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Holt County Test-Hole Logs: Nebraska Water Survey Test-Hole Report No. 45

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HOLT COUNTY
Test-Hole Logs

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Nebraska Water Survey
Test-Hole Report No. 45

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

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Revised October 2003

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Publication and price lists are furnished upon request.

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ACKNOWLEDGMENTS

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INTRODUCTION

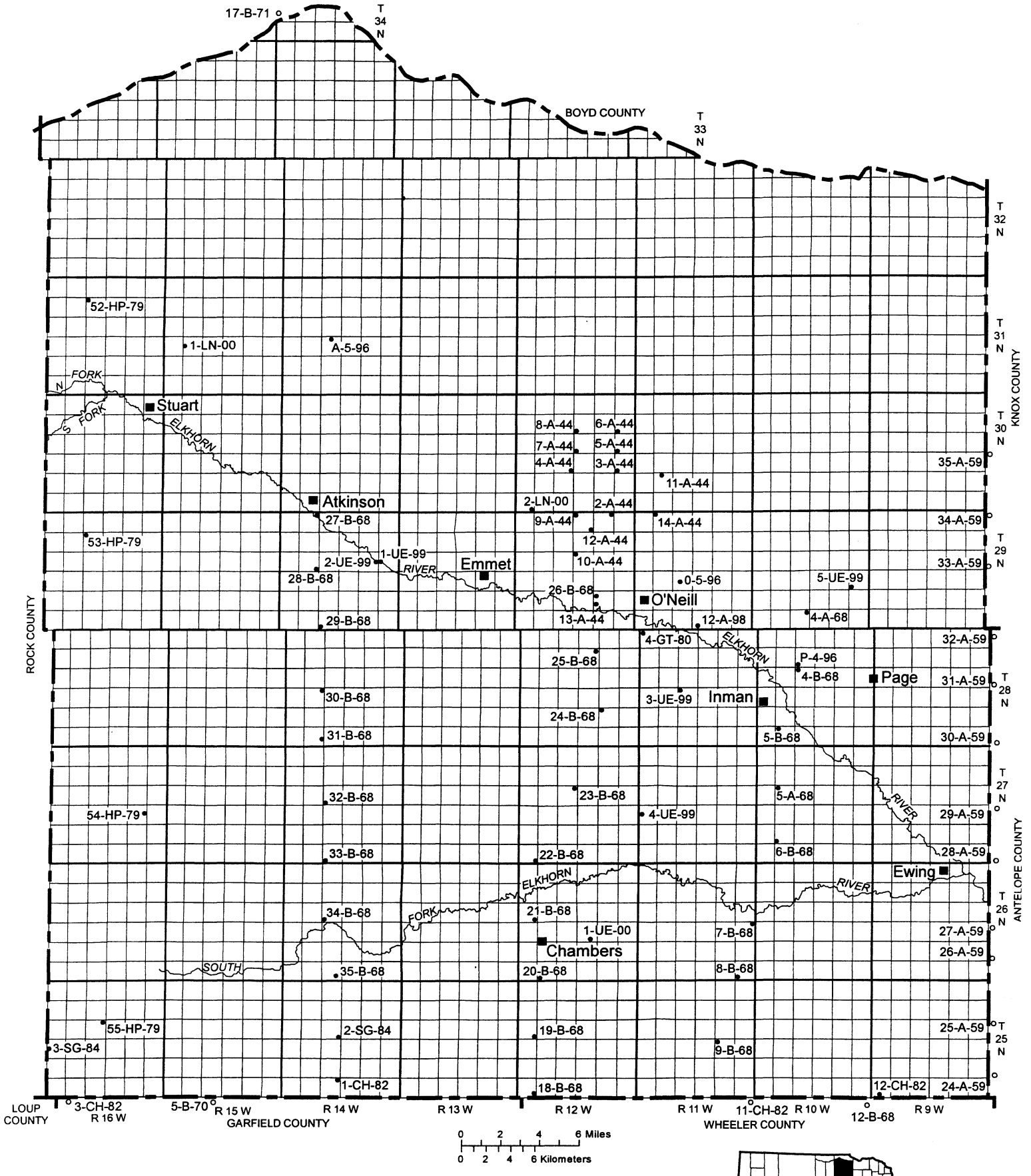
In 1930, the Conservation and Survey Division of the University of Nebraska and the U.S. Geological Survey began a program of cooperative groundwater studies in Nebraska. Since then test drilling by use of rotary drilling equipment has been an integral part of that program. This report contains logs of all the test holes drilled in Holt County, Nebraska, 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 (see figure 1) shows the location of all test holes drilled in Holt County, Nebraska, from 1944 to 2000.

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. Beginning in September 1951, the test holes have been logged electrically (see sample Holt County e-log for #54-HP-79) in figure 2). All samples are processed and kept on open file in the offices of Conservation and Survey Division, 113 Nebraska Hall, University of Nebraska-Lincoln, Lincoln, Nebraska 68588-0517, 402-472-3471.

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.

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 = leveling, t = estimated from topographic map.



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

Fig. 2 Test-hole location map of Holt County

Figure 2. Holt County sample geophysical log (54-HP-79)

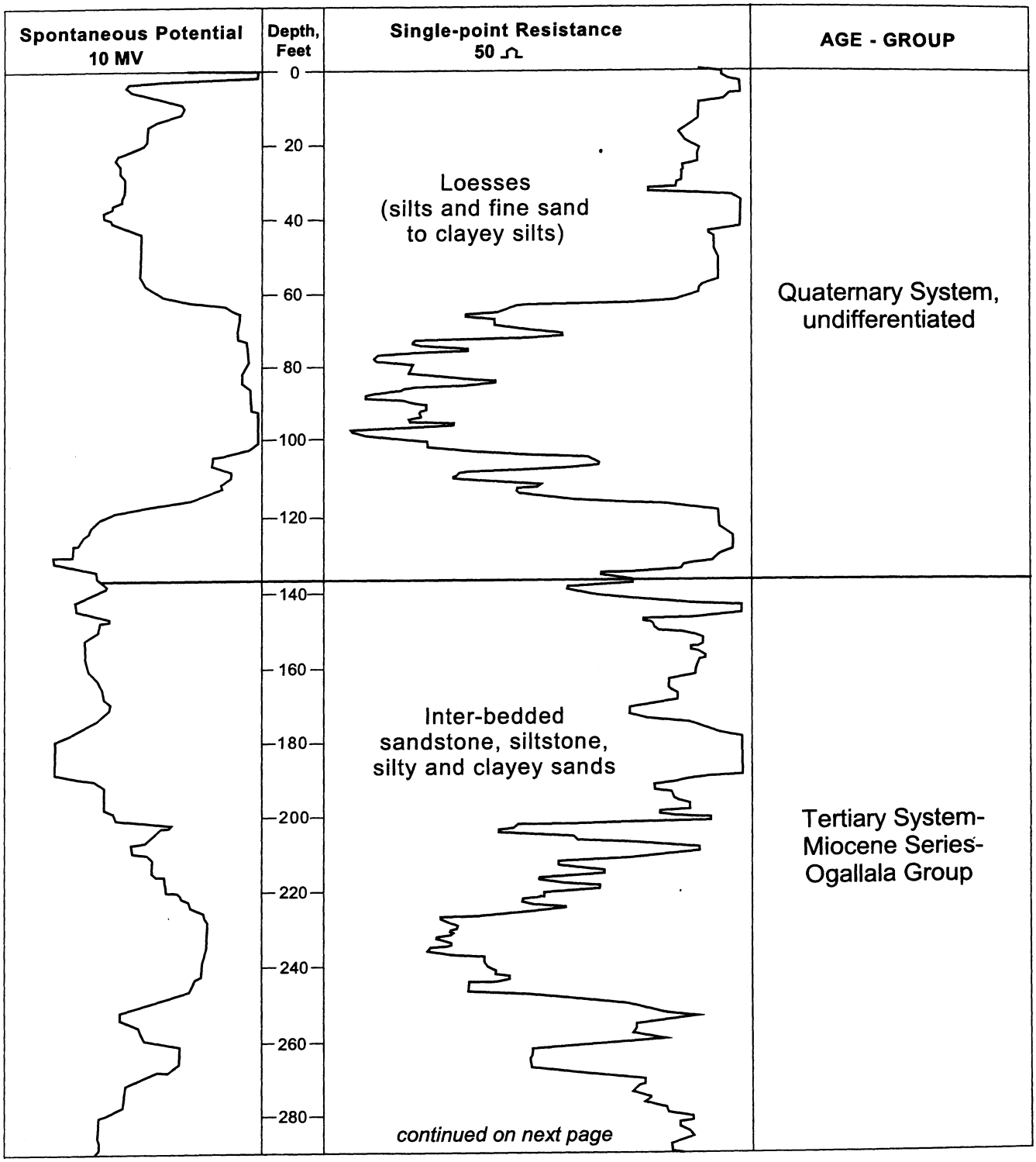
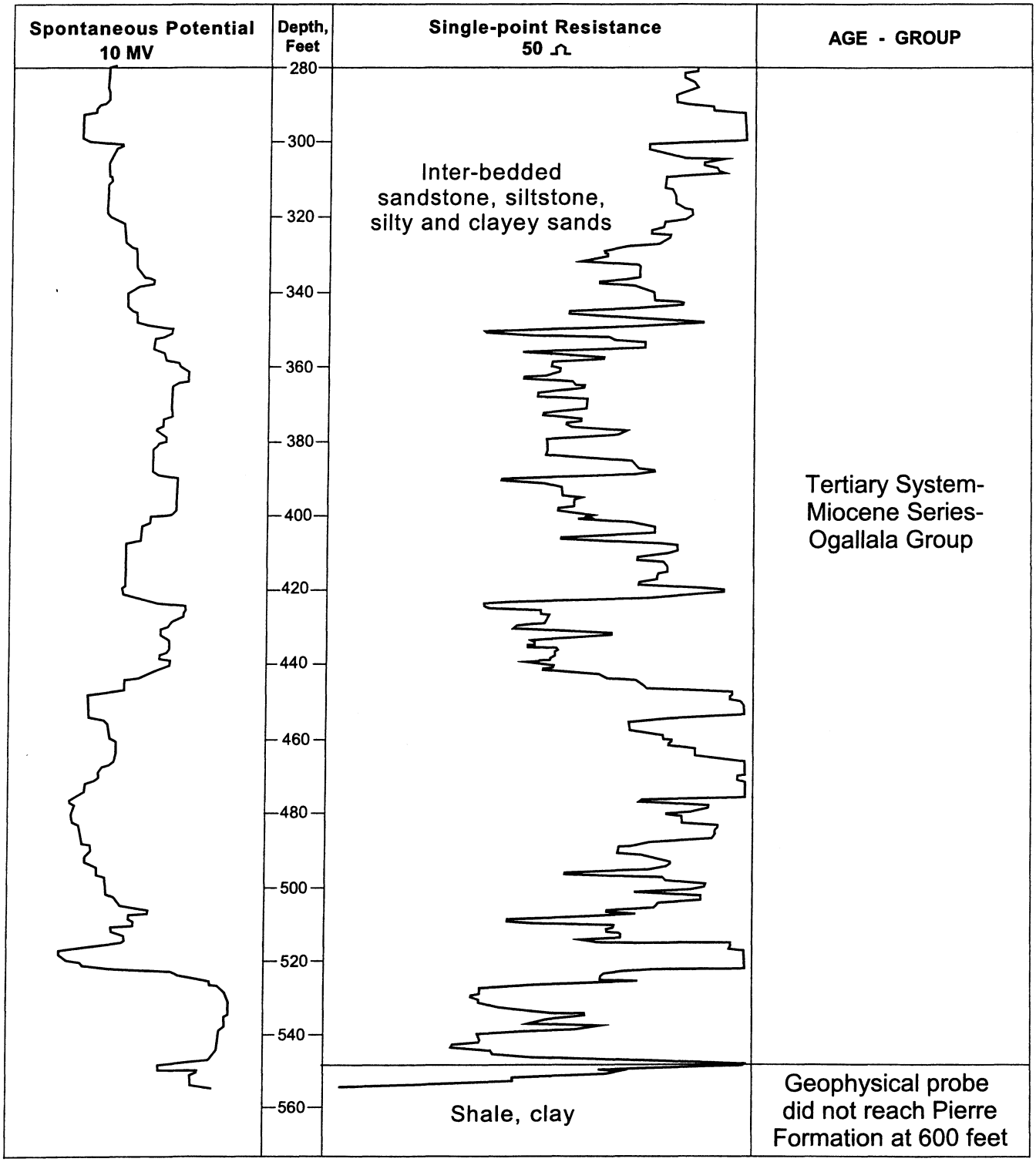


Figure 2. Holt County sample geophysical log (54-HP-79)



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, #41-79), 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. 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 section. No number is shown unless more than one test hole is within the given quarter-quarter section.

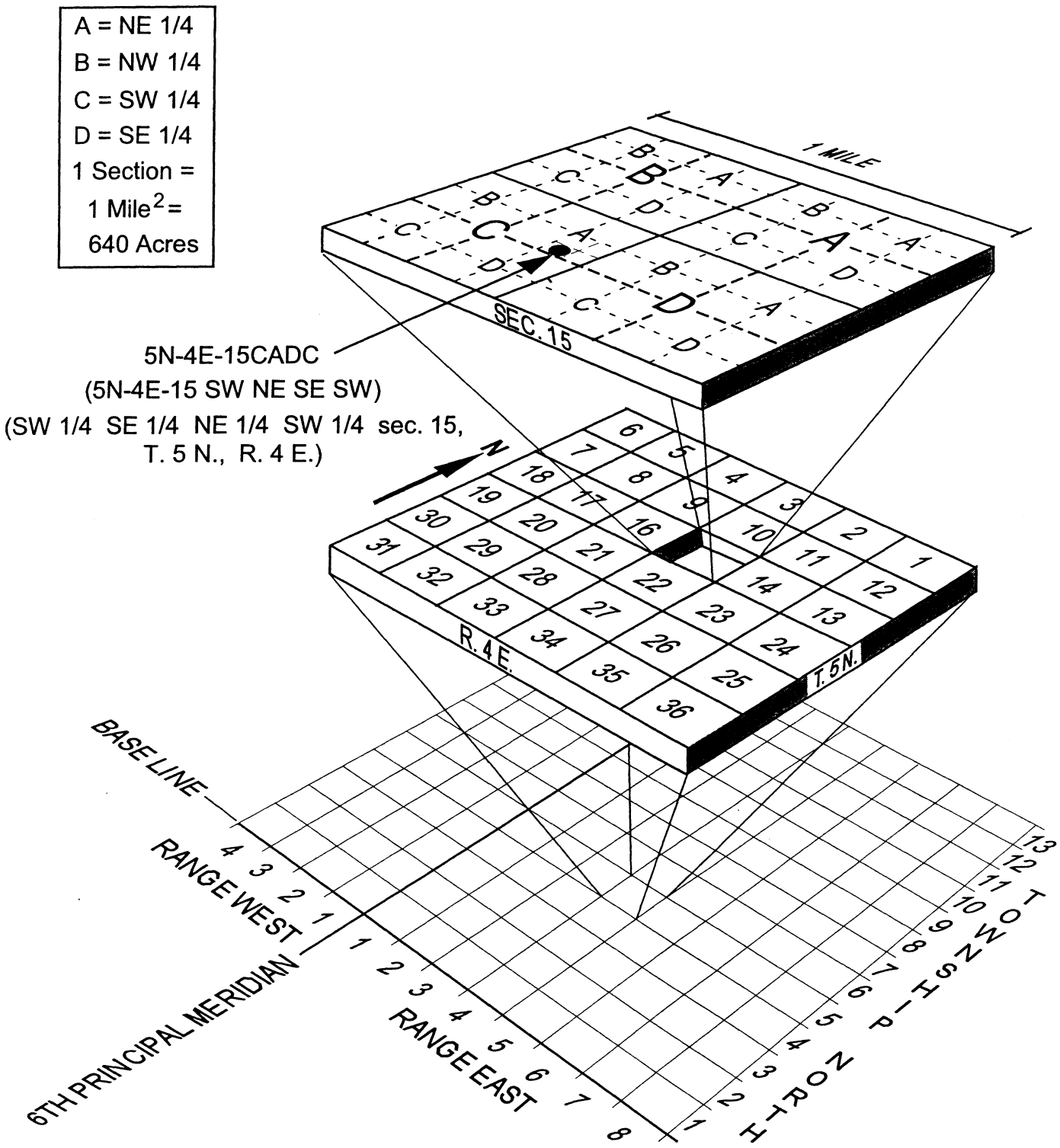


Fig. 3. System for identifying test-hole according to its location.

SELECTED REFERENCES

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

Some Publications that are Guides to Earth Resources of Holt County

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*, Report of Investigations No. 9, Conservation and Survey Division, University of Nebraska-Lincoln, 1994.

Olafsen-Lackey, S., Conservation and Survey Division, Shapiro, C. and Kranz, W., Cooperative Extension Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, *Agricultural Management Practices and the Groundwater System of Northern Holt County, Nebraska, with a Focus on the Holt County Groundwater Education Project*, 2002 (Conservation and Survey Division Educational Circular 15, Extension Circular EC02-799-X).

Shapiro, C., Kranz, W., Olafsen-Lackey, S. and Kulm, R., *Holt County Groundwater Education Project*, a cooperative program of the University of Nebraska-Lincoln (UNL) Cooperative Extension, UNL Conservation and Survey Division, U.S. Department of Agriculture Natural Resources Conservation Service, Lower Niobrara Natural Resources District and the Upper Elkhorn Natural Resources District, April, 2001 (MP-77).

U. S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Holt County*, in cooperation with the Conservation and Survey Division, University of Nebraska-Lincoln, 1983.

Holt County
Test-Hole Table of Contents

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

Holt County
Test-Hole Table of Contents

Arranged by year drilled, test-hole number.

1944

1968

1979

1980

1982

1984

1996

1998

1999

2000

Test Hole #12-CH-82
(25N-9W-31cdcd)
Holt County

Location: SE SW SE SW Sec. 31, T. 25 N., R. 9 W., approximately 1,750 feet east and 123 feet north of the southwest corner.
Ground elevation: 1,999 ft (t). (DeLoit SW, 7.5 min. quadrangle)
Depth to water: 17.0 ft (10-29-82)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium	0.0	6.0
Silt, slightly sandy, light olive gray, moderately calcareous; sand is very fine to medium	6.0	35.0
Silt, slightly clayey, light olive brown	35.0	40.0
Clay, silty, gray	40.0	45.0
Sand and gravel, fine sand to very fine gravel; some fine gravel from 50 to 55 ft; below 55 ft some medium gravel	45.0	90.0
Sand and gravel, fine sand to very fine gravel	90.0	96.0
Silt, clayey, olive gray and light olive brown	96.0	100.0
Silt, moderately clayey, light yellow brown, slightly calcareous	100.0	120.0
Sand and gravel, fine sand to fine gravel, some medium gravel; from 168 to 170 ft, silt	120.0	174.0
Sand and gravel, fine sand to fine gravel; silty below 180 ft	174.0	182.0
Clay, silty, light yellow brown	182.0	196.0
Sand and gravel, fine sand to very fine gravel	196.0	208.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone and sand, in part silty; sand is very fine to fine	208.0	232.0
Silt, very sandy to sand; sand is very fine to medium	232.0	239.0
Sand and sandstone; sand is very fine; some interbedded sandy silt	239.0	260.0
Sandstone and sand, in part silty; sand is very fine to medium	260.0	313.0
Sand, very silty to silt, very sandy; sand is very fine to medium	313.0	320.0

Silt, clayey, sandy, pale olive; sand is very fine to fine; some white calcareous fragments	320.0	340.0
Sandstone, some silt; sand is very fine to fine	340.0	349.0
Silt, very sandy, slightly clayey; sand is very fine to fine	349.0	362.0
Sand, slightly silty; sand is very fine to medium; below 365 ft, sand is very fine to coarse	362.0	370.0
Sand, very fine to medium	370.0	375.0
Sand, very fine to coarse; from 385 to 390, sand is very fine to medium; below 400 ft silty	375.0	408.0
Silt, clayey, sandy, pale olive; sand is very fine to medium	408.0	422.0
Sandstone, silty; sand is very fine to fine	422.0	448.0
Tertiary System - Oligocene Series - White River Group:		
Chadron Formation(?):		
Silt, clayey, sandy, some interbedded sandstone, pale brown; sand is very fine to fine little medium to coarse; from 500 to 525 ft. some volcanic ash	448.0	532.0
Sand, very fine to medium; some silt	532.0	552.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, black, slightly calcareous	552.0	559.0

Test Hole #9-B-68
(25N-11W-23bbbb)
Holt County

Location: NW NW NW NW Sec. 23, T. 25 N., R. 11 W., approximately 74 feet south and 27 feet east of northwest corner.
Ground elevation: 2,028 ft. (t).(Goose Lake NE, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 10 ft. (7-3-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, slightly silty; very fine to fine, some medium; below 5 ft, less silty.....	0.0	10.0
No sample.....	10.0	20.0
Silt, slightly clayey, sandy, pale olive; sand is very fine to fine; from 25 to 34 ft, in part slightly more clayey; from 30 to 34 ft, trace medium sand; below 34 ft, contains trace of medium sand.....	20.0	40.0
Silt, slightly clayey, sandy, light gray; sand is very fine to fine.....	40.0	41.8
Silt, slightly clayey, sandy, light yellowish brown; sand is very fine to fine.....	41.8	45.0
Silt, slightly clayey, sandy, light yellowish brown; sand is very fine to fine; contains limy areas; volcanic ash.....	45.0	61.0
Marl, silty, clayey, light gray.....	61.0	63.0
Silt, slightly clayey, sandy, yellowish brown; sand is very fine to fine.....	63.0	65.0
Clay, slightly silty, sandy, light yellowish brown; sand is very fine to fine; contains some sandstone; below 70 ft marly.....	65.0	94.0
Sand, gravelly; coarse sand to fine gravel....	94.0	95.0
Clay, silty, sandy, pale olive; sand is very fine to medium, trace of fine gravel.....	95.0	100.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine to medium; rootlets; trace of fine gravel to 110 ft; below 110 ft, trace coarse sand.....	100.0	138.0
Silt to silty clay, sandy, pale yellow; sand is very fine to fine, trace medium.....	138.0	140.0
Sandstone, silty; sand is very fine to fine; contains interbedded silty clay.....	140.0	163.0
Silt, sandy, pale yellow; sand is very fine to fine; contains some sandstone.....	163.0	170.0

