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Custer County Test Hole Logs

Larry D. Cast

University of Nebraska-Lincoln

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CUSTER COUNTY Test-Hole Logs

Larry D. Cast

**Nebraska Water Survey
Test-Hole Report No. 21**

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



May 2000



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UNIVERSITY OF NEBRASKA-LINCOLN CREDITS

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

It is the policy of the the Conservation and Survey Division, as it is of the University of Nebraska-Lincoln, not to discriminate on the basis of and to provide information and educational programs to all regardless of sex, age, handicap, race, color, religion, marital status, veteran's status, national or ethnic origin or sexual orientation.

Publication and price lists are furnished upon request.

May 2000

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Vern Souders' work provided the basis for the subsurface geologic interpretation of Custer County.

INTRODUCTION

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

The map in this report (figure 1) shows the location of all test holes drilled in the county since 1948.

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

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

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 Custer County, descriptions of strata done in earlier test hole reports are included with some revised formation information in this report. Unconsolidated Pliocene Series - Tertiary System - deposits occur within the

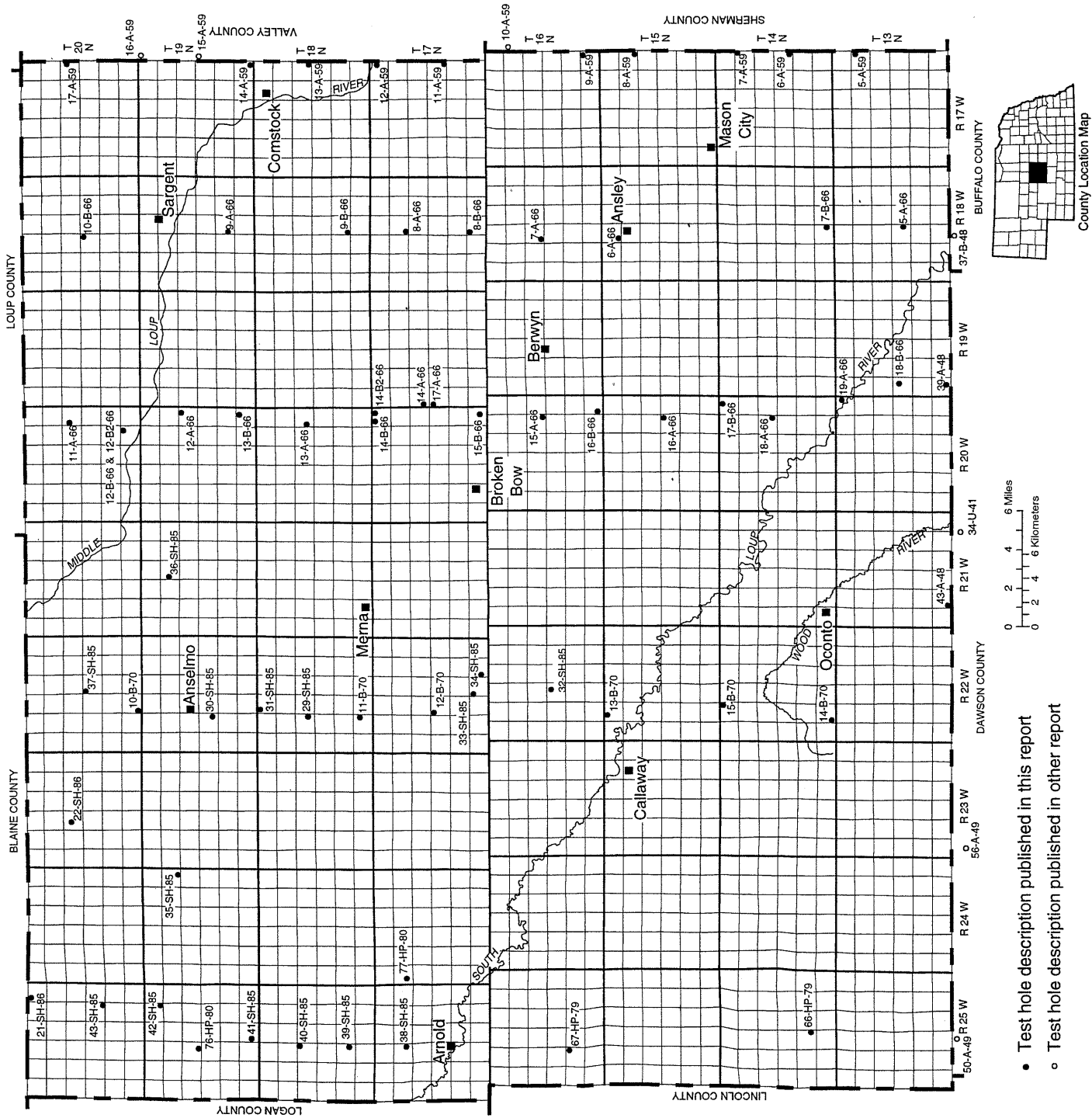


Fig. 1. Test-hole location map of Custer County.

Figure 2. Custer County sample geophysical log (6-A-59)

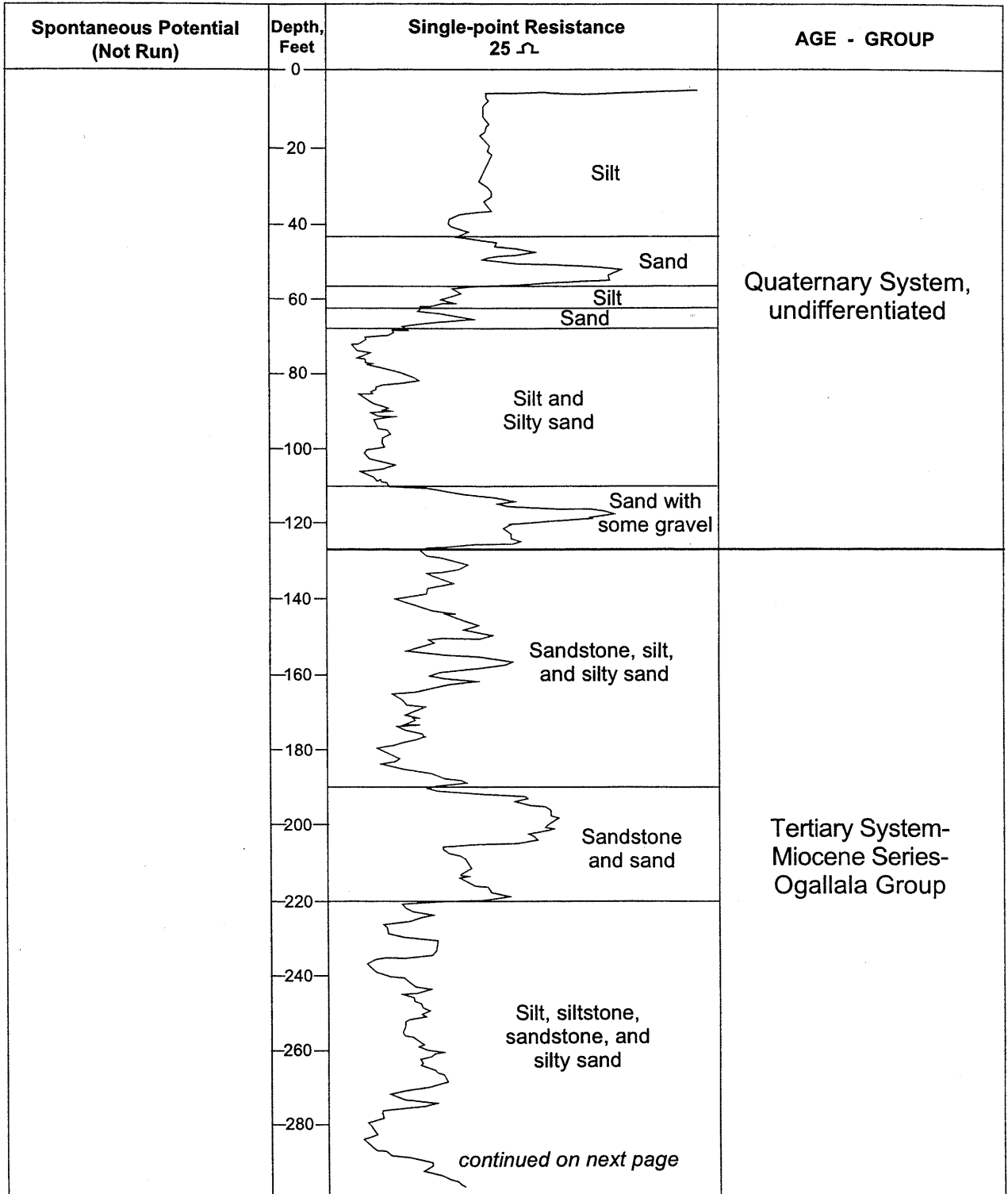
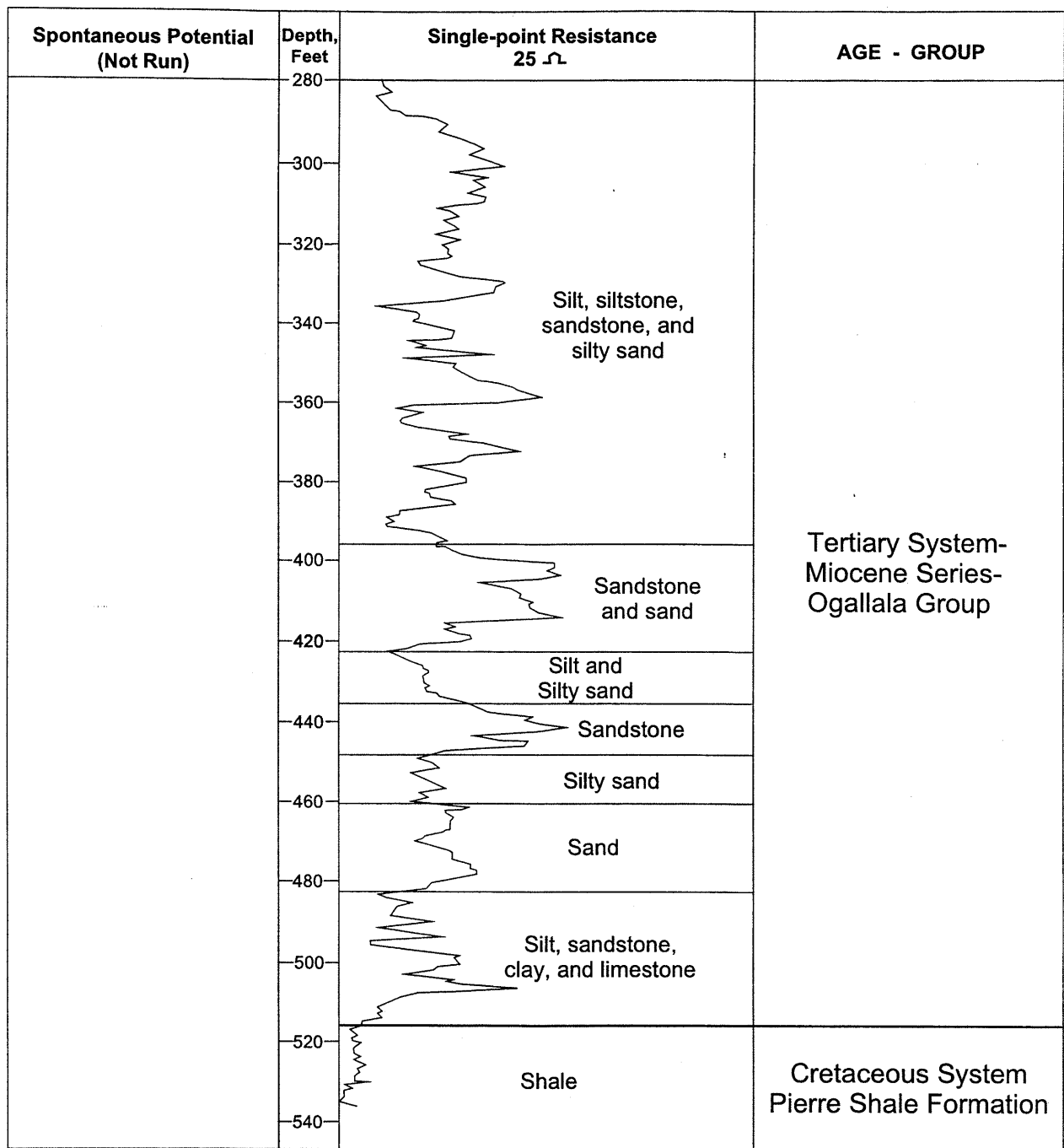


Figure 2 continued. Custer County sample geophysical log (6-A-59)



subsurface in Custer County. This material consists of silt, clays, sand, and sand and gravel which are similar to the overlying Quaternary System deposits. These Pliocene units are included within the Quaternary System, undifferentiated classification.

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

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

Each test hole is identified by a number assigned in the field (for example #13-A-59), and most are also identified by a number indicating its location within the land divisions of the U.S. Bureau of Land Management's survey of Nebraska (see USGS test hole identification in figure 3). Location numbers of test holes east of the 6th principal meridian, which passes through Columbus in a north-south direction, are preceded by the capital letter A; those west of the principal meridian have no preceding letter. The first numeral indicates the township, the second the range, and the third the section. As shown in figure 3, the letters that follow the section number indicate the location of the test hole within the section, the first letter indicating the quarter section and the second letter indicating the quarter-quarter section and so on to the quarter-quarter-quarter-quarter section. The letters A, B, C, and D are applied in counterclockwise direction beginning with A in the northeast quadrant. As shown in figure 3, the letters that follow the section number indicated the location of the test hole within the section, the first letters (NE) indicating the quarter section, the second letter (NW) indicating the quarter-quarter section, the third letter (SW) indicating the quarter-quarter-quarter section, and the fourth letter (SE) indicating the quarter-quarter-quarter-quarter section. The last numeral is the serial number of the test hole within the quarter-quarter-quarter-quarter section if more than one well is present in that area.

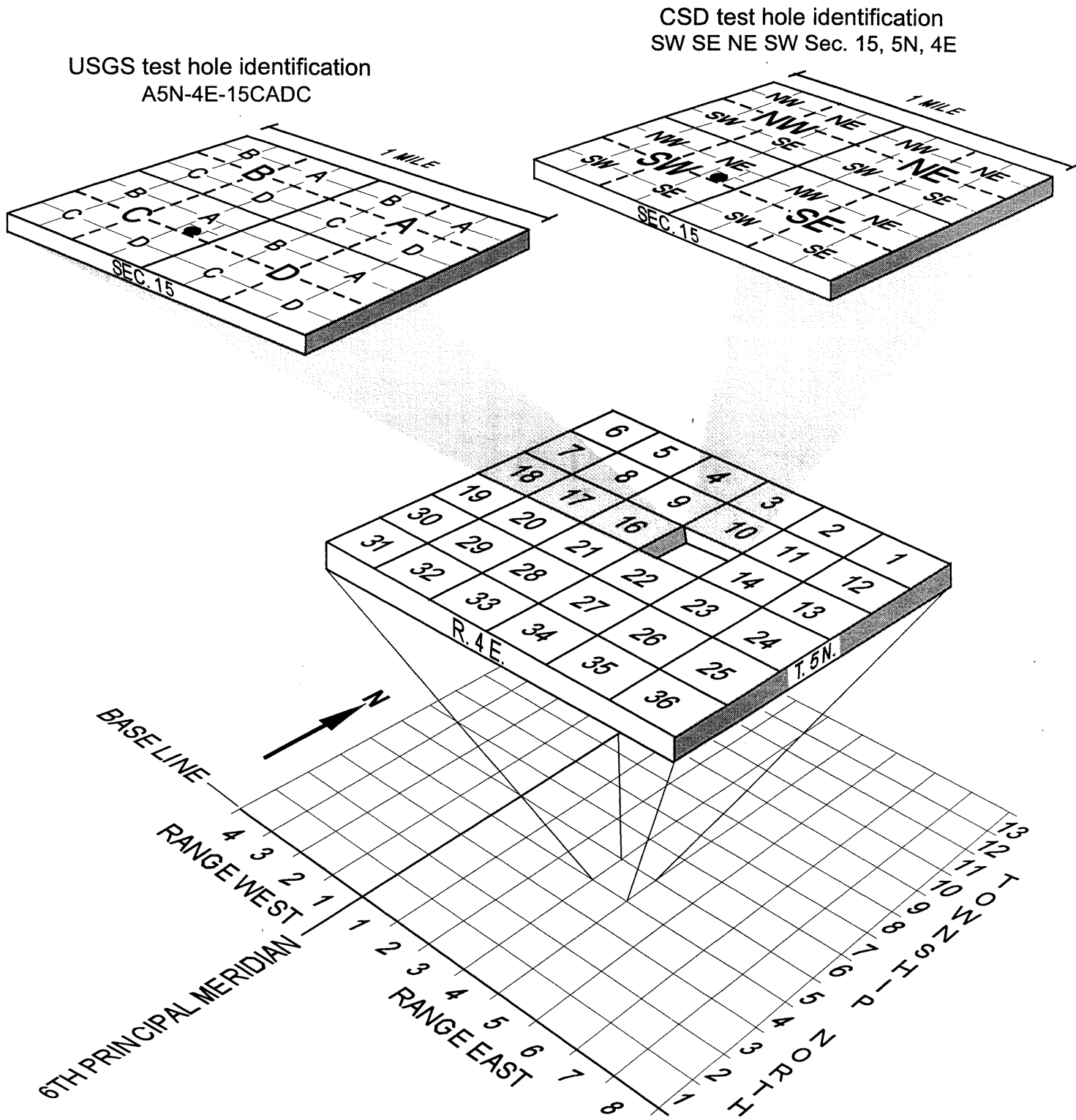


Fig. 3. System for identifying test-hole according to its location.

SELECTED REFERENCES

A few of the most recently published groundwater resources of Custer County are included below. The interested reader may find citations to earlier published studies noted in these references:

- May, D., Swinehart, J.B., Loope, D., and Souders, V., 1995, Late Quaternary fluvial and eolian sediments: Loup River Basin and the Nebraska Sand Hills in Diffendal, R.F., Jr., chair, and Flowerday, C.A., ed., Geologic field trips in Nebraska and adjacent parts of Kansas and South Dakota, parts of the 29th Annual meetings of the north-central and south-central sections, Geological Society of America: University of Nebraska Conservation and Survey Division Guidebook 10, p. 13-31.
- Sniegocki, R.T., 1959, Geologic and ground-water reconnaissance of the Loup River drainage basin, Nebraska: U.S. Geological Survey Water Supply Paper 1493, 106 p.
- Souders, V.L., Preliminary Bedrock maps and cross sections showing configurations of bedrock surfaces, Broken Bow 1° x 2° quadrangle, Nebraska, U.S. Geological Survey Investigations Series (In press).
- Swinehart, J.B., and Diffendal, R.F., Jr., 1989, Geology of the pre-dune strata, in Bleed, A.S., and Flowerday, C.A., eds., An atlas of the Sand Hills: University of Nebraska Conservation and Survey Division Resource Atlas 5, p. 29-42.

Custer County
Test-Hole Table of Contents

Legal Descrip Twp Rge Sec	Test-Hole Number	Page
13N 17W 12AADD	05-A-59	1
13N 18W 21DAAD	05-A-66	8
13N 19W 19ACBD	18-B-66	11
13N 19W 31DCCA	39-A-48	14
13N 20W 01ADBB	19-A-66	17
13N 21W 32CCCC	43-A-48	20
14N 17W 12AAAA	07-A-59	23
14N 17W 24DDAD	06-A-59	28
14N 18W 33DAAA	07-B-66	33
14N 20W 01ABBB	17-B-66	36
14N 20W 14DADD	18-A-66	40
14N 22W 05AAAB	15-B-70	44
14N 22W 32CCBC	14-B-70	49
14N 25W 28DADD	66-HP-79	53
15N 17W 12DDAD	08-A-59	56
15N 18W 04CCDC	06-A-66	61
15N 20W 23AABA	16-A-66	63
15N 22W 05BABA	13-B-70	66
16N 17W 36AABA	09-A-59	70
16N 18W 16CCAA	07-A-66	75
16N 20W 14DDDD	15-A-66	77
16N 20W 36CBBC	16-B-66	80
16N 22W 21ABCC	32-SH-85	84
16N 25W 29AAAB	67-HP-79	87
17N 17W 01ADDD	12-A-59	89
17N 17W 24DDDD	11-A-59	92
17N 18W 10CCCC	08-A-66	95
17N 18W 34BBBB	08-B-66	98
17N 19W 18CBBC	14-A-66	101
17N 19W 19BBCC	17-A-66	103
17N 20W 01ABAA	14-B2-66	106
17N 20W 01BABB	14-B-66	109
17N 20W 36DBBA	15-B-66	110
17N 22W 21BBBB	12-B-70	113
17N 22W 34BBCB	33-SH-85	116
17N 22W 35CBBB	34-SH-85	117
17N 24W 07CACD	77-HP-80	119
17N 25W 09DAAA	38-SH-85	121
18N 17W 13DDDD	13-A-59	124
18N 18W 27CCCC	09-B-66	127
18N 20W 13CBBB	13-A-66	130

18N 22W 04BBAA 31-SH-85	. . . . .	133
18N 22W 17DAAB 29-SH-85	. . . . .	136
18N 22W 32ADAD 11-B-70	. . . . .	139
18N 25W 16AAAA 40-SH-85	. . . . .	143
18N 25W 28DADA 39-SH-85	. . . . .	146
19N 17W 36DDDA 14-A-59	. . . . .	149
19N 18W 27CBCC 09-A-66	. . . . .	152
19N 20W 13ABAB 12-A-66	. . . . .	154
19N 20W 36ABCB 13-B-66	. . . . .	157
19N 21W 10BCCD 36-SH-85	. . . . .	160
19N 22W 20DACC 30-SH-85	. . . . .	163
19N 24W 12DCCD 35-SH-85	. . . . .	165
19N 25W 02DDDD 42-SH-85	. . . . .	168
19N 25W 16DCCD 76-HP-80	. . . . .	171
19N 25W 34CBCB 41-SH-85	. . . . .	173
20N 17W 13ADBD 17-A-59	. . . . .	176
20N 18W 21AADD 10-B-66	. . . . .	179
20N 20W 13BCBC 11-A-66	. . . . .	181
20N 20W 35AABA 12-B-66	. . . . .	183
20N 20W 35AABA 12-B2-66	. . . . .	184
20N 22W 22BBBB 37-SH-85	. . . . .	187
20N 22W 33CCCC 10-B-70	. . . . .	189
20N 23W 16BDDD 22-SH-86	. . . . .	193
20N 25W 01BBAB 21-SH-86	. . . . .	196
20N 25W 23DDDA 43-SH-85	. . . . .	199

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

Custer County
Test-Hole Table of Contents

Arranged by year drilled, test-hole number.

1948

13N 19W	31DCCA	39-A-48	. . . . .	14
13N 21W	32CCCC	43-A-48	. . . . .	20

1959

13N 17W	12AADD	05-A-59	. . . . .	1
14N 17W	24DDAD	06-A-59	. . . . .	28
14N 17W	12AAAA	07-A-59	. . . . .	23
15N 17W	12DDAD	08-A-59	. . . . .	56
16N 17W	36AABA	09-A-59	. . . . .	70
17N 17W	24DDDD	11-A-59	. . . . .	92
17N 17W	01ADDD	12-A-59	. . . . .	89
18N 17W	13DDDD	13-A-59	. . . . .	124
19N 17W	36DDDA	14-A-59	. . . . .	149
20N 17W	13ADBD	17-A-59	. . . . .	176

1966

13N 18W	21DAAD	05-A-66	. . . . .	8
15N 18W	04CCDC	06-A-66	. . . . .	61
16N 18W	16CCAA	07-A-66	. . . . .	75
14N 18W	33DAAA	07-B-66	. . . . .	33
17N 18W	10CCCC	08-A-66	. . . . .	95
17N 18W	34BBBB	08-B-66	. . . . .	98
19N 18W	27CBCC	09-A-66	. . . . .	152
18N 18W	27CCCC	09-B-66	. . . . .	127
20N 18W	21AADD	10-B-66	. . . . .	179
20N 20W	13BCBC	11-A-66	. . . . .	181
19N 20W	13ABAB	12-A-66	. . . . .	154
20N 20W	35AABA	12-B-66	. . . . .	183
20N 20W	35AABA	12-B2-66	. . . . .	184
18N 20W	13CBBB	13-A-66	. . . . .	130
19N 20W	36ABCB	13-B-66	. . . . .	157
17N 19W	18CBBC	14-A-66	. . . . .	101
17N 20W	01BABB	14-B-66	. . . . .	109
17N 20W	01ABAA	14-B2-66	. . . . .	106
16N 20W	14DDDD	15-A-66	. . . . .	77

17N	20W	36DBBA	15-B-66	. . . . .	110
15N	20W	23AABA	16-A-66	. . . . .	63
16N	20W	36CBBC	16-B-66	. . . . .	80
17N	19W	19BBCC	17-A-66	. . . . .	103
14N	20W	01ABBB	17-B-66	. . . . .	36
14N	20W	14DADD	18-A-66	. . . . .	40
13N	19W	19ACBD	18-B-66	. . . . .	11
13N	20W	01ADBB	19-A-66	. . . . .	17

1970

20N	22W	33CCCC	10-B-70	. . . . .	189
18N	22W	32ADAD	11-B-70	. . . . .	139
17N	22W	21BBBB	12-B-70	. . . . .	113
15N	22W	05BABA	13-B-70	. . . . .	66
14N	22W	32CCBC	14-B-70	. . . . .	49
14N	22W	05AAAB	15-B-70	. . . . .	44

1979

14N	25W	28DADD	66-HP-79	. . . . .	53
16N	25W	29AAAB	67-HP-79	. . . . .	87

1980

19N	25W	16DCCD	76-HP-80	. . . . .	171
17N	24W	07CACD	77-HP-80	. . . . .	119

1985

18N	22W	17DAAB	29-SH-85	. . . . .	136
19N	22W	20DACC	30-SH-85	. . . . .	163
18N	22W	04BBAA	31-SH-85	. . . . .	133
16N	22W	21ABCC	32-SH-85	. . . . .	84
17N	22W	34BBCB	33-SH-85	. . . . .	116
17N	22W	35CBBB	34-SH-85	. . . . .	117
19N	24W	12DCCD	35-SH-85	. . . . .	165
19N	21W	10BCCD	36-SH-85	. . . . .	160
20N	22W	22BBBB	37-SH-85	. . . . .	187
17N	25W	09DAAA	38-SH-85	. . . . .	121
18N	25W	28DADA	39-SH-85	. . . . .	146
18N	25W	16AAAA	40-SH-85	. . . . .	143
19N	25W	34CBCB	41-SH-85	. . . . .	173
19N	25W	02DDDD	42-SH-85	. . . . .	168
20N	25W	23DDDA	43-SH-85	. . . . .	199

1986

20N	25W	01BBAB	21-SH-86	. . . . .	196
20N	23W	16BDDD	22-SH-86	. . . . .	193

Test Hole #5-A-59 (E-logs)
(13-17-12aadd)
Custer County

Location: SE SE NE NE sec. 12, T. 13 N., R. 17 W., approximately
 1,123 feet south and 10 feet west of northeast section corner.
 Ground elevation: 2,306 ft. (t), (Litchfield SW 7.5 min.
 quadrangle)
 Depth to water: 141.3 ft., (June 15, 1959)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Not sampled.....	0.0	1.3
Sand, fine- to medium-grained, light grayish tan, light gray to greenish tan, contains marl layers..	1.3	2.0
Silt, slightly clayey, slightly calcareous, light yellowish gray to 10 ft. and light brownish gray below; contains a few snail shells.....	2.0	27.0
Silt, moderately clayey, slightly sandy, light brownish gray; sand is very fine; silt is medium brownish gray below 28.5 ft; contains very fine to medium sand.....	27.0	30.0
Silt, moderately clayey, medium brownish gray.....	30.0	31.0
Silt, moderately clayey, dark brownish gray.....	31.0	32.5
Silt, moderately clayey, medium brown to 33 ft; light brown below; contains a little very fine to medium sand; slightly more sandy below 34.5 ft....	32.5	35.5
Sand, very silty, slightly clayey; sand is mostly very fine to fine, some medium.....	35.5	37.5
Silt, slightly clayey, very sandy, light brown; sand is mostly very fine to fine, some medium.....	37.5	39.0
Silt, very clayey, in part sandy, light yellowish gray; sand is very fine to medium; contains a thin silt layer, dark brownish gray at 39 ft; moder- ately clayey and moderately sandy below 40 ft.....	39.0	43.5
Silt, slightly clayey, very sandy to 45 ft. and slightly sandy below, light gray; sand is very fine to fine.....	43.5	49.0
Silt, slightly clayey, very sandy, light brown; sand is mostly very fine to fine, some medium; slightly less sandy below 50 ft.....	49.0	53.5
Silt, slightly clayey, very sandy, light gray; sand is mostly very fine to fine, some medium; from 56.5 to 58 ft. slightly more clayey and moderately sandy; silt has brownish tint below 58 ft.....	53.5	62.0
Sand, slightly clayey, very silty; sand is mostly very fine to fine, some medium; contains some very sandy silt, some mottled light brown below 66 ft..	62.0	69.5

Silt, moderately clayey, slightly sandy, light brown; sand is mostly very fine to fine, some medium; slightly less clayey and moderately sandy below 70 ft; contains a sand lens from 77 to 77.5 ft; contains some coarse sand and limy nodules below 80 ft.....	69.5	83.0
Sand, slightly silty; sand is mostly very fine to medium, some coarse; contains a few gravel grains.	83.0	85.0
Silt, very clayey, light pinkish gray; contains a trace of fine to medium sand; slightly sandy from 86 to 87 ft; moderately sandy below 87 ft; sand is mostly very fine to medium, some coarse.....	85.0	88.5
Sand, fine to very coarse (about 20 percent very coarse sand and fine gravel).....	88.5	90.0
Sand and gravel, medium sand to fine gravel, some medium gravel (about 50 percent gravel).....	90.0	97.0
Sand, slightly clayey, very silty; sand is mostly very fine to medium, some coarse.....	97.0	100.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, moderately sandy, light brown; sand is very fine to fine; contains a trace of limy nodules; silt is slightly clayey below 101.5 ft; contains very fine to medium sand and limestone, light gray with brownish tint.....	100.0	104.0
Silt, very clayey, moderately sandy, light gray; sand is very fine to medium; silt is slightly clayey and slightly more sandy from 106 to 109 ft. and contains a trace of coarse sand; slightly sandy from 109 to 110 ft; in part moderately sandy from 115 to 116.5 ft; moderately clayey and contains very fine to fine sand, some medium and some coarse below 116.5 ft.....	104.0	118.1
Sand, very fine to medium, some coarse; contains a thin limy layer at 119.1 ft.....	118.1	120.0
Limestone, sandy, light gray; sand is very fine to medium.....	120.0	121.0
Silt, moderately clayey, moderately sandy, light gray; sand is very fine to fine, some medium; very sandy and light brown below 125 ft; sand is very fine to medium, some coarse.....	121.0	126.0
Silt, moderately clayey, moderately sandy, light olive gray; sand is very fine to fine, some medium	126.0	128.0
Sand, very silty; sand is very fine to fine, some medium.....	128.0	130.0
Sandstone, slightly consolidated, slightly silty; sand is very fine to fine, some medium; contains some thin limy layers from 130 to 132 ft.....	130.0	137.5

Silt, very clayey, slightly sandy, light olive gray; sand is very fine to medium; contains a trace of limy nodules; slightly clayey and moderately sandy from 138 to 140 ft; in part slightly limy; less medium sand below 138 ft; slightly clayey, very sandy below 142.5 ft; contains a trace of limy areas.....	137.5	143.5
Sandstone, silty, slightly consolidated; sand is very fine to fine, some medium; lime cemented from 143.5 to 144.5 ft.....	143.5	150.0
Limestone, sandy; sand is very fine to fine, some medium.....	150.0	150.5
Sand, moderately silty; sand is very fine to fine, some medium; contains a few consolidated limy zones.....	150.5	155.0
Sand, slightly consolidated; sand is very fine to medium; contains some limy zones; moderately sandy, white, marly from 160 to 160.5 ft. and contains a siltstone layer; contains some coarse sand from 160.5 to 165 ft; contains slightly more coarse sand below 165 ft.....	155.0	169.0
Siltstone, moderately sandy, moderately calcareous, white; sand is mostly very fine, some fine; very calcareous from 169 to 169.5 ft.....	169.0	170.0
Sandstone, moderately consolidated; sand is very fine to fine; contains a limestone seam at 172.2 ft. and a silt lens at 174.6 ft; slightly less cemented below 174.6 ft; contains a few thin silt lenses.....	170.0	180.0
Sand, slightly silty; sand is very fine to medium, some coarse.....	180.0	182.8
Silt, very clayey, light to medium yellowish gray...	182.8	184.7
Sandstone, slightly consolidated; sand is very fine to fine; contains interbedded silt lenses below 187.5 ft.....	184.7	190.5
Silt, very sandy, light yellowish gray; sand is very fine to fine, some medium.....	190.5	197.5
Sandstone, slightly consolidated; sand is very fine to fine; contains some rootlets; contains a silt layer from 197.5 to 198.6 ft; very sandy, light to medium yellowish gray.....	197.5	200.0
Silt, slightly clayey, moderately sandy, light to medium yellowish gray; sand is very fine to fine; very sandy below 201.5 ft.....	200.0	203.5
Sandstone, silty, moderately consolidated; sand is very fine to fine; slightly silty from 205 to 215 ft; slightly consolidated and moderately silty below 215 ft.....	203.5	218.0
Silt, slightly clayey, very sandy; sand is very fine to fine.....	218.0	220.0
Siltstone, blocky structure, light yellowish gray...	220.0	223.5

Sandstone, moderately silty, moderately consolidated; sand is very fine to fine; contains some limy areas; slightly consolidated below 230 ft....	223.5	233.0
Silt, slightly clayey, slightly sandy, light to medium yellowish gray.....	233.0	235.0
Silt, slightly clayey, medium brown; blocky structure; contains limy areas from 236.1 to 236.4 ft. and below 238 ft; contains a limestone lens at 238 ft; light yellowish gray below 238 ft.....	235.0	240.0
Sand, slightly silty, slightly consolidated; sand is very fine to fine; contains some rootlets.....	240.0	243.3
Silt, slightly clayey, moderately calcareous, blocky structure, light yellowish gray; contains limy layers.....	243.3	245.5
Sand, moderately silty, slightly consolidated; sand is very fine to fine; contains a silt lens at 246.3 ft. and at 247.5 ft.....	245.5	254.8
Silt, slightly clayey, very sandy, light yellowish gray; sand is very fine to fine; contains limy areas.....	254.8	255.0
Sandstone, silty, moderately consolidated, marly; sand is very fine to fine.....	255.0	258.0
Silt, slightly clayey, very sandy, light yellowish gray; sand is very fine to fine; contains limy areas.....	258.0	260.0
Sand, moderately silty, slightly consolidated; sand is very fine to fine.....	260.0	261.5
Sandstone, moderately consolidated; sand is very fine to fine; contains some rootlets; slightly silty and slightly consolidated below 267.6 ft....	261.5	275.0
Silt, moderately clayey, very sandy, light yellowish gray; sand is mostly very fine to fine, some medium; contains a sandy silt lens at 281.5 ft....	275.0	284.7
Sand, slightly silty; sand is very fine to fine; contains some rootlets; sand is mostly very fine to medium with some coarse from 285 to 287.5 ft...	284.7	291.5
Silt, slightly clayey, very sandy, light yellowish gray; sand is very fine to fine; contains some medium sand below 295 ft.....	291.5	295.5
Sand, moderately silty, slightly consolidated; sand is very fine to medium; contains some rootlets; moderately consolidated below 300 ft. and sand is very fine to fine; contains a silt lens from 303.3 to 303.6 ft.....	295.5	303.6
Silt, slightly clayey, very sandy, light yellowish gray; sand is very fine to fine; contains some limy areas.....	303.6	305.0
Siltstone to sandstone, interbedded, moderately consolidated; contains limy areas; slightly consolidated from 305.9 to 306.8 ft.....	305.0	308.0
Silt, slightly clayey, very sandy, light olive gray; sand is very fine; contains some limy areas.....	308.0	310.0

Sand, very fine to coarse (about 10 percent fine gravel); contains a silt lens at 313.3 ft.....	310.0	314.7
Silt, slightly clayey, very sandy, slightly calcareous, light yellowish gray; sand is very fine to fine; contains some limy areas.....	314.7	318.0
Sandstone, slightly silty; sand is very fine to fine; contains some rootlets.....	318.0	320.0
Sand, very fine to medium, some coarse.....	320.0	325.0
Silt, slightly clayey, very sandy, slightly calcareous, light olive gray; sand is very fine to fine.	325.0	327.5
Sandstone, slightly silty, moderately consolidated; sand is very fine to fine; sand is mostly very fine to medium with some coarse below 332.8 ft....	327.5	334.8
Silt, slightly clayey, very sandy, light olive gray; sand is mostly very fine to fine, some medium; marly from 335 to 338 ft; slightly calcareous below 338 ft.....	334.8	340.0
Silt, slightly clayey, moderately sandy, slightly calcareous, light olive gray; sand is very fine to fine; slightly less sandy from 343.4 to 345 ft; moderately calcareous from 345 to 352.5 ft; contains marly areas at 346.5 and 349.6 ft; mostly diatomaceous earth from 352.5 to 353 ft.....	340.0	355.0
Sand, moderately consolidated; sand is very fine to medium; contains limestone lenses from 357.1 to 357.6 ft. and from 359.1 to 359.5 ft; sand is very fine to fine and contains some rootlets below 360 ft; consists of marl from 362.8 to 363 ft; contains some limy areas below 365 ft.....	355.0	368.5
Silt, slightly clayey, moderately sandy, light olive gray; sand is very fine to fine; slightly calcareous below 370 ft; in part marly.....	368.5	375.0
Sandstone to siltstone; sand is very fine to medium.	375.0	380.0
Sand, very fine to medium; contains reworked material; sand is mostly very fine to fine below 390 ft; slightly consolidated and contains some rootlets below 395 ft.....	380.0	400.0
Sandstone, moderately consolidated, marly; sand is very fine to fine; very silty and slightly consolidated from 402.5 to 405 ft; poorly consolidated below 405 ft; sand is mostly very fine to medium with some coarse.....	400.0	408.5
Marl, moderately sandy, white; sand is very fine to fine.....	408.5	410.0
Sandstone, moderately consolidated; sand is very fine to fine; contains some limy areas from 411.3 to 411.9 ft. and from 413.8 to 414.1 ft.....	410.0	421.5
Silt, slightly clayey, moderately sandy, light olive gray; sand is very fine to fine; contains some limy layers from 421.5 to 425 ft; contains some clay layers below 425 ft.....	421.5	428.5

Sand, slightly consolidated; sand is mostly very fine to coarse, some very coarse; slightly finer from 435 to 445 ft; contains some silt layers below 456.5 ft.....	428.5	464.0
Silt, very clayey, moderately sandy, light pinkish gray; sand is very fine to medium; very sandy from 464 to 469 ft; sand is very fine to fine below 469 ft.....	464.0	470.0
Sand, moderately silty, sand is mostly very fine to fine, some medium; contains no silt below 475 ft..	470.0	477.5
Marl, white; contains some interbedded sandstone....	477.5	478.0
Clay, silty, very light greenish gray; in part marly below 480 ft.....	478.0	483.5
Silt, slightly clayey, very sandy, marly, white; sand is very fine to fine.....	483.5	484.5
Silt, slightly clayey, very sandy, slightly calcareous to 490 ft. white to light olive gray; sand is very fine to fine; contains some lime-cemented sandstone from 484.5 to 489 ft; moderately clayey from 489 to 490 ft. and below 495 ft; very clayey and contains some coarse sand from 490 to 495 ft; sand is very fine to medium below 495 ft.....	484.5	497.0
Sand, gravelly; sand is fine to very coarse, some fine gravel (about 40 percent gravel to 500 ft., 10 percent gravel below 500 ft.); contains reworked material and dark minerals.....	497.0	505.0
Sand, mostly fine to coarse, some very coarse sand and fine gravel.....	505.0	510.5
Sand, moderately silty; sand is very fine to fine; slightly silty from 515 to 520 ft; contains limy areas below 522.8 ft.....	510.5	525.0
Sandstone, slightly silty, poorly consolidated; sand is very fine to fine; contains limy areas.....	525.0	526.0
Silt, slightly clayey, very sandy, moderately calcareous, light olive gray; sand is very fine to fine; contains some limy areas.....	526.0	530.0
Sandstone, moderately silty, moderately consolidated; sand is very fine to fine; contains limy areas; contains some medium sand and rootlets below 535 ft.....	530.0	540.0
Sand, mostly very fine to fine, some medium.....	540.0	545.0
Silt, slightly clayey, slightly sandy, light olive gray; sand is very fine to fine; moderately clayey and moderately sandy below 552.5 ft; sand is fine to coarse.....	545.0	558.5
Limestone, white.....	558.5	559.6

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, light olive gray with yellow mottling, clayey	559.6	560.0
Shale, mottled light yellowish gray with some brownish yellow, clayey; principally light yellowish gray from 561 to 562.5 ft; contains some light gray below 562.5 ft.....	560.0	574.5
Shale, medium brownish gray with some yellowish brown, clayey; medium brownish gray below 575 ft..	574.5	580.0

Test Hole #5-A-66 (E-log)
(13-18-21daad)
Custer County

Location: SE NE NE SE sec. 21, T. 13 N., R. 18 W., approximately
 415 ft. south and 15 ft. west of northeast corner of the southeast
 quarter, west side of road.
 Ground elevation: 2,430 ft. (t). (Mason City SW 7.5 min. quadrangle)
 Depth to water: 192.5 ft., (July 1, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Silt, slightly clayey; sandy, contains very fine sand; iron stains, slightly calcareous, light brownish gray.....	1.0	36.5
Silt, moderately clayey; slightly sandy, contains very fine sand; dark gray.....	36.5	38.5
Silt, moderately clayey; sandy, contains very fine to medium sand; manganese stains, lime cemented sandstone from 54.6 to 55 ft., very pale brown and light yellowish brown.....	38.5	62.5
Sand, very fine to medium grained, quartz grains predominate, interbedded with marl zones above 70 ft., slightly silty, light gray.....	62.5	90.0
Silt, slightly clayey; moderately sandy, contains very fine to fine sand with trace of medium, light yellowish brown.....	90.0	97.0
Sand, very silty, very fine to fine grained, marly and very calcareous below 98.5 ft., grayish brown grading to very pale brown.....	97.0	100.0
Silt, slightly clayey; very sandy, contains very fine to fine sand with trace of medium; marl zones between 104.7 and 112.5 ft., very calcareous above 112.5 ft., very pale brown grading to light yellowish brown below 112.5 ft.....	100.0	115.0
Sand, very fine to fine grained with some medium....	115.0	120.0
Silt, very sandy, contains very fine to fine sand with some medium, very pale brown.....	120.0	125.0
Sand, very slightly silty, very fine to fine grained with some medium and coarse below 140 ft., light pale gray.....	125.0	170.0
Silt, very sandy, contains very fine to fine sand, moderately calcareous above 173.5 ft., grayish brown.....	170.0	175.0
Sand, very silty, very pale brown.....	175.0	180.0
Sand, slightly silty, very fine to medium grained, mostly quartz grains, very pale brown.....	180.0	189.0
Sand, silty, very fine to fine grained, very cal- careous below 190 ft., light yellowish brown.....	189.0	195.0

Silt, slightly clayey; slightly to moderately sandy; contains very fine to fine sand; slightly calcareous, light yellowish brown.....	195.0	210.0
Sand, silty, very fine to fine grained, light yellowish brown.....	210.0	214.5
Sand and gravel, texture grades from fine sand to coarse gravel, some pebbles, silt interbeds to 217 ft.....	214.5	220.0
Gravel, texture grades from fine sand to coarse gravel, silt interbeds.....	220.0	225.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, interbedded with sand and gravel, rootlets common, light yellowish brown.....	225.0	230.0
Sand and sandstone, gradual variations, very fine to medium grained, silt interbeds from 235 to 240 ft., rootlets, some coarse sand and fine gravel below 240 ft. and gravel interbeds below 250 ft., light brownish gray.....	230.0	252.2
Clay, very silty and sandy, contains very fine to fine sand, light gray.....	252.2	252.5
Silt and sand, interbedded, very fine to fine grained, rootlets, light gray.....	252.5	258.0
Sand and sandstone, gradual variations, very fine to fine grained, slightly silty, rootlets, scattered interbeds of silt, light gray.....	258.0	281.0
Silt, very sandy, contains very fine to fine sand, scattered sandstone interbeds, light gray.....	281.0	285.0
Sand and sandstone, gradual variations, very fine to fine grained, silty, sandstones are lime cemented, calcareous zones, light gray.....	285.0	298.4
Silt, very sandy, marly, scattered sandstone interbeds, slightly to very calcareous, pale olive becoming very pale yellow below 300 ft.....	298.4	305.5
Sand and gravel, texture grades from very fine sand to medium gravel with trace of coarse, 25 percent gravel.....	305.0	315.0
Sand, very fine to coarse with trace of fine gravel, interbedded with silt and marl, moderately calcareous.....	315.0	320.5
Sand and sandstone, gradual variations, very fine to medium grained, interbedded with marl, siltstone and silt, rootlets, slightly calcareous, pale yellow.....	320.5	334.0
Sand, sandstone, and marl interbeds, very fine to fine grained with trace of medium sand, silty, very calcareous, light gray.....	334.0	345.0
Sand and sandstone, gradual variations, very fine to fine grained, silty, marly and very calcareous from 347 to 350.2 ft., rootlets, light gray and pale olive.....	345.0	355.0

Sand, silty, very fine to medium grained, rootlets, slightly consolidated, pale yellow.....	355.0	403.5
Sand and sandstone, interbedded, slightly silty, very fine to fine grained to 410 ft., below 410 ft. is very fine to medium grained with trace of coarse sand; rootlets, pale yellow.....	403.5	435.0
Sand, silty, very fine to fine grained with trace of medium sand, rootlets, moderately consolidated below 470 ft., pale yellow.....	435.0	486.2
Silt, moderately sandy, contains very fine to fine sand, sandstone interbeds, rootlets, pale olive...	486.2	490.0
Sand, silty, very fine to fine grained with some medium sand, slightly to moderately consolidated, rootlets, pale olive.....	490.0	509.4
Marl, slightly silty and sandy, white, very calcareous.....	509.4	509.8
Sand and sandstone, interbedded, very fine to fine grained, marly, very calcareous, rootlets, pale olive.....	509.8	511.5
Marl, slightly silty and sandy, very calcareous, white.....	511.5	512.2
Sand and sandstone, interbedded, silty, very fine to fine grained, marly to 520 ft., rootlets, lime cemented and white from 526.6 to 527.0 ft., very calcareous from 512.2 to 520 ft. and 526.6 to 527 ft., pale olive.....	512.2	527.0
Sand, silty, very fine to medium grained, rootlets, slightly consolidated, silt interbeds from 540 to 545 ft., pale olive.....	527.0	570.5
Marl, silty and sandy, very calcareous, white.....	570.5	571.5
Silt, interbedded with marl, sandy, slightly calcareous, pale olive.....	571.5	575.5
Marl, silty and sandy, very calcareous, white.....	575.5	576.0
Sand, sandstone, and marl, interbedded, very silty, very fine to fine grained with trace of medium sand, moderately to very calcareous, pale olive to white, iron stained at base.....	576.0	581.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, iron stained, bentonite and gypsum present, gray becoming black below 590 ft.....	581.5	600.5

Test Hole #18-B-66 (E-log)
(13-19-19acbd)
Custer County

Location: SE NW SW NE sec. 19, T. 13 N., R. 19 W., approximately 950 ft. north and 480 ft. east of the center of the section, west side of road.

