.0
Clay, light colored.....	20.0	30.0
Clay, yellow.....	30.0	55.0
Sand and fine to coarse gravel, some clay.....	55.0	65.0
Sand and medium to coarse gravel, some lime and clay	65.0	67.0
Sand and fine to coarse gravel, some lime.....	67.0	76.0
Gravel, medium to coarse, and clay.....	76.0	81.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, rock and clay, solid.....	81.0	89.0
Sand and fine gravel, solid.....	89.0	109.0
Sand and fine gravel.....	109.0	119.0
Sand and fine to coarse gravel.....	119.0	129.0
Sand, rock and gravel.....	129.0	135.0

**Test Hole #120-42
4N 31W 19addd
Hitchcock County**

Location: SE SE SE NE sec. 19, T. 4 N., R. 31 W., approximately 138 feet north of southeast corner of quarter.

Ground elevation: 2,646.0 ft. (i). (Burger Canyon SE 7.5 min. quadrangle)

Depth to water: 24.6 ft. (9-20-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill, sandy, yellow.....	0.0	2.0
Clay, sandy, dark, some silt.....	2.0	12.0
Clay and silt, sandy.....	12.0	22.0
Clay, yellow.....	22.0	34.0
Clay, blue.....	34.0	44.0
Clay, blue, and fine gravel.....	44.0	53.0
Sand and fine gravel.....	53.0	63.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand and fine to coarse gravel, some lime.....	63.0	81.0
Sand and fine to medium gravel, some clay.....	81.0	89.0
Sand and fine to medium gravel, some clay and lime..	89.0	97.0
Gravel, fine, some clay and lime.....	97.0	98.0
Gravel, fine, some lime.....	98.0	99.0

**Test Hole #1-R
4N 31W 19ddcc
Hitchcock County**

Location: SW SW SE SE sec. 19, T. 4 N., R. 31 W., approximately 150 feet north and 1,100 feet west of southeast corner of section.

(U.S. Bureau of Reclamation test hole)

Ground elevation: 2,693.0 ft. (i). (Burger Canyon SE 7.5 min. quadrangle)

Depth to water: Unknown. Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Top Soil.....	0.0	3.0
Clay, silty, brown.....	3.0	58.0
Lime, decomposed.....	58.0	67.0
Clay, silty, brown.....	67.0	88.0
Sand and lime pebbles.....	88.0	94.0
Tertiary System - Miocene Series - Ogallala Group:		
Limestone, decomposed.....	94.0	109.0
Sand and lime pebbles.....	109.0	117.0
Limestone, decomposed.....	117.0	130.0
Sand and gravel.....	130.0	143.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, brown.....	143.0	150.0
Shale, brown and blue.....	150.0	160.0
Shale, blue.....	160.0	169.0

**Test Hole #2-R
4N 31W 29aaca
Hitchcock County**

Location: NE SW NE NE sec. 29, T. 4 N., R. 31 W., approximately 700 feet south and 700 feet west of northeast corner of section.

(U.S. Bureau of Reclamation test hole)

Ground elevation: 2,703.0 ft. (i). (Burger Canyon SE 7.5 min. quadrangle)

Depth to water: Unknown. Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Top Soil.....	0.0	2.0
Clay, silty, brown.....	2.0	84.0
Sand and gravel.....	84.0	86.0
Clay, silty, brown.....	86.0	95.0
Sand and gravel.....	95.0	118.0
Tertiary System - Miocene Series - Ogallala Group:		
Limestone, decomposed.....	118.0	140.0
Clay, sandy.....	140.0	150.0
Sand and gravel.....	150.0	156.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, brown.....	156.0	168.0
Shale, blue.....	168.0	181.0

**Test Hole #3-R
4N 31W 29abdd
Hitchcock County**

Location: SE SE NW NE sec. 29, T. 4 N., R. 31 W., approximately 1,000 feet south and 1,500 feet west of northeast corner of section.

(U.S. Bureau of Reclamation test hole)

Ground elevation: 2,642.0 ft. (i). (Burger Canyon SE 7.5 min. quadrangle)

Depth to water: Unknown. Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Top Soil.....	0.0	3.0
Clay, silty, brown.....	3.0	51.0
Sand and gravel.....	51.0	64.0
Tertiary System - Miocene Series - Ogallala Group:		
Limestone.....	64.0	73.0
Clay, sandy.....	73.0	74.0
Limestone, decomposed, sandy.....	74.0	80.0
Sand, fine.....	80.0	94.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, brown and blue.....	94.0	100.0
Shale, blue.....	100.0	120.0

**Test Hole #4-R
4N 31W 29abcd
Hitchcock County**

Location: SE SW NW NE sec. 29, T. 4 N., R. 31 W., approximately 1,200 feet south and 2,000 feet west of northeast corner of section.