Sandstone, sand is very fine to fine, trace medium; contains interbedded silt; from 210 to 215 ft, some volcanic ash; below 235 ft some rootlets.....	170.0	241.0
Silt, slightly clayey, sandy, pale olive; sand is very fine to fine, trace medium.....	241.0	245.0
Sandstone, silty; sand is very fine to fine; some rootlets from 245 to 250 ft; below 250 ft some interbedded silt.....	245.0	255.0
Silt, slightly clayey, sandy; sand is very fine to fine; some interbedded sandstone lenses; below 265 ft, some marly areas.....	255.0	280.0
Sandstone, silty, clayey; sand is very fine to fine.....	280.0	284.0
Sand, very fine, some medium.....	284.0	292.0
Sandstone, marly; sand is very fine to fine...	292.0	305.0
Silt, marly, sandy, pale yellow; sand is very fine to fine.....	305.0	320.0
Sandstone, sand is very fine to fine; some marl.....	320.0	323.0
Silt, clayey, sandy, pale yellow; sand is very fine to fine, trace medium; contains some interbedded sandstone layers.....	323.0	350.0
Silt, sandy, in part slightly clayey, light gray; sand is fine to medium; below 355 ft, pale yellow.....	350.0	360.0
Sand, very fine to coarse; from 365 to 370 ft, sand is very fine to very coarse; below 380 ft, sand is very fine to medium, trace coarse; 387 ft, in part silty.....	360.0	395.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Silt, slightly clayey, dark olive; interbedded sandstone; sand is very fine to fine.....	395.0	410.0
Silt, sandy, in part moderately clayey to clay, brown; sand is very fine to fine.....	410.0	440.0
Clay, silty, slightly sandy, pale brown; sand is very fine to fine; below 460 ft mottled yellow to brownish gray; some marl.....	440.0	461.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey.....	461.0	475.0

Test Hole #19-B-68
(25N-12W-18dddd)
Holt County

Location: SE SE SE SE Sec. 18, T. 25 N., R 12 W., approximately 14 feet north and 164 feet west of the southeast corner.
Ground elevation: 2,148 ft (t). (Chambers East, 7.5 min. quadrangle)
Depth to water: Unknown: Test hole caved at 3.10 ft (7-3-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very silty; sand is very fine to fine, trace of medium; from 1 to 7 ft, contains little medium sand and trace of coarse	0.0	13.0
Silt, very sandy, slightly clayey, greenish gray; sand is very fine to fine; below 15 ft gray; below 25 ft light brownish gray...	13.0	35.0
Silt, moderately sandy, slightly clayey, light gray; sand is very fine; from 45 to 46 ft, grayish brown; below 48 ft pale brown; below 56.8 ft marl.....	35.0	57.0
Silt, moderately sandy, slightly clayey, pale brown; sand is very fine; at 61 ft limestone lens; below 70 ft, sandstone lens.....	57.0	70.4
Silt, very sandy, slightly clayey, moderately calcareous, pale yellow; sand is very fine to fine.....	70.4	75.0
Sandstone, silty; sand is very fine to fine with a trace of medium.....	75.0	80.0
Silt, moderately, sandy, slightly clayey, moderately calcareous, light gray; sand is very fine to fine; contains marl; below 85 ft moderately clayey.....	80.0	104.0
Clay, silty, moderately sandy, slightly calcareous, light olive gray; sand is very fine to fine; some yellow stain; some marl.	104.0	114.0
Silt, very clayey, very sandy, grayish brown; sand is very fine to fine, few medium to coarse grains to 115 ft.....	114.0	117.0
Silt, very sandy, moderately clayey, light gray; sand is very fine to fine; below 119 ft, few coarse to very coarse grains...	117.0	120.0
Clay, silty, moderately sandy, light olive gray; sand is very fine to fine, with trace of medium.....	120.0	121.8

Silt, moderately clayey, moderately sandy, light gray; sand is very fine to fine; some interbedded sandstone below 125 ft.....	121.8	127.5
Sand, silty; sand is very fine to fine.....	127.5	129.0
Clay, silty, moderately sandy, pale yellow; sand is very fine to fine.....	129.0	145.0
Sand, slightly gravelly; fine sand to fine gravel.....	145.0	150.0
Sand, gravelly; fine sand to fine gravel with some medium and trace of coarse gravel; some thin silt lenses.....	150.0	170.0
Sand, gravelly; fine sand to medium gravel, some coarse gravel; below 185 ft, some silt lenses.....	170.0	200.0
Sand, very fine to very coarse, little fine gravel; below 220 ft, some silt lenses.....	200.0	228.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine to medium; contains thin silt lenses; below 238 ft, clayey.....	228.0	240.0
Sand, very silty; sand is very fine to fine...	240.0	248.0
Sandstone, sand is very fine to fine; below 250 ft, silty.....	248.0	255.0
Siltstone and silty clay, pale yellow; contains interbedded silt lenses; sand is very fine to fine.....	255.0	275.0
Sandstone, sand is very fine to fine; from 275 to 280 ft and from 285 to 290 ft and below 300 ft, some thin interbedded silt lenses..	275.0	305.0
Silt, very sandy, pale yellow; moderately calcareous to 310 ft; sand is very fine to fine; contains thin interbedded sandstone lenses.....	305.0	325.0
Sandstone, sand is very fine to medium; contains thin silt lenses.....	325.0	330.0
Silt, very clayey, very sandy, pale yellow, moderately calcareous; contains thin bentonite and sandstone lenses; below 340 ft, slightly calcareous.....	330.0	345.0
Sand, silty; sand is very fine to fine; contains silt lenses.....	345.0	360.0
Sandstone to sand, very fine to medium; contains some silt.....	360.0	380.0
Silt, very sandy, pale yellow; sand is very fine to fine; below 390 ft, interbedded sandstone lenses.....	380.0	397.0
Sand, very fine to fine; contains interbedded silt lenses.....	397.0	410.0

Silt, very sandy, slightly clayey, pale yellow; contains medium sand to fine gravel	410.0	420.0
Silt, clayey, pale yellow; contains interbedded sandstone lenses	420.0	425.0
Sandstone, sand is very fine to coarse; contains interbedded silt lenses	425.0	438.0
Silt, very sandy, pale yellow; sand is very fine to fine	438.0	445.0
Silt, very clayey, sandy, slightly calcareous to 450 ft, pale yellow; below 450 ft, some coarse sand to fine gravel	445.0	460.0
Sand, silty, clayey; sand is very fine to coarse	460.0	475.0
Silt, very sandy, light gray; sand is very fine to fine, little medium to coarse sand	475.0	480.0
Sandstone, sand is very fine to medium, some gravel grains	480.0	490.0
Sand, fine to very coarse; contains interbedded sandstone and silt lenses	490.0	495.0
Clay, silty, light gray; contains much fine sand and fine gravel; below 505 ft, interbedded sandstone lenses	495.0	515.0
Sand, very fine to coarse; interbedded sandstone and silt lenses	515.0	520.0
Sandstone, sand is very fine to medium; contains interbedded silt and gravel lenses	520.0	530.0
Sand, very fine to coarse; contains interbedded silt and sandstone lenses; from 540 to 545 ft, clay layer, light gray	530.0	565.0
Marl, white	565.0	566.0
Tertiary System - Oligocene Series - White River Group:		
Chadron Formation(?):		
Clay, slightly silty; moderately calcareous, in part slightly calcareous; contains claystone and bentonite lenses	566.0	590.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay shale, brownish yellow; shale black	590.0	600.0

Test Hole #18-B-68
(25N-12W-31dddd)
Holt County

Location: SE SE SE SE Sec. 31, T. 25 N., R. 12 W., approximately 136 feet north and 11 feet west of the southeast corner.
Ground elevation: 2,160 ft (t). (Goose Lake SW, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 4.80 ft (7-3-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
No sample	0.0	2.0
Sand, very silty, slightly clayey; sand is very fine to fine, some medium	2.0	8.0
Silt moderately clayey, moderately sandy, light gray; sand is very fine to fine	8.0	14.0
Sand, slightly silty; sand is very fine to fine, some medium sand; very silty below 29 ft	14.0	36.0
Silt, slightly clayey, moderately sandy, light brown to light gray; very sandy from 41 to 48 ft and from 55 to 59 ft	36.0	70.0
Sand, silty; sand is very fine to fine; more silt below 83 ft	70.0	92.0
Silt, clayey, sandy, pale brown; sand is very fine to fine	92.0	104.0
Clay, very sandy, silty, marly, pinkish gray; sand is very fine to fine; light gray from 105 to 107 ft	104.0	111.0
Clay, silty, sandy, light brown; sand is very fine to fine, little medium	111.0	120.0
Gravel, sandy; fine sand to medium gravel	120.0	141.0
Silt, very sandy, light gray; sand is very fine to coarse	141.0	149.0
Gravel, sandy; fine sand to medium gravel	149.0	165.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty; sand is very fine to fine; very silty and slightly clayey below 188 ft	165.0	196.0
Clay, very silty, sandy, pale yellow; sand is very fine to fine; very silty below 210 feet	196.0	222.0
Sandstone, silty; sand is very fine to fine; interbedded clay from 233 to 235 ft and from 240 to 242 ft	222.0	251.0
Silt, very sandy, slightly clayey, gray; sand is very fine to fine	251.0	259.0

Sand, very fine to medium, some coarse sand to very fine gravel	259.0	268.0
Clay, silty, sandy, pale yellow; sand is very fine to medium	268.0	272.0
Silt, very sandy, pale olive; sand is very fine to fine	272.0	289.0
Sand, very fine to coarse	289.0	294.0
Silt, very sandy, pale olive; sand is very fine to fine	294.0	302.0
Sandstone, silty; sand is very fine to fine; contains clayey layers	302.0	320.0
Silt, very sandy, pale olive; sand is very fine to fine	320.0	336.0
Sandstone, sand is very fine to fine, some medium to coarse	336.0	355.0
Silt, clayey, sandy, pale yellow to pale olive; very sandy and clayey below 362 ft	355.0	373.0
Sand, very fine to medium; some coarse sand to fine gravel	373.0	411.0
Silt, sandy, clayey, pale olive; sandy silt and sand from 424 to 432 ft	411.0	449.0
Sand, gravelly; fine sand to fine gravel	449.0	464.0
Silty sand to sandy silt; pale yellow to pale olive	464.0	515.0
Silt, clayey, sandy, light gray	515.0	532.0
Sand, very silty; sand is very fine to fine	532.0	630.0
Sand, very fine to very coarse	630.0	640.0
Sand, very fine to very coarse, little fine gravel; silt lenses; much claystone, some clear quartz	640.0	650.0
Tertiary System - Oligocene Series - White River Group:		
Chadron Formation:		
Clay, silty, sandy, light gray; sand is very fine to medium	650.0	662.0
Sand, very fine to very coarse; contains some very fine to fine gravel	662.0	668.0
Silt, very clayey, sandy, light gray	668.0	680.0
Sand, fine to very coarse; contains very fine to fine gravel; contains much clear quartz	680.0	702.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, black	702.0	710.0

Test Hole #2-SG-84
(25N-14W-16dddd)
Holt County

Location: SE SE SE SE Sec. 16, T. 25 N., R. 14 W., approximately 130 feet north and 10 feet west of the southeast corner.
Ground elevation: 2,287 ft (t). (Amelia, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 3.8 ft. (10-11-84)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine.....	0.0	5.0
Sand, very fine to medium, contains some coarse grains; below 15 ft some dark gray organic material.....	5.0	21.0
Silt, moderately sandy, dark olive gray; sand is very fine.....	21.0	22.0
Sand, very fine to fine; from 25 to 30 ft, trace of medium; below 40 ft, sand is very fine to medium with some coarse grains.....	22.0	60.0
Silt, very sandy, gray; below 65 ft greenish gray with olive gray; sand is very fine, trace medium to coarse; from 70 to 80 ft, interbedded sand lenses; below 80 ft moderately sandy; below 95 ft, some brown gray.....	60.0	110.0
Silt, moderately sandy, light brownish gray; sand is very fine to fine; from 120 to 125 ft, yellowish brown; below 125 ft, pale brown, with some greenish gray below 130 ft; below 145 ft, slightly calcareous.....	110.0	150.0
Silt, moderately clayey, slightly sandy, light yellowish brown; sand is very fine; below 155 ft, slightly calcareous.....	150.0	170.0
Silt, moderately clayey, moderately sandy, light olive gray; sand is very fine to coarse.....	170.0	175.0
Gravel, sandy; very fine sand to fine gravel with rare medium gravel; from 200 to 210 ft, some silty areas.....	175.0	223.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, slightly sandy, light brownish gray; sand is very fine to very coarse.....	223.0	235.0
Silt, slightly clayey, light gray; little very fine sand; contains volcanic ash.....	235.0	245.0

Silt, slightly clayey, slightly sandy, light brownish gray; sand is very fine.....	245.0	275.0
Sand, very fine; trace silt.....	275.0	285.0
Sand, very fine to coarse.....	285.0	290.0
Sandstone, moderately silty; sand is very fine to fine with trace of medium to coarse.....	290.0	295.0
Sandstone, slightly silty; sand is very fine to fine; below 300 ft, some rootlets.....	295.0	305.0
Sandstone, slightly silty; sand is very fine to fine.....	305.0	364.0
Silt, sandy, slightly calcareous, light gray to pale yellow; sand is very fine to fine..	364.0	394.0
Sand, slightly silty; sand is very fine to fine; some interbedded silt layers; below 466 ft, moderately silty.....	394.0	524.0
Sand, in part sandstone; slightly silty; sand is very fine to fine.....	524.0	598.0
Sand, in part sandstone; slightly silty; sand is very fine to medium.....	598.0	606.0
Silt, clayey, sandy, light brownish gray; sand is very fine to fine.....	606.0	612.0
Sand, slightly silty; sand is very fine to medium, trace of coarse; below 615 ft, trace of coarse to very coarse.....	612.0	618.0
Silt, very sandy, light brownish gray; sand is very fine to medium.....	618.0	628.0
Sand, slightly silty; sand is very fine to medium.....	628.0	652.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation:		
Silt, moderately clayey, moderately sandy, light brownish gray; sand is very fine to fine.....	652.0	675.0
Silt, very clayey brown; some very fine sand..	675.0	700.0
Tertiary System - Oligocene Series - White River Group:		
Chadron Formation:		
Sand, very fine to fine, little medium; principally quartz; clear, rounded, and elongated.....	700.0	710.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, moderately calcareous, speckled dark gray.....	710.0	720.0

Test Hole #1-CH-82
(25N-14W-33aaaa)
Holt County

Location: NE NE NE NE Sec. 33, T. 25N., R. 14 W., approximately 110 feet south and 10 feet west of the northeast corner.
Ground elevation: 2,278 ft (t). (Chain Lake, 7.5 min quadrangle)
Depth to water: Unknown. Test hole caved at 5 ft (10-29-82)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine.....	0.0	40.0
Silt, slightly clayey, moderately sandy, slightly calcareous, pale brown to grayish brown; sand is very fine to fine.....	40.0	65.0
Sand, slightly silty; sand is very fine to fine.....	65.0	74.0
Silt, moderately sandy, light grayish brown; sand is very fine to fine.....	74.0	78.0
Sand, slightly silty; sand is very fine to fine.....	78.0	98.0
Silt, moderately clay, slightly to very sandy, light gray to pale olive; pale brown to light yellowish brown, moderately calcareous from 115 to 147 ft; light brownish gray to light yellowish brown below 147 ft.	98.0	160.0
Sand and gravel, medium sand to medium gravel; contains interbedded silts; principally gravel from 168 to 176 ft and below 184 ft.	160.0	189.0
Gravel, sandy, medium sand to medium gravel; contains some coarse gravel from 189 to to 205 ft.....	189.0	234.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately sandy, very pale brown to light yellowish brown; sand is very fine to fine.....	234.0	270.0
Silt, moderately sandy; pale olive; sand is very fine to fine; white below 288 ft.....	270.0	305.0
Silt, moderately sandy, pale olive; pale olive and white below 319 ft, sand is very fine to fine.....	305.0	344.0
Sand, slightly silty; sand is very fine to fine.....	344.0	359.0
Sandstone, sand is very fine to fine.....	359.0	416.0
Silt, moderately clayey, white, slightly calcareous; some very fine to fine sand....	416.0	420.0

Sand, slightly silty; sand is very fine to fine; some medium to very coarse from 430 to 452 ft; interbedded silt from 428 to 430 ft.....	420.0	458.0
Sandstone, slightly silty; sand is very fine to fine; some medium sand and siltstone....	458.0	462.0
Sand, very fine to medium; some siltstone to 496; very fine to fine, moderately silty below 496 ft.....	462.0	507.0
Siltstone, moderately sandy, pale yellow to olive; sand is very fine to fine.....	507.0	586.0
Sand, silty; sand is very fine to fine; very fine to medium, some coarse below 620 ft...	586.0	644.0
Silt, sandy, pale olive; sand is very fine to fine; moderately sandy below 650 ft.....	644.0	666.0
Sand, very fine to medium, some sandstone and siltstone.....	666.0	711.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey.....	711.0	720.0

Test Hole #55-HP-79
(25N-16W-16aaaa)
Holt County

Location: NE NE NE NE Sec. 16. T. 25 N., R. 16 W., estimated 100 feet west and 10 feet south of the northeast corner.
Ground elevation: 2,400 ft (t). (Bruner Lake, 7.5 min. quadrangle)
Depth to water: Not measured. Electric log estimate 36 ft

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine; below 5 ft, sand is very fine to medium; below 25 ft, interbedded dark gray sandy clayey layers.....	0.0	30.0
Sand, very fine to fine; clay layer at 39 ft; below 40 ft slightly silty.....	30.0	65.0
No Sample.....	65.0	70.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to fine.....	70.0	76.0
Sand, very fine to medium; below 80 ft sand is very fine to fine, slightly silty.....	76.0	90.0
Sand, very silty; sand is very fine to fine...	90.0	100.0
Sand, very fine to medium; from 108 to 110 ft, moderately silty.....	100.0	116.0
Silt, moderately sandy, slightly clayey, light yellowish brown; sand is very fine to medium; from 123 to 126 ft and below 131 ft, very sandy.....	116.0	148.0
Sand, slightly silty; sand is very fine to medium; below 162 ft, moderately silty.....	148.0	172.0
Sand, slightly silty; sand is very fine to fine.....	172.0	179.0
Sand, very fine to coarse.....	179.0	180.0
Sand, slightly gravelly; very fine sand to very fine gravel, trace of fine to medium gravel.....	180.0	185.0
No sample.....	185.0	190.0
Sand, gravelly; fine sand to fine gravel, little medium gravel; trace coarse gravel..	190.0	195.0
Sand, very fine to very coarse; little very fine to fine gravel; trace medium gravel...	195.0	204.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine to medium.....	204.0	220.0
Sandstone, sand is very fine to medium; some rootlets; from 235 ft to 245 ft some volcanic ash; below 265 ft, some interbedded silt layers.....	220.0	281.0

Silt, very sandy, slightly clayey, pale yellow; sand is very fine to medium.....	281.0	289.0
Sand, slightly silty; sand is very fine to medium.....	289.0	302.0
Silt, very sandy, pale yellow; sand is very fine to medium.....	302.0	307.0
Sand, very silty; sand is very fine to medium.	307.0	312.0
Sandstone, sand is very fine to medium, in part lime cemented.....	312.0	316.0
Silt, very sandy, moderately calcareous, pale yellow; sand is very fine to medium.....	316.0	318.0
Sandstone, slightly silty; sand is very fine to medium; rootlet fragments; from 385 to 390 ft, trace of siliceous fragments.....	318.0	442.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to medium.....	442.0	448.0
Sandstone, slightly silty; sand is very fine to medium; from 460 to 465 ft, brownish clay fragments.....	448.0	498.0
Sand, very fine to medium.....	498.0	510.0
Silt, moderately clayey, sandy, pale yellow; sand is very fine to medium.....	510.0	512.0
Sand, very fine to medium; contains inter-bedded sandy silt layers.....	512.0	560.0
Silt, clayey, very calcareous, white; some very fine to medium sand.....	560.0	568.0
Sand, very fine to medium; below 576 ft, silty.....	568.0	578.0
Sandstone, sand is very fine to medium; contains fine to very coarse sand, with some fine gravel; principally reworked clay fragments; interbedded clay layers from 612 to 618 ft and below 642 ft.....	578.0	665.0
Sand, very fine to medium; contains reworked siltstone, claystone, rootlets, and siliceous fragments that range from fine sand to fine gravel.....	665.0	695.0
Tertiary System - Oligocene Series - Arikaree Group:		
Rosebud Formation(?):		
Silt to clayey silt, possible sandy, very pale brown to pale yellow.....	695.0	755.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, moderately calcareous, black...	755.0	760.0

