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Rock County Test Hole Logs

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ROCK COUNTY Test-Hole Logs

Susan Olafsen-Lackey, Frank A. Smith, and Leonard R. Boryca

**Nebraska Water Survey
Test-Hole Report No. 75**

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



August 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.

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Publication and price lists are furnished upon request.

August 2000

ACKNOWLEDGMENTS

The authors gratefully acknowledge the contributions of the following Conservation and Survey Division personnel for production of this test-hole log book: Melba Stemm and Amy Mescher for typing the logs, Dee Ebbeka and Ann Mack for drafting the illustrations, and Duane Mohlman for computer assistance.

INTRODUCTION

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

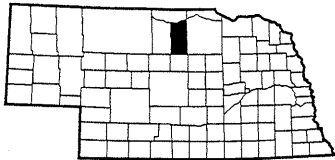
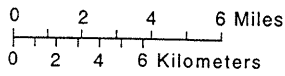
The map in this report shows the location of all test holes drilled in the county since 1930 (Figure 1).

Present techniques of test-hole logging and sampling include use of drilling mud suitable to drilling conditions, timing by stopwatch of the drilling of each 5-foot increment of depth, and removal of all cuttings from the test hole at intervals of 5 feet or less. During the drilling of the hole, cuttings from each interval are examined immediately; samples representing each 5-foot interval and each recognizable change in material are retained. After samples are washed, they are described lithologically and the color is evaluated by comparison with standard color charts. The samples then are dried, stored, and cataloged. All samples are processed and kept on open file in the offices of Conservation and Survey Division, 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 occur at the boundary from one formation to another. Figure 2 is an example of a geophysical log from Rock County (test hole #19-SG-84) 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. Descriptions of the strata done in earlier test hole reports as well as formation names have been revised where necessary in this report.

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



County Location Map

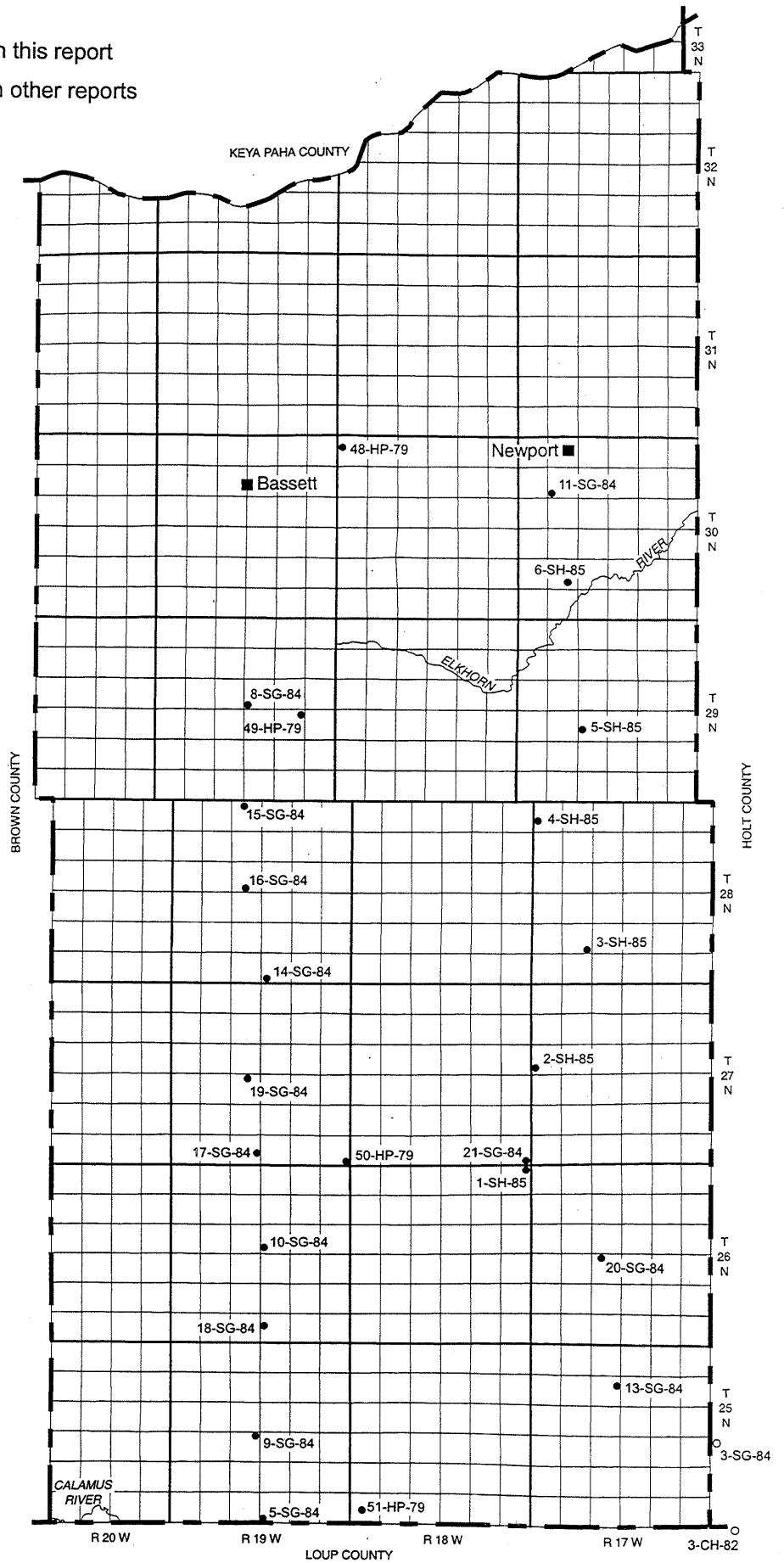


Figure 1. Test-hole location map of Rock County

Figure 2. Rock County sample geophysical log (19-SG-84)

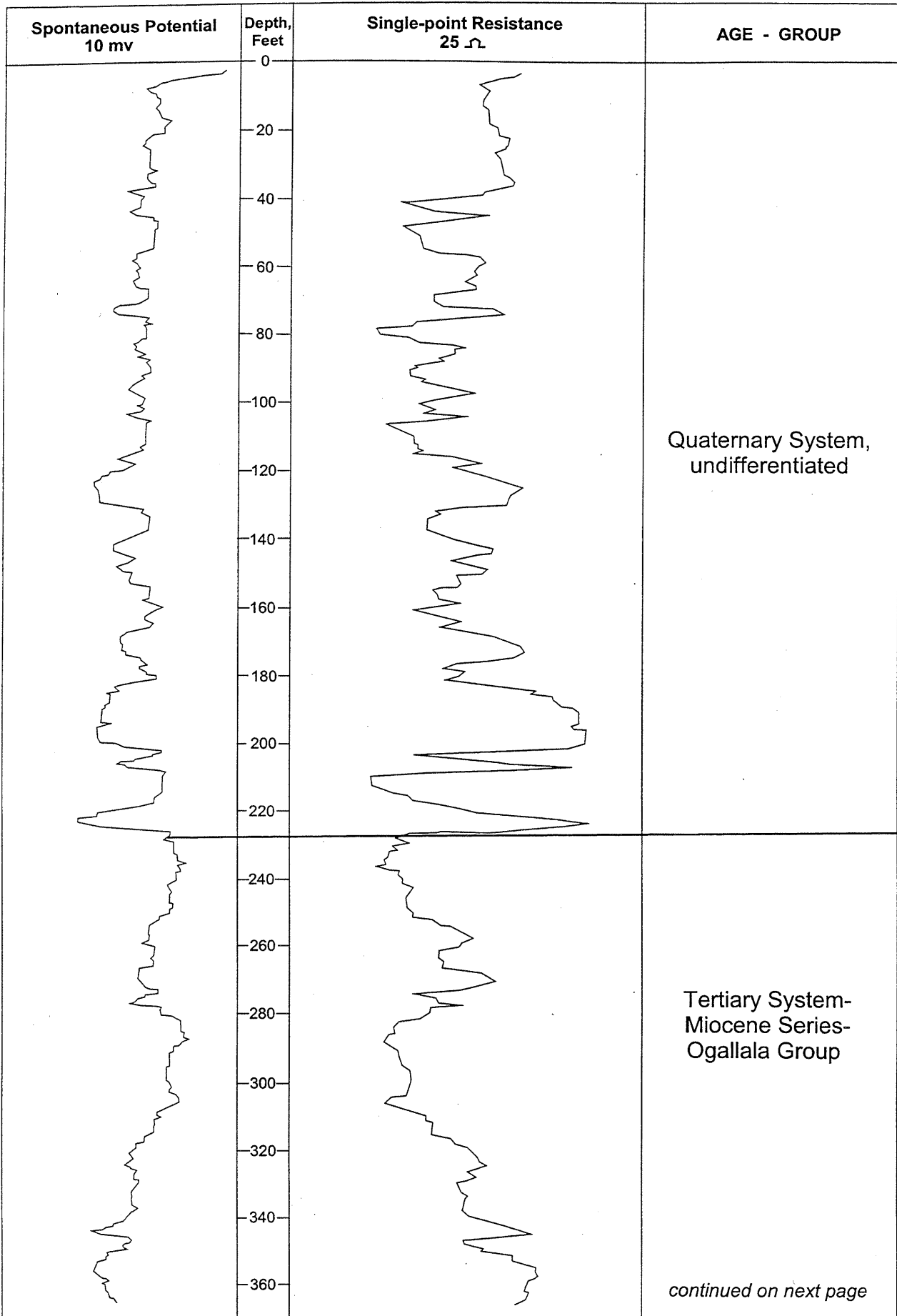
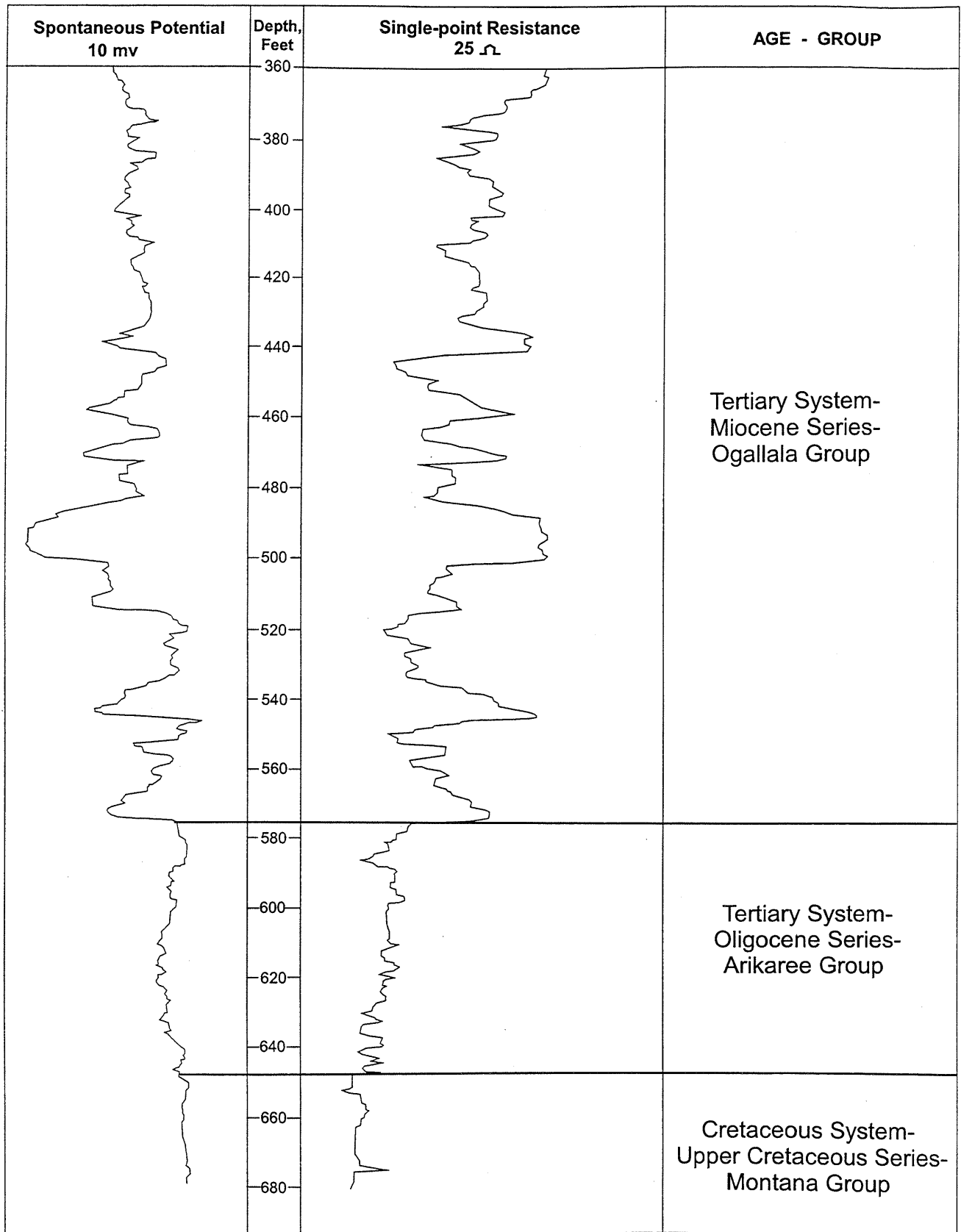