(U.S. Bureau of Reclamation test hole)

Ground elevation: 2,633.0 ft. (i). (Burger Canyon SE 7.5 min. quadrangle)

Depth to water: Unknown. Not measured

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Top Soil.....	0.0	3.0
Clay, silty, brown.....	3.0	44.0
Sand, fine.....	44.0	46.0
Clay, silty, brown.....	46.0	49.0
Sand, coarse, and gravel.....	49.0	57.0
Clay, silty, brown.....	57.0	59.0
Sand, coarse, and gravel.....	59.0	86.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, brown.....	86.0	90.0
Shale, brown and blue.....	90.0	100.0
Shale, blue.....	100.0	135.0

**Test Hole #5-R
4N 31W 29bdaa
Hitchcock County**

Location: NE NE SE NW sec. 29, T. 4 N., R. 31 W., approximately 1,400 feet south and 2,400 feet east of northwest corner of section.

(U.S. Bureau of Reclamation rest hole)

Ground elevation: 2,650.0 ft. (i). (Burger Canyon SE 7.5 min. quadrangle)

Depth to water: Unknown. Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Top Soil.....	0.0	3.0
Clay, yellow.....	3.0	54.0
Sand and gravel.....	54.0	62.0
Sand.....	62.0	75.0
Sand and gravel.....	75.0	86.0
Tertiary System - Miocene Series - Ogallala Group:		
Limestone, decomposed.....	86.0	91.0
Sand and gravel.....	91.0	95.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, brown and blue.....	95.0	105.0
Shale, blue.....	105.0	121.0

**Test Hole #6-R
4N 31W 29bcad
Hitchcock County**

Location: SE NE SW NW sec. 29, T. 4 N., R. 31 W., approximately 1,700 feet south and 1,300 feet east of northwest corner of section.

(U.S Bureau of Reclamation test hole)

Ground elevation: 2,689.0 ft. (i). (Burger Canyon SE 7.5 min. quadrangle)

Depth to water: Unknown. Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Top Soil.....	0.0	3.0
Clay, silty, yellow.....	3.0	15.0
Clay, yellow.....	15.0	25.0
Clay, silty, yellow.....	25.0	81.0
Sand and gravel.....	81.0	95.0
Sand, coarse, and gravel.....	95.0	125.0
Sand.....	125.0	129.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, yellow.....	129.0	140.0
Shale, brown and blue.....	140.0	150.0
Shale, blue.....	150.0	155.0

Test Hole #121-42
4N 31W 29ddaa
Hitchcock County

Location: NE NE SE SE sec. 29, T. 4 N., R. 31 W., on west edge of road.

Ground elevation: 2,633.0 ft. (i). (Burger Canyon SE 7.5 min. quadrangle)

Depth to water: 17.1 ft. (8-25-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, yellow.....	0.0	2.0
Clay, sandy, dark.....	2.0	8.0
Clay, sandy, yellow.....	8.0	30.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay and sandrock.....	30.0	33.0
Clay and sandrock, brown.....	33.0	43.0
Clay, hard, brown.....	43.0	53.0
Gravel, fine to coarse, some lime.....	53.0	63.0
Gravel, fine to coarse.....	63.0	66.0
Gravel, fine to medium, some clay.....	66.0	73.0
Soil, light clay.....	73.0	81.0
Sand and fine to coarse gravel.....	81.0	89.0
Clay and sand, yellow.....	89.0	96.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	96.0	102.0

Test Hole #32-F-77
4N 32W 6bbcc
Hitchcock County

Location: SW SW NW NW sec. 6, T. 4 N., R. 32 W., approximately 47 feet east of N-S center of dirt road and 1,047 feet south of E-W dirt road.