Ground elevation: 2,370 ft. (t). (Eddyville 7.5 min. quadrangle)

Depth to water: 58.4 ft. (September 20, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Silt, slightly clayey; slightly sandy, contains very fine sand; gray brown.....	1.0	11.2
Silt, slightly clayey, slightly sandy; contains very fine sand; iron and manganese stains, slightly to moderately calcareous, light brownish gray.....	11.2	40.0
Sand, very silty, very fine to medium grained, seam of coarse sand and fine gravel at 44.5 ft, light yellowish brown.....	40.0	45.0
Sand, slightly silty, very fine to medium grained with interbeds of very coarse sand; limy zones, moderately calcareous, light yellowish brown.....	45.0	51.0
Silt, moderately clayey; moderately sandy, contains very fine to medium sand; limy zones, moderately calcareous, pale brown.....	51.0	55.5
Sand, silty, very fine to medium grained, interbeds of sandy silt and coarse sand; limy zones, slightly calcareous, pale brown.....	55.5	60.4
Sand, fine to coarse grained with 15 percent fine gravel, slight iron staining at 63 ft.....	60.4	75.0
Sand and gravel, texture grades from fine sand to medium gravel with trace of very coarse gravel, 40 percent gravel.....	75.0	85.5
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty, interbedded with marl and lime cemented sandstone and siltstone, very fine to coarse grained, very calcareous, white.....	85.5	92.7
Silt, very sandy, interbedded with fine to medium grained sandstone, rootlets, pale yellow.....	92.7	99.7
Sandstone, very fine to medium grained, moderately indurated, limy zones, rootlets, olive.....	99.7	110.9
Silt, interbedded with siltstone, sandstone, and limestone, olive, white and highly calcareous at 113 ft.....	110.9	113.9
Sand, very fine to medium grained with trace of coarse, cemented zones and rootlets below 125 ft..	113.9	130.0
Sand and sandstone, interbedded, very fine to fine grained, moderately indurated, pale olive.....	130.0	146.8

Silt, moderately clayey, scattered interbeds of siltstone and sandstone, very calcareous below 147.5 ft., pale olive.....	146.8	151.5
Sand, very fine to coarse grained, seams of medium gravel from 160 to 165 ft., scattered interbeds of siltstone.....	151.5	165.0
Sand, gradational change from very fine and fine to very fine and medium grained, scattered sandstone and sandy silt interbeds, scattered moderately calcareous zones below 199 ft., pale olive.....	165.0	210.5
Silt, moderately clayey, slightly sandy, interbedded siltstone and marly siltstone, very to moderately calcareous, pale yellow and white.....	210.5	214.5
Sand, silty, very fine to medium grained, interbeds of sandstone from 214.5 to 229.7 ft., rootlets, pale yellow.....	214.5	240.0
Sand and sandstone, interbedded, very fine to medium grained, scattered interbeds of sandy silt and siltstone, very marly, very calcareous, white.	240.0	248.5
Sand and sandstone, interbedded, very fine to medium grained, rootlets, pale olive.....	248.5	264.5
Silt, very sandy, interbedded with very fine to medium grained sandstone and silty sand, pale yellow.....	264.5	275.2
Sand, very silty, very fine to medium grained, scattered interbeds of sandstone and silt, rootlets, pale yellow.....	275.2	310.0
Silt, very sandy, contains very fine to medium sand, scattered sandstone interbeds and indurated zones, pale yellow.....	310.0	315.0
Sand, very fine to medium grained, slightly to moderately consolidated, rootlets, pale olive.....	315.0	325.0
Sand, very fine to very coarse grained with trace of fine gravel, a few interbedded silts below 342 ft.	325.0	345.8
Silt, clayey; very sandy, contains very fine to medium sand; rootlets, very marly and white below 347.5 ft., pale olive.....	345.8	347.8
Sand, very fine to medium grained.....	347.8	353.0
Silt, sandy, contains very fine to medium sand, marly, very calcareous, light gray.....	353.0	355.0
Sand and sandstone, interbedded, very fine to medium grained with trace of coarse, moderately consolidated, rootlets, pale yellow.....	355.0	382.2
Sand and sandstone, interbedded, very marly, lime cemented, very calcareous, white.....	382.2	388.1
Silt, marly; moderately sandy, contains very fine to medium sand; interbeds of siltstone and lime cemented sandstone, very calcareous, white.....	388.1	394.4
Sand, very fine to medium grained, rootlets, a few sandstone interbeds, pale olive.....	394.4	405.0
Sand, very fine to very coarse grained with trace of fine gravel, scattered silt interbeds, light gray.	405.0	425.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, clayey, weathered, iron stained, some iron cementation, gray to yellow.....	425.0	435.0
Shale, clayey, light gray.....	435.0	450.5

**Test Hole #39-A-48 (No e-log)
(13-19-31dcca)
Custer County**

Location: NE SW SW SE sec. 31, T. 13 N., R. 19 W., approximately
340 feet north and 2,118 feet west of southeast section corner.
Ground elevation: 2,445 ft. (i) (Eddyville 7.5 min. quadrangle)
Depth to water: 101.7 ft. (9-17-48)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, medium to dark grayish brown.....	0.0	5.0
Silt, light yellowish gray to gray with pink tint...	5.0	20.0
Sand, light yellowish gray, texture grades from fine to medium.....	20.0	21.0
Silt, coarse texture, light gray with pink to yellow tint.....	21.0	30.0
Sand, silty, light gray with pink tint, very fine texture sand.....	30.0	40.0
Silt, sandy, light gray with yellow tint, contains fine sand.....	40.0	46.0
Sand, silty, light gray with pink tint, very fine texture sand.....	46.0	50.0
Silt, sandy, light gray, contains very fine sand....	50.0	52.5
Sand, light gray, fine.....	52.5	60.0
Silt, sandy, light gray with tan tint, contains very fine sand, slightly finer below 65.0 ft.....	60.0	70.0
Silt, coarse texture, light gray, contains a few calcareous nodules below 75.0 ft.....	70.0	80.0
Silt, slightly clayey to sandy, light pinkish gray..	80.0	87.0
Sand, slightly silty, light pinkish gray, texture grades from fine to medium.....	87.0	90.0
Silt, slightly clayey, contains some sand.....	90.0	97.5
Gravel, gray, yellow and pink, texture grades from fine to coarse.....	97.5	117.0
Silt, slightly clayey to sandy, light gray with a pink tint.....	117.0	119.0
Sand and some gravel, texture grades from fine sand to fine gravel.....	119.0	127.5
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, slightly calcareous, light gray, contains some sand.....	127.5	130.0
Silt, very calcareous, to marl, white.....	130.0	133.0
Silt, slightly clayey, very calcareous, light gray..	133.0	137.0
Silt, medium reddish gray to brown, slightly clayey from 137.0 to 140.0 ft.....	137.0	146.0
Silt, slightly clayey to sandy, slightly to moderately calcareous, light gray.....	146.0	150.0
Silt, sandy, slightly calcareous, light gray.....	150.0	157.0

Silt, slightly clayey to sandy, moderately calcareous, grayish tan to reddish tan, contains fine sand.....	157.0	162.0
Silt, slightly clayey, light gray, contains some sand.....	162.0	166.0
Silt, slightly clayey to sandy, moderately calcareous, grayish white, contains medium sand.....	166.0	174.0
Sandstone, fine- to medium-grained, grayish tan.....	174.0	177.0
Silt, sandy to slightly clayey, light gray.....	177.0	182.5
Sandstone, fine- to medium-grained, light grayish tan, light gray to greenish tan, contains marl layers below 204.5 ft.....	182.5	211.5
Silt, slightly clayey to sandy, light gray with yellow tint, contains medium sand.....	211.5	217.5
Sandstone, gray to greenish tan, contains some fine gravel.....	217.5	220.0
Sand and some gravel, grayish tan to pink, texture grades from fine sand to fine gravel, slightly coarser below 235.0 ft.....	220.0	240.0
Sand, light gray to tan, texture grades from fine to coarse.....	240.0	250.0
Sand and gravel, gray, yellow and pink, texture grades from coarse sand to medium gravel.....	250.0	256.0
Sand, slightly silty, light grayish tan, texture grades from fine to coarse, contains a few limy fragments.....	256.0	270.0
Sand and calcareous silt, interbedded, texture of sand grades from fine to medium.....	270.0	275.0
Clay, light grayish green.....	275.0	280.0
Sandstone, fine- to medium-grained, light greenish gray.....	280.0	282.0
Clay, light grayish green, medium reddish brown below 286.0 ft.....	282.0	290.0
Sand, light grayish tan, texture grades from fine to medium.....	290.0	296.0
Silt, slightly clayey, slightly calcareous, light grayish white.....	296.0	297.0
Sand and sandstone, fine- to medium-grained, light grayish tan.....	297.0	300.0
Sand, light grayish tan, texture grades from fine to medium, contains a few hard limy layers.....	300.0	310.0
Sandstone, moderately calcareous, light gray to light grayish tan.....	310.0	325.0
Sand, light tannish gray, texture grades from fine to medium.....	325.0	330.0
Sand and sandstone, interbedded, fine- to medium-grained, light tannish gray.....	330.0	340.0
Sandstone, in part calcareous, light gray to tan....	340.0	350.0
Sandstone, very calcareous, light gray to white.....	350.0	355.0
Sand, light gray, texture grades from fine to medium, contains a few clay granules below 370.0 ft..	355.0	383.0
Silt, slightly clayey, light gray with a green tint.	383.0	389.5

Sand, light greenish gray, texture grades from fine to coarse.....	389.5	420.0
Silt, slightly clayey, very calcareous, light gray..	420.0	422.0
Sand, greenish gray, texture grades from fine to medium, contains many clay granules below 430.0 ft.....	422.0	440.0
Clay, light greenish gray.....	440.0	450.0
Sand, slightly calcareous, greenish gray, texture grades from medium to coarse, consists principally of clay granules.....	450.0	460.0
Clay, light gray with green tint, contains sand, medium reddish brown from 466.0 to 470.0 ft.....	460.0	480.0
Silt, clayey, light gray to light grayish tan.....	480.0	530.0
Silt, slightly sandy, light gray to white.....	530.0	541.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, light gray, limonitic-stained below 550.0 ft..	541.5	552.5
Clay shale, brownish black.....	552.5	560.0

Test Hole #19-A-66 (No e-log)
(13-20-1adbb)
Custer County

Location: NW NW SE NE sec. 1, T. 13 N., R. 20 W., approximately
 1,400 feet south and 1,200 feet west of northeast section corner,
 north side of road.

Ground elevation: 2,335 ft. (t). (Eddyville NE 7.5 min. quadrangle)

Depth to water: 37.8 ft. (September 6, 1966).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill, silt, grayish brown.....	0.0	2.0
Silt, slightly clayey; slightly to moderately sandy, contains very fine sand; large calcareous nodules from 7.8 to 14.8 ft., consolidated zones from 6.2 to 7.8 ft., slightly calcareous from 4.8 to 14.8 ft., dark brown to light grayish brown.....	2.0	14.8
Clay, light brownish gray to gray, slightly calcar- eous.....	14.8	17.5
Silt, slightly to moderately clayey; slightly sandy, contains very fine sand; slightly calcareous to 27 ft., shades of light brownish gray and light olive gray except very dark brown from 21.5 to 22.5 ft.....	17.5	32.8
Clay, moderately silty, very calcareous, dark gray to very dark gray.....	32.8	35.8
Sand, very fine to fine sand grading to very fine to coarse sand, very silty, limy zones, very cal- careous, light brownish gray.....	35.8	39.0
Silt, moderately clayey; slightly sandy, contains very fine sand; iron concretions, dark gray.....	39.0	40.0
Clay, slightly to moderately silty, black to very dark gray.....	40.0	43.2
Silt, moderately to very clayey becoming less clayey with depth, dark bluish gray becoming dark olive gray.....	43.2	49.0
Sand and gravel, texture grades from very fine sand to coarse gravel, 60 percent gravel, scattered silt seams, bluish gray.....	49.0	60.0
Sand, gravelly, predominantly fine to medium sand with 15 percent gravel.....	60.0	70.0
Sand and gravel, texture grades from very fine to coarse gravel, 40 percent gravel.....	70.0	75.0
Gravel, texture grades from fine sand to coarse gravel and pebbles, 20 percent sand, pebbles are reworked sandstone of Ogallala Group.....	75.0	100.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, limy, very calcareous, light gray and white.....	100.0	110.0

Sandstone, very fine to medium grained, some coarse sand below 130 ft., clayey zones to 120 ft., rootlets, slight to very slightly calcareous, light olive gray.....	110.0	150.0
Sand, very fine to medium grained with some coarse sand, 30 percent fine to medium gravel from 160 to 165 ft., rootlets, white limestone from 161.8 to 162.5 ft., limy zones below 185 ft., clayey sand from 192.2 to 193.1 ft., very calcareous in spots; light olive gray becoming light gray below 175 ft.	150.0	200.0
Sand and sandstone, interbedded, very fine to medium grained with some coarse sand, rootlets, thin clay seams to 205 ft., some lime cementation below 205 ft., moderately calcareous in spots; white.....	200.0	210.0
Sand, fine to medium grained with some coarse and very coarse sand, scattered areas of sandstone, very calcareous in spots, light gray.....	210.0	230.0
Sand and sandstone, interbedded, very fine to medium grained with some coarse sand, a few rootlets, light gray and light olive gray becoming pale yellow below 255 ft., very calcareous in spots....	230.0	275.0
Sand, fine to coarse grained with some very coarse sand, interbedded with silt and clayey sand from 277 to 280 ft., a few rootlets, pale olive.....	275.0	280.0
Sand, very fine to fine grained with some medium sand, scattered thin sandstones, a few rootlets...	280.0	285.0
Sand, very fine to fine grained with some coarse sand and fine gravel.....	285.0	295.0
Sand and gravel, texture grades from very fine sand to medium gravel, 30 percent gravel, very slightly calcareous.....	295.0	305.0
Sand, very fine to medium grained with some coarse sand and fine gravel, slightly to very calcareous, pale olive.....	305.0	325.0
Sand, fine to coarse grained, silty limestone from 326.8 to 328.2 ft., slightly to very calcareous...	325.0	330.0
Sand, fine to medium grained with some coarse and very coarse sand, scattered sandstone interbeds, rootlets below 340 ft., slightly to very calcareous.....	330.0	345.8
Limestone, marly, white, very calcareous.....	345.8	346.7
Sand and sandstone, interbedded, fine to medium grained with some coarse sand, rootlets, scattered limestone interbeds, moderately to very calcareous, light brownish gray.....	346.7	355.0
Sand and sandstone, interbedded, fine to coarse grained with some very coarse sand, scattered silty limestone interbeds, moderately to very calcareous, light brownish gray.....	355.0	360.0

Sand and sandstone, interbedded very fine to medium grained with some coarse sand, scattered white limestone interbeds to 370 ft., slightly to very calcareous, light brownish gray.....	360.0	380.0
Sand and siltstone, interbedded, sand is fine to medium grained with some coarse; siltstone is slightly sandy; scattered limestone interbeds, a few rootlets below 400 ft., slightly calcareous and very calcareous in areas, dark grayish brown to 400 ft., brown below 400 ft.....	380.0	410.0
Siltstone, slightly sandy, contains very fine sand, a few interbedded limestones, very calcareous in areas, brown.....	410.0	415.0
Sandstone, silty, very fine grained, interbed of fine to coarse sand from 416.9 to 419 ft., sand interbed is slightly calcareous, brown.....	415.0	420.0
Sand and sandstone, interbedded, sand is very fine to fine with some medium and coarse; sandstone is silty and very fine grained, slightly calcareous, brown.....	420.0	440.0

Test Hole #43-A-48 (No e-log)
(13-21-32cccc)
Custer County

Location: SW SW SW SW sec. 32, T. 13 N., R. 21 W., approximately
 7 feet north and 50 feet east of southwest section corner.
 Ground elevation: 2,676 ft. (i) (Oconto SE 7.5 min. quadrangle)
 Depth to water: 210.4 ft. (10-6-48)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, dark brownish gray.....	0.0	3.0
Silt, light grayish buff with some limonitic stain..	3.0	45.0
Silt, sandy, light grayish buff, contains very fine sand.....	45.0	57.5
Silt, soil-like, dark reddish brown.....	57.5	60.0
Silt, light reddish buff, slightly coarser below 75.0 ft.....	60.0	87.0
Silt, slightly clayey, light gray with buff tint....	87.0	88.0
Silt, medium grayish buff.....	88.0	92.5
Sand, light grayish tan.....	92.5	97.5
Silt, medium grayish buff, contains thin dark gray- brown layer at top.....	97.5	100.0
Silt, slightly to moderately calcareous, light gray- ish buff, slightly coarser below 140.0 ft.....	100.0	145.0
Silt, sandy, in part moderately calcareous, light to medium grayish buff, contains fine to medium sand.	145.0	160.0
Silt, light gray with some limonitic stain, contains a few calcareous nodules, slightly sandy below 170.0 ft.....	160.0	175.0
Silt, slightly clayey to sandy, contains fine sand..	175.0	180.0
Silt, light gray, contains marl and thin sandy layers.....	180.0	200.0
Silt, in part calcareous, light grayish tan, con- tains hard limy layers.....	200.0	210.0
Siltstone, light brown, contains hard limy layers, slightly sandy below 220.0 ft.....	210.0	227.5
Silt, slightly clayey, slightly calcareous, medium grayish tan.....	227.5	230.0
Silt, slightly clayey to sandy, slightly calcareous, medium grayish tan, contains fine sand, contains some coarse sand below 237.5 ft.....	230.0	240.0
Marl and silt, sandy, interbedded, light grayish brown, contains fine sand.....	240.0	246.0
Silt, slightly sandy to slightly clayey, contains fine sand.....	246.0	250.0
Sand and gravel, gray and yellowish brown to reddish brown, texture grades from coarse sand to coarse gravel.....	250.0	270.0

Sand and gravel, gray and yellowish brown to reddish brown, texture grades from fine sand to medium gravel, slightly coarser texture below 285.0 ft...	270.0	310.0
Sand and some gravel, grayish tan to pink, texture grades from fine sand to fine gravel.....	310.0	315.0
Sand and gravel, texture grades from medium sand to medium gravel, contains thin silt layers.....	315.0	318.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, light reddish gray to tan.....	318.0	320.0
Silt, sandy, in part moderately calcareous, light pink to white, contains fine sand.....	320.0	330.0
Silt, very calcareous, white.....	330.0	336.0
Silt, sandy, light gray, contains fine sand.....	336.0	340.0
Sand, silty, fine texture sand, contains hard calcareous layers.....	340.0	353.0
Sandstone, fine- to medium-grained, light gray to reddish tan.....	353.0	357.0
Silt, sandy, light grayish white, contains fine sand	357.0	360.0
Sand, silty, light grayish tan.....	360.0	362.5
Sand, light grayish tan, texture grades from fine to medium, slightly consolidated.....	362.5	384.5
Silt, slightly clayey, moderately calcareous, light grayish white.....	384.5	392.0
Sandstone, fine- to medium-grained, light grayish tan.....	392.0	416.0
Sand, brownish gray, texture grades from fine to coarse.....	416.0	423.0
Sand, silty.....	423.0	424.5
Silt, very calcareous, to marl, light gray to white.	424.5	427.5
Silt, very calcareous, contains thin sandstone layers.....	427.5	429.0
Sandstone, fine-grained, light brown.....	429.0	431.0
Silt, light gray, contains a hard limy layer from 432.0 to 432.5 ft.....	431.0	435.0
Silt, sandy, light gray, contains very fine sand, contains a hard calcareous layer from 436.0 to 436.5 ft.....	435.0	442.0
Sand, light grayish tan, fine texture.....	442.0	446.0
Silt, sandy, light gray with tan tint, contains fine sand.....	446.0	448.0
Marl, light gray to white, contains some white calcareous silt.....	448.0	450.0
Sandstone, fine-grained, light tan.....	450.0	455.0
Marl, light bluish gray to white.....	455.0	460.0
Sandstone, fine-grained, light tan, unconsolidated at top.....	460.0	487.5
Sand, silty, very calcareous, light gray to light tan.....	487.5	494.0
Marl, light bluish gray.....	494.0	495.0
Sandstone, silty, fine-grained, very calcareous, light grayish tan to white.....	495.0	500.0

Silt, sandy, moderately calcareous, light tan, contains fine sand.....	500.0	502.5
Marl, light grayish blue.....	502.5	505.0
Sandstone, silty, fine- to medium-grained, light tan, principally medium-grained below 560.0 ft....	505.0	586.0
Marl, light grayish white.....	586.0	595.0
Silt, clayey, slightly calcareous, light tannish gray.....	595.0	598.0
Silt, clayey, brownish gray.....	598.0	637.0
Marl.....	637.0	638.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, light brown.....	638.0	645.0

Test Hole #7-A-59 (E-log)
(14-17-12aaaa)
Custer County

Location: NE NE NE NE sec. 12, T. 14 N., R. 17 W., approximately
 8 feet south and 139 feet west of northeast section corner.
 Ground elevation: 2,298 ft. (t). (Litchfield 7.5 min. quadrangle)
 Depth to water: 133.0 ft. (6-22-59).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Topsoil.....	0.0	0.5
Silt, slightly clayey, slightly calcareous, in part granular structure, medium yellowish gray.....	0.5	2.5
Silt, slightly clayey, coarse textured, medium brown; slightly lighter in color below 6.7 ft.....	2.5	8.5
Silt, slightly clayey, medium brown; dark brown from 9.5 to 11.4 ft; coarse textured below 11.4 ft.....	8.5	13.8
Silt, slightly clayey, slightly sandy to 15 ft; moderately sandy from 15 to 15.7 ft; very sandy and medium brown below 15.7 ft; sand is very fine to fine.....	13.8	20.0
Silt, slightly clayey, moderately sandy, slightly calcareous, light olive gray; sand is very fine to fine; very sandy and contains coarse silt to fine sand below 23.5 ft.....	20.0	26.5
Silt, moderately clayey, coarse textured, slightly calcareous, light olive gray; slightly clayey, slightly sandy, noncalcareous below 28 ft; sand is very fine to fine.....	26.5	29.5
Sand, moderately clayey, slightly silty; sand is very fine to fine, some medium.....	29.5	40.7
Silt, slightly clayey, slightly sandy, light yellowish brown to 43 ft. and light brown below; sand is very fine to fine; moderately clayey below 45 ft..	40.7	48.0
Sand, slightly clayey, slightly silty; sand is very fine to fine, some medium.....	48.0	50.0
Silt, slightly clayey, moderately sandy, light brown; sand is very fine to fine.....	50.0	54.5
Sand, moderately silty; sand is very fine to fine; slightly silty and contains some medium sand below 55 ft.....	54.5	60.0
Sand, very fine to fine.....	60.0	65.0
Silt, slightly clayey, coarse textured, medium brown; contains a limy area from 72.3 to 73 ft; slightly calcareous, slightly sandy and light brown below 75 ft; sand is very fine to fine.....	65.0	80.0
Sand, slightly clayey, slightly sandy; sand is very fine to fine, some medium; slightly silty below 83.5 ft; sand is very fine to medium, some coarse.	80.0	85.0

Sand, silty; sand is fine to medium, some coarse sand and fine gravel; contains some rootlets and limestone grains.....	85.0	90.0
Sand, gravelly; fine sand to fine gravel.....	90.0	93.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, moderately sandy, light olive gray; sand is very fine to fine, some medium.....	93.0	95.0
Silt, slightly clayey, moderately sandy, light olive gray; sand is very fine to fine with some medium sand below 100 ft.....	95.0	109.0
Siltstone, moderately consolidated, light olive gray; slightly sandy below 110 ft; sand is very fine to fine.....	109.0	113.5
Silt, moderately clayey, very sandy, mottled medium brown to olive gray; sand is very fine to fine, some medium; slightly silty below 120 ft, light olive gray, contains no medium sand.....	113.5	122.3
Sand, moderately silty; sand is very fine to fine...	122.3	127.5
Silt, moderately clayey, very sandy, moderately calcareous, light olive gray; contains limy areas....	127.5	131.8
Silt to silty sandstone, interbedded, moderately consolidated, light gray; sand is very fine to fine; contains a limy layer from 134 to 134.5 ft; marly below 135 ft.....	131.8	140.0
Sandstone, silty, in part moderately consolidated; sand is very fine to fine; contains some rootlets.	140.0	150.0
Sand, moderately silty, poorly consolidated; sand is very fine to fine; contains some rootlets; contains a well consolidated sandstone layer below 155 ft.....	150.0	156.0
Silt to silty sandstone, interbedded, light olive gray; sand is very fine to fine.....	156.0	160.0
Sand, very fine to fine; contains some rootlets; sand is very fine to medium with some coarse to very coarse below 165 ft; contains some fine gravel from 165 to 170 ft.....	160.0	175.0
Sandstone, slightly silty, moderately consolidated; sand is very fine to medium; contains some rootlets; well consolidated below 180 ft; contains a marly layer from 188 to 188.5 ft.....	175.0	191.3
Silt, moderately clayey, very sandy, light yellowish gray; sand is very fine to fine.....	191.3	194.0
Sandstone, well consolidated; sand is very fine to fine, some medium; contains some limy areas below 200 ft.....	194.0	207.8
Sand, slightly silty, slightly consolidated; sand is very fine to medium, some coarse; contains some rootlets and limy areas.....	207.8	210.5

Sandstone, moderately silty, well consolidated; sand is very fine to fine; contains some medium sand below 215 ft; slightly silty from 215 to 220 ft; contains some rootlets and limy areas below 220 ft.....	210.5	221.7
Silt, slightly clayey, moderately sandy, moderately calcareous, light yellowish gray; sand is very fine to fine; contains some limy areas from 221.7 to 223.8 ft; very sandy below 223.8 ft; contains some medium sand and rootlets.....	221.7	230.0
Sandstone, slightly silty, poorly consolidated; sand is very fine to medium; very silty below 232 ft; contains interbedded silt layers.....	230.0	235.0
Sandstone, slightly silty, moderately consolidated; sand is very fine to fine; contains some medium sand below 240 ft.....	235.0	245.0
Silt, marly, light gray to white.....	245.0	252.5
Sand, very silty; sand is very fine to fine; contains marly areas.....	252.5	255.0
Sand, moderately consolidated; sand is very fine to fine, some medium; contains a limestone lens from 255.9 to 256.4 ft; slightly consolidated below 257 ft; contains interbedded silty sand layers from 257 to 260 ft; contains some rootlets and limy areas below 260 ft.....	255.0	265.0
Sand, very fine to medium; contains some rootlets; contains some limy areas to 270 ft; contains some fine gravel and interbedded silt lenses from 270 to 275 ft; contains some coarse sand and fine to medium gravel below 275 ft.....	265.0	280.0
Sand, gravelly; fine sand to fine gravel, about 30 percent gravel to 285 ft. and 20 percent gravel below.....	280.0	290.0
Sand, fine to medium, some coarse; contains a silt layer, slightly clayey from 291.6 to 292.8 ft. and at 299.8 ft; contains no coarse sand below 295 ft.....	290.0	305.0
Silt, slightly clayey, very sandy, light olive gray; sand is very fine to medium.....	305.0	309.8
Sand, very fine to medium, some coarse; contains reworked claystone grains.....	309.8	311.7
Silt, slightly clayey, coarse textured, light olive gray.....	311.7	314.5
Sand, slightly clayey, very silty; sand is very fine to medium; slightly consolidated and contains some rootlets below 315 ft; contains silt lenses from 319.5 to 319.6 ft and below 319.8 ft.....	314.5	320.0
Silt, slightly clayey, moderately sandy, coarse textured, granular structure, light olive gray; contains coarse silt to very fine sand.....	320.0	330.0

Silt to silty sandstone, interbedded, light olive gray; sand is very fine to fine; contains some rootlets.....	330.0	335.0
Sand, slightly clayey, very silty, in part consolidated; sand is very fine to fine, some medium; contains some rootlets.....	335.0	340.0
Sand, very fine to fine.....	340.0	344.5
Silt, moderately clayey, coarse textured, granular structure, light olive gray.....	344.5	347.3
Sand, very fine to fine; contains some rootlets and reworked siltstone below 350 ft.....	347.3	355.0
Sandstone, moderately consolidated; sand is very fine to fine; contains a limy area from 356.8 to 357.7 ft.....	355.0	360.0
Sand, moderately consolidated; sand is very fine to fine, some medium; contains limy areas and some rootlets; contains no medium sand below 370 ft; contains silt layers from 372.4 to 373.5 ft. and below 374.6 ft.....	360.0	375.7
Sand, poorly consolidated; sand is very fine to fine, some medium; contains some rootlets; slightly silty from 380 to 385 ft; sand is very fine to medium.....	375.7	385.5
Siltstone, sandy, marly; sand is very fine to fine, some medium.....	385.5	390.0
Sand, very fine to medium, some coarse; contains some rootlets and limy areas; slightly silty from 393.6 to 394.7 ft. and below 395 ft.....	390.0	399.5
Sand, moderately clayey, slightly silty; sand is very fine to fine, some medium; poorly consolidated and slightly silty below 400 ft, sand is very fine to medium, some coarse.....	399.5	405.0
Sand, very fine to medium, some coarse to very coarse.....	405.0	413.6
Sand, slightly clayey, slightly silty; sand is very fine to fine, some medium; very silty and contains no medium sand below 415 ft.....	413.6	423.5
Silt, slightly clayey, coarse textured, granular structure, light olive gray; contains coarse silt to very fine sand.....	423.5	425.0
Sand, slightly clayey, very silty; sand is very fine to fine.....	425.0	430.0
Sand, very fine to fine, some coarse; contains rootlets; contains reworked claystone grains from 435 to 440 ft; contains no coarse sand below 440 ft...	430.0	450.0
Sand, very fine to fine, some medium to coarse and a trace of very coarse; slightly silty from 452.2 to 455 ft; moderately silty from 456.4 to 457.3 ft. and from 457.8 to 458.2 ft; contains no very coarse sand below 455 ft.....	450.0	460.0
Sand, slightly clayey, slightly silty; sand is very fine to fine.....	460.0	462.0

Silt, moderately clayey, coarse textured, light olive gray.....	462.0	464.9
Sand, in part slightly silty; sand is very fine to medium.....	464.9	473.0
Silt, slightly clayey, very sandy, light gray to white; sand is very fine to medium; slightly consolidated below 474 ft; contains some rootlets; contains less medium sand.....	473.0	480.0
Sand, slightly consolidated; sand is very fine to fine; contains some rootlets.....	480.0	488.5
Silt, slightly clayey, slightly sandy, light gray to white; sand is very fine to fine; contains some marly areas.....	488.5	490.0
Sand, very silty; sand is very fine to fine; contains marly areas.....	490.0	491.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, silty, slightly calcareous, light yellowish gray to yellowish brown; contains claystone, siltstone, ironstone, and limestone grains.....	491.0	493.0
Shale, mottled light gray to light yellowish brown, clayey; shale is mostly light gray below 495.5 ft.	493.0	497.0
Shale, mottled light yellowish brown to light gray, clayey; contains some bentonite; shale is mostly medium gray from 502.5 to 503.5 ft.....	497.0	510.0

Test Hole #6-A-59 (E-log)
(14-17-24ddad)
Custer County

Location: SE NE SE SE sec. 24, T. 14 N., R. 17 W., approximately
 791 feet north and 6 feet west of southeast section corner.
 Ground elevation: 2,280 ft. (t). (Litchfield 7.5 min. quadrangle)
 Depth to water: Unknown. Test hole caved at 122 ft. (6-15-59).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	0.5
Silt, slightly clayey, slightly calcareous, light gray and light olive gray; contains snail shells; light olive gray with some yellowish gray and a trace of brownish yellow from 5 to 15 ft; light yellowish gray below 15 ft; contains some very fine sand below 20 ft.....	0.5	26.0
Silt, slightly clayey, light yellowish gray; coarse textured; silty has brownish tint from 31 to 32.7 ft; light brown below 32.7 ft.....	26.0	33.2
Silt, moderately clayey, medium brownish gray; contains very fine to fine sand from 34.5 to 36 ft; slightly more clayey below 36 ft.....	33.2	36.5
Silt, very clayey, light brown; contains a trace of very fine to fine sand; slightly less clayey and slightly sandy below 37 ft; partly marly and contains limy nodules below 42.3 ft.....	36.5	42.5
Silt, moderately clayey, moderately sandy, slightly calcareous, light brown; sand is mostly very fine to fine, some medium; contains a trace of limy nodules; noncalcareous and contains no medium sand or limy nodules below 43.5 ft.....	42.5	44.0
Sand, very silty; sand is very fine to fine; slightly clayey with interbedded sandy silt layers below 45 ft; contains some limy nodules.....	44.0	58.0
Sand, mostly very fine to coarse, some very coarse; contains iron and manganese concretions.....	58.0	59.0
Silt, slightly clayey, moderately sandy, light brown; sand is very fine to fine.....	59.0	63.0
Sand, gravelly; mostly medium to very coarse sand, some fine gravel (about 15 percent fine gravel)...	63.0	65.5
Silt, moderately clayey, moderately sandy, light greenish gray; sand is mostly fine to coarse, some fine gravel.....	65.5	66.8
Sand, gravelly; mostly medium to very coarse sand, some fine gravel (about 15 percent fine gravel)...	66.8	69.2
Silt, slightly clayey, very sandy, light gray; sand is mostly very fine to medium, some coarser grains	69.2	70.0

Sand, slightly clayey, very silty; sand is very fine to fine.....	70.0	72.4
Marl, white.....	72.4	72.8
Silt, very clayey, slightly sandy, light gray; contains marly areas.....	72.8	74.5
Clay, very silty, slightly sandy, light gray; slightly less sandy below 75 ft.....	74.5	77.3
Silt, very clayey, slightly sandy, slightly calcareous, light olive gray; sand is very fine to medium; contains a limy nodular area from 77.3 to 77.5 ft.....	77.3	79.0
Silt, moderately clayey, moderately sandy, slightly calcareous, light olive gray; sand is mostly very fine to medium, some coarser grains.....	79.0	81.0
Siltstone, well consolidated, sandy, light to medium olive gray; sand is very fine to fine.....	81.0	87.5
Silt, very clayey, moderately sandy, light olive gray; sand is mostly very fine to fine, some medium to coarse; moderately clayey and very sandy below 90 ft.....	87.5	97.5
Sand, moderately clayey, very silty; sand is very fine to fine.....	97.5	99.0
Silt, moderately clayey, moderately sandy, granular structure, light yellowish gray; sand is very fine to fine; slightly clayey below 103 ft.....	99.0	106.5
Sand, very silty, moderately clayey; sand is very fine to fine; contains a trace of volcanic ash....	106.5	109.0
Silt, very clayey, slightly sandy, light to medium olive gray; sand is very fine to fine.....	109.0	110.0
Sand, very silty, slightly consolidated; sand is very fine to medium; contains some volcanic ash...	110.0	113.0
Sand, very fine to fine; contains some volcanic ash; contains some limy areas to 114.8 ft; sand is moderately consolidated and contains some coarse gravel and rootlets below 114.8 ft.....	113.0	116.0
Sand, fine to very coarse, some fine gravel (about 5 percent fine gravel); contains no fine gravel below 120 ft; slightly finer texture below 123.5 ft.	116.0	128.5
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, moderately consolidated; sand is very fine to fine; silty and in part marly below 131.5 ft.....	128.5	134.8
Limestone, white.....	134.8	135.7
Silt, moderately clayey, moderately sandy, light olive gray; sand is very fine.....	135.7	136.5
Sandstone, slightly consolidated; sand is mostly very fine to fine, some medium; contains rootlets; sand is mostly very fine to medium with some coarse below 140 ft; moderately silty from 140 to 145 ft; slightly silty from 145 to 150 ft.....	136.5	154.7

Silt, slightly clayey, moderately sandy, slightly calcareous, light olive gray; sand is mostly very fine to fine, some medium; contains some claystone	154.7	157.5
Sand, slightly consolidated; sand is mostly very fine to medium, some coarse; moderately consolidated and slightly silty below 160 ft; sand is very fine to fine.....	157.5	162.0
Silt, slightly clayey, very sandy, light olive gray; sand is very fine to fine.....	162.0	164.0
Sandstone, slightly silty, moderately consolidated; sand is very fine to fine; contains some rootlets; very silty and slightly clayey below 167 ft.....	164.0	175.0
Sand, slightly clayey, very silty; sand is very fine to fine; contains some limy areas; sand is very fine to fine with some medium and contains some rootlets below 185 ft.....	175.0	190.0
Sandstone, moderately consolidated; sand is mostly very fine to fine, some medium; poorly consolidated and marly below 191.5 ft; contains very fine sand to fine gravel.....	190.0	192.0
Sand, slightly silty; sand is fine to coarse, some very coarse; contains some marly areas.....	192.0	208.0
Sandstone, moderately consolidated; sand is mostly very fine to medium, some coarse; contains limy areas and rootlets; sand is mostly very fine to fine with some medium below 215 ft.....	208.0	222.0
Sand, very silty, slightly consolidated; sand is mostly very fine to fine, some medium.....	222.0	225.0
Sandstone, moderately consolidated; sand is very fine to medium; contains limy areas to 230 ft; moderately silty and contains some rootlets below 230 ft.....	225.0	236.0
Sand, very silty, slightly clayey; sand is very fine to medium; slightly less silty and slightly less clayey from 240 to 245 ft; sand is very fine to fine with some medium from 245 to 260 ft; slightly silty with a trace of coarse sand from 260 to 275 ft; moderately silty and slightly clayey below 275 ft; sand is mostly very fine to fine with some medium; slightly consolidated below 280 ft.....	236.0	282.0
Sand, moderately clayey, very silty; sand is very fine to medium.....	282.0	287.0
Silt, slightly clayey, very sandy, light olive gray; sand is mostly very fine to fine, some medium.....	287.0	292.0
Sand, very silty, slightly clayey; sand is very fine to medium; contains no clay below 296 ft.....	292.0	300.0
Silt, slightly clayey, very sandy, coarse textured, light olive gray; sand is mostly very fine to fine, some coarse.....	300.0	305.0

Sand, slightly silty; sand is mostly very fine to fine, some medium; very silty from 310 to 330 ft; moderately silty and in part slightly consolidated below 330 ft; contains some rootlets.....	305.0	337.7
Silt, slightly clayey, coarse textured, light olive gray.....	337.7	340.0
Sand, very silty; sand is mostly very fine to fine, some medium; slightly less silty below 344.7 ft...	340.0	345.0
Sand, very silty, slightly clayey; sand is very fine to fine; contains some marly areas.....	345.0	350.0
Siltstone, very sandy, marly, light gray; sand is very fine to fine.....	350.0	360.0
Sandstone to sandy silt, interbedded, in part moderately consolidated and limy; sand is very fine to medium.....	360.0	365.0
Sand, very silty, slightly consolidated; sand is very fine to medium; in part limy; slightly less silty below 366 ft.....	365.0	370.0
No sample.....	370.0	375.0
Sandstone, slightly silty; sand is mostly very fine to fine, some medium; very silty and slightly consolidated from 378 to 378.5 ft; moderately silty below 380 ft.....	375.0	388.5
Silt, moderately clayey, slightly sandy to 389.5 ft; moderately sandy below, moderately calcareous, light olive gray; sand is very fine to fine.....	388.5	390.0
Silt, very clayey, in part slightly sandy, light gray; sand is very fine to fine; contains a marly layer from 393.5 to 394 ft; very sandy below 394 ft; sand is mostly very fine to fine, some medium.	390.0	395.0
Sand, slightly silty, slightly consolidated; sand is very fine to medium; very silty from 398.5 to 399.7 ft.....	395.0	403.6
Sandstone, marly, well consolidated; sand is very fine to medium.....	403.6	405.0
Sand, very fine to medium, some gravel; contains a silt lens at 407.5 ft; sand is very fine to medium with some coarse to very coarse below 410 ft; contains no coarse sand or fine gravel below 415 ft..	405.0	417.5
Sand, slightly clayey; sand is mostly very fine to fine, some medium; very silty from 417.5 to 417.8 ft.....	417.5	422.0
Silt, very clayey, moderately sandy; sand is very fine to fine.....	422.0	425.5
Sand, very silty, moderately clayey; sand is very fine to fine; slightly clayey below 427 ft; sand is very fine to medium.....	425.5	435.0
Sandstone, silty, moderately consolidated; sand is very fine to medium.....	435.0	446.0
Siltstone to sandstone, marly, very calcareous, in part well consolidated; sand is very fine to medium.....	446.0	448.0

Sand, very silty, slightly clayey; sand is very fine to medium; slightly consolidated below 457.7 ft...	448.0	460.0
Sand, slightly silty; sand is mostly very fine to fine, some medium; contains some thin greenish gray silt layers from 460 to 465 ft; very silty from 471.5 to 475 ft; contains no silt below 475 ft; sand is very fine to medium.....	460.0	482.0
Silt, moderately clayey, slightly sandy, in part moderately sandy, light greenish gray; sand is very fine to fine; contains a limy layer from 486.5 to 487 ft; moderately clayey and in part slightly sandy below 490 ft; contains dense limy nodules.....	482.0	495.0
Sandstone, very fine.....	495.0	496.5
Clay, blocky structure, light green.....	496.5	499.0
Silt, slightly clayey, in part moderately sandy, light gray; sand is very fine; very sandy below 500 ft; contains marly areas; sand is very fine to fine.....	499.0	508.5
Limestone, light yellowish gray to white.....	508.5	509.5
Silt, moderately clayey, slightly sandy, in part marly to 510 ft; light olive gray; sand is very fine to fine; in part moderately sandy from 510 to 513 ft; contains no clay below 510 ft; contains limy nodules.....	509.5	515.0
Limestone and silty clay, interbedded, light olive gray, in part sandy; sand is very fine to fine....	515.0	518.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light gray, light yellowish gray and brownish yellow, clayey; contains limy nodules at 518.7 ft; light medium gray color below 525 ft.....	518.0	540.0

Test Hole #7-B-66 (E-log)
(14-18-33daaa)
Custer County

Location: NE NE NE SE sec. 33, T. 14 N., R. 18 W., approximately 143 feet south and 8 feet west of east ½ section line, west edge of road.

Ground elevation: 2,430 ft (t). (Mason City NW 7.5 min. quadrangle)

Depth to water: 155.0 ft. (July 29, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Silt, slightly clayey, slightly calcareous, yellowish brown, iron mottling, scattered gastropod shells, manganese stains below 22.5 ft.....	1.0	25.0
Silt, slightly sandy; contains very fine to fine sand; pale brown to yellowish brown.....	25.0	35.0
Silt, clayey; sandy, contains very fine to fine sand with some medium; pale brown to yellowish brown...	35.0	58.0
Sand, silty; contains very fine to medium sand; interbedded with sandy silt; pale brown; moderately clayey interbeds below 64.8 ft.....	58.0	70.5
Silt, moderately clayey, very sandy; contains very fine to medium sand, pale brown to yellowish brown.....	70.5	73.8
Clay, interbedded with sandy silt and very fine to medium sand; light brownish gray, iron and manganese staining.....	73.8	76.0
Silt, clayey; very sandy from 77.0 to 77.5 ft; light brownish gray becoming light yellowish brown below 77.5 ft; iron and manganese staining.....	76.0	82.5
Sand, very silty; texture grades from very fine to medium sand, several interbeds of sandy silt; very pale brown, iron and manganese staining.....	82.5	92.5
Silt, slightly to moderately clayey; with sandy interbeds containing very fine to fine sand; very pale brown, zones of iron staining.....	92.5	125.0
Sand and gravel, texture grades from fine sand to medium gravel with some coarse gravel, with 55 percent gravel to 135 ft and 70 percent below; reddish brown.....	125.0	145.5
Sand, very silty to slightly clayey; texture grades from very fine to fine with some medium sand; very pale brown to light yellowish brown.....	145.5	155.0
Silt, sandy, moderate to very clayey; contains very fine to fine sand; interbeds of fine gravel below 168.5 ft; very pale to pale brown.....	155.0	170.0

Sand and gravel, texture grades from fine sand to medium gravel; contains 40 percent gravel; reddish brown.....	170.0	175.0
Gravel, sandy, texture grades from fine sand to coarse gravel; contains 70 percent gravel, reddish brown.....	175.0	187.0
Silt, moderately clayey, interbedded with reworked fragments of siltstone and sandstone, pale brown..	187.0	192.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, interbedded with very fine to fine sand..	192.0	195.5
Silt, slightly to moderately clayey; interbedded with siltstone below 197.1 ft; very calcareous, indurated limy layers below 200 ft; light gray to pale yellow.....	195.5	201.9
Sandstone and siltstone, interbedded; sandstone is very fine to fine grained; limy streaks from 201.9 to 202.3 ft; very calcareous, light gray to very pale brown.....	201.9	206.0
Silt, very sandy; limy zones, very calcareous, light gray.....	206.0	208.0
Sand, very silty, texture grades from very fine to coarse sand and scattered fine gravel; numerous rootlets; moderately calcareous; silt from 210 to 210.5 ft; pale yellow brown.....	208.0	215.0
Sandstone, very fine to medium grained; very calcareous; limy zones; light gray to very pale brown...	215.0	220.0
Sandstone and sand, interbedded; very fine to fine grained; slightly to moderately calcareous; brown grading to pale olive at 239 ft.....	220.0	253.5
Sand, slightly indurated; texture grades from very fine to coarse sand; slightly calcareous; bone fragment at 260 ft; brown grading to pale olive at 260 ft.....	253.5	263.0
Silt, very sandy, slightly clayey; contains very fine to medium sand; pale olive.....	263.0	265.0
Sandstone, very fine to medium grained; interbedded with sand below 275 ft; rootlets are common, noticeably larger rootlets from 280 to 285 ft; slightly calcareous to 290 ft, very calcareous below 290 ft; pale olive.....	265.0	306.0
Silt and siltstone, interbedded; slightly clayey; several hard limy to limestone layers from 320 to 330 ft; very calcareous; gradational color changes of pale olive, olive, brown, pale brown and light gray with pale olive dominant; white and marly 332 to 333 ft.....	306.0	333.0
Sandstone, very fine to fine grained; interbedded with silty and limy zones; very calcareous; rootlets below 340 ft; pale olive to olive.....	333.0	345.0

Silt, moderately to very sandy, contains very fine to fine sand; moderately to very clayey; very slightly calcareous; pale yellow.....	345.0	365.0
Sandstone, very fine to fine grained; interbedded with silty and clayey sands, sandstone more common below 367 ft; very slightly calcareous; pale yellow.....	365.0	372.0
Silt, very sandy, very to moderately clayey; contains very fine to fine sand; interbedded with sandstone from 380 to 381.5 ft; very slightly calcareous; pale olive.....	372.0	390.5
Sand, silty, texture grades from very fine to medium sand; slightly calcareous; brown.....	390.5	393.0
Sandstone, very fine to fine grained; interbedded with sandy silt; pale olive.....	393.0	396.0
Silt, very sandy, contains very fine to fine sand; slightly clayey; pale yellow.....	396.0	405.0
Sand and sandstone, interbedded; very fine to fine grained; slightly calcareous, brown.....	405.0	420.0
Silt, slightly clayey; rootlets common; scattered indurated zones throughout; thin zones of volcanic ash from 435 to 450 ft; light brownish gray.....	420.0	455.0
Sand, silty; and silt, sandy; interbedded; contains very fine to fine sand, light brownish gray.....	455.0	470.0
Sand and gravel, texture grades from medium sand to coarse gravel; 40 percent gravel; reddish brown...	470.0	485.0
Gravel, texture grades from medium sand to coarse gravel and cobbles; 80 percent gravel; reddish brown.....	485.0	493.0
Sand, silty; texture grades from very fine to fine with some medium sand; interbedded with sandstone from 495 to 500 ft and 505 to 510 ft, light brown to very pale brown.....	493.0	515.0
Sand, interbedded with silty sand; texture grades from very fine to medium sand; contains reworked iron stained siltstone from 555 to 560.2 ft; brown.....	515.0	560.2
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, weathered shale, iron stained; light yellow to yellow brown.....	560.2	570.0
Shale, clayey, yellow brown from 570 to 575 ft, light gray from 575 to 590 ft.....	570.0	590.0

Test Hole #17-B-66 (E-log)
(14-20-1abbb)
Custer County

Location: NW NW NW NE sec. 1, T. 14 N., R. 20 E., approximately
 2,500 feet west and 207 feet south of northeast section corner,
 south edge of trail.