Figure 2 continued. Rock County sample geophysical log (19-SG-84)



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

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

Each test hole is identified by a number assigned in the field (for example #3-B-67), 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. **Location numbers of test holes east of the 6th principal meridian, which passes through Columbus in a north-south direction, are preceded by the capital letter A; those west of the principal meridian have no preceding letter.** The first numeral indicates the township, the second the range, and the third the section. As shown in figure 3, the letters that follow the section number indicate the location of the test hole within the section, the first letter indicating the quarter section and the second letter indicating the quarter-quarter section and so on to the quarter-quarter-quarter-quarter section. The letters A, B, C, and D are applied in counterclockwise direction beginning with A in the northeast quadrant. The last numeral is the serial number of the test hole within the quarter-quarter-quarter-quarter section and is only utilized if more than one test hole is present in that area. This system of identification is also utilized by the USGS.

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

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

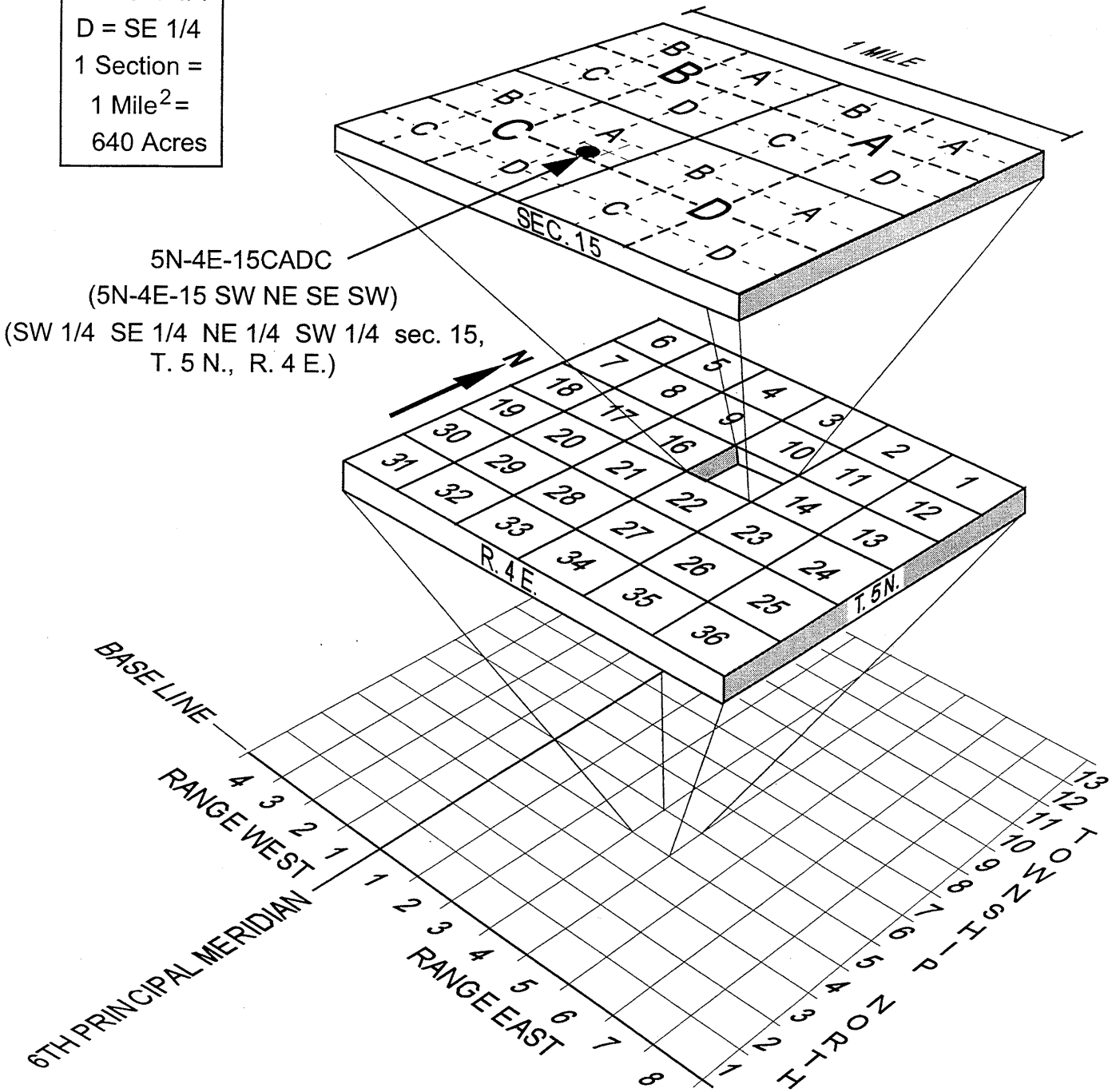


Fig. 3. System for identifying test-hole according to its location.

SELECTED REFERENCES

Some Publications that are Guides to Earth Resources in Rock County

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

- An Atlas of the Sand Hills: Resource Atlas 5b: Bleed, A. S., and Flowerday, C. A., editors, Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, (third edition 1998)*
- Diffendal, R. F., Jr. and Voorhies, M. R., *Geologic Framework of the Niobrara River Drainage Basin and Adjacent Areas in South Dakota Generally East of the 100th Meridian West Longitude and West of the Missouri River*. Nebraska Geological Survey Report of Investigations No. 9. Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, 1994.
- Skinner, M. F., and Johnson, F. W., *Tertiary Stratigraphy and the Frick Collection of Fossil Vertebrates from North-central Nebraska*: American Museum of Natural History Bulletin V. 178, art. 3, p. 215-368, 1984.
- Soil Survey of Rock County*. U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, 1985.

Rock County
Test-Hole Table of Contents

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25N-18W-31caac	51-HP-79	3
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25N-19W-34cccc	05-SG-84	7
26N-17W-21baba	20-SG-84	9
26N-18W-01aaaa	01-SH-85	11
26N-19W-15ccbb	10-SG-84	13
26N-19W-34bccb	18-SG-84	15
27N-17W-18ccbc	02-SH-85	17
27N-18W-36dddd	21-SG-84	19
27N-19W-21abbd	19-SG-84	20
27N-19W-33daaa	17-SG-84	22
27N-19W-36dddd	50-HP-79	24
28N-17W-06cbbb	04-SH-85	26
28N-17W-29dddd	03-SH-85	28
28N-19W-04baab	15-SG-84	30
28N-19W-16cdcd	16-SG-84	32
28N-19W-34ccdd	14-SG-84	34
29N-17W-21cbbb	05-SH-85	36
29N-19W-15cccc	08-SG-84	38
29N-19W-23aada	49-HP-79	40
30N-17W-08cccc	11-SG-84	42
30N-17W-29dcab	06-SH-85	43
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Test-holes are arranged in this publication by township,
range and section.

Rock County
Test-Hole Table of Contents

Arranged by year drilled, test-hole number.

1979

30N-18W-06bccb	48-HP-79	. . . . .	44
29N-19W-23aada	49-HP-79	. . . . .	40
27N-19W-36dddd	50-HP-79	. . . . .	24
25N-18W-31caac	51-HP-79	. . . . .	3

1984

25N-19W-34cccc	05-SG-84	. . . . .	7
29N-19W-15cccc	08-SG-84	. . . . .	38
25N-19W-21aaaa	09-SG-84	. . . . .	5
26N-19W-15ccbb	10-SG-84	. . . . .	13
30N-17W-08cccc	11-SG-84	. . . . .	42
25N-17W-09adaa	13-SG-84	. . . . .	1
28N-19W-34ccdd	14-SG-84	. . . . .	34
28N-19W-04baab	15-SG-84	. . . . .	30
28N-19W-16cdcd	16-SG-84	. . . . .	32
27N-19W-33daaa	17-SG-84	. . . . .	22
26N-19W-34bccb	18-SG-84	. . . . .	15
27N-19W-21abbd	19-SG-84	. . . . .	20
26N-17W-21baba	20-SG-84	. . . . .	9
27N-18W-36dddd	21-SG-84	. . . . .	19

1985

26N-18W-01aaaa	01-SH-85	. . . . .	11
27N-17W-18ccbc	02-SH-85	. . . . .	17
28N-17W-29dddd	03-SH-85	. . . . .	28
28N-17W-06cbbb	04-SH-85	. . . . .	26
29N-17W-21cbbb	05-SH-85	. . . . .	36
30N-17W-29dcab	06-SH-85	. . . . .	43

Test Hole #13-SG-84 (E-log)
(25N-17W-9adaa)
Rock County

Location: NE NE SE NE Sec. 9, T. 25 N., R. 17 W.; 1,500 feet south and 65 feet west of the northeast corner.
 Ground Elevation: 2,460 ft. (t). (Stonehouse Ranch NE, 7.5 min quadrangle)
 Depth to water: Unknown. Test hole caved at 29.9 ft. (11-14-84)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, fine to medium; very fine below 10 ft.....	0.0	20.0
Silt, very sandy to sand very silty; pale olive; sand is very fine to fine.....	20.0	64.0
Sand, very silty; sand is very fine to fine.....	64.0	76.0
Silt, very sandy to sand very silty, pale olive; sand is very fine to fine.....	76.0	110.0
Sand, moderately silty; sand is very fine to fine.	110.0	126.0
Silt, very sandy, light yellowish brown; sand is very fine to fine.....	126.0	142.0
Sand, moderately silty; sand is very fine to fine	142.0	160.0
Sand, slightly silty; sand is fine to medium; contains fine to coarse below 170 ft.....	160.0	190.0
Silt, moderately clayey, sandy, light yellowish brown; sand is very fine to medium.....	190.0	194.0
Sand, fine to very coarse; little fine gravel from 194 to 205 ft.....	194.0	210.0
Sand and gravel; fine sand to fine gravel, trace of medium gravel.....	210.0	220.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, slightly to very sandy; pale olive; sand is very fine to fine.....	220.0	240.0
Sand, slightly silty; sand is very fine to fine...	240.0	248.0
Silt, moderately clayey, moderately sandy; contains interbedded sandstone; sand is very fine to fine; contains few rootlet fragments.....	248.0	260.0
Sandstone, sand is very fine to medium, little coarse; trace of gravel.....	260.0	284.0
Silt, very sandy to sand very silty, slightly clayey, pale olive; sand is very fine to fine...	284.0	300.0
Sand, moderately silty; sand is very fine to fine.	300.0	316.0
Sandstone, moderately silty; sand is very fine to medium; contains rootlets and claystone fragments.....	316.0	324.0
Silt, moderately clayey, pale yellow.....	324.0	340.0
Sandstone, moderately silty; sand is very fine to medium; contains rootlet fragments; slightly silty with claystone fragments below 380 ft.....	340.0	475.0