Ground elevation: 2,917.0 ft. (t). (Beverly 7.5 min. quadrangle)

Depth to water: 213.0 ft. (1977).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, moderately sandy and slightly clayey, very dark grayish brown.....	0.0	6.0
Silt, fine to very coarse, slightly sandy, light yellowish brown, snails from 6.0 to 15.0 ft. and from 50.0 to 55.0 ft., slightly to moderately calcareous.....	6.0	65.0
Silt, slightly sandy, light yellowish brown, some limy layers and rootlets.....	65.0	117.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine-grained, very pale brown to white, some lime cementation, occasional coarse sand grains.....	117.0	136.0
Silt, very sandy, pale brown, sand is very fine to coarse, trace of fine gravel, some lime cemented sandstone and siltstone, slightly calcareous.....	136.0	152.0
Sandstone, fine to coarse grained, very pale brown, marly in places, some siltstone and fine to medium sand layers.....	152.0	165.0
Sand, very fine to medium, trace of very coarse sand	165.0	169.0
Sandstone, very fine to medium, fine-grained, pale brown and light reddish brown, some lime cemented, some siltstone layers.....	169.0	186.0
Silt, clayey, white, marly, occasional ash shards and rootlets, ashy from 191.0 to 195.0 ft.....	186.0	212.0
Silt, moderately clayey, very pale brown, moderately calcareous, some very fine to medium sand.....	212.0	241.0
Sand, very fine to very coarse, trace of fine gravel	241.0	246.0
Silt, slightly clayey, very pale brown to light yellowish brown, few thin limestone layers, moderately calcareous.....	246.0	261.0
Sandstone, very fine- to fine-grained, white to very pale brown, few rootlets, moderately calcareous, some siltstone layers.....	261.0	279.0
Silt, moderately clayey, very pale brown to white, slightly to moderately calcareous.....	279.0	291.0
Sand, very fine to coarse, some fine gravel.....	291.0	305.0

Silt, moderately clayey, very pale brown, very calcareous.....	305.0	315.0
Sand and gravel, fine sand to fine gravel, some very coarse gravel.....	315.0	318.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light gray to yellow, clayey, light gray to black below 320.0 ft.....	318.0	340.0

**Test Hole #337-41
4N 32W 29bcbb
Hitchcock County**

Location: NW NW SW NW sec. 29, T. 4 N., R. 32 W., approximately 0.3 mile south of northwest corner, on east edge of road.

Ground elevation: 2,662.0 ft. (t). (Beverly 7.5 min. quadrangle)

Depth to water: Unknown. Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	4.0
Sand, silty, dark brown.....	4.0	8.0
Clay, sandy, grayish buff.....	8.0	13.0
Clay, sandy, gray, some limy concretions.....	13.0	16.0
Gravel, fine to coarse, green, red, some lime.....	16.0	24.0
Gravel, red, green, dirty, some gray clay.....	24.0	26.0
Gravel, fine to coarse, red, some lime pebbles.....	26.0	36.0
Gravel, fine to coarse, some very coarse, red, some lime and sandy lime pebbles, compact zones.....	36.0	60.0
Gravel, fine to coarse, loose, more fine than above, some lime pebbles and some sandy clay or sandstone pebbles.....	60.0	82.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray to black.....	82.0	86.0

Test Hole #336-41
4N 32W 32addc
Hitchcock County

Location: SW SE SE NE sec. 32, T. 4 N., R. 32 W., approximately 375 feet west of southeast corner of quarter, on north edge of road.
 Ground elevation: 2,651.0 ft. (t). (Beverly 7.5 min. quadrangle)
 Depth to water: 14.8 ft. (11-7-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill and black sandy soil.....	0.0	4.0
Clay, sandy, grayish brown.....	4.0	6.0
Clay, sandy, medium gray.....	6.0	9.0
Silt, sandy, buff.....	9.0	15.0
Silt, sandy, medium brown.....	15.0	23.0
Clay or silt, sandy, bluish gray.....	23.0	34.0
Gravel, medium to coarse, red, dirty, grayish blue clay streak at 37.0 ft.....	34.0	39.0
Silt, sandy, dark bluish gray.....	39.0	40.0
Gravel, medium, red.....	40.0	46.0
Gravel, medium to coarse, red, compact.....	46.0	65.0
Clay streaks, sandy, buff tan, some coarse gravel...	65.0	68.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray.....	68.0	69.0