Test Hole #3-SG-84
(25N-16W-19bccc)
Holt County

Location: SW SW SW NW Sec. 19, T. 25 N., R. 16 W., approximately 2,426 feet south and 164 feet east of the northwest corner.
Ground elevation: 2,436 ft. (t). (Carson Lake, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 63 ft. (9-11-84)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silt, very sandy, pale brown; sand is very fine to medium.....	0.0	5.0
Sand, very fine to medium, little coarse.....	5.0	42.0
Silt, slightly clayey, slightly sandy, in part very sandy, pale yellow; sand is very fine to fine, little medium; grayish brown with iron stain below 75 ft.....	42.0	57.0
Sand, slightly silty; sand is very fine to fine.....	57.0	105.0
Sand, slightly clayey, interbedded brownish gray silt lenses; sand is very fine to fine; pale olive from 130 to 145 ft; below 145 ft, pale yellow.....	105.0	155.0
Sand, slightly silty; sand is very fine to medium, trace coarse.....	155.0	170.0
Silt, very sandy, slightly clayey, light brownish gray; sand is very fine to medium.	170.0	182.0
Sand, very fine to medium, trace of coarse....	182.0	200.0
Gravel, sandy; fine sand to fine gravel.....	200.0	238.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine to medium; from 240 to 250 ft, some volcanic ash.....	238.0	280.0
Sand, slightly silty; sand is very fine to fine; some limy areas below 296 ft.....	280.0	505.0
Sand, very fine to medium, trace coarse.....	505.0	516.0
Sand, moderately silty; sand is very fine to fine; some limy areas.....	516.0	557.0
Sand, very fine to medium trace coarse; interbedded silt lenses.....	557.0	580.0
Sand, moderately silty; sand is very fine to medium; some siltstone; some bentonic clay.....	580.0	590.0
Siltstone to claystone very calcareous, brown with pinkish tint; below 600 ft, olive yellow to pale olive.....	590.0	612.0

Sand, slightly silty; sand is very fine to medium, trace coarse; some consolidation below 615 ft.....	612.0	620.0
Sand,silty; very fine to medium; some consolidation and rootlets below 645 ft; some interbedded silts below 650 ft.....	620.0	658.0
Sand, very fine to medium, moderately silty; contains reworked clay and bentonite fragments; some consolidation below 670 ft.	658.0	698.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, moderately calcareous, yellow to dark olive gray.....	698.0	730.0

Test Hole #7-B-68
(26N-11W-24aaaa)
Holt County

Location: NE NE NE NE Sec. 24, T. 26 N., R. 11 W., approximately 301 feet south and 22 feet west of the northeast corner.
Ground elevation: 2,022 ft.(t). (Goose Lake NE, 7.5 min. quadrangle)
Depth to water: 21.89 ft (7-3-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, slightly silty; sand is very fine to medium.....	0.0	15.0
Silt, moderately clayey, slightly sandy, light gray mottling; sand is very fine to fine; from 15 to 20 ft, few volcanic ash layers; below 20 ft, some volcanic ash.....	15.0	36.0
Silt, very sandy, slightly clayey, light yellowish brown; below 38 ft, very clayey, moderately sandy, brown.....	36.0	40.0
Silt, very clayey, moderately sandy, brown; sand is very fine to medium; below 44 ft, less clayey, sand is very fine to coarse with trace of gravel.....	40.0	47.0
Sand, gravelly, silty; very fine sand to fine gravel.....	47.0	50.0
Sand, gravelly, silty; medium sand to fine gravel.....	50.0	60.0
Silt, slightly clayey, sandy, pale yellow; sand is very fine to fine, trace of medium; contains some volcanic ash below 60 ft.....	60.0	65.0
Silt, moderately clayey, sandy, pale yellow; sand is very fine to fine.....	65.0	66.0
Sand, very fine to medium, little fine gravel; below 70 ft, sand is very fine to coarse.....	66.0	75.0
Gravel, sandy; very fine sand to coarse gravel.....	75.0	80.0
Sand, gravelly; very fine sand to fine gravel.....	80.0	85.0
Sand, gravelly; very fine sand to medium gravel; below 90 ft some coarse gravel; below 120 ft some interbedded silt lenses.....	85.0	130.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to medium; below 140 ft, sand is very fine to coarse.....	130.0	148.0

Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clay, sandy, pale yellow; sand is very fine to fine, trace of medium.....	148.0	162.0
Clay, silty, sandy, pale yellow; sand is very fine to fine.....	162.0	170.0
Silt, very clayey, very sandy, pale yellow; sand is very fine to fine.....	170.0	182.0
Sandstone, sand is very fine to fine; contains some rootlets; some interbedded silt lenses.....	182.0	190.0
Sandstone, sand is very fine to fine; contains rootlets and interbedded silt lenses.....	190.0	214.0
Clay, silty, sandy, light olive brown; sand is very fine to fine; some limy zones.....	214.0	228.0
Sand to sandstone; sand is very fine to fine, some coarse; contains rootlets, interbedded silt lenses, and limy zones.....	228.0	258.0
Silt, marly, sandy, pale yellow; sand is very fine to fine, trace of medium.....	258.0	260.0
Sand, marly; sand is very fine to fine, trace medium; contains rootlets; below 275 ft, less coarser grains; below 283 ft, some lime cement sand.....	260.0	285.0
Silt, sandy, limy zones, pale olive; sand is very fine to fine.....	285.0	290.0
Sandstone, sand is very fine to medium trace of coarse grains; contains interbedded silt layers, in part very clayey; contains limy zones.....	290.0	320.0
Silt, very sandy, pale yellow; sand is very fine to fine, trace of medium.....	320.0	330.0
Sand, silty; sand is very fine to coarse; below 335 ft, lime cemented; below 350 ft, some clayey silts and rootlets.....	330.0	360.0
Sandstone, silty; sand is very fine to fine, trace of medium; contains limy areas.....	360.0	392.0
Sand, silty; sand is very fine to medium with a trace of coarse.....	392.0	407.0
Silt, moderately clayey, sandy, pale yellow; sand is very fine to fine, trace of medium.....	407.0	412.0

Sand, very fine to medium; contains thin silt lenses; contains siltstone and claystone gravels; below 425 ft, lenses of sandstone, claystone and silt; below 445 ft, contains siltstone and claystone gravels.....	412.0	472.0
Silt, slightly sandy, slightly clayey; sand is very fine to medium.....	472.0	477.0
Sand, slightly silty; sand is very fine to medium.....	477.0	480.0
Silt, clayey, very sandy, light gray; sand is very fine to fine, trace of medium.....	480.0	500.0
Sand, slightly silty; sand is fine to very coarse, some fine gravel.....	500.0	521.0
Silt, moderately clayey, moderately sandy, pale yellow; sand is very fine to medium.....	521.0	525.0
Clay, moderately silty, sandy, pale yellow; sand is very fine to fine.....	525.0	535.0
Silt, moderately clayey, moderately sandy, pale yellow; sand is very fine to fine.....	535.0	539.0
Clay, very silty, pale yellow; much iron staining; below 540 ft, slightly calcareous.....	539.0	542.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, gray, moderately calcareous to very calcareous; contains iron staining.....	542.0	550.0

Test Hole #8-B-68
(26N-11W-36cccb)
Holt County

Location: NW SW SW SW Sec. 36., T. 26 N., R. 11 W., approximately 379 feet north and 7.6 feet east of the southwest corner.
Ground elevation: 2,021 ft (t). (Goose Lake NE, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 33 ft (7-3-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, silty; sand is very fine to fine; contains some silt zones below 15 ft; below 40 ft, moderately silty.....	0.0	60.0
Sand, gravelly; very fine sand to medium gravel, trace coarse gravel.....	60.0	65.0
No Sample.....	65.0	70.0
Sand, gravelly; very fine sand to fine gravel; below 80 ft, contains fine sand to very coarse gravel.....	70.0	90.0
Sand, gravelly; very fine sand to medium gravel; below 100 ft, trace coarse gravel..	90.0	120.0
Sand, very fine to very coarse, trace of gravel; below 120 ft some gravel.....	120.0	135.0
Sand, very fine to medium; below 140 ft some silt lenses.....	135.0	148.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty; sand is very fine to medium; contains rootlets; below 155 ft, some silt zones.....	148.0	172.0
Silt, slightly clayey, sandy, pale yellow.....	172.0	182.0
Sandstone, silty; sand is very fine to fine...	182.0	190.0
Silt, moderately clayey, sandy, pale yellow; sand is very fine to fine.....	190.0	193.0
Sandstone, silty; sand is very fine to fine; below 200 ft, trace of medium sand, contains rootlets.....	193.0	205.0
Sandstone; sand is very fine to coarse; contains interbedded silt lenses.....	205.0	228.0
Silt, slightly clayey, sandy, pale olive; sand is very fine to fine.....	228.0	230.0
Sandstone, clayey; sand is very fine to medium	230.0	235.0
Clay, silty, pale olive; contains very fine to fine sand.....	235.0	238.0
Sandstone, silty; sand is very fine to fine; some interbedded silt lenses.....	238.0	258.0

Silt, clayey, sandy, pale yellow; sand is very fine to fine	258.0	266.0
Sandstone, silty; sand is very fine to fine; trace medium below 270 ft; rootlets from 275 to 280 ft	266.0	282.0
Silt, very sandy, slightly clayey, marly zones, pale yellow; sand is very fine to fine	282.0	295.0
No sample	295.0	300.0
Sandstone, silty; sand is very fine to fine	300.0	302.0
Clay, silty, sandy, pale olive; sand is very fine to fine	302.0	330.0
Sandstone, silty; sand is very fine to fine, trace medium; below 350 ft, sand is very fine to coarse	330.0	382.0
Silt, clayey, sandy, pale olive; sand is very fine with some fine gravel	382.0	388.0
Sandstone, silty; sand is very fine to very coarse	388.0	406.0
Sand, very fine to fine, trace medium; from 418 to 420 ft, indurated siltstone	406.0	420.0
Silt, clayey, sandy, light gray; in part indurated; sand is very fine	420.0	440.0
Sand, slightly silty; sand is very fine to very coarse; below 445 ft, some fine gravel	440.0	450.0
Sand, gravelly; medium sand to fine gravel	450.0	454.0
Silt, moderately clayey, olive gray; contains trace of fine sand	454.0	455.0
Claystone, very silty, olive gray	455.0	455.5
Sand, gravelly; coarse sand to medium gravel	455.5	464.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, olive gray; below 465 ft, slightly calcareous, dark olive gray	464.0	470.0

Test Hole #21-B-68
(26N-12W-18dddc)
Holt County

Location: SW SE SE SE Sec. 18, T. 26 N., R. 12 W., approximately 384 feet west and 3 feet north of the southeast corner.
Ground elevation: 2,108 ft. (t).(Chambers East, 7.5 min. quadrangle)
Depth to water: 18.40 ft (8-10-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very silty; sand is very fine to fine; below 4.5 ft, trace of medium sand...	0.0	6.0
Silty sand to sandy silt; sand is very fine to fine.....	6.0	10.0
Silt, slightly sandy, pale brown; sand is very fine to fine; below 15 ft yellow brown.....	10.0	20.0
Silt, very clayey, slightly sandy, slightly calcareous, yellow brown; sand is very fine; below 30 ft, noncalcareous.....	20.0	32.0
Silt, moderately clayey, slightly sandy, pale brown; sand is very fine to fine; below 45 ft, little medium sand.....	32.0	49.0
Silt, slightly clayey, slightly sandy, light yellow brown; sand is very fine to fine, little medium.....	49.0	53.0
Sand, fine to very coarse, some fine gravel...	53.0	55.0
Sand, gravelly; very fine sand to fine gravel.....	55.0	56.0
Silt, slightly clayey, sandy, pale yellow; sand is very fine.....	56.0	58.0
Sand, gravelly; fine sand to fine gravel, little medium gravel; below 65 ft, trace of coarse gravel.....	58.0	70.0
Sand, gravelly; fine sand to fine gravel, little medium gravel.....	70.0	75.0
Sand, gravelly; fine sand to medium gravel....	75.0	95.0
Gravel, sandy; fine sand to medium gravel, trace of coarse gravel.....	95.0	98.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, in part silty; sand is very fine to fine.....	98.0	120.0
Sandstone, sand is very fine to fine; some silt zones and rootlet fragments; from 130 to 135 ft, chert fragments.....	120.0	143.0
Silt, clayey, sandy, pale yellow; sand is very fine to fine.....	143.0	153.0

Sandstone, sand is very fine to fine; below 171 ft, sand is silty, some rootlet fragments	153.0	178.0
Silt, moderately sandy, pale yellow; sand is very fine to fine	178.0	190.0
Sandstone, silty; sand is very fine to fine	190.0	218.0
Sandstone, sand is very fine to fine	218.0	235.0
Silty sand to silty sandstone; sand is very fine to fine, some rootlet fragments below 255 ft; below 266 ft, trace of medium sand; sandstone limy; sand is very fine to fine, some rootlets	235.0	307.0
Sand, very silty; sand is very fine to fine, some rootlet fragments	307.0	322.0
Silt, clayey, sandy, pale olive; sand is very fine to fine, trace medium	322.0	330.0
Sandstone, silty to sand, silty; sand is very fine to fine, from 330 to 332 ft, limy zones	330.0	343.0
Silty sand to sandy silt; sand is very fine to medium, some limy zones; below 350 ft, some interbedded silty sandstone; below 355 ft, trace coarse sand	343.0	365.0
Sandy silt to sandstone, sand is very fine to fine; some limy zones to 370 ft	365.0	385.0
Silt to siltstone, pinkish gray	385.0	390.0
Sand, silty; sand is very fine to fine; below 395 ft, limy zones; below 400 ft, marly	390.0	406.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, very calcareous, pale yellow, some light gray; below 407 ft some ironstone	406.0	410.0
Shale, clayey, slightly calcareous, yellow; below 415 ft, pale yellow; from 415 to 420 ft, some light gray	410.0	430.0

Test Hole #01-UE-00 (E-log)
(26N-12W-22dccc)
Holt County

Location: SW SW SW SE Sec. 22, T. 26 N., R. 12 W., approximately 2,441 feet west and 138 feet north of the southeast corner.
Ground elevation: 2,107 ft. (t). (Chambers East, 7.5 min. quadrangle).
Depth to water: 13.84 ft. (6-15-00)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, no sample	0.0	0.5
Sand, dark brown; sand is very fine to fine, trace of medium to coarse, little fine gravel	0.5	5.0
Sand, very fine to medium, yellowish brown; contains silt lenses; below 10 ft, contains gray clayey lenses	5.0	15.0
Sand, very fine to fine, trace of medium, gray; contains silt lenses; below 22.5 ft, some coarse sand to fine gravel	15.0	32.5
Silt, very sandy, slightly to moderately clayey, light brownish-gray; sand is very fine to medium; below 42.5 ft, moderately sandy	32.5	52.5
Clay, moderately silty, brownish gray; slightly calcareous from 56 to 57.5 ft; moderately to very calcareous below 57.5 ft; moderately sandy from 59 to 60 ft; slightly silty below 62.5 ft	52.5	79.0
Sand, medium to coarse, some fine to very coarse; some fine gravel below 87.5 ft	79.0	92.5
Sand, gravelly; coarse sand to fine gravel; some medium gravel below 97.5 ft	92.5	102.5
Sand, gravelly; fine sand to medium gravel; less fine to medium sand below 112.5 ft; less grave; below 117.5 ft	102.5	136.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sandy, olive gray; sand is very fine	136.0	162.5
Silt, very sandy, moderately clayey, pale olive; sand is very fine	162.5	177.5
Sandstone, sand is very fine to fine, olive; some gray silty clay below 192.5 ft	177.5	202.5
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine; moderately clayey below 217.5 ft	202.5	227.5
Sandstone, sand is very fine to fine, silty, light olive brown; pale olive below 247.5 ft	227.5	257.5
Sand, silty, sand is very fine to fine	257.5	267.5
Sandstone, sand is very fine to fine, light olive brown	267.5	277.5

Test Hole #20-B-68
(26N-12W-32cccc)
Holt County

Location: SW SW SW SW Sec. 32, T. 26 N., R. 12 W., approximately 280 feet east and 12 feet north of the southwest corner.
Ground elevation: 2,112 ft. (t).(Chambers East, 7.5 min. quadrangle)
Depth to water: 0.1 ft (8-10-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silty sand to sandy silt, very dark gray; sand is very fine to fine, trace of medium.....	0.0	2.0
Sand, very fine to fine, trace medium; some iron staining.....	2.0	14.0
Sandstone, silty; sand is very fine to fine...	14.0	15.0
Sand, very silty; sand is very fine.....	15.0	20.0
Silt, very sandy, slightly clayey, moderately calcareous, light gray; sand is very fine; below 25 ft, pale brown, some light gray...	20.0	35.0
Sandstone, silty; sand is very fine to fine; contains limy fragments.....	35.0	41.0
Sand, very fine to fine, trace of medium; below 45 ft, little coarse.....	41.0	48.0
Silt, very clayey, sandy, marly, light gray; sand is very fine to medium; below 50 ft, in part less clayey, sand is very fine to fine.....	48.0	54.0
Clay, silty, sandy, limy, light gray, moderately calcareous; sand is very fine to fine; below 55 ft, pinkish gray; below 57.5 ft, trace medium to coarse sand.....	54.0	58.0
Clay, silty, sandy, limy, light gray with a pinkish tint, very calcareous; sand is very fine to fine, some medium, trace of coarse; below 58.5 ft, pinkish gray.....	58.0	60.0
Silt, very sandy, moderately clayey, light gray with pink.....	60.0	64.0
Sand, silty; sand is very fine to medium.....	64.0	65.0
Sand, gravelly; very fine sand to fine gravel.	65.0	70.0
Sand, slightly gravelly; very fine sand to fine gravel.....	70.0	75.0
Gravel, sandy; fine sand to fine gravel with some medium, trace coarse.....	75.0	95.0
Gravel, sandy; medium sand to fine gravel, little medium and trace of coarse gravel below 105 ft	95.0	109.2

No sample.....	109.2	110.0
Sand, gravelly; fine sand to fine gravel, some medium gravel.....	110.0	142.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty; sand is very fine to fine; below 145 ft, some rootlet fragments and rare seeds.....	142.0	156.0
Silt, very sandy, slightly clayey, light gray; sand is very fine to fine, little medium; below 174 ft, interbedded sandstone.....	156.0	175.0
Sandstone, very silty; sand is very fine to fine; below 180 ft some rootlet fragments..	175.0	210.0
Silt, very sandy, light gray; sand is very fine to medium; some interbedded sandstone.	210.0	213.0
Sandstone, interbedded silt to siltstone, light gray; contains rootlet fragments.....	213.0	215.0
Sandstone, silty; sand is very fine to fine; contains rootlets and interbedded silt lenses; below 245 ft, few very coarse sand to fine gravel grains.....	215.0	250.0
Sandstone, sand is very fine to fine, trace medium.....	250.0	258.0
Silt, moderately clayey, marly, in part sandy, light olive gray; sand is very fine to fine; contains interbedded sandstone; below 275 ft, very sandy.....	258.0	280.0
Sandstone, silty to very sandy silt; sand is very fine to fine; below 287 ft, silty sand to sandy silt.....	280.0	290.0
Sandstone, silty, slightly clayey; sand is very fine to fine.....	290.0	298.0
Marl, silty, light gray.....	298.0	305.0
Sandstone, sand is very fine to fine, trace of medium, some limy areas.....	305.0	328.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine; from 330 to 334 ft, light gray, some sandstone; from 335 to 338 ft, pale yellow.....	328.0	345.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine; some limy zones; below 348 ft, interbedded sandstone.....	345.0	350.0
Sandstone, sand is very fine to fine.....	350.0	360.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine.....	360.0	370.0
Sandstone, slightly silty; sand is very fine to fine.....	370.0	384.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine.....	384.0	392.0

Sandstone, sand is very fine; from 402 to 404 ft, silt lens	392.0	410.0
Silt, very sandy, pale olive; sand is fine	410.0	420.0
Sandstone, in part silty; sand is fine; some siltstone chips; below 430 ft, some limy zones and rootlets	420.0	436.0
Silt, moderately sandy, pale olive; sand is fine; contains interbedded sandstone lenses	436.0	446.0
Sandstone, silty, sand is very fine trace of volcanic ash, some rootlets	446.0	455.0
Sandstone to sand, sand is very fine to very coarse	455.0	460.0
Sand, very fine to coarse, trace very coarse, some reworked quartz sand, sandstone and claystone	460.0	465.0
Claystone and sandstone reworked, some coarse sand, trace ironstone and very coarse sand.	465.0	470.0
Sand, very fine to very coarse, trace of reworked claystone; below 475 ft more claystone	470.0	480.0
Sand to sandstone, very fine to fine, some medium to very coarse reworked claystone fragments	480.0	490.0
Sand, slightly gravelly, reworked claystone and chert	490.0	494.2
Chert, olive	494.2	495.5
Silt, moderately clayey, pale yellow	495.5	500.2
Sand, very fine to fine	500.2	506.0
Clay, silty, olive with some yellow stain; below 510 ft, pale olive	506.0	512.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, olive brown; below 515 ft, dark grayish brown, some gray	512.0	526.0
Shale, clayey, dark gray, some grayish brown	526.0	530.0
Shale, clayey, black, trace of yellow, moderately calcareous; below 535 ft, black.	530.0	540.0