Ground elevation: 2,560 ft. (t). (Eddyville NE 7.5 min. quadrangle)

Depth to water: 203.2 ft. (September 6, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey; very sandy, contains very fine to fine sand with scattered medium; iron stained and cementation from 1.5 to 5 ft., light manganese staining from 8 to 22 ft., rounded sandstone grains from 17 to 20 ft., pale olive to 5 ft; pale grayish brown below 5 ft.....	0.0	26.2
Silt, moderately clayey, slightly sandy, soil-like, dark brown.....	26.2	31.6
Silt, slightly clayey; moderately sandy, contains very fine to fine sand with some medium; limy areas below 39.2 ft., slightly calcareous below 38.3 ft., manganese staining below 50 ft., iron stained below 51 ft., iron cemented nodules at 51 ft., sand layer from 80.5 to 81.8 ft., yellowish brown from 31.6 to 38 ft., brown from 38 to 45 ft., yellowish brown from 45 to 48 ft., light olive gray from 48 to 60 ft; pale yellow from 60 to 80 ft., and olive gray from 80 to 90 ft.....	31.6	90.0
Sand, very fine to medium grained, silt layers from 91 to 91.7 ft. and 93.4 to 93.9 ft., brown.....	90.0	96.4
Silt, slightly clayey; very sandy, contains very fine to fine sand with some medium; iron stained below 101 ft., light brownish gray.....	96.4	106.4
Sand, very fine to coarse grained, scattered pale olive silt interbeds, brown.....	106.4	117.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; iron stained below 120 ft., manganese stains below 128.3 ft., light brownish gray.....	117.0	130.0
Sand, very fine to coarse grained, brown.....	130.0	134.5
Silt, slightly to moderately clayey; very sandy, contains very fine to fine sand with trace of medium; iron stained from 135 to 137.7 ft., pale brown with reddish hues.....	134.5	141.5
Silt, slightly clayey; moderately sandy, contains very fine to fine sand, manganese stains at 150 ft., yellow brown.....	141.5	166.1

Silt, moderately clayey; very sandy, contains very fine to medium sand; marly, manganese stained, slightly calcareous, light gray grading to pale olive.....	166.1	180.0
Sand, silty, texture grades from very fine sand to coarse gravel, 10 percent gravel, reddish brown...	180.0	185.0
Gravel, texture grades from medium sand to very coarse gravel, 20 percent sand, reddish brown.....	185.0	200.0
Sand and gravel, texture grades from very fine sand to medium gravel, 40 percent gravel, reddish brown.....	200.0	203.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey; very sandy, contains very fine to fine sand with some medium; pale olive....	203.0	212.0
Sand and sandstone, interbedded, texture grades from very fine sand to fine gravel, brown.....	212.0	221.0
Silt, moderately clayey; very sandy, contains very fine to medium sand; marly below 225 ft., sandstone interbeds below 235 ft., rootlets below 228 ft., slightly to moderately calcareous, pale olive grading to light grayish brown.....	221.0	240.0
Sand, silty, very fine to medium grained, sandstone interbeds, marly, moderately calcareous, light grayish brown.....	240.0	242.4
Sand, very fine sand to 10 percent fine gravel, marly, reddish brown.....	242.4	250.0
Clay, silty; very sandy, contains very fine to coarse sand to 255 ft. and very fine to fine below; scattered manganese staining, scattered sandstone interbeds, lime nodules at 255 ft., pale olive.....	250.0	261.5
Sand, very fine to coarse sand with 15 percent gravel, brown.....	261.5	265.5
Silt, moderately clayey; very sandy, contains very fine to fine sand; marly, pale olive.....	265.5	266.5
Sandstone, silty, very fine to fine grained, grading to sand below 271.5 ft., interbeds of silty sand, olive gray.....	266.5	275.0
Silt, moderately clayey; very sandy, contains very fine to fine sand with some medium; scattered zones of rootlets, marly in zones, slightly calcareous below 290 ft., pale yellow.....	275.0	295.4
Sandstone, marly, very calcareous, pale olive.....	295.4	297.5
Sand, silty, very fine to fine sand except from 300 to 305 ft is very fine to coarse, lime cemented sandstone and siltstone interbeds, marly zones, slightly calcareous, pale olive and pale yellow...	297.5	310.0
Sandstone, very fine to fine grained, very marly, very calcareous, pale olive to white.....	310.0	320.0
Silt, interbedded with sandstone and marl, pale olive.....	320.0	325.0

Sandstone, silty, very fine to fine grained, with 3 to 5 ft. thick interbeds of silt, siltstone, and silty sand, marly, slightly calcareous, pale olive, pale yellow and light gray.....	325.0	343.5
Sand, very fine to medium grained, brown.....	343.5	349.0
Sandstone, very fine to medium grained, interbeds of silty sand, marly, very calcareous, brown.....	349.0	359.8
Sand, silty, very fine to fine grained with some medium, interbeds of sandstone, marly, scattered zones of lime cementation, slightly to moderately calcareous, pale olive to pale yellow.....	359.8	395.0
Marl, interbedded with lime cemented sandstone, very calcareous, white.....	395.0	400.0
Sand, silty, interbeds of lime cemented sandstone, marly, light olive gray.....	400.0	405.0
Silt, slightly sandy, contains very fine sand; sandstone interbeds, marly, slightly calcareous, pale olive.....	405.0	412.3
Marl, slightly sandy, silty below 412.8 ft., very calcareous, white.....	412.3	413.5
Sand, moderately silty, very fine to medium sand with trace of coarse, coarser at base, pale olive to pale yellow.....	413.5	457.0
Sand, very fine to coarse grained.....	457.0	475.0
Sand, slightly to moderately silty, very fine to medium grained with some coarse, some consolidation, rootlets below 495 ft., light gray.....	475.0	502.3
Sand, very fine to medium grained with some coarse, some silt interbeds, light gray.....	502.3	515.0
Sand, moderately silty, very fine to medium grained with some very coarse, scattered silt and sandstone interbeds, rootlets below 530 ft., slightly consolidated below 545 ft.; pale yellow to 578.5 ft., light gray below.....	515.0	590.0
Sand, very fine to coarse sand, slightly consolidated, scattered rootlets, light olive.....	590.0	610.0
Sand, very fine to medium, scattered rootlets, light olive.....	610.0	622.5
Sand, moderately silty, very fine to medium grained, marly, very calcareous, white.....	622.5	630.0
Silt, very sandy, interbedded with limestone, very calcareous, light gray.....	630.0	635.0
Sand, moderately silty, very fine to medium grained, numerous sandstone interbeds, marly, slightly to moderately consolidated, very calcareous, light gray to white.....	635.0	665.0
Silt, very sandy, contains very fine to fine sand, marly and some lime cementation from 665 to 670 ft., rootlets, light gray.....	665.0	676.7

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, clayey, weathered, yellow, orange, and light gray.....	676.7	685.0
Shale, clayey, lightly weathered, yellowish brown to light gray.....	685.0	710.0

Test Hole #18-A-66 (E-log)
(14-20-14dadd)
Custer County

Location: SE SE NE SE sec. 14, T. 14 N., R. 20 W., approximately
 1,480 feet north and 130 feet west of southeast section corner,
 west side of road.
 Ground elevation: 2,520 ft. (t). (Eddyville NE 7.5 min. quadrangle)
 Depth to water: 164.3 ft. (September 2, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, very slightly clayey; slightly sandy, contains very fine sand; scattered snail shells, iron stains, slightly calcareous, a few limy nodules, grayish brown.....	0.0	15.0
Sand, silty, very fine to fine grained with some medium sand, interbedded with silt from 21.8 to 24.5 ft, brown.....	15.0	24.5
Silt, slightly clayey; slightly sandy, contains very fine sand; pale brown with reddish hues.....	24.5	27.6
Silt, very clayey, very dark brown to dark grayish brown grading to pale brown at base, clay layer from 28.1 to 29.4 ft.....	27.6	30.8
Sand, moderately silty, very fine to fine grained, pale brown.....	30.8	40.0
Silt, slightly to moderately clayey; moderately sandy, contains very fine to fine sand, brown to pale brown.....	40.0	44.0
Sand, moderately silty, slightly clayey, very fine to fine grained, contains very fine to medium sand from 50.0 to 53.2 ft., clay interbed from 55 to 56 ft., interbedded very fine to medium sand from 60 to 65 ft., pale brown and brown.....	44.0	65.0
Silt, slightly clayey; moderately sandy, contains very fine to fine sand; interbedded with very fine to fine sand, brown to light brown with pinkish hues.....	65.0	69.0
Clay, very silty, very dark brown.....	69.0	69.9
Silt, slightly to very clayey, slightly calcareous, pale brown.....	69.9	73.4
Sand, moderately silty and clayey, very fine to fine grained, slightly calcareous, pale brown.....	73.4	79.0
Sand, very fine to fine grained with some medium sand, limy and calcareous zones from 85 to 89 ft..	79.0	89.0
Clay, with changes to silt; slightly sandy, contains very fine to fine sand; sand interbed from 93.1 to 93.8 ft., brown to pale brown.....	89.0	97.0

Sand, very fine to fine grained with some medium sand, scattered thin silt and clay seams to 110 ft., and below 120 ft. interbedded sand, silt, and clay layers from 110 to 120 ft., light gray with bands of pale brown.....	97.0	130.0
Sand, very fine to medium grained with some coarse and trace of very coarse sand, a few silt seams to 135 ft., interbedded with silt from 135 to 140 ft., silt and clay layers are yellowish brown.....	130.0	141.5
Sand, slightly to moderately clayey, very fine to fine grained with some medium sand, silt interbeds from 145 to 149 ft. and 151 to 152 ft., light gray to pale brown.....	141.5	157.4
Gravel, fine to coarse grained with 10 percent sand and pebbles.....	157.4	160.0
Sand and gravel, texture grades from very fine sand to coarse gravel, interbedded with silt and sand layers, light olive gray.....	160.0	165.0
Sand and gravel, predominantly coarse sand to coarse gravel.....	165.0	170.0
Sand, very fine to medium with some coarse sand and trace of gravel, scattered silt layers.....	170.0	172.4
Clay, moderately silty, moderately sandy, contains very fine to fine sand; white silty zone from 175 to 176.4 ft., slightly calcareous, light olive gray.....	172.4	177.8
Sand, moderately silty and clayey, very fine to fine grained, slightly calcareous, light gray.....	177.8	180.0
Silt, moderately clayey; slightly sandy, contains very fine sand, interbedded with clay below 182.5 ft., pale olive.....	180.0	185.0
Sand, silty, slightly clayey, very fine to fine grained, slightly calcareous, pale olive.....	185.0	187.8
Clay, slightly silty, scattered hard limestone nodules, moderately calcareous in spots, light brown with white mottling.....	187.8	193.5
Sand, very fine to coarse grained.....	193.5	195.0
Sand and gravel, texture grades from medium sand to medium gravel.....	195.0	198.3
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine grained, brown.....	198.3	199.2
Sand, slightly clayey, very fine to fine grained, light reddish brown.....	199.2	202.2
Sandstone, very fine to fine grained, pale brown...	202.2	207.5
Sand, moderately silty, very fine to fine grained, light gray.....	207.5	208.5
Sand, very fine to medium grained with trace of coarse sand, rootlets.....	208.5	215.0
Sand, silty, very fine to fine grained with some medium sand, interbedded with sandstone and clayey sand, slightly calcareous, light gray.....	215.0	225.0

Sand, very fine to medium grained with some coarse, light gray to white, slightly to very calcareous..	225.0	227.0
Limestone, very silty and sandy, pale olive.....	227.0	230.0
Sand and sandstone, interbedded, very fine to fine grained, scattered thin limestone seams above 235 ft., white and very calcareous marl from 235.2 to 237.6 ft., pale olive.....	230.0	240.0
Sand and sandstone, interbedded, moderately silty, very fine to fine grained with some medium, rootlets, pale yellow to light brownish gray.....	240.0	250.0
Sand, very fine to fine with some medium sand, moderately silty, scattered silt and sandstone interbeds, rootlets, pale olive.....	250.0	260.0
Sand, very fine to medium with some coarse sand, rootlets.....	260.0	270.0
Sand, very fine to fine with some medium sand, rootlets, thin limestone layers below 280 ft., silt and clayey sand interbeds below 290 ft., very calcareous from 295 to 300 ft.....	270.0	300.0
Sand and sandstone, gradual variations, very fine to fine grained with some medium sand and trace of coarse, marly areas below 305 ft., some lime cementation from 315 to 320 ft; slightly calcareous from 315 to 320 ft; pale olive and olive.....	300.0	322.1
Silt, slightly clayey; very sandy, contains very fine to medium sand, pale olive.....	322.1	325.2
Sand, very fine to medium grained, scattered sandstone interbeds, marly from 331.6 to 332.5 and below 345 ft., slightly calcareous in marl zones, light gray to pale olive.....	325.2	347.1
Sand and sandstone, gradual variations, very fine to medium grained with trace of coarse sand, lime cemented and moderately consolidated, very calcareous, olive to pale olive.....	347.1	365.0
Sand and sandstone, gradual variations, very fine to fine grained with trace of medium sand, lime cemented above 370 ft., very calcareous above 370 ft., silt interbeds from 370 to 375 ft., white at top to pale olive at base.....	365.0	375.0
Sand, very silty, very fine to fine grained with some medium sand, pale yellow.....	375.0	387.0
Sand, silty, very fine to medium grained with some coarse and very coarse sand, clay interbed from 392 to 392.5 ft., sandstone interbeds from 395 to 399 and 401 to 404.5 ft., pale yellow.....	387.0	404.5
Silt, slightly clayey; slightly sandy, contains very fine to fine sand, light olive gray.....	404.5	411.5
Sand, texture grades from very fine sand to fine gravel, predominantly medium to very coarse sand, light gray.....	411.5	415.0
Sand and gravel, texture grades from fine sand to medium gravel, 50 percent gravel, a few rootlets..	415.0	421.0

Sand and sandstone, very fine to fine grained with some medium sand, a few rootlets.....	421.0	425.0
Sand, very fine to medium grained with some coarse, slightly silty.....	425.0	430.0
Sand, very fine to very coarse grained, predominantly fine to coarse sand, scattered sandstone and clayey sand interbeds, light gray.....	430.0	455.0
Sandstone, very fine to fine grained, rootlets, light olive brown.....	455.0	458.5
Silt and siltstone; slightly sandy, contains very fine sand, light olive gray.....	458.5	460.0
Sand, very fine to medium with coarse sand.....	460.0	468.0
Silt, sandy, contains very fine sand; moderately clayey, traces of rootlets, very pale yellow.....	468.0	470.0
Sand, fine to medium sand with some coarse, calcareous marly silts below 475 ft., light gray.....	470.0	476.2
Silt, moderately sandy, contains very fine to fine sand, interbeds of fine to coarse sand and sandstone below 480 ft., very calcareous in spots, white.....	476.2	485.0
Sand and sandstone, interbedded, very fine to medium grained with some coarse sand.....	485.0	495.0
Sand, very fine to fine grained with some medium sand, sandy clay interbeds from 500.5 to 504.5 ft.	495.0	510.0
Sand and sandstone, interbedded, very fine to medium grained with some coarse and very coarse sand, numerous marly zones, slightly to moderately calcareous.....	510.0	530.0
Sand and clayey sand, interbedded, very fine to medium grained, moderately clayey, slightly to moderately calcareous.....	530.0	540.0
Sand, very fine to medium grained with some coarse sand to 545 ft., marly zones and scattered sandstone interbeds below 550 ft., trace of rootlets below 560 ft., non to very calcareous in spots....	540.0	578.8
Tertiary System - Miocene Series - Arikaree Group:		
Clay and claystone, slightly silty, marly from 583 to 583.5 ft., light olive gray to light reddish brown.....	578.8	600.5
NOTE: Poor sample quality below 575 ft.		

Test Hole #15-B-70 (E-log)
(14-22-5aaab)
Custer County

Location: NW NE NE NE sec. 5, T. 14 N., R. 22 W., approximately
 410 feet west and 8 feet south of northeast section corner,
 south side of road.

Ground elevation: 2,649 ft. (t). (Oconto 7.5 min. quadrangle)

Depth to water: Caved at 134 ft. (August 17, 1970)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, black.....	0.0	3.0
Silt, slightly clayey; very slightly sandy, contains very fine to fine sand; dark grayish brown to 10.5 ft., light grayish brown and iron stained below 10.5 ft.....	3.0	26.0
Sand, slightly silty, very fine grained with some fine.....	26.0	31.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; iron stains, pale brown.....	31.0	43.0
Sand, moderately silty, very fine to fine grained, areas of iron cementation.....	43.0	44.0
Silt, slightly clayey; moderately sandy, contains very fine to fine sand; light yellowish brown to 51 ft., light brownish gray below 51 ft.....	44.0	54.0
Clay, silty, iron stains, light olive gray.....	54.0	55.0
Silt, moderately clayey; slightly sandy, very fine to fine grained; light olive gray to pale brown...	55.0	60.8
Sand, silty, very fine to fine grained.....	60.8	62.7
Silt, moderately clayey; slightly sandy, contains very fine sand, pale brown.....	62.7	65.1
Sand, slightly silty, very fine to fine grained, thin silt lenses from 70 to 80 ft.....	65.1	81.5
Silt, slightly to moderately clayey; slightly sandy, contains very fine to fine sand; numerous limy areas, slightly to very calcareous, white marl from 82 to 83.5 ft., lime nodules from 105 to 110 ft., light gray to 85 ft., pale brown below 85 ft.	81.5	120.0
Clay, silty; moderately sandy, contains very fine to fine sand; limy; pale brown with reddish tints....	120.0	124.0
Silt, moderately clayey; very sandy, contains very fine to fine sand; pale yellow.....	124.0	127.5
Clay, silty; very sandy, contains very fine to fine sand; iron stains from 128.5 to 129.5 ft., lime nodules; pale yellow.....	127.5	132.0
Silt, moderately clayey; very sandy, contains very fine to fine sand; limy nodules, light olive gray to pale yellow.....	132.0	146.0

Sand, silty, very fine to fine grained with some medium sand, light olive gray.....	146.0	155.0
Sand and gravel, texture grades from very fine sand to medium gravel with trace of coarse gravel, 60 percent gravel, silt lenses from 155.5 to 156.3 and 169.2 to 169.3 ft., interval grades coarser with depth.....	155.0	185.0
Sand with gravel, texture grades from very fine sand to coarse gravel, predominantly medium to coarse sand, 15 percent gravel.....	185.0	187.0
Silt, slightly clayey; very sandy, light gray with pinkish tint.....	187.0	190.0
Sand, very fine to coarse grained, predominantly medium sand, scattered silt interbeds.....	190.0	195.0
Sand, silty, very fine to fine grained with trace of medium sand, rootlets, lightly cemented in areas.....	195.0	202.2
Sand, very fine to coarse grained, predominantly medium to coarse sand.....	202.2	205.0
Sand, very fine to medium grained with trace of coarse and very coarse sand, scattered silt interbeds.....	205.0	210.0
Silt, slightly to very clayey; very sandy, contains very fine to fine sand; pale yellow to light olive.....	210.0	218.0
Sand with gravel, texture grades from very fine sand to fine gravel, 5 percent gravel, a few silt interbeds.....	218.0	230.0
Sand and gravel, texture grades from very fine sand to medium gravel with trace of coarse gravel, 50 percent gravel, silt interbed from 244.5 to 245 ft.....	230.0	245.0
Silt, moderately clayey; moderately sandy, contains very fine to fine sand; sandstone interbeds from 247.5 to 250 ft.....	245.0	255.0
Sand and gravel, texture grades from very fine sand to medium gravel, 30 percent gravel, scattered interbeds of sandy silt.....	255.0	265.0
Tertiary System - Miocene Series - Ogallala Group:		
Siltstone, moderately clayey, small amount of very fine sand, light brown.....	265.0	275.5
Silt, very clayey, marly, interbeds of limestone, moderately to very calcareous, pinkish gray.....	275.5	280.0
Silt and siltstone, gradual variations, interbeds of limestone, moderately to very calcareous, grayish brown to light olive gray.....	280.0	295.0
Clay, silty, moderately to very calcareous, light olive gray to pale yellow.....	295.0	298.5
Marl, clayey, very calcareous, white.....	298.5	302.5

Sand and gravel, texture grades from coarse sand to fine gravel, numerous thin marly clay and limestone interbeds.....	302.5	305.0
Sand, very fine to coarse grained, trace of fine gravel, 5 percent gravel, many dark silicates.....	305.0	311.5
Sandstone, slightly silty, moderately consolidated, very fine to fine grained, scattered silt and sandy silt interbeds, olive gray.....	311.5	330.0
Sand, very fine to medium grained, interbeds of limestone and lime cemented sandstone, olive gray.	330.0	345.5
Silt and siltstone, gradual variations, moderately clayey, pale yellow.....	345.5	350.6
Sand, sandstone and siltstone, gradual variations, silty, very fine to fine grained, limy areas, lime cemented areas, trace of rootlets, pale yellow to pale olive gray.....	350.6	375.0
Sandstone, very fine to fine grained, well consolidated, lime cementation, marly areas, rootlets, siltstone interbeds below 385 ft., pale yellow to light olive gray.....	375.0	389.5
Sand and sandstone, gradual variations, silty, very fine to fine grained, limy areas, slightly to very calcareous, pale yellow to olive gray.....	389.5	415.0
Sandstone, silty and siltstone, sandy; interbedded, lime cementation, moderately consolidated, moderately to very calcareous, pale yellow.....	415.0	427.5
Marl, silty, very calcareous, white.....	427.5	435.7
Sandstone, silty, very fine to fine grained, interbedded with silty sand and sandy silt, moderately consolidated, light olive gray.....	435.7	445.0
Sand, very fine to fine.....	445.0	450.0
Silt, very sandy, contains very fine to fine sand, pale yellow.....	450.0	455.5
Sand and sandstone, interbedded, silty, very fine to fine grained with some medium sand, light olive.....	455.0	470.3
Silt, slightly clayey; very sandy, contains very fine to fine sand; a few sandstone and silty sand interbeds, pale yellow to light gray.....	470.3	500.0
Sand, silty, very fine to fine grained with trace of medium sand, a few limy areas, interbedded with sandy silt and siltstone from 510 to 515 ft. and from 520 to 523 ft., olive gray to pale olive.....	500.0	523.0
Silt and siltstone, gradual variations, moderately clayey; slightly sandy, contains very fine to fine sand; lime cemented interbeds below 535 ft., very calcareous in spots, pale olive to olive.....	523.0	540.0
Sand, very fine to medium grained, partly lime cemented, a few rootlets, many dark silicates.....	540.0	545.0
Sandstone, silty, very fine to fine grained, lime cemented, poorly consolidated, a few rootlets, olive gray.....	545.0	550.0

Sand, very fine to medium with trace of coarse sand, many dark silicates, olive.....	550.0	555.0
Sandstone, very fine to fine grained, moderately consolidated, lime cemented, very calcareous, pale yellow.....	555.0	565.0
Sand, very fine to medium grained with trace of coarse sand, many dark silicates.....	565.0	571.0
Siltstone, very clayey, slightly iron stained, some limy areas, moderately calcareous, light brownish gray.....	571.0	575.0
Sand, very fine to medium sand with trace of coarse sand.....	575.0	580.0
Siltstone, very clayey, slightly iron stained, limy areas, moderately calcareous.....	580.0	585.0
Sandstone, slightly silty, very fine to fine grained, moderately consolidated, lime cemented, moderately to very calcareous, pale yellow.....	585.0	595.0
Limestone and marl, trace of lime cemented sandstone below 600 ft., very calcareous, pale yellow to white.....	595.0	601.5
Sandstone, lime cemented, marly areas, hard from 606.2 to 607.8 ft., very calcareous, pale yellow to light gray.....	601.5	610.0
Sand, slightly to moderately silty, very fine to medium grained, some lime cemented sandstone and siltstone interbeds.....	610.0	619.5
Marl, sandy, white.....	619.5	620.1
Silt and siltstone, gradual variations, moderately clayey, pale yellow.....	620.1	625.3
Sandstone and siltstone, poorly consolidated, contains very fine to coarse sand and fine gravel, olive.....	625.3	630.0
Tertiary System - Miocene Series - Arikaree Group:		
Siltstone and silt, gradual variations, volcanic ash shards, pink bentonite scattered throughout, grayish brown to brown.....	630.0	665.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Silt and siltstone, gradual variations, slightly micaceous from 670 to 680 ft., pinkish gray.....	665.0	691.0
Sandstone, slightly silty, very fine grained, moderately consolidated, scattered silt interbeds, dark brown.....	691.0	698.0
Silt and siltstone, gradual variations, scattered very fine grained sandstone interbeds to 720 ft., considerable amount of bentonite from 720 to 721.8 ft., pinkish gray.....	698.0	721.8

<p>Silt, scattered siltstone interbeds to 730 ft. and very common below 730 ft., small amount of bentonite from 721.8 to 725 ft. and from 745 to 760 ft., a few reworked siltstone grains from 745 to 750 ft., pale yellow.....</p>	721.8	760.0
<p>Silt and siltstone, gradual variations, considerable bentonite from 765 to 780 ft., pinkish gray, some pale yellow from 770 to 775 ft.....</p>	760.0	780.0

Test Hole #14-B-70 (E-log)
(14-22-32ccbc)
Custer County

Location: SW NW SW SW sec. 32, T. 14 N., R. 22 W., approximately
 722 ft. north and 274 ft. east of southwest section corner.
 Ground elevation: 2,840 ft. (t). (Oconto 7.5 min. quadrangle)
 Depth to water: 300+ ft., (September 6, 1970)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey; slightly sandy, contains very fine sand; iron stains below 10 ft., slightly to moderately calcareous from 10 to 55 ft., light brownish gray to brownish gray.....	0.0	60.0
Sand, silty, very fine to fine grained, pale brown..	60.0	65.0
Silt, slightly clayey; slightly sandy, contains very fine sand; pale brown.....	65.0	68.0
Silt, very clayey; moderately sandy, contains very fine to fine sand; dark brown to 72.5 ft., pale brown below 72.5 ft.....	68.0	75.0
Sand, slightly silty, very fine to fine grained, interbedded with silt from 75 to 80 ft., very pale brown.....	75.0	90.0
Silt, moderately clayey; moderately to very sandy, contains very fine to fine sand; a few limy grains, very calcareous below 93.4 ft., sand interbeds from 95 to 95.5 ft., from 99 to 100 ft., and from 133.5 to 135 ft., slightly to moderately calcareous from 115 to 140 ft., brown to pale brown.....	90.0	140.0
Sand, silty, very fine to fine grained with trace of medium sand, pale brown to light gray.....	140.0	165.0
Sand, very fine to fine grained, thin sandy silt interbeds from 170 to 175 ft., and from 185 to 190 ft., light gray.....	165.0	196.8
Sand, silty, very fine to fine grained, light gray..	196.8	225.0
Sand, silty and silt, sandy; gradual variations, very fine to fine grained, light gray.....	225.0	242.0
Sand, silty, and silt, sandy; gradual variations, very fine to medium grained with some coarse and very coarse sand, light gray to light olive gray..	242.0	248.0
Sand, very fine to coarse grained, predominantly very fine to medium sand.....	248.0	259.0
Sand, silty and silt, sandy; gradual variations, very fine to fine grained, light brownish gray....	259.0	265.0
Silt, slightly clayey; moderately sandy, very fine to fine grained; limy nodules, light brownish gray.....	265.0	270.0
Sand, silty, very fine to coarse grained, pre-dominantly very fine to fine.....	270.0	274.8

Silt, moderately clayey; slightly sandy, contains very fine to fine sand; limy and moderately to very calcareous from 284 to 290 ft., pale brown and light yellowish brown to 284 ft., very pale brown from 284 to 287 ft., and light brownish gray below 287 ft.....	274.8	297.0
Sand, moderately silty, very fine to very coarse grained, predominantly very fine to fine sand.....	297.0	298.3
Silt, slightly to very clayey; moderately sandy, contains very fine to fine sand; marl from 326 to 326.3 ft., limy zones from 326.3 to 330 ft., moderately to very calcareous from 326 to 330 ft., light brown, brown, and pale brown.....	298.3	332.0
Silt, very clayey; very sandy, contains very fine to fine sand; lime nodules to 335 ft., numerous interbeds of limestone and marl, moderately to very calcareous, light gray to light olive gray...	332.0	345.0
Silt, slightly to moderately clayey; very sandy, contains very fine to fine sand; limy and marly areas, slightly to very calcareous, coarse sand and fine gravel noted below 365 ft., light gray to olive.....	345.0	370.0
Sand, very silty, very fine to fine grained.....	370.0	372.5
Sand, texture grades from very fine sand to fine gravel, 10 percent gravel.....	372.5	375.0
Gravel, texture grades from very fine sand to medium gravel, 60 percent gravel, contains many red and pink silicates.....	375.0	380.2
Silt, slightly silty; very sandy, contains very fine to fine sand; interbedded thin limestones to 395 ft., limy and marly areas throughout, very calcareous in spots, pale yellow to light olive gray.	380.2	400.0
Sand, slightly silty, very fine to coarse.....	400.0	403.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; limy areas; very calcareous in spots, pale yellow to light olive gray.....	403.0	408.0
Sand, texture grades from very fine sand to medium gravel with trace of coarse gravel, predominantly coarse and very coarse sand, 20 percent gravel....	408.0	430.0
Sand and gravel, texture grades from very fine sand to medium gravel, trace of coarse gravel, predominantly very coarse sand to fine gravel, 60 percent gravel.....	430.0	435.0
Sand, silty and silt, sandy; gradual variations, very fine to fine grained, brown.....	435.0	440.0
Sand, very fine to coarse, trace of fine gravel, rootlets.....	440.0	444.0
Tertiary System - Miocene Series - Ogallala Group:		
Marl, with limestone, very calcareous, white.....	444.0	445.5

Silt, slightly clayey; very sandy, very fine to fine sand; marly; very calcareous, pale olive to light gray to pale yellow.....	445.5	459.0
Sandstone, moderately clayey, very fine to fine grained, a few limy streaks, moderately to very calcareous, pale yellow.....	459.0	461.0
Volcanic ash, light gray.....	461.0	462.0
Silt, slightly to moderately clayey, slightly to very sandy, marly, sandstone interbed from 465 to 466 ft., white marly siltstone at base of interval from 472.5 to 473.1 ft., very calcareous, iron stains at 467 ft., numerous rootlets from 470 to 472.5 ft., pale yellow to pale olive..	462.0	473.1
Sand, very fine to medium grained, limy to marly, sandstone layers from 473.1 to 475 ft. and 486 to 487.1 ft., silt interbed from 482 to 485 ft., non to very calcareous, pale olive.....	473.1	487.1
Silt, slightly clayey; very sandy, contains very fine to medium sand; interbeds of limestone and lime cemented sandstone below 490 ft., moderately to very calcareous, pale yellow.....	487.1	495.0
Sand and sandstone, gradual variations, silty; very fine to fine grained, limy areas, slightly to very calcareous, light gray.....	495.0	505.0
Sand, very fine to medium grained with some coarse sand, scattered interbeds of sandstone and siltstone, rootlets, limy areas, moderately to very calcareous, pale yellow to pale olive.....	505.0	515.0
Sand, very fine to coarse grained, predominantly medium sand, trace of fine gravel, abundant dark silicates.....	515.0	523.7
Silt, slightly clayey; very sandy, contains very fine to fine sand; marly and white in upper 2 ft., very calcareous, pale yellow.....	523.7	530.0
Sand, very fine to medium grained.....	530.0	535.0
Silt, slightly clayey, very sandy, top 0.5 ft. is very marly and pinkish gray, limy zones below 550 ft., pale olive to 560 ft., light gray below 560 ft.....	535.0	570.5
Marl, sandy, white.....	570.5	570.7
Sand, and sandstone, silty, marly, very calcareous, white to pale olive.....	570.7	575.0
Sand, silty and silt, sandy; gradual variations, sandstone interbeds from 576 to 580 ft., sand is very fine to fine grained, very calcareous in spots, light gray to pale olive.....	575.0	585.0
Sand, very fine to coarse grained, trace of gravel..	585.0	590.0
Sand and gravel, texture grades from very fine sand to fine gravel with some medium gravel, 35 percent gravel, limy areas.....	590.0	595.2
Limestone, marly, white.....	595.2	597.4

Gravel, texture grades from very fine sand to fine gravel, trace of medium gravel, 75 percent gravel.	597.4	610.2
Marl, sandy, white.....	610.2	614.5
Silt, sandy, contains very fine to fine sand, limy areas, slightly to very calcareous, pale yellow to light gray.....	614.5	625.0
Sand, silty and silt, sandy; gradual variations, sand is very fine to fine grained, upper 0.1 ft. is lime cemented sandstone, limy areas, very calcareous, light gray.....	625.0	630.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; limy, very calcareous, pinkish white.....	630.0	635.0
Marl, silty, very sandy, interbedded with lime cemented sandstone, very calcareous, pinkish white.....	635.0	637.0
Silt, slightly clayey, very sandy, limy areas, very calcareous in spots, light gray.....	637.0	645.0
Silt, sandy and sand, silty; gradual variations, very fine to fine grained sand, limy areas to 650 ft., light gray.....	645.0	670.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; light olive gray to light gray.	670.0	680.0
Silt, sandy, and sand, silty; gradual variations, very fine to fine sand, volcanic ash shards from 695 to 700 ft., from 715 to 720 ft., and 730 to 735 ft., rootlets below 737 ft., limy areas from 720 to 725 ft., pale yellow and light gray.....	680.0	740.0
Silt, moderately clayey; very sandy, contains very fine to fine sand; limy, moderately calcareous, sandstone interbeds from 750 to 754.4 ft., white marl from 754.4 to 755 ft; light gray.....	740.0	755.0
Clay, silty, limy, moderately calcareous, pale yellow.....	755.0	756.5
Silt, very sandy, contains fine to very fine sand, a few volcanic ash shards from 756.5 to 760 ft., limy areas, very calcareous, pale yellow, bottom 2 ft. is pinkish white.....	756.5	780.0
Limestone and sandstone, interbedded, well consolidated to 790 ft., sandy, marly, very calcareous, siltstone interbeds from 791 to 795 ft., pale yellow with areas of pinkish white.....	780.0	800.0

Test Hole #66-HP-79 (E-log)
(14-25-28dadd)
Custer County

Location: SE SE NE SE sec. 28, T. 14 N., R. 25 W., approximately
 1500 feet north and 50 feet west of the southeast section corner.
 Ground elevation: 2,850 ft. (t). (Odencranze Table North 7.5 min.
 quadrangle)

Depth to water: Not recorded

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, moderately clayey, brown to 15 ft., dark brown below 15 ft.....	0.0	20.0
Silt, slightly to moderately clayey, layers of dark brown silt from 40 to 45 ft., white calcareous thin clay layers from 140 to 155 ft., 165 to 170 ft., 195 to 200 ft., and white clay streaks from 210 to 225 ft., light gray clay streaks 155 to 160 ft. and 190 to 195 ft., iron stains to 105 ft., and trace of iron stains from 125 to 130 ft., scattered thin limestone layers below 170 ft., interval becomes slightly sandy below 215 ft., slightly to moderately calcareous below 140 ft., light yellowish brown from 20 to 30 ft., pale brown from 30 to 120 ft., and light yellowish brown from 120 to 224 ft.....	20.0	224.0
Sand, very silty, very fine to very coarse grained, predominantly fine to medium sand, trace of fine gravel.....	224.0	230.0
Sand, slightly silty, very fine to very coarse sand, some fine and medium gravel, predominantly medium to coarse from 230 to 240 ft and predominantly coarse to very coarse sand from 240 to 245 ft.....	230.0	245.0
Sand and gravel, texture grades from very fine sand to medium gravel, predominantly coarse to very coarse sand, trace of coarse gravel below 270 ft., silt interbeds at 255 ft.....	245.0	284.0
Silt, slightly clayey, slightly sandy, scattered clay streaks, light olive gray.....	284.0	295.0
Silt, grading to sand from 300 ft to 308 ft., white streaks of calcareous clay, slightly to moderately calcareous, pale yellow.....	295.0	308.0
Sand, very fine to very coarse with some fine gravel, predominantly medium to coarse sand.....	308.0	310.0
Tertiary System - Miocene Series - Ogallala Group:		
Limestone and lime cemented sandstone.....	310.0	315.0
Silt, interbedded with lime cemented sandstone and white clay below 320 ft., a few rootlets, slightly to moderately calcareous, light yellowish brown...	315.0	330.0

Sandstone, very fine to fine grained, interbedded with silt and white clay, slight to moderately calcareous, rootlets, brown.....	330.0	345.0
Silt, slightly to moderately sandy, a few lime cemented brown sandstone interbeds, light yellowish brown.....	345.0	352.0
Sand, moderately silty, very fine to coarse grained, predominantly very fine to fine sand, light yellowish brown with a few white clay streaks and pale yellow silt interbeds.....	352.0	370.0
Sandstone, very pale brown with pale yellow silt interbeds.....	370.0	380.0
Silt, moderately sandy, hard limestone interbed at 382 ft., very pale brown.....	380.0	395.0
Sand, moderately silty, very fine to very coarse grained with trace of fine gravel, silt interbed from 410 to 414 ft.....	395.0	422.0
Sandstone, sandy silt, and sand, interbedded; sand and sandstone are very fine to fine grained, slightly to moderately calcareous below 440 ft., pale brown and very pale brown.....	422.0	460.0
Sand, very fine to medium grained, a few limestone and siltstone fragments, slightly to moderately calcareous.....	460.0	465.0
Silt, moderately sandy, a few thin sandstone and limestone interbeds, and white clay streaks, moderately to very calcareous.....	465.0	485.0
Sandstone, very fine to fine grained, a few fine to medium sand and sandy silt interbeds, silt interbeds with white clay streaks from 510 ft to 515 ft., moderately calcareous, brown.....	485.0	520.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; a few white clay streaks to 535 ft., scattered sandstone interbeds, very fine to medium sand interbed from 540 to 545 ft., very pale brown to 545 ft., pale yellow below 545 ft...	520.0	555.0
Sand, very fine to coarse grained, several pale yellow silt interbeds.....	555.0	565.0
Silt, very sandy, contains very fine to medium sand with trace of coarse sand, a few thin sandstone layers, pale yellow.....	565.0	580.0
Silt, with limestone interbeds, and white calcareous clay and brownish yellow silt seams, moderately calcareous, pale yellow.....	580.0	595.0
Sandstone, interbedded with sandy silt, very fine to fine grained, slightly calcareous, pale brown.....	595.0	600.0
Silt, slightly to very sandy, a few sandstone and clayey silt interbeds, hard limestone seams from 615 to 620 ft., slightly to moderately calcareous, a few rootlets from 630 to 635 ft., pale brown to 620 ft., pale yellow below 620 ft.....	600.0	640.0

Sand, moderately silty, very fine to very coarse grained, predominantly fine to medium sand, trace of fine gravel.....	640.0	644.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Silt, interbedded with pale brown very fine to fine grained sandstone to 650 ft., slightly calcareous, very pale brown.....	644.0	655.0
Siltstone, interbedded with very pale brown silts to 685 ft., trace of pink and white minerals from 665 to 670 ft., trace of olive claystone fragments from 680 to 685 ft.....	655.0	700.0

Test Hole #8-A-59 (E-log)
(15-17-12ddad)
Custer County

Location: SE NE SE SE sec. 12, T. 15 N., R. 17 W., approximately
 926 feet north and 9 feet west of southeast section corner.
 Ground elevation: 2,305 ft. (t). (Arcadia SW 7.5 min. quadrangle)
 Depth to water: 108 ft. (6-22-59).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	0.5
Silt, slightly clayey, slightly calcareous, coarse textured, light brown; contains some limy nodules below 5 ft; noncalcareous below 15 ft.....	0.5	18.3
Silt, slightly clayey, very dark brown; contains coarse silt to very fine sand.....	18.3	19.3
Silt, slightly clayey, slightly sandy, light brown; sand is very fine to fine; moderately clayey from 20 to 25 ft; moderately sandy and slightly calcareous from 25 to 27.5 ft.....	19.3	30.0
Silt, slightly clayey, slightly calcareous, coarse textured, light medium brown; contains limy areas from 31 to 32 ft., 33.5 to 35 ft. and from 37.8 to 40 ft; in part moderately clayey and contains blocky structure.....	30.0	45.0
Silt, slightly clayey, slightly sandy, light medium brown; sand is very fine to fine.....	45.0	57.5
Gravel, fine to very coarse.....	57.5	60.0
Gravel, sandy; fine sand to medium gravel (about 75 percent gravel).....	60.0	63.8
Silt, slightly clayey, very sandy, light yellowish gray; sand is very fine to fine, some medium.....	63.8	65.0
Sand, very silty; sand is very fine, some fine; contains silt layers from 70 to 71.5 ft. and from 74 to 75 ft; very sandy; sand is very fine to fine with some medium below 71.5 ft.....	65.0	84.5
Sand, gravelly; very fine sand to medium gravel (about 25 percent gravel); contains no medium gravel below 90 ft.....	84.5	99.5
Silt, very clayey, slightly sandy, light yellowish gray; sand is very fine.....	99.5	100.0
Silt, slightly clayey, very sandy, light olive gray; sand is very fine to fine; mottled light olive gray to yellowish brown below 104.4 ft.....	100.0	105.0
Silt, slightly clayey, moderately sandy, light pinkish gray; sand is very fine to fine, some medium; slightly less sandy below 105.5 ft.....	105.0	110.0

Silt, moderately clayey, very sandy, light brown; sand is very fine to medium; contains some marly areas.....	110.0	113.1
Sand, very fine to medium, some fine gravel; contains some marly areas.....	113.1	115.0
Sand, gravelly; fine sand to fine gravel (about 40 percent gravel); contains some silt lenses and marly areas.....	115.0	120.0
Sand, mostly very fine to medium, some coarse to very coarse sand and a trace of fine gravel.....	120.0	125.0
Sand, gravelly; fine sand to fine gravel (about 30 percent gravel); contains some silt lenses.....	125.0	130.0
Gravel, sandy; fine sand to fine gravel (about 60 percent gravel); contains some thin silt layers...	130.0	140.7
Silt, moderately clayey, sandy, medium brown; sand is very fine to fine.....	140.7	142.0
Gravel, sandy; fine sand to fine gravel (about 70 percent gravel); contains a silt layer from 145 to 145.6 ft; contains some medium gravel from 155 to 165 ft.....	142.0	167.5
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, slightly silty, poorly consolidated; sand is very fine to fine; contains no silt below 170 ft; contains some medium sand.....	167.5	173.5
Silt, moderately clayey, very sandy, light olive gray; sand is very fine to fine; slightly clayey and contains some medium sand below 175 ft.....	173.5	175.7
Sand, very fine to medium; contains a thin silt layer from 177.8 to 177.9 ft; silty and contains less medium sand from 180 to 185 ft; contains a thin clay layer at 177.8 ft; contains rootlets below 180 ft.....	175.7	190.0
Sand, very fine to medium, in part silty; contains some rootlets and seeds.....	190.0	195.0
Sand, very fine to fine, some medium; contains thin silty lenses from 195 to 200 ft.....	195.0	203.5
Silt, moderately clayey, very sandy, light olive gray; sand is very fine to fine; silt is light gray and contains some medium sand below 205 ft; contains silty sandstone below 206.5 ft.....	203.5	209.0
Silt, slightly clayey, coarse-textured, granular structure, light olive gray; silt is medium yellowish gray below 210 ft.....	209.0	210.4
Sandstone and silt, interbedded; sand is very fine to fine, some medium.....	210.4	215.0
Sand, very fine to medium; contains some rootlets; contains a silty layer from 218.3 to 218.5 ft; contains a few coarser grains from 220 to 227.6 ft; contains no medium sand below 227.6 ft.....	215.0	230.0
Sandstone and silt, interbedded; sand is very fine to fine, some medium.....	230.0	233.1

Silt, slightly clayey, very sandy, light olive gray; sand is very fine to fine.....	233.1	235.0
Sandstone, slightly silty, poorly consolidated; sand is very fine to fine, some medium; contains some limy areas from 235 to 245 ft; contains no medium sand below 240 ft; contains some rootlets below 245 ft.....	235.0	249.4
Silt, marly, light gray; contains a siltstone lens below 249.7 ft.....	249.4	250.0
Silt and sandstone, interbedded, marly, light gray; sand is very fine to medium; contains a marly layer below 255 ft.....	250.0	255.5
Silt, slightly clayey, very sandy, moderately calcareous, light gray; sand is very fine to fine....	255.5	256.5
Marl and silty sandstone, interbedded, light gray; sand is very fine to fine; contains no silty sandstone below 260 ft.....	256.5	261.1
Silt, slightly clayey, marly, light gray; moderately sandy from 262.8 to 265 ft; very sandy below 265 ft; sand is very fine to fine.....	261.1	270.0
Sandstone, well consolidated; sand is very fine to fine.....	270.0	275.0
Sand, gravelly; fine sand to fine gravel (about 25 percent gravel).....	275.0	280.0
Sand, very fine to medium, some coarse sand and a trace of fine gravel; contains reworked material and rootlets; contains a silt layer at 281.8 ft...	280.0	285.0
Sand, very fine to coarse, some very coarse; contains reworked material and rootlets; contains some fine gravel from 290 to 300 ft; sand is very fine to medium, some coarse below 310 ft.....	285.0	314.6
Silt, slightly clayey, very sandy, light gray; sand is very fine to fine; contains some rootlets; contains interbedded silty sandstone from 315.8 to 318.2 ft; contains coarse silt to very fine sand below 318.2 ft.....	314.6	320.0
Sand, very fine to medium, some coarse to very coarse; contains some rootlets; slightly silty below 327 ft.....	320.0	330.0
Sand, slightly clayey, very silty, light olive gray; sand is very fine to fine, some medium.....	330.0	337.0
Sand, very fine to fine, some medium; contains some rootlets.....	337.0	340.5
Silt, slightly clayey, moderately sandy, light olive gray; contains coarse silt to fine sand; contains volcanic ash; sand is very fine to fine below 345 ft.....	340.5	350.0
Sand, slightly consolidated; sand is very fine to medium; contains mostly very fine to fine sand below 355 ft.....	350.0	358.6
Silt, slightly clayey, coarse-textured, granular structure, light olive gray.....	358.6	358.8

Siltstone, sandy, light olive gray; contains coarse silt to very fine sand.....	358.8	360.0
Sand, slightly clayey, very silty; sand is very fine to fine.....	360.0	365.0
Silt, marly, slightly clayey, sandy, light gray; sand is very fine to fine; contains no marl below 366.5 ft; silt is light olive gray.....	365.0	367.9
Sand, slightly clayey, very silty; sand is very fine to fine.....	367.9	370.0
Sandstone, well consolidated; sand is very fine to fine, some medium; contains some marly areas; poorly consolidated and very silty below 375 ft; sand is very fine to fine; contains some rootlets.	370.0	380.0
Sand, slightly silty, slightly consolidated; sand is very fine to fine, some medium; contains limy areas and rootlets; very silty and contains no medium sand from 393.5 to 395 ft; moderately silty and slightly clayey from 395 to 400 ft; very silty and contains no medium sand below 400 ft.....	380.0	401.5
Sandstone, well consolidated; sand is very fine to fine; contains some marly areas to 404 ft; moderately silty and slightly consolidated from 404 to 405 ft; moderately consolidated, contains some silt lenses and rootlets below 405 ft.....	401.5	408.0
Silt, very sandy, slightly calcareous, light olive gray; sand is very fine to fine.....	408.0	410.0
Sand, slightly consolidated; sand is very fine to fine; contains some silt lenses; contains some rootlets below 420 ft.....	410.0	425.0
Sand, very silty; sand is very fine to fine; moderately silty below 430 ft.....	425.0	435.0
Sand, slightly consolidated; sand is very fine to fine; marly from 447.5 to 448.5 ft; moderately consolidated and contains some marly areas from 450 to 455 ft; slightly silty and contains some medium sand below 460 ft.....	435.0	466.5
Silt, slightly clayey, moderately sandy, slightly calcareous, light olive gray to white; sand is very fine to fine.....	466.5	468.0
Sand and silty sand, interbedded, slightly consolidated; sand is very fine to fine; contains some rootlets below 475 ft.....	468.0	480.0
Sand, slightly consolidated; sand is very fine to fine, some medium; contains some rootlets; contains more medium sand below 485 ft; slightly silty below 490 ft.....	480.0	492.5
Silt, slightly clayey, very sandy, light gray to white; sand is very fine to medium.....	492.5	495.0
Sandstone, very silty, very light olive gray; sand is very fine to fine.....	495.0	500.0
Silt, sandy, light gray to white; contains coarse silt to very fine sand.....	500.0	505.0

Sand, slightly silty, slightly consolidated; sand is very fine to fine; contains some medium sand below 515 ft.....	505.0	525.0
Sand, slightly silty; sand is very fine to medium; moderately silty and contains no medium sand below 538.5 ft.....	525.0	540.0
Silt, slightly clayey, very sandy, slightly calcareous, light olive gray; sand is very fine to fine.	540.0	545.0
Sand, very silty; sand is very fine to fine.....	545.0	546.0
Silt, slightly clayey, slightly sandy, very calcareous, light brownish yellow; sand is very fine to fine; contains interbedded sandstone below 550 ft.	546.0	555.0
Sandstone, slightly silty, well consolidated; sand is very fine to fine; contains some marly areas...	555.0	561.5
Marl, white.....	561.5	564.2
Sandstone, slightly silty, moderately consolidated; sand is very fine to fine; contains some silt lenses below 565 ft.....	564.2	570.5
Silt, marly, slightly sandy, coarse textured, blocky structure, white; sand is very fine to fine.....	570.5	575.0
Silt, slightly clayey, slightly sandy, moderately calcareous, light olive gray; sand is very fine; moderately clayey below 580 ft; contains some limy areas.....	575.0	585.0
Silt, very clayey, moderately sandy, moderately calcareous, light olive gray; sand is very fine; contains limy areas; contains reworked ironstone from 585 to 589.2 ft.....	585.0	590.5
Gravel; principally reworked quartz, ironstone, and siltstone fragments.....	590.5	593.0
Silt, moderately clayey, moderately calcareous, coarse textured, light olive gray; contains limy areas.....	593.0	595.0
Silt, moderately clayey, moderately calcareous, light yellowish gray.....	595.0	601.5
Gravel; principally reworked quartz and ironstone fine gravel sized fragments.....	601.5	602.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, light gray; mottled light gray to light yellowish gray below 605 ft.....	602.5	610.0

Test Hole #6-A-66 (E-log)
(15-18-4ccdc)
Custer County

Location: SW SE SW SW sec. 4, T. 15 N., R. 18 W., approximately
 831 feet east and 9 feet north of southwest section corner, north
 side of road.

Ground elevation: 2,310 ft. (t). (Ansley 7.5 min. quadrangle)

Depth to water: Hole caved at 70 ft. (July 1, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Sand, very silty, very fine to fine grained, very dark grayish brown.....	1.0	2.5
Silt, very slightly clayey; very sandy, contains very fine to fine sand; silty sand layer from 5.5 to 6 ft., very dark grayish brown.....	2.5	8.2
Sand, very silty, very fine to fine grained, con- tains limy nodules, moderately calcareous, pale olive.....	8.2	9.5
Silt, slightly clayey; moderately sandy, contains very fine sand; contains limy nodules, slightly calcareous, brown.....	9.5	10.5
Sand, very fine to medium grained, contains wood fragments and decayed organic material, zone of wood from 28.5 to 30.2 ft.....	10.5	36.3
Sand and gravel, texture grades from very fine sand to coarse gravel with some pebbles.....	36.3	45.0
Sand, very fine to medium grained, zone of silt at 52.3 ft.....	45.0	55.0
Sand and gravel, texture grades from very fine sand to coarse gravel with scattered zones containing pebbles, 40 percent gravel from 110 to 130 ft., bone fragment recovered between 125 and 130 ft....	55.0	145.0
Sand and gravel, silty, contains fragments of re- worked sandstone and rootlets, texture grades from very fine sand to medium gravel, many dark sand grains.....	145.0	150.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine to fine grained, rootlets, moderately consolidated, scattered zones of sand, marly below 156 ft., olive.....	150.0	167.0
Sand and sandstone, silty, interbedded, very fine to fine grained, rootlets, lime cemented from 180.9 to 181.5 ft., marl from 195 to 195.5 ft., moderately calcareous above 195.5 ft., pale olive.	167.0	200.0
Sand, texture grades from fine to very coarse sand with some fine gravel, rootlets, pale olive.....	200.0	205.0

Sand, sandstone, and marl, interbedded, very fine to fine grained, very calcareous, light gray.....	205.0	210.0
Sand and sandstone, interbedded, very fine to medium grained, silty, rootlets, silt interbeds from 225 to 230 ft., pale yellow.....	210.0	230.0
Sand, very fine grained.....	230.0	260.5
Sand, very fine to medium grained with some very coarse, rootlets.....	260.5	270.0
Sandstone, very fine to fine grained, rootlets, moderately consolidated, pale yellow.....	270.0	280.0
Sand and sandstone, gradual variations, very fine to fine grained with trace of medium sand, rootlets, siltstone interbeds from 290 to 295 ft., moderately consolidated.....	280.0	326.2
Sandstone, lime cemented, very fine to fine grained, rootlets, scattered sand interbeds, very calcareous, light yellow grading to light brown below 360 ft.....	326.2	375.0
Sand, silty, very fine to medium grained, scattered siltstone and sandstone interbeds, rootlets, slightly consolidated, light gray to light brown..	375.0	415.0
Sand, sandstone, and silty sand, interbedded, very fine to medium grained, moderately consolidated, rootlets, light gray.....	415.0	430.0
Sand, very fine to medium grained, slightly consolidated, a few rootlets, light gray.....	430.0	470.0
Sand, texture grades from fine to very coarse sand and 10 percent fine gravel.....	470.0	480.0
Marl, limy, very calcareous.....	480.0	482.6
Sand, very fine to fine grained with some medium grained and trace of coarse sand, slightly to moderately consolidated, rootlets, weathered shale fragments below 525 ft.....	482.6	529.6
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale.....	529.6	540.5

Test Hole #16-A-66 (E-log)
(15-20-23aaba)
Custer County

Location: NE NW NE NE sec. 23, T. 15 N., R. 20 W., approximately
 776 feet west and 56 feet south of northeast section corner,
 north side of trail.

Ground elevation: 2,622 ft. (t). (Broken Bow SE 7.5 min. quadrangle)

Depth to water: 178.9 ft. (August 26, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Topsoil.....	0.0	2.0
Silt, coarse texture, slightly clayey, slightly sandy, contains very fine sand; iron stains to 38.2 ft., iron concretions from 15 to 20.4 ft., wood from 20.4 to 20.8 ft., pale brown and light yellowish brown to 20.4 ft., light olive brown and pale olive below 20.8 ft., slightly calcareous....	2.0	42.5
Silt, very sandy, contains very fine to fine sand, slightly clayey, light yellowish brown.....	42.5	48.0
Sand, very fine to medium grained, silt interbed from 51.5 to 52.2 ft., light brownish gray.....	48.0	60.6
Sand, moderately silty, very fine to fine grained, iron and yellow stains, light brownish gray.....	60.6	65.0
Silt, moderately clayey; moderately sandy, contains very fine to fine sand; fine to medium sand inter- bed from 68 to 70 ft., iron stains, gray.....	65.0	75.0
Sand, very fine to medium grained, scattered thin silt layers, iron stains.....	75.0	95.0
Sand, interbedded with silty sand, very fine to medium grained, iron stains, small amount of man- ganese stains, gray.....	95.0	110.0
Sand, very fine to medium grained, a few thin silt layers, iron stains.....	110.0	116.6
Silt, slightly clayey; very sandy, contains very fine to fine sand; trace of iron stains, light yellowish brown.....	116.6	121.3
Sand, very fine to medium grained.....	121.3	128.0
Silt, very clayey; moderately sandy, contains very fine sand; iron stained, iron concretions, light gray.....	128.0	136.5
Silt, slightly clayey; slightly sandy, contains very fine sand; lime fragments to 139 ft., iron stains to 140 ft., slightly calcareous, grayish brown....	136.5	143.8
Silt, moderately clayey, coarse texture; slightly sandy, contains very fine sand; yellowish brown...	143.8	158.3

Silt, slightly clayey, coarse texture; slightly sandy, contains very fine sand; limy zone with nodules and carbonaceous material from 160 to 163.5 ft., scattered areas are slightly cemented; yellow brown.....	158.3	180.0
Silt, slightly clayey; moderately sandy, contains very fine to fine sand; marly and lime cemented zones from 186.5 to 200 ft., very calcareous in spots from 186.5 to 195 ft., light gray.....	180.0	202.0
Sand, moderately silty, very fine to medium grained with trace of coarse sand, sandy silt interbeds below 215 ft., manganese stains from 202 to 210 ft., slightly limy from 210 to 215 ft., pale brown becoming light gray below 210 ft.....	202.0	230.0
Sand, very fine to very coarse grained sand with some fine gravel; silty to 233.5 ft.....	230.0	235.0
Sand with gravel, texture grades from very fine sand to medium gravel, 15 percent gravel, a few rootlets above 245.5 ft., silty zone at 257 ft.....	235.0	265.0
Sand and gravel, texture grades from very fine sand to medium gravel, 40 percent gravel.....	265.0	290.0
Sand, very fine to medium grained with some coarse sand, slightly consolidated, a few rootlets.....	290.0	295.0
Sand and gravel, texture grades from fine sand to medium gravel, trace of very coarse gravel, rootlets, silt interbeds at 302 and 326.8 ft.....	295.0	334.5
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, coarse texture, yellow.....	334.5	340.0
Sand, slightly to moderately silty, very fine to fine grained, limy zones, rootlets, very calcareous in spots.....	340.0	345.0
Sand, silty, and marly silt, interbedded, very fine to fine grained, rootlets, very calcareous, light gray to white.....	345.0	355.0
Sand and sandstone, gradual variations, lime cementation to 370 ft., very fine to medium grained with trace of coarse sand, very calcareous in spots to 370 ft., marly and slightly calcareous from 400 to 420 ft., rootlets, light olive to light olive gray.....	355.0	425.0
Sand and sandstone, moderately silty, very fine to medium grained, rootlets, olive.....	425.0	435.0
Sand and sandstone, very fine to medium grained, gradual variations, very marly, rootlets, slightly to moderately consolidated, moderately to very calcareous, light gray except white from 440 to 445 ft and 475 to 485 ft.....	435.0	485.0
Sand, slightly silty, very fine grained to fine grained with some medium, scattered sandstone interbeds, a few rootlets, slightly to moderately consolidated, light gray.....	485.0	520.0

Silt, slightly clayey, coarse texture; slightly sandy, contains very fine sand; numerous thin interbeds of sandstone, pale yellow.....	520.0	525.0
Sand, silty, very fine to fine grained, pale yellow.	525.0	530.5

Test Hole #13-B-70 (E-log)
(15-22-5baba)
Custer County

Location: NE NW NE NW sec. 5, T. 15 N., R. 22 W., approximately 1,950 feet east and 259 feet south of northwest section corner, east side of road.