**Test Hole #334-41
4N 32W 34bbcc
Hitchcock County**

Location: SW SW NW NW sec. 34, T. 4 N., R. 32 W., approximately 0.25 mile south of northwest corner of section, on east edge of road.
Ground elevation: 2,642.0 ft. (t). (Beverly 7.5 min. quadrangle)
Depth to water: 12.7 ft. (11-1-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill and tan sandy soil.....	0.0	5.0
Clay, sandy, gray.....	5.0	9.0
Gravel, medium to coarse, some fine, red.....	9.0	20.0
Gravel, medium, red, compact.....	20.0	26.0
Gravel, medium to coarse, red, compact, some re-worked lime.....	26.0	31.0
Gravel, medium to coarse, red, more reworked lime, not so compact.....	31.0	42.0
Gravel, medium, red, some reworked shale.....	42.0	43.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, grayish yellow, weathered.....	43.0	47.0
Shale, medium gray.....	47.0	49.0

Test Hole #142-42
4N 33W 5dada
Hitchcock County

Location: NE SE NE SE sec. 5, T. 4 N., R. 33 W., approximately 100 feet north of bridge, on west edge of road.

Ground elevation: 2,738.0 ft. (i). (Palisade 7.5 min. quadrangle)

Depth to water: 34.8 ft. (10-3-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, dark.....	0.0	5.0
Clay, sandy, yellow.....	5.0	35.0
Sand and clay.....	35.0	40.0
Sand and fine to medium gravel, some lime.....	40.0	90.0
Sand and clay.....	90.0	97.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	97.0	102.0

**Test Hole #341-41
4N 33W 6bdda
Hitchcock County**

Location: NE SE SE NW sec. 6, T. 4 N., R. 33 W., approximately 0.4 mile south of northeast corner of quarter, 20 feet north of northeast corner of cemetery, on west edge of road.
Ground elevation: 2,742.0 ft. (t). (Palisade 7.5 min. quadrangle)
Depth to water: 13.5 ft. (11-8-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy soil.....	0.0	4.0
Clay, sandy, tan.....	4.0	10.0
Clay, sandy, brownish green.....	10.0	12.0
Clay, sandy, grayish yellow.....	12.0	16.0
Sand, fine, red.....	16.0	24.0
Gravel, medium, red, and fine sand.....	24.0	44.0
Gravel, medium to coarse, red, compact, some lime pebbles.....	44.0	66.0
Gravel, medium to coarse, some very coarse, red, some lime.....	66.0	90.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray.....	90.0	91.0

Test Hole #1-RS-97
(4-33-8adbb)
Hitchcock County

Location: NW NW SE NE sec. 8, T. 4 N., R. 33 W., 1450 feet south of north section line and 1250 feet west of east section line.

Source Footage: Map

Latitude: 40 19 55N

Longitude: 101 03 51W

Source Lat/Long: Map

7.5-minute Quad Map Name: Palisade

Ground elevation: 2717 ft (t.)

Source elev: Map

Depth to water: 12.0 ft

Date measured: 9-22-97

Geophysical Log(s): Yes, SP & Res.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly sandy and clayey, pale brown.....	0.0	8.5
Sand, very fine to very coarse.....	8.5	14.0
Silt, slightly clayey and sandy, light gray, some limy nodules.....	14.0	15.0
Sand and gravel, fine sand to medium gravel, with thin clayey silt seams to 20 ft, some reworked Ogallala fragments, coarse to very coarse gravel between 28 and 50 ft.....	15.0	55.0
Sand and gravel, very fine sand to medium gravel, few reworked Pierre shale fragments.....	55.0	63.0
Cretaceous System, Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light gray, some iron staining, gray below 66 ft.....	63.0	70.0

**Test Hole #2-RS-97
(4-33-8adbb)
Hitchcock County**

Location: NW NW SE NE sec. 8, T. 4 N., R. 33 W., 1320 ft south of north section line and 1245 ft west of east section line.

Source Footage: Map

Latitude: 40 19 56N

Longitude: 101 03 52W

Source Lat/Long: Map

7.5-minute Quad Map Name: Palisade

Ground elevation: 2716 ft (t)

Source elev: Map

Depth to water: 11 ft

Date measured: 9-22-97

Geophysical Log(s): Yes, SP & Res

Depth, in feet
From To

Quaternary System, undifferentiated:

Silt, slightly sandy and clayey, pale brown.....	0.0	8.0
Sand, very fine to medium, some coarse to very coarse.....	8.0	14.0
Silt, slightly sandy, gray.....	14.0	15.0
Sand and gravel, very fine sand to coarse gravel....	15.0	50.0
Sand and gravel, fine sand to very coarse gravel, coarse reworked Ogallala, few reworked shale fragments below 60 ft.....	50.0	61.5

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, gray.....	61.5	70.0
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**Test Hole #3-RS-97
(4-33-8adbb)
Hitchcock County**

Location: NW NW SE NE sec. 8, T. 4 N., R. 33 W., 1290 ft south of north section line and 1220 ft west of east section line.