Test Hole #34-B-68
(26N-14W-16cccc)
Holt County

Location: SW SW SW SW Sec. 16, T. 26 N., R. 14 W., approximately 86 feet north and 2 feet east of the southwest corner.
Ground elevation: 2,231 ft. (t). (Amelia, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 5.9 ft (9-6-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very silty; sand is very fine to medium	0.0	17.0
Silt, slightly clayey, very sandy, gray; sand is very fine to fine	17.0	32.0
Clay, moderately silty, sandy, pale brown; sand is very fine to fine	32.0	35.0
Silt, very sandy, slightly clayey, pale brown; sand is very fine to fine; below 38 ft, trace of medium	35.0	40.0
No sample	40.0	44.0
Sand, very silty; sand is very fine to medium; below 46 ft, sand is very fine to fine	44.0	48.0
Clay, silty, sandy, very pale brown; sand is very fine to medium; from 50 to 55 ft, light yellowish brown; below 55 ft brownish yellow	48.0	64.0
Clay, silty, sandy, brownish yellow; sand is very fine; below 70 ft, sand is very fine to fine, trace of medium	64.0	78.0
Sand, very fine to fine, trace of medium; below 80 ft, sand is very fine to medium	78.0	87.0
Silt, very sandy, slightly clayey, grayish brown; sand is very fine to medium	87.0	88.0
Sand, very fine to coarse; below 90 ft, trace of fine gravel	88.0	95.0
Sand, gravelly; fine sand to medium gravel	95.0	120.0
Sand, very fine to very coarse	120.0	122.0
Silt, slightly clayey, very sandy, pale yellow; sand is very fine to fine	122.0	123.0
Sand, gravelly; very fine sand to fine gravel, little medium gravel	123.0	125.0
Sand, gravelly; very fine sand to fine gravel.	125.0	130.0
Sand, gravelly; medium sand to medium gravel..	130.0	134.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, sandy, pale yellow; sand is very fine	134.0	135.2

Sand, very fine to very coarse, trace of fine gravel.....	135.2	140.0
Sandstone, sand is very fine to fine; from 145 to 150 ft, some coarse sand; below 155 ft sand is very fine to medium, some rootlets.....	140.0	168.0
Silt, slightly clayey, sandy, olive; sand is very fine.....	168.0	170.0
Sandstone, sand is very fine to fine; contains interbedded silt lenses; from 205 to 210 ft, some rootlets; from 212 to 215 ft, marl zone.....	170.0	220.0
Silt, slightly clayey, sandy, pale yellow; sand is very fine to fine.....	220.0	225.0
Sandstone; sand is very fine to fine; contains interbedded silt lens.....	225.0	229.0
Silt, slightly clayey, pale yellow; sand is very fine to fine; from 230 to 235 ft, trace of medium sand; below 230 ft, interbedded sandstone lenses.....	229.0	240.0
Sandstone, silty; sand is very fine to fine, little medium; below 250 ft, some rootlets.	240.0	285.0
Silt sand to sandy silt; pale yellow; sand is very fine to fine, little medium.....	285.0	290.0
Sandstone, silty; sand is very fine to fine, trace of rootlets.....	290.0	299.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine, little medium...	299.0	301.0
Sandstone, sand is very fine to fine, some medium; trace of rootlets.....	301.0	310.0
Silty sand to sandy silt, pale yellow; sand is very fine to fine, little medium.....	310.0	325.0
Sandstone, sand is very fine to fine; contains silt lenses; below 330 ft, few rootlets....	325.0	334.0
Silty sand to sandy silt, pale yellow; sand is very fine to medium; below 335 ft interbedded sandstone lens.....	334.0	340.0
Silt, very sandy, slightly clayey, slightly calcareous, pale yellow; sand is very fine to fine, some medium; below 350 ft some marl zones.....	340.0	360.0
Sandstone, sand is very fine to fine; from 360 to 363 ft some marl zones.....	360.0	371.0
Silt, very sandy, slightly clayey, moderately calcareous, light gray; sand is very fine to fine.....	371.0	380.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to fine; contains interbedded sandstone lenses.....	380.0	400.0

Sandstone, sand is very fine to fine; contains interbedded silt, lens.....	400.0	405.0
Silt, slightly clayey, slightly sandy, pale yellow; sand is very fine to fine.....	405.0	410.0
Sandstone, sand is very fine to fine; contains limy areas.....	410.0	413.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to fine.....	413.0	430.0
Sandstone, sand is very fine to very coarse...	430.0	440.0
Sand, fine to very coarse; from 450 to 455 ft, less very coarse sand; from 455 to 460 ft, trace fine gravel, some shale and limy fragments; below 460 ft, some marl zones.....	440.0	465.0
Sand, fine to very coarse; trace of gravel....	465.0	470.0
Silt, very sandy, slightly clayey, pale yellow; sand is fine to fine, little medium.....	470.0	485.0
Sand, fine to very coarse; contains reworked sandstone and claystone fragments.....	485.0	497.0
Sandstone, sand is very fine to fine; contains interbedded sandy silt.....	497.0	510.0

Test Hole #35-B-68
(26N-14W-33dbdd)
Holt County

Location: SE SE NW SE Sec. 33, T. 26 N., R. 14 W., approximately 1,333 feet north and 1,444 feet west of the southeast corner.
Ground elevation: 2,245 ft (t). (Amelia, 7.5 min. quadrangle)
Depth to water: 5.95 ft (9-6-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silty sand to sandy silt, dark brownish gray; sand is very fine to medium.....	0.0	0.5
Sand, very fine to medium, little coarse; from 5 ft to 20 ft sand is very fine to medium; below 20 ft less medium sand.....	0.5	40.0
Silty sand to sandy silt, brown; sand is very fine to fine.....	40.0	50.0
No sample.....	50.0	55.0
Silt, slightly clayey, very sandy, light gray; sand is very fine to fine, trace of medium; below 68.8 ft slightly more clayey.....	55.0	90.0
Silty sand to sandy silt, marly in part, pale yellow; sand is very fine to fine, little medium.....	90.0	97.0
Silt, very sandy, marly, pale yellow; sand is very fine to fine.....	97.0	108.0
Silt, very sandy, slightly clayey, light olive gray; sand is very fine to fine; contains marly areas.....	108.0	123.0
Sand, very fine to medium, trace of coarse; below 125 ft, sand is fine to very coarse, trace of fine gravel.....	123.0	130.0
Sand, slightly gravelly; fine sand to fine gravel.....	130.0	140.0
Sand, gravelly; fine sand to medium gravel....	140.0	166.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, silty, pale yellow.....	166.0	168.0
Sand, very fine to fine, some medium; below 170 ft, sand is very fine to medium.....	168.0	173.0
Sandstone, sand is very fine to fine; contains rootlet fragments; contains interbedded silt lens.....	173.0	175.0
Sandstone, sand is very fine to fine; contains interbedded silt lenses; from 180 to 185 ft, rootlet fragments.....	175.0	210.0

Sand, very fine to fine; from 215 to 220 ft, trace rootlet fragments and interbedded sandstone.....	210.0	228.0
Silt, slightly clayey, very sandy, pale yellow; sand is very fine to fine.....	228.0	230.0
Sandstone, sand is very fine to fine; contains interbedded silt lenses; below 250 ft, some medium sand; below 260 ft, trace of rootlet fragments.....	230.0	270.0
Silty sand to sandy silt, light gray; sand is very fine to fine, trace of medium; below 275 ft, some interbedded sandstone.....	270.0	280.0
Sandstone, sand is very fine to fine, trace of medium; contains interbedded silt layers...	280.0	290.0
Silt, slightly clayey, slightly sandy, light gray; sand is very fine to fine; contains some bentonite; below 295 very clayey.....	290.0	297.0
Sandstone, sand is very fine to fine; below 300 ft, some rootlets, some interbedded silt layers; below 305 ft in part lime cemented; below 337 ft, sand is very fine to medium..	297.0	343.0
Silt, slightly clayey, slightly calcareous, pale yellow; sand is very fine to medium; contains interbedded sandstone lens.....	343.0	346.0
Sandstone, sand is very fine to fine, trace of medium; contains interbedded silt lenses; contains rootlet fragments; in part lime cemented; some marl zone.....	346.0	357.0
Silt, marly, sandy, pale olive; sand is very fine to fine, trace of medium, some lime cemented sandstone.....	357.0	360.0
Sandstone, sand is very fine to fine, trace of medium; in part lime cemented and marl zones.....	360.0	367.0
Silt, slightly clayey, sandy, light gray; sand is very fine to medium; some interbedded sandstone lenses, and marl zones.....	367.0	383.0
Sandstone, sand is very fine to medium; in part lime cemented with marl zones.....	383.0	395.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to medium; below 400 ft, trace of sandstone and rootlets.....	395.0	403.0
Silty sandstone, sand is very fine to medium; contains trace of volcanic ash.....	403.0	405.0
Silt, slightly clayey, sandy, limy, light gray; sand is very fine to medium; contains limy zones.....	405.0	435.0

Silty sand to sandy silt; sand is very fine to fine, light gray; below 440 ft, pale yellow.....	435.0	450.0
Silt, moderately clayey, sandy, pale yellow; sand is very fine to fine; interbedded siltstone and sandstone lenses.....	450.0	455.0
Sandstone, sand is very fine to fine; some rootlets, in part lime cemented; below 460 ft, some medium sand.....	455.0	465.0
Silty sand to silty sandstone; sand is very very fine to fine; light gray.....	465.0	473.0
Silt, slightly clayey, very sandy, light gray; sand is very fine to fine; in part bentonitic.....	473.0	475.0
Silty sand to silty sandstone; sand is very fine to fine, light gray; from 480 to 485 ft, limy areas, trace rootlet fragment.....	475.0	495.0
Silt, slightly clayey, very sandy, pale yellow; sand is very fine to fine.....	495.0	500.0
Silty sand to sandy silt; sand is very fine to fine, pale yellow; contains interbedded sandstone lenses.....	500.0	505.0
Sandstone, sand is very fine to fine; 510 to 525 ft, sand is very fine to medium; below 525 ft, sand is very fine to very coarse, trace of gravel, some rootlet fragments and reworked claystone.....	505.0	550.0
Sandstone, sand is very fine to very coarse, in part lime cemented; contains reworked claystone, and rootlet fragments.....	550.0	565.0
Sand, very fine to fine, some medium; some reworked sandstone, siltstone fragments, some rootlets; below 610 ft, interbedded silt lenses.....	565.0	618.0
Silt, moderately clayey, moderately sandy, pale brown; sand is very fine; some limy areas..	618.0	620.0
Clay, moderately sandy, slightly calcareous, pale brown; sand is very fine; below 630 ft light yellowish brown, some light brownish gray.....	620.0	635.0
Clay, gray, slightly calcareous; from 636 to 640 ft, pale brown; below 650 ft some pale olive with a greenish tint.....	635.0	657.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, black, very calcareous; dark gray below 660 ft; some black below 665 ft.	657.0	680.0

Test Hole #5-A-68
(27N-10W-17bbbb)
Holt County

Location: NW NW NW NW Sec. 17, T. 27 N., R. 10 W., approximately 65 feet south and 8.5 feet east of the northwest corner.
Ground elevation: 1,969 ft. (t). (O'Neill SE, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 5 ft. (7-3-68)

	Depth, in feet	
Quaternary System, undifferentiated:		
Sand, very fine to medium, trace of coarse; below 5 ft, silty.....	0.0	20.0
Sand, silty; sand is very fine to medium, trace very coarse sand to fine gravel; silt lenses from 25 to 30 ft and below 38 ft....	20.0	40.0
Silt, very sandy, brown; sand is very coarse with a trace of fine gravel.....	40.0	44.0
Sand, very fine to very coarse.....	44.0	45.0
Sand, gravelly; medium sand to medium gravel; from 54.7 to 56.1 ft, silt lens; below 55 ft, medium sand to fine gravel.....	45.0	65.0
Gravel, sandy; medium sand to coarse gravel; some pebbles and cobbles.....	65.0	76.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, pale yellow; sand is very fine to coarse; some rootlets.....	76.0	80.0
Sandstone, sand is very fine to medium.....	80.0	90.0
Sand, very silty; sand is very fine to fine, some medium; some rootlets; contains interbedded sandstone.....	90.0	100.0
Sandstone, sand is very fine to medium; contains silt about 100 ft.....	100.0	107.0
Silt, in part sandy, light olive gray; sand is very fine.....	107.0	108.0
Sand, in part sandstone; sand is very fine to medium.....	108.0	110.0
Silt, sandy, light olive gray; sand is very fine to medium.....	110.0	115.0
Sandstone, sand is very fine to medium; contains rootlets; contains silty lenses; below 139 ft possible volcanic ash and bentonite.....	115.0	140.0
Sandstone, sand is very fine to medium; from 150 to 155 ft, rootlets; below 160 ft, sand is very fine to fine.....	140.0	163.0

Sand, very silty; sand is very fine to fine with some medium.....	163.0	165.0
Sandstone, sand is very fine to medium; contains rootlets; below 170 ft, silty.....	165.0	182.0
Silt, moderately clayey, sandy, light gray; sand is very fine to fine with trace of medium; below 188 ft, interbedded sandstone layer.....	182.0	190.0
Silt, clayey, sandy, slightly calcareous, marly; sand is very fine to fine; below 194 ft, moderately calcareous.....	190.0	195.0
Silt with interbedded sandstone, sand is very fine to fine.....	195.0	200.0
Silt, clayey, sandy, light gray; sand is very fine to fine.....	200.0	205.0
Sandstone, silty; sand is very fine to medium.	205.0	210.0
Sandstone, silty, marly; sand is very fine to medium; below 215 ft, some interbedded silt.....	210.0	217.0
Silt, clayey, sandy, marly.....	217.0	217.6
Sandstone, sand is very fine to fine; below 220 ft, interbedded silts, some rootlets...	217.6	229.6
Silt, clayey, marly, white.....	229.6	229.9
Clay, silty, slightly calcareous, pale olive..	229.9	237.0
Silt, clayey, sandy, pale olive; sand is very fine to fine.....	237.0	243.0
Sandstone, sand is very fine to medium; below 250 ft, some rootlets; below 253.2 ft, marly.....	243.0	254.0
Clay, silty, pale olive.....	254.0	266.0
Sandstone, in part silty; sand is very fine to fine, from 282 to 290 ft, sand is very fine to medium; below 285 ft, some silt silt lenses; below 320 ft, some volcanic ash.....	266.0	325.0
Silt, slightly clayey, sandy, pale yellow; sand is very fine to fine; below 328 ft, very clayey.....	325.0	335.0
Sandstone, silty; sand is very fine to fine, 335 to 340 ft, some rootlets.....	335.0	343.0
Sand to sandstone, with interbedded sandy silts; sand is very fine to fine.....	343.0	366.0
Clay, silty, sandy, pale yellow; sand is very fine to fine.....	366.0	375.0
Sand, silty, with interbedded sandstone; sand is very fine to fine; from 380 to 385 ft, some rootlets; possible volcanic ash below 385 ft.....	375.0	400.0

Clay, silty, in part siltstone, pale yellow; from 400 to 405 ft, some rootlets, trace limy zones; below 405 ft, limy siltstone and claystone; below 410 ft, slightly calcareous,some limy zones; below 414 ft, slightly sandy, sand is very fine.....	400.0	420.0
Sand to sandstone, sand is very fine to fine; some rootlets and coarse green sand grains.	420.0	428.0
Silt, very sandy, slightly calcareous; sand is very fine to fine, with coarse green sand grains, and rootlets.....	428.0	435.0
Sand to sandstone, with interbedded sandy silts; sand is very fine to fine; contains rootlets, coarse green sand, and weathered Pierre Shale fragments.....	435.0	440.0
Sand to sandstone, with siltstone; sand is very fine to medium; from 440 to 448 ft, contains rootlets and coarse green sand grains; below 455 ft, interbedded clay lenses.....	440.0	456.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, slightly calcareous, very light gray.....	456.0	460.0

Test Hole #6-B-68
(27N-10W-29cccc)
Holt County

Location: SW SW SW SW Sec. 29, T. 27 N., R. 10 W., approximately 265 feet east and 6 feet north of the Southwest corner.
Ground elevation: 1,980.0 ft. (t) (O'Neill SE, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 5 feet (7-3-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, slightly silty; sand is very fine to medium; below 25 ft, contains some coarse to very coarse sand.....	0.0	29.0
Clay, moderately silty, light gray; contains trace very fine sand.....	29.0	32.0
Sand, silty; sand is very fine to coarse; contains some clay lenses.....	32.0	40.0
Silt, moderately clayey, moderately sandy, light gray; sand is fine to medium; below 43 feet some organic material.....	40.0	46.0
Sand, very fine to fine, trace of very coarse.....	46.0	50.0
Gravel, sandy; fine sand to fine gravel, trace of medium gravel.....	50.0	55.0
Sand, gravelly; very fine sand to fine gravel.....	55.0	60.0
Gravel, sandy; very fine sand to medium gravel.....	60.0	80.0
Sand, slightly gravelly; very fine sand to fine gravel; below 85 ft, less fine gravel.....	80.0	90.0
Sand, gravelly; very fine sand to medium gravel; principally fine gravel below 95 ft.....	90.0	111.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, slightly sandy, light gray; sand is very fine to fine, with a trace of coarse.....	111.0	126.0
Sand, very fine to medium, trace of fine gravel; from 150 to 155 ft, interbedded silt lenses; below 170 ft, some medium to coarse sand; below 180 ft, trace of coarse to very coarse sand.....	126.0	185.0
Sand and gravel, fine sand to fine gravel; some interbedded clay and limestone lenses.....	185.0	190.0

Sandstone, with limy zones; sand is very fine to medium; from 192 to 192.5 ft interbedded silty clay lens.....	190.0	215.0
Silt, moderately sandy, slightly silty, moderately calcareous, pale olive; sand is very fine to fine; contains interbedded sandstone lenses.....	215.0	230.0
Sandstone, slightly silty; sand is very fine to fine; below 240 ft, some silt lenses....	230.0	254.0
Silt, moderately clayey, moderately sandy; sand is very fine to fine; below 255 ft, some interbedded sandstone lenses.....	254.0	287.0
Sand, medium to coarse; below 290 ft, sand is very fine to very coarse.....	287.0	301.0
Silt, moderately sandy, slightly clayey, pale yellow; sand is fine to coarse.....	301.0	302.0
Sand, fine to coarse, trace of very coarse; contains limy grains.....	302.0	332.0
Sandstone, sand is very fine to fine.....	332.0	333.0
Marl, moderately sandy, slightly clayey, white.....	333.0	333.5
Gravel, fine to medium; principally sandstone and siltstone.....	333.5	335.0
Sandstone, slightly silty; sand is very fine to medium.....	335.0	340.0
Sand, very fine to fine; below 346 ft, slightly silty.....	340.0	350.0
Silt, moderately sandy, pale olive; sand is very fine to fine.....	350.0	356.0
Sandstone, slightly silty; sand is very fine to fine.....	356.0	360.0
Silt, moderately clayey, sandy, light gray; sand is very fine to fine; contains interbedded sandstone lenses.....	360.0	365.0
Silt, moderately clayey, sandy, light gray; sand is very fine to fine; from 371.5 to 373.7 ft, sandstone layer.....	365.0	390.0
Sand, very fine to medium; contains interbedded silt lenses; from 411.8 to 412.4 ft, claystone cobble zone.....	390.0	413.0
Silt, slightly clayey, moderately sandy, pale yellow; sand is very fine to fine.....	413.0	425.0
Siltstone, reworked, rounded pebbles	425.0	433.0
Silt, moderately clayey, moderately sandy, pale yellow; sand is very fine to fine.....	433.0	435.0
Siltstone, reworked, rounded pebbles.....	435.0	436.5
Silt, clayey, sandy, pale olive; sand is very fine to fine; contains interbedded sandstone lenses.....	436.5	440.0

Silt, moderately clayey, moderately sandy, pale yellow; sand is very fine to fine; below 445 ft, contains interbedded sandstone and siltstone.....	440.0	450.0
Silt, slightly clayey, slightly calcareous, pale olive; contains trace of very fine sand; below 453 ft, contains interbedded sandstone and siltstone, sand is very fine to fine.....	450.0	455.0
Siltstone, reworked; moderately clayey, light olive gray; contains trace of sand to 464 ft; below 464 ft, interbedded sand lenses, sand is medium to coarse.....	455.0	465.0
Sand, silty; sand is very fine medium, some coarse.....	465.0	470.0
Siltstone, reworked; clayey, silty, slightly calcareous,light gray; contains trace very fine sand.....	470.0	475.0
Silt, slightly clayey, pale yellow; contains trace of very fine to fine sand.....	475.0	480.0
Siltstone, reworked; slightly clayey, light gray; from 493 to 495 ft, contains clay layer.....	480.0	534.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, moderately calcareous, black..	534.0	540.0

Test Hole #4-UE-99
(27N-11W-19bccc)
Holt County

Location: SW SW SW NW Sec. 19, T. 27 N., R. 11 W., approximately 2,602 ft south 180 ft east of the northwest corner.
Ground elevation: 2,053 ft (t). (O'Neill SW, 7.5 min. quadrangle)
Depth to water: 13.6 ft (10-1-99)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, light gray; sand is very fine to fine...	0.0	20.0
Silt, moderately clayey, moderately sandy, pale olive; sand is very fine to fine.....	20.0	25.0
Sand, slightly silty, pale olive; sand is very fine to fine, some medium.....	25.0	30.0
Sand, gravelly; very fine sand to fine gravel; below 35 ft contains trace of medium gravel.....	30.0	45.0
Sand, tan; very fine to very coarse, little fine to medium gravel.....	45.0	50.0
Sand, gravelly; very fine sand to fine gravel, trace of medium gravel.....	50.0	55.0
Sand, tan; very fine to very coarse, little fine gravel.....	55.0	60.0
Sand, gravelly; very fine sand to fine gravel.	60.0	70.0
Gravel, sandy; very fine sand to fine gravel, trace of medium gravel, rare coarse gravel.	70.0	75.0
Sand, tan; very fine to medium, little coarse, trace very coarse.....	75.0	80.0
Gravel, sandy; medium sand to fine gravel, rare medium gravel.....	80.0	90.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, pale olive; sand is very fine, little fine; contains some lag from above; below 100 ft very fine to fine sand.....	90.0	105.5
Silt, very sandy, moderately clayey, light gray; sand is very fine; contains rootlets.	105.5	111.0
Sand, light gray; sand is very fine; contains rootlets below 120 ft; contains sandstone below 125 ft, below 127 ft silty; pale olive below 130 ft.....	111.0	140.0
Silty sand to sandy silt with sandstone, moderately silty, pale olive, sand is very fine to fine; less silty below 145 ft; contains rootlets below 160 ft.....	140.0	165.0