Silt, very sandy to sandy silt, pale yellow; sand is very fine to medium.....	475.0	490.0
Sandstone; lime cemented; sand is very fine to fine; slightly silty and limy from 507 to 509 ft	490.0	522.0
Siltstone, clayey, limy, sandy; sand is very fine to fine.....	522.0	540.0
Sandstone, very silty, limy; sand is very fine to fine.....	540.0	560.0
Sand, very fine to fine; principally siltstone, claystone, and silicates; sand is very fine to medium below 580 ft.....	560.0	656.0
Silt, very sandy, moderately clayey, light gray; sand is very fine to fine.....	656.0	660.0
Sand, very fine to coarse; very fine to very coarse from 682 to 684 ft; contains interbedded silt lenses from 702 to 704 ft.....	660.0	712.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, slightly calcareous, very dark gray to black.....	712.0	740.0

51-HP-79 (E-log)
(25N-18W-31caac)
Rock County

Location: SW NE NE SW Sec. 31, T. 25 N., R. 18 W., 2000 feet north
and 2,250 feet east of the southwest corner.

Ground elevation: 2,438 ft. (t). (Stonehouse Ranch SW, 7.5 min
quadrangle)

Depth to water: Not measured.

Depth, in feet
From To

Quaternary System, undifferentiated:

Sand, very fine to medium; contains soil material.....	0.0	10.0
Sand, very fine; slightly silty below 15 ft.....	10.0	40.0
Sand, very fine to medium.....	40.0	50.0
Sand, very fine to fine, some coarse to very coarse; some silt below 65 ft.....	50.0	80.0
Sand, very fine to very coarse, few gravel grains; from 88 to 89 ft, silty.....	80.0	90.0
Sand and gravel; fine sand to medium gravel.....	90.0	95.0
Gravel, sandy; fine sand to medium gravel.....	95.0	110.0

Tertiary System - Miocene Series - Ogallala Group:

Siltstone, clayey, sandy, olive yellow; sand is very fine; some rootlets below 115 ft.....	110.0	120.0
Sandstone, silty; sand is very fine to fine.....	120.0	135.0
Sand, very fine to medium; some sandstone lenses..	135.0	145.0
Sand, silty; sand is very fine to fine.....	145.0	150.0
Sand, very fine to medium; some sandstone lenses..	150.0	160.0
Sandstone, very fine to medium; contains rootlets.	160.0	185.0
Sand, very fine to medium; with sandstone lenses; below 195 ft, sand is very fine to fine.....	185.0	200.0
Sand, very silty, slightly clayey; sand is very fine to fine; clayey below 206 ft.....	200.0	256.0
Sandstone, in part silty; sand is very fine to medium; from 260 to 270 ft contains some rootlets.....	256.0	316.0
Clay, silty, sandy, brown to yellowish brown; sand is very fine to fine; limestone layer below 330 ft.....	316.0	340.0
Claystone, very pale brown.....	340.0	344.0
Sandstone, cemented; sand is fine to medium, less cemented below 370 ft.....	344.0	400.0
Sand, silty; sand is very fine to fine; below 410 ft, less silty, in part well cemented, very fine to medium.....	400.0	436.0
Sandstone, silty; sand is very fine to medium; sand is very fine to coarse below 456 ft.....	436.0	462.0
Silt, sandy, pale yellow; sand is very fine to fine	462.0	468.0

Sand, silty; sand is very fine to fine; contains sandstone below 475 ft, sand is very fine to medium.....	468.0	501.0
Silt, sandy, yellow; sand is very fine to fine, in part sand is very silty.....	501.0	514.0
Sand, very fine to medium.....	514.0	525.0
Sandstone, silty; sand is medium to coarse; below 535 ft, medium to very coarse.....	525.0	545.0
Sand, gravelly; medium sand to fine gravel.....	545.0	562.0
Sand, silty; sand is very fine to medium; some sandstone lenses.....	562.0	590.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Siltstone to claystone, micaceous, pale brown, contains volcanic ash; below 603 ft, pale brown.	590.0	628.0
Tertiary System - Eocene Series - White Group:		
Chadron Formation:		
Sand, quartz; very fine to coarse, little very coarse, trace fine gravel.....	628.0	633.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey.....	633.0	640.0

Test Hole #9-SG-84 (E-log)
(25N-19W-21aaaa)
Rock County

Location: NE NE NE NE Sec. 21, T. 25 N., R. 19 W., 87 feet south and
 46 feet west of the northeast corner.

Ground elevation: 2,467 ft. (t). (Rose, 7.5 min. quadrangle)

Depth to water: 3.5 ft. (10-31-84)

Depth, in feet
 From To

Quaternary System, undifferentiated:

Sand, very fine to medium.....	0.0	17.0
Silt, very clayey, light olive gray.....	17.0	18.0
Sand, very silty; sand is very fine to very coarse	18.0	37.0
Silt, very sandy, slightly clayey, grayish-brown; sand is very fine to fine, some medium to very coarse.....	37.0	47.0
Sand, very silty, slightly clayey; sand is very fine to medium, little coarse to very coarse....	47.0	77.0
Silt, moderately sandy, slightly clayey, grayish-green; sand is very fine to fine.....	77.0	81.0
Sand, slightly silty; sand is fine to medium, trace of coarse to very coarse.....	81.0	108.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to medium.....	108.0	118.0
Sand, gravelly; fine sand to fine gravel, rare medium to coarse gravel.....	118.0	138.0

Tertiary System - Miocene Series - Ogallala Group:

Sandstone, slightly silty; sand is very fine to medium; moderately silty below 165 ft, trace of rootlets.....	138.0	176.0
Sandstone, very silty; sand is very fine to fine with a trace of medium to coarse; in part very calcareous below 193 ft.....	176.0	208.0
Sandstone, slightly silty; sand is very fine to medium; contains rootlets and seeds.....	208.0	218.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine.....	218.0	228.0
Sandstone, moderately silty, slightly clayey; sand is very fine to medium.....	228.0	238.0
Silt, moderately clayey, slightly sandy, pale brown; trace of rootlets below 269 ft.....	238.0	294.0
Sandstone, slightly silty; sand is very fine to medium, rare coarse; some rootlets.....	294.0	334.0
Silt, moderately sandy, slightly clayey, olive gray; sand is very fine.....	334.0	342.0
Sandstone, slightly silty; sand is very fine to fine; some rootlets; silt lenses from 366 to 368 ft and from 378 to 380 ft.....	342.0	425.0

Sandstone, sand is very fine to medium, some very coarse sand to fine gravel.....	425.0	438.0
Sandstone, sand is very fine to very coarse, little fine gravel.....	438.0	450.0
Sandstone, slightly silty; sand is very fine to fine; moderately silty below 460 ft.....	450.0	465.0
Sandstone, sand is very fine to very coarse, with trace of fine gravel.....	465.0	473.0
Sand, very silty; sand is very fine to fine.....	473.0	490.0
Sandstone, moderately silty; sand is very fine to fine.....	490.0	500.0
Silt, moderately clayey, very sandy, slightly calcareous, pale olive; sand is very fine to fine; some interbedded sandstone.....	500.0	521.0
Sandstone, sand is very fine to coarse; moderately silty from 525 to 530 ft; limy from 530 to 535 ft; sand is very fine to very coarse with a trace of fine gravel below 545 ft.....	521.0	550.0
Sandstone, in part very silty; sand is very fine to medium.....	550.0	560.0
Sandstone, slightly silty; sand is very fine to coarse, trace very coarse sand to fine gravel...	560.0	575.0
Sand, slightly silty; sand is very fine to medium.	575.0	577.0
Sandstone, sand is very fine to very coarse, some fine gravel.....	577.0	592.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Silt, moderately clayey, slightly sandy, light reddish brown to pale brown; sand is very fine to coarse.....	592.0	615.0
Silt, moderately clayey, limy, pale reddish brown.	615.0	620.0
Sand, very fine to very coarse, trace fine gravel.	620.0	625.0
Silt, moderately clayey, pale brown; contains brown siltstone; some sandstone lenses below 630 ft.....	625.0	635.0
Siltstone to claystone, pale olive gray with reddish gray sandstone.....	635.0	650.0
Clay to claystone, grayish blue green and yellow..	650.0	660.0
Cretaceous System - Upper Cretaceous System - Montana Group:		
Pierre Formation:		
Shale, clayey, yellow.....	660.0	670.0
Shale, clayey, gray to black.....	670.0	680.0

Test Hole #5-SG-84 (E-log)
(25N-19W-34cccc)
Rock County

Location: SW SW SW SW Sec. 34 T. 25 N., R. 19 W., 47 feet north and 82 feet east of the southwest corner.
 Ground elevation: 2,427 ft. (t). (Shovel Dot Ranch, 7.5 min. quadrangle)
 Depth to water: Unknown. Test hole caved at 9.7 ft. (10-22-84)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine, trace of fine; from 15 to 20 ft, trace of silt; from 20 to 25 ft, trace of organic material.....	0.0	45.0
Sand, very fine to fine.....	45.0	60.0
Sand, gravelly; very fine sand to fine gravel; below 65 ft, less gravel.....	60.0	75.0
Gravel, sandy; very fine sand to medium gravel; slightly gravelly below 85 ft.....	75.0	100.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand to sandstone, sand is very fine, trace of medium; below 105 ft, sand is very fine to medium.....	100.0	120.0
Sandstone to sand, sand is very fine to medium, with some medium to very coarse; sand is very fine to medium below 140 ft.....	120.0	150.0
Sandstone to sand, sand is very fine to fine, trace of medium.....	150.0	165.0
Sand, slightly silty; sand is very fine to fine...	165.0	170.0
Silt, moderately sandy, light gray; sand is very fine with a trace of fine.....	170.0	176.0
Sandstone, sand is very fine to fine; below 185 ft, moderately silty; some rootlets below 190 ft...	176.0	200.0
Sandstone, sand is very fine; contains interbedded sandy silt lenses.....	200.0	210.0
Silt, moderately sandy, slightly calcareous, pale yellow; sand is very fine; some clay below 212 ft.....	210.0	225.0
Sandstone, slightly silty; sand is very fine to fine; from 280 to 285 ft, trace of medium sand..	225.0	294.0
Silt, clayey, moderately sandy, pale olive to pale yellow; sand is very fine, trace fine.....	294.0	300.0
Sandstone, silty; sand is very fine; some iron stained clayey silt below 305 ft.....	300.0	310.0
Sandstone, trace of silt; sand is very fine to medium.....	310.0	325.0
Sandstone, sand is very fine to fine; below 370 ft, sand is very fine and silty.....	325.0	387.0