Source Footage: Map

Latitude: 40 19 57N

Longitude: 101 03 50W

Source Lat/Long: Map

7.5-minute Quad Map Name: Palisade

Ground elevation: 2716 ft (t)

Source elev: Map

Depth to water: 11 ft

Date measured: 9-23-97

Geophysical Log(s): Yes, SP & Res

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly sandy and clayey, pale brown.....	0.0	5.0
Sand, very fine to medium, some coarse to very coarse, some limy nodules and few snail shells....	5.0	14.0
Silt, slightly sandy and clayey, dark gray.....	14.0	15.0
Sand and gravel, fine sand to coarse gravels, some reworked Ogallala fragments.....	15.0	30.0
Gravel and sand, fine sand to very coarse gravel, some very coarse reworked Ogallala.....	30.0	50.0
Sand and gravel, fine sand to coarse gravel, few reworked shale fragments.....	50.0	62.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, gray.....	62.0	70.0

**Test Hole #4-RS-97
(4-33-8abdd)
Hitchcock County**

Location: SE SE NW NE sec. 8, T. 4 N., R. 33 W., 1210 ft south north section line and 1305 ft west of east section line.

Source Footage: Map

Latitude: 40 19 58N

Longitude: 101 03 53W

Source Lat/Long: Map

7.5-minute Quad Map Name: Palisade

Ground elevation: 2717 ft (t)

Source elev: Map

Depth to water: 12 ft

Date measured: 9-23-97

Geophysical Logs: Yes, SP & Res

Depth, in feet
From To

Quaternary System, undifferentiated:

Silt, slightly sandy, pale brown.....	0.0	5.0
Sand, very fine, occasional coarse sands.....	5.0	14.0
Silt, slightly sandy, light gray.....	14.0	15.0
Sand and gravel, fine sand to medium gravel, some limy nodules.....	15.0	40.0
Sand and gravel, fine sand to very coarse gravels, some reworked Ogallala fragments.....	40.0	60.5

Cretaceous system - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, some iron staining, gray.....	60.5	70.0
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**Test Hole #340-41
4N 33W 8bdda
Hitchcock County**

Location: NE SE SE NW sec. 8, T. 4 N., R. 33 W., approximately 340 feet north of railroad, 130 feet south of highway, on west edge of road.

Ground elevation: 2,749.0 ft. (a). (Palisade 7.5 min. quadrangle)

Depth to water: 44.5 ft. (11-7-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill, sandy.....	0.0	4.0
Soil, sandy, dark brownish black.....	4.0	8.0
Sand, silty, light brown, compact.....	8.0	24.0
Sand, silty, brown, very compact.....	24.0	30.0
Sand, silty, buff.....	30.0	40.0
Gravel, fine to medium, dirty, much brown sandstone.	40.0	45.0
Gravel, fine to medium, red.....	45.0	50.0
Silt, grayish tan, soft, some concretions.....	50.0	65.0
Gravel, fine to coarse, red, many lime pebbles and brown sandstone.....	65.0	83.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light gray to tan, very sticky.....	83.0	87.0

**Test Hole #339-41
4N 33W 9ddda
Hitchcock County**

Location: NE SE SE SE sec. 9, T. 4 N., R. 33 W., approximately
645 feet north of southeast corner of section, 300
feet north of river bridge on west edge of road.

Ground elevation: 2,695.0 ft. (a). (Palisade 7.5 min. quadrangle)

Depth to water: 7.6 ft. (11-7-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, very sandy, light brown.....	0.0	2.0
Silt, sandy, medium gray.....	2.0	6.0
Gravel, medium to coarse, red, some fine sand and very coarse gravel.....	6.0	20.0
Gravel, medium to coarse, compact, red, some very coarse gravel and lime pebbles.....	20.0	30.0
Gravel, medium to coarse, red, many lime pebbles....	30.0	35.0
Gravel, coarse to very coarse, dark red and black- ened.....	35.0	53.0
Gravel, coarse to very coarse, red, some medium sand	53.0	60.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, grayish yellow.....	60.0	64.0
Shale, dark grayish blue.....	92.0	96.8

Test Hole #338-41
4N 33W 14cdd
Hitchcock County

Location: SE SW SE SW sec. 14, T. 4 N., R. 33 W., approximately 0.32 mile east of southwest corner of section, 180 feet west of small irrigation ditch, on north edge of road.