Ground elevation: 2,595 ft. (t). (Callaway SE 7.5 min. quadrangle)

Depth to water: 84.1 ft. (August 17, 1970)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.5
Silt, slightly clayey; slightly sandy, contains very fine to fine sand; dark gray brown to gray brown..	1.5	6.0
Silt, slightly clayey; slightly sandy, contains very fine to fine sand; iron stains, limonitic nodules, slightly calcareous, light brownish gray.....	6.0	21.0
Sand, moderately silty, very fine to fine grained, large lime and iron cemented concretions, very calcareous in areas, one bone fragment, light grayish brown.....	21.0	30.0
Silt and sand, interbedded; silt is slightly to moderately clayey and slightly sandy; sand is silty and fine grained; slightly to very calcareous, light brownish gray.....	30.0	35.0
Silt, slightly clayey, very slightly sandy, iron and manganese stains from 50 to 55 ft., limy area from 43 to 45 ft., numerous limy concretions from 61.8 to 61.9 ft., at 66 ft., and from 76 to 77.5 ft., very slightly to moderately calcareous to 80 ft., pale brown, becomes light yellowish brown below 80 ft.....	35.0	90.0
Sand, very silty, very fine to medium sand with some coarse sand to medium gravel, pale brown.....	90.0	94.0
Silt, slightly clayey; slightly sandy, contains very fine to fine sand, light brownish gray.....	94.0	97.3
Sand, silty, gravelly, texture grades from very fine sand to fine gravel, pale brown.....	97.3	99.0
Clay, silty, light gray.....	99.0	100.5
Gravel, texture grades from fine sand to coarse gravel, predominantly fine to medium gravel, 80 percent gravel; several thin, gray silt interbeds to 115 ft., considerable amount of orthoclase.....	100.5	120.0
Gravel, sandy, texture grades from fine sand to coarse gravel, 40 percent sand.....	120.0	125.0
Clay, silty; slightly sandy, contains very fine to fine sand; iron and manganese stains, light olive gray.....	125.0	130.2

Sand, gravelly, texture grades from fine sand to medium gravel, 30 percent gravel.....	130.2	135.0
Sand and gravel, texture grades from fine sand to medium gravel with some coarse, 50 percent gravel, silt layers at 147 ft. and from 160 to 165 ft., numerous pink feldspars.....	135.0	165.0
Sand, texture grades from fine sand to fine gravel, 20 percent gravel.....	165.0	175.0
Gravel, texture grades from fine sand to medium gravel with trace of coarse gravel, 60 percent gravel, olive silt lens at 199.7 ft.....	175.0	200.0
Sand, very fine to very coarse grained, several silt interbeds, trace of limy grains.....	200.0	205.5
Silt, slightly to very clayey, very sandy, very limy, very calcareous, pale brown.....	205.5	207.0
Sand, gravelly, texture grades from fine sand to medium gravel, 30 percent gravel.....	207.0	220.0
Sand and gravel, texture grades from fine sand to medium gravel, silty zone from 228 to 233 ft.....	220.0	240.0
Sand, texture grades from fine sand to medium gravel, 20 percent gravel.....	240.0	245.0
Gravel, texture grades from fine sand to medium gravel, 60 percent gravel, rootlets from 250 to 255 ft., white siliceous fragments from 255 to 260 ft.....	245.0	270.0
Sand, texture grades from fine sand to fine gravel, predominantly medium to very coarse sand, a few thin interbeds of brown silt.....	270.0	275.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine to coarse grained, numerous siliceous rootlets.....	275.0	280.0
Sand and sandstone, gradual variations, very fine to medium grained, some rootlets, scattered silt interbeds.....	280.0	296.8
Sandstone, silty, limy zones, olive gray.....	296.8	299.0
Sandstone, slightly silty, very fine to medium grained, trace of rootlets, scattered silt interbeds below 315 ft., pale olive.....	299.0	330.0
Silt, slightly to moderately clayey, slightly sandy becoming more sandy below 335 ft., marly, slightly calcareous, pale yellow.....	330.0	340.0
Sandstone, very fine to fine grained, slightly silty, lime cementation, poorly consolidated from 355 to 358.4 ft., slightly to moderately calcareous, light pale olive.....	340.0	370.0
Sandstone, very fine to medium grained with trace of coarse sand, slightly silty, rootlets, some manganese cementation from 375 to 395 ft., moderately consolidated becoming less consolidated below 420 ft., olive to light olive gray.....	370.0	441.0
Sand, very silty, slightly clayey, pale olive.....	441.0	445.0

Sand and sandstone, gradual variations, slightly silty, very fine to medium grained, trace of rootlets, light olive gray.....	445.0	460.0
Sandstone, silty, slightly clayey, pale yellow.....	460.0	465.0
Sandstone, slightly silty, interbedded with weathered volcanic ash-clay from 465 to 470 ft., silt and claystone interbeds from 470 to 475 ft., moderately consolidated, olive.....	465.0	490.0
Sand and sandstone, gradual variations, slightly silty, very fine to medium grained, trace of rootlets, well consolidated sandstone from 505 to 511 ft., pale olive.....	490.0	511.0
Sand, silty with sandy siltstone, trace of lime cementation, pale olive.....	511.0	516.0
Sandstone, silty, very fine to fine grained, limy zones, moderately to well consolidated, slightly to very calcareous, pale olive.....	516.0	530.0
Sandstone, slightly silty, very fine to medium grained, interbeds of claystone and siltstone from 530 to 545 ft., pale olive becoming light gray below 550 ft.....	530.0	558.0
Sand, silty, slightly clayey, very sandy, limy areas, slightly to moderately calcareous, light gray.....	558.0	560.0
Silt, moderately sandy, limy areas, slightly calcareous, light olive gray.....	560.0	570.0
Sandstone, silty, lime cemented, poorly to moderately consolidated, trace of rootlets, interbeds of sandy silt from 580 to 585 ft., slightly calcareous, pale olive.....	570.0	595.0
Silt, slightly to moderately clayey, very sandy, limy areas, iron stains from 614 to 615 ft., slightly to very calcareous, pale yellow grading to light olive gray.....	595.0	615.0
Sandstone and sand, interbedded, very fine to coarse grained, contains fragments of reworked brown siltstones, trace of pink bentonite, well consolidated in sandstone zones, light gray.....	615.0	619.0
Tertiary System - Miocene Series - Arikaree Group:		
Silt and siltstone, gradual variations, trace of volcanic ash and pink bentonite, brown to light brownish gray.....	619.0	635.0
Silt and siltstone, gradual variations; slightly sandy, contains very fine sand; light yellowish brown to light brownish gray.....	635.0	655.0
Silt and siltstone, gradual variations, slightly to moderately clayey, becomes predominantly silt below 665 ft., light brownish gray.....	655.0	678.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation:

Silt and siltstone, manganese nodules from 680 to 685 ft., 700 to 702 ft. and 719.4 to 720 ft., considerable volcanic ash, interbeds of volcanic ash from 689.4 to 695 ft. and 700 to 702 ft., light brownish gray to 698.9 ft., from 719.4 to 724 ft., and from 726 to 729 ft., remainder of interval is pale brown..... 678.0 729.0

Tertiary System - Oligocene Series - White River Group:

Chadron Formation:

Clay, bentonitic, fragments of reworked shale, some claystone, iron stains below 735 ft., olive gray to light gray, pale yellow to white below 735 ft.. 729.0 737.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, clayey, bentonitic, weathered, heavily iron stained, brownish yellow..... 737.0 745.0
Shale, clayey, weathered, slightly calcareous, gray to brownish yellow hard seams of ironstone from 750 to 760 ft., gray to brownish yellow..... 745.0 765.0
Shale, gray to black..... 765.0 770.0

Test Hole #9-A-59 (E-log)
(16-17-36aaba)
Custer County

Location: NE NW NE NE sec. 36, T. 16 N., R. 17 W., approximately
 1 foot south and 670 feet west of northeast section corner.
 Ground elevation: 2,365 ft. (t). (Arcadia SW 7.5 min. quadrangle)
 Depth to water: Test hole caved at 176 ft. (7-2-59).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Topsoil.....	0.0	0.7
Silt, slightly clayey, coarse-textured, granular structure, medium brown; light brownish gray from 1.5 to 5 ft; contains limy nodules from 1.5 to 3.2 ft.....	0.7	10.0
Silt, moderately clayey, moderately calcareous, medium yellowish gray; slightly less clayey from 13 to 15 ft; slightly calcareous.....	10.0	15.0
Silt, slightly clayey, coarse textured, in part granular structure, medium yellowish gray; slight- ly calcareous from 20 to 30 ft; contains shell fragments below 25 ft.....	15.0	47.0
Silt, moderately clayey, very dark brown.....	47.0	49.5
Silt, very clayey, medium brown.....	49.5	55.0
Silt, moderately clayey, moderately sandy, medium brown; sand is very fine to fine; contains some limy grains at 57 ft; slightly sandy below 60.5 ft; contains coarse silt to very fine sand, con- tains some limy grains.....	55.0	65.0
Silt, moderately clayey, coarse-textured, medium brown; slightly less clayey below 66.5 ft; slight- ly lighter in color from 70 to 75.8 ft; contains limy areas from 80 to 82 ft, 85 to 86.5 ft, and below 95 ft; contains some limestone lenses from 92.5 to 95 ft; contains blocky structure.....	65.0	100.0
Silt, moderately clayey, moderately sandy, slightly calcareous, coarse-textured, medium brown; sand is very fine to medium.....	100.0	101.4
Sand, gravelly; very fine sand to fine gravel (about 10 percent gravel); contains about 20 percent gravel below 105 ft.....	101.4	115.0
Gravel, sandy; fine sand to medium gravel (about 75 percent gravel); contains a thin silt lens at 117 ft.....	115.0	120.6
Sand, very silty; sand is very fine to medium.....	120.6	126.0
Sand, fine to coarse, some very coarse sand with fine gravel (about 15 percent gravel from 126 to 130 ft. and about 5 percent gravel from 130 to 135 ft.); contains no fine gravel below 135 ft....	126.0	142.0

Silt, slightly clayey, very sandy, light olive gray; sand is very fine to medium.....	142.0	145.5
Sand, fine to very coarse, some fine gravel (about 10 percent gravel).....	145.5	150.0
Silt, slightly clayey, slightly sandy, coarse-textured, light yellowish gray; sand is very fine; sand is very fine to fine below 158.8 ft.....	150.0	160.0
Sand, moderately clayey, very silty; sand is very fine, some fine.....	160.0	165.0
Silt, slightly clayey, very sandy; sand is very fine; contains some rootlets.....	165.0	171.3
Sand and gravel, fine sand to medium gravel (about 50 percent gravel); contains a silt lens from 187 to 188 ft.....	171.3	191.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, moderately consolidated; sand is very fine to medium, some coarse.....	191.0	193.0
Silt, slightly clayey, moderately sandy, light brown; sand is very fine to fine.....	193.0	196.5
Silt, slightly clayey, slightly sandy, white; sand is very fine; contains volcanic ash and diatomaceous earth.....	196.5	201.5
Silt, slightly clayey, slightly sandy, marly, white; sand is very fine; contains volcanic ash, moderately sandy below 202.5 ft; sand is very fine to fine.....	201.5	206.0
Sandstone, moderately consolidated, slightly silty; sand is very fine to fine; contains some rootlets.	206.0	210.0
Sand, slightly consolidated; sand is very fine to fine; contains some rootlets.....	210.0	219.0
Marl, slightly silty, moderately sandy; sand is very fine to fine; slightly sandy below 221 ft, sand is very fine.....	219.0	223.5
Silt, slightly clayey, moderately sandy, light olive gray; sand is very fine to fine.....	223.5	227.5
Sand, moderately consolidated; sand is very fine to fine, some coarse; contains a silt lens from 228.2 to 229.3 ft.....	227.5	230.0
Sand, gravelly; fine sand to fine gravel (about 35 percent gravel).....	230.0	240.0
Gravel, sandy; fine sand to medium gravel (about 65 percent gravel).....	240.0	245.0
Sandstone, slightly silty, moderately consolidated; sand is very fine to fine, some medium.....	245.0	246.5
Silt, slightly clayey, very sandy, light olive gray; sand is very fine to medium; contains rootlets; silt is light gray to white below 250 ft; contains some interbedded sandstone.....	246.5	256.5
Sandstone, poorly consolidated; sand is very fine to fine; contains some interbedded silt, very sandy..	256.5	260.0
Sand, very fine to fine; contains some silt lenses..	260.0	265.0

Silt, slightly clayey, coarse-textured, light olive gray; contains thin limy layers from 268 to 268.3 ft. and from 269.1 to 269.3 ft.....	265.0	270.7
Sand, slightly clayey, very silty, in part slightly consolidated; sand is very fine to medium; sand is very fine to coarse below 275 ft; contains some rootlets.....	270.7	278.3
Silt, slightly clayey, coarse-textured, light olive gray; contains coarse silt to very fine sand.....	278.3	281.0
Sand, very fine to medium; contains some rootlets; contains a silt layer from 283.9 to 284.1 ft.....	281.0	289.7
Sand, slightly clayey, very silty; sand is very fine; contains rootlets; contains no silt from 291.6 to 293.6 ft; sand is very fine to medium....	289.7	295.0
Silt, slightly clayey, very sandy, light olive gray; sand is very fine to fine; contains limy areas; contains a sand lens from 296 to 296.5 ft; contains some rootlets.....	295.0	300.0
Siltstone, moderately clayey, slightly calcareous, coarse-textured, granular structure, light olive gray; contains some sandstone lenses below 301.4 ft.....	300.0	305.0
Sandstone, very fine to fine.....	305.0	308.0
Silt, slightly clayey, sandy, marly, coarse-textured, granular structure; sand is very fine to fine.....	308.0	309.5
Silt, slightly clayey, slightly sandy, marly, light gray; contains coarse silt to very fine sand.....	309.5	310.0
Sandstone, moderately silty, marly; sand is very fine to fine.....	310.0	311.5
Silt, slightly clayey, sandy, marly, light brownish gray; sand is very fine to fine.....	311.5	313.0
Silt, slightly clayey, in part sandy and marly, light olive gray; sand is very fine to fine.....	313.0	315.0
Siltstone, moderately consolidated, sandy, marly, light olive gray; sand is very fine to fine.....	315.0	318.8
Silt, moderately clayey, very sandy, marly, coarse-textured, granular structure, light olive gray; sand is very fine to fine.....	318.8	320.0
Silt, slightly clayey, sandy, marly, light olive gray; sand is very fine to fine; contains some interbedded sandstone lenses; contains some volcanic ash.....	320.0	325.0
Sandstone, moderately consolidated; sand is very fine to fine.....	325.0	326.0
Silt, slightly clayey, coarse-textured, marly, light olive gray; contains coarse silt to very fine sand; moderately clayey below 327.6 ft.....	326.0	330.0
Sandstone, poorly consolidated; sand is very fine to fine; contains some silty areas; contains marly areas and rootlets below 335 ft.....	330.0	341.9

Silt, moderately clayey, light olive gray; contains volcanic ash; slightly clayey below 345 ft; contains marly areas and some sand below 350 ft.....	341.9	355.0
Sand, slightly consolidated; sand is very fine to fine.....	355.0	358.0
Silt, slightly clayey, very sandy, light olive gray; sand is very fine to fine.....	358.0	365.0
Sand, slightly silty, in part slightly consolidated; sand is very fine to fine; moderately silty below 415 ft.....	365.0	420.0
Silt, slightly clayey, very sandy, light olive gray; sand is very fine to fine, some medium; slightly more clayey below 424.3 ft; contains no medium sand below 424.9 ft; contains a limestone lens from 426.3 to 426.4 ft.....	420.0	426.4
Silt, moderately clayey, moderately calcareous, mottled medium brown to light olive gray; contains some siltstone lenses; sandy below 436.6 ft; sand is very fine to fine; contains a limestone lens from 438.2 to 439.5 ft.....	426.4	440.7
Sand, slightly silty; sand is very fine to fine, some medium; contains no medium sand below 445 ft; contains no silt below 450 ft; contains some consolidation.....	440.7	453.0
Sand, slightly clayey, very silty; sand is very fine to fine.....	453.0	455.0
Sandstone, moderately consolidated; sand is very fine to fine.....	455.0	457.0
Silt, slightly clayey, very sandy, marly, light gray; sand is very fine to medium.....	457.0	458.0
Sand, slightly clayey, very silty; sand is very fine to medium; contains some rootlets.....	458.0	460.0
Sandstone, moderately consolidated; sand is very fine to fine; contains some rootlets; contains some sandy silt from 462.1 to 465 ft.....	460.0	466.5
Silt, slightly clayey, moderately calcareous, light olive gray; contains coarse silt to very fine sand; noncalcareous below 467.6 ft.....	466.5	470.0
Sand, very fine to coarse; contains some rootlets and claystone grains.....	470.0	479.0
Silt, moderately clayey, slightly calcareous, light olive yellow.....	479.0	480.0
Sand, slightly clayey, very silty; sand is very fine to fine; contains some medium sand below 483.9 ft; contains some limy areas.....	480.0	485.0
Silt, moderately clayey, very calcareous, light gray; contains a limestone layer from 490 to 492.6 ft.....	485.0	495.0
Sand, slightly silty; sand is very fine to medium, some coarse; contains some rootlets; contains no coarse sand from 505 to 515 ft; contains some limy areas below 520 ft.....	495.0	530.0

Sand, slightly clayey, very silty; sand is very fine to medium; in part moderately consolidated from 530 to 535 ft; in part marly below 542.4 ft.....	530.0	545.0
Sand, very fine to medium; contains some thin silt lenses from 550 to 555 ft; slightly silty from 565 to 573.3 ft; contains some coarse sand from 575 to 580 ft; sand is very fine to fine; sand is slightly clayey and very silty below 583.3 ft.....	545.0	587.0
Silt, moderately clayey, very sandy, slightly calcareous, light olive gray; sand is very fine to fine.....	587.0	590.0
Sand, slightly clayey, very silty; sand is very fine to fine.....	590.0	595.0
Silt, moderately clayey, moderately sandy, slightly calcareous, light olive gray; sand is very fine to fine.....	595.0	597.5
Sand, moderately clayey, very sandy; sand is very fine to fine.....	597.5	600.0
Silt, moderately clayey, very sandy, moderately calcareous, light olive gray; sand is very fine to fine; contains some limy grains; contains some silty sandstone lenses.....	600.0	605.0
Sand, slightly clayey, moderately silty; sand is very fine to fine; sand is slightly consolidated below 610 ft; slightly silty.....	605.0	616.4
Siltstone, poorly consolidated, light olive gray; contains coarse silt to very fine sand.....	616.4	624.0
Silt, moderately clayey, moderately sandy, very calcareous, marly, light olive gray; sand is very fine to fine; slightly clayey from 625 to 630 ft; coarse-textured.....	624.0	635.0
Silt, very clayey, moderately sandy, moderately calcareous, in part marly, light olive gray; contains coarse silt to very fine sand.....	635.0	651.3
Sand, very fine to medium, some coarse.....	651.3	653.6
Limestone.....	653.6	654.0

Test Hole #7-A-66 (E-log)
(16-18-16ccaa)
Custer County

Location: NE NE SW SW sec. 16, T. 16 N., R. 18 W., approximately
 1,098 feet north and 1,200 feet east of southwest section corner,
 west side of US Hwy 183.

Ground elevation: 2,478 ft. (t). (Ansley 7.5 min. quadrangle)

Depth to water: 136.5 ft. (July 16, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, very sandy, contains very fine to fine sand, pale brown.....	0.0	1.5
Sand, very fine to fine grained with some medium sand, sandy silt from 4.5 to 5 ft., light brownish gray.....	1.5	10.0
Silt, slightly clayey; moderately sandy, contains very fine to fine sand, slightly calcareous, pale yellow.....	10.0	15.0
Sand, lime cemented, rootlets, moderately calcar- eous, pale olive.....	15.0	20.0
Silt, very sandy, contains very fine sand; interbeds of silty sandstone, slightly calcareous, pale olive.....	20.0	22.5
Sand, very fine to medium grained, slightly consoli- dated.....	22.5	27.6
Silt, slightly to moderately clayey; moderately sandy, contains very fine to fine sand; moderately calcareous, sand from 29.2 to 30 ft., light gray..	27.6	33.0
Sand, very fine to fine grained with trace of medium sand, snail shell fragments below 40 ft.....	33.0	46.5
Silt, moderately sandy, contains very fine sand, iron stained, snail shell fragments below 48.5 ft., pale yellow.....	46.5	50.0
Sand, fine to medium grained, slightly silty.....	50.0	60.5
Silt, moderately clayey; sandy, contains very fine to fine sand, limy below 63 ft., spotty calcareous zones, very pale brown.....	60.5	65.0
Sand, very fine to fine grained with trace of coarse sand, slightly consolidated, very hard from 80.7 to 81.2 ft., very pale brown.....	65.0	81.2
Silt, slightly clayey; very sandy, contains very fine to fine sand with a trace of medium.....	81.2	87.0
Sand, very silty, fine to very fine grained, silt layer from 92 to 93.5 ft., light yellowish brown..	87.0	95.0
Silt, sandy, very fine to medium with trace of coarse sand, light yellowish brown.....	95.0	97.0
Sand, very fine to medium grained with some coarse sand, sandy silt interbeds below 100 ft.....	97.0	103.0

Silt, moderately clayey, very sandy, contains very fine sand; very pale brown, green gray mottling below 109 ft.....	103.0	110.0
Silt, slightly clayey; sandy, contains very fine sand; sand interbeds from 113.5 to 115 ft. and 120 to 121.5 ft., limy nodules 121.5 to 121.7 ft., light olive.....	110.0	121.7
Silt, moderately clayey, slightly sandy, contains very fine to fine sand; micaceous from 130 to 134 ft., light yellowish brown grading to brown.....	121.7	134.0
Silt, very clayey, slightly sandy, contains coarse sand and fine gravel, brown.....	134.0	136.5
Sand and gravel, texture grades from fine sand to coarse gravel and some pebbles, 30 percent gravel.	136.5	150.0
Sand and gravel, texture grades from fine sand to medium gravel, 50 percent gravel.....	150.0	158.0
Sand, texture grades from fine sand to medium gravel, 10 percent gravel, silt layer at 161 ft...	158.0	165.0
Sand and gravel, texture grades from medium sand to medium gavel, 40 percent gravel.....	165.0	167.0
Silt, slightly clayey; very sandy, contains fine to medium sand; rootlets.....	167.0	170.0
Sand, texture grades from very fine to coarse.....	170.0	178.0
Silt, very clayey, moderately sandy, light gray with reddish brown and gray mottling.....	178.0	181.5
Silt, slightly clayey; moderately sandy, contains very fine to medium sand, very pale brown.....	181.5	189.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey and sandy, slightly iron stained, pale yellow.....	189.0	190.5

Test Hole #15-A-66 (E-log)
(16-20-14dddd)
Custer County

Location: SE SE SE SE sec. 14, T. 16 N., R. 20 W., approximately 137 feet north and 6.5 feet west of southeast section corner, west side of road.

Ground elevation: 2,510 ft. (t). (Broken Bow SE 7.5 min. quadrangle)

Depth to water: Hole caved at 101 ft. (August 18, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Silt, coarse texture, slightly clayey; slightly sandy, contains very fine sand; iron stains, snail shells from 15.3 to 16.5 ft., manganese stains below 33 ft., light yellowish brown grading to pale olive.....	1.0	40.0
Sand, silty, very fine to medium grained with trace of coarse sand; iron stains from 40 to 42 ft., light yellowish brown.....	40.0	45.4
Sand, very fine to coarse grained, slightly silty from 45.4 to 50 ft.....	45.4	55.2
Silt, moderately clayey; slightly sandy, contains very fine to fine sand; sand interbed from 68 to 68.7 ft., manganese stains to 62 ft. and from 80 to 83 ft., slightly calcareous and limy zones from 83 to 86 ft., light yellowish brown to pale brown.	55.2	86.6
Sand, moderately silty, very fine to medium grained, marly and limy areas throughout, slightly to very calcareous, scattered limestone fragments, very pale brown to 94.6 ft. and light gray below 94.6 ft.....	86.6	100.0
Sand, very fine to very coarse grained, light gray..	100.0	117.0
Sand, very silty, very fine to medium grained, light gray.....	117.0	119.0
Silt, moderately clayey; moderately sandy, contains very fine to medium sand; marly zones from 120.6 to 124 ft., very calcareous from 120.6 to 124 ft., light gray to 124 ft. and pale brown below 124 ft.	119.0	128.2
Sand and sandstone, gradual variations, very fine to coarse sand.....	128.2	132.0
Sand, texture grades from fine sand to medium gravel, 10 percent gravel.....	132.0	140.0
Sand and gravel, texture grades from fine sand to medium gravel, 25 percent gravel.....	140.0	150.0
Sand and gravel, texture grades from fine sand to medium gravel, 40 percent gravel.....	150.0	155.0

Tertiary System - Miocene Series - Ogallala Group:

Sand and sandstone, gradual variations, very fine to medium grained, moderately consolidated, pale olive silt interbed from 158.5 to 159.5 ft., rootlets.....	155.0	166.3
Silt, slightly to moderately clayey, interbedded with marl, siltstone, limestone, and sandstone, some lime cementation, calcareous in spots, pale brown.....	166.3	176.7
Sand, very fine to medium grained, a few thin sandstone layers, rootlets.....	176.7	180.0
Sand and gravel, texture grades from fine sand to medium gravel, 40 percent gravel.....	180.0	192.8
Sand and sandstone, gradual variations, silty, very fine to medium grained, rootlets, marly zones at 194 and 203 ft., olive.....	192.8	210.0
Silt, slightly clayey; moderately sandy, contains very fine to fine sand; slightly consolidated, rootlets, pale brown.....	210.0	215.0
Sand, slightly silty, very fine to medium grained...	215.0	217.9
Silt, coarse texture, slightly clayey; slightly to moderately sandy, contains very fine sand; light yellowish brown.....	217.9	221.3
Sand and sandstone, silty, interbedded, very fine to medium grained, moderately consolidated, rootlets throughout, large rootlets from 260 to 265 ft., slightly to very calcareous in spots, olive..	221.3	300.5
Marl, sandy, very calcareous, white.....	300.5	301.0
Sand and sandstone, silty, interbedded, very fine to fine grained with some medium sand, numerous marly and limy areas, very calcareous in spots, rootlets, light olive.....	301.0	345.0
Sand and sandstone, interbedded, very fine to medium grained, slightly consolidated, marly areas from 365 to 370 ft., rootlets below 380 ft., light olive to very pale olive.....	345.0	410.0
Sand, slightly silty, very fine to medium grained, slightly consolidated, a few rootlets, scattered thin silt layers, light gray.....	410.0	470.0
Sand, very fine grained.....	470.0	476.0
Marl, sandy, contains very fine to fine sand, silty, white, very calcareous.....	476.0	477.0
Sandstone, very fine to medium grained, slightly consolidated.....	477.0	480.4
Marl, moderately sandy, contains very fine to fine sand, silty, very calcareous.....	480.4	482.2
Sand, silty, and silt, marly, interbedded, very fine to fine grained, slightly to very calcareous, light gray.....	482.2	485.0
Sand and sandstone, interbedded with marly silt, very calcareous, yellow.....	485.0	495.0

Sand and sandstone, very fine to medium grained, rootlets.....	495.0	500.4
Marl, silty, sandy, white, very calcareous.....	500.4	501.2
Sand, interbedded with silt and sandstone, very fine to medium grained, rootlets from 510 to 515 ft., light gray.....	501.2	539.2
Marl, silty, very calcareous, white.....	539.2	540.6
Sand and gravel, texture grades from very fine sand to coarse gravel, 30 percent gravel.....	540.6	550.0
Sand, moderately silty, very fine to medium grained with some coarse sand.....	550.0	560.0
Sand, very fine to medium grained, silty sand and sand interbeds from 570 to 575 ft. and 590 to 595 ft., little or no consolidation, light gray.....	560.0	600.5

Test Hole #16-B-66 (E-log)
(16-20-36cbbc)
Custer County

Location: SW NW NW SW sec. 36, T. 16 N., R. 20 W., approximately
 572 feet south and 3 feet east of northwest corner of south-
 west quarter; east edge of county road.

Ground elevation: 2,618 ft. (t). (Broken Bow SE 7.5 min. quadrangle)

Depth to water: 223.3 ft. (September 2, 1966)

Depth, in feet
 From To

Quaternary System undifferentiated:

Silt, slightly silty; very sandy, contains very fine to fine sand; iron stained, manganese stained below 12.5 ft., soil zone at 15 ft., olive to dark brown.....	0.0	16.2
Sand, silty, very fine to medium grained, heavily iron stained at 45 ft., iron and manganese stained below 58.5 ft., yellowish brown to 34 ft., light gray from 34 to 45 ft., brown and light gray from 45 to 94.5 ft.....	16.2	94.5
Silt, slightly clayey; very sandy, contains very fine to fine sand with trace of medium; pale yellow to pale olive with brown mottling.....	94.5	99.4
Sand, silty, very fine to fine grained with trace of medium sand, light olive gray.....	99.4	104.4
Silt, slightly clayey; very sandy, contains very fine to fine sand, light brownish gray.....	104.4	109.8
Sand, silty, very fine to medium grained, manganese stained, light brownish gray.....	109.8	110.5
Silt, slightly clayey; very sandy, contains very fine to medium sand with scattered coarse grains; brown to 143 ft., yellowish brown from 143 to 160 ft.....	110.5	160.0
Silt, moderately clayey, brown.....	160.0	185.0
Silt, slightly clayey; sandy, contains very fine sand; brown with some reddish hues.....	185.0	195.5
Clay, moderately silty; sandy, contains very fine sand; lime nodules at 197 ft., brown with reddish hues.....	195.5	200.0
Silt, slightly clayey, except moderately clayey below 203.7 ft.; slightly sandy, contains very fine sand; marl from 201.4 to 203 ft., slightly to moderately calcareous from 201 to 205 ft., brown with some areas with reddish hues.....	200.0	205.7
Clay, very silty; slightly sandy, contains very fine sand; brown.....	205.7	208.5
Sand, very silty, very fine to fine grained; brown..	208.5	211.5

Clay, moderately silty; sandy, contains very fine to fine sand; marly, very calcareous in spots, brown and gray with pinkish hues.....	211.5	213.2
Sand, slightly silty, very fine to medium grained, trace of marl, light gray grading to pale olive...	213.2	228.5
Silt, slightly clayey; moderately sandy, contains very fine to fine sand; iron stained, light brownish gray grading to pale olive.....	228.5	230.8
Sand, very silty, slightly clayey, very fine to fine grained; pale brown.....	230.8	236.4
Sand, texture grades from very fine sand to medium gravel, predominantly very fine to medium sand with 5 percent gravel.....	236.4	240.0
Gravel, texture grades from very fine sand to coarse gravel, 25 percent sand, scattered pebbles.....	240.0	255.5
Sand, moderately silty, slightly clayey, predominantly very fine sand with some fine and medium, pale olive.....	255.5	260.0
Silt, moderately clayey; very sandy, contains very fine to fine sand; light olive gray.....	260.0	265.0
Sand, slightly to moderately silty, very fine to fine grained, pale olive.....	265.0	283.5
Sand and gravel, texture grades from very fine sand to medium gravel, 40 percent gravel, reddish brown.....	283.5	294.9
Silt, very clayey; slightly sandy, contains very fine sand; micaceous, light brownish gray.....	294.9	300.2
Sand, silty, very fine to fine grained, light olive gray.....	300.2	304.0
Silt, moderately clayey; very sandy, contains very fine to medium sand with trace of coarse; marly below 313 ft., light brownish gray.....	304.0	318.9
Sand, silty, very fine to medium grained, marly, very pale brown.....	318.9	320.0
Sand and gravel, texture grades from very fine sand to fine gravel, 40 percent gravel, marl interbeds from 320 to 325 ft., reddish brown.....	320.0	340.0
Gravel, texture grades from very fine sand to very coarse gravel, silty sand interbeds from 345 to 350 ft., reddish brown.....	340.0	355.0
Sand, gravelly, texture grades from very fine sand to fine gravel, 20 percent fine gravel, silt interbeds from 360 to 365 ft., reddish brown.....	355.0	370.0
Sand and gravel, texture grades from very fine sand to medium gravel, 50 percent gravel, reddish brown.....	370.0	380.0
Gravel, texture grades from very fine sand to medium gravel, 20 percent sand, reddish brown.....	380.0	414.5

Tertiary System - Miocene Series - Ogallala Group:

Silt, slightly clayey; moderately sandy, contains very fine sand; marly at 417 ft., cemented from 420 to 423.2 ft., light olive gray.....	414.5	425.0
Sand, very silty, slightly clayey, interbedded with lime cemented sandstone, very fine to medium grained, marly zones, moderately calcareous in spots, pale olive gray.....	425.0	453.9
Silt, slightly clayey; very sandy, contains very fine to fine sand; interbeds of lime cemented siltstone, pale yellow.....	453.9	460.0
Sand, slightly silty, very fine to fine grained, lime cemented sandstone interbeds, numerous marly zones, moderately calcareous, light olive gray....	460.0	468.7
Marl, sandy, white.....	468.7	470.0
Sand, silty, very fine to fine grained, numerous lime cemented interbeds, silt layers at 483 ft., numerous marly zones, slightly to moderately calcareous pale olive.....	470.0	500.0
Silt, slightly clayey; moderately sandy, contains very fine to fine sand; moderately calcareous, pale olive.....	500.0	505.0
Sand and gravel, texture grades from very fine sand to medium gravel, 50 percent gravel, reddish brown.....	505.0	509.0
Silt, very clayey, very sandy, pale yellow.....	509.0	510.0
Sand, silty, slightly clayey, very fine to fine grained, scattered sandstone and silt interbeds, marly from 535 to 540 ft., pale olive.....	510.0	566.2
Silt, slightly clayey; very sandy, contains very fine to fine sand; pale olive.....	566.2	571.6
Sand, slightly silty, very fine to fine grained, numerous marly zones, scattered sandstone interbeds, slightly calcareous, pale olive.....	571.6	590.0
Marl, sandy, very calcareous, white.....	590.0	593.0
Sand, moderately clayey, very fine to fine grained, numerous marly zones, scattered sandstone interbeds, light olive gray.....	593.0	618.0
Marl, sandy, moderately clayey, very calcareous, white.....	618.0	624.5
Sand, silty, very fine to fine grained, numerous marly zones, scattered sandstone and silt interbeds, slightly calcareous, pale olive.....	624.5	635.0
Sand, silty, very fine to medium sand with trace of coarse sand and fine gravel, scattered sandstone and sandy silt interbeds, trace of marl, pale olive.....	635.0	670.0
Silt, slightly clayey; very sandy, contains very fine sand; marly below 675 ft., pale olive to pale yellow.....	670.0	679.0

Sand, texture grades from very fine to very coarse sand and 10 percent fine gravel, reworked siltstone and limestone fragments, grains of red silicates predominate, reddish brown.....	679.0	690.0
Sand, slightly silty, very fine to medium grained, pale olive.....	690.0	699.0
Sand, very fine to coarse grained, silty sand interbeds from 700 to 705 ft., limy below 708 ft., brown.....	699.0	710.0
Sand, silty, very fine to fine grained, scattered interbeds of sandstone, marly zones, pale olive...	710.0	721.5
Marl, sandy, interbeds of silty sand, white.....	721.5	723.0
Sand, slightly clayey, very fine to fine grained, sandstone interbeds below 726 ft., marly zones, pale yellow.....	723.0	735.0
Marl, sandy, white.....	735.0	737.0
Sand, slightly silty, very fine to fine grained except interval from 737 to 745 ft. contains some medium and coarse sand, marly zones, scattered sandstone interbeds which become more numerous below 770 ft., intermittent calcareous areas, pale olive.....	737.0	786.0
Silt, slightly clayey; very sandy, contains very fine sand; interbeds of lime cemented siltstone, moderately calcareous, light gray.....	786.0	795.0
Marl, lime cemented, very calcareous; white.....	795.0	796.0
Sand, silty, very fine to fine grained, lime cemented sandstone interbeds, pale yellow.....	796.0	803.0
Silt, moderately clayey, very sandy, contains very fine to fine sand with trace of medium, light brownish gray.....	803.0	810.0
Sand, silty, with gradational changes to sandy silt, interbeds of lime cemented sandstone, very fine to fine grained, marly, non to very calcareous, light brownish gray.....	810.0	825.0
Silt, very sandy, contains very fine to coarse sand with trace of fine gravel, pale olive.....	825.0	837.3
Silt and siltstone, interbedded, slightly clayey; moderately sandy, contains very fine to fine sand with trace of medium, pale olive to light gray....	837.3	856.8
Sand, very fine to very coarse grained with trace of fine gravel, reworked siltstone fragments, gray brown.....	856.8	857.8
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, silty, weathered, orange to dark gray, marly zones.....	857.8	860.4
Shale, clayey, trace of ironstone, very dark grayish brown, slightly calcareous.....	860.4	870.0

Test Hole #32-SH-85 (E-log)
(16-22-21abcc)
Custer County

Location: SW SW NW NE sec. 21, T. 16 N., R. 22 W., approximately 139 feet east and 1,545 feet north of the center of the section, in pasture.

Ground elevation: 2,592 ft. (t). (Callaway SE 7.5 min. quadrangle)

Depth to water: Not recorded (Hole backfilled upon completion)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, moderately sandy, contains very fine sand, topsoil, dark grayish brown.....	0.0	5.0
Silt, slightly sandy, contains very fine sand, grayish brown.....	5.0	20.0
Silt, trace of clay; moderately sandy, contains very fine sand; calcareous nodules, light yellowish brown.....	20.0	35.0
Clay, silty, trace of very fine sand, slightly to moderately calcareous in areas, marl as lenses, reddish tints to 40 ft., white to light gray below 40 ft.....	35.0	60.0
Silt, very sandy, contains very fine to fine grained with trace of medium, reddish yellow to strong brown.....	60.0	78.0
Clay, moderately sandy, contains very fine to fine sand, slightly calcareous and marly below 95 ft., light brownish gray grading to light gray at 80 ft.....	78.0	105.0
Silt, clay, and marl, interbedded; numerous sandstone fragments, slightly calcareous.....	105.0	110.0
Sand, very fine to very coarse grained with trace of fine gravel, moderately silty.....	110.0	120.0
Sand and gravel, slightly silty.....	120.0	132.0
Silt, very sandy, contains very fine to medium sand, light gray.....	132.0	137.0
Marl, moderately sandy, contains very fine to medium sand, moderately calcareous, white.....	137.0	144.0
Clay, silty; moderately sandy, contains very fine to fine sand; marly, moderately calcareous in areas, less marl below 150 ft., harder and more calcareous below 165 ft., light gray.....	144.0	170.0
Silt, interbedded with sand and fine gravel.....	170.0	175.0
Sand and gravel, texture grades from very fine sand to fine gravel, scattered interbeds of silt.....	175.0	188.0

Tertiary System - Miocene Series - Ogallala Group:

Silt, moderately sandy, contains very fine sand, scattered sandstone interbeds below 195 ft., reddish yellow to 195 ft., pale yellow to pale olive below 195 ft.....	188.0	210.0
Sand and sandstone, gradual variations; marly in areas, slightly calcareous in areas, rootlets below 225 ft., pale olive.....	210.0	258.0
Silt, moderately sandy, contains very fine to fine sand, marly and slightly calcareous in areas, rootlets, interbedded with very fine to fine grained sandstone below 270 ft., pale yellow.....	258.0	285.0
Silt, siltstone and sandstone, gradual variations; very fine to fine sand, pale yellow.....	285.0	300.0
Sand, very fine to medium grained, marly sandstone from 318 to 320 ft., pale yellow with brown hues becoming brown below 320 ft.....	300.0	325.0
Sand and sandstone, gradual variations; very fine to medium grained, rootlets, pale olive.....	325.0	330.0
Marl, very silty; sandy, contains very fine to medium sand; moderately calcareous, white.....	330.0	340.0
Sand and sandstone, gradual variations; slightly silty, very fine to fine grained, rootlets, light gray.....	340.0	355.0
Silt, moderately sandy, contains very fine to fine sand, pale yellow.....	355.0	360.0
Sand, slightly to moderately silty, very fine grained with some fine sand, pale yellow.....	360.0	380.0
Sand and sandstone, gradual variations; very fine to fine grained with some medium sand; scattered thin interbeds of silt, pale yellow.....	380.0	400.0
Sand and siltstone, gradual variations; sand is very fine to fine grained; silt is very sandy, contains very fine sand; slightly marly and slightly calcareous in areas, pale yellow.....	400.0	420.0
Sand, very fine to medium grained, becoming slightly silty below 440 ft., rootlets below 440 ft., numerous gravel sized siltstone lithics from 475 to 480 ft., pale olive to 455 ft., pale brown below 455 ft.....	420.0	485.0
Sand and sandstone, gradual variations; very fine to medium grained; slightly to moderately silty, pale olive to pale yellow.....	485.0	500.0
Silt and siltstone, gradual variations; slightly sandy, contains very fine sand; pale yellow to 510 ft; marly, white and moderately calcareous below 510 ft.....	500.0	520.0
Sand, very fine to medium grained, marly and interbedded with sandstone from 520 to 528 ft., pale brown.....	520.0	560.0

Sand, very fine to fine grained with trace of medium, moderately calcareous and marly; hard claystone and limestone interbeds below 577 ft., white to pale yellow.....	560.0	581.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Silt and siltstone, gradual variations, slightly to moderately clayey, trace of sand; hard, pink, very coarse sand-sized fragments from 620 to 630 ft., pale brown to 650 ft., pink from 650 to 689 ft., pale yellow grading to dark yellowish brown below 689 ft., areas contain volcanic ash below 689 ft..	581.0	708.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, highly weathered shale, variegated ocher, yellow and brown.....	708.0	720.0
Note: could be reworked shale		
Shale, clayey, light olive gray to dark olive gray..	720.0	750.0

Test Hole #67-HP-79 (E-log)
(16-25-29aaab)
Custer County

Location: NW NE NE NE sec. 29, T. 16 N., R. 25 W., approximately
 463 feet west and 20 feet south of the northeast section corner,
 south side of road.

Ground elevation: 2,850 ft. (t). (Arnold SW 7.5 min. quadrangle)

Depth to water: Not recorded

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, moderately clayey, dark grayish brown.....	0.0	10.0
Silt, slightly clayey; slightly sandy, contains very fine sand; moderately sandy from 30 to 35 ft., pale brown becoming yellowish brown below 45 ft...	10.0	46.0
Silt, slightly clayey; slightly to moderately sandy, contains very fine to fine sand, pale olive.....	46.0	75.0
Silt, moderately to very sandy, contains very fine to fine sand, pale yellow from 75 to 90 ft. and from 100 to 105 ft., and very pale brown from 90 to 100 ft.....	75.0	105.0
Sand, moderately silty, very fine to medium grained.	105.0	110.0
Silt, slightly to moderately sandy, contains very fine to medium sand, trace of fine gravel below 155 ft., slightly clayey, interbeds of pale brown clayey silt from 125 to 140 ft., scattered streaks of white clay from 120 to 135 ft., slightly calcareous areas, pale yellow.....	110.0	162.0
Sand, moderately silty, very fine to very coarse grained, predominantly fine to medium sand.....	162.0	165.0
Gravel, sandy, texture grades from very fine sand to medium gravel, scattered thin interbeds of brown silt, pale yellow silt interbed from 192 to 195 ft., moderately silty below 230 ft.....	165.0	235.0
Silt, slightly to very sandy, interbedded with pale yellow clayey silts below 250 ft., light yellow- ish brown from 235 to 240 ft., pale yellow from 240 to 245 ft., and very pale brown below 245 ft..	235.0	255.0
Sandstone, moderately silty, very fine to medium grained, rootlets, pale yellow silt interbed from 260 to 263 ft., thin silt interbeds below 263 ft., pale brown.....	255.0	270.0
Silt, moderately sandy, gradational change to very fine to very coarse sand below 288 ft., a few limestone and gray silt layers from 275 to 280 ft., light reddish brown.....	270.0	290.0
Sand and gravel, texture grades from very fine sand to fine gravel with some medium gravel below 305 ft., thin silt interbeds from 300 to 305 ft.....	290.0	308.0

Tertiary System - Miocene Series - Ogallala Group:

Sandstone, very fine to fine grained, scattered clay, silt, and limestone interbeds, numerous pale silt interbeds from 345 to 350 ft., and from 365 to 370 ft., moderately calcareous, pale brown to 335 ft. and grayish brown below 335 ft.....	308.0	410.0
Silt, moderately sandy to 420 ft., scattered sandstone interbeds from 420 to 425 ft. and below 430 ft., slightly to moderately calcareous, pale yellow, sandstones tend to be shades of brown.....	410.0	440.0
Siltstone, firm, numerous clayey interbeds, slightly calcareous, pale yellow.....	440.0	450.0
Silt, moderately clayey, slightly sandy, scattered siltstone and lime cemented sandstone interbeds to 475 ft., siltstone interbeds below 475 ft., moderately to very calcareous, pale yellow, white areas to 470 ft.....	450.0	485.0
Sandstone, interbedded with pale yellow silts and white siltstones and clays, slightly to moderately calcareous, light yellow brown to olive.....	485.0	495.0
Silt, moderately to very sandy, contains very fine to medium sand, interbedded by very fine to fine grained sandstone, pale yellow.....	495.0	515.0
Sandstone, poorly consolidated from 520 to 525 ft., interbeds of silty clay, olive.....	515.0	535.0
Silt, moderately to very sandy, contains very fine to medium sand, sand interbed from 545 to 550 ft., scattered sandstone and clay interbeds, scattered white clay streaks below 555 ft., pale yellow.....	535.0	565.0
Sandstone, very fine to fine grained, pale yellow silt interbed from 580 to 585 ft., scattered silt, clay, and marl interbeds, moderately calcareous, pale yellow to pale olive.....	565.0	600.0
Siltstone, interbedded with pale yellow silts and white marl, very sandy to sand with rootlets below 615 ft., light brownish gray.....	600.0	620.0
Silt, moderately sandy, numerous interbeds of siltstone, clay, and sandstone, interbed colors above 640 ft. are yellow brown and below 640 ft. light reddish brown to brown; pale yellow.....	620.0	668.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation:

Siltstone, some gradational changes to silt, brown with pale brown to white areas from 680 to 685 ft., pale brown with reddish tints below 685 ft...	668.0	700.0
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Test Hole #12-A-59 (No e-log)
(17-17-1addd)
Custer County

Location: SE SE SE NE sec. 1, T. 17 N., R. 17 W., approximately
 8 feet north and 156 feet west of east one half mile line,
 north side of trail.

Ground elevation: 2,219.5 ft. (h). (Arcadia West 7.5 min. quadrangle)

Depth to water: 23.7 ft. (July 2, 1959)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	0.5
Silt, coarse texture, moderately clayey to 7 ft., then slightly clayey; dark yellowish brown.....	0.5	10.0
Sand, very fine to coarse grained with trace of fine gravel, very silty to 15 ft.....	10.0	17.9
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine to fine grained, moderately consolidated, rootlets.....	17.9	35.6
Silt and siltstone, gradual variations, very clayey; moderately sandy, contains very fine to fine sand; pale yellow.....	35.6	40.0
Sand, very fine to medium grained with trace of coarse sand, rounded fragments of reworked clay- stone and siltstone, rootlets, slightly consoli- dated.....	40.0	65.0
Siltstone and silt, gradual variations to inter- bedded; coarse textured silt; very sandy, contains very fine to fine sand; rootlets, pale yellow.....	65.0	75.0
Sandstone, very fine to medium grained, moderately silty, moderately consolidated.....	75.0	87.5
Marl, slightly sandy and clayey, moderately cal- careous, white.....	87.5	89.7
Sandstone, very fine to fine grained and siltstone; interbedded; moderately consolidated, some lime cementation, rootlets, fine to medium sand inter- bed from 92.7 to 95 ft., marly below 95 ft., slightly to very calcareous, pale yellow.....	89.7	110.0
Sandstone, very fine to medium grained, slightly silty, moderately consolidated; rootlets and small seeds.....	110.0	118.4
Marl, interbedded with silty sandstones, rootlets, very calcareous.....	118.4	123.0
Sandstone, very fine to fine grained, moderately consolidated, several lime cemented areas, very silty, moderately calcareous in spots.....	123.0	126.5
Silt, very clayey, interbedded with very fine to fine sand and lime cemented sandstones, pale yellow.....	126.5	136.0

Sandstone, very fine to fine grained, slightly to moderately silty, moderately consolidated, lime cemented areas, marly below 150 ft., rootlets, sandy marl from 163.1 to 164.5 ft., moderately to very calcareous below 150 ft.....	136.0	166.5
Silt, moderately clayey; very sandy, contains very fine to medium sand; lime cemented sandstone interbeds above 170 ft., moderately calcareous above 170 ft., pale yellow.....	166.5	173.0
Sand, very fine to fine grained with trace of medium sand, moderately silty, slightly consolidated.....	173.0	185.0
Sandstone, very fine to medium grained, slightly silty, silt interbeds below 201.5 ft., rootlets...	185.0	207.5
Silt, moderately clayey; very sandy, contains very fine to medium sand.....	207.5	214.7
Sand, very fine to medium grained, slightly silty, rootlets, slightly consolidated, very sandy silt interbed from 222.1 to 225 ft., sandstone interbed from 225 to 226.5 ft., pale yellow.....	214.7	230.0
Sandstone, very fine to fine grained with some medium sand, slightly silty, moderately consolidated, rootlets, non-cemented zone from 260 to 263 ft., pale yellow with light brown hues.....	230.0	269.5
Silt, very sandy, contains very fine sand; marly areas, very calcareous.....	269.5	277.5
Sandstone, very fine to fine grained, very silty, rootlets, slightly calcareous above 280 ft., moderately consolidated except non-cemented from 290 to 296 ft., marly and very calcareous from 296 to 296.5 ft.....	277.5	298.0
Silt, moderately sandy, contains very fine to medium sand.....	298.0	300.5
Sand, very fine to fine grained with some medium sand, moderately to very silty, limy areas from 317 to 319 ft., slightly consolidated, light yellowish brown.....	300.5	327.5
Marl - sandstone, very hard, white, very calcareous.	327.5	328.0
Silt, slightly sandy, contains very fine to fine sand, marly areas, slightly calcareous.....	328.0	330.0
Siltstone, moderately to well consolidated, limy areas, slightly calcareous, light gray.....	330.0	333.0
Volcanic ash, well consolidated.....	333.0	335.0
Siltstone, sandy, contains very fine sand, light gray.....	335.0	336.0
Claystone, silty, light yellowish brown.....	336.0	338.0
Silt, very sandy, contains very fine sand, light brown.....	338.0	339.0
Sand, fine to coarse grained, well consolidated sandstone from 339 to 340 ft.....	339.0	344.5
Silt, slightly clayey, interbedded with sandy silt and silty sand, light olive gray.....	344.5	350.0

Sand, very silty, very fine to fine grained with some medium, lime nodules at base, light yellowish brown.....	350.0	355.0
Sandstone, very fine to medium grained, moderately consolidated, hard from 363.8 to 364.8 ft., slightly calcareous.....	355.0	365.5
Clay, silty, olive green.....	365.5	366.5
Limestone, hard, dense, very calcareous.....	366.5	367.3
Silt, coarse texture, light olive green.....	367.3	368.0
Sand, very fine to medium grained with trace of coarse sand, slightly silty.....	368.0	379.0
Silt, very sandy, contains very fine to fine sand, interbeds of silty sand below 380 ft., light yellowish brown.....	379.0	384.0
Sandstone, very fine to fine grained with some medium sand, moderately consolidated to 390 ft., non-cemented below 390 ft.....	384.0	393.5
Silt, slightly to very sandy, contains very fine to fine sand, limy and very calcareous from 395.7 to 396.8 ft. and 404 to 404.3 ft., clay interbed from 396.8 to 397.5 ft., light yellowish brown....	393.5	405.0
Sand, very silty, very fine to fine grained with some medium sand, limy nodules from 420.5 to 422.8 ft., limy and marly areas, slightly to very calcareous, light yellowish brown to 410 ft., light gray below 410 ft.....	405.0	423.5
Sandstone, very fine to fine grained with some medium, moderately consolidated, siltstone interbed from 427.5 to 430.5 ft., silty sand interbed from 440 to 441 ft.....	423.5	441.0
Silt, slightly to moderately sandy, contains very fine to fine sand, moderately clayey, limy area at 448 and 456 ft., limy nodules from 450 to 455 ft., slightly to very calcareous, light gray clay layer from 455 to 455.5 ft., light olive gray.....	441.0	457.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, weathered, ironstone layer at 459.2 ft., mottled gray and yellow brown.....	457.0	480.0

Test Hole #11-A-59 (E-log)
(17-17-24dddd)
Custer County

Location: SE SE SE SE sec. 24, T. 17 N., R. 17 W., approximately
 300 feet west and 13 feet north of southeast section corner,
 north shoulder of road.