Sandstone, sand is very fine; contains some clayey silt.....	387.0	395.0
Sandstone; sand is very fine; below 415 ft, sand is very fine to fine; silty below 425 ft.....	395.0	430.0
Silt, moderately sandy, in part slightly calcareous, pale yellow; sand is very fine.....	430.0	468.0
Sandstone, silty; sand is very fine to fine; below 470 ft, slightly silty.....	468.0	480.0
Silt, moderately sandy, pale olive; sand is very fine; from 500 to 505 ft, some sandstone; below 505 ft, very sandy.....	480.0	520.0
Sandstone, sand is very fine to fine; from 540 to 545 ft, silty.....	520.0	550.0
Sandstone, silty; sand is very fine to fine.....	550.0	555.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Silt to siltstone, slightly sandy, pale brown; sand is very fine; contains trace of clay and claystone.....	555.0	560.0
Silt, slightly sandy, very pale brown; sand is very fine; below 570 ft, pale brown; some iron stain below 580 ft.....	560.0	600.0
Silt, moderately clayey, slightly sandy, pale brown; contains sandstone and little volcanic ash; sand is very fine.....	600.0	607.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, shaley, pale yellow.....	607.0	610.0
Shale, clayey, light yellowish brown.....	610.0	620.0
Shale, clayey, very dark gray.....	620.0	640.0

Test Hole #20-SG-84 (E-log)
(26N-17W-21baba)
Rock County

Location: NE NW NE NW Sec. 21 T. 26 N., R. 17 W., 1,972 feet east and 38 feet south of the northwest corner.
 Ground elevation: 2,475 ft. (t). (Stonehouse Ranch NE, 7.5 min quadrangle)
 Depth to water: 8 ft. (12-8-84)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, trace of coarse.....	0.0	21.0
Silt, very sandy, moderately clayey, light olive gray; some dark clay fragments; sand is very fine to medium.....	21.0	28.0
Sand, very fine to medium; some silt lenses.....	28.0	40.0
Silt, very sandy, moderately clayey, light olive gray; sand is very fine to medium.....	40.0	50.0
Sand, slightly silty; sand is very fine to medium.	50.0	58.0
Silt, very sandy to sand, very silty; light olive gray; sand is very fine to fine; from 66 to 70 ft, sand.....	58.0	78.0
Sand, very fine to medium.....	78.0	86.0
Silt, very sandy to very silty sand, light olive gray; sand is very fine to fine.....	86.0	100.0
Sand, slightly silty; sand is very fine to medium.	100.0	111.0
Silt, very sandy, slightly clayey, light olive gray; sand is very fine to medium; light brown below 156 ft.....	111.0	180.0
Silt, very sandy, moderately clayey, pale olive; sand is very fine to medium.....	180.0	207.0
Sand, gravelly, slightly silty; very fine sand to medium gravel, rare coarse gravel.....	207.0	227.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, moderately clayey, pale olive; sand is very fine to medium.....	227.0	250.0
Sandstone, sand is very fine to medium; some rootlets; slightly silty; some coarse grains below 260 ft.....	250.0	275.0
Sand, very fine to medium, little coarse.....	275.0	291.0
Silt, moderately clayey, pale olive; volcanic ash below 295 ft.....	291.0	300.0
Sand, moderately silty; sand is very fine to fine.	300.0	305.0
Silt, moderately sandy, moderately clayey, pale olive; sand is very fine to medium.....	305.0	307.0
Sand, very silty; sand is very fine to medium.....	307.0	315.0
Sand to sandstone, silty; sand is very fine to medium; slightly less silty below 319 ft.....	315.0	400.0

Sandstone, moderately silty; sand is very fine to medium.....	400.0	566.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine.....	566.0	619.0
Sand, very fine to very coarse, little fine gravel; some limestone fragments and dark silicates; from 619 to 625 ft, rare shell fragments.....	619.0	657.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre formation:		
Shale, clayey, dark gray; below 600 ft, slightly calcareous, black.....	657.0	680.0

Test Hole #1-SH-85 (E-log)
(26N-18W-1aaaa)
Rock County

Location: NE NE NE NE Sec. 1, T. 26 N., R. 18 W., approximately 291 feet west and 8 feet south of the northeast corner.
 Ground elevation: 2,465 ft. (t). (Sybrant, 7.5 min quadrangle)
 Depth to water: 7.02 ft. (3-26-85)

	<u>Depth, in feet</u>	
	From	To
Quaternary System - undifferentiated:		
Sand, very fine to medium; moderately silty below 5 ft.....	0.0	10.0
Silt, very clayey, very sandy, pale brown; sand is very fine to medium.....	10.0	46.0
Sand, very silty; sand is very fine to medium.....	46.0	56.0
Silt, very sandy, pale olive; sand is very fine to fine.....	56.0	64.0
Sand, moderately silty; sand is very fine to medium.....	64.0	72.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to medium.....	72.0	76.0
Sand, moderately silty; sand is very fine to medium.....	76.0	80.0
Silt, very clayey, moderately sandy, pale olive; sand is very fine to medium.....	80.0	86.0
Sand, slightly to moderately silty; sand is very fine to medium.....	86.0	130.0
Silt, moderately clayey, sandy, pale olive; sand is very fine to medium.....	130.0	134.0
Silt, very sandy to sand very silty, pale brown; sand is very fine to medium.....	134.0	150.0
Sand, slightly silty; sand is very fine to medium.....	150.0	158.0
Silt, very sandy, slightly clayey, pale brown; sand is very fine to fine little medium.....	158.0	178.0
Sand, slightly silty; sand is very fine to medium.....	178.0	190.0
Silt, moderately clayey, moderately sandy, yellowish brown; sand is very fine to medium....	190.0	208.0
Sand, gravelly, fine sand to medium gravel, some coarse gravel.....	208.0	215.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine to medium; contains some rootlets; slightly silty below 265 ft.....	215.0	293.0
Clay, silty, slightly calcareous, pale olive.....	293.0	300.0
Sandstone, moderately silty, lime cemented; sand is very fine to medium.....	300.0	404.0
Silt, moderately sandy, slightly clayey, slightly calcareous, light gray; some volcanic ash; sand is very fine to medium.....	404.0	410.0

Sandstone, lime cemented; sand is very fine to medium.....	410.0	428.0
Clay, slightly calcareous, pale olive.....	428.0	452.0
Sandstone, sand is very fine to medium.....	452.0	462.0
Silt, very sandy, slightly clayey, olive; sand is very fine to fine.....	462.0	474.0
Sandstone, slightly silty; sand is very fine to medium.....	474.0	506.0
Clay, very sandy, moderately silty, pale olive; sand is very fine to fine.....	506.0	518.0
Sandstone, slightly silty; sand is very fine to medium.....	518.0	536.0
Silt, slightly clayey, moderately sandy, pale olive; sand is very fine to medium.....	536.0	554.0
Sand, slightly silty; sand is very fine to medium; moderately silty and limy in part below 572.....	554.0	577.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Silt, clayey to claystone, slightly sandy, limy in part, pale yellow to pale olive; sand is very fine.....	577.0	580.0
Silt, moderately clayey, slightly sandy, limy in part, pale yellow to gray; sand is very fine....	580.0	594.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, greenish gray; darker gray below 610 ft.....	594.0	635.0
Shale, clayey, slightly calcareous, dark gray.....	635.0	640.0

Test Hole #10-SG-84 (E-log)
(26N-19W-15ccbb)
Rock County

Location: NW NW SW SW Sec. 15, T. 26 N., R. 19 W., 1,210 feet north
and 54 feet east of the southwest corner.

Ground elevation: 2580 ft. (t). (Rose, 7.5 min quadrangle)

Depth to water: 7.0 ft. (11-8-84)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to coarse.....	0.0	22.0
Clay, silty, slightly sandy, grayish-brown; sand is very fine; light brown below 30 ft; very sandy from 46 to 48 ft.....	22.0	60.0
Silt, moderately clayey, moderately sandy, reddish-brown; sand is very fine to fine; pale olive brown below 95 ft.....	60.0	132.0
Sand, slightly silty; sand is very fine to medium; silt layer from 152 to 156 ft; trace of coarse to very coarse sand below 162 ft.....	132.0	180.0
Silt, very sandy, slightly clayey, light brown; sand is very fine to medium with a trace of coarse sand.....	180.0	196.0
Sand, slightly silty; sand is very fine to medium; very silty from 218 to 222 ft and from 230 to 232 ft.....	196.0	240.0
Sand, gravelly; fine sand to fine gravel with a trace of medium gravel.....	240.0	258.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, slightly silty; sand is very fine to medium; less silt below 400 ft.....	258.0	417.0
Sandstone, slightly silty; sand is very fine to medium; some rootlets.....	417.0	474.0
Silt, slightly clayey, ashey, moderately calcareous, pale olive.....	474.0	478.0
Sandstone, sand is very fine to medium.....	478.0	502.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to medium.....	502.0	510.0
Sandstone, moderately silty; sand is very fine to medium.....	510.0	607.0
Silt, very sandy, slightly clayey, light brown; sand is very fine to medium.....	607.0	617.0
Sand, very fine to medium, trace of coarse.....	617.0	646.0
Sandstone, sand is very fine to fine, trace of medium; limy clay lenses below 655 ft.....	646.0	656.0
Silt, moderately sandy, moderately clayey, olive; sand is very fine to fine.....	656.0	682.0

Tertiary System - Oligocene Series - Arikaree Group:

Rosebud Formation:

Clay, moderately silty, pale olive to reddish brown.....	682.0	685.0
Siltstone to claystone, pale reddish brown.....	685.0	690.0
Clay, pale olive to pale reddish brown.....	690.0	695.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, clayey, gray, greenish with yellow; more yellow below 700 ft.....	695.0	725.0
Shale, clayey, yellow orange and dark gray; below 750 ft, dark gray with some yellow orange.....	725.0	760.0

Test Hole #18-SG-84 (E-log)
(26N-19W-34bccb)
Rock County

Location: NW SW SW NW Sec. 34, T. 26 N., R. 19 W., 2,282 feet south
 and 86 feet east of the northwest corner.
 Ground elevation: 2,529 ft. (t). (Rose, 7.5 min. quadrangle)
 Depth to water: 33 ft. (12-2-84)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium; silty from 12 to 15 ft.	0.0	25.0
Sand, moderately silty; sand is very fine to medium.....	25.0	67.0
Silt, very sandy, slightly clayey, yellowish-brown; sand is very fine to fine.....	67.0	75.0
Sand, slightly silty; sand is very fine to fine...	75.0	99.0
Silt, very sandy, slightly clayey, light brownish-gray; sand is very fine to fine.....	99.0	105.0
Sand, very silty, sand is very fine to fine; below 175 ft, some medium to coarse sand with rare fine gravel.....	105.0	192.0
Sand, very fine to very coarse with a trace of gravel.....	192.0	195.0
Sand, sample missing, probably as above.....	195.0	200.0
Sand, gravelly; fine sand to medium gravel.....	200.0	237.0
Sand, very fine to medium with a trace of coarse; below 262 ft, slightly silty.....	237.0	273.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine to medium.....	273.0	279.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to medium.....	279.0	298.0
Sand, very fine to medium.....	298.0	310.0
Silt, very sandy, moderately clayey, pale yellow; sand is very fine to fine.....	310.0	343.0
Sandstone, slightly silty; sand is very fine to medium; below 370 ft, some rootlet fragments....	343.0	429.0
Silt, marly, white; little very fine sand.....	429.0	435.0
Sandstone, slightly silty; sand is very fine to medium; below 445 ft, some rootlets.....	435.0	447.0
Sand, slightly silty; very fine to fine; slightly clayey; some interbedded silty sand, some rootlet fragments.....	447.0	510.0
Sand, slightly silty; sand is very fine to fine; below 549 ft, moderately silty.....	510.0	591.0
Silt, moderately clayey, gray with pinkish tint...	591.0	608.0
Sand, very fine to medium, little coarse to very coarse, rare fine gravel.....	608.0	618.0
Silt, moderately clayey, gray.....	618.0	626.0