Ground elevation: 2,692.0 ft. (a). (Palisade 7.5 min. quadrangle)

Depth to water: 18.0 ft. (11-7-41).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill and brownish buff sandy clay.....	0.0	6.0
Clay, sandy, grayish brown.....	6.0	7.0
Sand, clayey, buff.....	7.0	15.0
Gravel, fine to coarse, red, large sandy lime pebbles.....	15.0	21.0
Gravel, fine to coarse, dirty, some clay.....	21.0	24.0
Gravel, fine to coarse, red, clean, large lime and sandy lime pebbles, slightly compact.....	24.0	39.0
Gravel, fine to coarse, some lime and sandy lime pebbles, much brown sandy lime, sandstone, slightly compact.....	39.0	58.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light gray to tan, sticky, compact.....	58.0	63.0

**Test Hole #141-42
4N 33W 15ccda
Hitchcock County**

Location: NE SE SW SW sec. 15, T. 4 N., R. 33 W., approximately 0.3 mile southeast along highway from west section line, 25 feet east of center of highway.

Ground elevation: 2,727.0 ft. (i). (Palisade 7.5 min. quadrangle)

Depth to water: 39.1 ft. (10-3-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	29.0
Sand and fine gravel, some lime.....	29.0	49.0
Sand and fine gravel, some lime and clay.....	49.0	87.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	87.0	94.0

**Test Hole #140-42
4N 33W 25daaa
Hitchcock County**

Location: NE NE NE SE sec. 25, T. 4 N., R. 33 W., approximately 150 feet north of center of highway in center of east line of section.

Ground elevation: 2,673.0 ft. (i). (Beverly 7.5 min. quadrangle)

Depth to water: 23.3 ft. (10-3-42).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, yellow.....	0.0	20.0
Clay and gravel, dark.....	20.0	35.0
Gravel, fine to coarse, some lime.....	35.0	55.0
Sand and fine to medium gravel, some coarse, and lime.....	55.0	85.0
Gravel and dark clay.....	85.0	93.0
Gravel, fine to coarse.....	93.0	94.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark.....	94.0	99.0

**Test Hole #5-A-02
(4-33-33bbda)
Hitchcock County**

Location: 62 ft west of quarter section line and 200 ft north of center line of Boveau canyon, approximately 900 ft south of north section line and 1250 ft east of west section line.

Source Footage: Map

Latitude: 40 16 32N

Longitude: 101 03 18W

Source Lat/Long: Map

7.5-minute Quad Map Name: Palisade

Ground elevation: 2760 ft

Source elev: (t)

Depth to water: NA

Geophysical Log(s): SP & R

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, brown.....	0.0	1.0
Silt, some very fine sand, light yellowish brown, occasional snails, small worm burrows and roots...	1.0	10.0
Silt to very fine sand, very pale brown, few worm burrows to 20 ft, scattered very small calcareous nodules, some magnetite.....	10.0	23.0
Silt to very fine sand, pale brown, very small calcareous nodules, some magnetite.....	23.0	30.0
Silt to very fine sand, very pale brown, very small calcareous nodules, some magnetite, scattered broken snail shells.....	30.0	34.0
Silt to very fine sand, slightly clayey, calcareous nodules, some small iron nodules and iron staining, occasional small worm burrows; very pale brown.....	34.0	37.0
Silt, very slightly clayey, light gray, scattered brown woody rootlets, scattered broken snail shells, occasional very small calcareous nodules, some magnetite.....	37.0	47.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, clayey, some very fine sand lenses, light gray, some iron staining, occasional silica nodule, occasional rootlet.....	47.0	49.0
Silt to very fine sand, some medium sand grains, rootlets, some interbedded very fine to fine sandstones below 56 ft, some iron staining.....	49.0	61.0
Sand and gravel, fine sand to coarse gravel.....	61.0	67.0

Silt, sandy, interbedded with very fine to fine sandstone, some rootlets, calcareous, some silty clay lenses below 72 ft, occasional ash shards, grayish white.....	67.0	77.0
Silt, very fine to fine sand, slightly clayey, some coarse sand to fine gravel below 80 ft.....	77.0	82.0
Sand, fine to medium, some coarse sand and fine gravel, coarser below 87 ft.....	82.0	95.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, weathered, pale yellow, some iron stains.....	95.0	99.0
Shale, weathered, light yellowish gray to 100.5 ft, then light gray, iron stains.....	99.0	102.0

**Test Hole #15-FC-52
4N 34W 2aaaa
Hitchcock County**

Location: NE NE NE NE sec. 2, T. 4 N., R. 34 W.