Ground elevation: 2,225 ft. (t). (Arcadia West 7.5 min. quadrangle)

Depth to water: 11.5 ft., (July 2, 1959)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Topsoil.....	0.0	0.5
Silt, moderately to very clayey, limonitic nodules from 5 to 6.5 ft., clay layer from 2 to 5 ft., iron stains from 10 to 16.4 ft and 38 to 40 ft., moderately calcareous from 5 to 10 ft., snail shells from 27.8 to 38 ft., peaty from 35 to 38 ft., very dark brown to 5 ft., pale olive from 5 to 15 ft., olive gray and dark olive gray from 15 to 40 ft.....	0.5	40.0
Silt, slightly clayey; slightly sandy, contains very fine to fine sand; peaty from 40 to 50 ft., wood pieces from 45 to 48 ft., lime nodules from 50 to 53 ft., olive gray to 53 ft., light brownish gray from 53 to 57.5 ft.....	40.0	57.5
Sand, very fine to fine grained, slightly silty, light brown.....	57.5	61.5
Silt, coarse textured, moderately clayey; very sandy below 70 ft., contains very fine to medium sand; very pale brown.....	61.5	75.0
Sand, texture grades from fine sand to fine gravel, 15 percent gravel, very fine and fine sand from 75 to 76.1 ft and sandy silt from 77.4 to 78.8 ft....	75.0	80.5
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to medium grained, silty, rootlets below 85 ft., silt interbed from 83.5 to 85 ft., light olive gray.....	80.5	95.0
Sandstone, very fine to fine grained with some medium, very silty, clayey silt interbed from 100 to 101.1 ft., rootlets, a few small seeds, trace of volcanic ash, poorly consolidated, light olive gray.....	95.0	115.0
Sand, very silty, very fine to fine grained with some medium sand, rootlets, limy zone from 134.1 to 134.6 ft., slightly to moderately calcareous below 127.9 ft., silty sand interbed from 125 to 127.9 ft.....	115.0	147.6

Sandstone, very fine to medium grained and siltstone, sandy; gradual variations, marly below 150 ft. with marl layer from 157 to 158 ft., very to moderately calcareous, light olive gray.....	147.6	158.0
Sandstone, very fine to medium grained, very silty, poorly consolidated, rootlets, interbedded with silt from 168.5 to 170 ft., marly from 162.9 to 163.4 ft., slightly to very calcareous to 165 ft..	158.0	177.5
Sand, very silty, very fine to fine grained, marly; very calcareous, marl and sandstone from 185 to 186.5 ft.....	177.5	186.5
Silt, very sandy, contains very fine to medium sand; marly, very calcareous, light olive gray.....	186.5	190.0
Sandstone, very fine to fine grained, marly, limy interbeds, very calcareous.....	190.0	195.0
Silt and siltstone; interbedded; moderately consolidated sandstone interbeds below 200 ft., slightly to very calcareous above 200 ft., light olive gray.....	195.0	205.0
Sand, very silty, clayey, very fine to fine grained with some medium sand.....	205.0	220.0
Silt, very sandy, contains fine to very fine sand; silty sand interbeds below 225 ft., marl from 225.6 to 226 ft., pale olive.....	220.0	230.0
Sand, very fine to fine grained with some medium sand, very silty, rootlets, lime cemented sandstone interbeds below 245 ft., very calcareous below 245 ft., poorly consolidated.....	230.0	254.5
Silt, very marly, very sandy.....	254.5	255.0
Sand, very silty, very fine to fine grained, moderately marly, moderately calcareous, interbeds of silty sandstone.....	255.0	260.0
Sandstone, very fine to fine grained, moderately consolidated, lime cemented to 265 ft., thin silt layers from 266.9 to 268.7 ft.....	260.0	270.0
Sand, very fine to fine grained with some medium sand below 280.6 ft., moderately silty, moderately consolidated, hard layer at 287.9 ft., marly from 283.5 to 285 ft.....	270.0	290.0
Sandstone, very fine to medium grained, slightly silty, interbedded with marl and silt, moderately to very calcareous to 300 ft.....	290.0	305.0
Sand, very fine to medium grained, slightly silty, slightly consolidated; rootlets below 310 ft.....	305.0	311.3
Silt, very sandy, contains very fine to medium sand; sand interbed from 315 to 319.7 ft., rootlets.....	311.3	320.0
Marl, very sandy, interbeds of very fine to fine grained sandstone above 324.3 ft., very calcareous, white.....	320.0	326.2

Sand, very silty, very fine to fine grained, numerous interbeds and gradational changes to sandy silt, hard limy area from 345.8 to 346.4 ft., light grayish brown.....	326.2	360.5
Sand, slightly to moderately silty, very fine to fine grained, light olive gray.....	360.5	373.5
Sand, very fine to fine grained with trace of medium sand, moderately consolidated sandstone from 385 to 390 ft., more medium sand from 395 to 399 ft., several silt interbeds from 405 to 417.5 ft.....	373.5	423.0
Silt, slightly to moderately clayey; moderately sandy, contains very fine to fine sand; light olive gray.....	423.0	430.0
Sand, very fine to fine grained, slightly to moderately silty, very fine to coarse sand from 433.5 to 435.5 ft.....	430.0	440.0
Sand, very fine to fine grained, very silty, less silty below 450 ft.....	440.0	455.0
Sandstone, very fine to fine grained, slightly consolidated.....	455.0	465.0
Sand, very fine to fine grained with trace of medium sand.....	465.0	472.0
Silt, very coarse, some volcanic ash shards, very light gray.....	472.0	477.0
Sand, very silty, very fine to fine grained with trace of medium sand, light olive brown.....	477.0	481.0
Silt, moderately clayey, slightly micaceous, thin limy layers from 481 to 483 ft., slightly calcareous above 483 ft., light yellow brown becoming light olive gray at 483 ft.....	481.0	488.0
Sand, moderately silty, very fine to fine grained with trace of medium sand, light yellowish gray...	488.0	491.5
Silt, very to moderately clayey; slightly sandy, contains very fine to fine sand; limy and slightly calcareous to 501.5 ft., white marl from 513 to 514.5 ft., pale yellow.....	491.5	515.0
Silt, slightly clayey and moderately sandy; and sand, very fine to fine grained with trace of medium; interbedded in 0.9 to 2.5 ft. beds, light gray to light brownish gray.....	515.0	527.0
Silt, very sandy, contains very fine to medium sand and trace of fine gravel, ironstone fragments.....	527.0	530.0
Silt, moderately sandy to slightly gravelly with quartz grains and ironstone fragments.....	530.0	531.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, ironstone layers at 534 and 539 ft., mottled green, gray and brown.....	531.0	541.0
Shale, clayey, mottled dark gray and brown, red and yellow hematite/limonite zone from 546.9 to 547 ft.....	541.0	550.0

Test Hole #8-A-66 (E-log)
(17-18-10cccc)
Custer County

Location: SW SW SW SW sec. 10, T. 17 N., R. 18 W., approximately
 262 feet east and 8 feet north of southwest section corner,
 north side of trail.

Ground elevation: 2,432 ft. (t). (Westerville 7.5 min. quadrangle)

Depth to water: 82.1 ft. (July 9, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, moderately clayey; slightly sandy, contains very fine sand; very dark grayish brown.....	0.0	3.0
Silt, moderately sandy, contains very fine sand, iron stains, slightly calcareous, light yellowish brown.....	3.0	10.0
Silt, coarse texture, slightly to moderately clayey, slightly sandy, contains very fine sand; yellow and iron stained, moderately to very calcareous, lime nodules from 43.5 to 45 ft., grayish brown from 10 to 28.5 ft and 35 to 40 ft., light yellowish brown from 28.5 to 35 ft. and 40 to 44 ft; brown from 44 to 46.5 ft.....	10.0	46.5
Sand, very fine to coarse, predominantly coarse sand, iron and manganese stains.....	46.5	51.0
Sand, very fine grained, indurated.....	51.0	53.5
Silt, coarse texture; moderately sandy, contains very fine sand; limy zones and slightly calcareous below 65 ft; light yellowish brown.....	53.5	67.0
Sand, very fine to coarse grained, predominantly medium sand, iron stained siltstone layer from 69 to 69.5 ft.....	67.0	74.5
Sand, very silty, fine to medium grained, light yellowish brown.....	74.5	81.0
Silt, very coarse texture; slightly sandy, contains very fine to coarse sand; light brownish gray to light yellowish brown, yellow stains from 92 to 93 ft.....	81.0	93.0
Sand, very fine to medium grained.....	93.0	94.5
Silt and sand, interbedded, slightly clayey, fine to medium grained, pale olive.....	94.5	105.5
Silt, slightly clayey; slightly sandy, contains very fine to coarse sand; scattered sand interbeds, pale brown to brown.....	105.5	113.5
Sand and gravel, texture grades from very fine sand to fine gravel, 25 percent gravel.....	113.5	115.2
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very clayey; very sandy, contains very fine to medium sand; green to olive.....	115.2	118.0

Sand, very silty, very fine to medium grained, numerous large rootlets, light olive.....	118.0	125.5
Silt, very clayey, becomes clay from 135.2 to 136 ft.; very sandy, contains fine to medium sand, pale olive.....	125.5	136.0
Sand, very silty, moderately clayey; very fine to medium grained, pale olive.....	136.0	139.0
Silt, very clayey, becomes clay from 149 to 152 ft.; slightly sandy, contains very fine sand; rootlets, marly zones from 144.5 to 149 ft., moderately to very calcareous, pale yellow.....	139.0	154.0
Sand, very fine to fine grained, marly, scattered sandstone and siltstone interbeds, very calcareous, rootlets, silt layer from 162.5 to 165 ft., pale yellow.....	154.0	168.5
Silt, moderately clayey; very sandy, contains very fine to medium sand; rootlets, slightly calcareous, pale yellow.....	168.5	173.0
Sandstone, very fine to medium grained, little or no cementation from 175.2 to 183.5 ft., rootlets, marly zone at 185 ft. and from 215 to 223.5 ft., slightly to moderately calcareous in marly areas, pale olive.....	173.0	223.5
Silt, moderately clayey; very sandy, contains very fine to fine sand; marly, moderately to very calcareous.....	223.5	225.0
Marl, slightly sandy, contains very fine to fine sand, very calcareous, white.....	225.0	227.0
Sandstone, very fine to medium grained, with trace of coarse, rootlets very common, slightly to moderately consolidated, marly and moderately calcareous from 260 to 265 ft., pale olive.....	227.0	270.0
Marl, very clayey, moderately sandy, white.....	270.0	272.5
Sand and sandstone, gradual variations, very fine to fine grained; marly, silty and slightly calcareous from 275 to 280 ft; pale olive.....	272.5	284.5
Sand, very fine to coarse.....	284.5	287.0
Sandstone, very fine to medium grained, scattered lime cementation and limy areas; non to very calcareous.....	287.0	299.0
Sand, silty, very fine to medium grained, slightly consolidated, marly and very calcareous from 299 to 309.5 ft.; sandy silt interbeds from 307.5 to 309.5 and 313 to 315 ft., pale olive.....	299.0	330.0
Sand and sandstone, gradual variations, very fine to medium grained, slightly to moderately consolidated, pale olive.....	330.0	345.0
Sand, slightly silty, very fine to medium grained with some coarse sand, very slightly consolidated, sandstone interbed from 380 to 382 ft., pale olive.....	345.0	390.0

Sand and sandstone, gradual variations, very fine to medium grained, sandy silt interbed from 397 to 400 ft. and 419 to 420 ft., pale olive.....	390.0	420.0
Sand, very fine to medium sand, predominantly medium, trace of coarse sand below 425 ft.....	420.0	430.5
Marl, silty, very clayey, slightly sandy, very calcareous, white with pink tint in top 1 ft.....	430.5	435.0
Sandstone, very fine to medium grained, interbedded with marl, moderately consolidated, pale olive....	435.0	440.0
Sand, slightly silty, very fine to medium grained, trace of coarse sand below 470 ft., light olive gray.....	440.0	475.0
Sand, very fine to medium grained with some coarse sand, slightly consolidated, silty layers from 479.5 to 480 ft. and 483.5 to 485 ft., pale olive.	475.0	505.0
Sand, very fine to fine grained with some medium....	505.0	520.0
Sand, very fine to medium with some coarse.....	520.0	530.0
Sand, very fine to coarse, consolidated zones.....	530.0	535.0
Sand, very fine to medium with a trace of coarse sand, hard lime layers at 537 ft. and from 555.5 to 555.7 ft., silt layer at 567.5 ft., and very silty fine sand from 594 to 597 ft.....	535.0	600.5

Test Hole #8-B-66 (E-log)
(17-18-34bbbb)
Custer County

Location: NW NW NW NW sec. 34, T. 17 N., R. 18 W., approximately
 88 feet east and 38 feet south of northwest section corner.
 Ground elevation: 2,330 ft. (t). (Westerville 7.5 min. quadrangle)
 Depth to water: 9.1 ft. (July 29, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Ditch fill and soil, light brown gray.....	0.0	1.0
Silt, slightly to moderately clayey; slightly cal- careous, grayish brown.....	1.0	5.0
Silt, slightly clayey; some limy nodules, slightly calcareous, dark grayish brown.....	5.0	8.0
Silt, slightly to moderately clayey; slightly cal- careous, lime nodules present; light brownish gray.....	8.0	13.8
Silt, slightly to moderately clayey; slightly sandy, contains very fine sand; lime nodules from 21 to 25 ft., gray and light gray.....	13.8	25.0
Silt, slightly to moderately clayey, slightly sandy; lime nodules from 26.5 to 28.5 ft; slightly cal- careous, dark gray.....	25.0	34.0
Silt, slightly to moderately clayey; organic rich from 34 to 36.5 ft., slightly calcareous; dark grayish brown.....	34.0	38.5
Silt, slightly to moderately clayey; slightly sandy, contains very fine sand; greenish gray; lime nodules; non to slightly calcareous, greenish gray.....	38.5	65.0
Silt, contains peats, wood fragments, and highly organic silt zones; olive gray.....	65.0	71.0
Sand, texture grades from fine to very coarse with 5 percent fine to coarse gravel from 71 to 75 ft and 20 percent gravel from 75 to 80 ft; larger fractions are reworked fragments of the Ogallala Group; moderately calcareous; brown.....	71.0	80.0
Gravel, sandy, texture grades to very coarse gravel; 40 percent of gravel is reworked Ogallala Group fragments, remainder is quartz and feldspar, brown.....	80.0	86.0
Silt, moderately clayey, thin seams of sand and gravel; pale brown.....	86.0	95.0
Silt, slightly to moderately clayey; contains some very fine to fine sand; siltstone layers from 95 to 96.5 ft; light brownish gray.....	95.0	98.5

Sand, texture grades from very fine to medium sand; some grains are reworked Ogallala Group fragments, brown.....	98.5	100.0
Silt, slightly to moderately clayey; light brownish gray.....	100.0	100.4
Sand and gravel, 40 percent sand, interbedded with 0.4 ft. silt layers, light brown.....	100.4	105.0
Gravel, texture grades to very coarse gravel, 15 percent sand, brown.....	105.0	110.0
Sand and gravel, 40 percent sand, brown.....	110.0	112.5
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very silty, interbedded with sandstone and silt; lime cemented zone from 116 to 116.7 ft; grain size grades from very fine to medium with some coarse, light brown.....	112.5	122.5
Sandstone, very fine to medium grained, lime rootlets, less cementation from 145 to 147.5 ft., olive.....	122.5	147.5
Silt, moderately clayey, very sandy, contains fine to medium sand.....	147.5	149.0
Sand and sandstone, interbedded, silty, slightly clayey, fine to medium grained, some lime nodules and rootlets; sandstone zones are olive and brown.	149.0	170.0
Sand, fine to medium with some coarse, brown.....	170.0	180.0
Silt, with interbeds of siltstone, very sandy, contains very fine to fine sand, slightly to moderately clayey, pale olive.....	180.0	190.0
Sandstone, interbedded with silty sand and sandy silt; very fine to fine grained; limy nodules and rootlets from 194 to 195 ft. and 200 to 208 ft., pale olive to 208 ft., then yellow brown.....	190.0	215.6
Silt, interbedded with sandstone, limy, very calcareous, white.....	215.6	218.5
Volcanic ash, limy cementation zones, light brownish gray.....	218.5	228.5
Silt, slightly clayey, very sandy, contains very fine to fine sand; light brownish gray.....	228.5	230.0
Sand, silty, texture grades from very fine to fine grained sand; varying degrees of induration; rootlets common, pale olive.....	230.0	245.0
Sand, silty, texture grades from very fine to medium with some coarse sand, interbedded with limy silt, scattered rootlets, olive.....	245.0	267.0
Silt, slightly to moderately clayey; moderately sandy, very fine to fine grained; interbedded limy areas; moderately calcareous; pale olive.....	267.0	275.0
Sand, texture grades from very fine to medium sand, slightly calcareous, olive.....	275.0	280.0
Sand and sandstone, very silty, very fine to fine grained; limy zones, rootlets, pale olive.....	280.0	287.2

Silt, moderately clayey, interbedded with limy zones which decrease with depth, light gray.....	287.2	291.5
Sand, interbedded with sandstone; texture grades from very fine to fine sand; rootlets, slightly calcareous, pale olive.....	291.5	315.0
Sandstone, interbedded with sand and limy zones; rootlets; induration increases with depth, pale olive.....	315.0	351.5
Silt, moderately sandy, contains very fine to fine sand; very limy, very calcareous, olive gray.....	351.5	355.0
Limestone, very calcareous, pale yellow.....	355.0	356.8
Silt, very limy, pale yellow.....	356.8	357.0
Sandstone, very limy; interbedded with silt, siltstone, and sand from 360 to 364 ft., pale olive...	357.0	365.0
Volcanic ash, pale yellow.....	365.0	367.0
Sand, texture grades from very fine to medium with some coarse sand; slightly to very silty, interbedded with sandstone and scattered siltstones; rootlets from 370 to 375 ft; brown to 375 ft., pale olive below; hard limy zones from 388 to 390 ft.....	367.0	400.0

Test Hole #14-A-66 (No e-log)
(17-19-18cbbc)
Custer County

Location: SW NW NW SW sec. 18, T. 17 N., R. 19 W., approximately
 2,200 feet north and 8.5 feet east of southwest section corner,
 east side of highway.

Ground elevation: 2,678 ft. (t). (Broken Bow NE 7.5 min. quadrangle)

Depth to water: 128.1 ft. (August 18, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Silt, slightly clayey, coarse texture; slightly sandy, contains very fine sand; limy nodules, iron stains, snail shells noted from 5 to 15 ft., slightly to moderately calcareous, grayish brown to 15 ft. and 48 to 62 ft., light olive brown from 15 to 48 ft.....	1.0	67.0
Silt, moderately clayey; very slightly sandy, con- tains very fine to fine sand; considerable organic staining, very dark grayish brown.....	67.0	71.0
Silt, slightly clayey; very sandy, contains very fine to medium sand with trace of coarse; small amount of organic material from 71.0 to 71.2 ft., brown.....	71.0	73.6
Sand, very fine to medium grained with some coarse sand, silt interbed from 76.0 to 76.8 ft., slight amount of manganese staining, pale brown.....	73.6	80.0
Silt, very sandy, contains very fine to medium sand, pale brown.....	80.0	84.5
Sand, very fine to medium grained, several thin silt interbeds, very pale brown.....	84.5	100.0
Silt, very sandy, contains very fine sand, slightly clayey, iron stains, light gray.....	100.0	104.0
Sand, very fine to medium grained, several silty sand and sandy silt interbeds from 104 to 113.4 ft. and 129 to 129.5 ft.....	104.0	129.5
Silt, slightly clayey; moderately sandy, contains very fine to fine sand; very fine to medium grained silty sand from 140 to 142.8 ft. and 151.5 to 155 ft., numerous limy areas, moderately to very calcareous, iron stains below 155 ft., pale olive.....	129.5	155.5
Sand, very fine to medium grained, interbeds of silty sand from 162.7 to 165 ft. and 170 to 175 ft., light gray silt interbed from 170 to 172 ft., moderately to very calcareous from 160 to 165 ft..	155.5	197.1

Silt, slightly clayey; moderately sandy, contains very fine to fine sand; slightly calcareous, yellow stains from 205 to 210 ft., light gray.....	197.1	210.0
Sand, very fine to medium grained, several limy fragments, a few thin silt seams.....	210.0	211.5
Clay, slightly silty, numerous limy nodules, moderately to very calcareous, light gray grading to pale olive.....	211.5	218.0
Sand, very silty, very fine to medium grained, slightly consolidated, concentration of lime nodules, silt interbeds from 218 to 220 ft., moderately to very calcareous, pale olive grading to light brownish gray.....	218.0	230.0
Silt, moderately sandy, contains fine sand; trace of rootlets, limy areas, slightly calcareous, light yellowish brown.....	230.0	240.0
Sand, very silty at top grading to less silt with depth, very fine to medium with some coarse sand, reworked limy fragments, red quartz grains predominate, slightly to moderately calcareous.....	240.0	250.0
Silt, coarse texture, slightly clayey; moderately sandy, contains very fine to fine sand with trace of medium; interbedded with siltstone and sandstone from 265 to 274.8 ft., light yellowish brown.....	250.0	280.0
Note: Hole abandoned due to drill fluid loss.		

Test Hole #17-A-66 (No e-log)
(17-19-19bbcc)
Custer County

Location: SW SW NW NW sec. 19, T. 17 N., R. 19 W., approximately
 1,300 feet south and 93 feet east of northwest section corner,
 north side of trail.

Ground elevation: 2,537 ft. (t). (Broken Bow NE 7.5 min. quadrangle)

Depth to water: Hole caved at 88 ft. (August 18, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Silt, slightly clayey, coarse texture; slightly sandy, contains very fine sand; blocky structure, dark gray.....	1.0	6.3
Silt, slightly clayey; slightly sandy, contains very fine sand; snail shells from 20 to 63 ft., iron stains from 20 to 63 ft., silty sand interbed from 68.5 to 70 ft., slightly to moderately calcareous below 17.2 ft., light olive brown to light olive gray.....	6.3	74.5
Sand, silty, very fine to medium grained, rootlets..	74.5	80.0
Sand, silty, very fine to fine grained, rootlets below 85 ft., grades to sandy silt at base.....	80.0	90.0
Sand, very fine to coarse grained, thin silt inter- beds from 90 to 92 ft., light brownish gray.....	90.0	100.0
Sand, very fine to fine grained with some fine sand, very silty, scattered clay seams, pale brown.....	100.0	105.0
Sand, very fine to very coarse grained, scattered clay seams, very slightly calcareous, pale brown..	105.0	110.0
Silt, slightly to moderately clayey; slightly to moderately sandy, contains very fine to fine sand with some medium, limestone or limy concretions from 127.9 to 128.4 ft., marly areas below 137.3 ft., slightly to very calcareous in areas below 130 ft., pale brown to 135 ft. and light brownish gray below 135 ft.....	110.0	141.5
Marl, moderately silty and sandy, very calcareous, white.....	141.5	143.5
Sand, very fine to coarse grained, seams of marl, 0.5 ft. sandy clay at base, white.....	143.5	145.0
Sand and gravel, texture grades from fine sand to fine gravel, 35 percent gravel, a few clay seams..	145.0	148.5
Tertiary System - Miocene Series - Ogallala Group:		
Sand, moderately clayey, light gray.....	148.5	150.0
Clay, very sandy, contains very fine to coarse sand, light gray.....	150.0	154.0

Sand, moderately silty, slightly clayey, very fine to medium grained with some coarse sand, light gray.....	154.0	156.5
Sand, moderately clayey, very fine to fine grained with some coarse sand, a few limy zones and rootlets, light gray to pale olive.....	156.5	165.0
Sand, very fine to medium sand with some coarse, a few rootlets, a few limestone particles below 180 ft., pale olive.....	165.0	181.5
Silt and limy siltstone, interbedded, slightly clayey; slightly to moderately sandy, contains very fine sand; slightly to very calcareous in spots, light gray.....	181.5	186.4
Sandstone, silty, very fine to fine grained, moderately calcareous, light gray.....	186.4	187.5
Clay, sandy limestone at base, light yellowish brown to white, very calcareous in spots.....	187.5	190.7
Sand, silty, very fine to fine grained, light brownish gray, slightly calcareous.....	190.7	192.0
Clay, very sandy, contains very fine to fine sand, moderately calcareous, light brownish gray.....	192.0	195.0
Sand, very fine to fine grained, slightly to moderately silty, slightly to very calcareous, very pale brown and white.....	195.0	201.3
Sand and sandstone, interbedded, silty, very fine to fine grained with some medium sand at base, marly zones to 206.6 ft., rootlets, silt interbed from 212 to 215 ft., slightly calcareous to 208.9 ft., very pale brown to light brownish gray.....	201.3	240.0
Sand and sandstone, interbedded, very fine to medium grained, numerous marly zones, rootlets, very calcareous, light gray and white.....	240.0	248.0
Silt, sandy, contains very fine to medium sand, moderately to very calcareous, light gray and white..	248.0	250.0
Sand and sandstone, interbedded, very fine to coarse grained, very marly from 254 to 255 ft., very calcareous in areas, light gray and white grading to light olive brown.....	250.0	260.0
Sand, very fine to medium grained with trace of coarse sand, silt interbed from 271.5 to 272 ft., rootlets, light gray.....	260.0	275.0
Sand and sandstone, interbedded, very fine to medium grained, trace of coarse sand from 290 to 300 ft., silt interbeds from 280 to 280.5 ft. and at 315 ft., marly areas from 290 to 295 ft., 315 to 320 ft., and 325 to 330 ft., slightly to very calcareous to 295 ft. and from 310 to 335 ft., rootlets, light brownish gray with some areas of white and pale olive.....	275.0	335.0
Sand, very fine to medium grained, slightly calcareous, light brown; hard, white, very calcareous limestone from 337 to 337.4 ft.....	335.0	340.0

Sand and sandstone, very fine to medium grained, lightly consolidated with unconsolidated areas, rootlets, scattered silt and sandy silt interbeds throughout, marly areas from 345 to 360 ft., slightly to moderately calcareous from 340 to 368.5 ft., light gray to pale olive; white zones at 364.5, 366.5, and 388.5 ft.....	340.0	405.0
Sand with gravel, texture grades from very fine sand to medium gravel, 15 percent gravel.....	405.0	410.0
Sand, very fine to coarse grained with trace of fine gravel, white silt interbed from 416.5 to 416.8 ft.....	410.0	420.0
Sand, very fine to medium grained, several interbeds of sandy silt, very slightly consolidated, light gray.....	420.0	445.0
Sand, very fine to medium grained with some coarse sand, slightly consolidated from 460 ft. to 468.5 ft., rootlets from 460 to 580 ft., numerous silt interbeds from 468.5 to 470 ft., scattered sandy silt, silty sand and sandy clay interbeds below 500 ft., light gray.....	445.0	580.0
Sand and sandstone, interbedded, very fine to fine grained with some medium sand; white, very calcareous marl zone from 587.4 to 588.1 ft., light gray.....	580.0	600.5

Test Hole #14-B2-66 (E-log)
(17-20-1abaa)
Custer County

Location: NE NE NW NE sec. 1, T. 17 N., R. 20 W., approximately
 7 feet south and 1,620 feet west of northeast section corner.
 Ground elevation: 2,522 ft. (t). (Broken Bow NE 7.5 min. quadrangle)
 Depth to water: 77.6 ft. (August 18, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Silt, slightly clayey; very sandy, contains very fine sand; iron stained below 6 ft., slightly calcareous below 6 ft., grayish brown.....	1.0	20.0
Silt, slightly clayey; very sandy, contains very fine sand; iron and manganese staining; slightly calcareous, olive to 45 ft., grayish olive below..	20.0	60.0
Silt, slightly clayey; very sandy, contains very fine to medium sand; non to slightly calcareous, iron staining, pale brown to 65 ft., yellowish brown below.....	60.0	75.0
Sand, texture grades from very fine to very coarse sand, limy grains, brown.....	75.0	77.5
Silt, slightly clayey; very sandy, contains very fine to fine sand; marly to lime cemented, moderately calcareous, pale brown.....	77.5	85.0
Sand to sandstone, very fine to coarse grained, partly lime cemented, brown.....	85.0	95.0
Silt, slightly clayey; very sandy, contains very fine to medium sand, scattered marly areas below 109 ft., gravelly zones at 124, 130, and 134 ft., yellowish brown to 123.5 ft., light gray to pale brown below.....	95.0	134.5
Sand and gravel, texture grades from very fine sand to fine gravel, very silty, light grayish brown...	134.5	139.0
Gravel, texture grades from fine sand to very coarse gravel, 10 percent sand, reddish brown.....	139.0	142.0
Silt, slightly clayey; very sandy, contains very fine to coarse sand and trace of fine gravel, light brownish gray.....	142.0	145.0
Sand, very silty, pale olive.....	145.0	154.0
Sand and gravel, texture grades from very fine sand to medium gravel, 40 percent gravel.....	154.0	160.0
Gravel, texture grades from very fine sand to coarse gravel, 20 percent sand, becomes silty below 170 ft., reddish brown.....	160.0	170.8

Tertiary System - Miocene Series - Ogallala Group:

Silt, moderately clayey; very sandy, contains very fine to medium sand, marly and moderately calcareous below 177.5 ft., pale olive to light yellowish brown.....	170.8	181.0
Sandstone, very fine to medium grained, very silty, olive.....	181.0	184.0
Silt, moderately clayey; very sandy, contains very fine to coarse sand; very pale brown.....	184.0	187.0
Sandstone, very fine to medium grained, scattered silt and silty sand interbeds, rootlets, bone fragment at 205 ft., marly and strongly calcareous from 210 to 220 ft. and 244 to 255.6 ft., pale olive.....	187.0	255.6
Marl, indurated in upper 1 foot, strongly calcareous, light gray to pale olive.....	255.6	260.0
Silt, very sandy, contains very fine to medium sand, interbeds of sandstone, lime cemented, very calcareous, pale olive.....	260.0	270.0
Sandstone, very fine to coarse grained, very silty, marly to partly lime cemented, moderately calcareous, olive.....	270.0	291.0
Silt, sandy, contains very fine to medium sand; siltstone interbeds, moderately calcareous, olive.	291.0	295.0
Sandstone, very fine to coarse grained, zones of lime cementation, rootlets, very to moderately calcareous, marly below 364 ft., brown to 350 ft., light gray from 350 to 365 ft., white below 365 ft.....	295.0	375.0
Sand and sandstone, gradational changes, very fine to coarse grained, scattered interbeds of silt and silty sandstones, brown.....	375.0	385.0
Sand and sandstone, very silty, scattered silt interbeds, well consolidated at 400 ft., pale yellow grading to light brownish gray below 400 ft.....	385.0	420.0
Sand, very fine to medium grained, brown.....	420.0	428.0
Silt, slightly clayey, moderately sandy, light gray.	428.0	430.0
Sand and sandstone, very fine to medium grained with some coarse sand, scattered silt interbeds, numerous rootlets, olive.....	430.0	470.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; pale yellow.....	470.0	480.0
Sand and sandstone, very silty, thin interbeds of silt, pale olive to 505 ft., brown below.....	480.0	527.5
Silt, slightly clayey; very sandy, contains very fine to medium sand; pale olive.....	527.5	530.0
Sand and sandstone, very fine to medium grained, silty, interbeds of sandy silt, pale olive.....	530.0	560.0

Sand, silty, texture grades from very fine to coarse sand, scattered sandstone interbeds, marly at 584 ft., pale olive to 575 ft., pale yellow from 575 to 585 ft., olive below 585 ft.....	560.0	590.0
Silt, very sandy, contains very fine to fine sand, interbeds of silty sandstone, pale olive.....	590.0	595.0
Sand, very silty, very fine to fine grained, pale olive.....	595.0	600.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; marl at 609.5 ft., pale olive..	600.0	610.0
Sand, very silty, very fine to fine grained, very calcareous, pale yellow.....	610.0	611.5
Silt, slightly clayey, marly; very sandy, contains very fine to fine sand; interbeds of sandstone, very calcareous, pale olive.....	611.5	615.0
Sandstone, lime cemented, marly, very fine to fine grained, pale olive.....	615.0	625.5
Silt, moderately clayey and sandy, pale yellow.....	625.5	630.0
Sand, very silty, very fine to medium grained, lime cemented sandstone interbeds, pale olive.....	630.0	640.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; thin silty sandstone interbeds, pale yellow.....	640.0	645.0
Sandstone and siltstone, interbedded, very fine to fine grained, in part lime cemented, marly, slightly to very calcareous, pale olive.....	645.0	651.4
Tertiary System - Miocene Series - Arikaree Group:		
Silt to siltstone, slightly clayey; slightly sandy, contains very fine sand; pink bentonite seams from 655 to 660 ft., pale brown.....	651.4	685.0
Silt to siltstone, slightly clayey; very sandy, contains very fine sand; scattered interbeds of silty sand, thin seams of pink bentonite from 710 to 715 ft., pale yellow to 705 ft. and very pale brown below.....	685.0	723.7
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, silty and clayey, weathered, brownish orange.	723.7	725.0
Shale, gray and orange grading to very dark gray....	725.0	730.0
Shale, very dark gray, iron stained layers from 735 to 740.5 ft.....	730.0	745.5

Test Hole #14-B-66 (No e-log)
(17-20-1babb)
Custer County

Location: NW NW NE NW sec. 1, T. 17 N., R. 20 W., approximately
 11 feet south and 1,535 feet east of northwest section corner.
 Ground elevation: 2,541 ft. (t). (Broken Bow NE 7.5 min. quadrangle)
 Depth to water: (Not encountered)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	0.7
Silt, slightly clayey; sandy, contains very fine to fine sand; organic rich zone from 5.5 to 7 ft., iron and manganese staining from 15 to 32.5 ft., grayish brown from 0.7 to 7.5 ft., dark yellowish brown from 7.5 to 10 ft., light brownish gray from 10 to 15 ft., mottled yellow 15 to 20 ft., and light brownish gray from 20 to 38 ft.....	0.7	38.0
Silt, very sandy, contains very fine to medium sand, slightly clayey, heavily iron stained, grayish brown.....	38.0	50.0
Note: Hole abandoned due to drill fluid loss.		

Test Hole #15-B-66 (E-log)
(17-20-36dbba)
Custer County

Location: NE NW NW SE sec. 36, T. 17 N., R. 20 W., approximately 156 feet south and 2,114 feet west of the east half mile line, west side of trail.

Ground elevation: 2,523 ft. (t). (Broken Bow NE 7.5 min. quadrangle)

Depth to water: (Not recorded)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Topsoil, silty, very dark grayish brown.....	0.0	3.0
Silt, very sandy, contains very fine to fine sand; iron staining, manganese staining from 15 to 20 ft., slightly calcareous, pale brownish gray to 41.2 ft., pale olive below.....	3.0	78.0
Sand, silty, very fine to medium grained, very slightly calcareous, light brownish gray.....	78.0	80.8
Sand, very fine to medium grained with trace of coarse sand, brown.....	80.8	85.0
Silt, slightly clayey; moderately sandy, contains very fine to fine sand; pale olive.....	85.0	86.0
Sand, silty, very fine to medium grained, pale olive.....	86.0	87.5
Silt, moderately clayey; moderately to very sandy, contains very fine to fine sand; scattered iron and manganese staining; pale olive grading to pale brown.....	87.5	106.8
Silt, sandy, contains very fine to fine sand, slightly clayey, pale brown.....	106.8	109.0
Sand, very silty, partially lime cemented, brown....	109.0	112.0
Silt, slightly clayey; very sandy, contains very fine to medium sand; marly, slightly calcareous; iron staining below 115 ft., pale brown.....	112.0	120.0
Clay, silty; moderately sandy, contains very fine to medium sand with scattered coarse and very coarse grains, marly zones below 126.8 ft., pale brown with yellow and red hues.....	120.0	130.7
Silt, moderately clayey and sandy, contains very fine to coarse sand, marly below 132.2 ft., slightly calcareous, yellow brown.....	130.7	135.0
Silt, slightly clayey; moderately sandy, contains very fine to medium sand; scattered lime nodules at 135 ft., marly from 136.1 to 137 ft., yellow brown with shades of brown.....	135.0	140.8
Gravel, texture grades from fine to coarse gravel, reddish brown.....	140.8	140.9

Silt, slightly clayey; very sandy, contains very fine to very coarse sand and trace of fine gravel, brown.....	140.9	143.5
Gravel, texture grades from very fine sand to fine gravel, several silt layers below 145.5 ft., brown.....	143.5	149.0
Silt, moderately clayey; very sandy, contains very fine to medium sand, grayish brown to pale olive..	149.0	160.0
Silt, moderately clayey; very sandy, contains very fine to coarse sand with some fine gravel; marly at 177 ft., pale olive.....	160.0	180.9
Sand and gravel, texture grades from very fine sand to very coarse gravel, 50 percent gravel, reddish brown.....	180.9	195.5
Sand, silty, very fine to very coarse grained, pale brown.....	195.5	199.3
Silt, slightly clayey; moderately sandy, contains very fine to medium sand; lime nodules from 206.4 to 209.5 ft., marly from 206.4 to 209.5 ft. and 210 to 216.5 ft., slightly to moderately calcareous, light grayish brown.....	199.3	216.5
Tertiary System - Miocene Series - Ogallala Group:		
Sand and sandstone, lime cemented, texture grades from very fine sand to fine gravel, brown.....	216.5	218.5
Silt, very sandy, contains very fine to medium sand, trace of volcanic ash from 220 to 223 ft., light gray.....	218.5	223.0
Sand, very silty, very fine to coarse grained sand, marly, moderately calcareous, rootlets, partially lime cemented, light grayish brown.....	223.0	227.3
Marl, indurated, very sandy, contains very fine to coarse sand, very calcareous, white.....	227.3	229.0
Sandstone, interbedded with silty sand and sandy silt, very fine to fine grained, rootlets, partially cemented with lime below 240 ft., marly at 249.9 ft., light olive to brown.....	229.0	250.0
Sandstone, very fine to medium grained, lime cemented in part, marly below 254 ft., olive.....	250.0	270.5
Silt, interbedded with siltstone, lime cemented sandstone, and marl; very sandy, contains very fine to fine sand, moderately calcareous in zones, pale olive and pale yellow.....	270.5	285.0
Sand, very fine to coarse grained, interbedded with sandstone and silty sand, some lime cementation, rootlets, brown.....	285.0	317.0
Silt and siltstone, interbedded by silty sandstone, marly below 325 ft., partly lime cemented below 327 ft., moderately calcareous, pale yellow.....	317.0	330.0
Sandstone, very fine to medium grained, marly, partly lime cemented, olive.....	330.0	339.2

Silt, moderately clayey; very sandy, contains very fine to very coarse sand; scattered interbeds of sandstone, partly lime cemented from 339.2 to 341 ft., pale olive and pale yellow.....	339.2	350.0
Sand, silty, very fine to medium grained, marly, moderately calcareous, interbeds of silt and silty sand below 367 ft., light gray to pale yellow.....	350.0	370.0
Silt, slightly clayey; very sandy, contains very fine to medium sand, sandstone interbeds, pale yellow.....	370.0	375.0
Sand, silty, very fine to medium grained with some coarse sand, sandstone and silt interbeds below 395 ft., pale yellow.....	375.0	401.5
Silt, very sandy, contains very fine to fine sand, pale yellow.....	401.5	430.0
Sand, silty, very fine to medium grained with some coarse, rootlets, scattered sandstone interbeds, pale yellow grading to brown below 450 ft.....	430.0	485.0
Sand and sandstone, silty, very fine to medium grained, rootlets, marly and lime cemented zones from 495 to 505 ft., marly from 485 to 490 ft. and 495 to 497.5 ft., olive gray to pale olive....	485.0	535.0
Sand, silty, very fine to medium grained, scattered sandstone and silt interbeds, brown grading to pale olive.....	535.0	585.0
Sandstone, lime cemented, very fine to medium grained, moderately calcareous, pale olive.....	585.0	586.0
Marl, very sandy, white.....	586.0	589.3
Sand, very silty, very fine to coarse grained, scattered sandstone and siltstone interbeds, marly and lime cemented zones and moderately calcareous below 650 ft., pale olive.....	589.3	655.0
Marl, sandy, limestone interbeds, very calcareous, light gray.....	655.0	659.0
Silt, slightly clayey, very sandy, contains very fine sand, sandstone interbeds, light gray.....	659.0	664.0
Tertiary System - Eocene Series - White River Group:		
Chadron Formation:		
Silt, very clayey, hard from 666.8 to 667.5 ft., white.....	664.0	667.5
Sand, very fine to very coarse grained sand with up to 5 percent gravel, almost all quartz grains, silt lenses from 680 to 686.4 ft., iron stained from 685 to 687 ft., white.....	667.5	693.0
Silt, very sandy, moderately clayey, iron cemented, light gray.....	693.0	695.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, black.....	695.5	710.0

Test Hole #12-B-70 (E-log)
(17-22-21bbbb)
Custer County

Location: NW NW NW NW sec. 21, T. 17 N., R. 22 W., approximately
 199 feet east and 3.5 feet south of northwest section corner.
 Ground elevation: 2,910 ft. (t). (Merna 7.5 min. quadrangle)
 Depth to water: 300+ ft. (September 6, 1970)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill, silt, dark gray.....	0.0	3.5
Silt, slightly clayey, coarse texture to 18 ft.; sandy, contains very fine sand; iron stains below 20 ft., limonite nodules from 20 to 30 ft., man- ganese stains below 60 ft., slightly calcareous, light yellowish brown to 30 ft.; yellowish brown, pale brown, and light yellow brown below 30 ft....	3.5	88.5
Sand, silty, very fine to fine grained, mostly quartz.....	88.5	90.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; light gray.....	90.0	95.5
Silt, moderately to very clayey; slightly sandy, contains very fine sand; abundant iron stains, yellowish brown to light yellowish brown.....	95.5	108.0
Clay, silty; very slightly sandy, contains very fine sand; light brownish gray.....	108.0	110.5
Silt, moderately clayey; very slightly sandy, con- tains very fine to fine sand; iron stains, pale brown to light yellowish brown.....	110.5	123.0
Silt, slightly clayey; very sandy, contains very fine to fine sand with some medium; trace of iron and manganese stains from 140 to 145 ft., very calcareous below 140 ft., pale brown.....	123.0	148.2
Sand, silty, very fine to fine grained, light brown.	148.2	150.0
Silt, moderately to very sandy, contains very fine to medium sand, predominantly fine sand, trace of manganese stains from 153 to 155 ft., pale brown to light yellowish brown.....	150.0	159.5
Sand, silty, very fine to fine grained, predominant- ly fine sand, interbedded with silt to 165 ft., light brown.....	159.5	170.0
Sand, very fine to fine grained with some medium sand, trace of coarse sand below 195 ft., mostly quartz grains, light brown.....	170.0	206.5
Silt, very sandy, light olive gray.....	206.5	215.0
Sand, silty, very fine to medium grained, scattered sandy silt interbeds, light olive gray.....	215.0	244.0
Silt, moderately to very sandy, contains very fine sand, pale olive.....	244.0	252.0

Sand, silty, very fine to fine grained, light brown.	252.0	254.5
Silt, slightly clayey; very sandy to 263 ft., then slightly to moderately sandy, contains very fine to fine sand; volcanic ash shards from 269 to 285 ft., limy concretions from 275 to 280 ft., iron stain from 271.5 to 275 ft., light olive gray to 265 ft., light gray below 265 ft.....	254.5	285.0
Sand, very silty, very fine grained with some fine sand, light olive gray.....	285.0	290.0
Sand, very fine to fine grained, scattered thin sandy silt layers to 305 ft., zones of lime cementation from 300 to 316 ft., sandy silt interbed from 315.2 to 316 ft.....	290.0	320.0
Sand, very fine to medium grained.....	320.0	325.0
Silt, slightly clayey; moderately to very sandy, contains predominantly very fine sand; light olive gray.....	325.0	337.5
Silt, moderately to very clayey; moderately to very sandy, contains very fine to fine sand; silty sand interbeds from 350 to 355 ft., light olive gray to light gray.....	337.5	360.5
Sand, very fine to fine grained with some medium sand, light brownish gray.....	360.5	366.0
Silt, moderately clayey; moderately to very sandy, very fine to fine grained with trace of medium sand to fine gravel; amount of gravel increases with depth, a few limy concretions from 370 to 373 ft., consolidated from 375 to 380 ft., olive gray to pale olive.....	366.0	380.0
Gravel and sand, texture grades from fine sand to coarse gravel, considerable medium gravel, 40 percent sand.....	380.0	415.0
Sand and gravel, fine gravel predominates.....	415.0	419.0
Silt, slightly to moderately clayey, very sandy, pale olive.....	419.0	421.5
Clay, silty; very sandy, contains very fine sand to fine gravel, light olive gray.....	421.5	429.0
Sand, gravelly, texture grades from very fine sand to fine gravel, trace of medium gravel below 435 ft.....	429.0	439.2
Silt, very sandy, contains very fine to coarse sand, light brown.....	439.2	441.5
Sand, very fine to medium grained with some coarse sand, light brown.....	441.5	445.0
Sand, very fine to very coarse, interbeds of brown silt.....	445.0	450.5

Tertiary System - Miocene Series - Ogallala Group:

Silt, slightly to moderately clayey; slightly to moderately sandy, contains very fine to fine sand, trace of manganese stain at 450.5 ft., small amount of limy nodules and limy streaks, very calcareous in spots, pale brown to brown.....	450.5	465.0
Clay, silty; sandy, contains very fine to fine sand and a few coarse grains; lime streaks and nodules throughout, very calcareous, pale brown and brown with some olive mottling.....	465.0	475.7
Sand, very fine to very coarse sand with trace of fine gravel, considerable medium sand; predominately quartz grains and some dark silicates.....	475.7	481.3
Silt, moderately clayey, numerous hard limy layers or nodules; silty, manganese stained limestone from 490 to 491.8 ft.; very calcareous, pale olive to olive.....	481.3	500.0

Test Hole #33-SH-85 (No e-log)
(17-22-34bbcb)
Custer County

Location: NW SW NW NW sec. 34, T. 17 N., R. 22 W., approximately
 815 feet south and 174 feet east of northwest section corner.
 Ground elevation: 2,912 ft. (t). (Merna 7.5 min. quadrangle)
 Depth to water: Not recorded (Hole backfilled at abandonment)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Topsoil.....	0.0	3.0
Silt, slightly clayey, iron stains, very slightly calcareous below 60 ft., light brownish gray.....	3.0	80.0
Silt, moderately sandy, contains very fine to medium sand, pale brown.....	80.0	95.0
Clay, moderately silty, trace of fine sand, dark grayish brown.....	95.0	115.0
Clay, moderately silty, trace of sand, iron stains, pale brown.....	115.0	140.0
Note: No sample recovered from 140 to 160 ft., and hole abandoned due to loss of drill fluid.		

Test Hole #34-SH-85 (E-log)
(17-22-35cbbb)
Custer County

Location: NW NW NW SW sec. 35, T. 17 N., R. 35 W., approximately
 305 ft. south and 25 ft. east of the northwest corner of the
 southwest quarter of the section.

Ground elevation: 2,912 ft. (t). (Merna 7.5 min. quadrangle)

Depth to water: Greater than 300 ft. (August 6, 1985)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, slightly sandy, topsoil, dark grayish brown...	0.0	3.0
Clay, slightly sandy, contains very fine to fine sand, light olive.....	3.0	5.0
Silt, slightly sandy to 60 ft., moderately sandy below 60 ft.; contains very fine to fine sand, iron and manganese stains below 40 ft., pale olive to 40 ft., light brown gray below 40 ft., slightly calcareous from 40 to 85 ft.....	5.0	85.0
Sand, very fine to medium grained, light gray.....	85.0	110.0
Silt, moderately clayey; moderately sandy, contains very fine to fine sand; iron stains, color bands of dark gray brown, yellow brown, and light yellowish brown.....	110.0	140.0
Sand, slightly silty, very fine to medium grained...	140.0	154.0
Silt, moderately clayey; moderately sandy contains very fine to fine sand; iron stains, calcareous nodules from 180 to 185 ft., light brownish gray to gray brown.....	154.0	198.0
Sand, light gray, interval of poor recovery.....	198.0	202.0
Silt, moderately sandy, contains very fine to fine sand, snail shell fragments.....	202.0	225.0
Silt and sand, interbedded; sand is very fine to fine grained; silt is very sandy; iron stains, calcareous nodules below 240 ft., light brownish gray to light gray, interval of poor recovery.....	225.0	297.0
Sand, very fine to medium grained, trace of coarse sand below 330 ft., slightly silty, scattered interbeds of silt, light gray.....	297.0	340.0
Silt, moderately to very sandy, contains very fine to fine sand; interbedded with sand from 340 to 360 ft., calcareous fragments from 405 to 410 ft., light brownish gray, reddish tint from 382 to 400 ft., white calcareous fragments at 405 ft.....	340.0	418.0
Sand with gravel, texture grades from very fine sand to fine gravel, 5 to 10 percent gravel, some rounded sandstone fragments.....	418.0	435.0
Silt, moderately sandy, fragments of reworked sand- stone, brownish yellow to olive yellow.....	435.0	455.0

Sand with gravel, texture grades from very fine sand to fine gravel, 20 percent gravel, silty zones at 465 and 485 ft.....	455.0	500.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, contains very fine to medium sand; with interbeds of fine to coarse sand below 510 ft., light yellowish brown.....	500.0	523.0
Sand, fine to coarse grained, a few dark grains.....	523.0	550.0
Sandstone, very fine to fine grained, trace of sandy silt, pale olive.....	550.0	560.0
Sand, very fine to medium grained with trace of coarse, interbeds of sandstone from 590 to 650 ft. and 685 to 690 ft., pale olive to light brownish gray.....	560.0	700.0
Silt, sandy and very fine to medium silty sand, gradual variations, pale yellow.....	700.0	740.0
Silt, siltstone, sand, and sandstone, interbedded, very fine grained, pale olive to pale yellow with reddish siltstone.....	740.0	780.0
Sand, very fine to medium grained, scattered interbeds of silt and siltstone, silts below 830 ft. are calcareous, pale olive.....	780.0	860.0
Silt and siltstone, gradual variations; some claystone interbeds, dendritic black markings, very calcareous, pale yellow to white.....	860.0	873.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Silt and siltstone, gradual variations, very calcareous in areas, a few thin limestones from 895 to 900 ft., pale yellow to pale olive with brown tints to 925 ft., light gray below 925 ft.....	873.0	960.0
Note: Circulation losses throughout the depth of the hole resulted in poor quality samples, hole abandoned at 960 ft. because of sample quality. E-log was used extensively for interval selection.		