Sand, very fine to medium, some coarse, trace of very coarse; rare fine gravel.....	626.0	635.0
Sand, very fine to very coarse, some fine gravel..	635.0	660.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Silt, clayey, light gray; contains trace very fine to very coarse sand; trace brown clay below 670 ft.....	660.0	675.0
Silt to siltstone, light brownish gray; contains trace very fine sand.....	675.0	700.0
Silt, slightly sandy, light gray; sand is very fine to fine; trace of yellow clay below 720 ft.	700.0	722.0
Cretaceous Series - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, yellow with gray.....	722.0	735.0
Shale, clayey, black.....	735.0	740.0

2-SH-85 (E-log)
(27N-17W-18ccbc)
Rock County

Location: SW NW SW SW Sec. 18, T. 27 N., R. 17 W., approximately
 766 feet north and 95 feet east of the southwest corner.
 Ground elevation: 2440 ft. (t). (Sybrant, 7.5 min quadrangle)
 Depth to water: 7.9 ft. (3-27-85)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine, trace of medium; slightly more medium below 15 ft.....	0.0	45.0
Sand, slightly silty; sand is very fine to medium; contains organic material below 49 ft.....	45.0	52.0
Sand, slightly silty; sand is very fine to medium; below 55 ft, some coarse to very coarse.	52.0	66.0
Sand, moderately silty; sand is very fine, trace of medium.....	66.0	90.0
Silt, very sandy, pale brown; sand is very fine; contains less silt below 94 ft.....	90.0	100.0
Sand, very fine; contains trace of silt; below 112 ft, slightly silty, sand is very fine to medium.	100.0	124.0
Sand, slightly silty; sand is very fine to medium with trace of coarse.....	124.0	138.0
Silt, slightly sandy to sand slightly silty, pale brown; sand is very fine.....	138.0	200.0
Silt, moderately clayey, slightly sandy, brown to brownish yellow.....	200.0	216.0
Silt, slightly sandy, brownish yellow; sand is very fine, trace of fine to medium.....	216.0	222.0
Tertiary system - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine with fine to medium; contains hackberry seeds; below 240 ft, contains rootlets; from 280 to 285 ft, some clay.....	222.0	310.0
Sand, very silty, limy; sand is very fine.....	310.0	325.0
Sand to sandstone; sand is very fine to fine; contains rootlets.....	325.0	376.0
Silt, moderately sandy, slightly calcareous pale yellow; sand is very fine to fine.....	376.0	415.0
Sandstone, sand is very fine to fine; contains rootlets; from 420 to 430 ft, trace of medium to coarse; below 430 ft, trace of very coarse...	415.0	435.0
Sandstone; sand is very fine to fine, with some medium to very coarse; silty below 442 ft.....	435.0	450.0
Sandstone, slightly silty; sand is very fine to fine; below 460 ft, some rootlets.....	450.0	480.0

Sandstone, slightly silty; sand is very fine; interbedded sandy silt layer from 442 to 448 ft; some rootlets from 495 to 500 ft and below 560 ft; sand is very fine to fine below 515 ft.....	480.0	580.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Silt, moderately clayey, slightly sandy; pale yellow to pale olive; sand is very fine; some claystone below 585 ft; brown below 595 ft.....	580.0	600.0
Silt, very clayey, slightly sandy, pale olive; sand is very fine; in part calcareous; contains some claystone.....	600.0	645.0
Claystone, varigated with reds to 650 ft; some brown from 650 to 655 ft; light yellowish brown below 655 ft.....	645.0	665.0
Silt, clayey; some green claystone.....	665.0	685.0
Clay; brown, green, gray and black.....	685.0	690.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, slightly calcareous, black.....	690.0	700.0

Test Hole #21-SG-84 (No e-log)
(27N-18W-36dddd)
Rock County

Location: SE SE SE SE Sec. 36, T. 27 N., R 18 W., 108 feet north and
 18 feet west of the southeast corner.
 Ground elevation: 2473 ft. (t). (Sybrant, 7.5 min quadrangle)
 Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty; sand is very fine to fine; trace of clay below 10 ft.....	0.0	20.0
Clay, slightly silty, slightly sandy, light brownish gray; sand is very fine to fine; from 30 to 35 ft, little iron stain; from 40 to 45 ft, pale brown; below 45 ft, pale olive; below 50 ft, in part brown.....	20.0	60.0
Sand, clayey, silty; sand is very fine to fine; below 70 ft, sand is very fine to medium.....	60.0	80.0
Silt, clayey, very sandy; sand is very fine to fine.....	80.0	85.0
Clay, moderately silty, slightly sandy, pale olive; sand is very fine; moderately sandy below 90 ft	85.0	95.0
Sand, moderately clayey; moderately silty; sand is very fine to fine; contains some iron stain; interbedded clay lenses below 115 ft.....	95.0	120.0
Sand, very clayey, silty; sand is very fine.....	120.0	145.0
Clay, moderately silty, sandy, pale olive; sand is very fine to fine; below 150 ft, some very coarse sand.....	145.0	155.0
Clay, moderately sandy, slightly silty, pale olive; sand is very fine to coarse.....	155.0	160.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone; sand is very fine to fine.....	160.0	165.0
Clay, slightly sandy, pale brown; sand is very fine; below 180 ft; sand is very fine to fine...	165.0	195.0
Sand, very fine to fine.....	195.0	200.0

Test Hole #19-SG-84 (E-log)
(27N-19W-21abbd)
Rock County

Location: SE NW NW NE Sec. 21, T. 27 N., R. 19 W., 1,650 feet west
 and 625 feet south of the northeast corner.
 Ground elevation: 2,517 ft. (t). (Lake George, 7.5 min. quadrangle)
 Depth to water: 20 ft. Estimated (12-7-84)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, some coarse.....	0.0	40.0
Silt, very sandy to very silty sand, pale brown; sand is very fine to medium.....	40.0	42.0
Sand, slightly silty; sand is very fine to medium.	42.0	46.0
Silt, very sandy to very silty sand, pale brown; sand is very fine to medium.....	46.0	54.0
Sand, sand is very fine to medium.....	54.0	67.0
Silt, very sandy, slightly clayey, pale olive; very fine to fine.....	67.0	72.0
Sand, moderately silty; sand is very fine to fine.	72.0	75.0
Silt, moderately sandy, slightly clayey, pale olive, sand is very fine to fine.....	75.0	82.0
Sand, slightly silty; sand is very fine to medium.	82.0	106.0
Silt, very sandy to very silty sand, light olive green.....	106.0	118.0
Sand, very fine to medium; from 120 to 130 ft, slightly silty; from 130 to 140 ft, moderately silty.....	118.0	182.0
Sand, gravelly; very fine sand to fine gravel, some medium gravel; from 202 to 204 ft, interbedded silt layer.....	182.0	208.0
Clay, moderately sandy, pale olive; sand is very fine to medium.....	208.0	216.0
Sand, very fine to coarse.....	216.0	226.0
Silt, moderately clayey, moderately sandy, reddish-yellow; sand is very fine to medium.....	226.0	252.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, moderately silty; sand is very fine to fine; some rootlets.....	252.0	280.0
Silt, very sandy to very silty sand, slightly clayey, pale olive; sand is very fine to fine...	280.0	308.0
Sand, slightly silty; sand is very fine to medium; few rootlet fragments; moderately silty below 372 ft.....	308.0	390.0
Sandstone, san is very fine to medium.....	390.0	402.0
Sand, moderately silty; sand is very fine to fine; slightly more silty below 410 ft.....	402.0	414.0
Sand, slightly silty; sand is very fine to fine; below 420 ft, some medium sand.....	414.0	441.0

Clay, moderately sandy, silty, pale olive; sand is very fine to fine.....	441.0	452.0
Sand, slightly silty; sand is very fine to medium.	452.0	460.0
Silt, very sandy, pale olive; sand is very fine to fine.....	460.0	466.0
Sand, slightly silty; sand is very fine to fine; few rootlets below 472 ft.....	466.0	472.0
Silt, very sandy; slightly calcareous, pale olive.	472.0	484.0
Sand to sandstone; sand is very fine to medium....	484.0	502.0
Silt, very sandy, moderately clayey, moderately calcareous, pale yellow; sand is very fine to fine.....	502.0	534.0
Sand, very fine to medium.....	534.0	546.0
Silt, moderately clayey, pale yellow.....	546.0	553.0
Sand, very fine to fine; moderately silty from 556 to 560 ft; slightly silty below 570 ft.....	553.0	575.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Silt to siltstone, clayey, slightly to moderately sandy, pale yellow; sand is very fine to fine; slightly calcareous from 580 to 585 ft.	575.0	600.0
Silt, clayey, sandy, pale yellow; sand is very fine to fine.....	600.0	620.0
Silt to siltstone, clayey, light brown; contains trace very fine sand.....	620.0	648.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Shale, clayey, gray with reddish tint.....	648.0	654.0
Shale, clayey, slightly calcareous, dark gray.....	654.0	680.0

17-SG-84 (E-log)
 (27N-19W-33daaa)
 Rock County

Location: NE NE NE SE Sec. 33, T. 27 N., R. 19 W., approximately
 2,410 feet north and 175 feet west of the southeast corner.
 Ground elevation: 2,543 ft. (t). (Lake George, 7.5 min quadrangle)
 Depth to water: 3.2 ft (11-30-84)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine.....	0.0	5.0
Silt, slightly sandy, light brownish gray; sand is very fine to fine.....	5.0	10.0
Silt, very clayey, pale olive with black and gray laminae; contains trace of very fine sand.....	10.0	15.0
Clay, slightly silty, laminated browns, blues and greens, some iron stain; from 25 to 35 ft lost circulation; below 35 ft slightly to in part moderately sandy; from 35 to 50 ft, sand is very fine to fine; sand is very fine below 50 ft.....	15.0	70.0
Silt, slightly clayey, pale olive; contains trace of very fine to fine sand; pale yellow below 95 ft.....	70.0	100.0
Silt, slightly clayey, moderately sandy, dark olive gray; sand is very fine; little medium to coarse sand below 140 ft.....	100.0	145.0
Silt, slightly clayey, moderately sandy, olive gray; sand is very fine to fine.....	145.0	180.0
Sand, slightly silty; sand is very fine to coarse; contains interbedded silty clay lenses.....	180.0	205.0
Sand, trace silty clay; sand is medium to coarse with some very fine to fine.....	205.0	220.0
Sand, medium to very coarse, contains trace of very fine gravel; from 235 to 245 ft, slightly silty with trace of clay; less silt below 245 ft; some rootlets below 255 ft.....	220.0	275.0
Sand, medium to very coarse; contains little reddish clay.....	275.0	290.0
Sand, very fine to very coarse; some sandy clay...	290.0	340.0
Siltstone, clayey, slightly sandy, pale yellow; in part very calcareous; sand is very fine.....	340.0	353.0
Sand, slightly clayey, slightly silty; sand is very fine to medium.....	353.0	370.0
Silt to siltstone, moderately clayey, slightly sandy, pale olive; sand is very fine.....	370.0	395.0
Sandstone, slightly silty; sand is very fine to fine; some medium.....	395.0	420.0
Sand with interbedded silty clay; sand is very fine to fine.....	420.0	460.0