(U.S. Bureau of Reclamation test hole)

Ground elevation: 2,773.6 ft. (i). (Palisade 7.5 min. quadrangle)

Depth to water: 22.0 ft. (1952).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, soft, light brown to gray.....	0.0	22.0
Sand, very fine, to gravel, fine, silty, fossili- ferous; contains nodules of caliche.....	22.0	52.0
Sand, very fine to very coarse, silty; contains nodules of caliche and some thinly cemented zones.	52.0	72.0
Sand, very fine to very coarse, loose; contains nodules of caliche.....	72.0	85.0
Sand, very fine to very coarse; contains very fine to medium gravel.....	85.0	91.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, light gray to dark blue with slight yellow stain, soft.....	91.0	92.0
Clay, gray to dark blue, soft, plastic; contains yellow streaks.....	92.0	96.8

Test Hole #18-FC-52
4N 34W 6bbbb
Hitchcock County

Location: NW NW NW NW sec. 6, T. 4 N., R. 34 W.

(U.S. Bureau of Reclamation test hole)

Ground elevation: 3,060.1 ft. (i). (Palisade SW 7.5 min. quadrangle)

Depth to water: 227.0 ft. (1952).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, clayey, soft, tan.....	0.0	79.0
Silt, soft, tan; contains very fine to coarse sand and caliche.....	79.0	83.0
Silt, soft, and caliche, sandy, white.....	83.0	99.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, fine, to gravel, medium, loose; contains silt and caliche.....	99.0	101.0
Caliche.....	101.0	102.0
Silt, soft, brown; contains very fine sand to fine gravel and caliche.....	102.0	111.5
Sand, very fine, to gravel, medium, silty, loose....	111.5	117.0
Silt, clayey, soft, light brown; contains sand and caliche.....	117.0	142.0
Caliche, white to gray, and silt; contains very fine sand to very fine gravel.....	142.0	152.0
Caliche, soft, white, interbedded with light green silt and light green very fine to medium-grained sandstone.....	152.0	162.0
Caliche, soft, white, and silt, medium brown; con- tains some cemented zones.....	162.0	172.0
Caliche, hard, white, interbedded with light brown to light green soft silt; contains very fine to fine gravel.....	172.0	224.0
Sand, very fine, to gravel, medium, loose.....	224.0	230.5
Caliche, hard, and silt, sandy, light green.....	230.5	232.8
Silt, cemented in zones, soft, light green; contains very fine to very coarse sand.....	232.8	242.0
Silt, clayey, sandy, light green; contains some white caliche.....	242.0	255.0
Sand.....	255.0	256.0
Silt, clayey, sandy, light green; contains some white caliche.....	256.0	257.5
Sand.....	257.5	259.5
Silt, clayey, sandy, light green; contains some white caliche.....	259.5	266.0
Silt, clayey, hard, yellow to tan.....	266.0	276.0
Sand, very fine to coarse, silty, tan.....	276.0	282.0

Silt, clayey, sandy, hard, yellow to tan; contains some streaks of siltstone.....	282.0	302.0
Silt, clayey, plastic, and tan and gray caliche, sandy.....	302.0	327.0
Sand, very fine, to gravel, fine, silty, interbedded with layers of silt.....	327.0	340.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, yellow to light gray, plastic, hard.....	340.0	344.5
Clay, dark gray, plastic, hard.....	344.5	347.0

**Test Hole #16-FC-52
4N 34W 26ddddd
Hitchcock County**

Location: SE SE SE SE sec. 26, T. 4 N., R. 34 W.