Test Hole #77-HP-80 (E-log)
(17-24-7cad)
Custer County

Location: SE SW NE SW sec. 7, T. 17 N., R. 24 W., approximately
 1,500 feet north and 1,840 feet east of southwest section corner.
 Ground elevation: 2,795 ft. (t). (Arnold 7.5 min. quadrangle)
 Depth to water: Not recorded

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, clayey, topsoil, dark brown.....	0.0	5.0
Silt, clayey, brown.....	5.0	55.0
Silt, clayey, pale brown.....	55.0	80.0
Silt, slightly sandy, brown.....	80.0	105.0
Sand, very fine to fine grained, silty, less silty from 110 ft. to 115 ft., brown.....	105.0	120.0
Silt, very sandy, contains very fine to fine sand, brown.....	120.0	135.0
Sand, fine to very coarse grained with some fine and medium gravel, silt interbeds from 170 to 175 ft., multi-colored.....	135.0	175.0
Silt, sandy, contains very fine sand, light brownish gray.....	175.0	182.0
Sand and gravel, texture grades from fine sand to medium gravel, 40 percent gravel, trace of peb- bles, multi-colored.....	182.0	248.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, clayey, moderately sandy, contains very fine to fine sand, brown to 255 ft., pale yellow below 255 ft.....	248.0	265.0
Sand, very fine to fine grained, slightly silty, rootlets, slightly calcareous, sandy silt interbed from 278 to 282 ft., pale yellow.....	265.0	288.0
Sandstone, silty, very fine to fine grained, slightly calcareous to 310 ft., rootlets, light olive brown.....	288.0	330.0
Siltstone, moderately sandy, contains very fine sand, light gray.....	330.0	340.0
Siltstone, lime cemented; moderately sandy, contains very fine sand; very calcareous, light yellowish brown.....	340.0	350.0
Silt, moderately sandy, contains very fine sand, slightly to very calcareous, light yellowish brown.....	350.0	365.0
Sand, slightly silty, very fine to medium grained, light brownish gray.....	365.0	375.0
Clay, silty, very limy, slightly sandy, very calcar- eous, scattered rootlets, light brownish gray.....	375.0	420.0

Sand, very silty, very fine grained, trace of fine and medium sand, rootlets, scattered sandy silt interbeds, light olive brown.....	420.0	456.0
Silt, sandy, contains very fine sand, rootlets, light yellowish brown.....	456.0	480.0
Sand, slightly silty, very fine to fine grained, trace of medium, rootlets, sandstone interbeds, light yellowish brown.....	480.0	500.0
Siltstone, very limy; moderately sandy, contains very fine sand, rootlets, very calcareous, pale yellow.....	500.0	540.0
Claystone, slightly silty, fine gravel erratics, very calcareous, siltier below 545 ft., yellow....	540.0	550.0
Sand, very fine to fine grained, rootlets, gray....	550.0	560.0
Clay, silty, slightly sandy, olive yellow.....	560.0	565.0
Sand, very silty, very fine grained.....	565.0	570.0
Silt, very limy to limestone, very calcareous, olive yellow.....	570.0	585.0
Siltstone, moderately sandy, contains very fine to medium sand, interbeds of fine sand below 595 ft., light yellowish brown.....	585.0	600.0
Clay, very sandy, contains very fine to fine sand with scattered erratics to fine gravel in size, light yellowish brown.....	600.0	605.0
Sand, very silty, very fine grained with trace fine and medium sand, some gradual gradations to poorly indurated sandstones, scattered rootlets, light yellowish brown.....	605.0	674.0
Tertiary System - Miocene Series - Arikaree Group:		
Silt, moderately sandy, contains very fine sand, very pale brown.....	674.0	700.0
Siltstone, slightly silty, scattered fine gravel sized fragments of reddish brown siltstone, very pale brown.....	700.0	710.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone, reddish brown.....	710.0	740.0

Test Hole #38-SH-85 (E-log)
(17-25-9daaa)
Custer County

Location: NE NE NE SE sec. 9, T. 17 N., R. 25 W., approximately
 127 feet south and 17 feet west of east half mile line.
 Ground elevation: 3,062 ft. (t). (Arnold 7.5 min. quadrangle)
 Depth to water: Hole caved at 362 ft. (August 20, 1985)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, very sandy, contains very fine sand, a few calcareous nodules, dark grayish brown.....	0.0	5.0
Silt, moderately sandy, contains very fine sand, rust streaks below 20 ft., moderately clayey below 140 ft., pale olive to 60 ft., light brownish gray from 60 to 158 ft.....	5.0	158.0
Clay, very sandy, contains very fine to fine sand, considerable amount of organic material, dark gray.....	158.0	162.0
Sand, very fine to fine grained, moderately silty and pale yellow at 175 ft.....	162.0	180.0
Sand, very fine to fine grained with trace of medium sand; gray brown sandy silt from 190 to 195 ft.; pale olive gray sandy silt from 208 to 212 ft., and several silt interbeds from 230 to 250 ft.; brown.....	180.0	270.0
Silt, slightly to moderately sandy, contains very fine sand, dark brown.....	270.0	275.0
Sand, very fine to medium grained, predominantly fine sand, brown.....	275.0	280.0
Silt, moderately to very sandy, olive.....	280.0	287.0
Sand, very fine to medium grained, predominantly fine grained, brown.....	287.0	310.0
Sand, very fine to fine grained with trace of medium sand, brown.....	310.0	335.0
Sand, moderately to very silty, very fine to medium grained, predominantly fine sand, brown.....	335.0	360.0
Sand, slightly to moderately silty, very fine to medium grained, brown.....	360.0	380.0
Sand, very fine to coarse sand, predominantly medium, overall coarseness increases with depth, base of interval has some very coarse sand and trace of fine gravel.....	380.0	402.0
Sand and gravel, texture grades from fine sand to fine gravel with trace of medium gravel, predominantly coarse sand and fine gravel, silt interbeds from 415 to 420 ft.....	402.0	422.0

Silt, moderately sandy, contains very fine to medium sand, slightly clayey, gravel interbed at 434 ft., pinkish to reddish brown.....	422.0	440.0
Sand and gravel, texture grades from fine sand to medium gravel, predominantly coarse to very coarse sand, silty zones at 485 and 500 ft.....	440.0	516.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately sandy, contains very fine to medium sand, trace of rootlets, brown.....	516.0	540.0
Sand, slightly silty, very fine to coarse grained, reddish brown.....	540.0	545.0
Clay, pale yellow.....	545.0	560.0
Clay and very fine sand, interbedded, clay is white, sand is light gray.....	560.0	570.0
Sand, very fine to fine grained, claystone interbeds, gray.....	570.0	578.0
Sand, very fine to medium grained with trace of coarse, gray with numerous black grains, scattered sandstone interbeds below 605 ft.....	578.0	620.0
Sand, very fine to medium grained, moderately silty, pale olive.....	620.0	640.0
Sand and sandstone, gradual variations, very fine to fine grained, pale olive.....	640.0	650.0
Sand, very fine to fine grained with some medium sand, silty zones at 655 ft., 675 ft., and from 705 to 720 ft., a few rootlets below 740 ft., olive and gray to 760 ft., brown from 760 to 800 ft., and gray from 800 to 815 ft.....	650.0	815.0
Sandstone, moderately silty, lime cemented, hard from 819 to 820 ft., very fine to fine grained, gray and very pale brown to white.....	815.0	825.0
Silt, slightly sandy, contains very fine sand, some lime cementation from 825 to 830 ft., gray to olive.....	825.0	840.0
Sand, very fine grained, very silty, interbedded with numerous thin, hard, slightly lime cemented seams; slightly calcareous, fragments from hard seams are gray to black, very pale brown.....	840.0	900.0
Tertiary System - Miocene Series - Arikaree Group:		
Silt, very sandy, contains very fine to fine sand, pale brown.....	900.0	905.0
Silt and siltstone, gradual variations, fine gravel sized siltstone lithics, pale brown.....	905.0	940.0
Sand, no samples, driller reported drilling action of possibly very fine to fine sand.....	940.0	960.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation:

Silt and siltstone, gradual variations, several pink silts containing volcanic ash, reddish brown..... 960.0 1000.0

Note: Poor recovery below 990 ft., field observation says possible shale, no shale fragments in sample.

Test Hole #13-A-59 (No e-log)
(18-17-13dddd)
Custer County

Location: SE SE SE SE sec. 13, T. 18 N., R. 17 W., approximately
 272 feet west and 10.5 feet north of southeast section corner,
 north side of trail.

Ground elevation: 2,255 ft. (t). (Comstock 7.5 min. quadrangle)

Depth to water: 31.2 ft. (July 10, 1959)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very silty, very fine to medium grained with trace of coarse sand and fine gravel, a few iron cemented nodules.....	0.0	14.5
Siltstone, coarse texture, moderately to very clayey.....	14.5	15.8
Sand, very fine to coarse grained with some fine and medium gravel.....	15.8	25.0
Sand, very silty, very fine to medium with trace of coarse.....	25.0	40.0
Sand, very fine to coarse grained, trace of fine gravel, some reworked sandstone fragments.....	40.0	61.6
Silt, moderately clayey, iron stains, mottled dark gray to blue gray.....	61.6	68.0
Sand, very fine to coarse grained with trace of gravel, very silty.....	68.0	70.0
Silt, peaty, slightly clayey, very dark brown.....	70.0	77.4
Gravel, texture grades from very fine sand to medium gravel, 80 percent gravel, sandy silt from 78.2 to 78.3 ft., blue green.....	77.4	80.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very silty, very fine to fine grained, slightly consolidated, olive gray.....	80.0	90.0
Sand, very fine to medium grained, slightly consolidated, rootlets, reworked sandstone and siltstone fragments below 115 ft.....	90.0	130.0
Silt and siltstone, gradual variations, slightly clayey; very sandy, contains very fine to medium sand; marly, thin limy seams, very calcareous.....	130.0	135.0
Sandstone, very fine to fine grained, marly to 136.1 ft., lime cemented below 136.1 ft., moderately consolidated, contains volcanic ash, moderately to very calcareous.....	135.0	140.9
Silt, moderately clayey; very sandy, contains very fine to fine sand; light gray.....	140.9	144.8
Sandstone, very fine to fine grained, very silty, rootlets, slightly consolidated.....	144.8	155.0

Sand, very fine to medium grained, very to moderately silty, rootlets and a few small seeds, limy below 163.9 ft., moderately to very calcareous....	155.0	165.0
Sandstone, very fine to fine grained, marly; interbeds of silt, limestone, and sandstone from 176.6 to 178 ft., well consolidated; very calcareous....	165.0	180.0
Sand, very fine to fine grained, lime cemented interbeds from 185 to 190 ft., rootlets, slightly consolidated.....	180.0	194.4
Marl, very sandy, very calcareous.....	194.4	195.0
Sandstone, very fine to medium grained, moderately consolidated, very marly and very calcareous above 200 ft.....	195.0	208.4
Sand, very silty, very fine to medium grained with trace of coarse sand, rootlets, slightly consolidated.....	208.4	230.0
Sand, very fine to medium grained with trace of coarse sand, slightly silty, rootlets, silty sand lenses at 237.3 and 248 ft.....	230.0	252.7
Sand, very fine to coarse grained with some very coarse sand, scattered sandy silt seams.....	252.7	255.0
Sandstone, very fine to medium grained with some coarse sand, thin layers of light olive gray silts.....	255.0	260.0
Sand, very fine to medium grained, slightly silty, very sandy silt interbeds from 263.4 to 265 ft. and 274 to 278 ft., pale olive to light gray.....	260.0	280.5
Silt, interbedded with fine grained sand and sandstone to 290 ft., moderately consolidated below 290 ft., rootlets, slightly calcareous.....	280.5	295.0
Sand, very fine to fine grained, slightly consolidated, rootlets.....	295.0	305.0
Sandstone, very fine to fine grained, interbedded with silt below 325 ft., rootlets, light gray.....	305.0	332.0
Sand, very fine to fine grained; light gray, limy silt interbed from 338 to 341.5 ft., becomes very silty below 352.5 ft.....	332.0	355.0
Sandstone, very fine to fine grained with trace of medium sand, moderately consolidated.....	355.0	358.5
Marl, silty, very calcareous.....	358.5	359.5
Sandstone, very fine to fine grained, moderately consolidated to 365 ft., non to slightly consolidated below 365 ft., interbeds of sandy silt and marl, rootlets, slightly calcareous to 365 ft., very marly and calcareous below 370 ft.....	359.5	372.5
Sand, very fine to fine grained, very silty; interbedded; rootlets.....	372.5	385.0
Sand, very fine to fine grained, silt interbeds from 424.8 to 426 ft. and 428 to 431 ft., zone of very fine to medium sand from 431 to 435 ft., very silty from 385 to 390 ft. and from 447.5 to 450 ft., rootlets, light grayish brown.....	385.0	454.0

Limestone, marly, very calcareous.....	454.0	457.5
Sand, very fine to medium sand, rootlets.....	457.5	460.0
Sandstone, very fine to fine grained, moderately consolidated, scattered lime cemented sandstone and siltstone from 462.5 to 472 ft., slightly to very calcareous, rootlets.....	460.0	475.0
Sand, very fine to fine grained with some medium sand, silt interbed from 479 to 481 ft., slightly consolidated; rootlets.....	475.0	500.0
Sand, very fine to fine grained, very silty, and slightly clayey silt; interbedded; pale yellow....	500.0	508.0
Siltstone, moderately clayey, coarse texture; interbedded with silty sandstone, pale yellow.....	508.0	510.0
Sand, very silty, very fine to fine grained with trace of medium sand, rootlets.....	510.0	515.4
Sand, very fine to coarse grained with trace of very coarse sand.....	515.4	524.3
Silt, very clayey, a few siltstone interbeds above 526.7 ft., pink to 526.7 and light olive gray below 526.7 ft.....	524.3	537.5
Silt, very sandy, slightly clayey, a few limestone interbeds above 545 ft., pale olive.....	537.5	550.0
Sand, very silty, slightly clayey, very fine to medium grained, scattered limestone interbeds, moderately calcareous.....	550.0	560.0
Tertiary System - Miocene Series - Arikaree Group:		
Siltstone, interbedded with limy silts, slightly to moderately calcareous, light gray and brown.....	560.0	584.0
Tertiary system - Eocene Series - White River Group:		
Chadron Formation:		
Silt; mixture of reworked siltstone, sandstone, limestone, sand, and ironstone; scattered limy areas; seams of fine to coarse sand, predominantly quartz grains; slightly calcareous, very pale brown to 605 ft., light yellowish brown predominate from 605 to 610 ft., below 610 ft. is mixture of yellows and grays.....	584.0	617.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, ironstones, very dark gray to black..	617.5	641.0

Test Hole #9-B-66 (E-log)
(18-18-27cccc)
Custer County

Location: SW SW SW SW sec. 27, T. 18 N., R. 18 W., approximately
 228 feet east and 6 feet north of southwest section corner.
 Ground elevation: 2,480 ft. (t). (Westerville 7.5 min. quadrangle)
 Depth to water: 164 ft. (July 25, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	1.2
Silt, slightly clayey, slightly sandy, contains very fine sand, limy from 2 to 3 ft., strongly calcareous, yellowish brown.....	1.2	5.0
Silt, slightly clayey, iron stained, oxidized zone at 24 ft., light brownish gray becoming grayish brown at 19 ft., gray and brown mottling from 19 to 20.2 ft.....	5.0	25.0
Silt, slightly clayey; slightly sandy below 35 ft., contains very fine sand; slightly calcareous, iron stained, manganese stained from 40 to 45 ft., olive gray.....	25.0	45.0
Sand, silty, very fine to medium grained, moderately calcareous, light brown.....	45.0	47.0
Silt, moderately sandy, contains very fine to fine sand; slightly clayey, slightly calcareous, iron stained from 47 to 48.5 ft., lime nodules from 47 to 48 ft., limy areas below 55 ft., pale olive....	47.0	60.0
Silt, slightly clayey; very sandy, contains very fine to medium sand with some coarse; limy nodules from 60 to 62.5 ft., brown from 60 to 65 ft., and yellowish brown from 65 to 88.5 ft.....	60.0	88.5
Sand, slightly silty, texture grades from very fine to very coarse, brown.....	88.5	101.0
Silt, slightly clayey; moderately sandy, contains very fine sand; iron stained, light brownish gray.	101.0	109.0
Sand, texture grades from very fine to very coarse with small amount of fine gravel in upper part of interval, silt interbeds from 120 to 125 ft., brown.....	109.0	136.0
Silt, moderately clayey; slightly sandy, contains very fine sand; lime nodule at 148 ft., yellowish brown.....	136.0	154.0
Sand, gravelly, texture grades from fine sand to coarse gravel.....	154.0	155.0
Sand and gravel, texture grades from fine sand to coarse gravel, contains 25 to 40 percent sand.....	155.0	166.5

Silt, slightly to moderately clayey; very sandy, contains very fine to fine sand; yellowish brown grading with depth to light brownish gray.....	166.5	174.0
Sand, very fine to medium grained with some coarse, silt layer from 178 to 178.2 ft., brown.....	174.0	180.0
Sand and gravel, texture grades from fine sand to medium gravel; quartz and feldspar grains predominate, contains 30 to 40 percent sand.....	180.0	199.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very silty, texture grades from very fine to medium sand; interbedded with sandstone and silt from 205 to 215 ft., pale olive.....	199.0	218.7
Silt, moderately clayey; moderately sandy, contains very fine to medium sand; pale yellow.....	218.7	223.5
Sandstone, interbedded with silt, rootlets, olive...	223.5	232.0
Limestone, white, strongly calcareous.....	232.0	232.5
Sand, very fine to fine sand with some medium, brown.....	232.5	237.7
Limestone, sandy, white.....	237.7	238.0
Silt, slightly clayey, slightly sandy, very limy, very calcareous, pale yellow.....	238.0	239.0
Sand, very silty, limy, pale olive.....	239.0	240.0
Sandstone, slightly cemented, slightly silty, rootlets, pale olive.....	240.0	241.0
Sand, texture grades from very fine to medium sand with some coarse sand, rootlets, scattered sandstone interbeds, brown from 241 to 270 ft., olive from 270 to 287 ft.....	241.0	287.0
Sandstone, silty, variable cementation, rootlets; very calcareous 288.5 to 300 ft., trace of volcanic ash from 290 to 295 ft., hard, limy zone from 310 to 311.5 ft.; pale olive.....	287.0	338.0
Silt, slightly clayey, slightly to moderately sandy, very limy, very calcareous, light gray.....	338.0	340.0
Sand, silty, very fine to fine grained; hard, white siltstone from 345.5 to 346 ft; moderately calcareous, light gray.....	340.0	355.0
Silt, slightly clayey, very sandy, interbedded with limy zones, bentonite zones from 355 to 358 ft., moderately calcareous, pale olive.....	355.0	360.0
Sandstone and silt, interbedded, slightly clayey, limy zones, pale olive.....	360.0	365.0
Sandstone, very fine to fine grained, interbedded with very fine to fine sand; slightly silty, limy zones, moderately to highly calcareous, rootlets from 382.5 to 385 ft., pale olive.....	365.0	400.0
Sand and sandstone, very fine to coarse grained, interbedded with silty sands, slightly calcareous, bentonite seam at 413 ft., greenish brown from 400 to 410 ft. and pale olive from 410 to 415 ft.....	400.0	415.0

Sand, very silty, interbedded with bentonite, pale olive.....	415.0	420.0
Sand, silty, texture grades from very fine to coarse sand, interbedded with very silty sand, trace of volcanic ash from 420 to 425 ft., slightly calcareous, brown from 420 to 430 ft. and pale olive from 430 to 432.4 ft.....	420.0	432.4
Silt, clayey, very limy, strongly calcareous, pale olive.....	432.4	445.0
Sandstone, silty, interbedded with silty sand and sandy silt, hard, moderately calcareous, pale olive.....	445.0	450.0

Test Hole #13-A-66 (E-log)
(18-20-13cbbb)
Custer County

Location: NW NW NW SW sec. 18, T. 18 N., R. 20 W., approximately
 50 feet south and 2 feet east of west half mile line, in pasture.
 Ground elevation: 2,675 ft. (t). (Round Valley 7.5 min. quadrangle)
 Depth to water: Hole caved at 209 ft. (August 18, 1966)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Topsoil.....	0.0	2.0
Silt, coarse texture, slightly clayey; moderately sandy, contains very fine sand; iron stains below 12.1 ft., manganese stains below 40 ft., moderately calcareous to 40 ft. and slightly calcareous from 40 to 75 ft., gastropod shells at 42 ft., limy nodules from 65 to 70 ft., shades of olive brown and grayish brown to 40 ft., shades of yellow brown, light olive, and light olive gray from 40 to 78.5 ft.....	2.0	78.5
Silt, moderately clayey; moderately sandy, contains very fine to fine sand; iron and organic stains, brown.....	78.5	80.0
Silt, slightly clayey; slightly sandy, contains very fine to fine sand, light yellowish brown.....	80.0	88.5
Sand, very silty, very fine to fine grained, some iron stains, very pale brown.....	88.5	92.0
Silt, moderately clayey; moderately sandy, contains very fine to medium sand; iron stained; pale olive to light gray.....	92.0	96.9
Sand, very fine to fine grained with some medium sand, silty zones below 106.1 ft.....	96.9	120.0
Silt, coarse texture; slightly sandy, contains very fine to fine sand; light olive gray.....	120.0	125.0
Sand, very fine to fine grained with some medium sand, numerous interbeds of silt, pale yellow....	125.0	150.0
Silt, slightly to moderately clayey; slightly sandy, contains very fine sand; pale yellow.....	150.0	154.8
Sand, very fine to medium grained, mostly very fine sand below 190 ft., silt interbeds from 154.8 to 170 ft. and 195 to 200 ft.....	154.8	200.0
Silt, moderately clayey; slightly sandy, mostly very fine sand with trace of medium and coarse, scattered iron stains, rootlets, scattered lime cemented areas, slightly to moderately calcareous, olive to pale olive.....	200.0	230.0

Sand, silty; very fine to medium grained with trace of gravel; scattered siltstone and sandstone interbeds, limy and calcareous zone at 236 ft., pale yellow.....	230.0	240.0
Clay, very silty; very sandy, contains very fine to fine sand; slightly calcareous, pale olive with yellow stains.....	240.0	248.0
Clay, very silty; very sandy, contains very fine to fine sand; olive to pale olive.....	248.0	260.0
Sand and gravel, texture grades from very fine sand to medium gravel, 40 percent gravel.....	260.0	280.0
Sand, very fine to coarse grained with some fine gravel, several silt seams.....	280.0	282.0
Sand and gravel, texture grades from fine sand to medium gravel, 40 percent gravel, several silty sand interbeds from 295 to 300 ft., numerous feldspar grains.....	282.0	300.0
Sand, very fine to coarse sand with some fine gravel, silt interbeds from 300 to 302 ft. and 304 to 305 ft.....	300.0	305.0
Sand and gravel, texture grades from fine sand to fine gravel, 35 percent gravel, silty sand from 305 to 306 ft.....	305.0	310.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, fine to coarse grained, interbedded with sandy silt.....	310.0	320.0
Sand, very silty, very fine to fine grained; rootlets, light brownish gray.....	320.0	330.0
Sand and sandstone, gradual variations, very fine to coarse grained, interbeds of silt, limy in areas, slightly to moderately calcareous, rootlets, light gray.....	330.0	340.0
Sand, moderately silty, very fine to fine grained with some medium sand, rootlets, limy areas, moderately calcareous, light gray.....	340.0	345.0
Sand and sandstone, gradual variations, very fine to fine grained, very silty and limy zones, slightly to very calcareous, slightly to moderately consolidated, light gray.....	345.0	356.5
Siltstone, interbeds of limy silt, very calcareous, white.....	356.5	360.0
Sandstone, very fine to fine grained, limy areas, slightly consolidated, moderately to very calcareous.....	360.0	365.0
Sand, very fine to coarse grained, several interbeds of sandy silt.....	365.0	390.0
Sand, very fine to medium grained with trace of coarse sand, sandstone and sandy silt interbeds from 390 to 395 ft.....	390.0	397.4

Sandstone, very fine to medium grained, moderately consolidated, trace of rootlets, interbeds of weathered volcanic ash and bentonite from 403 to 406 ft., olive gray to brown.....	397.4	410.0
Sand, very fine to medium grained, scattered sandstone and siltstone interbeds, some coarse sand from 423.9 to 430 ft., trace of rootlets, olive...	410.0	440.0
Sand and sandstone, gradual variations, very fine to fine grained with some medium sand and trace of coarse, a few siltstone interbeds, volcanic ash 453.9 to 454.2 ft. and 455.5 to 456.4 ft.....	440.0	460.0
Sand, very fine to medium grained with trace of coarse, rootlets, thin interbeds of silt below 480 ft.....	460.0	494.6
Sand, silty, interbedded with marly sand and sandstone, very fine to fine grained.....	494.6	500.0
Silt, marly, interbedded with sandstone, very calcareous, light gray to light yellow.....	500.0	508.1
Sand and sandstone, gradual variations, very fine to fine grained, rootlets to 530 ft., limy zones from 515 to 520 ft., slightly to moderately consolidated, several hard layers from 535 to 540 ft.....	508.1	540.0
Sand, very fine to medium grained.....	540.0	550.5

Test Hole #31-SH-85 (E-log)
(18-22-4bbaa)
Custer County

Location: NE NE NW NW sec. 4, T. 18 N., R. 22 W., approximately
 1,062 feet east and 62.5 feet south of northwest section corner,
 north of shelter belt.

Ground elevation: 2,722 ft. (t). (Anselmo 7.5 min. quadrangle)

Depth to water: Hole caved at 118 ft. (August 1, 1985)

Depth, in feet
 From To

Quaternary System, undifferentiated:

Silt, moderately sandy, contains very fine sand, slightly clayey, dark grayish brown.....	0.0	20.0
Sand, very fine grained.....	20.0	34.0
Clay, very silty, moderately sandy, contains very fine sand, dark grayish brown.....	34.0	40.0
Silt, moderately sandy, contains very fine sand, moderately clayey below 65 ft., sand interbeds from 70 to 90 ft., from 100 to 110 ft. and at 120 ft., pale brown grading to light brownish gray below 105 ft.....	40.0	140.0
Sand, very fine to fine grained, interbedded with sandy silt.....	140.0	185.0
Clay, interbedded with very fine sand to fine gravel.....	185.0	190.0
Sand and gravel, texture grades from very fine sand to fine gravel, clay interbed at 220 ft., rusty zone from 255 to 260 ft., reworked sandstone and rusty claystone fragments below 280 ft., pinks and reds are predominant grain colors.....	190.0	291.0

Tertiary System - Miocene Series - Ogallala Group:

Sandstone, sand, and silt; interbedded; sand and sandstones are very fine to medium grained, rust stains from 295 to 300 ft., pale yellow to pale olive.....	291.0	315.0
Silt and siltstone, gradual variations; a few sand- stone interbeds below 330 ft.; moderately sandy, contains very fine to fine sand, calcareous in areas, white with areas of pale olive and light gray.....	315.0	335.0
Sandstone, very fine to fine grained, with zones that grade to sandy silt, trace of calcareous nodules from 340 to 345 ft., pale yellow.....	335.0	360.0
Sand and sandstone, gradual variations; moderately silty, pale yellow to pale olive.....	360.0	373.0
Silt to siltstone, very calcareous, white.....	373.0	380.0
Sand, moderately silty, very fine to fine grained, slightly calcareous in areas, pale yellow.....	380.0	395.0

Sand and sandstone, gradual variations; very fine to fine grained, clay interbed at 416 ft., very pale brown grading to brown below 420 ft.....	395.0	435.0
Sandstone and siltstone, marly, moderately calcareous, white grading to white and pale yellow below 450 ft.....	435.0	460.0
Sand, slightly to moderately silty with less silt below 490 ft., very fine to medium grained, sandstone interbeds at 470 and 495 ft., pale olive to 485 ft., brown below 485 ft.....	460.0	500.0
Sand, moderately silty, very fine to fine grained, slightly calcareous, light gray.....	500.0	520.0
Silt, marly; moderately sandy, contains very fine sand; slightly to moderately calcareous, white....	520.0	535.0
Sandstone, very fine to fine grained, non to moderately calcareous, white to very pale brown.....	535.0	546.0
Clay, trace of silt, trace of very fine sand, rootlets, pale yellow.....	546.0	563.0
Sand, slightly silty, very fine to medium grained with trace of very coarse, brown.....	563.0	574.0
Sand, very fine to very coarse grained.....	574.0	588.0
Sand, very slightly silty, very fine to medium grained, pale brown.....	588.0	660.0
Sand, slightly to moderately silty, very fine to medium grained with a trace of grain sizes to very coarse gravel, rootlets, pale brown.....	660.0	670.0
Clay, silty, slightly sandy, contains very fine sand, very pale brown.....	670.0	680.0
Sand, silt, and clay, interbedded, pale brown.....	680.0	685.0
Sand, very fine to very coarse grained with trace of fine gravel.....	685.0	702.0
Sand and gravel, texture grades from very fine sand to medium gravel, rounded siltstone fragments, multicolored.....	702.0	716.0
Tertiary System - Miocene Series - Arikaree Group:		
Clay, slightly sandy, contains very fine sand, slightly calcareous, very pale brown.....	716.0	720.0
Sand, slightly sandy, very fine to medium grained, scattered silt and siltstone interbeds below 770 ft., light brownish gray, rootlets below 775 ft...	720.0	790.0
Sandstone and sand, gradual variations; very fine to fine grained with trace of medium sand, rootlets, light brownish gray.....	790.0	800.0
Clay, silty, trace of very fine sand, very pale brown.....	800.0	809.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Clay, weathered shale, ocher and pale yellow to 820 ft., ocher, brown and yellow below 820 ft., very hard below 830 ft.....	809.0	852.0
Shale, several thin limestone layers, slightly to moderately calcareous, gray to black.....	852.0	860.0

Test Hole #29-SH-85 (E-log)
(18-22-17daab)
Custer County

Location: NW NE NE SE sec. 17, T. 18 N., R. 22 W., approximately
 321 feet south and 358 feet west of east one half mile line.
 Ground elevation: 2,763 ft. (t). (Anselmo 7.5 min. quadrangle)
 Depth to water: Hole caved at 185 ft. (July 25, 1985)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, topsoil, very dark gray brown.....	0.0	3.0
Silt, slightly clayey, trace of very fine sand, iron stains from 20 to 25 ft., light yellowish brown to 15 ft., light brown gray below 15 ft.....	3.0	48.0
Sand, slightly silty, very fine grained, light gray.	48.0	64.0
Silt, slightly to moderately sandy, contains very fine sand, iron stains, sand interbeds at 70 ft., 79 ft., 82 ft., 90 ft., 98 ft., 110 ft., and 115 ft., light brownish gray to 80 ft., pale yellow from 80 to 90 ft.; pale yellow with browns below 90 ft.....	64.0	122.0
Sand, slightly silty, very fine to fine grained with trace of medium sand.....	122.0	130.0
Silt, slightly clayey; slightly sandy, contains very fine sand, rust stains, sand interbeds at 140 and 150 ft., pale yellow with brown tints.....	130.0	152.0
Sand, slightly silty, very fine to fine grained with trace of medium sand.....	152.0	157.0
Silt, moderately clayey; slightly sandy, contains very fine to fine sand; pale yellow with green tints.....	157.0	192.0
Sand, slightly silty, very fine to fine grained, light gray.....	192.0	206.0
Silt, moderately clayey, trace of very fine sand, a few calcareous nodules, pale yellow.....	206.0	212.0
Clay, very silty, grading sandier with depth, mod- erately calcareous, light gray.....	212.0	217.0
Sand, slightly silty, very fine to fine grained, light brownish gray.....	217.0	224.0
Sand and gravel, texture grades from very fine sand to fine gravel, numerous reddish grains.....	224.0	245.0
Sand, slightly silty, slightly marly in areas, very fine to fine grained, trace of medium sand to very fine gravel, numerous pink grains.....	245.0	262.0
Sand and gravel, texture grades from very fine sand to very coarse gravel, pink grains predominate, very fine to very coarse sand interbed from 275 to 280 ft.....	262.0	325.0

Tertiary System - Miocene Series - Ogallala Group:

Silt, moderately sandy, contains very fine to fine sand, pale yellow to 335 ft., white and moderately calcareous from 335 to 340 ft.....	325.0	340.0
Silt and marl, interbedded; moderately to very sandy, contains very fine to fine sand; moderately calcareous, pale yellow.....	340.0	355.0
Marl and siltstone, gradual variations, moderately sandy, contains very fine to fine sand; white.....	355.0	362.0
Sand and marl, gradual variations; very fine to fine grained, slightly calcareous in areas, pale yellow and white.....	362.0	374.0
Silt, moderately sandy, contains very fine sand; moderately clayey, pale yellow.....	374.0	380.0
Sand, moderately to very silty, very fine to fine grained, marly in spots, pale yellow.....	380.0	395.0
Sandstone, moderately silty, very fine to fine grained, marly in spots, pale yellow.....	395.0	440.0
Sand, very silty, very fine to fine grained, marly in spots, pale yellow.....	440.0	455.0
Sandstone, very fine to fine grained, lime cemented to limy, moderately calcareous, pale yellow to white.....	455.0	495.0
Silt, very sandy, very fine to fine sand, marly.....	495.0	500.0
Sand and sandstone, gradual variations; very fine to fine grained, marly.....	500.0	512.5
Marl, silty, slightly sandy, slightly calcareous, white.....	512.5	515.0
Silt, slightly clayey; slightly sandy, contains very fine sand; marly, slightly calcareous, pale yellow.....	515.0	520.0
Sand, slightly silty, very fine to fine grained, slightly marly, pale yellow.....	520.0	529.0
Silt, slightly clayey; slightly sandy, contains very fine sand; a few siltstone interbeds, slightly calcareous, light brownish gray.....	529.0	540.0
Sand, variable silt content - slightly to very silty, very fine to fine grained, trace of marl from 560 to 565 ft.; silt interbed from 569 to 573 ft., light gray grading to light brownish gray below 569 ft.....	540.0	640.0
Sand, very fine to medium grained, rootlets.....	640.0	660.0
Sandstone, very fine to fine grained, marly and calcareous to 665 ft., pale yellow.....	660.0	680.0
Sand, moderately silty, very fine to fine grained, marly, slightly calcareous, pale yellow.....	680.0	714.0
Marl, silty, moderately sandy, moderately calcareous, white.....	714.0	720.0
Sand, moderately silty, very fine to fine grained, slightly calcareous, pale yellow becoming light brownish gray below 750 ft.....	720.0	758.0

Sand and sandstone, gradual variations; slightly silty, very fine grained, light brownish gray.....	758.0	790.0
Sand, very fine grained, some coarse silt, light brownish gray.....	790.0	820.0
Tertiary System - Miocene Series - Arikaree Group:		
Sand, moderately silty, very fine grained, light brownish gray.....	820.0	848.0
Siltstone, silt, sand, and sandstone; gradual variations; siltstone and silts are sandy, sands and sandstones are very fine grained and silty; sandier phases predominate below 898 ft., volcanic ash present below 870 ft., biotitic siltstone at 875 ft., pale brown with reddish and olive tints.....	848.0	915.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Clay and claystone, gradual variations; silty, light yellowish brown.....	915.0	953.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, fissile, black with metallic luster.....	953.0	960.0

Test Hole #11-B-70 (E-log)
(18-22-32adad)
Custer County

Location: SE NE SE NE sec. 32, T. 18 N., R. 22 W., approximately
 662 feet north and 8.8 feet west of the southeast corner of the
 northeast quarter section, west side of road.

Ground elevation: 2,715 ft. (t). (Merna 7.5 min. quadrangle)

Depth to water: Hole caved at 113 ft. (August 17, 1970)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	2.0
Silt, very sandy, contains very fine to fine sand, light brownish gray.....	2.0	6.0
Silt, sandy, contains very fine to fine sand, root- lets, iron nodules, slightly calcareous, light olive brown.....	6.0	15.0
Sand, silty, iron and lime nodules, slightly calcar- eous, light yellowish brown.....	15.0	21.0
Silt, sandy, contains very fine to fine sand, manga- nese and iron stains, light gray to light olive gray.....	21.0	53.0
Sand, silty, very fine to fine grained, some medium sand below 60 ft., very light brown.....	53.0	67.5
Silt, slightly clayey, very sandy areas contain very fine to fine sand, light gray to pale yellow.....	67.5	75.0
Sand, silty, very fine to fine grained, light brown.	75.0	82.0
Silt, very slightly clayey; sandy, contains very fine to fine sand; manganese stains, light gray...	82.0	84.0
Sand, very fine to medium grained, predominantly medium, trace of coarse sand. light gray.....	84.0	90.0
Sand, very fine to fine grained with some medium sand, light olive gray to light brown.....	90.0	97.0
Silt, very sandy, contains very fine to medium sand; slightly clayey, layer of fine to medium silty sand from 100 to 101.5 ft., manganese stains, light olive gray becoming dark gray at base.....	97.0	110.0
Sand, very fine to medium sand, predominantly medium, light brown.....	110.0	124.0
Silt, very sandy, contains very fine to fine sand with some medium, light gray to light olive gray..	124.0	135.0
Sand, silty, very fine to fine sand, light olive gray.....	135.0	140.0
Silt, coarse textured; very sandy, contains very fine to fine sand with trace of medium; pale gray.	140.0	145.0
Sand, very fine to medium grained, predominantly fine sand, silt interbeds from 145 to 146.5 ft. and 149 to 150 ft., rootlets below 155 ft., light brown.....	145.0	162.5

Silt, slightly to moderately clayey, marly, limy nodules common, slightly to very calcareous, olive gray.....	162.5	170.0
Sand, coarse to very coarse with some fine to medium gravel, silt lens at 172 ft., trace of rootlets, increasing amount of gravel with depth, olive gray.....	170.0	180.0
Gravel, texture grades from medium sand to very coarse gravel.....	180.0	190.0
Sand, medium to coarse grained with some fine to medium gravel, scattered silt seams, olive brown..	190.0	200.0
Gravel, texture grades from coarse sand to fine gravel with trace of medium gravel.....	200.0	205.0
Sand and gravel, texture grades from fine sand to medium gravel, predominantly medium sand to fine gravel.....	205.0	224.0
Silt, slightly clayey, contains very fine to fine sand, light olive gray.....	224.0	227.6
Sand and gravel, texture grades from fine sand to very coarse gravel, predominantly very coarse sand and fine gravel, iron stains from 230 to 240 ft., reddish orange.....	227.6	280.0
Sand, very fine to medium grained, pale olive.....	280.0	281.5
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly to very clayey, contains very fine sand, a few siltstone layers, manganese stained, weathered, yellowish brown.....	281.5	290.0
Silt and siltstone, interbedded, slightly clayey, contains very fine sand, moderately calcareous, yellowish brown.....	290.0	294.0
Silt, slightly to moderately clayey, contains very fine to fine sand, scattered siltstone interbeds, marly to limy, slightly to moderately calcareous to 320 ft., very calcareous below 320 ft., iron stains at 300 ft., light yellowish brown with zones of light olive and light gray.....	294.0	340.0
Sand and sandstone, gradual variations, very fine to medium grained, predominantly very fine to fine sand, marly from 350 to 360 ft., rootlets, slightly to moderately calcareous, pale yellow to pale olive.....	340.0	383.5
Volcanic ash, silty, limy, hard at 384 ft., light olive gray.....	383.5	385.0
Silt, marly, moderately clayey, trace of rootlets, very calcareous, light gray.....	385.0	387.0
Sandstone, very fine to fine grained, some rootlets and lime nodules, light brownish gray.....	387.0	395.0
Sand and sandstone, gradual variations, very fine to fine grained, some lime cementation below 415 ft., pale olive, becomes pale brown below 400 ft.....	395.0	435.0

Silt, slightly clayey, sandy, marly to lime cemented, white and very marly from 450 to 455 ft., very calcareous to 460 ft., slightly calcareous from 460 to 475 ft., light gray to 450 ft., light olive gray to pale olive below 450 ft.....	435.0	475.0
Sand and sandstone, gradual variations, poorly consolidated, very fine to fine grained, some medium sand below 490.2 ft., slightly calcareous and lime-marl cemented zones from 480 to 485 ft., pale yellow to pale olive.....	475.0	495.0
Silt, very sandy, contains very fine to fine sand, trace of rootlets, thin sandstones from 505 to 510 ft., pale olive.....	495.0	515.0
Sand to sandstone, gradual variations, very silty, some rootlets below 530 ft., pale olive to olive..	515.0	540.0
Sandstone, silty, and siltstone, sandy; gradual variations, limy layer at 549 ft., very fine to medium grained sand, light gray.....	540.0	560.0
Sandstone, slightly silty, very fine to fine grained except below 590 ft. has some medium sand, poorly to moderately consolidated, scattered rootlets, limy zones from 580 to 587 ft., light olive gray..	560.0	595.0
Sandstone, silty, very fine to medium grained with some coarse sand, trace of rootlets, pale olive...	595.0	615.0
Sandstone, silty and siltstone, sandy; interbedded, lime cemented, very calcareous, white.....	615.0	620.0
Silt, slightly clayey, very sandy, scattered interbedded marl and limestone below 640 ft., very calcareous below 635 ft., light olive gray to 635 ft., white below 635 ft.....	620.0	650.0
Sandstone, very fine to fine grained, lime cemented and marly, very calcareous, rootlets, pale yellow.	650.0	658.0
Silt, slightly clayey; sandy, contains very fine to fine sand; scattered lime cemented zones and limestones; slightly to very calcareous, rootlets, pale yellow to pale olive.....	658.0	685.0
Sand and sandstone, silty, very fine to fine grained, poorly consolidated, rootlets, pale yellow to olive.....	685.0	695.0
Silt, very sandy, contains very fine to medium sand, scattered limestone, siltstone, and sandstone interbeds, marly from 700 to 703 ft., slightly to very calcareous, manganese stains at 704 ft., pale yellow.....	695.0	705.0
Sandstone, silty, lime cemented, very calcareous, manganese stains, few thin siltstones, pale yellow.....	705.0	710.0

Tertiary System - Miocene Series - Arikaree Group:

Silt and siltstone, gradual variations; sandy, contains very fine to fine sand, weathered ash noted from 715 to 730 ft., very fine to fine sand from 710 to 711 ft., and from 740 to 741 ft., pale brown to light yellowish brown..... 710.0 741.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation:

Silt and siltstone, gradual variations, slightly clayey; sandy, contains very fine sand; trace of pink bentonite from 750 to 770 ft., moderately consolidated zones from 770 to 775 ft., light reddish brown to 750 ft., brown below 750 ft..... 741.0 780.0

Test Hole #40-SH-85 (E-log)
(18-25-16aaaa)
Custer County

Location: NE NE NE NE sec. 16, T. 18 N., R. 25 W., approximately
 228 feet south and 27 feet west of northeast section corner,
 in west road ditch.

Ground elevation: 2,918 ft. (t). (Linscott SW 7.5 min. quadrangle)

Depth to water: Estimated 162 ft., (E-log pick)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly to moderately silty, very fine to medium grained, very pale brown.....	0.0	40.0
Sand, slightly silty, very fine to medium grained, pale yellow.....	40.0	75.0
Sand, slightly to moderately clayey, very fine to medium grained, light gray.....	75.0	100.0
Sand, silty, very fine to fine grained, pale yellowish brown.....	100.0	115.0
Silt, slightly sandy, contains very fine sand, trace of iron stains, light yellowish brown.....	115.0	150.0
Sand, very silty, very fine to fine grained, light yellowish brown.....	150.0	160.0
Silt, very sandy, contains very fine to fine sand, pale yellowish brown.....	160.0	170.0
Sand, slightly to moderately silty, very fine to fine grained, pale yellowish brown.....	170.0	175.0
Silt, very sandy, contains very fine to fine sand, grayish brown.....	175.0	185.0
Sand, very fine to fine, grading to very fine to coarse sand, pale brown.....	185.0	195.0
Silt, moderately sandy, partially lime cemented, lime streaks to 200 ft., slightly to very calcareous, white and pale brown.....	195.0	205.0
Sand, slightly silty, very fine to fine grained, pale brown.....	205.0	240.0
Silt, moderately to very clayey, contains some very fine sand, slightly calcareous to 250 ft. and moderately calcareous below 253 ft., pale brown to pale grayish brown.....	240.0	265.0
Sand and gravel, texture grades from fine sand to fine gravel with trace of medium gravel, silty and finer zone from 285 to 290 ft., olive silt interbed from 307 to 312 ft., brown silt interbeds from 315 to 322 ft.....	265.0	322.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, very sandy, contains very fine to medium sand, olive brown to pale brown with reddish hues.....	322.0	335.0

Sand, very fine to fine grained with trace of medium sand, slightly to moderately silty below 350 ft., limy nodules from 355 to 360 ft., pale brown becoming reddish yellow and reddish brown below 355 ft.....	335.0	376.0
Silt, very limy, very calcareous, very pale brown to white.....	376.0	380.0
Sand, slightly silty, very fine to medium grained with trace of coarse sand, brown.....	380.0	400.0
Sand and sandstone, gradual variations, moderately silty, very fine grained, slightly limy and slightly calcareous, pale yellowish brown.....	400.0	420.0
Sand, very fine to fine grained, white zones of lime cementation from 430 to 435 ft., moderately to very calcareous from 430 to 435 ft., slightly calcareous in remainder of interval, brown becoming pale brown and pale olive below 435 ft.....	420.0	460.0
Sand, moderately silty, very fine to fine grained with trace of medium sand, pale olive.....	460.0	480.0
Sand, slightly silty, very fine to medium grained, predominantly fine sand, partially cemented below 490 ft., pale olive brown.....	480.0	494.0
Silt, lime cemented to 496 ft., then less cementation; moderately sandy, contains very fine sand; white becoming pale olive.....	494.0	500.0
Sand, very fine to medium grained with trace of coarse sand, some cementation to 505 ft., light gray silt interbed from 517 to 520 ft., small amounts of volcanic ash below 530 ft., grayish brown.....	500.0	545.0
Silt, very sandy, contains very fine to fine sand, partially laminated from 555 to 565 ft., slightly calcareous except moderately to very calcareous from 560 to 565 ft., pale yellow olive to 554 ft.; white from 554 to 555 ft., and very pale olive below 555 ft.....	545.0	567.0
Sand, very fine to medium grained, predominantly fine sand, medium sand sizes are mostly black, grayish brown.....	567.0	580.0
Sand, very fine to fine grained, silt interbed from 590 to 593 ft., slightly to moderately calcareous, brown.....	580.0	600.0
Sand, very fine to medium grained, predominantly fine sand, slightly silty, grayish brown.....	600.0	640.0
Sand, very fine to medium grained with trace of coarse sand, medium sand and larger grains are black, grayish brown.....	640.0	660.0
Sand, very fine to medium grained, slightly silty, grayish brown.....	660.0	680.0

Silt, very fine to fine grained with trace of medium sand, slightly silty, hard zone from 685 to 686 ft., grayish brown to 695 ft. and brown below 695 ft.....	680.0	715.0
Sand, very fine to fine grained, very silty, limy, slightly to moderately calcareous, brown to grayish brown.....	715.0	733.0
Sand, very fine to medium grained, slightly to moderately silty, limy and slightly calcareous to 740 ft., brown.....	733.0	790.0
Sand, very fine to medium grained, predominantly fine sand, medium sand grains are black to 820 ft., brown.....	790.0	830.0
Sand, silty, very fine to medium grained to 840 ft., predominantly very fine sand below 840 ft., brown.	830.0	860.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Silt and siltstone, gradual variations, moderately sandy, contains very fine sand, scattered claystone layers, siltstone predominates below 882 ft., pale brown to brown with strong reddish hues.	860.0	935.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, very clayey, highly weathered, iron stains to 940 ft., mottled bright yellow and pale gray.....	935.0	983.0
Shale, clayey, very hard at 996 ft., dark gray to black.....	983.0	996.0

Test Hole #39-SH-85 (E-log)
(18-25-28dada)
Custer County

Location: NE SE NE SE sec. 28, T. 18 N., R. 25 W., approximately
 1,921 feet north and 46 feet west of southeast section corner.
 Ground elevation: 3,085 ft. (t). (Arnold 7.5 minute quadrangle)
 Depth to water: Hole caved at 362 ft. (August 20, 1985)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, topsoil, dark brown.....	0.0	8.0
Silt, very slightly clayey, trace of iron staining below 15 ft., brown to 25 ft., grayish brown from 25 to 50 ft., below 50 ft. becomes grayish brown with olive to yellow hues.....	8.0	115.0
Silt, slightly to moderately sandy, contains very fine sand with scattered coarse grains, yellowish brown to 150 ft., light gray to pale brown to 170 ft., grayish brown with reddish hues below 170 ft.	115.0	205.0
Sand, slightly silty, very fine to fine grained, pale brown to 215 ft., pale brownish gray from 215 to 240 ft. and from 260 to 270 ft., gray from 240 to 260 ft.....	205.0	270.0
Silt, moderately to very sandy, contains very fine sand, light grayish brown.....	270.0	280.0
Sand, slightly to very silty in areas, very fine to fine grained with trace of medium sand, a few limy streaks from 300 to 315 ft., slightly calcareous from 300 to 315 ft., grayish brown grading to light brownish gray.....	280.0	325.0
Sand, slightly silty, very fine to medium grained with trace of coarse sand.....	325.0	340.0
Sand, slightly to moderately silty, very fine to fine grained, light grayish brown.....	340.0	360.0
Silt, moderately to very sandy, contains very fine sand, light grayish brown.....	360.0	375.0
Sand, slightly silty, very fine to fine grained with trace of medium sand, light grayish brown to 410 ft., yellowish brown below 410 ft.....	375.0	434.0
Sand and gravel, texture grades from fine sand to fine gravel with trace of medium gravel, consid- erable very coarse sand.....	434.0	490.0
Sand and gravel, texture grades from medium sand to coarse gravel.....	490.0	500.0
Sand and gravel and silt, interbedded, sand and gravel texture grades from fine sand to fine gravel, light grayish brown.....	500.0	507.0

Tertiary System - Miocene Series - Ogallala Group:

Silt, slightly clayey; slightly to moderately sandy, contains very fine to fine sand; pale brown.....	507.0	520.0
Sand, slightly to very silty, very fine to medium grained with trace of coarse sand, silt interbeds from 535 to 540 ft., 555 to 560 ft. and from 595 to 600 ft.; lime seams to limy from 535 to 540 ft. and from 555 to 600 ft., these two interbeds were light gray to white and moderately to very calcareous; brown to 600 ft., grayish brown below 600 ft.....	520.0	645.0
Silt, very sandy, contains very fine to medium sand, pale brown with olive hues.....	645.0	660.0
Sand, slightly to moderately silty, very fine to medium grained, pale brown.....	660.0	670.0
Sand and sandstone, gradual variations, slightly to moderately silty, very fine to medium grained, lime cemented and slightly calcareous from 685 to 690 ft., olive brown becoming pale yellowish brown at 685 ft.....	670.0	690.0
Sand, slightly to moderately sandy, very fine to medium grained, a few yellow silt seams from 700 to 710 ft., medium sand grains from 710 to 725 ft. are black, brown to grayish brown.....	690.0	725.0
Silt, moderately clayey, thin interbeds of volcanic ash, pale yellow.....	725.0	730.0
Sand, slightly to very silty, very fine to medium grained, scattered silt and claystone interbeds, pale yellow.....	730.0	755.0
Claystone, with thin sand seams, olive gray.....	755.0	760.0
Sand, very fine to medium grained, interbedded with thin siltstone seams, grayish olive brown.....	760.0	770.0
Claystone, limy, white and moderately calcareous to 775 ft; olive and sandy below 775 ft.....	770.0	780.0
Silt, numerous sand and claystone interbeds, white limestones and limy nodules from 805 to 810 ft., olive.....	780.0	820.0
Sand, very fine to medium grained, moderately to very silty, olive brown.....	820.0	840.0
Sand, very fine to medium grained with trace of coarse; scattered, thin claystone interbeds becoming more common below 860 ft., light gray to 870 ft., olive brown below 870 ft.....	840.0	890.0
Silt, moderately sandy, interbeds of claystone, numerous fine to medium sand interbeds from 900 to 910 ft., olive to grayish olive to 910 ft., light brownish gray below 910 ft.....	890.0	940.0
Sand, slightly to moderately silty, very fine to fine grained, small amount of volcanic ash from 985 to 990 ft., a few cemented zones below 997 ft., brownish gray.....	940.0	1010.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation:

Silt and siltstone, gradual variations, light brown
to brown with pinkish and reddish hues..... 1010.0 1038.0

Note: Hole terminated at 1038 ft. due to encountering
hard layer, a few slate-like fragments recovered.