Silt, moderately sandy, pale olive; in part slightly calcareous; sand is very fine to fine..	460.0	475.0
Sandstone, slightly silty; sand is very fine to fine.....	475.0	482.0
Sand, slightly silty; sand is very fine to fine; from 495 to 510 ft, sand is moderately silty...	482.0	567.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Sandstone, moderately silty; sand is very fine to fine.....	567.0	570.0
Silt, moderately sandy, pale olive, pinkish in part; some green clay from 580 to 590 ft; some reddish brown siltstone below 595 ft.....	570.0	605.0
Silt to siltstone, clayey, very pale brown, some green and reddish yellow color.....	605.0	630.0
Silt to siltstone, clayey, light yellowish brown; brown below 640 ft.....	630.0	650.0
Silt, slightly sandy, very pale brown; moderately calcareous; sand is very fine to fine.....	650.0	655.0
Silt to siltstone, clayey, moderately calcareous, very pale brown.....	655.0	676.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, black.....	676.0	700.0

50-HP-79 (E-log)
(27N-19W-36ddd)
Rock County

Location: SE SE SE SE Sec. 36, T. 27 N., R. 19 W., approximately 100 feet north and 300 feet west of the southeast corner.

Ground elevation: 2,541 ft. (t). (Stockdale Lake, 7.5 min quadrangle)

Depth to water: Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium; slightly silty with some iron stain below 20 ft.....	0.0	35.0
Sand, slightly silty; sand is very fine to fine, some medium.....	35.0	122.0
Silt, moderately clayey, slightly sandy, light yellowish brown; sand is very fine to fine.....	122.0	132.0
Sand, silty; sand is very fine to fine.....	132.0	162.0
Silt, slightly clayey, sandy, light yellowish brown; sand is very fine to fine.....	162.0	169.0
Sand, silty; sand is very fine to fine; sand is very fine to medium below 175 ft.....	169.0	186.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine.....	186.0	196.0
Sand, medium to coarse, some fine; silty from 215 to 220 ft.....	196.0	225.0
Sand, slightly silty; sand is fine to very coarse.	225.0	238.0
Sand, gravelly; fine sand to medium gravel.....	238.0	240.0
Gravel sandy, fine sand to coarse gravel.....	240.0	304.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty, clayey; sand is very fine to fine....	304.0	310.0
Sand, silty; sand is very fine to medium; contains rootlets; very silty from 365 to 385.....	310.0	424.0
Silt, slightly clayey, sandy, pale olive; moderately calcareous; sand is very fine to fine	424.0	428.0
Sand, silty; sand is very fine to fine; from 456 to 460 ft, very silty; below 460 ft, sand is very fine to medium.....	428.0	476.0
Silt, clayey, sandy, pale yellow, very calcareous; sand is very fine to fine.....	476.0	490.0
Sand, very silty, sand is very fine to medium; slightly clayey from 522 to 526 ft and below 538 ft.....	490.0	553.0
Sand, very fine to medium; contains some silty areas, contains volcanic ash.....	553.0	612.0

Tertiary System - Oligocene Series - Arikaree Group:

Rosebud Formation:

Siltstone, sandy, clayey, very calcareous, pale brown; some very fine sand.....	612.0	620.0
Claystone, silty, slightly calcareous, reddish yellow; below 625 ft, very calcareous; below 630 ft, pink.....	620.0	640.0

Test Hole #4-SH-85 (E-log)
(28N-17W-6cbbb)
Rock County

Location: NW NW NW SW Sec. 6, T. 28 N., 17 W., 2,450 feet north and
 260 feet east of the southwest corner.
 Ground elevation: 2,358 ft. (t). (Pony Lake, 7.5 min quadrangle)
 Depth to water: 3.9 ft. (3-29-85)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty; sand is very fine to medium, some coarse;	0.0	20.0
Silt, very sandy, slightly clayey, dark grayish-brown; sand is very fine to fine.....	20.0	22.0
Sand, moderately silty; sand is very fine to coarse.....	22.0	38.0
Silt, very sandy, slightly clayey, very pale brown; sand is very fine to fine.....	38.0	43.0
Sand, moderately silty; sand is very fine to fine.	43.0	49.0
Silt, very sandy, moderately clayey, light brownish-gray; sand is very fine to fine; slightly more clayey below 60 ft.....	49.0	66.0
Sand, very silty; sand is very fine to fine, little medium, rare coarse; clay layer from 74 to 76 ft.....	66.0	80.0
Sand, very fine to coarse; some very coarse below 90 ft.....	80.0	102.0
Silt, very sandy, moderately clayey, light brownish-gray; sand is very fine to medium.....	102.0	108.0
Sand, gravelly; fine sand to medium gravel, some coarse gravel; little very coarse gravel from 168 to 172 ft.....	108.0	184.0
Clay, very sandy, light brown; sand is very fine to medium.....	184.0	189.0
Sand, moderately silty; sand is very fine to fine, some medium, rare coarse.....	189.0	200.0
Silt, very clayey, very sandy, brown; sand is very fine to medium.....	200.0	214.0
Sand, moderately silty; sand is very fine to medium.....	214.0	220.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, moderately sandy, light gray; sand is very fine to medium.....	220.0	232.0
Sand, very silty, very fine to medium.....	232.0	236.0
Sandstone, very fine to medium; some rootlets.....	236.0	258.0
Silty sand to sandy silty, slightly clayey, white; sand is very fine to medium.....	258.0	286.0
Sand, very fine to medium.....	286.0	310.0

Sandstone, slightly silty; sand is very fine to medium; moderately silty below 324 ft, some rootlets.....	310.0	350.0
Sandstone, very fine to medium, trace of coarse; few rootlets and claystone fragments below 370 ft; clay layer from 388 to 390 ft.....	350.0	400.0
Sandstone, slightly silty; sand is very fine to medium.....	400.0	431.0
Silt, moderately sandy, slightly clayey, pale olive; sand is very fine to fine.....	431.0	434.0
Sand, moderately silty; sand is very fine to fine, little medium.....	434.0	450.0
Silt, moderately sandy, slightly clayey, pale yellow; sand is very fine to fine; moderately clayey below 458 ft.....	450.0	462.0
Sand, slightly silty, sand is very fine to fine, little medium; very silty from 484 to 500 ft....	462.0	506.0
Silt, very sandy, slightly clayey; sand is very fine to fine.....	506.0	512.0
Sand, slightly silty; sand is very fine to fine; from 520 to 525 ft, few rootlet fragments; moderately silty from 528 to 532 ft.....	512.0	542.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine.....	542.0	544.0
Sand and gravel, fine sand to fine gravel, little medium gravel; heterogeneous.....	544.0	570.0
Sand, very fine to medium, little coarse; some rootlets and claystone fragments; silty from 581 to 583 ft and from 586 to 587 ft.....	570.0	596.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre formation:		
Shale, clayey, slightly calcareous, black.....	596.0	600.0

Test Hole #3-SH-85 (E-log)
(28N-17W-29ddd)
Rock County

Location: SE SE SE SE Sec. 29, T. 28 N., R. 17 W., 147 feet north
and 47 feet west of the southeast corner.

Ground elevation: 2,369 ft. (t). (Sybrant, 7.5 min quadrangle)

Depth to water: 185 ft. (3-28-85)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty; sand is very fine to medium; from 18 to 24 ft and from 24 to 26 ft, some coarse sand; moderately silty at 38 ft.....	0.0	45.0
Silt, very sandy to sand, very silty, black; sand is very fine to medium with some coarse to very coarse.....	45.0	52.0
Sand, slightly silty; sand is very fine to coarse; some organic material.....	52.0	62.0
Silt, very sandy to sandy, very silty, black; sand is very fine to medium; some organic material...	62.0	70.0
Sand, moderately silty; sand is very fine to medium.....	70.0	78.0
Silt, very sandy, moderately clayey, yellowish-brown; sand is very fine to fine.....	78.0	88.0
Sand, very fine to coarse, some fine gravel with a trace of medium gravel.....	88.0	106.0
Silt, very sandy, moderately clayey, grayish-olive; sand is very fine to fine.....	106.0	127.0
Sand, gravelly; very fine sand to medium gravel, rare coarse gravel.....	127.0	140.0
Silt, very sandy, moderately clayey, olive yellow; sand is very fine to fine.....	140.0	149.0
Gravel, sandy; medium sand to medium gravel, some coarse gravel.....	149.0	172.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very silty; sand is very fine to fine, little medium; from 170 to 200 ft, moderately silty; below 200 ft, slightly silty.....	172.0	210.0
Sandstone, moderately silty; sand is very fine to medium; in places few rootlet fragments; below 260 ft, sand is very fine to medium with some coarse.....	210.0	276.0
Silt, very clayey, moderately sandy, pale olive; sand is very fine to fine.....	276.0	280.0
Sandstone, sand is very fine to medium; some rootlets; below 298 ft, slightly silty.....	280.0	306.0
Silt, very clayey, very sandy, pale yellow; sand is very fine to medium.....	306.0	308.0

Sand, slightly silty; sand is very fine to medium; finer texture below 318 ft.....	308.0	334.0
Silt, slightly clayey, moderately sandy, light gray; some interbedded sandstone; sand is very fine to fine.....	334.0	350.0
Sand, slightly silty; sand is very fine to fine, little medium; moderately silty below 356 ft....	350.0	370.0
Silt, very clayey, moderately sandy, pale yellow; sand is very fine to fine.....	370.0	380.0
Sand, very silty; sand is very fine to fine; silt layer from 394 to 398 ft.....	380.0	421.0
Silt, slightly clayey, very sandy, pale olive; sand is very fine to fine, some medium.....	421.0	435.0
Sand, very fine to medium; interbedded silt layers from 435 to 446 ft and from 462 to 466 ft; some reworked fragments.....	435.0	480.0
Sandstone, sand is very fine to medium; lime cemented.....	480.0	500.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to fine; moderately clayey below 514 ft.....	500.0	530.0
Sandstone, moderately silty; sand is very fine to medium; bone fragments below 540 ft.....	530.0	554.0
Silt, very clayey, moderately sandy, pale yellow; sand is very fine to fine.....	554.0	561.0
Sand, moderately silty; sand is very fine to fine; slightly silty from 570 to 577 ft, some volcanic ash.....	561.0	580.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud formation:		
Silt, very sandy, slightly clayey, light brown with pinkish tint.....	580.0	603.0
Sand, moderately silty; sand is very fine to fine, some silt lenses.....	603.0	618.0
Silt, very sandy, moderately clayey, pale brown; sand is very fine to fine.....	618.0	632.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre formation:		
Shale, clayey, yellowish-brown; dark gray below 650 ft.....	632.0	660.0

Test Hole #15-SG-84 (E-log)
(28N-19W-4baab)
Rock County

Location: NE NE NE NW Sec. 4 T. 28 N., R. 19 W., 2,240 feet east and
 56 feet south of the northwest corner.