Sand, little sandstone, slightly silty, light gray; sand is very fine to fine; more sandstone below 170 ft, contains white siliceous fragments.....	165.0	177.0
Silt, very clayey, pale olive; contains sandstone.....	177.0	181.0
Sand to sandstone, pale olive; sand is very fine to fine; contains some rootlets below 185 ft, much rootlet material below 195 ft.	181.0	205.0
Silty sand to sandy silt to sandstone, silty; sand is very fine to fine; contains rootlets from 220 to 224 ft; below 231 ft slightly more silty.....	205.0	234.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine, some fine; contains some sandstone.....	234.0	241.0
Silt, moderately clayey, moderately sandy, yellow; sand is very fine, some fine; contains few siltstone fragments; contains trace of sandstone.....	241.0	246.0
Sand to sandstone, silty, pale olive; sand is very fine to fine; contains rootlets; below 250 ft in part lime cemented.....	246.0	270.0
Silt, very sandy, moderately clayey, pale yellow; sand is very fine, little fine; from 270 to 275 ft limy areas; contains sandstone, silty below 290 ft.....	270.0	315.0
Sand, silty, pale yellow; sand is very fine to fine; below 320 ft contains some silty sandstone.....	315.0	325.0
Sand, very fine to fine, gray; contains little sandstone; from 340 to 345 ft silty; silty area at 356 ft.....	325.0	369.0
Sand, olive, very fine to fine, below 371 ft silty.....	369.0	385.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, yellow; moderately calcareous; slightly calcareous from 385 to 420 ft.....	385.0	420.0
Shale, clayey, pale yellow.....	420.0	425.0
Shale, clayey, gray to dark gray.....	425.0	430.0
Shale, clayey, black.....	430.0	440.0

Test Hole #23-B-68
(27N-12W-16aaaa)
Holt County

Location: NE NE NE NE Sec. 16, T. 27 N., R. 12 W., approximately 211 feet west and 1 foot south of the northeast corner.
Ground elevation: 2,071 ft. (t). (O'Neill SW, 7.5 min. quadrangle)
Depth to water: 3.30 ft (8-10-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, slightly silty; sand is fine to medium; from 4 to 6 ft, little coarse sand; below 6 ft, rare coarse sand.....	0.0	13.0
Sand, fine to medium; below 15 ft, sand is silty.....	13.0	48.5
Sand, slightly gravelly; very fine sand to fine gravel.....	48.5	70.0
Sand and gravel, coarse sand to coarse gravel.	70.0	76.5
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty; sand is very fine to fine; contains volcanic ash; contains some rootlet fragments.....	76.5	128.0
Silt, clayey, light olive gray; contains volcanic ash.....	128.0	132.0
Sandstone, sand is very fine; contains volcanic ash.....	132.0	135.0
Sandstone and siltstone; sand is very fine, in part silty; contains volcanic ash.....	135.0	145.0
Sandstone, very silty; sand is very fine.....	145.0	146.0
Silt, clayey, sandy, light gray, moderately calcareous; sand is very fine.....	146.0	150.0
Clay, silty, light gray, moderately calcareous	150.0	158.0
Sandstone, silty; sand is fine with a trace of medium; below 160 ft, no medium sand.....	158.0	163.0
Silt, sandy, clayey, light gray, trace of bentonite.....	163.0	164.0
Sandstone, sand is fine to medium; from 180 to 185 ft, trace coarse sand; below 185 ft, very fine to medium.....	164.0	200.0
Sandstone, sand is very fine to fine, trace medium; from 210 to 215 ft, fine to medium; below 215 ft, fine to coarse.....	200.0	220.0
Sandstone, sand is very fine to fine; from 225 to 230 ft, silty; below 230 ft, fine to coarse.....	220.0	233.0
Sandstone, silty; sand is very fine to fine...	233.0	245.0

Sandstone, silty; sand is very fine; below 255 ft, clayey.....	245.0	265.0
Sandstone, very silty; sand is very fine to fine; below 275 ft, clayey.....	265.0	287.0
Sand, very silty, clayey; sand is very fine to fine; below 290 ft, silty.....	287.0	291.0
Sandstone, slightly silty; sand is very fine to fine; below 295 ft, sand is very fine to medium with less silt.....	291.0	325.0
Sand, very silty, clayey; sand is very fine to fine.....	325.0	330.0
Sandstone, silty; sand is very fine to fine; below 337.5 ft, very silty, slightly clayey	330.0	340.0
Sand, slightly silty; sand is very fine to medium with trace of coarse; below 345 ft, very fine to coarse.....	340.0	352.0
Sandstone, slightly silty; sand is very fine to fine, trace of medium; below 370 ft, some medium.....	352.0	386.5
Clay, silty, in part moderately sandy, light olive gray; sand is very fine to medium....	386.5	391.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale ,clayey, slightly calcareous, yellowish brown some light gray; below 396 ft, brownish yellow, some yellowish brown and light brownish gray.....	391.0	399.0
Shale, clayey, bright brownish yellow; below 403 ft, light yellowish brown and light gray; below 404.5 ft, trace of ironstone...	399.0	405.0
Shale, clayey, light brownish gray and light gray.....	405.0	420.0

Test Hole #22-B-68
(27N-12W-31ddcd)
Holt County

Location: SE SW SE SE Sec. 31, T. 27 N, R. 12 W., approximately 965 feet west and 8 feet north of the southeast corner.
Ground elevation: 2,083 ft. (t). (Emmet SE, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 50 ft. (8-10-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, very sandy, slightly clayey, moderately calcareous, very dark gray; sand is fine to medium.....	0.0	4.0
Sand, very fine to coarse; below 5 ft, silty, sand is very fine to medium.....	4.0	10.0
Silt, very sandy, slightly clayey, dark gray; sand is very fine to fine.....	10.0	15.0
Sand, slightly clayey, sandy; sand is very fine to fine.....	15.0	16.0
Silt, moderately clayey, sandy, dark gray; sand is very fine to fine.....	16.0	20.0
Sand, silty; sand is very fine to fine; below 25 ft, sand is very fine to coarse; below 35 ft, some very coarse gravel.....	20.0	40.0
Sand, very fine to coarse; below 50 ft, sand is very fine to fine, with some fine gravel	40.0	55.0
Gravel, sandy; very coarse sand to medium gravel.....	55.0	60.0
Gravel, very coarse to pebbles.....	60.0	64.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately sandy, slightly clayey, pale yellow; sand is very fine to fine; below 70 ft, olive and light yellow brown.....	64.0	75.0
Clay, slightly silty, slightly sandy, dark brown and pale brown; sand is very fine....	75.0	78.0
Silt, moderately clayey, slightly sandy, light gray; sand is very fine to fine.....	78.0	80.0
Sand, medium to very coarse; below 86 ft, interbedded silty sand to sandy silt lens..	80.0	92.0
Silt, moderately clayey, slightly sandy, pale olive; sand is very fine to fine.....	92.0	99.0
Sand, gravelly; coarse sand to coarse gravel; below 105 ft, some volcanic ash, some rootlets.....	99.0	115.0
Sandstone, sand is very fine.....	115.0	139.0

Silt, moderately sandy, slightly calcareous, very pale brown; sand is very fine.....	139.0	140.5
Sandstone, sand is very fine.....	140.5	155.0
Silt, moderately sandy, pale yellow; sand is very fine to medium; contains interbedded sandstone.....	155.0	160.0
Sandstone, sand is very fine; below 186.3 ft, in part lime cemented; from 206.4 to 220 ft, some volcanic ash; below 240 ft, in part silty.....	160.0	312.0
Silt to sandstone, interbedded, sand is very fine to fine.....	312.0	315.0
Silt, moderately sandy, pale olive; sand is very fine to fine; below 325 ft, interbedded sandstone.....	315.0	330.0
Sandstone, sand is fine to very fine.....	330.0	340.0
Sand, gravelly, moderately silty; very coarse sand to fine gravel.....	340.0	345.0
Sandstone, sand is very fine to fine; below 370 ft, interbedded silt lenses.....	345.0	380.0
Sand, gravelly; medium sand to medium gravel, principally reworked siltstone.....	380.0	386.1
Sand, gravelly; fine sand to fine gravel, little medium gravel.....	386.1	387.2
Silt to siltstone, pinkish gray; below 392 ft, gray.....	388.0	392.3
Limestone, white.....	392.3	392.7
Silt, moderately sandy, slightly clayey, light gray; sand is very fine to fine.....	392.7	396.0
Silty sand to sandy silt; slightly clayey, pale yellow; sand is very fine to fine.....	396.0	400.0
Sand to sandstone; sand is very fine to fine..	400.0	409.0
Silt, slightly clayey, light gray; below 410 ft, moderately clayey, sandy; sand is very fine.....	409.0	412.0
Clay, silty, light gray; some very fine sand and limy grains; below 447 ft, sandy, sand is very fine to medium.....	412.0	453.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, yellow with some light gray....	453.0	460.0
Shale, clayey, olive with some yellow and gray, slightly calcareous; below 465 ft, yellowish brown, some gray.....	460.0	470.0
Shale, clayey, slightly calcareous, light olive brown.....	470.0	475.0
Shale, clayey, very dark gray.....	475.0	480.0

Test Hole #32-B-68
(27N-14W-16ccbc)
Holt County

Location: SW NW SW SW Sec. 16, T. 27 N., R. 14 W., approximately 724 and 77 feet north and 77 feet east of the southwest corner.
Ground elevation: 2,190 ft. (t). (Emmet SW, 7.5 min. quadrangle)
Depth to water: 6.25 ft. (8-24-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very silty; sand is very fine to fine; below 0.5 ft, some medium with trace of coarse	0.0	8.0
Sand; very fine to medium	8.0	14.0
Sandy silt to silty sand; very fine to fine, some medium	14.0	18.0
Silt, very sandy, slightly clayey, gray; sand is very fine to fine	18.0	19.0
Sand, very fine to medium; from 22.8 to 23 ft, contains silty clay lenses; below 31 ft, some coarse with a trace of very coarse	19.0	35.0
Sand, very fine to medium, some coarse with trace of very coarse; below 40 ft, sand is very fine to fine, some medium	35.0	45.0
Sand, gravelly; fine sand to fine gravel	45.0	70.0
Gravel, sandy; very fine sand to very coarse gravel	70.0	80.0
Gravel, sandy; fine sand to medium gravel; below 85 ft, trace of coarse gravel; from 90 to 95 ft, some clay lenses	80.0	98.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty; sand is very fine to fine	98.0	110.0
Silt, moderately sandy, slightly clayey, light gray; sand is very fine to fine; interbedded sandstone	110.0	125.0
Sandstone, sand is very fine to fine with some medium; below 135 ft, some sandy silts; below 140 ft, some rootlets	125.0	151.0
Silt, marly, moderately sandy, light gray; sand is very fine to fine; below 160ft, interbedded silty sandstone	151.0	166.0
Sandstone, silty; sand is very fine to fine	166.0	190.0
Silt, moderately sandy, slightly clayey, slightly calcareous, light gray; sand is very fine to fine	190.0	194.0

Sandstone, silty; sand is very fine to fine; from 205 to 210 ft, interbedded silt zones; below 210 ft, some rootlets.....	194.0	248.0
Silt, marly, sandy, white; sand is very fine to fine.....	248.0	254.0
Sandstone, silty; sand is very fine to fine; below 250 ft, some rootlets; below 255 ft, some interbedded silts; from 265 to 270 ft marl zone; below 280 ft, some shell fragments.....	254.0	284.0
Silt, very sandy, slightly clayey, moderately calcareous, pale yellow; sand is very fine to fine.....	284.0	290.0
Sandstone, silty; sand is very fine to fine; from 295 to 300 ft, some marl lenses; below 310 ft, some rootlets.....	290.0	320.0
Silt, moderately sandy, with interbedded sandstone, pale olive; sand is very fine to fine; contains volcanic ash.....	320.0	329.0
Sandstone, silty; sand is very fine to fine; below 335 ft slightly calcareous.....	329.0	340.0
Silt, moderately sandy, slightly clayey, light gray; sand is very fine to fine; from 345 to 350 ft pale yellow; below 355 ft light grayish brown with some interbedded sandstone lenses.....	340.0	380.0
Sandstone, silty; sand is very fine to fine; some limy nodes.....	380.0	420.0
Silt to siltstone, moderately clayey, moderately sandy, light olive gray; very fine sand to fine gravel; below 422.6 ft, slightly clayey, slightly calcareous.....	420.0	423.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, slightly calcareous, light yellow brown.....	423.0	429.0
Shale, clayey, moderately calcareous, olive yellow; below 430 ft, slightly calcareous, yellow brown.....	429.0	440.5

Test Hole #33-B-68
(27N-14W-33cccc)
Holt County

Location: SW SW SW SW Sec. 33, T. 27 N., R. 14 W., approximately 9 feet north and 175 feet east of the southwest corner.
Ground elevation: 2,205 feet, (t.) (Emmet SW, 7.5 min. quadrangle)
Depth of water: Unknown. Test hole caved at 6 feet (9-6-68)

	Depth, in feet From	To
Quaternary System, Undifferentiated:		
Silty sand to sandy silt, very dark gray; sand is very fine to fine, some medium.....	0.0	3.0
Sand, silty; sand is very fine to fine; below 5 ft, sand is very fine to medium.....	3.0	12.0
Silt, very sandy, slightly clayey, pinkish gray; sand is very fine to fine.....	12.0	20.0
Silty sand to sandy silt, light brown; sand is very fine to fine, little medium.....	20.0	22.0
Silt, very sandy, moderately clayey, pinkish gray; sand is very fine to fine, trace of medium; below 25 ft, light brown.....	22.0	36.0
Clay, very sandy, silty, light gray; sand is very fine to fine.....	36.0	42.0
Silty sand to sandy silt; sand is very fine to fine, some medium.....	42.0	43.0
Silt, very sandy, moderately clayey, light brown; sand is very fine to fine, little medium; below 44 ft, light brown to light gray; below 47 ft, sand is very fine to very coarse, trace fine gravel.....	43.0	50.0
Silt, moderately clayey, sandy, light brown; sand is very fine to medium, trace of coarse; below 55 ft, sand is coarse to very coarse.....	50.0	57.0
Sand, very fine to fine, trace of medium; below 60 ft, sand is very fine to coarse, little very coarse.....	57.0	64.5
Silt, very sandy, moderately clayey, light gray; sand is very fine to fine some medium, trace coarse.....	64.5	65.7
Sand, slightly gravelly; fine sand to fine gravel; below 70 ft, some medium gravel; below 85 ft, some silty areas.....	65.7	100.0
Gravel; fine to coarse.....	100.0	103.0

Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, micaceous, pale brown; some very fine sand; below 105 ft, moderately clayey, silty sand to sandy silts, light brownish gray with olive tint.	103.0	109.0
Silty sand to sandy silts, light brownish gray with olive tint.....	109.0	114.5
Sand, very fine to medium, trace of coarse; below 115 ft, very fine to medium.....	114.5	117.3
Silt, moderately sandy, slightly clayey, pale yellow; sand is very fine to medium.....	117.3	119.5
Sand, very fine to fine, some medium; below 120 ft, some silty zones.....	119.5	125.0
Sandstone, sand is very fine to fine, trace of medium; some rootlets from 130 to 135 ft; below 135 ft, some silty zones.....	125.0	155.0
Sandstone, sand is very fine to fine; below 165 ft some interbedded silt lenses, limy zones, some lime cemented grains.....	155.0	207.0
Silt, very sandy, slightly clayey, sand is very fine to fine.....	207.0	210.0
Sandstone, sand is very fine to fine, much lime cement; below 215 ft, marly zones.....	210.0	218.0
Silt, marly, sandy, white; sand is very fine to fine; contains interbedded sandstone....	218.0	240.6
Sandstone, silty; sand is very fine to fine, some coarse grains; contains interbedded marly zones.....	240.6	249.0
Silt, moderately sandy, slightly clayey, slightly calcareous, pale olive; sand is fine.....	249.0	250.0
Sandstone, silty; sand is very fine to fine, from 260 to 265 ft, rootlets; from 273 to 275 ft, silt zone.....	250.0	283.0
Silt, slightly sandy, in part marly, light gray, moderately calcareous; sand is very fine to fine; below 285 ft, pale yellow....	283.0	290.0
Sandstone, sand is very fine to fine.....	290.0	295.0
Silt, very sandy, slightly clayey, slightly calcareous, pale olive; sand is very fine to fine; below 295 ft, some rootlets.....	295.0	320.0
Sandstone, silty, sand is very fine.....	320.0	329.0
Silt, slightly clayey, sandy, marly, light gray; sand is very fine; contains interbedded sandstone.....	329.0	330.0
Sandstone, silty; sand is very fine to fine; contains interbedded light gray silts; below 350 ft, marl zones.....	330.0	360.0

Silt, moderately clayey, very sandy, slightly calcareous, pale olive; sand is very fine to fine; below 370 ft, very clayey, moderately to slightly calcareous, pale yellow with some light gray; below 385 ft, trace of reworked shale.....	360.0	390.0
Sand, silty; sand is very fine to coarse, some fine gravel and silty zones.....	390.0	410.0
Rubble, reworked sandstone, shale, siltstone, and rootlets.....	410.0	415.0
Sandstone, silty; sand is very fine to fine; contains rootlets.....	415.0	425.0
Silt, slightly clayey, slightly sandy, light olive gray; sand is very fine; below 430 ft, sand is very fine to coarse with a trace very coarse sand and fine gravel; below 435 ft, interbedded sandstone.....	425.0	445.0
Rubble, sand is very fine to coarse, reworked siltstone and sandstone; below 450 ft, principally very fine to very coarse sand.....	445.0	455.0
Silt to siltstone, slightly sandy, slightly calcareous, light brownish gray; sand is very fine; from 460 to 465 ft, much very fine sand to fine gravel; below 465 ft, some sandstone, bentonite and volcanic ash.....	455.0	470.0
Silt to siltstone, limy light gray, slightly calcareous.....	470.0	475.0
Silt, slightly clayey, sandy, light gray, slightly calcareous; below 480 ft, some siltstone; below 490 ft, light brownish gray.....	475.0	492.0
Limestone, very light gray.....	492.0	493.0
Silt, siltstone, moderately sandy, light gray to light brownish gray.....	493.0	510.0
No sample.....	510.0	515.0
Clay, silty, sandy, pale yellow; sand is very fine; below 520 ft, some iron staining and gray mottling.....	515.0	532.0
Cretaceous System - Upper Cretaceous Series- Montana Group:		
Pierre Formation:		
Shale, clayey, black, slightly calcareous; below 540 ft, moderately calcareous.....	532.0	550.0

Test Hole #54-HP-79
(27N-16W-23addd)
Holt County

Location: SE SE SE NE Sec. 23, T. 27 N., R. 16 W., distance measured from topographic map; 2,600 feet south and about 100 feet west of the northeast corner.
Ground elevation: 2,333 ft. (t). (Lambs Lake, 7.5 min. quadrangle)
Depth to water: Not measured. Electric log estimate 35 ft.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium; from 25 to 30 ft, soil, some black.....	0.0	32.0
Silt, slightly clayey, very sandy, black; sand is very fine to medium.....	32.0	34.0
Sand, very fine to medium.....	34.0	50.0
No Sample.....	50.0	55.0
Sand, very fine to medium.....	55.0	60.0
Silt, slightly clayey, sandy, light olive gray; sand is very fine to fine.....	60.0	68.0
Sand, moderately silty; sand is very fine to medium, little coarse.....	68.0	80.0
Silt, very sandy, slightly clayey, light yellowish brown; sand is very fine to fine, trace of medium; from 90 to 95 ft, light gray; from 95 to 104 ft, pale yellow; below 104 ft, very pale brown.....	80.0	107.0
Sand, very fine to medium; below 112 ft, trace coarse sand.....	107.0	116.0
Sand, very fine to very coarse, little very fine gravel.....	116.0	125.0
Sand, gravelly; very fine sand to fine gravel, little medium gravel, trace of coarse gravel.....	125.0	130.0
Sand, slightly gravelly; very fine sand to very fine gravel, little fine gravel.....	130.0	134.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine to medium; rootlet casts.....	134.0	145.0
Sand, very fine to medium; some silt; below 150 ft, trace rootlet fragments, some volcanic ash.....	145.0	180.0
Sand, very fine to medium; contains shell and rootlet fragments; below 190 ft, some volcanic ash.....	180.0	203.0
No sample.....	203.0	205.0

Sandstone, sand is very fine to fine, in part lime cemented; below 220 ft, sand is very fine to medium, some volcanic ash.....	205.0	229.0
Sandstone, moderately silty; sand is very fine to medium.....	229.0	248.0
Sandstone, sand is very fine to medium; below 250 ft, some rootlets; below 260 ft, slightly silty.....	248.0	268.0
Sandstone, sand is very fine to medium; some rootlets; below 270 ft, some volcanic ash..	268.0	350.0
Sandstone, sand is very fine to medium; some interbedded sandy silt lenses; from 390 to 425 ft, moderately to very calcareous.....	350.0	445.0
Sand, very fine to medium; contains dark silicates; below 510 ft, some coarse sand with a trace of very coarse.....	445.0	527.0
Silt, very sandy, slightly clayey, slightly calcareous, pale yellow; sand is very fine to medium; below 538 ft, moderately calcareous; below 540 ft, light olive gray.	527.0	546.0
Sandstone, slightly silty; sand is very fine to medium.....	546.0	560.0
Silt, very sandy, slightly clayey, moderately calcareous, pale yellow; sand is very fine with some medium.....	560.0	565.0
No sample.....	565.0	570.0
Silt, very sandy, slightly clayey, moderately calcareous, pale olive; sand is very fine to medium.....	570.0	575.0
Sand, slightly clayey, very silty, moderately calcareous; sand is very fine to medium....	575.0	580.0
Silt, very sandy, moderately clayey, moderately calcareous, pale yellow; sand is very fine to medium.....	580.0	600.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, silty, moderately calcareous, light yellow.....	600.0	610.0
Shale, clayey, slightly calcareous, very dark gray.....	610.0	620.0

Test Hole #P-4-96
(28N-10W-9cccd)
Holt County

Location: SE SW SW SW Sec. 9, T. 28 N., R. 10 W., approximately 532 feet east and 235 feet north of the southwest corner.
Ground elevation: 1,945 ft. (t). (Page, 7.5 min. quadrangle)
Depth to water: 35.4 ft. (10-9-96) Well screened between 110-120 ft.