Test Hole #14-A-59 (E-log)
(19-17-36ddda)
Custer County

Location: NE SE SE SE sec. 36, T. 19 N., R. 17 W., approximately 515 feet north and 4 feet west of southeast section corner, west side of trail.

Ground elevation: 2,425 ft. (t). (Comstock 7.5 min. quadrangle)

Depth to water: 176.7 ft. (July 10, 1959)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	0.5
Silt, coarse texture, slightly clayey, iron stains below 32 ft., slightly calcareous above 50 ft., snail shells from 40 to 45 ft., light yellowish brown.....	0.5	62.0
Silt, very clayey, very dark brown.....	62.0	64.3
Silt, moderately clayey; very slightly sandy, contains very fine to medium sand; grayish brown.....	64.3	74.5
Silt, moderately clayey; moderately sandy, contains very fine to medium sand; iron stains from 74.5 to 75 ft., pale olive.....	74.5	80.0
Sand, very silty, very fine to medium grained with trace of coarse sand, iron stains, pale olive.....	80.0	86.5
Silt, coarse texture; very to slightly sandy, contains very fine to medium sand; moderately clayey below 104 ft., very fine to medium grained sand interbedded from 109.5 to 109.9 ft., iron stains from 100 to 115 ft., pale olive.....	86.5	115.0
Sand, very silty, slightly clayey, very fine to medium grained with trace of coarse sand; iron stains.....	115.0	151.9
Silt, moderately clayey; slightly to moderately sandy, contains very fine to fine sand; sand is slightly coarser below 180 ft., limy nodules at 174.5 ft., light yellowish brown to 155 ft., light olive brown below 155 ft.....	151.9	188.5
Sand and gravel, texture grades from fine sand to fine gravel with some medium gravel, 60 percent gravel, sandy clay balls below 198.5 ft.....	188.5	201.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, contains very fine to medium sand, very clayey, interbedded with limestone below 208.6 ft., moderately calcareous below 208.6 ft., pale olive.....	201.0	210.4
Limestone and marl, moderately clayey; very sandy, contains very fine to medium sand, very calcareous.....	210.4	215.0

Sand, slightly to very silty, some marl, very fine to medium grained, slightly calcareous, light gray silt interbed from 222.5 to 225 ft.....	215.0	234.6
Limestone, marly, interbedded with sandstone.....	234.6	237.2
Sandstone, moderately consolidated, rootlets, slightly calcareous, partly lime cemented, volcanic ash interbeds from 241.5 to 244.2 ft.....	237.2	245.0
Siltstone, partly lime cemented, interbedded with sand and silt.....	245.0	250.0
Sand, very fine to medium grained, trace of coarse sand below 265 ft., areas of slight consolidation; rootlets, a few lime cemented sandstone interbeds below 275 ft.....	250.0	285.0
Sandstone, lime cemented, well consolidated, very fine to medium grained, rootlets, marly areas, very calcareous.....	285.0	288.9
Silt, very sandy, pale yellow.....	288.9	290.0
Sand, very silty, very fine to fine grained, interbedded with sandstone, rootlets.....	290.0	295.0
Sandstone, very fine to medium grained, moderately silty, lime cemented areas above 300 ft., slightly to moderately consolidated.....	295.0	302.0
Silt, coarse texture, moderately clayey, marly below 304.6 ft., slightly calcareous, light gray.....	302.0	305.0
Sand, very silty, very fine to medium grained, interbeds of lime cemented sandstone and marl, slightly to moderately calcareous.....	305.0	320.0
Sandstone, very fine to medium grained, interbedded with marl and siltstone, very silty sand interbed from 348 to 350 ft., lime cemented, moderately to well consolidated, moderately to very calcareous..	320.0	358.5
Marl, very silty, very calcareous, white.....	358.5	360.0
Sandstone, very fine to medium grained, marly from 362.5 to 363.5, moderately calcareous.....	360.0	363.5
Silt, moderately sandy, contains very fine to fine sand, areas of nodules and marl, numerous limestone interbeds below 375 ft., moderately to very calcareous, light gray and white.....	363.5	380.0
Sand, very silty, very fine to fine grained, lime cemented areas, moderately calcareous.....	380.0	385.0
Marl, interbedded with sandy silt, white, very calcareous.....	385.0	388.5
Silt, moderately sandy, interbedded with very fine to fine sand.....	388.5	390.0
Sand, very fine to fine grained with areas that are very fine to medium grained, scattered silt and sandstone interbeds, very to moderately silty from 420 to 449 ft. and 470 to 475 ft., rootlets, slightly consolidated, marly and moderately calcareous below 475 ft.....	390.0	485.0
Sandstone, lime cemented, moderately to well consolidated, marly below 494.4 ft., very calcareous.	485.0	495.0

Silt and siltstone, gradual variations, marly areas, moderately to very calcareous, olive yellow to olive gray.....	495.0	505.0
Sandstone, moderately to well consolidated, rootlets, marly at 508.9 ft.....	505.0	510.0
Sand, very fine to medium grained with some coarse sand, very sandy silt interbed from 517.4 to 520 ft., rootlets, pale yellow.....	510.0	525.0
Silt and siltstone, gradual variations, coarse texture, numerous sandstone interbeds from 530 to 535 ft., pale yellow.....	525.0	537.0
Sand, very silty, very fine to medium grained, sandstone interbed from 540 to 545 ft., very marly from 537 to 540 ft. and from 550 to 562 ft., rootlets.....	537.0	570.0
Silt and siltstone, gradual variations, coarse texture, limestone interbeds with black specks from 575 to 580 ft., light olive gray.....	570.0	580.0
Sand, very fine to medium grained with trace of coarse sand, very silty, marly areas to 645 ft., rootlets, silty sandstone interbeds from 625 to 630 ft.....	580.0	658.9
Silt, coarse texture, slightly clayey, light olive gray.....	658.9	663.0
Sand, fine to very coarse grained, rootlets, light olive gray.....	663.0	673.0
Silt and siltstone, gradual variations, coarse texture; slightly sandy, contains very fine to fine sand; marly from 688.5 to 689 ft., light olive gray.....	673.0	690.0
Sand, very silty, very fine to fine grained, marly at 703.5 ft.....	690.0	705.0
Tertiary System - Miocene Series - Arikaree Group:		
Silt, coarse texture; very sandy, contains very fine to fine sand; marly above 715 ft., siltstone interbed from 715 to 717.5 ft., light pinkish gray to 717.5 ft., light olive gray below 717.5 ft.....	705.0	725.0
Sand, very silty, very fine grained, light olive gray.....	725.0	740.0
Silt, coarse texture, slightly clayey, slightly sandy, contains very fine sand; yellowish brown, some light gray below 745 ft.....	740.0	751.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, ironstone and claystone layers from 755 to 760 ft., iron stains below 760 ft., mottled gray, yellow, and brown.....	751.5	770.0

Test Hole #9-A-66 (E-log)
(19-18-27cbcc)
Custer County

Location: SW SW NW SW sec. 27, T. 19 N., R. 18 W., approximately 1,450 feet north and 48 feet east of southwest section corner, north side of trail.

Ground elevation: 2,485 ft. (t). (Sargent SW 7.5 min. quadrangle)

Depth to water: 157 ft., (July 16, 1966)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	0.5
Silt, moderately clayey, very coarse texture; slightly sandy, contains very fine sand; iron and manganese stains, rootlets from 8 to 18 ft., rootlets are large from 15 to 18 ft., moderately calcareous, brown to 15 ft., pale brown from 15 to 30 ft., light brownish gray and grayish brown from 30 to 61 ft.....	0.5	61.0
Silt, slightly clayey, coarse textured, slightly sandy, very dark grayish brown becoming brown below 64.1 ft., slightly calcareous above 63 ft...	61.0	66.1
Silt, slightly to moderately clayey; moderately sandy, contains fine to medium sand; iron stains at 79.7 ft., manganese stains from 87 to 90 ft., a few rootlets from 85 to 87 ft., slightly to moderately calcareous from 70 to 92.3 ft., pale brown to 87 ft., brown from 87 to 107.5 ft.....	66.1	107.5
Silt, sandy and silty sand, interbedded, very fine to medium sand, very oxidized from 114 to 115 ft., iron stained, brown.....	107.5	115.0
Sand, very fine to coarse grained, very silty, silt interbeds, dark brown to 140 ft., light brownish gray from 140 to 143 ft.....	115.0	143.0
Sand and gravel, texture grades from very fine sand to coarse gravel, 50 percent gravel, iron stained from 143 to 145 ft.....	143.0	165.0
Sand, very fine to coarse sand with some gravel, rootlets, brown.....	165.0	178.8
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey; moderately sandy, contains very fine to fine sand; sandstone interbeds from 180 to 180.5 ft., 185.7 to 188.5 ft., 193.5 to 194.1 ft., and 195 to 195.4 ft., sand and sandstone interbeds from 190 to 193.5 ft.; light brownish gray to 190 ft., pale olive and light gray from 190 to 195.4 ft., and pale yellow from 195.4 to 205 ft.....	178.8	205.0

Sandstone, very fine to medium grained, interbedded with sandy silt, pale olive.....	205.0	210.0
Sand, very fine to medium grained, interbedded with sandstone and silt, rootlets, pale olive.....	210.0	215.0
Sand, very fine to medium grained, rootlets, pale olive.....	215.0	220.0
Sandstone, very fine to medium grained, moderately consolidated, rootlets, silt interbeds from 251.5 to 266.6 ft., pale olive with brown tints.....	220.0	266.6
Silt, very sandy, interbedded with sand and sandstone, very fine to medium grained sand, marly and limy areas from 271.6 to 280.0 ft., slightly to very calcareous, lime nodules from 275 to 278.5 ft., pale yellow to pale olive.....	266.6	280.0
Sandstone, very fine to medium grained, moderately indurated, areas of lime cementation, rootlets, interbeds of silt from 294 to 295 ft. and very silty sand from 288 to 290 ft., pale olive.....	280.0	300.0
Sand, very fine to medium grained, interbedded with sandstone and silt, zones of lime cementation from 315.5 to 320 ft., rootlets, moderately calcareous below 315.5 ft., pale olive.....	300.0	320.0
Sand and sandstone, gradual variations, very fine to medium grained, sandstone and scattered siltstone intervals are lime cemented, rootlets, non to very calcareous, bands of brown, pale olive, light brown, and light gray.....	320.0	332.8
Siltstone and sandstone, interbedded, lime cemented, rootlets, moderately calcareous, pale olive.....	332.8	340.0
Sandstone, fine to medium grained, lime cemented, moderately consolidated, very calcareous to 365 ft., pale olive.....	340.0	380.0
Sand and sandstone, silty, interbedded, very fine to medium grained, rootlets, pale olive.....	380.0	425.0
Sandstone, siltstone, sand, and silt; interbedded with individual bed thicknesses ranging from 1.6 to 5 ft., sands and sandstones are silty and very fine to fine grained, silts and siltstones are sandy, rootlets are very common, ash shards from 445 to 450 ft., pale olive.....	425.0	450.0
Sandstone, very fine to fine grained, mostly lime cemented, silt interbed from 460.4 to 464 ft., moderately to very calcareous, pale olive and pale yellow from 450 to 459 ft., white from 459 to 464 ft., light olive gray and pale olive from 464 to 485 ft.....	450.0	485.0
Sand and sandstone, very fine to coarse grained, interbedded, silt interbeds below 489.7 ft., olive to pale olive.....	485.0	500.5

Test Hole #12-A-66 (E-log)
(19-20-13abab)
Custer County

Location: NW NE NW NE sec. 13, T. 19 N., R. 20 W., approximately 783 ft. east and 8 feet south of north half section line, south edge of county road.

Ground elevation: 2,421 ft. (t). (Walworth 7.5 min. quadrangle)

Depth to water: 22.8 ft. (July 29, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill, silt with gravel, very dark gray.....	0.0	0.5
Silt, slightly to moderately clayey, numerous lime and sandstone nodules from 6.7 to 15.8 ft., rootlets from 15.8 to 22.3 ft., very calcareous in spots, dark grayish brown to 5.0 ft., grayish brown and brown from 5.0 to 22.3 ft., yellowish brown mottling at 15 ft.....	0.5	22.3
Silt, slightly clayey to 36.5 ft., then moderately clayey, calcareous rootlets which are very abundant from 29.5 to 36.5 ft., scattered peat fragments from 26.9 to 29.5 ft., several peat and clay layers from 40.7 to 46.6 ft., dark bluish gray....	22.3	46.6
Sand, very fine to medium grained, gray.....	46.6	53.8
Silt, moderately clayey; interbedded with fine to medium sand and clay; gastropod shells at 54.5 ft., several thin peat layers from 55.7 to 65 ft., diatomaceous from 60 to 65 ft., very dark gray to 58.7 ft. and bluish gray below 58.7 ft.....	53.8	65.0
Sand and gravel, texture grades from very fine to medium sand with some coarse sand and fine gravel, 10 percent gravel, vegetal material from 80 to 90 ft., light gray.....	65.0	95.0
Sand with gravel, texture grades from very fine sand to coarse sand with 10 percent fine gravel.....	95.0	105.0
Sand, very fine to fine grained with some medium sand to fine gravel.....	105.0	120.0
Sand with gravel, predominantly fine to medium grained, texture grades from very fine sand to 10 percent gravel.....	120.0	130.0
Sand, predominantly fine to coarse grained, texture grades from very fine sand to trace of gravel.....	130.0	140.0
Sand, predominantly medium to very coarse sand, texture grades from very fine sand to trace of gravel.....	140.0	145.0
Sand, very fine to medium grained with trace of coarse sand and fine gravel.....	145.0	160.0

Sand with gravel, predominantly fine to medium grained, texture grades from fine sand to medium gravel, 5 percent gravel.....	160.0	187.0
Sand and gravel, texture grades from fine sand to coarse gravel, 60 percent gravel, sandstone and clay seams at 207 ft.....	187.0	210.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very clayey, very fine to coarse grained, pale olive to light gray.....	210.0	218.5
Sandstone, very fine to fine grained, rootlets, pale olive.....	218.5	245.0
Sand, moderately silty and clayey, very fine to fine grained, white limy zones from 255 to 265 ft., very calcareous in spots, pale yellow to pale olive.....	245.0	265.0
Sand and sandstone; interbedded; very fine to fine grained, rootlets becoming numerous below 340 ft., brown to 305 ft., light olive gray and pale olive from 305 to 367.1 ft.....	265.0	367.1
Siltstone and fine to medium sand, light olive gray.	367.1	370.0
Sand, very fine to medium grained with trace of coarse below 380 ft.....	370.0	382.0
Silt and very fine to medium sand; interbedded; pale olive.....	382.0	390.0
Clay, very sandy, contains very fine to coarse sand, interbeds of sandstone, brown.....	390.0	397.5
Sand and sandstone; interbedded; very fine to medium grained, trace of coarse sand below 410 ft., sandy clay interbeds from 405 to 425 ft., scattered rootlets, light gray.....	397.5	425.0
Sand, very fine to medium grained with some coarse sand; scattered clay interbeds from 430 to 460 ft., rootlets.....	425.0	460.0
Sand, very fine to fine grained with trace of medium, scattered rootlets below 475 ft., clay interbed from 487.5 to 488.5 ft., light gray.....	460.0	498.0
Siltstone, sandy, contains very fine to fine sand, partially lime cemented, calcareous in spots, white to pale olive.....	498.0	499.2
Sand and sandstone; interbedded; very fine to medium grained, silty, a few rootlets, light gray, slightly calcareous.....	499.2	509.0
Clay, very sandy, contains very fine to fine sand, very calcareous in spots, white and light olive...	509.0	510.0
Sand and siltstone, interbedded; very fine to medium grained sand to 515 ft., and very fine to fine sand below 515 ft., slightly calcareous, light gray with brown hues.....	510.0	516.2
Sand, moderately clayey, very fine to fine grained, pale brown siltstone interbeds, slightly calcareous, light gray.....	516.2	526.5

Tertiary System - Miocene Series - Arikaree Group:		
Siltstone, slightly sandy, contains very fine sand, pale olive to light brownish gray.....	526.5	550.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone and silt, gradual variations, pale brown to light brownish gray.....	550.0	570.0
Tertiary System - Eocene Series - White River Group:		
Chadron Formation:		
Clay and claystone, gradual variations, varicolored - yellow, green, pink.....	570.0	575.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, highly weathered, yellow brown.....	575.0	590.0

Test Hole #13-B-66 (E-log)
(19-20-36abcb)
Custer County

Location: NW SW NW NE sec. 36, T. 19 N., R. 20 W., approximately
 730 feet south and 2,600 feet west of northeast section corner.
 Ground elevation: 2,535 ft. (t). (Round Valley 7.5 min. quadrangle)
 Depth to water: 99.5 ft. (August 18, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, moderately clayey, dark brown from 0.0 to 14.5 ft. and pale brown and gray brown to 25 ft...	0.0	25.0
Silt, slightly clayey, moderately sandy, contains very fine to fine sand, slightly calcareous, iron stained, yellow brown.....	25.0	33.0
Silt, slightly clayey, moderately sandy, contains very fine to fine sand, iron stained, grayish brown to light grayish brown, slightly calcareous.	33.0	108.0
Silt, with lime cemented siltstone, very clayey; sandy, contains very fine to medium sand and scattered fine gravel; gray brown grading to yellow brown with depth, slightly calcareous.....	108.0	115.0
Clay, silty; sandy, contains very fine to very coarse sand and fine gravel, slightly calcareous, reddish pale brown.....	115.0	117.0
Sand, texture grades from very fine sand to fine gravel, contains 10 percent gravel at top of interval to 30 percent in bottom of interval, reddish brown.....	117.0	135.0
Gravel, texture grades from very fine sand to very coarse gravel, contains 25 percent sand, reddish brown.....	135.0	145.0
Sand, texture grades from fine sand to 30 percent fine gravel, reddish brown.....	145.0	153.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; light brownish gray.....	153.0	162.0
Sand, texture grades from very fine to medium gravel, gravel content increases from 5 percent at top of interval to 35 percent at base, reddish brown.....	162.0	173.2
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty, with interbeds of sandstone, fine to medium grained, rootlets, brown to olive.....	173.2	177.5
Silt, very sandy, contains very fine to medium sand, moderately clayey, light brownish gray becoming pale yellow below 180 ft.....	177.5	187.0

Sand and sandstone, varying induration, very fine to coarse grained, rootlets, scattered siltstone and claystone lenses, pale olive with changes to brown and olive.....	187.0	257.5
Silt, very sandy, contains very fine to medium sand, scattered sandstone and siltstone interbeds, slightly calcareous; pale yellow.....	257.5	264.0
Sand, with sandstone and silt interbeds, very fine to medium grained, moderately lime cemented below 285 ft., abundant rootlets, slightly calcareous, olive from 264 to 285 ft., brown from 285 to 290 ft., and yellow brown below 290 ft.....	264.0	305.0
Sandstone and sand, interbedded, very fine to medium grained with some coarse sand, silty, rootlets, well consolidated from 325 to 330 ft., zones of lime cementation from 330 to 352 ft., moderately calcareous, olive.....	305.0	352.0
Silt, very sandy, contains very fine to medium sand, slightly clayey, interbeds of silty sandstone, very calcareous, light gray.....	352.0	357.0
Sandstone, fine to medium grained, interbeds of sandy silt and sand, partially lime cemented, slightly to moderately calcareous; olive.....	357.0	370.0
Silt, slightly clayey; very sandy, contains very fine to medium sand; lime cemented to marly zones, very calcareous, pale yellow.....	370.0	385.0
Sandstone, silty, very fine to medium grained; interbeds of silt, rootlets, olive.....	385.0	399.0
Silt, moderately clayey, very sandy, contains very fine to coarse sand, pale yellow.....	399.0	405.0
Sandstone, silty, very fine to medium grained, with interbeds of sandy silt which become numerous below 410 ft., olive.....	405.0	415.0
Silt, slightly clayey, very sandy, pale yellow.....	415.0	420.0
Sandstone, very fine to medium grained, interbeds of silty sand, bentonitic from 425 to 430.9, lime cementation, very calcareous, olive.....	420.0	430.9
Silt, slightly clayey, zones of marl and lime cemented sandstone, very calcareous.....	430.9	440.0
Sandstone and sandy silt, interbedded, olive.....	440.0	445.0
Sandstone, very fine to medium grained, grains are well rounded, limy and silty interbeds, very calcareous, pale olive.....	445.0	450.0
Silt, sandy, contains very fine to fine sand, slightly clayey, zones of marl, very calcareous, light gray to pale yellow.....	450.0	455.0
Sandstone, very fine to fine grained, partly lime cemented, zones of marl, moderately calcareous, pale yellow.....	455.0	465.0
Silt, sandy, limy to marl, very calcareous, pale yellow.....	465.0	467.0
Limestone, with sandy marl, very calcareous, white..	467.0	470.0

Sand, sandstone, siltstone, interbedded, contains very fine to medium sand, marl zones, olive.....	470.0	477.0
Silt, slightly clayey; very sandy, interbeds of sand and sandstone, pale yellow.....	477.0	490.0
Sand, silty; texture grades from very fine to medium with some coarse sand, marly zones, brown to pale yellow.....	490.0	500.0
Silt, slightly clayey; moderately sandy, contains very fine to medium sand; scattered sandstone interbeds, hackberry seed at 520 ft., marly zones below 520 ft. which are very calcareous, pale yellow to white at bottom of interval.....	500.0	525.0
Silt and siltstone, with sandstone and sand interbeds, partly lime cemented, rootlets, pale olive..	525.0	532.0
Sand, very fine to very coarse grained, sandy siltstone lenses below 540 ft. becoming numerous below 548.3 ft., brown.....	532.0	551.8
Silt, slightly clayey, micaceous, pale yellow.....	551.8	555.0
Sand and sandstone, very fine to medium grained with some coarse sand, becomes mostly sand below 580 ft., pale olive and brown.....	555.0	600.0
Sandstone, very fine to medium grained with some coarse sand, siltstone layers from 600 to 605 ft., layers of sand and silty sand below 610 ft., siltier and marly below 620 ft., light brownish gray.....	600.0	625.0
Silt, very sandy, contains very fine to fine sand, marly, lime cemented sandstone interbeds below 635 ft., very calcareous to 665 ft., light brownish gray to 645 ft. and pale yellow below 645 ft.....	625.0	675.0
Sandstone and sandy silt, interbedded, pale yellow..	675.0	685.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; interbeds of sandstone, pale yellow.....	685.0	695.0
Sand, medium to coarse grained, fragments of chert, claystone, and siltstone.....	695.0	697.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, weathered, clayey, green and orange.....	697.0	700.0
Shale, clayey, pale yellow.....	700.0	708.0
Shale, waxey, very dark gray brown.....	708.0	720.0

Test Hole #36-SH-85 (E-log)
(19-21-10bccd)
Custer County

Location: SE SW SW NW sec. 10, T. 19 N., R. 21 W., approximately
 502 feet east and 204 feet north of west half mile line, north
 side of road.

Ground elevation: 2,505 ft. (t). (Milburn 7.5 min. quadrangle)

Depth to water: Not recorded

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, moderately silty, trace of very fine sand, iron streaks below 5 ft., brown.....	0.0	10.0
Sand, very fine grained, moderately silty, brown....	10.0	15.0
Sand, moderately clayey, very fine grained, greenish gray.....	15.0	18.0
Clay, moderately sandy, contains very fine sand, slightly to very calcareous, snail shells, some organic material, dark gray to black.....	18.0	30.0
Silt, moderately sandy, contains very fine sand, snail shells, olive gray.....	30.0	35.0
Clay, moderately sandy, contains very fine sand, snail shells, slightly calcareous, olive gray.....	35.0	40.0
Silt, very sandy, contains very fine sand, olive gray.....	40.0	45.0
Sand, very fine to fine grained.....	45.0	50.0
Silt, slightly to very sandy, contains very fine sand, organic material from 55 to 60 ft. and 70 to 75 ft., dark gray.....	50.0	89.0
Gravel, very fine to coarse grained with medium to very coarse sand, clay and rusty silt lenses from 95 to 100 ft.....	89.0	100.0
Sand and gravel, texture grades from medium sand to fine gravel, 40 percent gravel, rusty, brownish yellow clay from 108 to 109 ft.....	100.0	125.0
Sand, fine to very coarse grained with some medium gravel.....	125.0	130.0
Sand, predominantly very fine to medium grained with some coarse sand to fine gravel, gravels below 140 ft are sandstone lithics.....	130.0	144.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, contains very fine to medium sand, pale yellow.....	144.0	158.0
Sandstone, very fine to medium grained, pale olive..	158.0	165.0
Sand and sandstone, gradual variations, very fine to medium grained, rootlets, pale olive.....	165.0	180.0
Sand, very fine to medium grained, a few consoli- dated zones, medium sand grains are black, root- lets, light olive gray.....	180.0	195.0

Silt, very sandy, contains very fine to fine sand, light olive gray.....	195.0	200.0
sand and sandstone, gradual variations, slightly silty, very fine to medium grained, pale yellow...	200.0	236.0
Sand and sandstone, gradual variations, moderately silty, very fine to medium grained, sandstones predominate to 250 ft., moderately calcareous to 250 ft., pale yellow.....	236.0	280.0
Sand, very slightly silty, very fine to fine grained to 295 ft. and very fine to medium grained below 295 ft., pale yellow.....	280.0	300.0
Sand and sandstone, gradual variations, moderately silty, pale yellow.....	300.0	305.0
Sand, very fine to fine grained with some medium sand, a few sandstone interbeds from 315 to 320 ft., pale yellow to light yellow brown.....	305.0	340.0
Sand and sandstone, gradual variations, slightly to moderately silty, very fine to medium grained, rootlets, light yellowish brown.....	340.0	350.0
Sand, very fine to medium, pale olive.....	350.0	361.0
Sand and sandstone, gradual variation, moderately silty, very fine to medium grained, pale yellow...	361.0	365.0
Sand, moderately silty, predominantly very fine grained with some fine sand, pale yellow.....	365.0	370.0
Sand, very fine to fine grained with trace of medium sand, pale olive.....	370.0	380.0
Sand and sandstone, gradual variations, slightly silty, very fine to medium grained, pale olive....	380.0	394.0
Sand, very fine to medium grained, interbedded with sandy silt, pale olive.....	394.0	420.0
Sand, very fine to medium grained with trace of coarse sand, slightly silty below 430 ft., a few rootlets, larger sand grains are dark.....	420.0	440.0
Sand, and sandstone, interbedded, very fine to fine grained with some medium sand, slightly silty, dark olive.....	440.0	445.0
Sand, very fine to medium grained with trace of coarse sand, predominantly very fine to fine sand.	445.0	460.0
Sand and sandstone, gradual variations, very fine to medium grained, predominantly fine sand, becomes interbedded below 480 ft., rootlets.....	460.0	490.0
Sandstone, very fine to fine grained, a few rootlets, olive.....	490.0	500.0
Sand and sandstone, gradual variations, very fine to fine grained, slightly silty in areas, olive.....	500.0	520.0
Sand, slightly to moderately silty, very fine to fine grained, pale yellow.....	520.0	535.0
Sand and sandy silt, interbedded, olive and pale olive.....	535.0	540.0
Sand, moderately silty, very fine to fine grained, pale olive.....	540.0	550.0
Silt and sand, interbedded, pale olive.....	550.0	560.0

Sand, very fine to medium grained, predominantly fine sand, scattered interbeds of silt, light gray with silts having brownish tints.....	560.0	580.0
Sand, slightly to moderately silty, very fine to fine grained with some medium sand.....	580.0	594.0
Sand, fine to coarse grained, predominantly medium sand, numerous black sand grains.....	594.0	600.0
Sand, very fine to medium grained.....	600.0	610.0
Sandstone and claystone, numerous lithic fragments..	610.0	612.0
Sand, very fine to coarse grained, a trace of very coarse sand.....	612.0	615.0
Sand, very fine to medium grained, predominantly fine sand, rootlets below 640 ft.....	615.0	660.0
Sand, very silty, very fine grained, scattered grains of coarse and very coarse sand, slight amount of gravel-sized lithic fragments of sandstone, siltstone, and limestone, pale yellow to pale olive.....	660.0	715.0
Sand, slightly silty, very fine to fine grained, trace of sandstone lithics, light brownish gray...	715.0	725.0
Sand, very fine grained, moderately to very sandy silt; interbedded; light brownish gray.....	725.0	734.0
Sandstone, very fine to fine grained and siltstone; interbedded; a few areas of silt, light brownish gray to 735 ft., light yellowish brown below 735 ft.....	734.0	760.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, black.....	760.0	780.0

Test Hole #30-SH-85 (E-log)
(19-22-20dacc)
Custer County

Location: SW SW NE SE sec. 20, T. 19 N., R. 22 W., approximately 91 feet north and 63 feet west of the center of the southeast quarter of the section, inside pasture.

Ground elevation: 2,622 ft. (t). (Anselmo 7.5 min. quadrangle)

Depth to water: Not recorded (hole backfilled upon completion)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, topsoil, sandy silt, very dark grayish brown..	0.0	2.0
Silt, moderately sandy, contains very fine sand, light yellowish brown.....	2.0	22.0
Sand, very silty, very fine grained, silt interbeds, pale olive to 30 ft., pale yellow below 30 ft.....	22.0	75.0
Clay, silty, trace of very fine sand, slightly calcareous, pale yellow to 80 ft., greenish gray below 80 ft.....	75.0	90.0
Clay, sand, and gravel; interbedded; blue gray-green.....	90.0	95.0
Sand and gravel, texture grades from very fine sand to medium gravel, white clay interbed from 100 to 105 ft., greenish blue.....	95.0	188.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand and sandstone, gradual variations; very fine to fine grained, rootlets below 210 ft., calcareous siltstone interbed from 212 to 217 ft., pale brown.....	188.0	222.0
Sand and sandstone, gradual variations; very fine to fine grained, moderately silty, light yellowish brown.....	222.0	278.0
Sand, very fine to fine grained, predominantly very fine sand, pale brown.....	278.0	285.0
Sand and sandstone, gradual variations; very fine grained, moderately silty, pale yellow.....	285.0	340.0
Clay, very sandy, contains very fine sand, very calcareous, grades to silt below 358 ft., white.....	340.0	364.0
Sand and sandstone, gradual variations; very fine grained, slightly silty, silt interbeds from 370 to 375 ft., rootlets below 410 ft., pale yellow to 450 ft., light brownish gray below 450 ft.....	364.0	460.0
Sand, very fine to medium grained, slightly to moderately silty, pale yellow to 475 ft., very pale brown below 475 ft.....	460.0	500.0
Sandstone and sand, gradual variations; moderately to very calcareous, white, grading to light gray below 515 ft.....	500.0	525.0

Sand and sandstone, gradual variations; very fine to fine grained, slightly silty, pale olive.....	525.0	540.0
Sand and sandstone, gradual variations; very fine grained with some fine and medium sand, moderately silty, trace of marl, non to slightly calcareous, pale yellow.....	540.0	560.0
Sand, very fine to fine grained, slightly silty, pale yellow.....	560.0	610.0
Tertiary System - Miocene Series - Arikaree Group:		
Silt, moderately clayey, trace of very fine sand, thin seams of very heavy clay, slightly calcareous, pink with brown tints.....	610.0	635.0
Siltstone and sandstone, gradual variations; contains very fine sand and is clayey, very pale brown to pale brown.....	635.0	640.0
Silt and siltstone, gradual variations; pale yellow to olive.....	640.0	654.0
Siltstone and silt, gradual variations; contains siltstone lithics up to medium gravel in size, pink to brown.....	654.0	675.0
Silt, with scattered siltstone interbeds, light brown.....	675.0	703.0
Siltstone and silt, gradual variations; contains siltstone lithics up to medium gravel in size, large white rootlets with pink interiors below 715 ft., light brown to brown.....	703.0	750.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Silt, moderately clayey, some gradations to siltstone and claystone, contains reworked shale below 780 ft., light brown to pink, olive and yellow hues with ocher below 780 ft.....	750.0	788.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, very dark gray.....	788.0	800.0

Test Hole #35-SH-85 (E-log)
(19-24-12dccd)
Custer County

Location: SE SW SW SE sec. 12, T. 19 N., R. 24 W., approximately
 637 feet east and 30 feet north of the south half section line.
 Ground elevation: 2,705 ft. (t). (Linscott 7.5 min. quadrangle)
 Depth to water: Hole caved at 9.9 ft. (August 8, 1985)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty, very fine to fine grained, pale brown to 10 ft., light gray from 10 to 30 ft., and light brownish gray from 30 to 80 ft.....	0.0	80.0
Sand, slightly silty, very fine to fine grained, numerous sandy clay interbeds, light brownish gray.....	80.0	134.0
Sand and gravel, texture grades from very fine sand to medium gravel, 25 percent gravel, clay interbed at 158 ft.....	134.0	160.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, very sandy, contains very fine to fine sand, pale yellow.....	160.0	170.0
Sand and sandstone, gradual variations, very fine to medium grained with trace of coarse sand, moderately clayey, pale yellow.....	170.0	200.0
Sand and sandstone, gradual variations, slightly silty, very fine to medium grained, calcareous nodules below 220 ft., light gray with brown tints to 220 ft., pale yellow below 220 ft.....	200.0	232.0
Sand, slightly to moderately silty, very fine to fine grained, medium sand grains are predominantly black, light olive gray.....	232.0	240.0
Sand and sandstone, gradual variations, sandstones predominate, very fine to fine grained, slightly silty, rootlets, slightly calcareous in spots from 240 to 245 ft., olive.....	240.0	260.0
Sand, very fine to medium grained, rootlets, olive..	260.0	278.0
Silt, slightly sandy, contains very fine to medium sand, pale yellow.....	278.0	286.0
Sand, slightly to moderately silty, very fine to medium grained, olive to pale yellow.....	286.0	315.0
Sand, silt, and clay, interbedded; sand is very fine to medium grained, pale olive.....	315.0	320.0
Sand, slightly to moderately silty; very fine to medium grained, predominantly very fine sand; pale yellow.....	320.0	345.0

Sand and sandstone, gradual variations, slightly silty, very fine to medium grained, rootlets, silt increases below 360 ft., light brownish gray.....	345.0	367.0
Silt, moderately sandy and sandstone, fine to medium grained; gradual variations, pale olive.....	367.0	380.0
Sand and sandstone, gradual variations, very fine to medium grained, slightly silty, pale olive.....	380.0	400.0
Sand, very fine to medium grained, silt content varies from none to slight; light brownish gray...	400.0	440.0
Sand, very fine to medium grained, predominantly fine sand, interbedded with silt, rootlets, light brownish gray.....	440.0	452.0
Silt, very sandy, pale olive.....	452.0	458.0
Sand, slightly silty, very fine to fine grained, silt interbeds from 480 to 485 ft., rootlets, pale olive.....	458.0	505.0
Sand, fine to very coarse grained with trace of fine gravel, predominantly medium to coarse sand, rootlets.....	505.0	520.0
Sand and gravel, texture grades from coarse sand to medium gravel, 40 percent gravel, a few sandstone fragments below 535 ft.....	520.0	542.0
Sand, very fine to medium grained, predominantly fine sand, a few thin white calcareous silts below 545 ft.....	542.0	550.0
Sand, very fine to fine grained, rootlets.....	550.0	560.0
Silt, moderately sandy, a few thin sandstone interbeds, slightly calcareous, pale olive.....	560.0	575.0
Sand, very silty, very fine to fine grained, slightly calcareous, pale yellow.....	575.0	583.0
Sand, fine to medium grained with trace of coarse sand.....	583.0	600.0
Sand, slightly silty, very fine to fine grained, scattered sandstone interbeds.....	600.0	620.0
Sand, very fine to medium grained, scattered rootlets.....	620.0	643.0
Sand and sandstone, gradual variations, moderately silty, very fine to fine grained.....	643.0	662.0
Sand and sandstone, gradual variations, moderately silty, very fine grained, pale olive.....	662.0	680.0
Sand and sandstone, gradual variations, very fine to fine grained, several reddish siltstone interbeds, pale olive.....	680.0	698.0
Tertiary System - Oligocene Series - White River Group - Brule Formation:		
Silt and siltstone, interbedded, trace of very fine sand, silts predominate, sandstone fragments from 730 to 735 ft., silts are light brownish gray to 720 ft. and below 740 ft., silts are brown from 720 to 740 ft., siltstones are reddish brown throughout interval.....	698.0	760.0

Sand, very silty, very fine grained, scattered sandstone and siltstone interbeds, brown with reddish brown siltstones.....	760.0	800.0
Silt and very fine grained sand, gradual variations, scattered siltstone interbeds, pinkish tan with reddish brown tints.....	800.0	820.0
Siltstone and silt, interbedded, scattered very fine sand layers, brown.....	820.0	860.0
Silt, siltstone, claystone, and very fine sand; interbedded, pale brown.....	860.0	880.0
Siltstone, primarily lithic gravel of reddish siltstone and greenish claystone with brown siltstone matrix.....	880.0	915.0
Clay, mixture of gray and yellow clay with claystone and siltstone fragments, some coarse sand and fine quartz grains, greenish gray, fragments of reworked and weathered Pierre shale.....	915.0	919.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, black, iron stains, very slightly calcareous.....	919.0	930.0

Test Hole #42-SH-85 (E-log)
(19-25-2ddddd)
Custer County

Location: SE SE SE SE sec. 2, T. 19 N., R. 25 W., approximately
 328 feet north and 33 feet west of the southeast section corner.
 Ground elevation: 2,799 ft. (t). (Linscott NW 7.5 min. quadangle)
 Depth to water: Hole caved at 32 ft. (August 22, 1995)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty, very fine to fine grained.....	0.0	17.0
Silt, very sandy, contains very fine sand, pale brown to 24 ft., slight yellowish brown below 24 ft.....	17.0	35.0
Sand, slightly silty, very fine to fine grained with trace of medium, sandy silt interbed from 42 to 45 ft., pale brown.....	35.0	100.0
Silt, moderately to very clayey, iron stains, grayish brown.....	100.0	116.0
Sand, silty, very fine to fine grained, grayish brown.....	116.0	118.0
Silt, moderately clayey; moderately sandy, contains very fine to fine sand, iron stains, lime concretions and streaks from 128 to 130 ft., slightly calcareous from 128 to 130 ft., light brown with reddish and pink hues.....	118.0	137.0
Sand, slightly silty, very fine to medium grained with trace of coarse sand, reddish brown.....	137.0	150.0
Silt, very sandy, contains very fine to medium sand, yellow brown.....	150.0	159.0
Sand and gravel, texture grades from fine sand to medium gravel, predominantly very coarse sand and fine gravel, reddish brown.....	159.0	195.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, contains very fine to medium sand, trace of rootlets, pale yellowish brown.....	195.0	215.0
Sand, very fine to medium grained, moderately silty, pale yellowish brown.....	215.0	220.0
Sand and sandstone, gradual variations, moderately silty, very fine to fine grained, olive yellow....	220.0	225.0
Sandstone, slightly silty, very fine to medium grained, rootlets, olive yellow.....	225.0	245.0
Sand and sandstone, gradual variations, sand predominates, slightly to moderately silty, olive brown.....	245.0	255.0
Sand, very fine to medium grained, predominantly fine to medium sand, medium grains are black, grayish brown.....	255.0	275.0

Sand, very fine to medium grained with trace of coarse, scattered sandstone interbeds and rootlets from 310 to 320 ft., grayish brown.....	275.0	355.0
Sand and sandstone, gradual variations, very fine to medium grained, a few limy nodules, rootlets, grayish brown.....	355.0	372.0
Silt, moderately sandy, contains very fine to medium sand, very slightly limy with white streaks and nodules, pale olive.....	372.0	380.0
Sand and sandstone, gradual variations, moderately to very silty, very fine to fine grained, pale yellowish brown.....	380.0	395.0
Silt, very sandy, contains very fine to fine sand, trace of rootlets, pale yellowish brown.....	395.0	405.0
Sand and sandstone, gradual variations, moderately to very silty, very fine to fine grained, trace of rootlets, pale olive yellow.....	405.0	455.0
Sand, very fine to medium grained, predominantly fine to medium sand, grayish brown.....	455.0	464.0
Sandstone, moderately to very silty, very fine to medium grained, bone fragments at 465 ft., thin claystone seams above 470 ft., limy silt seams below 470 ft., olive yellow.....	464.0	478.0
Sand, very fine to medium grained, scattered sandstone interbeds from 480 to 495 ft., silt and claystone interbeds from 490 to 495 ft. and from 505 to 510 ft., trace of rootlets below 495 ft., grayish brown.....	478.0	520.0
Sand and gravel, texture grades from fine sand to fine gravel with some medium gravel.....	520.0	538.0
Silt, very sandy, contains very fine to medium sand, pale olive yellow.....	538.0	544.0
Sandstone, very fine to fine grained, areas of lime cementation, sandy silt interbed from 555 to 560 ft., slightly to moderately calcareous, pale brown.....	544.0	575.0
Silt, moderately clayey, very limy; very sandy, contains very fine to fine sand, moderately to very calcareous, pale olive brown.....	575.0	585.0
Sand and sandstone, gradual variations, moderately silty, very fine to fine grained, numerous areas of lime cementation from 595 to 600 ft., very slightly calcareous except 595 to 600 ft. is slightly calcareous, light olive, white mottling from 595 to 600 ft.....	585.0	615.0
Sand, moderately to very silty, very fine to medium grained, grayish brown to light olive.....	615.0	630.0
Sandstone, very fine to fine grained, trace of rootlets, yellowish brown.....	630.0	655.0
Sand, very fine to fine grained with some medium sand, slightly silty, some sandstone areas from 655 to 660 ft., pale brown.....	655.0	670.0

Tertiary System - Miocene Series - Arikaree Group:

Siltstone, very slightly sandy, contains very fine sand, brown.....	670.0	705.0
Sandstone, very fine to medium grained, scattered thin silt interbeds, trace of rootlets, iron stains below 745 ft., gray becoming olive brown below 725 ft.....	705.0	750.0
Sand and sandstone, gradual variations, very fine to medium grained, predominantly sand, grayish brown.	750.0	770.0
Sand, very fine to fine grained with trace of medium sand, grayish brown.....	770.0	780.0
Silt and siltstone, scattered interbeds of very fine grained sandstone, layers of pink colored silts, very pale brown, reddish hues below 805 ft.....	780.0	825.0
Silt, pale olive and brown siltstone, interbedded...	825.0	840.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation:

Silt and siltstone, gradual variations, silts predominate below 850 ft., brown.....	840.0	880.0
Siltstone, brown to reddish brown to 900 ft., pale brown to brown below 900 ft., interval of poor quality samples.....	880.0	966.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, very clayey, black, small amount of gray and yellow to 970 ft.....	966.0	980.0
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Test Hole #76-HP-80 (E-log)
(19-25-16dccd)
Custer County

Location: SE SW SW SE sec. 16, T. 19 N., R. 25 W., approximately 3,000 feet east of southwest section corner, north side of road.