Ground elevation: 2,461 ft. (t). (Hagan Lake NE, 7.5 min quadrangle)

Depth to water: 9.0 ft. (11-16-84)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to coarse.....	0.0	10.0
Silt, very clayey, moderately sandy, pale brown; sand is very fine to fine.....	10.0	34.0
Sand, very silty; sand is very fine to fine.....	34.0	42.0
Silt, very clayey, moderately sandy, pale brown; sand is very fine to fine.....	42.0	50.0
Sand, very silty; sand is very fine to fine.....	50.0	56.0
Silt, very clayey, moderately sandy, pale brown; sand is very fine to fine.....	56.0	66.0
Sand, slightly silty; sand is very fine to fine...	66.0	74.0
Silt, very clayey, moderately sandy, pale brown; sand is very fine to fine; some shell fragments.	74.0	86.0
Sand, moderately silty; sand is very fine to coarse; less silty below 100 ft.....	86.0	120.0
Sand, gravelly; fine sand to fine gravel with some medium to coarse gravel.....	120.0	180.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, slightly silty; sand is very fine to fine.....	180.0	200.0
Sandstone, moderately silty; sand is very fine to medium; below 230 ft, slightly silty, some rootlet fragments.....	200.0	300.0
Silt, very sandy, slightly clayey, light gray; sand is very fine to fine; some volcanic ash....	300.0	310.0
Sand, slightly silty; sand is very fine to fine...	310.0	313.0
Silt, light gray, moderately clayey.....	313.0	316.0
Sandstone, slightly silty; sand is very fine to medium.....	316.0	350.0
Silt, moderately clayey, moderately sandy, brown; sand is very fine to fine.....	350.0	370.0
Sand, slightly silty; sand is very fine to medium.	370.0	382.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine.....	382.0	390.0
Sand, slightly silty; sand is very fine to fine; from 405 to 412 ft, sand is very fine to medium.	390.0	424.0
Clay, silty, pale olive.....	424.0	426.0
Sand, very fine to medium; moderately silty from 426 to 435 ft.....	426.0	460.0

Sand, slightly silty; sand is very fine to fine; sample missing from 475 to 480 ft.....	460.0	485.0
Silt, very sandy, slightly clayey, light brown; sand is very fine to fine.....	485.0	490.0
Sand, slightly silty, sand is very fine to fine...	490.0	502.0
Silt, moderately clayey, moderately sandy, pale olive; sand is very fine to fine.....	502.0	508.0
Sand, slightly silty; sand is very fine to medium; some interbedded siltstone.....	508.0	624.0
Sand, very fine to coarse, some very coarse; contains rootlets, claystone, and sandstone fragments.....	624.0	640.0
Silt, moderately sandy, slightly clayey, pale yellow; sand is very fine; some silty sandstone.	640.0	720.0
Tertiary System - Eocene Series - White River Group:		
Chadron Formation:		
Sand, fine to coarse; much quartz.....	720.0	722.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Shale, clayey, slightly calcareous, dark gray; iron stain below 725 ft.....	722.0	740.0

Test Hole #16-SG-84 (E-log)
(28N-19W-16cdcd)
Rock County

Location: SE SW SE SW Sec. 16, T. 28 N., R. 19 W., 715 feet east and
 23 feet north of the southwest corner.

Ground elevation: 2,485 ft. (t). (Hagan Lake NE, 7.5 min quadrangle)

Depth to water: 4 ft. (11-20-84)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to coarse.....	0.0	40.0
Silt, moderately clayey, moderately sandy, pale yellow; sand is very fine to fine; very sandy, slightly clayey below 5 ft.....	40.0	64.0
Sand, slightly silty; sand is very fine to medium.	64.0	76.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to fine.....	76.0	84.0
Sand, moderately silty; sand is very fine to medium.....	84.0	100.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to fine.....	100.0	106.0
Sand, slightly silty; sand is very fine to coarse; below 135 ft, moderately silty.....	106.0	144.0
Silt, very sandy, slightly clayey, yellowish-brown; sand is very fine to fine.....	144.0	148.0
Sand, gravelly; fine sand to medium gravel; some coarse gravel from 170 to 175 ft.....	148.0	180.0
Gravel, sandy; medium sand to medium gravel; from 182 to 184 ft, clay layer.....	180.0	185.0
Sand, gravelly; fine sand to medium gravel with a trace of coarse.....	185.0	230.0
Sand, very fine to very coarse; with interbedded silt.....	230.0	235.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, moderately sandy, light brown; sand is very fine to medium; very sandy below 252 ft.....	235.0	262.0
Silt, moderately clayey, moderately sandy, light yellowish-brown; sand is very fine to fine; light brown below 282 ft.....	262.0	300.0
Sandstone, moderately silty; sand is very fine to medium; lime cemented below 324 ft.....	300.0	356.0
Silt, moderately clayey, slightly sandy, light gray; sand is very fine to fine; some volcanic ash.....	356.0	400.0
Sandstone, sand is very fine to fine; in part lime cemented; some volcanic ash; some interbedded silt lenses.....	400.0	438.0

Silt, moderately clayey, moderately sandy, moderately calcareous, light gray; sand is very fine to fine; some volcanic ash.....	438.0	442.0
Sandstone, slightly silty; sand is very fine to fine; in part lime cemented; some volcanic ash..	442.0	450.0
Sand, fine to very coarse, rare fine gravel.....	450.0	468.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to fine; some volcanic ash below 470 ft.....	468.0	480.0
Sandstone, slightly silty; sand is very fine to fine; below 490 ft, some volcanic ash.....	480.0	518.0
Silt, slightly sandy, calcareous in part, pale yellow; sand is very fine.....	518.0	526.0
Sand, silty; sand is very fine to fine; interbedded silt lenses below 540 ft.....	526.0	567.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Silt, slightly clayey, slightly sandy, slightly calcareous; sand is very fine to fine.....	567.0	570.0
Sandstone, silty; sand is very fine to fine; contains volcanic ash.....	570.0	590.0
Silt to siltstone, clayey, slightly sandy, slightly calcareous, light gray; sand is very fine to fine.....	590.0	626.0
Silt, clayey, yellow; trace of shale; some sand and rare gravel grains below 630 ft.....	626.0	635.0
Clay, silty, pale yellow; some shale.....	635.0	640.0
Cretaceous System - Upper Cretaceous Series- Montana Group:		
Pierre Formation:		
Shale, clayey, slightly calcareous, black.....	640.0	645.0
Shale, clayey, slightly calcareous, yellow to black; dark gray, moderately calcareous below 650 ft.....	645.0	660.0

Test Hole #14-SG-84 (E-log)
(28N-19W-34ccdd)
Rock County

Location: SE SE SW SW Sec. 34 T. 28 N., R. 19 W., 1,200 feet east and 79 feet north of the southwest corner.
 Ground elevation: 2,494 ft. (t). (Lake George, 7.5 min quadrangle)
 Depth to water: Unknown. Test hole caved at 6.5 ft. (11-15-84)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to coarse; from 40 to 44 ft, interbedded silt layer; very silty, less coarse sand below 40 ft.....	0.0	70.0
Silt, very sandy to very silty sand, pale yellow; sand is very fine to fine.....	70.0	81.0
Sand, slightly silty; and is very fine to medium..	81.0	104.0
Silt, very sandy, pale yellow; sand is very fine to fine.....	104.0	116.0
Sand, slightly silty; sand is very fine to medium; moderately silty from 122 to 130 ft.....	116.0	140.0
Silt, very sandy, light gray; sand is very fine to fine.....	140.0	156.0
Sand, gravelly; fine sand to fine gravel.....	156.0	170.0
Silt, very sandy, light gray; sand is very fine to fine.....	170.0	178.0
Sand, gravelly; fine sand to fine gravel; below 185 ft, some medium gravel; silt layer from 206 to 208 ft and below 238 ft.....	178.0	240.0
Gravel, sandy, silty; medium sand to medium gravel	240.0	246.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, silty, slightly sandy, light yellowish brown; sand is very fine.....	246.0	260.0
Silt, very sandy, slightly clayey, light brown; sand is very fine to medium.....	260.0	266.0
Clay, very silty, moderately sandy, light brown; sand is very fine to medium.....	266.0	280.0
Sand, moderately silty; sand is very fine to fine.	280.0	296.0
Silt, very sandy, slightly clayey, light reddish-brown; sand is very fine to fine; from 300 to 305 ft, some volcanic ash.....	296.0	309.0
Sand, moderately silty; sand is very fine to fine.	309.0	316.0
Silt, very sandy, slightly clayey, reddish-brown; sand is very fine to fine; from 322 to 324 ft, interbedded sand layer.....	316.0	326.0
Sandstone, very fine to medium; some rootlets, slightly silty below 342 ft; from 350 to 355 ft, some volcanic ash.....	326.0	366.0

Sandstone, slightly silty, sand is very fine to medium; from 410 to 414 ft and 436 to 440 ft, moderately silty; below 425 ft, some lime cemented sandstone.....	366.0	440.0
Sand, very fine to medium; in part lime cemented; contains sandstone and claystone fragments.....	440.0	505.0
Clay, silty, light gray.....	505.0	508.0
Sand, moderately silty; sand is very fine to medium, some claystone.....	508.0	524.0
Sand, very fine to medium.....	524.0	534.0
Sandstone, slightly silty; sand is very fine to fine; some silt lenses.....	534.0	578.0
Sand, moderately silty; sand is very fine to fine.	578.0	582.0
Sand, very fine to medium; contains silty sandstone fragments.....	582.0	608.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud formation:		
Silt, very sandy, light brownish-gray with pink cast; sand is very fine to fine.....	608.0	622.0
Silt, very sandy, light brownish-gray; sand is very fine to fine.....	622.0	626.0
Clay, sandy, light brownish gray; claystone below 635 ft, with some yellow color.....	626.0	640.0
Clay, pale yellow, slightly calcareous; yellow to olive yellow below 655 ft.....	640.0	665.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre formation:		
Shale, clayey, slightly calcareous, black yellow and brownish gray.....	665.0	670.0
Shale, clayey, slightly calcareous, dark olive gray.....	670.0	680.0

Test Hole #5-SH-85 (E-log)
(29N-17W-21cbbb)
Rock County

Location: NW NW NW SW Sec. 21, T. 29 N., R. 17 W., 2,325 feet north
and 307 feet east of the southwest corner.
Ground elevation: 2,319 ft. (t). (Pony Lake, 7.5 min quadrangle)
Depth to water: 3.5 ft. (4-4-85)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty; sand is very fine to medium.	0.0	20.0
Sand, very fine to coarse; little fine gravel.....	20.0	30.0
Clay, moderately sandy, pale olive; sand is very fine.....	30.0	60.0
Sand, gravelly; very fine sand to fine gravel, little medium gravel.....	60.0	70.0
Clay, moderately sandy, olive; sand is very fine to fine.....	70.0	81.0
Sand, gravelly; fine sand to medium gravel, little coarse gravel.....	81.0	130.0
Gravel, sandy; fine sand to medium gravel, little coarse gravel.....	130.0	152.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, moderately clayey, pale olive; sand is very fine to fine, little medium.....	152.0	158.0
Sand, moderately silty; sand is very fine to medium.....	158.0	162.0
Silt, very sandy, moderately clayey, pale yellow; sand is very fine to medium; few rootlets.....	162.0	190.0
Sand, moderately silty; sand is very fine to medium.....	190.0	196.0
Sand, silty to sandy silt; sand is very fine to medium.....	196.0	208.0
Sandstone, slightly silty; sand is very fine to medium; rootlet fragments.....	208.0	274.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to medium.....	274.0	286.0
Sand, very fine to medium; moderately silty from 312 to 315 ft; very silty below 330 ft.....	286.0	332.0
Sand, very fine to medium; some reworked siltstone fragments; interbedded limy layers from 355 to 356 ft and from 368 to 369 ft.....	332.0	393.0
Sand, slightly clayey, very silty; sand is very fine to medium.....	393.0	418.0
Clay, pale olive.....	418.0	424.0
Sand, slightly silty; sand is very fine to medium, some reworked siltstone and sandstone fragments; silt layer from 438 to 440 ft.....	424.0	445.0