	Depth, in feet	
Quaternary System, undifferentiated:		
Topsoil, silt; very sandy, slightly clayey, dark brownish gray.....	0.0	5.0
Sand, medium to very coarse; below 6 ft, sand is silty and medium grained.....	5.0	10.0
Clay, silty, gray; contains wood fragments....	10.0	20.0
Sand, gravelly; fine sand to coarse gravel, some pebbles.....	20.0	62.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty; sand is fine to medium.....	62.0	89.0
Sandstone, fine - grained, moderately cemented; contains rootlet casts; from 100 to 110 ft, silty.....	89.0	120.0

Test Hole #4-B-68
(28N-10W-16bbbb)
Holt County

Location: NW NW NW NW Sec. 16, T. 28 N., R. 10 W., approximately 212 feet south and 7 feet east of the northwest corner.
Ground elevation: 1,948 ft. (t). (Page, 7.5 min. quadrangle)
Depth to water: 30.10 ft (7-3-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, silty; sand is fine to medium.....	0.0	15.0
Sand, fine to coarse; from 20 to 25 ft, trace of coarse sand.....	15.0	35.0
Sand, gravelly; medium sand to medium gravel..	35.0	55.0
Gravel, sandy; medium sand to medium gravel...	55.0	65.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, moderately silty, moderately sandy, light gray; sand is very fine to fine; below 70 ft, light olive gray.....	65.0	72.0
Sand, very clayey, silty; sand is very fine to fine, trace of medium.....	72.0	75.0
Sandstone, sand is very fine to medium, some coarse; contains rootlets; below 80 ft, sand is very fine to fine.....	75.0	85.0
Silt, sandy; sand is very fine to fine; contains interbedded sandstone.....	85.0	88.0
Sandstone, silty; sand is very fine to fine; contains rootlets.....	88.0	93.0
Marl, silty, sandy, white, sand is very fine to fine.....	93.0	97.0
Sandstone, silty; sand is very fine to fine, some medium; below 105 ft, marly.....	97.0	106.0
Sand, very fine to medium.....	106.0	110.0
Sandstone, silty; sand is very fine to medium; from 115 to 120 ft, rootlets; below 120 ft, indurated sandstone zones.....	110.0	140.0
Sand, moderately silty; sand is very fine to medium.....	140.0	145.0
Silt, moderately clayey, very calcareous, light gray.....	145.0	149.0
Siltstone, moderately sandy, moderately calcareous, light gray.....	149.0	150.0
Sandstone, silty; sand is very fine to medium; below 155 ft, some rootlets; below 165 ft, marly.....	150.0	168.0

Silt, moderately clayey, slightly sandy, light gray, very calcareous; sand is very fine to fine.....	168.0	173.0
Sandstone, silty; sand is very fine to fine...	173.0	176.0
Silt, marly, sandy, white; sand is fine to medium.....	176.0	179.0
Sandstone, silty; sand is very fine to fine, trace of medium.....	179.0	180.0
Silt, very sandy, slightly clayey, light gray; sand is very fine to fine, trace of medium; below 185 ft, moderately clayey.....	180.0	187.0
Clay, moderately sandy, moderately silty, light gray; sand is very fine to medium....	187.0	190.0
Silt, moderately sandy, slightly clayey, light gray; sand is very fine to medium; contains marl zones.....	190.0	195.0
Clay, moderately silty, moderately sandy, slightly calcareous; sand is very fine to medium.....	195.0	197.0
Sandstone, marly, silty; sand is very fine to fine.....	197.0	210.0
Silt, sandy, light gray, moderately calcareous; sand is very fine to fine.....	210.0	213.0
Sandstone, silty; sand is very fine to fine...	213.0	215.0
Silt, moderately clayey, moderately sandy, pale olive; sand is very fine to fine; below 220 ft, very sandy; below 225 ft, interbedded sandstone lenses.....	215.0	240.0
Sandstone, sand is very fine to fine, trace of medium.....	240.0	245.0
Sand, very fine to fine; below 265 ft, silty zones; below 270 ft, marly.....	245.0	275.0
Silt, sandy, pale yellow, slightly calcareous; sand is fine with trace of medium.....	275.0	275.5
Clay, moderately silty, moderately sandy, very calcareous, light gray; sand is very fine to fine; below 281 ft, some mottled, light brownish gray.....	275.5	285.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, slightly calcareous, olive yellow; below 297 ft, light olive gray.....	285.0	300.0

Test Hole #5-B-68
(28N-10W-32bbbb)
Holt County

Location: NW NW NW NW Sec. 32, T. 28 N., R. 10 W., approximately 131 feet south and 8 feet east of the northwest corner.
Ground elevation: 1,926 ft. (t). (O'Neill SE, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 4 ft. (7-3-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, slightly silty; sand is very fine to fine, some medium; from 5 to 10 ft, sand is very fine to medium; below 15 ft, sand is slightly coarser	0.0	35.0
Sand, very fine to medium with some coarse sand to fine gravel; contains more medium to coarse sand below 45 ft.....	35.0	85.0
Sand, gravelly; fine sand to fine gravel.....	85.0	90.0
Gravel, sandy; fine sand to medium gravel.....	90.0	100.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to medium; below 105 ft, rootlets; below 120 ft, contains some coarse to very coarse sand; contains silt lenses.....	100.0	140.0
Sand, very fine to fine; below 145 ft, interbedded silt lenses.....	140.0	150.0
Silt, moderately clayey, moderately sandy, pale yellow; sand is very fine to fine.....	150.0	155.0
Sandstone, moderately silty; sand is very fine to fine.....	155.0	160.0
Sand, silty; sand is very fine to fine; contains clay lenses.....	160.0	175.0
Silt, moderately clayey, moderately sandy, pale yellow; sand is very fine to fine.....	175.0	176.0
Sand, very fine to fine, some medium; from 179 to 179.4 ft, silt lens.....	176.0	182.0
Silt, moderately clayey, sandy, moderately calcareous, pale olive; sand is very fine to fine; below 185 ft, white; below 190 ft, very calcareous.....	182.0	193.0
Sand, very fine to medium, trace coarse to very coarse.....	193.0	204.0
Silt, moderately clayey, moderately sandy, pale olive; sand is very fine to fine; below 212 ft, some interbedded sandstone...	204.0	233.0

Clay, moderately silty, sandy, pale olive; sand is very fine to fine; below 234.5 ft, no sand, less silty.....	233.0	235.0
Silt, moderately clayey, sandy, pale olive; sand is very fine to fine.....	235.0	240.0
Sand, very fine to medium.....	240.0	245.0
Silt, clayey, very sandy, pale olive; sand is very fine to fine; below 250 ft, interbedded sandstone.....	245.0	255.0
Sandstone, silty; sand is very fine to fine; below 270 ft, some rootlet fragments.....	255.0	280.0
Silt, moderately sandy, slightly clayey, pale yellow; sand is very fine to fine.....	280.0	282.0
Sand to sandstone, very fine to fine.....	282.0	285.0
Silt, moderately clayey, moderately sandy, pale yellow; sand is very fine to fine; below 289 ft, sand is very fine to medium..	285.0	293.0
Sandstone, sand is very fine to fine; below 295 ft, some rootlet fragments.....	293.0	302.0
Silt, moderately clayey, sandy, pale olive; slightly calcareous from 302 to 305 ft and from 310 to 313 ft; sand is very fine to fine; below 318 ft, less clay, more sand.....	302.0	320.0
Siltstone, very sandy, pale olive; sand is very fine to fine.....	320.0	321.0
Silt, very clayey, moderately sandy; sand is very fine to fine; below 325 ft, slightly calcareous.....	321.0	331.0
Clay, moderately silty, slightly sandy, pale yellow; sand is very fine to fine; below 344 ft, interbedded sandstone lenses.....	331.0	345.0
Sandstone, moderately silty; sand is very fine to medium.....	345.0	350.0
Silt, slightly clayey, slightly sandy, moderately calcareous, pale yellow; sand is very fine to fine; below 352 ft, pale olive, slightly calcareous.....	350.0	355.0
Sandstone, moderately silty; sand is very fine to fine.....	355.0	356.0
Silt, moderately clayey, sandy, light gray; sand is very fine to fine.....	356.0	357.0
Silt, moderately clayey, sandy, very pale brown; sand is very fine to fine; below 375.5 ft, pale yellow; below 370 ft, white, very calcareous, contains limestone lenses.	357.0	372.0
Sand and gravel, fine sand to fine gravel; principally siltstone, claystone and limestone fragments.....	372.0	379.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, clayey, pale yellow with iron staining; below 380 ft, olive gray.....	379.0	382.0
Shale, clayey, very dark gray; contains limy zone below 385 ft.....	382.0	390.0

28N 11W 06BBBB 04-GT-80

Test Hole #4-GT-80
(28N-11W-6bbbb)
Holt County

Location: NW NW NW NW Sec. 6, T. 28 N., R. 11 W., approximately 153 feet east and 72 feet south of the northwest corner.
Ground elevation: 1,967 ft (t). (O'Neill, 7.5 min quadrangle)
Depth to water: Unknown.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to coarse, some very coarse, trace fine gravel, rare medium gravel.....	0.0	2.0
Sand, very fine to coarse, some very coarse sand to very fine gravel; below 12 ft, little medium to very coarse sand; below 17 ft, trace very fine to fine gravel.....	2.0	27.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, moderately clayey, pale olive sand is very fine to fine; below 35 ft, little medium to coarse sand, possible volcanic ash.....	27.0	37.0
Sand, medium to very coarse, trace very fine gravel; some reworked rootlets and sandstone, some silt zones.....	37.0	59.0
Sandstone to sand, sand is very fine to fine, some medium to coarse; contains rootlet fragments and silt zones; below 80 ft, very fine sand to fine gravel, little medium gravel.....	59.0	88.0
Sand to sandstone, sand is very fine to coarse, little very coarse; contains rootlet fragments.....	88.0	112.0
Sandstone, sand is fine; contains rootlet fragments.....	112.0	118.0
Sandstone, sand is very fine to medium; some rootlet fragments; below 135 ft, trace very fine to fine gravel; from 135 to 138 ft, clay layer, silty and sandy.....	118.0	140.0
Sand to sandstone, sand is very fine to fine, some medium, little coarse.....	140.0	155.0
Silt, very sandy, moderately clayey, light olive gray; sand is very fine to fine.....	155.0	160.0
Silty sand to silty sandstone; sand is very fine to fine, some medium, little coarse...	160.0	200.0
Sand, very fine, trace of medium; from 238 to 243 ft and from 274 to 278 ft, clayey...	200.0	296.0

Sandstone, sand is very fine to fine; with olive gray silty zones.....	296.0	344.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, lightly yellowish brown; from 360 to 370 ft, olive yellow; below 370 ft, olive gray and dark olive gray.....	344.0	390.0
Shale, clayey, moderately calcareous, dark olive gray.....	390.0	420.0
Shale, clayey, olive, trace medium gray to dark gray.....	420.0	426.0
Shale, clayey, dark olive gray and dark gray; from 445 to 455 ft, slightly clayey.....	426.0	460.0
Shale, clayey, dark olive gray, moderately calcareous; below 480 ft, very calcareous; below 488 ft, dark gray.....	460.0	503.0

Test Hole #3-UE-99
(28N-11W-21bbba)
Holt County

Location: NE NW NW NW Sec. 21, T. 28 N., R. 11 W., approximately 86.5 ft south and 540 ft east of northwest corner.
Ground elevation: 1,983 ft (t) (Inman, 7.5 min. quadrangle)
Depth to water: 4.5 ft (9-29-99)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Top soil: no sample	0.0	0.6
Sand, tan; very fine to fine, some medium to coarse	0.6	5.0
Silt, slightly clayey, slightly sandy, light gray; sand is very fine	5.0	12.0
Sand, tan; very fine to coarse, some very coarse	12.0	15.0
Silt, slightly clayey, sandy, light brown; sand is very fine	15.0	20.0
Sand, tan; very fine to coarse, some very coarse, contains rare gravel below 30 ft	20.0	32.5
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, moderately clayey, light olive; sand is very fine; contains less clay below 40 ft	32.5	45.0
Sand, silty to silt, sandy, light olive; sand is very fine; contains rootlets and little sandstone; moderately calcareous; indurated from 57 to 58 ft; below 65 ft slightly calcareous	45.0	67.0
Silt, moderately sandy, moderately clayey, light olive; sand is very fine	67.0	70.0
Sand, clayey, silty, light olive; sand is very fine	70.0	75.0
Silty sand to sandy silt, clayey, light olive; sand is very fine; contains trace of rootlets; below 80 ft some sandstone	75.0	90.0
Sand to sandstone; silty, light olive; sand is very fine to fine; contains rootlets	90.0	95.0
Sandstone, light olive; sand is very fine to fine, contains rootlets; below 115 ft slightly silty	95.0	125.0
Sandstone, light olive; sand is very fine to fine; contains rootlets	125.0	139.0
Silt, very sandy, slightly clayey, light olive; sand is very fine	139.0	145.0

Sand to sandstone, light olive; sand is very fine to fine; contains rootlets.....	145.0	150.0
Silt, very sandy, slightly clayey, light olive; sand is very fine to fine; below 154 ft slightly more clayey.....	150.0	156.0
Sand to sandstone, light brown; sand is very fine to fine; below 160 ft moderately calcareous.....	156.0	169.0
Sand to sandstone, moderately silty, clayey, light olive; sand is very fine to fine.....	169.0	182.0
Sandstone, slightly silty, light olive; sand is very fine to fine.....	182.0	189.0
Silt, very clayey, very sandy, light olive; sand is very fine to fine; slightly less clayey below 200 ft.....	189.0	203.0
Silt, moderately clayey, very sandy, light olive; sand is very fine to fine; below 205 ft contains some sandstone.....	203.0	209.0
Silt, very sandy, moderately clayey, light olive; sand is very fine to fine; contains interbedded sandstone.....	209.0	225.0
Sand to sandstone, light olive; sand is very fine to fine.....	225.0	230.0
Silt, moderately clayey, moderately sandy to very sandy, light olive; sand is very fine to fine; below 235 ft slightly less clayey.	230.0	245.0
Sand, light olive; very fine to fine; contains sandstone and reworked clay fragments.....	245.0	251.0
Silty sand and sandy silt, very clayey, pale yellow; sand is very fine.....	251.0	257.0
Sand to sandstone, pale yellow to light brown; sand is very fine with little fine; from 269 to 275 ft trace of silt fragments; below 282 ft silty.....	257.0	285.0
Silt, very sandy, very clayey, pale yellow; sand is very fine, little fine.....	285.0	300.0
Sand to sandstone, very silty, light brown with olive tint; sand is very fine with some fine.....	300.0	308.0
Silt, very sandy, very clayey, pale yellow; sand is very fine, little fine.....	308.0	319.0
Sand to silty sand, slightly clayey, pale yellow; sand is very fine, little fine; below 329 ft moderately clayey.....	319.0	334.0
Sand to sandstone, pale yellow; very fine to fine; contains trace of rootlets.....	334.0	346.0
Sand to sandstone, silty, pale yellow; sand is very fine to fine; contains rare rootlets.....	346.0	354.0

Silty sand to sandy silt, moderately clayey, pale olive; sand is very fine, little fine; below 363 ft less silty; trace claystones..	354.0	375.0
Sand to sandstone, silty, pale olive; sand is very fine, some fine; below 395 ft contains reworked rootlets, green claystone fragments.....	375.0	402.0
Silt, moderately sandy, moderately clayey, brown; sand is very fine, little fine; below 410 ft contains reworked bentonitic clay and shale fragments.....	402.0	420.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, gray with some yellow stain; from 425 to 435 ft gray to olive gray, little dark gray.....	420.0	435.0
Shale, clayey, olive gray to black.....	435.0	440.0

Test Hole #25-B-68
(28N-12W-10aaaa)
Holt County

Location: NE NE NE NE Sec. 10, T. 28 N., R. 12 W., approximately 147 feet west and 5 feet south of the northeast corner.
Ground elevation: 1,996 ft. (t). (O'Neill, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 8 ft. (8-18-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to coarse; contains some rootlets to 1 ft; below 2 ft, trace of fine gravel	0.0	5.0
Sand and gravel, fine sand to fine gravel	5.0	10.0
Sand, fine to coarse; below 25 ft sand is fine to coarse	10.0	30.0
Sand, medium to coarse	30.0	45.0
Sand and gravel, fine sand to coarse gravel	45.0	50.0
Sand, medium to coarse; trace fine gravel	50.0	60.0
Sand, medium, with a trace of very coarse	60.0	64.0
Gravel, fine to coarse	64.0	64.5
Sand, medium to coarse; below 70 ft, trace of gravel	64.5	79.0
Gravel, fine to coarse; below 80 ft, some pebbles, principally granite, siltstone, sandstone, marl fragments	79.0	85.0
Sand, medium to coarse	85.0	92.0
Gravel, sandy; very coarse sand to coarse gravel; interbedded silty sand	92.0	93.0
Silt, sandy, clayey, light olive green	93.0	97.0
Gravel, fine to coarse; interbedded silt sand, medium coarse	97.0	100.0
Sand, medium to coarse	100.0	105.0
Gravel, sandy; very coarse sand to coarse gravel	105.0	106.0
Silt and reworked sandstone	106.0	108.0
Sand, medium to coarse	108.0	113.0
Gravel, fine to coarse	113.0	114.0
Sand, medium to coarse	114.0	115.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is medium; from 120 to 125 ft sand is fine to medium, with interbedded sandy silt; below 125 ft, medium	115.0	130.0

Sandstone, sand is very fine to fine; with interbedded silty sand lenses; from 135 to 140 ft, sand is fine to medium; below 140 ft, sand is medium to coarse.....	130.0	148.0
Silt, very clayey, moderately calcareous, pale yellow.....	148.0	150.0
Marl, silty, light gray; interbedded silty sand lenses.....	150.0	155.0
Sandstone, sand is fine to medium; below 170 ft, sand is very fine to fine; below 175 ft, interbedded silty sand lenses.....	155.0	178.0
Silt, very sandy, light gray; sand is very fine to fine, below 180 ft, some sandstone.....	178.0	183.0
Sand, very silty to silt, very sandy; sand is very fine to fine.....	183.0	185.0
Sand, very silty; sand is very fine to fine...	185.0	195.0
Sandstone, sand is very fine to fine; below 205 ft, interbedded silty sand lenses.....	195.0	208.0
Silt, very sandy to sand very silty, light gray; sand is very fine to fine.....	208.0	210.0
Sand, very silty; sand is very fine to fine...	210.0	215.0
Sandstone, sand is very fine to medium.....	215.0	240.0
Sand, fine to medium; below 256 ft, sand is silty.....	240.0	260.0
Sandstone, sand is very fine to fine, some medium.....	260.0	274.0
Sand, silty; sand is very fine to fine.....	274.0	275.0
Sandstone, sand is very fine, some medium; below 280 ft, some interbedded silty sand lenses.....	275.0	285.0
Sand, silty; sand is very fine to fine; with interbedded sandstone.....	285.0	290.0
Sandstone, sand is very fine to fine; some interbedded silty sand to 295 ft.....	290.0	298.0
Sand, clayey, very silty; sand is very fine to fine.....	298.0	300.0
Sandstone, sand is very fine to fine.....	300.0	303.0
Sand, very silty; sand is very fine to fine; from 305 to 308 ft, from 315 ft to 318 ft, and below 320 ft, interbedded sandstone....	303.0	321.0
Sand, very silty to silt very sandy; sand is very fine to fine.....	321.0	325.0
Silt, very sandy, clayey, light gray; sand is very fine to fine; from 330 to 332 ft, interbedded sandstone.....	325.0	334.0
Sandstone, sand is very fine to fine; contains silt layers.....	334.0	335.0