(U.S. Bureau of Reclamation test hole)

Ground elevation: 2,984.4 ft. (i). (Palisade 7.5 min. quadrangle)

Depth to water: 216.0 ft. (1952).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, clayey, dark brown to tan.....	0.0	22.0
Silt, tan.....	22.0	42.0
Silt, clayey, soft, tan.....	42.0	67.0
Silt, clayey, soft, tan; contains very fine sand....	67.0	71.0
Silt, soft, tan; contains some sand, gravel, and pebbles.....	71.0	97.5
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, soft to hard, white.....	97.5	102.0
Caliche, sandy, silty, soft, buff.....	102.0	118.5
Caliche, hard, white.....	118.5	122.0
Caliche and siltstone, gray.....	122.0	126.0
Silt; contains very fine to coarse sand and some caliche.....	126.0	135.0
Silt, cemented; contains very fine to coarse sand...	135.0	141.0
Silt; contains very fine to coarse sand and some caliche.....	141.0	142.0
Sandstone, very fine- to medium-grained, and caliche, white to gray.....	142.0	160.0
Silt, clayey, gray, and caliche.....	160.0	167.0
Silt, hard, tan, and caliche.....	167.0	174.0
Sand, very fine to fine, silty, loose.....	174.0	176.0
Silt, clayey, soft, tan, and caliche.....	176.0	189.0
Sand, very fine to coarse, silty, frosted, well-rounded grains, loose.....	189.0	199.5
Silt, sandy, soft, gray.....	199.5	208.0
Sand, very fine to coarse, silty; contains some slightly cemented zones.....	208.0	214.5
Caliche.....	214.5	215.0
Sand, very fine to coarse, silty; contains some slightly cemented zones.....	215.0	234.3
Silt; contains very fine to very coarse sand.....	234.3	238.0
Silt, clayey, hard, tan, and siltstone.....	238.0	242.0
Silt, clayey, hard, tan, and siltstone, sandy.....	242.0	267.5
Sand, very fine to very coarse, interbedded with silt and caliche.....	267.5	272.0
Silt, sandy, soft, gray.....	272.0	278.8

Sand, very fine, to gravel, medium, and silt, gray to green.....	278.8	298.7
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, light green, light blue, and yellow, plastic..	298.7	303.0
Clay, dark blue, plastic.....	303.0	308.0

Test Hole #34-F-77
4N 34W 34dddd
Hitchcock County

Location: SE SE SE SE sec. 34, T. 4 N., R. 34 W., approximately
 17 feet north and 45 feet west of southeast corner.

Ground elevation: 2,975.0 ft. (t). (Palisade SW 7.5 min. quadrangle)

Depth to water: 190.0 ft. approximately. Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, slightly sandy, dark brown, slightly calcareous, sand is very fine to fine, below 2.0 ft. slightly lighter in color.....	0.0	5.0
Silt, slightly clayey, slightly sandy, yellowish brown, slightly calcareous, moderately calcareous below 20.0 ft.....	5.0	60.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, slightly clayey, pale brown, moderately calcareous, sand is very fine to medium...	60.0	67.0
Sand, slightly gravelly, very fine sand to very fine gravel, some limy fragments.....	67.0	73.0
Silt, very sandy, slightly clayey, reddish brown, very calcareous, sand is very fine.....	73.0	80.0
Sand, very fine to coarse with little very coarse, moderately silty, in places marly.....	80.0	100.0
Sand, gravelly, very fine sand to fine gravel with medium gravel, some limestone fragments, marly below 108.0 ft.....	100.0	110.0
Siltstone, clayey, reddish brown.....	110.0	112.0
Silt, moderately sandy, slightly clayey, white, sand is very fine to medium, marly areas.....	112.0	133.0
Sand, very fine to fine, very silty.....	133.0	135.0
Silt, slightly clayey, olive gray, some volcanic ash from 135.0 to 140.0 ft.....	135.0	145.0
Siltstone, clayey, reddish brown, slightly calcareous.....	145.0	160.0
Silt, very sandy, slightly clayey, pale brown, slightly calcareous, some siltstone below 178.0 ft. yellow, slightly calcareous.....	160.0	181.0
Sandstone, very fine- to coarse grained, less coarse sand below 200.0 ft.....	181.0	209.0
Siltstone, clayey, reddish brown.....	209.0	226.0
Sandstone, very fine- to medium-grained, some coarse, very silty.....	226.0	237.0
Silt, very sandy, slightly clayey, brown, slightly calcareous, sand is very fine to medium.....	237.0	247.0

Sand, slightly gravelly, very fine sand to fine gravel, slightly silty.....	247.0	258.0
Silt, moderately clayey, pale brown.....	258.0	260.0
Sand, gravelly, very fine sand to medium gravel.....	260.0	273.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, yellowish gray, clayey.....	273.0	295.0