Silt, very sandy, moderately clayey, pale yellow; sand is very fine to fine.....	445.0	451.0
Sand, very fine to medium; some reworked sandstone and claystone fragments; slightly silty below 482 ft.....	451.0	538.0
Sand, gravelly; fine sand to fine gravel, little medium gravel; much claystone, siltstone and shale fragments.....	538.0	562.0
Gravel, sandy; coarse sand to medium gravel; principally shale fragments.....	562.0	572.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre formation:		
Shale, clayey, pale olive; gray with some yellow stain below 580 ft.....	572.0	600.0

Test Hole #8-SG-84 (E-log)
(29N-19W-15cccc)
Rock County

Location: SW SW SW SW Sec. 15, T. 29 N., R. 19 W., 103 feet north
 and 55 feet east of the southwest corner.
 Ground elevation: 2,425 ft. (t). (Hagan Lake NE, 7.5 min.
 quadrangle)
 Depth to water: Unknown. Test hole caved at 11 ft. (10-26-84)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, trace of silt; sand is very fine to coarse..	0.0	10.0
Siltstone, moderately clayey, moderately sandy, light brownish-gray; sand is very fine to medium; moderately calcareous from 10 to 20 ft..	10.0	64.0
Sand, moderately silty; sand is very fine to fine with a trace of coarse.....	64.0	97.0
Gravel, sandy; very fine sand to fine gravel; silt lens from 118 to 120 ft.....	97.0	141.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine to fine; very silty below 170 ft.....	141.0	200.0
Sandstone, sand is very fine to medium; some rootlets.....	200.0	240.0
Silt, moderately sandy, moderately clayey, slightly calcareous, pale yellow; sand is very fine to fine; less clay below 285 ft.....	240.0	266.0
Sandstone, slightly silty; sand is very fine to medium; trace of rootlets.....	266.0	450.0
Silt, moderately sandy, slightly clayey, slightly calcareous, pale yellow; sand is very fine to fine.....	450.0	480.0
Sand, very fine to fine; interbedded silt lenses to 502 ft.....	480.0	523.0
Silt, slightly clayey, slightly sandy, pale yellow; sand is very fine.....	523.0	525.0
Sand, slightly silty; sand is very fine to medium, rare coarse to very coarse.....	525.0	574.0
Claystone, slightly sandy, in part ashy, pale yellow; sand is very fine.....	574.0	578.0
Sand, slightly silty; sand is very fine to coarse, trace of very coarse sand to fine gravel.....	578.0	597.0
Silt, moderately clayey, slightly sandy, pale yellow; sand is very fine.....	597.0	614.0
Sand, very fine to medium, trace of coarse to very coarse.....	614.0	624.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, clayey, slightly calcareous, dark olive gray.....	624.0	650.0
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49-HP-79 (E-log)
(29N-19W-23aada)
Rock County

Location: NE SE NE NE Sec. 23, T. 29 N., R. 19 W., approximately
 723 feet south and 19 feet west of the northeast corner.
 Ground elevation: 2,413 ft. (t). (Linke Lake, 7.5 min quadrangle)
 Depth to water: Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium; from 10 to 20 ft and below 30 ft, sand is very fine to coarse.....	0.0	36.0
Silt, clayey, sandy, light gray; sand is very fine to fine.....	36.0	40.0
Sand, silty; sand is very fine to fine; from 48 to 53 ft, silt layers; below 53 ft, sand is very fine to medium.....	40.0	64.0
Sand, silty; sand is very fine to fine; silt layer from 72 to 76 ft.....	64.0	80.0
Sand, silty; sand is very fine to medium; below 85 ft, sand is very fine to coarse.....	80.0	95.0
Sand, gravelly; fine sand to very coarse gravel...	95.0	110.0
Gravel, sandy; medium sand to coarse gravel.....	110.0	115.0
Sand, gravelly; medium sand to very coarse gravel; some silt at 149 ft.....	115.0	151.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, clayey, brown to reddish brown; some very fine to fine sand below 160 ft.....	151.0	165.0
Sand, slightly silty; sand is very fine to fine; sand is very fine to medium below 170 ft.....	165.0	185.0
Sand, fine to coarse; contains iron oxide layer to 190 ft; some rootlets below 190 ft.....	185.0	195.0
Sand, very fine to medium; from 200 to 205 ft, fine to coarse.....	195.0	220.0
Sand, silty; sand is very fine to fine; silt layer 225 to 228 ft.....	220.0	240.0
Sand, silty; sand is fine to medium; below 246 ft, less silt.....	240.0	268.0
Sandstone, silty; sand is very fine to medium, contains interbedded silt layer; sand is very fine to fine below 270 ft.....	268.0	278.0
Siltstone, clayey, sandy, olive yellow; sand is very fine to fine.....	278.0	280.0
Sandstone, sand is fine to medium; silty below 292 ft.....	280.0	304.0
Sand, slightly silty; sand is very fine to medium.	304.0	331.0
Sandstone, silty; sand is very fine to medium; below 348 ft, sand is very silty, slightly clayey.....	331.0	359.0

Sandstone, silty; sand is very fine to medium, some coarse; very silty below 430 ft.....	359.0	440.0
Sandstone, sand is fine to very coarse; below 455 ft, sand is silty and fine to coarse.....	440.0	460.0
Sandstone, silty; sand is fine to coarse; below 485 ft, sand is very fine to medium, some silty areas; some coarse sand below 525 ft.....	460.0	570.0
Sand to sandstone, sand is very fine to medium with some very fine to fine lithic gravel.....	570.0	580.0
Gravel, lithic; very fine to medium, trace coarse to very coarse.....	580.0	590.0

Test Hole #11-SG-84 (E-log)
(30N-17W-8cccc)
Rock County

Location: SW SW SW SW Sec. 8, T. 30 N., R. 17 W., 153 feet north and 39 feet east of the southwest corner.
 Ground elevation: 2,246 ft. (t). (Newport, 7.5 min. quadrangle)
 Depth to water: Unknown. Test hole caved at 4.5 ft. (11-16-84)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty, very fine to medium.....	0.0	30.0
Sand, gravelly; fine sand to medium gravel.....	30.0	44.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine to medium; slightly silty, slightly calcareous; slightly to moderately silty below 96 ft.....	44.0	167.0
Silt, moderately clayey, moderately sandy, light brown; sand is very fine to fine.....	167.0	176.0
Sandstone, slightly silty; sand is very fine to medium; rare rootlets from 260 to 280 ft.....	176.0	312.0
Silt, moderately clayey, moderately sandy, very calcareous, pale brown to pale yellow; sand is very fine to fine.....	312.0	342.0
Silt, very sandy, moderately clayey, slightly calcareous, pale yellow; sand is very fine to fine.....	342.0	360.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Silt, very clayey, very pale olive-gray.....	360.0	365.0
Silt, very clayey, slightly sandy, light reddish brown; sand is very fine to fine; below 375 ft, pale olive.....	365.0	400.0
Silt, very clayey, gray brown.....	400.0	405.0
Sandstone, sand is very fine to very coarse, much lithic fragments.....	405.0	412.0
Clay, gray to pale brown.....	412.0	420.0
Silt to siltstone, sandy, yellow brown to gray; sand is very fine to fine; yellow to gray below 440 ft.....	420.0	462.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, black.....	462.0	470.0

Test Hole #6-SH-85 (No e-log)
(30N-17W-29dcab)
Rock County

Location: NW NE SW SE Sec. 29, T. 30 N., R. 17 W., 1,085 feet north
and 1,700 feet west of the southeast corner.
Ground elevation: 2,258 ft. (Newport, 7.5 min. quadrangle)
Depth to water: Flowing. (4-3-85)

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, moderately silty; sand is very fine to medium, trace of coarse.....	0.0	5.0
Sand, slightly silty; sand is very fine to very coarse.....	5.0	10.0
Sand, slightly silty; sand is very fine to fine, little medium.....	10.0	15.0
Silt, very sandy, slightly clayey, black; sand is very fine to medium.....	15.0	25.0
Sand, gravelly; fine sand to fine gravel; below 55 ft, trace of medium gravel.....	25.0	70.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine to medium; ashey; some rootlets.....	70.0	125.0
Silt, very sandy, slightly clayey, moderately calcareous, white; sand is very fine to fine, little medium.....	125.0	145.0
Sandstone, slightly silty; sand is very fine to fine, trace of medium; greenish gray.....	145.0	170.0
Silt, slightly clayey, slightly sandy, pale yellow; sand is very fine to fine, trace of medium.....	170.0	175.0
Sand, very silty; sand is very fine to fine, trace of medium; below 175 ft, slightly silty, some rootlets.....	175.0	230.0
Sand, slightly silty; sand is medium, some very fine to fine.....	230.0	248.0
Clay, slightly silty, slightly sandy, pale yellow; sand is very fine.....	248.0	275.0
Sand, very silty to clayey; sand is very fine to medium.....	275.0	300.0
Sand, very fine to medium; moderately silty, from 340 to 345 ft.....	300.0	345.0
Sand, very fine to very coarse; some gravel below 355 ft.....	345.0	398.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, slightly calcareous, light yellow brown and light olive browns, some black.....	398.0	400.0

48-HP-79 (E-log)
(30N-18W-6bccb)
Rock County

Location: NW SW SW NW Sec. 6, T. 30 N., R. 18 W., approximately
 2,150 feet south and 15 feet east of the northwest corner.
 Ground elevation: 2,291 ft. (t). (Newport SW, 7.5 min quadrangle)
 Depth to water: Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to coarse; below 10 ft, less coarse sand.....	0.0	15.0
Sand, gravelly; fine sand to medium gravel.....	15.0	36.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, silty, sandy, yellow; sand is very fine to fine.....	36.0	46.0
Sand, silty; sand is very fine to fine; very silty to clayey below 68 ft.....	46.0	74.0
Sand, silty; sand is very fine to fine; sand is very fine to medium, below 80 ft; moderately silty from 106 to 114 ft.....	74.0	146.0
Sand to sandstone; in part silty; sand is very fine to fine, some medium; clay layer below 156 ft.....	146.0	160.0
Sand, very fine to medium; in part slightly silty.	160.0	216.0
Silt, clayey, sandy, very pale brown; sand is very fine to fine.....	216.0	220.0
Sand, very fine to fine; from 234 to 235 ft, some gravel; below 245 ft, sand is very fine to medium, some coarse; below 260 ft, some chert and bentonitic clay fragments.....	220.0	264.0
Sand, very fine to medium.....	264.0	282.0
Clay, silty, sandy, dark brownish gray; sand is very fine to fine, contains few coarse sand to very fine gravel grains.....	282.0	292.0
Clay, weathered shale fragments, white to grayish brown.....	292.0	300.0
Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, grayish brown to gray.....	300.0	320.0