Silt, sandy, light gray; sand is very fine to fine.....	335.0	342.0
Sandstone, sand is very fine to fine.....	342.0	350.0
Silt, sandy, slightly calcareous, light gray; sand is very fine to fine.....	350.0	357.0
Sand, very silty to silt, very sandy; sand is very fine	357.0	360.0
Silt, very sandy, slightly calcareous, light gray; sand is very fine.....	360.0	377.0
Sandstone, sand is very fine to fine; from 381 to 383.5 ft, silt layers; below 385.5 ft, slightly silty.....	377.0	389.5
Silt, slightly clayey, slightly sandy, light olive; sand is very fine to fine; below 390 ft, in part consolidated.....	389.5	392.5
Sandstone, slightly clayey, silty; sand is very fine to fine.....	392.5	396.0
Sand, very fine to medium; contains a few rounded to flat silt and claystone grains; below 400 ft, sand is very fine to coarse, little fine gravel.....	396.0	403.5
Tertiary System - Oligocene Series - White River Group:		
Chadron Formation(?):		
Clay, light gray with some yellow brown; contains limestone nodules; below 407 ft, light brown.....	403.5	412.0
Clay, slightly silty, slightly sandy, light gray; sand is very fine; below 420 ft, light brownish gray.....	412.0	423.0
Clay, silty, slightly sandy, light brown; sand is very fine; from 426.5 to 430 ft, light gray and brownish gray; below 430 ft, trace yellow brown.....	423.0	435.5
Clay, shale-like, light gray and light yellow brown; below 438.3 ft, rounded ironstone fragments.....	435.5	438.4
Clay, shale-like, light gray with some yellow brown.....	438.4	440.0
Clay, shale-like, mottled, light gray and light yellow brown; some limy nodules; below 443.2 ft, slightly sandy with gravel grains; quartz and ironstone.....	440.0	444.0
Clay, shale-like, slightly sandy, brownish gray, light gray, and yellow brown; contains embedded sand grains; below 445 ft, light medium gray, some yellow brown.....	444.0	451.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, clayey, yellow brown, some light gray, slightly calcareous; below 453 ft, dark gray.....	451.0	455.0
Shale, clayey, dark gray, moderately calcareous; from 455 to 460 ft, trace chalky shale.....	455.0	463.0
Shale, clayey, very dark gray, slightly calcareous; below 465 ft, moderately calcareous; at 468 ft, thin bentonite lens.....	463.0	470.0

Test Hole #24-B-68
(28N-12W-26bbbb)
Holt County

Location: NW NW NW NW Sec. 26, T. 28 N., R. 12 W., approximately 161 feet south and 105 east of the northwest corner.
Ground elevation: 2,038 ft. (t). (O'Neill, 7.5 min. quadrangle)
Depth to water: 5.74 ft. (8-10-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, slightly silty; sand is very fine to medium, trace coarse.....	0.0	1.0
Sand, very fine to coarse.....	1.0	9.0
Silt, moderately clayey, in part very sandy, very light gray; sand is very fine to fine; below 10 ft, slightly to moderately sandy, brown yellow with iron stain, sand is very fine to fine.....	9.0	11.5
Silt, very clayey, light gray.....	11.5	11.8
Silt, moderately clayey, slightly sandy, very dark gray; sand is very fine to fine; below 13 ft, medium gray.....	11.8	13.2
Silt, very sandy, slightly clayey, light gray to olive gray; sand is very fine to fine...	13.2	16.0
Sand, very silty; sand is very fine to fine; below 17 ft, sand is very fine to very coarse; below 25 ft, trace of fine gravel..	16.0	27.0
Sand, gravelly; fine sand to fine gravel.....	27.0	30.0
Sand and gravel; medium sand to fine gravel; below 35 ft, some medium gravel.....	30.0	41.5
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, slightly clayey, silty; sand is very fine to medium.....	41.5	43.0
Sand, silty, slightly clayey; sand is very fine to fine.....	43.0	45.0
Sandstone, slightly silty; sand is very fine to fine; from 50 to 55 ft, some medium sand; below 60 ft, some clayey silt.....	45.0	65.0
Sandstone, sand is very fine to fine.....	65.0	67.0
Silt, very sandy, light olive gray; sand is very fine to fine.....	67.0	70.0
Sandstone, in part silty; sand is very fine to fine, some medium.....	70.0	75.5
Sand, very silty, clayey; sand is very fine...	75.5	80.0
Sandstone, silty; sand is very fine to fine; below 81 ft, no silt, some medium sand.....	80.0	90.0

Sandstone, sand is very fine to fine; contains some rootlet casts.....	90.0	96.0
Sand in part sandstone, very silty, slightly clayey; sand is very fine to fine.....	96.0	102.0
Sandstone in part sand, slightly silty; sand is very fine to fine; from 102 to 111.5 ft, some medium sand.....	102.0	114.3
Silt, very sandy, very clayey, light gray; sand is very fine to fine.....	114.3	115.7
Sandstone, with silty clay layers; sand is very fine to medium.....	115.7	120.0
Sandstone, sand is very fine to medium.....	120.0	125.0
Sandstone, sand is very fine to fine, some medium; contains interbedded silty sand....	125.0	130.0
Sand, some sandstone; very fine to coarse; a trace of clay	130.0	133.6
Sandstone, silty; sand is very fine to fine, some medium; contains silt layers.....	133.6	140.0
Sandstone, very silty, very clayey; sand is very fine to fine, some volcanic ash.....	140.0	142.0
Sand, very silty and clayey; sand is very fine to fine; some volcanic ash; no silt and clay below 150 ft.....	142.0	155.0
Sandstone, sand is very fine to medium.....	155.0	168.7
Silt, very clayey, bentonitic, light gray; sand is very fine.....	168.7	170.0
Sandstone, sand is very fine to medium; contains white siliceous material.....	170.0	175.5
Silt, sandy, light gray; sand is very fine; contains reworked claystone; below 180 ft, some interbedded sandstone.....	175.5	185.0
Sandstone, sand is very fine to fine; from 190 to 194.6 ft, trace of medium sand; below 194.6 ft, sand is very fine and silty.....	185.0	195.0
Sandstone, silty; sand is very fine to fine, trace of medium; below 200 ft, sand is medium.....	195.0	210.0
Sandstone, sand is very fine to fine, some medium; from 216.5 to 220 ft, sand is silty.....	210.0	228.0
Silt, clayey,sandy, light gray; sand is very fine to fine.....	228.0	230.0
Sand, very fine to fine; little clay; from 233 to 235 ft, sand is very fine; below 235 ft, very silty and clayey, sand is very fine to medium.....	230.0	240.0
Sandstone, sand is very fine to fine.....	240.0	245.0
Sand, silty; sand is very fine to fine; below 250 ft, some medium sand.....	245.0	260.0

Sandstone, sand is very fine to medium; below 265 ft, sand is very fine to fine.....	260.0	268.0
Silt, clayey, slightly sandy, light gray; sand is very fine to fine.....	268.0	269.0
Sandstone to sand; very fine to fine, some medium; below 275 ft, slightly silty, sand is very fine to medium.....	269.0	280.0
Sandstone, sand is very fine to fine, some medium; a trace of clay; below 290 ft, interbedded silty sand and clay.....	280.0	295.0
Sand, silty; sand is very fine to fine.....	295.0	300.0
Sandstone, sand is very fine to fine, some medium; from 305 to 310 ft, some siliceous material.....	300.0	315.0
Sandstone, sand is very fine to fine; contains trace of rootlet casts.....	315.0	330.0
Sandstone, sand is very fine to medium, some coarse; below 340 ft, no medium sand.....	330.0	355.0
Sand, silty; sand is very fine to fine; below 357 ft, sand is very fine to medium.....	355.0	359.0
Limestone, sandy, white; contains medium sand, below 360 ft, some fine sand.....	359.0	360.6
Sand, silty; sand is very fine to fine.....	360.6	363.8
Sandstone, sand is very fine to fine, some medium; contains sandy limestone lenses....	363.8	368.5
Sand, silty; sand is very fine to fine.....	368.5	370.0
Sandstone, sand is very fine to fine, some medium; no medium sand below 375 ft.....	370.0	381.8
Silt, sandy and clayey, light gray; sand is very fine to fine.....	381.8	385.0
Sandstone, sand is very fine to fine.....	385.0	385.5
Silt, clayey, sandy, light gray; sand is very fine to fine.....	385.5	390.0
Sandstone, sand is very fine to fine, some medium.....	390.0	392.5
Sand, very silty and clayey; sand is very fine to fine; below 395 ft, no fine sand.....	392.5	401.5
Sandstone, sand is very fine to fine, some medium; trace of medium sand from 405 to 410 ft; below 410 ft, no medium sand, contains claystone and siltstone clasts....	401.5	420.0
Sand, very silty, slightly clayey; sand is very fine to fine; below 425 ft, much silt and clay.....	420.0	429.0
Silt, moderately clayey, moderately sandy, mottled light olive gray and light brown gray; sand is very fine to fine; below 430 ft, very sandy with less clay.....	429.0	431.0

Sand, very silty, slightly clayey; sand is very fine to fine.....	431.0	433.0
Tertiary System - Oligocene Series - White River Group:		
Chadron Formation:		
Silt, very clayey, slightly sandy, mottled light gray and light brown gray; sand is very fine to fine; contains volcanic ash; below 435 ft, moderately clayey, in part very sandy, sand is very fine to medium, rare coarse sand.....	433.0	437.0
Silt, moderately clayey, slightly sandy, mottled light olive gray and light brown gray; sand is very fine to fine; contains volcanic ash; below 440 ft, light olive gray, no sand to very sandy.....	437.0	443.0
Silt, moderately clayey, moderately sandy, light olive gray; sand is very fine to fine, trace of medium; contains volcanic ash; below 445 ft, some medium sand.....	443.0	448.0
Silt, moderately sandy, light olive gray with a trace of yellow stain; sand is very fine to fine, some medium, trace of coarse to very coarse; contains volcanic ash; below 450 ft, less coarse sand.....	448.0	452.0
Silt, moderately clayey, moderately sandy, light olive gray; sand is very fine to fine; contains volcanic ash; from 460 to 462.5 ft, some medium sand; below 462.5 ft, slightly clayey, moderately sandy, in part very sandy.....	452.0	467.0
Clay, bentonitic, light olive gray.....	467.0	475.5
Silt, moderately clayey, slightly sandy, in part moderately sandy, light brown; sand is very fine to fine; below 478 ft, moderately sandy, sand is very fine, some fine with a trace of medium to coarse; below 480 ft, trace of volcanic ash.....	475.5	483.0
Silt, slightly clayey, very sandy, light brown; sand is very fine to medium, with a trace of sandstone; below 485 ft, sand is very fine to fine.....	483.0	488.0
Chalcedony, speckled and claystone.....	488.0	489.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, yellow brown and medium dark gray; from 490 to 492 ft, principally medium yellow brown; below 492 ft, medium brown gray and medium gray.....	489.0	495.0

Shale clayey, medium dark brown gray and medium dark gray, slightly calcareous; from 497 to 498 ft, principally dark gray with brown tint; below 498 ft, dark gray.....	495.0	500.0

Test Hole #30-B-68
(28N-14W-20aaaa)
Holt County

Location: NE NE NE NE Sec. 20, T. 28 N., R. 14 W., approximately 232 feet south and 60 feet west of the northeast corner.
Ground elevation: 2,170 ft. (t). (Emmet NW, 7.5 min. quadrangle)
Depth to water: 3.94 ft. (8-17-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Topsoil	0.0	2.0
Sand, very fine to coarse, some very coarse	2.0	5.0
Sand, very fine to medium, some coarse	5.0	28.0
Silt, clayey, very sandy, gray; sand is very fine to coarse	28.0	30.0
Silt, very sandy, gray; very fine sand with fine gravel	30.0	35.0
Sand and gravel, very fine sand to coarse gravel	35.0	77.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand to sandstone, very silty; sand is very fine to fine; below 80 ft, some medium sand	77.0	100.0
Sandstone, sand is very fine to medium	100.0	125.0
Silt, very sandy, light gray to pale yellow; sand is very fine to fine	125.0	130.0
Silt, very sandy, slightly clayey, pale yellow; sand is very fine to fine	130.0	140.0
Sandstone, sand is very fine to fine; some silty areas	140.0	149.0
Sand, very silty; very fine to fine sand	149.0	160.0
Sandstone, sand is very fine to fine, some medium; very fine to medium sand below 180 ft; silty from 208 to 210 ft	160.0	225.0
Silt, moderately sandy, slightly clayey, pale olive; sand is very fine to fine	225.0	227.0
Sandstone, silty; sand is very fine to medium	227.0	244.0
Silt, moderately sandy, pale olive; sand is very fine to fine, some medium	244.0	248.0
Sandstone, silty, pale olive, lime cemented; sand is very fine to fine; some rootlets; marly with interbedded sandstone below 275 ft	248.0	282.0
Limestone, marly, light gray	282.0	286.0

Sandstone, lime cemented; sand is very fine to medium.....	286.0	296.0
Silt, slightly clayey, slightly sandy; sand is very fine to fine.....	296.0	304.0
Sandstone, in part lime cemented; sand is very fine to medium.....	304.0	310.0
Silt, moderately sandy, slightly clayey, light gray; sand is very fine to medium.....	310.0	315.0
Sandstone, silty; sand is very fine to fine; some limy siltstone and marl from 325 to 330 ft; some rootlets below 330 ft.....	315.0	334.0
Silt, moderately sandy, pale olive.....	334.0	340.0
Sandstone, silty; sand is very fine to fine; some interedded silt lenses.....	340.0	352.0
Silt, very sandy, slightly calcareous to 360 ft, pale olive; sand is very fine to medium; light gray from 355 to 360 ft; below 360 ft, light olive gray.....	352.0	365.0
Sandstone, silty; sand is very fine to fine...	365.0	370.0
Silt, slightly clayey, pale olive with some olive yellow; sand is very fine to fine....	370.0	372.0
Silt, sandy, slightly clayey, light brownish gray; sand is very fine to fine; slightly calcareous from 375 to 380 ft; rootlets from 402 to 406 ft; below 406 ft, interbedded silty sandstone.....	372.0	410.0
Silt, slightly clayey, sandy, light gray; sand is very fine to fine; some interbedded silty sandstone.....	410.0	430.0
Silt, sandy, light gray; sand is very fine to fine.....	430.0	439.0
Sandstone, sand is very fine to fine.....	439.0	440.0
Silt, sandy, slightly clayey, light gray; sand is very fine to fine.....	440.0	445.0
Sand, very silty; sand principally very fine to medium.....	445.0	480.0
Silt, very sandy, light gray; sand is very fine to fine.....	480.0	485.0
Sand, very silty; sand is very fine to fine...	485.0	495.0
Silt, very sandy, light gray; sand is very fine to fine; below 510 ft, much dark silicates.....	495.0	520.0
Silt with interbedded sandstone, light brownish gray; sand is very fine to fine; contains trace of reworked grains; claystone fragments; some coarse to very coarse sand.....	520.0	525.0

Silt, sandy; light brownish gray; contains reworked coarse sand to very fine gravel, claystone clasts, sandstone and quartz sand.....	525.0	530.0
Silt, very sandy, light gray; sand is very fine to fine; contains interbedded reworked, claystone, sandstone clasts, some quartz sand grains.....	530.0	531.0
Silt, clayey, light gray; some reworked sandstone clasts.....	531.0	534.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Iron oxide, weathered zone, lime rich.....	534.0	535.0
Shale, clayey, moderately calcareous, fissile black.....	535.0	540.0

Test Hole #31-B-68
(28N-14W-32dada)
Holt County

Location: NE SE NE SE Sec. 32, T. 28 N., R. 14 W., approximately 1,850 feet north and 188 feet west of the southeast corner.
Ground elevation: 2,220 ft. (t). (Emmet SW, 7.5 min. quadrangle)
Depth to water: 21.67 ft (8-24-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, silty; sand is very fine to coarse.....	0.0	10.0
Sand, very fine to medium, some coarse; very fine to medium below 25 ft; slight trace coarse silty sand from 45 to 50 ft; very silty below 60 ft.....	10.0	68.0
Sand, gravelly; fine sand to fine gravel; contains medium gravel below 75 ft.....	68.0	100.0
Gravel, sandy; medium sand to coarse gravel...	100.0	105.0
Sand and gravel, fine sand to fine gravel.....	105.0	110.0
Sand, very fine to medium, some coarse sand; reworked sandstone from 115 to 120 ft.....	110.0	125.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, pale yellow; sand is very fine to fine.....	125.0	128.0
Sandstone, silty; very fine sand, trace of coarse; rootlets below 130 ft.....	128.0	140.0
Sandstone, silty; sand is very fine to fine; some limy zones and lime cemented sandstone.....	140.0	156.0
Silt, moderately sandy, olive; sand is very fine to fine.....	156.0	160.0
Sandstone, silty; sand is very fine to fine; contains marly silt; in part well consoldated; below 170 ft, some rootlets...	160.0	172.0
Silt, very sandy, pale yellow; contains interbedded silty sandstone; sand is very fine to fine.....	172.0	195.0
Sandstone with interbedded sandy silt; sand is very fine to fine; rootlets below 225 ft...	195.0	232.0
Silt, sandy, pale yellow; sand is very fine to fine.....	232.0	235.0
Sandstone, sand is very fine to fine; contains reworked claystone and siltstone.....	235.0	270.0
Silt, very sandy, pale olive; sand is very fine to fine; marly.....	270.0	274.0

Sandstone, silty; sand is very fine to fine; some marly zones; in part lime cemented....	274.0	302.0
Silty sand to sandy silt, moderately calcareous, pale yellow; marly zones; sand is very fine to fine.....	302.0	306.0
Sandstone, marly zones; sand is very fine to fine.....	306.0	315.0
Silt, moderately sandy, slightly clayey, moderately calcareous, pale yellow; sand is very fine to fine.....	315.0	320.0
Sandy silty to silty sand; sand is very fine to fine.....	320.0	328.0
Silt, very sandy, slightly clayey, very calcareous, pale yellow; sand is very fine to fine.....	328.0	330.0
Sandstone, lime cemented, marly zones; sand is very fine to fine.....	330.0	336.0
Silty sand to sandy silt, in part very calcareous, light gray to pale olive; sand is very fine to fine; contains limy zones.....	336.0	372.0
Silt, very sandy, slightly clayey, moderately calcareous to 375 ft; sand is very fine to fine; contains limy zones.....	372.0	380.0
Sand to sandstone, silty; sand is very fine to fine; little medium sand below 385 ft...	380.0	390.0
Silt, clayey, sandy, moderately calcareous, pale olive; sand is very fine to fine.....	390.0	392.0
Sand, silty; sand is very fine to fine, little medium; interbedded sandstone and limestone lenses.....	392.0	400.0
Silty sand to sandy silt, marly; sand is very fine to fine.....	400.0	405.0
Sand, silty, marly; sand is very fine to fine; some sandstone below 420 ft.....	405.0	422.0
Silt, very sandy, moderately clayey, pale olive; sand is very fine to fine.....	422.0	434.5
Limestone, marly, sandy, brown; sand is very fine to fine.....	434.5	435.0
Clay, silty, sandy, marly, light gray; sand is very fine to fine.....	435.0	445.0
Sand, very silty, slightly clayey; sand is very fine to fine; contains thin bentonitic seams; below 450 ft, limy grains.....	445.0	455.0
Silt, moderately clayey, sandy, very calcareous light gray with pinkish tint; sand is very fine to fine; below 460 ft, less calcareous.....	455.0	475.0

Silt, moderately clayey, moderately sandy, slightly calcareous, grayish brown; sand is very fine to fine; contains limestone lenses.....	475.0	485.0
Silt to siltstone, clayey, sandy, gray; sand is very fine to fine.....	485.0	493.0
Silt, slightly clayey, slightly calcareous, pale olive; some very fine to fine sand; below 495 ft, moderately clayey, contains siltstone and ironstone fragments; below 500 ft, light yellowish brown; below 505 ft, in part sandy, some limy nodules.....	493.0	510.0
Silt to siltstone, clayey, olive gray, slightly calcareous; some ironstone fragments.....	510.0	520.0
Silt to siltstone, some sandy siltstone, slightly calcareous, pale brown to greenish gray; sand is very fine.....	520.0	553.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, black to dark gray; below 555 ft, moderately calcareous.....	553.0	560.0

Test Hole #5-UE-99
(29N-10W-24cccc)
Holt County

Location: SW SW SW SW Sec. 24, T. 29 N., R. 10 W., approximately 147 feet north and 27 feet east of the southwest corner.
Ground elevation: 1,937 ft. (t). (Page, 7.5 min. quadrangle)
Depth to water: 34.29 ft (10-12-99).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Top soil: silt, very sandy, slightly clayey, dark brown; sand is very fine to fine.....	0.0	1.5
Silt, very sandy, slightly clayey, light brown; sand is very fine to fine; below 5 ft light brown.....	1.5	12.5
Sand, light brown; very fine to medium; from 15 to 20 ft medium to coarse, little very coarse; below 20 ft medium to very coarse, trace of fine gravel.....	12.5	25.0
Sand, gravelly; medium sand to fine gravel, trace of medium gravel; rare pebbles from 30 to 35 ft; medium sand to medium gravel, trace of coarse gravel below 35 ft.....	25.0	40.0
Sand, gravelly; medium sand to medium gravel, little coarse gravel with silt lens.....	40.0	45.0
Sand, very fine to very coarse, little very fine gravel; contains silt lens.....	45.0	50.0
Sand, gravelly; fine sand to fine gravel, little medium to coarse gravel; contains silt lens.....	50.0	55.0
Gravel, sandy; medium sand to medium gravel, rare pebbles; contains clay lens.....	55.0	60.0
Sand, gravelly; medium sand to medium gravel, little coarse gravel.....	60.0	65.0
Sand, very fine to very coarse, little very fine to fine gravel, trace of medium gravel; silt lens below 68 ft.....	65.0	70.0
Sand, very fine to coarse, little very coarse.	70.0	75.0
Sand, gravelly; very fine sand to fine gravel, little medium gravel; rare coarse gravel below 85 ft.....	75.0	88.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine.....	88.0	98.5
Clay, silty, olive; contains some fine sand...	98.5	101.0