Ground elevation: 2,800 ft. (t). (Linscott SW 7.5 min. quadrangle)

Depth to water: Not recorded

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, brown.....	0.0	10.0
Silt, slightly to very clayey, moderately sandy below 25 ft., very sandy below 60 ft., grayish brown.....	10.0	105.0
Sand, very silty, very fine to fine grained with trace of medium sand.....	105.0	110.0
Sand, very fine to fine grained with trace of coarse, silty zones, light brownish gray.....	110.0	140.0
Silt, sandy, contains very fine to fine sand, trace of medium and coarse sand, brown.....	140.0	148.0
Sand, very fine to coarse grained, trace of fine gravel, multicolored.....	148.0	155.0
Sand and gravel, texture grades from fine sand to coarse gravel, predominantly medium sand to fine gravel, 50 percent gravel, a few pebbles below 170 ft., multicolored.....	155.0	195.0
Gravel, texture grades from fine sand to pebbles, predominantly coarse sand to medium gravel, multicolored.....	195.0	200.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone with gradations to sand, very fine to fine grained, predominantly very fine sand, moderately silty, rootlets, large rootlets below 260 ft., light olive brown.....	200.0	285.0
Sand, very fine to medium grained; numerous black, medium sand grains.....	285.0	300.0
Silt, numerous rootlets and limy nodules, bone fragment at 305 ft., moderately calcareous, pale yellow.....	300.0	310.0
Sandstone, sand and siltstone, interbedded; sand and sandstone are very fine to fine grained, pale yellow.....	310.0	320.0
Silt, slightly sandy, contains very fine sand, a few rootlets, pale yellow.....	320.0	335.0
Limestone, siltstone, very fine grained sand and sandstone; interbedded; moderately calcareous, pale yellow.....	335.0	355.0

Sandstone grading to sand, slightly silty, very fine to fine grained, rootlets, pale yellow.....	355.0	370.0
Sandstone, very silty, very fine grained, rootlets, slightly calcareous, pale yellow.....	370.0	400.0
Siltstone and limestone, moderately calcareous, moderately sandy, contains very fine sand; pale yellow to white.....	400.0	410.0
Sand and sandstone, gradual variations, very fine to fine grained, predominantly very fine, slightly silty, rootlets, pale olive.....	410.0	445.0
Sand, very fine to medium grained, predominantly fine sand, a few rootlets, scattered silt interbeds below 470 ft.....	445.0	480.0
Sandstone, very silty, very fine grained, rootlets, pale yellow.....	480.0	515.0
Sand, slightly silty, fine to very coarse grained with some fine gravel, and scattered pebbles.....	515.0	530.0
Sandstone, moderately silty, very fine grained, rootlets, slightly to moderately calcareous, interbedded with fine to very coarse sand from 545 to 550 ft., pale yellow.....	530.0	550.0
Sandstone, very silty, very fine grained, pale yellow.....	550.0	565.0
Siltstone, very sandy, contains very fine sand, silty sand interbed from 575 to 580 ft., moderately calcareous, lime streaks, pale yellow.....	565.0	610.0
Sand, very fine to medium grained with trace of coarse, rootlets, becomes fine to coarse from 640 to 645 ft.....	610.0	645.0
Siltstone, moderately sandy, contains very fine to fine sand, scattered rootlets, some areas of silty sand, pale yellow.....	645.0	672.0
Tertiary System - Miocene Series - Arikaree Group:		
Siltstone, moderately sandy, contains very fine sand, pale brown.....	672.0	700.0

Test Hole #41-SH-85 (E-log)
(19-25-34cbcb)
Custer County

Location: NW SW NW SW sec. 34, T. 19 N., R. 25 W., approximately
 899 feet south and 77 feet east of west one-half mile line.
 Ground elevation: 2,818 ft. (t). (Linscott SW 7.5 min. quadrangle)
 Depth to water: 58.1 ft. (August 22, 1985)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty, very fine grained, brown.....	0.0	5.0
Silt, slightly to moderately clayey, light grayish brown.....	5.0	20.0
Sand, slightly silty, very fine to fine grained, pale brown.....	20.0	30.0
Silt, very sandy, contains very fine sand, trace of white limy areas, slightly calcareous, light gray- ish brown.....	30.0	35.0
Sand, very silty, very fine grained, light grayish brown.....	35.0	40.0
Silt, very sandy, contains very fine sand, trace of white limy areas, slightly calcareous, pale gray- ish brown.....	40.0	45.0
Sand, slightly silty, very fine to fine grained, brown.....	45.0	58.0
Silt, slightly sandy, contains very fine sand, mod- erately clayey, interbedded by very fine to medium sand from 65 to 70 ft., grayish brown.....	58.0	73.0
Sand, very fine to fine grained and sandy silt; interbedded; brown.....	73.0	80.0
Sand, very slightly silty, very fine to medium grained, sandy silt interbed from 85 to 90 ft., brown.....	80.0	120.0
Silt, moderately to very sandy, contains very fine to fine sand, silty sand interbed from 125 to 130 ft., light reddish brown and grayish brown.....	120.0	140.0
Sand, very fine to medium grained, brown.....	140.0	175.0
Silt, very sandy, contains very fine to coarse sand, grayish brown.....	175.0	179.0
Sand and gravel, texture grades from fine sand to fine gravel with trace of medium gravel, predomi- nantly coarse sand.....	179.0	195.0
Silt, interbedded with fine to coarse sand and fine gravel, reddish brown.....	195.0	206.0
Sand and gravel, texture grades from fine sand to medium gravel with trace of coarse gravel, reddish brown.....	206.0	211.0

Tertiary System - Miocene Series - Ogallala Group:

Silt, siltstone, and sand; interbedded; olive gray..	211.0	215.0
Sand, slightly to moderately silty, very fine to medium grained, rootlets, light yellowish brown...	215.0	245.0
Silt, very sandy, slightly clayey, fine to medium grained sandstone interbed from 252 to 255 ft., limy and moderately calcareous above 255 ft., very pale brown.....	245.0	260.0
Sand and sandstone, gradual variations, very fine to medium grained with trace of coarse sand, slightly to moderately silty, rootlets, pale brown.....	260.0	270.0
Sandstone, very fine to fine grained with trace of medium and coarse sand, hard and lime cemented silty zones from 276 to 277 ft., brown except cemented zone is white.....	270.0	280.0
Sand and sandstone, gradual variations, very slightly silty, very fine to medium grained with trace of coarse and very coarse sand, slightly lime cemented in areas, grayish brown.....	280.0	285.0
Sand, very fine to coarse grained, predominantly fine sand.....	285.0	290.0
Sandstone, very fine to medium grained with trace of coarse, slightly to moderately lime cemented, numerous rootlets, slightly to moderately calcareous, grayish brown.....	290.0	320.0
Sand, very fine to medium grained with some coarse sand, predominantly fine, slightly to moderately silty below 340 ft., grayish brown to brown.....	320.0	364.0
Silt, moderately to very sandy, contains very fine to medium sand, hard from 374 to 375 ft., pale yellowish brown.....	364.0	381.0
Sand, slightly to very silty, very fine to medium grained with trace of coarse sand, slightly cemented from 395 to 400 ft., rootlets below 460 ft., traces of white diatomaceous material from 465 to 480 ft., brown to 440 ft., grayish brown below 440 ft.....	381.0	510.0
Sand, very fine to very coarse with trace of fine gravel, predominantly medium to coarse sand, grayish brown.....	510.0	520.0
Sand and gravel, texture grades from fine sand to fine gravel with trace of medium gravel, predominantly medium to coarse sand, scattered claystone interbeds.....	520.0	540.0
Sand, very fine to very coarse grained, predominantly medium to coarse, gray.....	540.0	555.0
Sand, moderately silty, very fine to medium grained with trace of coarse sand, becomes coarse with depth, gray.....	555.0	568.0
Sand, very fine to coarse grained, predominantly medium sand, gray.....	568.0	580.0

Sand, very fine to coarse grained, slightly to moderately silty, scattered olive claystone interbeds from 590 to 600 ft., partially cemented from 600 to 605 ft., brown.....	580.0	610.0
Sand, moderately to very silty, very fine to medium grained, limy, moderately calcareous, clayey silt interbed from 675 to 680 ft., pale brown.....	610.0	690.0
Sand, very fine to medium grained with trace of coarse, medium sand grains are black; thin, olive claystone interbeds, grayish brown.....	690.0	700.0
Sand, very fine to medium grained, several silt and claystone interbeds, manganese stains below 715 ft., grayish brown.....	700.0	720.0
Sand, very fine to very coarse grained, predominantly medium to coarse sand, slightly silty, pale grayish brown.....	720.0	755.0
Silt, slightly to very sandy, contains very fine to fine sand, pale olive.....	755.0	762.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Silt and siltstone, gradual variations, siltstone predominates above 790 ft., scattered olive claystone interbeds above 795 ft. and below 860 ft., reddish brown to 795 ft., pale reddish brown below 795 ft.....	762.0	889.0
Tertiary System - Eocene Series - White River Group:		
Chadron Formation:		
Silt, very clayey, scattered siltstones, greenish gray, yellow shale fragments below 890 ft.....	889.0	895.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, very clayey, weathered, yellow and orange to 910 ft., yellow and gray below 910 ft., very hard at 919 ft. and hole terminated.....	895.0	919.0

Test Hole #17-A-59 (E-log)
(20-17-13adbd)
Custer County

Location: SE NW SE NE sec. 13, T. 20 N., R. 17 W., approximately
 1,900 feet south and 850 feet west of northeast section corner,
 south side of trail.
 Ground elevation: 2,390 ft. (t). (Comstock NW 7.5 min. quadrangle)
 Depth to water: 176.2 ft. (July 27, 1959)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Topsoil, silt, dark brown.....	0.0	0.5
Silt, slightly clayey, coarse texture, iron stains below 5 ft., snail shells below 5 ft., limy nod- ules from 5 to 10 ft., grayish brown to 3 ft., yellowish brown below 3 ft., slightly calcareous..	0.5	50.0
Sand, very silty, very fine to fine grained, silt interbeds, light yellowish brown.....	50.0	54.5
Silt, very sandy, contains very fine to fine sand with trace of medium sand, pale olive.....	54.5	63.5
Sand, very silty, very fine to fine grained with trace of medium sand, pale olive.....	63.5	69.5
Silt, slightly to moderately clayey, coarse texture, trace of very fine sand, pale olive.....	69.5	83.5
Sand, very fine to fine grained with trace of coarse sand, trace of rootlets.....	83.5	90.0
Silt, slightly clayey, coarse texture, slightly sandy, interbeds of slightly silty sand from 90 to 92.5 ft. and 104.5 to 106 ft., numerous limy areas, slightly to moderately calcareous, light olive brown.....	90.0	107.5
Sand, very fine to medium grained with some coarse sand and trace of fine gravel, silt interbeds from 115 to 123 ft.....	107.5	130.0
Sand with gravel, texture grades from fine sand to medium gravel, 15 percent gravel.....	130.0	145.0
Sand, fine to coarse grained with some very coarse sand.....	145.0	155.0
Sand with gravel, texture grades from fine sand to medium gravel, 30 percent gravel.....	155.0	165.0
Gravel, texture grades from very coarse sand to medium gravel, trace of coarse gravel, 85 percent gravel.....	165.0	175.0
Sand and gravel, texture grades from fine sand to medium gravel, 30 percent gravel.....	175.0	189.0
Silt, slightly clayey; moderately sandy, contains very fine to fine sand, light yellowish brown.....	189.0	193.0

Sand with gravel, texture grades from fine sand to medium gravel, 20 percent gravel, silt interbeds from 200 to 210 ft.....	193.0	220.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to medium with trace of coarse sand, very slightly consolidated, some rootlets.....	220.0	240.0
Sandstone, moderately consolidated, very fine to fine grained, interbeds of silt and siltstone.....	240.0	245.0
Sand, very fine to fine grained with some medium sand and trace of coarse sand, very silty from 315 to 320 ft., from 367.5 to 370 ft., and from 400 to 405 ft.; slightly consolidated with some areas of moderate consolidation, siltstone and volcanic ash interbeds from 265 to 270 ft., lime cemented sandstone from 285 to 286 ft., silt interbeds from 370 to 378 ft., rootlets.....	245.0	417.0
Silt, coarse texture, moderately clayey and sandy, sandstone interbeds below 420 ft., pale yellow....	417.0	425.0
Sand, very silty, very fine to medium grained, rootlets.....	425.0	440.0
Silt and siltstone, gradual variations, numerous interbeds of silty sand and sandstone, light olive gray.....	440.0	450.0
Sand, very fine to medium.....	450.0	453.0
Sand, slightly to very silty, very fine to medium grained, rootlets.....	453.0	460.0
Sand, very fine to medium grained.....	460.0	463.0
Sand, very silty, very fine to medium grained.....	463.0	465.0
Silt, moderately clayey; very sandy, contains very fine to medium sand; light olive gray.....	465.0	471.0
Sand, very silty, very fine to fine grained, rootlets.....	471.0	475.0
Sand, very fine to medium grained with some very coarse sand, rootlets, reworked claystone and siltstone fragments.....	475.0	480.0
Sand, very fine to fine grained with trace of medium sand.....	480.0	488.0
Silt, moderately clayey; very sandy, contains very fine to fine sand; interbeds of silty sand, marly at 498 ft., pale yellow.....	488.0	500.0
Sand, very silty, very fine to fine grained, marly areas, moderately to very calcareous.....	500.0	519.5
Silt, moderately clayey, coarse texture; moderately sandy, contains very fine to fine sand; marly, slightly to very calcareous, pale yellow.....	519.5	530.0
Sand, very silty, very fine to fine grained, rootlets.....	530.0	540.0
Sandstone, very fine to fine grained, partly lime cemented, very calcareous.....	540.0	545.0

Sand, slightly to very silty, very fine to fine grained, marly from 552.5 to 553.3 ft., sandstone interbeds from 560 to 565 ft., slightly consolidated, light olive gray.....	545.0	570.0
Sand, very fine to fine grained.....	570.0	575.0
Silt, slightly clayey; moderately to very sandy, contains very fine to fine sand, pale yellow.....	575.0	580.0
Sand, very fine to fine grained, silt interbed from 585 to 585.5 ft.....	580.0	595.0
Sand, moderately to very silty, very fine to fine with trace of medium sand, marl interbeds and slightly calcareous below 610 ft., pale yellow....	595.0	615.0
Silt, moderately clayey; very sandy, contains very fine to fine sand; clay interbeds from 620 to 625 ft., pale yellow.....	615.0	627.0
Silt, slightly clayey, marl and siltstone interbeds, very calcareous, very pale brown.....	627.0	635.5
Tertiary System - Eocene Series - White River Group:		
Chadron Formation:		
Sand, coarse sand to very fine gravel, predominantly quartz grains, reworked siltstone, claystone and limestone fragments, slightly calcareous.....	635.5	641.0
Sand, very fine to fine grained, very silty below 650 ft.....	641.0	657.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, iron stains and bentonite to 665 ft., mottled light yellow brown and light gray.....	657.5	680.0

Test Hole #10-B-66 (E-log)
(20-18-21aadd)
Custer County

Location: SE SE NE NE sec. 21, T. 20 N., R. 18 W., approximately
 1,300 feet south and 8 feet west of northeast section corner.
 Ground elevation: 2,473 ft. (t). (Sargent West 7.5 min. quadrangle)
 Depth to water: Dry at 174 ft. (July 29, 1966)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, moderately clayey, very dark grayish brown....	0.0	6.7
Silt, slightly clayey; slightly sandy, contains very fine to fine sand; iron staining, moderately calcareous from 30 to 65 ft., slightly calcareous from 65 to 105 ft., pale brown from 6.7 to 20 ft., yellowish brown from 20 to 29.2 ft., pale olive from 29.2 to 45 ft., olive from 45 to 105 ft.....	6.7	105.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; limy zones, rootlets, olive....	105.0	115.0
Sand, silty, texture grades from very fine to medium with some coarse, rootlets, silt layer from 117.2 to 118.8 ft., brown grading to olive.....	115.0	125.0
Sand and gravel, texture grades from very fine sand to fine gravel, light grayish brown.....	125.0	135.5
Clay, silty, pale olive.....	135.5	136.3
Gravel, texture grades from very fine sand to fine gravel with some medium and coarse gravel, about 70 percent gravel, pale olive clay layer from 169.5 to 170.8 ft.....	136.3	240.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine to fine grained, marly streaks, olive.....	240.0	245.0
Sand, texture grades from very fine to medium with some coarse sand, rootlets, olive brown.....	245.0	265.9
Silt, slightly clayey; very sandy, contains very fine to fine sand; rootlets, interbeds of sand and sandstone, pale olive.....	265.9	275.0
Sandstone, very fine to fine grained, rootlets, pale olive.....	275.0	285.0
Clay, silty, marly, light gray, moderately calcar- eous.....	285.0	288.0
Sand, texture grades from very fine to fine, brown..	288.0	288.8
Silt, slightly clayey; very sandy, contains very fine to fine sand; lime cemented sandstone inter- beds from 295 to 300 ft., very calcareous from 295 to 300 ft.....	288.8	300.0
Sand and sandstone, interbedded, very fine to fine grained, rootlets, lime cementation, moderately calcareous, pale olive.....	300.0	317.4

Silt, slightly clayey; very sandy, contains very fine to fine sand; limy zones, moderately calcareous, pale olive.....	317.4	325.0
Sandstone, very fine to fine grained, slightly calcareous, pale olive.....	325.0	329.4
Silt, slightly clayey; very sandy, contains very fine to fine sand; sandstone layers from 332 to 333 ft., 335 to 337 ft., and 340 to 342 ft., pale olive.....	329.4	347.0
Sand, slightly clayey, texture grades from very fine to fine with some medium sand, pale olive.....	347.0	360.0
Sand and silt, interbedded, silt is slightly clayey, sand texture grades from very fine to medium, pale olive.....	360.0	375.0
Sand, silty, texture grades from very fine to medium sand with some coarse, scattered sandstone interbeds, pale olive.....	375.0	419.5
Sand and silt, interbedded, silt is sandy with very fine to fine sand, sand texture grades from very fine to medium, olive grayish brown.....	419.5	425.0
Sand and sandstone, interbedded, very fine to medium grained, slightly silty, rootlets, brown from 425 to 432.8 ft., pale yellow from 432.8 to 440 ft., and olive brown from 440 to 445 ft.....	425.0	445.0
Sand, very silty, texture grades from very fine to very coarse sand, olive brown.....	445.0	457.4
Silt, slightly clayey, pale olive.....	457.4	460.0
Sand, texture grades from very fine to coarse sand, silty clay lenses, olive brown.....	460.0	465.0
Sand and silty clay, interbedded, pale olive.....	465.0	470.0
Sand, texture grades from very fine to coarse with depth; scattered interbeds of silty sand, light brown.....	470.0	485.0
Sand and silty sand, interbedded, texture grades from very fine to very coarse sand, light brown...	485.0	490.0
Silt, slightly clayey, very sandy, pale olive.....	490.0	495.0
Sand, slightly silty, slightly clayey, very fine to fine grained sand, pale olive.....	495.0	500.0

Test Hole #11-A-66 (E-log)
(20-20-13bcbc)
Custer County

Location: SW NW SW NW sec. 13, T. 20 N., R. 20 W., approximately 964 feet north and 4 feet east of west half section line, east shoulder of road.

Ground elevation: 2,586 ft. (t). (Walworth 7.5 min. quadrangle)

Depth to water: Hole caved at 174 ft. (July 29, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill, silt, very dark gray.....	0.0	2.0
Silt, sandy, contains very fine sand; iron stains below 25 ft., slightly calcareous below 15 ft., slightly clayey below 53 ft., brown grading to very pale brown from 2.0 to 24 ft., light gray from 24 to 32 ft., grayish brown from 32 to 59.9 ft., light brownish gray from 59.9 to 82 ft.....	2.0	82.0
Clay, slightly silty, mottled gray and light olive to 83.3 ft., dark grayish brown and very dark gray from 83.3 to 83.6.....	82.0	83.6
Silt, moderately clayey; moderately sandy, contains very fine sand; light reddish brown clay interbeds from 83.6 to 85 ft. and 86.7 to 88.6 ft., light yellowish brown.....	83.6	95.7
Sand, slightly silty, very fine to medium grained with scattered zones of very fine to fine sand, silt interbed from 109 to 110.1 ft., light gray with gray and dark gray bands to 105 ft., pale brown from 105 to 119 ft.....	95.7	119.0
Clay, very sandy, contains very fine to fine sand; moderately silty, light olive gray.....	119.0	122.5
Silt, moderately clayey; moderately to very sandy, contains very fine sand; slightly calcareous, light olive gray.....	122.5	125.0
Sand, moderately silty, very fine to fine grained, interbed of very fine to medium sand from 127.1 to 128.5 ft. and several interbeds of very fine to medium sand from 135 to 145 ft., moderately calcareous to 140 ft., white and light gray to 129.5 ft. and pale olive below 129.5 ft.....	125.0	145.0
Silt, slightly clayey, clay interbed from 146 to 147.5 ft., olive gray to 147.5 ft., light gray below 147.5 ft.....	145.0	154.3
Sand, slightly silty, very fine to fine grained with interbeds of very fine to medium sand from 156.7 to 159 ft., numerous thin silt interbeds from 159 to 178.5 ft., light olive gray and light gray.....	154.3	178.5

Silt, moderately clayey; slightly sandy, contains very fine to fine sand; light olive gray, scattered snail shells.....	178.5	183.8
Sand and gravel, texture grades from fine sand to medium gravel, predominantly medium sand to fine gravel, 30 percent gravel.....	183.8	255.0
Sand and gravel, texture grades from medium sand to medium gravel, predominantly very coarse sand to fine gravel, 50 percent gravel.....	255.0	290.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to very coarse, numerous rootlets, interbedded with slightly indurated sandstone below 300 ft.....	290.0	315.0
Sand and sandstone, slightly indurated, very fine to fine grained, scattered rootlets to 390 ft., rootlets common below 390 ft., scattered silt and clay interbeds from 334 to 375 ft.....	315.0	408.0
Sandstone, very fine to fine grained, pale olive....	408.0	408.2
Silt, moderately sandy, contains very fine sand, thin sandstone interbeds, light gray.....	408.2	410.0
Sand, very fine to fine grained with some medium sand, sandstone interbed from 415 to 417 ft., rootlets.....	410.0	430.0
Sand, silty, moderately clayey, very fine to fine grained, light gray to white.....	430.0	440.0
Sand and sandstone, interbedded, very fine to fine grained with some medium sand, several silt interbeds from 445 to 460 ft., rootlets below 460 ft., white to light gray.....	440.0	471.0
Sand, very fine to fine grained with some medium sand, scattered sandstone interbeds, a few rootlets.....	471.0	490.0
Sand, very fine to medium grained with trace of coarse sand, scattered rootlets.....	490.0	500.0
Sand, very fine to fine grained with trace of medium sand.....	500.0	512.0
Silt, sand, and sandstone, interbedded; silty, moderately clayey, very fine to coarse grained sand, numerous limy zones from 515 to 522.6 ft., very calcareous in spots, white and light gray.....	512.0	530.0
Sand and sandstone, gradual variations, very fine to fine grained with some medium sand, a few thin silt and clay interbeds from 540 to 550.5 ft., light gray to light yellow.....	530.0	550.5

**Test Hole #12-B-66 (No e-log)
(20-20-35aaba)
Custer County**

Location: NE NW NE NE sec. 35, T. 20 N., R. 20 W., approximately
 970 feet west and 6 feet south of northeast section corner.
 Ground elevation: 2,418 ft. (t). (Walworth 7.5 min. quadrangle)
 Depth to water: Not recorded

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	2.2
Silt, slightly clayey; very sandy, contains very fine sand; slightly calcareous, dark brown.....	2.2	12.5
Sand, texture grades from very fine sand to coarse with 15 percent fine gravel, brown.....	12.5	65.0
Gravel, texture grades from fine to medium gravel with some coarse, trace to 10 percent sand from 65 to 75 ft., 30 percent sand from 75 to 115 ft., reddish brown.....	65.0	115.0
Sand, texture grades from very fine to coarse sand with some fine gravel, brown.....	115.0	118.7
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine to fine grained, silty, interbeds of sand and silt, rootlets, gray brown from 118.7 to 130 ft., pale olive from 130 to 140 ft...	118.7	140.0
Sand, with sandstone and sandy silt interbeds, sand is very fine to fine grained, rootlets, lime cemented sandstone interbeds from 155 to 174 ft., slightly calcareous from 155 to 174 ft., pale olive.....	140.0	174.0
Silt, sandy, interbeds of marl and sandstone, very calcareous, light gray.....	174.0	180.0
Sand, with lime cemented sandstone interbeds, sand is very fine to fine, rootlets, very calcareous, white.....	180.0	188.0
Sand, silty, very fine to medium grained, interbeds of silty sand and sandy silt, pale olive.....	188.0	210.0
Sand and sandstone, interbedded, very fine to fine grained, scattered interbeds of sandy silt, rootlets from 230 to 260 ft., olive.....	210.0	260.0
Sand, very fine to fine grained, slightly indurated, brown.....	260.0	295.0
Sand, very fine to fine grained, interbeds of sandstone and sandy silt, scattered rootlets, brown...	295.0	315.0
Note: Hole abandoned due to hole "belled out".		

Test Hole #12-B2-66 (No E-log)
(20-20-35aaba)
Custer County

Location: NE NW NE NE sec. 35, T. 20 N., R. 20 W., approximately 810 feet west and 9 feet south of northeast section corner.

Ground elevation: 2,416 ft. (t). (Walworth 7.5 min quadrangle)

Depth to water: Unknown, hole plugged at 31 ft. (August 18, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	2.0
Silt, slightly clayey; very sandy, very fine sand; grayish brown.....	2.0	5.0
Silt, very sandy, very fine sand, yellowish brown...	5.0	6.5
Sand, texture grades from very fine to medium sand, silty and interbedded with silt from 10 to 15 ft brown.....	6.5	35.0
Sand, texture grades from very fine to medium with coarse sand and fine gravel; brown.....	35.0	45.0
Sand, texture grades from very fine to very coarse sand and 10 percent fine gravel, reddish brown....	45.0	55.0
Gravel, sandy, texture grades from fine sand to coarse gravel and scattered cobbles; contains 20 to 40 percent sand, reddish brown.....	55.0	110.0
Sand, texture grades from very fine sand to fine gravel; contains 5 to 20 percent of fine gravel, brown.....	110.0	118.5
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine to fine grained, slightly silty; interbedded with intervals of poorly to nonconsolidated sand; rootlets below 140 ft, olive.....	118.5	155.0
Sandstone and sand, interbedded; texture grades from very fine to fine; lime cementation from 172 to 172.5 ft., rootlets 165 to 170 ft., brown to 172 ft., white below.....	155.0	172.5
Silt, slightly sandy, contains very fine to fine sand; slightly clayey; limy; light gray.....	172.5	175.0
Sand, with interbeds of sandstone; texture grades from very fine to fine sand; rootlets, olive.....	175.0	180.0
Sandstone, lime cemented, very fine to fine grained; strongly calcareous, white.....	180.0	187.0
Silt, sandy, slightly clayey, contains very fine to fine sand, pale olive.....	187.0	195.0
Sand, silty, texture grades from very fine to medium sand; scattered thin layers of marl and lime cementation, pale olive.....	195.0	200.0
Silt, very sandy, contains very fine to fine sand; slightly clayey; scattered interbeds of silty sandstone; rootlets from 209 to 210 ft., pale yellow..	200.0	215.5

Sandstone, silty, very fine to fine grained; interbeds of sandy silt; rootlets from 220 to 228 ft., olive.....	215.5	234.3
Sand, silty, interbeds of silty sandstone, siltstone, and sandy silt; texture grades from very fine sand to fine sand; rootlets, pale olive.....	234.3	270.0
Sand, very silty, interbedded with sandstone; texture grades from very fine to medium sand; rootlets, olive.....	270.0	280.0
Sand and sandstone, silty; very fine to fine grained; interbedded; rootlets; olive.....	280.0	311.5
Silt, slightly to moderately clayey; very sandy, contains very fine to fine sand; marly areas; white grading to pale yellow with depth.....	311.5	330.0
Sand, slightly indurated; texture grades from very fine to medium with some coarse sand; interbedded with sandstone; rootlets; brown.....	330.0	371.0
Silt, slightly clayey, pale olive.....	371.0	395.0
Silt, moderately to very sandy, contains very fine to fine sand; slightly to moderately clayey; pale olive.....	395.0	405.0
Sand, texture grades from very fine to medium sand, brown.....	405.0	408.5
Silt, moderately clayey; sandy, contains very fine sand; pale yellow.....	408.5	410.0
Gravel, texture grades from fine sand to very coarse gravel, 60 percent gravel from 410 to 420 ft., 75 percent gravel from 420 to 440 ft., sandstone interbeds from 435 to 440 ft; reddish brown.....	410.0	440.0
Sand, texture grades from very fine to very coarse sand; contains reworked claystone fragments from 455 to 481.5 ft., pale olive silty sand interbeds from 445 to 450 ft., brown.....	440.0	481.5
Silt, slightly clayey, sandy; contains very fine sand; highly calcareous; light gray.....	481.5	483.0
Sandstone, varies from lime cemented to slightly consolidated; very fine to fine grained; highly calcareous; light brownish gray.....	483.0	486.5
Silt, slightly clayey, very sandy; contains very fine to fine sand; moderately calcareous, silty sand and sandstone interbeds from 490 to 495 ft., pale olive grading to light gray.....	486.5	495.0
Sandstone, sand, siltstone, and claystone, interbeds, very fine grained, rootlets, olive.....	495.0	500.0
Sand, very fine grained to 510 ft. with fine and medium sand from 510 to 520 ft.; interbeds of siltstone and sandstone; rootlets; slightly indurated from 510 to 520 ft.; olive becoming brown at 508 ft.....	500.0	520.0

Tertiary System - Miocene Series - Arikaree Group:

Silt and siltstone, interbedded, slightly clayey, slightly sandy, contains very fine sand, pale brown grading to brown with depth.....	520.0	550.0
Sandstone, very fine grained, interbedded with silty sand and siltstone; trace of pink bentonite, gray brown grading to pale brown with depth.....	550.0	565.0
Silt and siltstone, interbedded; scattered interbeds of sandstone; contains very fine to fine sand, trace of pink bentonite from 590 to 600 ft., pale brown from 565 to 585 ft., pale olive from 585 to 605 ft., and greenish gray from 605 to 613 ft.....	565.0	613.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, weathered, clayey, yellow brown.....	613.0	619.0
Shale, slightly sandy, light gray grading to very dark gray at 625 ft., slightly calcareous below 625 ft.....	619.0	640.0

Test Hole #37-SH-85 (E-log)
(20-22-22bbbb)
Custer County

Location: NW NW NW NW sec. 22, T. 20 N., R. 22 W., approximately
 277 feet south and 100 feet east of the northwest section corner.
 Ground elevation: 2,668 ft. (t). (Anselmo NE 7.5 min. quadrangle)
 Depth to water: Not recorded (Hole backfilled upon completion)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, slightly silty, very pale brown.....	0.0	15.0
Sand, moderately to very silty, very fine to fine grained, predominantly very fine sand, a few rust stains, pale brown to 20 ft. and light brownish gray below 20 ft.....	15.0	50.0
Silt, very sandy, contains very fine sand, rust streaked below 80 ft., light brownish gray.....	50.0	107.0
Clay, moderately sandy, contains very fine sand, very slightly calcareous, greenish gray.....	107.0	130.0
Sand, very fine to medium, scattered clay interbeds, trace of gravel below 150 ft., greenish gray.....	130.0	160.0
Sand and gravel, texture grades from very fine sand to medium gravel, predominantly medium sand to fine gravel, moderately silty below 180 ft., many black sand grains, greenish gray.....	160.0	185.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand and sandstone, gradual variations, slightly silty, very fine to medium grained, rootlets below 200 ft., light greenish gray to 190 ft., pale yellow from 190 to 200 ft., and olive gray below 200 ft.....	185.0	297.0
Sand, silty, very fine to medium grained and sandy silt; interbedded; sands are light olive gray and silts greenish gray to 340 ft., pale yellow below 340 ft.....	297.0	358.0
Sand and sandstone, gradual variations to slightly interbedded, very fine to medium grained, clay interbed from 377 to 380 ft., rootlets, pale olive to light brownish gray.....	358.0	420.0
Sand, silty, very fine to medium grained, light brownish gray.....	420.0	430.0
Clay, moderately sandy, contains very fine to medium sand, pale yellow.....	430.0	440.0
Sand, very fine to medium grained, slightly silty, predominantly fine sand, trace of coarse sand below 465 ft.....	440.0	480.0
Sand, very fine to medium grained with some coarse sand to fine gravel.....	480.0	485.0

Sand and gravel, texture grades from very fine sand to fine gravel.....	485.0	496.0
Sand, very fine to medium grained, predominantly very fine sand, slightly silty.....	496.0	540.0
Sand, very fine to medium grained, numerous black grains.....	540.0	570.0
Sandstone, areas of limestone, very calcareous areas, light brownish gray to white.....	570.0	577.0
Sand and sandstone, gradual variations, very fine to fine grained, predominantly very fine, light gray.	577.0	595.0
Silt, moderately sandy, contains very fine sand and trace of fine sand, moderately calcareous, light gray.....	595.0	605.0
Sand, very fine grained with some fine to medium sand, silty in areas, very silty and containing reworked siltstone below 660 ft., pale olive.....	605.0	674.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone and silt; gradual variations, predominantly siltstone, slightly sandy, contains very fine sand; light yellowish brown, becoming light brown to brown below 690 ft.....	674.0	700.0
Siltstone, silt, and very fine grained sandstone, interbedded, rust stains below 710 ft., light brown to brown.....	700.0	720.0
Silt and siltstone, gradual variations, trace of very fine sand, hard pink fragments, light yellowish brown to brown with reddish tints below 750 ft.....	720.0	760.0
Silt, with siltstone lithics up to fine gravel in size, reddish brown to pale olive.....	760.0	770.0
Silt and siltstone, very clayey, trace of fine sand, a few sandstone, siltstone, and claystone lithics, light gray.....	770.0	790.0
Silt, moderately clayey, trace of very fine sand, scattered siltstone interbeds, greenish gray.....	790.0	800.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, very weathered shale, pale yellow to yellow, some ocher.....	800.0	810.0
Shale, fissile; white, clayey areas that are very calcareous; gray with ocher.....	810.0	815.0
Shale, fissile, black.....	815.0	820.0

Test Hole #10-B-70 (E-log)
(20-22-33cccc)
Custer County

Location: SW SW SW SW sec. 33, T. 20 N., R. 22 W., approximately 72 feet north and 60.5 feet east of southwest section corner, southwest corner of abandoned school yard.

Ground elevation: 2,688 ft. (t). (Anselmo NE 7.5 min. quadrangle)

Depth to water: Hole caved at 57 ft. (August 17, 1970)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Topsoil, sand, very silty.....	0.0	2.5
Sand, very fine to medium grained, silty to very silty, predominantly quartz grains, some pink feldspars, medium gray grading to pale brown with depth.....	2.5	10.0
Silt, slightly sandy, contains very fine sand, limonitic stains and small limonite nodules, pale brown and very light gray.....	10.0	15.5
Sand, very fine to fine grained, silty.....	15.5	20.0
Silt, coarse texture; slightly sandy, contains very fine sand; limonite stains and nodules, light gray.....	20.0	25.0
Sand, very fine to fine grained with some medium sand, slightly silty to 55 ft., very silty below, pale brown.....	25.0	62.5
Silt, very slightly clayey; slightly sandy, contains very fine sand; limonite stains and small limonite nodules below 85 ft., slightly calcareous below 90 ft., light brownish gray.....	62.5	110.0
Silt, very sandy grading to sand, very fine to fine grained with some medium sand, numerous limy nodules, light brownish gray.....	110.0	115.5
Silt, slightly clayey; slightly sandy, contains very fine sand; slightly calcareous, small limy nodules, light grayish brown.....	115.5	117.0
Sand, very fine to fine grained with some medium sand.....	117.0	129.0
Silt, slightly clayey; moderately to very sandy, contains very fine to fine sand; light olive gray.	129.0	131.8
Sand, very fine to fine grained with some medium sand.....	131.8	135.0
Silt, moderately clayey; slightly to very sandy, contains very fine to fine sand; shell fragments at 150 ft., wood fragment at 155 ft., iron stains below 157 ft., very calcareous below 140 ft., light gray and pale olive except light brownish gray from 140 to 150 ft. and 160 to 165.5 ft.....	135.0	165.5

Silt, moderately clayey; slightly sandy, contains very fine to coarse sand, trace of gravel below 172 ft., grayish brown, mottled with pale olive below 172 ft.....	165.5	175.0
Sand and gravel, texture grades from fine sand to medium gravel, 30 percent gravel, predominantly quartz and dark silicate grains, some gravel sizes are reworked Ogallala Group sandstones.....	175.0	180.0
Gravel with sand, texture grades from fine sand to medium gravel, 60 percent gravel.....	180.0	189.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very clayey to clay; very sandy, contains very fine to fine sand with some medium, pale olive....	189.0	195.5
Sandstone, silty, very fine to fine grained with some medium sand, olive.....	195.5	201.0
Clay, silty; moderately sandy, contains very fine to medium sand, light gray.....	201.0	205.0
Sandstone, silty, well consolidated, very fine to fine grained; interbedded with moderately clayey, sandy silts; light brownish gray, silts are pale olive.....	205.0	215.0
Silt, moderately clayey, moderately sandy, interbedded with sandstone, light gray to light grayish brown.....	215.0	220.0
Sandstone and siltstone, gradual variations, with silt interbeds, contains very fine to fine sand, some rootlets, light brownish gray to light gray..	220.0	225.0
Sandstone, very fine to fine grained, silty, numerous rootlets, light brownish gray.....	225.0	235.0
Sandstone, very fine to medium grained, light brownish gray.....	235.0	240.0
Sandstone, very fine to fine grained, poorly consolidated, small and large rootlets, pale yellow to pale olive.....	240.0	260.0
Sandstone, very fine to medium grained, well consolidated from 260 to 265 ft., and 275 to 280 ft., rootlets, scattered siltstone interbeds below 270 ft., light gray to light olive gray.....	260.0	285.0
Sandstone, silty, and siltstone, interbedded, sandstone is very fine to fine grained, rootlets, light gray to pale yellow.....	285.0	295.0
Sand, very fine to medium grained, trace of rootlets, light gray.....	295.0	310.0
Sandstone, silty, very fine to fine grained, trace of rootlets, pale yellow to pale olive.....	310.0	330.0
Sand, very fine grained, rootlets, pale olive.....	330.0	350.0
Sandstone, very fine to fine grained, well consolidated and mostly lime cemented below 355 ft., numerous rootlets, slightly to very calcareous, marly in some areas, pale yellow.....	350.0	380.0

Silt, moderately clayey; very sandy, contains very fine to fine sand; scattered sandstone interbeds, pale yellow.....	380.0	390.0
Sandstone, silty, very fine to fine grained, lime cemented, very calcareous in spots, marly, pale yellow.....	390.0	400.0
Silt, moderately clayey; very sandy, contains very fine to fine sand; iron stains; pale yellow.....	400.0	405.0
Sandstone, very silty, very fine to fine grained, well consolidated, pale yellow.....	405.0	415.0
Sandstone, slightly silty, very fine to medium grained, trace of rootlets, pale olive to pale yellow.....	415.0	425.0
Silt, slightly clayey; very sandy, contains very fine to fine sand; scattered sandstone interbeds, pale yellow.....	425.0	435.0
Sand and sandstone, gradual variations, very fine to medium grained; slightly silty, rootlets, pale yellow to yellowish brown.....	435.0	455.0
Sand, very fine to coarse grained with trace of fine gravel, predominantly medium sand, sandstone zones from 455 to 460 ft., silty zones from 470 to 475 ft., grayish brown.....	455.0	475.0
Sand and sandstone, gradual variations, very fine to medium grained, zones of reworked material from 505 to 510 ft., and 520 to 525 ft.; a few to numerous rootlets, well consolidated below 540 ft., grayish brown to 485 ft., light olive brown below 485 ft.....	475.0	550.0
Sandstone, very fine to coarse grained with trace of fine gravel, predominantly medium sand, slightly calcareous, light gray.....	550.0	554.0
Silt, slightly to moderately clayey; moderately sandy, scattered thin sandstone layers, light gray.....	554.0	560.5
Sand and sandstone, gradual variations, very fine to coarse grained sand with trace of fine gravel, predominantly medium sand, trace of rootlets, olive sandy silt from 574 to 575 ft.....	560.5	575.0
Sand and sandstone, gradual variations, very fine to medium grained with some coarse sand, rootlets, lime cemented from 580 to 585 ft., moderately calcareous from 580 to 585 ft., scattered silt interbeds, light gray.....	575.0	600.0
Silt and sandstone, interbedded; silt is slightly clayey and very sandy; sandstone is very fine to fine grained and silty; a few rootlets, limy and marly areas to 605 ft., very calcareous in areas to 605 ft., pale olive to olive brown.....	600.0	630.0
Sandstone, very fine to fine grained with some medium and trace of coarse sand, larger grains are primarily quartz, trace of rootlets.....	630.0	646.0

Silt, very sandy, contains very fine to fine sand, partly consolidated, pale olive.....	646.0	650.0
Sand, slightly silty, very fine to fine grained, scattered thin sandy siltstones, brown.....	650.0	660.0
Sand and sandstone, gradual variations, silty, considerable amount of reworked and rounded fragments of light gray sandstone and claystone, olive matrix to 680 ft., brown matrix below 680 ft., small amount of coarse to very coarse quartz sand from 685 to 690 ft., reworked rootlets from 690 to 695 ft.....	660.0	700.0
Sand and sandstone, silty, very fine to fine grained with small amount of coarse and very coarse sand, large amount of reworked Brule Formation siltstone fragments, a few well consolidated zones, a few fragments of pink bentonite from 705 to 710 ft., slight amounts of manganese stains and lime nodules from 710 to 717 ft., slightly calcareous from 710 to 717 ft., brown matrix.....	700.0	717.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Silt and siltstone, gradual variations, poorly consolidated to 770 ft., moderately consolidated below 770 ft., small amounts of pink bentonite and weathered volcanic ash from 740 to 780 ft., manganese stains from 780 to 783 ft., white and limy clays from 725 to 735 ft., pinkish gray.....	717.0	800.0

Test Hole #22-SH-86 (E-log)
(20-23-16bddd)
Custer County

Location: SE SE SE NW sec. 16, T. 20 N., R. 23 W., approximately
 205 feet north and 235 feet west of the center of the section,
 west side of Hwy 2.

Ground elevation: 2,725 ft. (t). (Anselmo NW 7.5 min. quadrangle)

Depth to water: Hole caved at 2 ft. (June 27, 1986)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, pale brown.....	0.0	5.0
Clay, slightly sandy, contains very fine sand, pale olive.....	5.0	10.0
Sand, very fine to medium grained, light brownish gray.....	10.0	20.0
Sand, very fine to fine grained with some medium, pale brown.....	20.0	30.0
Clay, slightly sandy, contains very fine to fine sand, iron stained, gray.....	30.0	35.0
Sand, very fine to fine grained with small amount of medium sand, light brownish gray.....	35.0	67.0
Silt, very sandy, contains very fine to fine sand, moderately clayey.....	67.0	70.0
Sand, very fine to fine grained, areas of sandy silt, light brownish gray.....	70.0	100.0
Silt, very sandy, contains very fine to fine grained, light brownish gray.....	100.0	115.0
Sand, very fine to fine grained.....	115.0	120.0
Silt, moderately sandy, contains very fine to fine sand; from 140 to 145 ft. has white, limy areas and is moderately calcareous; iron stains below 145 ft., light yellowish brown with areas of gray- ish brown.....	120.0	160.0
Sand, very fine to very coarse grained, trace of fine gravel.....	160.0	165.0
Sand, fine to very coarse grained, with 10 percent fine gravel.....	165.0	180.0
Sand and gravel, texture grades from coarse sand to medium gravel, 40 percent gravel.....	180.0	195.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, contains very fine to fine sand, slightly clayey, olive.....	195.0	205.0
Sandstone, very fine to fine grained, pale olive, many bone fragments below 215 ft.....	205.0	220.0
Sand, medium grained with trace of coarse sand, a few thin sandy silt layers, olive yellow.....	220.0	225.0

Sandstone, very fine to fine grained and sand, fine to medium; interbedded; bone fragments to 230 ft., rootlets below 235 ft., pale olive.....	225.0	240.0
Sand, fine to medium grained with a few coarse grains, very slightly silty, pale olive.....	240.0	260.0
Sand, very fine to medium grained, predominantly fine, small amount of sandstone interbeds, pale olive.....	260.0	284.0
Silt, moderately to very clayey, scattered siltstone and sandstone interbeds, pale olive.....	284.0	300.0
Sandstone, very fine to fine grained and silt, moderately to very sandy; interbedded, rootlets, pale olive.....	300.0	305.0
Sandstone, very fine to fine grained, and sand, fine to coarse grained; interbedded; pale olive.....	305.0	315.0
Sand, fine to coarse grained, predominantly medium, a few silt layers above 320 ft., many dark sand grains, pale olive.....	315.0	330.0
Sand, very fine to medium grained, predominantly fine to medium, trace of coarse sand, a few sandstone interbeds below 345 ft.....	330.0	350.0
Sand and sandstone, gradual variations, very fine to medium grained, moderately calcareous; light olive gray.....	350.0	360.0
Sand and sandstone, gradual variations, very fine to medium grained, moderately calcareous, pale yellow.....	360.0	370.0
Marl, moderately sandy, very calcareous, white.....	370.0	375.0
Silt, moderately clayey; very sandy, contains very fine to medium sand; slightly calcareous, pale olive to white.....	375.0	380.0
Sand and sandstone, interbedded, very fine to medium grained; light olive gray and pale olive.....	380.0	390.0
Sand, very fine to medium grained, very scattered interbeds of sandstone, light brownish gray.....	390.0	495.0
Sandstone, very fine to medium grained, a few thin sand and silt layers, olive.....	495.0	500.0
Sand, very fine to fine grained, predominantly fine, light brownish gray.....	500.0	520.0
Sandstone, sand and silt; interbedded; very calcareous, white.....	520.0	525.0
Sand, very fine to medium grained, pale olive.....	525.0	540.0
Sand and sandstone, gradual variations, moderately silty, pale olive.....	540.0	555.0
Silt, slightly sandy, contains very fine to fine sand, pale olive.....	555.0	560.0
Sand, very fine to medium grained, predominantly fine, numerous sandstone interbeds below 565 ft., pale olive.....	560.0	580.0
Sandstone, very fine to fine grained; a few white, calcareous silt interbeds below 595 ft., pale olive.....	580.0	600.0

Sandstone, very fine grained, hard areas above 605 ft., silt interbeds from 605 to 615 ft., very calcareous from 605 to 610 ft., pale yellow.....	600.0	620.0
Sand, very fine to fine grained, and silt, very sandy; interbedded; pale yellow.....	620.0	625.0
Siltstone, sandy, olive brown.....	625.0	640.0
Silt, clay, claystone and sand, fine to medium grained; interbedded; hard from 643 to 645 ft., very calcareous, pale yellow.....	640.0	645.0
Sandstone, very fine to fine grained, scattered siltstone interbeds, olive.....	645.0	660.0
Sand, very fine to fine grained; sandstone, very fine grained; and siltstone, interbedded; olive...	660.0	685.0
Siltstone, a few sandstone and silt interbeds, from 695 to 700 ft., pale olive, reddish tint from 690 to 695 ft., pale olive.....	685.0	705.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone, with some silt interbeds, light brown and brown.....	705.0	720.0

Test Hole #21-SH-86 (E-log)
(20-25-1bbab)
Custer County

Location: NW NE NW NW sec. 2, T. 20 N., R. 25 W., approximately 920 feet east and 192 feet south of northwest section corner, west side of road.

Ground elevation: 2,805 ft. (t). (Linscott NW 7.5 min. quadrangle)

Depth to water: Hole caved at 6 ft. (June 26, 1966)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium grained, pale olive silt layers from 15 to 20 ft., pale brown.....	0.0	20.0
Sand, very fine to fine grained with trace of medium, silty interbeds from 25 to 30 ft. and from 40 to 60 ft., moderately silty from 65 to 70 ft., iron stains from 40 to 45 ft., pale brown.....	20.0	80.0
Sand, very fine to very coarse sand, becomes slightly silty below 85 ft., pale brown.....	80.0	90.0
Sand, very fine to medium grained, slightly silty, pale brown.....	90.0	95.0
Clay, very sandy, contains very fine to medium sand, silty, light yellowish brown.....	95.0	120.0
Sand, very fine to medium grained, pale brown.....	120.0	136.0
Clay, very sandy, contains very fine to medium sand, greenish gray to 135 ft., and light yellowish brown below 135 ft.....	136.0	147.0
Marl, clayey, moderately calcareous, pale yellow....	147.0	150.0
Clay, slightly sandy, contains very fine to fine sand, reddish yellow.....	150.0	190.0
Sand and gravel, texture grades from fine sand to fine gravel, reddish brown.....	190.0	212.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, moderately silty; very sandy, contains very fine to fine sand; light brown.....	212.0	220.0
Siltstone, very sandy, contains very fine to fine sand, pale olive.....	220.0	227.0
Sand, very fine to medium grained, moderately consolidated, some very coarse sand from 240 to 245 ft., light brownish gray.....	227.0	345.0
Sandstone, very fine to fine grained, moderately calcareous in areas, pale yellow, white zones from 360 to 370 ft.....	345.0	375.0
Silt, siltstone, and marl; interbedded; sandy, contains very fine to fine sand; pale olive.....	375.0	380.0
Sandstone, very fine to fine grained with some medium, moderately calcareous, light olive gray to olive gray.....	380.0	395.0

Marl and siltstone, gradual variations; sandy, contains very fine to fine sand; moderately calcareous, white to light gray.....	395.0	400.0
Siltstone and silt, gradual variations; very sandy, contains very fine to fine sand; trace of marl, moderately calcareous, white.....	400.0	423.0
Sand, very fine to medium grained, light brownish gray.....	423.0	430.0
Sandstone, very fine to fine grained, moderately calcareous.....	430.0	435.0
Sand, very fine to medium, predominantly very fine to 440 ft., a few calcareous flakes below 440 ft., moderately calcareous in spots, pale brown.....	435.0	445.0
Sand and sandstone, gradual variations, very fine to medium grained, rootlets, pale olive.....	445.0	515.0
Marl and siltstone, gradual variations, moderately calcareous, white.....	515.0	520.0
Sand and sandstone, gradual variation, very fine to fine grained, scattered lime cemented siltstone interbeds from 520 to 525 ft., pale olive.....	520.0	546.0
Marl and sandstone, gradual variations, very fine to fine grained, pale yellow.....	546.0	550.0
Sand, very fine to medium grained, moderately calcareous in areas, pale yellow.....	550.0	560.0
Sand and sandstone, interbedded, very fine to fine grained with some medium sand, moderately calcareous in areas, pale yellow to white.....	560.0	575.0
Silt, slightly sandy, contains very fine to fine sand, pale yellow with grayish areas.....	575.0	580.0
Sand, very fine to medium, slightly silty, rootlets, pale olive to pale yellow.....	580.0	625.0
Silt, slightly clayey; moderately sandy, contains very fine to fine sand with trace of medium; rootlets, white and moderately calcareous areas from 630 to 635 ft., pale olive.....	625.0	640.0
Sand, very fine to medium grained, slightly silty, pale olive.....	640.0	660.0
Sand, very fine to fine grained with some medium; light gray.....	660.0	700.0
Tertiary System - Miocene Series - Arikaree Group:		
Clay, very sandy, contains very fine sand with trace of fine, light yellowish brown.....	700.0	720.0
Siltstone, slightly clayey, pale brown becoming brown below 730 ft.....	720.0	740.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone, slightly clayey, pieces of pink bentonitic clay, pink with brown tints.....	740.0	800.0
Silt and siltstone, interbedded, light brown and brown.....	800.0	820.0

Siltstone, scattered interbeds of silt, a few claystone interbeds below 880 ft., brown.....	820.0	900.0
Tertiary System - Eocene Series - White River Group:		
Chadron Formation:		
Siltstone and silt, interbedded, moderately clayey, gray with blue-green areas.....	900.0	928.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, weathered, light gray and ocher.....	928.0	956.0
Shale, black and ocher.....	956.0	960.0

Test Hole #43-SH-85 (E-log)
(20-25-23ddda)
Custer County

Location: NE SE SE SE sec. 23, T. 20 N., R. 25 W., approximately
 487 feet north and 34 feet west of southeast section corner.
 Ground elevation: 2,800 ft. (t). (Linscott NW 7.5 min. quadrangle)
 Depth to water: Not recorded

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Topsoil, very sandy, dark brown.....	0.0	5.0
Sand, moderately to very silty, very fine grained, light brownish gray.....	5.0	40.0
Silt, very sandy, contains very fine sand, trace of iron stains, light yellowish brown.....	40.0	45.0
Sand, very silty, very fine grained, light yellowish brown.....	45.0	55.0
Silt, very sandy, contains very fine sand, light yellowish brown.....	55.0	65.0
Sand, moderately to very sandy, very fine to fine grained, light brownish gray.....	65.0	73.0
Silt, slightly clayey; slightly sandy, contains very fine sand; iron stains below 80 ft., pale olive...	73.0	95.0
Sand, moderately to very silty, very fine to fine grained, light olive gray.....	95.0	100.0
Silt, moderately to very sandy, contains very fine to fine sand, light olive gray.....	100.0	135.0
Sand, very silty, very fine to fine grained, light olive gray to pale brown.....	135.0	145.0
Silt, moderately to very clayey, very sandy below 160 ft.; numerous sand interbeds from 150 to 155 ft., contains very fine to fine sand; grayish brown.....	145.0	170.0
Sand, very fine to very coarse grained, predomi- nantly medium sand.....	170.0	174.0
Sand and gravel, texture grades from fine sand to fine gravel with trace of medium gravel, predomi- nantly very coarse sand, reddish brown.....	174.0	193.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately to very sandy, contains very fine to medium sand, yellowish brown.....	193.0	195.0
Sand, slightly to moderately silty, very fine to medium grained with trace of coarse and very coarse sand, yellowish brown.....	195.0	205.0
Sand, very fine to coarse grained, trace of root- lets, yellowish brown.....	205.0	210.0
Sand, very fine to medium grained, grayish brown....	210.0	225.0

Sand and sandstone, gradual variations, very fine to medium grained with trace of coarse sand, grayish brown.....	225.0	235.0
Sand, very fine to medium grained, predominantly fine to medium sand, medium sand is predominantly black grained, grayish brown.....	235.0	240.0
Sand and sandstone, gradual variations, slightly to moderately silty, very fine to medium grained, trace of rootlets, light yellowish brown above 245 ft., grayish brown below 245 ft.....	240.0	255.0
Sandstone, very fine to medium grained with trace of coarse sand, trace of rootlets, grayish brown.....	255.0	265.0
Sand, very fine to medium grained with trace of coarse sand, grayish brown.....	265.0	280.0
Sand, very fine to medium with trace of coarse sand, predominantly fine to medium grained, grayish brown.....	280.0	315.0
Sand, slightly to very silty, very fine to coarse grained, rootlets, grayish brown.....	315.0	335.0
Sand and sandstone, gradual variations, very fine to medium grained, slightly silty, rootlets, olive gray to brown.....	335.0	345.0
Sandstone, very slightly silty, very fine to fine grained, trace of rootlets, brown.....	345.0	355.0
Sand and sandstone, gradual variations, very fine to medium grained with trace of coarse sand, grayish to olive brown.....	355.0	369.0
Silt, very limy; slightly sandy, contains very fine sand; very calcareous, white.....	369.0	380.0
Sand, very slightly silty, very fine to medium grained, light grayish brown.....	380.0	390.0
Sandstone, very fine to fine grained, trace of rootlets, light olive to grayish brown.....	390.0	400.0
Sandstone and sand, very fine to medium grained, rootlets, predominantly sandstone, grayish brown to olive.....	400.0	420.0
Sand and sandstone, gradual variations, very fine to medium grained, brown.....	420.0	435.0
Sand, very fine to medium grained with trace of coarse sand, predominantly medium sand, brown.....	435.0	465.0
Sand and sandstone, gradual variations, very fine to medium grained with trace of coarse sand, rootlets, pale olive silt interbeds from 485 to 490 ft., olive brown.....	465.0	505.0
Sandstone, slightly silty, very fine to medium grained, limy to limy cemented, slightly to very calcareous, light grayish brown to 520 ft., white below 520 ft.....	505.0	525.0
Silt, slightly sandy, very calcareous, white.....	525.0	530.0

Sandstone, very fine to medium grained, very silty, some lime cementation to 535 ft., numerous limy silt interbeds from 535 to 540 ft., rootlets, slightly to moderately calcareous, pale yellow to very pale brown.....	530.0	548.0
Silt and very fine to fine grained sandstone, interbedded, lime cementation, very calcareous, white..	548.0	555.0
Sand and sandstone, gradual variations, slightly to moderately silty, very fine to fine grained, slightly calcareous and limy to 575 ft., olive yellow to 575 ft., olive brown below 575 ft.....	555.0	590.0
Sand, slightly to very silty, very fine to medium grained, sandy silt interbed from 635 to 640 ft.; slightly cemented areas below 655 ft.; grayish brown.....	590.0	670.0
Tertiary System - Miocene Series - Arikaree Group:		
Siltstone, coarse texture; slightly sandy, contains very fine sand; scattered pink silt interbeds, brown.....	670.0	735.0
Sand, very fine to fine grained with trace of medium and coarse sand, fine sand and larger are black grains, reddish brown silt and siltstone interbeds below 765 ft., black to grayish brown...	735.0	769.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone, scattered olive and pale yellow silt interbeds, reddish brown.....	769.0	790.0
Silt and siltstone, gradual variations, reddish brown claystone interbeds below 825 ft., bands of brown and reddish brown to 820 ft., light reddish brown below 820 ft., some manganese stains and nodules below 865 ft.....	790.0	885.0
Silt and siltstone, gradual variations, trace of manganese nodules, very clayey to bentonitic below 895 ft., light grayish brown.....	885.0	920.0
Tertiary System - Eocene Series - White River Group:		
Chadron Formation:		
Claystone, yellow, and siltstone, dark grayish green; interbedded; fragments of weathered Pierre shale below 940 ft.....	920.0	950.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, very clayey, weathered, yellow-gray.....	950.0	960.0
Shale, clayey, yellow, dark gray and black.....	960.0	970.0
Shale, clayey, dark gray to black.....	970.0	980.0