Sand, light gray, sand is very fine to fine; contains reworked claystone fragments.....	101.0	112.0
Clay, silty, sandy, light olive; sand is very fine to fine.....	112.0	115.0
Sand, light brown, very fine to fine; contains reworked claystones.....	115.0	119.0
Clay, silty, sandy, light olive; sand is very fine.....	119.0	123.0
Sand to sandstone, white, lime cemented; very fine to fine sand.....	123.0	134.0
Sand to sandstone, limy, silty, pale olive; sand is very fine to fine.....	134.0	144.0
Silt, moderately clayey to clay, sandy, slightly calcareous, pale olive; sand is very fine to fine.....	144.0	147.0
Sandstone, pale olive, lime cemented; sand is very fine to fine.....	147.0	169.0
Sandstone, pale olive; silty, lime cemented; sand is very fine to fine; less silt below 174 ft.....	169.0	183.0
Silty sand with sandstone, pale olive, very calcareous; sand is very fine.....	183.0	185.0
Silt, very sandy, moderately clayey, very calcareous, olive; sand is very fine to fine.....	185.0	193.0
Sand to sandstone, silty, lime cemented, olive; sand is very fine to fine; contains rootlets below 200 ft.....	193.0	205.0
Sand, olive; very fine to fine; contains trace of sandstone; contains reworked clay fragments; below 265 ft no clay fragments.....	205.0	267.0
Silt, very sandy, slightly clayey, olive; sand is very fine to fine; below 278 ft slightly more clayey.....	267.0	281.0
Silt, very sandy, clayey, olive; sand is very fine to fine.....	281.0	290.0
Silt, sandy, gray; very fine to medium sand; contains a little sandstone; contains some clay fragments; contains clay layer from 303 to 307 ft; contains clay fragments below 310 ft; contains trace of rootlets below 320 ft.....	290.0	331.0

Cretaceous System - Upper Cretaceous Series - Montana Group:
Pierre Formation:

Shale, clayey, slightly calcareous, yellowish brown.....	331.0	345.0
Shale, clayey, slightly calcareous, dark olive; below 350 ft dark olive to dark olive gray.....	345.0	360.0

Test Hole #4-A-68
(29N-10W-33aaaa)
Holt County

Location: NE NE NE NE Sec. 33, T. 29 N., R. 10 W., approximately 136 feet east and 15.3 feet south of the northeast corner.
Ground elevation: 1,954 ft. (t). (Page, 7.5 min. quadrangle)
Depth to water: 36.13 ft (7-3-68)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill, no sample.....	0.0	0.5
Sand, slightly silty; sand is fine to very coarse, some gravel.....	0.5	5.0
Silt, moderately clayey, slightly sandy, brownish yellow; sand is very fine to fine, some medium; below 6 ft, less clayey, moderately sandy, sand is fine to coarse, trace gravel.....	5.0	10.3
Sand, fine to coarse, trace gravel.....	10.3	15.3
Silt, sandy, pale yellow; sand is very fine to fine, trace medium.....	15.3	16.0
Clay, slightly silty, sandy, pale yellow; sand is very fine to fine.....	16.0	17.0
Sand, fine to coarse, trace of gravel.....	17.0	20.0
Gravel, sandy; fine sand to medium gravel; below 25 ft, some coarse gravel.....	20.0	35.0
Sand, silty; very fine to fine.....	35.0	40.0
Sand, silty; sand is very fine to medium; contains trace of very coarse gravel; below 45 ft, much coarse gravel.....	40.0	50.0
Sand, gravelly; fine sand to coarse gravel, trace pebbles and cobbles; poor samples....	50.0	60.0
Sand, gravelly; fine sand to coarse gravel; below 70 ft, contains interbedded silt lenses.....	60.0	75.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, fine to coarse; contains rootlets; below 80 ft, sand is very fine to fine.....	75.0	85.0
Sandstone, silty; sand is very fine to medium; below 95 ft, less medium sand; from 105 to 110 ft many rootlets; below 110 ft, interbedded silt lenses.....	85.0	115.0
Sandstone with interbedded silt lenses; sand is very fine; from 120 to 140 ft, some rootlets; below 160 ft, sand is very fine to medium.....	115.0	170.0

Silt, clayey, sandy, pale olive; sand is very fine to fine, some medium.....	170.0	175.0
Sandstone, sand is very fine to fine, some medium; below 180 ft some rootlets.....	175.0	189.0
Silt, marly, clayey, sandy, white; sand is very fine to fine.....	189.0	191.0
Sandstone, silty; sand is very fine to fine, some medium; contains limy lenses.....	191.0	194.0
Silt, clayey, sandy, pale olive; sand is very fine to fine; some limy lenses.....	194.0	202.0
Sandstone, silty; sand is very fine to fine, some medium; contains interbedded silt lenses; some marly areas.....	202.0	260.0
Sandstone, silty; sand is very fine to medium; contains silty lenses; from 285 to 290 ft, some rootlets; below 290 ft some siltstone; below 310 ft some reworked Pierre Shale....	260.0	320.0
Sand to sandstone; sand is very fine to coarse; some silt lenses.....	320.0	344.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, silty, brownish yellow; below 345 ft, some gray mottling; from 345 to 346 ft, moderately calcareous; from 346 to 350 ft, slightly calcareous.....	344.0	360.0

Test Hole #14-A-44
(29N-11W-5bbbb)
Holt County

Location: NW NW NW NW Sec. 5, T. 29 N., R. 11 W., approximately 6 feet south and 56 feet east of the northwest corner.
Ground elevation: 2,004 ft. (t). (Meek SW, 7.5 min. quadrangle)
Depth to water: 11.3 ft. (7-15-44)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill; sand and fine gravel.....	0.0	5.0
Gravel, medium with sand.....	5.0	10.0
Gravel, medium to coarse.....	10.0	15.0
Gravel, medium to fine.....	15.0	20.0
Gravel, medium.....	20.0	25.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty, clayey, light gray.....	25.0	30.0
Clay, silty, calcareous, light tan; below 35 ft light brown to gray.....	30.0	40.0
Sand, silty, clayey.....	40.0	45.0
Clay ,sandy, light gray to brown; below 50 ft indurated.....	45.0	60.0

Test Hole #0-5-96
(29N-11W-21caad)
Holt County

Location: SE NE NE SW Sec. 21, T. 29 N., R. 11 W., approximately 2,638 feet east and 2,135 feet north of the southwest corner.
Ground elevation: 2,000 ft. (t). (Inman, 7.5 min. quadrangle)
Depth to water: 38.40 ft. (10-1-96). Well screened between 265 - 275 feet.

	Depth, in feet From	To
Quaternary System, undfferentiated:		
Topsoil: silt, very sandy, moderately clayey, very dark grayish brown; sand is very fine to fine.....	0.0	1.5
Silt, very sandy, moderately clayey, brown; sand is very fine to very coarse.....	1.5	3.0
Sand and gravel, very fine sand to fine gravel at 97.4 ft, clay layer from 10 to 20 ft, some medium to coarse gravel.....	3.0	30.0
Sand, gravelly; fine sand to medium gravel, some coarse to very coarse gravel.....	30.0	40.0
Clay, silty, light brownish gray.....	40.0	47.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, clayey, silty; sand is fine to very coarse; contains rootlets.....	47.0	53.0
Clay, very silty, moderately sandy, pale olive; sand is very fine to very coarse....	53.0	66.0
Sandstone, very fine to fine, in part moderately silty; sand is very fine to very coarse; contains rootlets, between 70 ft, some silty clay lenses.....	66.0	80.0
Silt, very sandy, light olive gray; sand is very fine to fine; some rootlets below 100 ft, interbedded sandstone, in part silty...	80.0	150.0
Silty sand to sandstone; sand is fine below 160 ft, some medium sandstone, below 170 ft some wood fragments and rootlets.....	150.0	200.0
Sand, silty; sand is very fine to fine.....	200.0	220.0
Sandstone, fine grained; below 280 ft, little iron-stained weathered shale fragments.....	220.0	290.0
Silt, sandy, pale olive; sand is very fine to fine; below 300 ft trace shale fragments; below 310 ft abundant weather shale fragments.....	290.0	320.0

Test Hole #12-A-98
(29N-11W-34ccdb)
Holt County

Location: NW SE SW SW Sec. 34, T. 29 N., R. 11 W., approximately 344 feet north and 816 east of the southwest corner.
Ground elevation: 1,945 ft. (t). (Inman, 7.5 min. quadrangle)
Depth to water: 2.40 ft. (8-6-98) Well screened between 218-223 ft.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Topsoil, silt; organic, sandy, black; sand is very fine to fine; below 2 ft, slightly calcareous	0.0	3.0
Sand, slightly silty; sand is medium, some coarse	3.0	3.5
Silt, very sandy, slightly clayey, olive gray; sand is fine to medium	3.5	4.0
Sand, coarse to very coarse, trace fine gravel	4.0	6.0
Sand, very silty; sand is very fine to fine, some medium; below 6.5 ft, less silt	6.0	10.0
Sand, silty; sand is very fine to fine, some medium sand to coarse gravel	10.0	15.0
Soil, silty, clayey, sandy, medium dark gray; sand is very fine to fine	15.0	18.0
Sand, fine to very coarse, some gravel	18.0	19.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine, some fine; below 23 ft, sand is very fine to fine; some interbedded silt lenses	19.0	28.0
Siltstone to sandstone; moderately calcareous grayish brown; sand is very fine, some fine	28.0	33.0
Sandstone to siltstone, moderately calcareous light brownish gray; sand is very fine, trace fine	33.0	38.0
Sandstone, moderately silty; sand is very fine to fine, some medium	38.0	45.0
Sand, sand is very fine to fine, some medium; contains some cemented zones	45.0	68.0
Sand, fine, some very fine to medium; from 73 to 78 ft, trace of medium; below 78 ft, more medium sand, some cemented zones; below 98 ft, some rootlets	68.0	103.0
Sandstone, sand is very fine to fine, with medium	103.0	104.0

Sand, in part sandstone, silty; sand is very fine to fine, some medium; contains volcanic ash.....	104.0	123.0
Sandstone and siltstone, clayey; sand is very fine, some fine; below 128 ft, some cemented zones; contains volcanic ash.....	123.0	133.0
Sand to sandstone, sand is very fine to fine, some medium, trace of clay; contains volcanic ash.....	133.0	138.0
Sand, very fine to fine, some medium, trace clay; contains volcanic ash; below 143 ft, slightly silty; no ash overhead below 148 ft.....	138.0	153.0
Sand, moderately silty; sand is very fine to fine, some medium; below 163 ft, sand is very fine, some fine.....	153.0	168.0
Siltstone to sandstone, silty, moderately calcareous, olive; sand is very fine, some fine.....	168.0	188.0
Sandstone to siltstone; sand is very fine, moderately consolidated.....	188.0	193.0
Sandstone, sand is very fine to fine, much medium; below 198, less medium sand.....	193.0	218.0
Sand, fine, some very fine, trace of medium; below 228 ft, some cemented zones.....	218.0	233.0
Sand to sandstone, sand is very fine to fine, trace of medium; below 238 ft, sand is slightly silty, very fine to fine.....	233.0	250.0
Sand to sandstone; sand is very fine to fine..	250.0	258.0
Sandstone, sand is very fine to fine.....	258.0	268.0
Sandstone, silty; sand is very fine, some fine; below 273 ft, sand is very fine to fine; below 278 ft, some rootlets; from 298 to 303 ft, some claystone fragments; below 303 ft, rare bone fragment.....	268.0	308.0
No sample.....	308.0	315.0
Clay, weathered, gray, some sand grains.....	315.0	316.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, light medium gray, some yellow orange with trace white, some sand grains.....	316.0	323.0
Clay, medium gray; contains limy and siliceous fragments.....	323.0	325.0
Clay, dark gray, little black; contains sand grains and limestone fragments.....	325.0	328.0

Test Hole #2-A-44
(29N-12W-2aaaa)
Holt County

Location: NE NE NE NE Sec. 2 T. 29 N., R. 12 W., approximately 33 feet south and 11.5 feet west of the northeast corner.
Ground elevation: 2,014 ft. (t). (Meek SW, 7.5 min. quadrangle)
Depth to water: 17.8 ft. (6-29-44)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Topsoil and sand, fine.....	0.0	5.0
Sand and gravel, fine.....	5.0	20.0
Gravel, coarse.....	20.0	30.0
Sand, coarse; and gravel.....	30.0	35.0
Gravel, coarse; contains some silty sand.....	35.0	40.0
Sand, silty; sand is fine, contains gravel....	40.0	55.0
Gravel, medium; some calcareous deposits.....	55.0	60.0
Gravel, fine; some sandy silt; some calcareous deposits.....	60.0	65.0
Gravel, medium; silty sand and calcareous deposits.....	65.0	70.0

Test Hole #9-A-44
(29N-12W-3bbbb)
Holt County

Location: NW NW NW NW Sec. 3, T. 29 N., R. 12 W., approximately 7 feet south and 31 feet east of the northwest corner.
Ground elevation: 2,019 ft. (t). (Meek SW, 7.5 min. quadrangle)
Depth to water: 16.2 ft. (7-12-44)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and topsoil; some gravel.....	0.0	5.0
Gravel, medium; contains some tan silty clay; some pebbles.....	5.0	10.0
Gravel, medium; light yellow.....	10.0	25.0
Tertiary System - Miocene Series - Ogallala Group:		
Limestone, tannish gray to green.....	25.0	35.0
Silt, clayey, sandy, light tan.....	35.0	40.0
Limestone, tan to gray.....	40.0	50.0

Test Hole #12-A-44
(29N-12W-3dddd)
Holt County

Location: SE SE SE SE Sec. 3, T. 29 N., R. 12 W., approximately 34 feet west and 8 feet north of the southeast corner.
Ground elevation: 2,029 ft. (t). (Meek SW, 7.5 min. quadrangle)
Depth to water: 25.6 ft. (7-14-44)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill; medium gravel and light brown sandy clay.....	0.0	5.0
Gravel, coarse; from 10-15 ft medium.....	5.0	20.0
Gravel, some fine sand.....	20.0	25.0
Gravel and pebbles.....	25.0	30.0
Tertiary System - Miocene Series - Ogallala Group:		
Silty clay and limestone.....	30.0	40.0
Limestone.....	40.0	50.0

Test Hole #10-A-44
(29N-12W-15bbbb)
Holt County

Location: NW NW NW NW Sec. 15, T. 29 N., R. 12 W., approximately 34 feet east and 15 feet south of the northwest corner.
Ground elevation: 2,036 ft. (t). (O'Neill, 7.5 min. quadrangle)
Depth to water: 11.9 ft. (7-14-44)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and medium gravel.....	0.0	5.0
Gravel, medium; below 10 ft, some pebbles.....	5.0	15.0
Gravel and clay, silty and sandy.....	15.0	20.0
Gravel and limestone fragments.....	20.0	25.0
Gravel, coarse; some clay, silty to sandy.....	25.0	30.0
Gravel, very coarse; below 35 ft, medium.....	30.0	40.0
Gravel, fine; below 45 ft, some ogallala fragments.....	40.0	50.0

Test Hole #26-B-68
(29N-12W-26bcbc)
Holt County

Location: SW NW SW NW Sec. 26, T. 29 N., R. 12 W., approximately 1,900 feet south and 64 feet east of the northwest corner.
Ground elevation: 1,988 ft. (t). (O'Neill, 7.5 min. quadrangle)
Depth to water: 8.17 ft (8-9-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand and gravel; fine sand to medium gravel...	0.0	1.5
Sand, very fine to coarse; below 3 ft, sand is medium to coarse.....	1.5	5.0
Sand and gravel; very fine sand to coarse gravel; contains sandy silt layers to 10 ft.....	5.0	11.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, light gray.....	11.0	15.0
Sandstone, sand is very fine to fine, some medium.....	15.0	28.0
Sand and gravel, fine sand to medium gravel...	28.0	40.0
Sand, very fine to medium; very fine to fine and slightly silty below 42 ft.....	40.0	50.0
Sand, very fine to medium.....	50.0	53.0
Silt, very sandy, light gray; sand is very fine.....	53.0	56.0
Sand to sandstone, very fine to medium.....	56.0	103.0
Silt, slightly sandy, light gray.....	103.0	105.0
Sandstone, sand is very fine to medium; some interbedded sandy silt.....	105.0	145.0
Silt, very sandy, clayey, moderately calcareous, pale yellow.....	145.0	152.0
Sandstone, sand is very fine to medium.....	152.0	155.0
Silt, very sandy, light gray; sand is very fine to medium.....	155.0	158.0
Sandstone, sand is very fine to medium.....	158.0	161.0
Sand, very silty, clayey, limey.....	161.0	168.0
Sandstone, with sand, very fine to medium, in part very fine to fine grained; contains some interbedded silt; below 210 ft, contains some fine to medium gravel, principally siltstone and sandstone.....	168.0	249.0
Sand, very silty, clayey; sand is very fine to fine, some medium.....	249.0	250.0
Silt, very sandy, slightly to moderately clayey, light olive gray; sand is very fine to fine.....	250.0	255.0

Sand, very silty; slightly clayey, light olive gray; sand is very fine to medium.....	255.0	260.0
Sand, slightly silty; sand is very fine to fine, some medium.....	260.0	268.0
Silt, very sandy, slightly clayey, light olive gray; sand is very fine to fine, trace of medium.....	268.0	270.0
Sandy silt to silty sand, partially cemented, some clayey silt; light olive gray; sand is very fine to fine.....	270.0	275.0
Sand, silty; very fine to fine; some medium; less silty from 285 to 290 ft; limey areas from 290 to 295 ft.....	275.0	300.0
Sand, very fine to fine, some medium.....	300.0	310.0
Silt, clayey; light gray; some indurated layers; yellow brown and medium gray below 313 ft.....	310.0	314.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, slightly calcareous, light gray and yellow brown; dark brown gray possible fossil fragment from 322 to 322.7 ft; some medium gray from 333 to 338 ft; some dark gray below 338 ft.....	314.0	340.0

Test Hole #13-A-44
(29N-12W-26cbbb)
Holt County

Location: NW NW NW SW Sec. 26, T. 29 N., R. 12 W., approximately 2,609 feet north and 11 feet east of the southwest corner.
Ground elevation: 1,986 ft. (t). (O'Neill, 7.5 min quadrangle)
Depth to water: 3.1 ft. (7-14-44)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Topsoil and road fill; contains clay and coarse sand	0.0	5.0
Gravel, sandy; contains fine gravel to coarse sand	5.0	10.0
Soil, black	10.0	20.0
Gravel, medium; contains some fine sand	20.0	25.0
Sand and gravel; fine sand to coarse gravel	25.0	30.0
Gravel, coarse; contains some silty sand; white to tan	30.0	35.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, sandy; some limestone	35.0	50.0
Sand, fine	50.0	60.0
Limestone	60.0	85.0

Test Hole #27-B-68
(29N-14W-5aaaa)
Holt County

Location: NE NE NE NE Sec. 5, T. 29 N., R. 14 W., approximately 116 feet south and 102 feet west of the northeast corner.
Ground elevation: 2,094 ft. (t). (Atkinson, 7.5 min. quadrangle)
Depth to water: 17.20 ft. (8-13-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand and gravel, silty; fine sand to medium gravel	0.0	2.0
Sand, very fine to medium, some coarse	2.0	5.0
Sand and gravel, very fine sand to medium gravel; below 10 ft, medium sand to coarse gravel; from 15 to 20 ft, trace of yellow clay	5.0	39.0
Silt, very clayey, dark greenish gray	39.0	39.2
Gravel, sandy; medium sand to coarse gravel	39.2	41.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, silty, pale brown	41.0	43.0
Clay, silty, light brownish gray	43.0	45.0
Silt, very clayey, slightly sandy, very calcareous in part, white and light gray	45.0	48.0
Sandstone to sand, very fine to medium sand; slightly silty; below 52 ft, very silty, sand is very fine	48.0	55.0
Sandstone to sand, very fine to medium, in part very fine to fine; silty from 60 to 60.8 ft and below 60.9 ft	55.0	65.0
Sandstone, sand is very fine to fine, some medium; silt with siliceous material from 70 to 75 ft	65.0	80.0
Sandstone, sand is very fine to fine; some interbedded silt layers	80.0	130.0
Sand, very silty; very fine sand	130.0	135.0
Marl, white; thin limestone layers below 136 ft	135.0	136.8
Sandstone, sand is very fine to medium, in part consolidated; silty and limy areas; principally very fine to fine below 170 ft	136.8	240.0
Sand, very silty; sand is very fine to fine; below 255 ft, sand is very fine to medium	240.0	265.0

Sandstone, sand is very fine to fine; very silty below 290 ft.....	265.0	313.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, yellowish brown to grayish brown below 320 ft, olive yellow to dark gray.....	313.0	340.0

Test Hole #1-UE-99
(29N-14W-13bcbc)
Holt County

Location: SW NW SW NW Sec. 13, T. 29 N., R. 14 W., approximately 1,962 ft south and 32 ft east of the NW corner.
Ground elevation: 2,052 ft. (t) (Emmet NW, 7.5 min. quadrangle)
Depth to water: 4 ft (9-24-99)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Top soil: silt, clayey, sandy, black; sand is very fine to medium, some coarser grains...	0.0	2.0
Sandstone, very dark brown; sand is very fine to medium, few coarser grains.....	2.0	5.0
Sand, light gray; sand is very fine to medium, some coarse to very coarse.....	5.0	10.0
Sand, gravelly; very fine sand to fine gravel.	10.0	20.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, light gray; very fine to medium; contains few rootlets; contains some siltstone below 30 ft.....	20.0	35.0
Sand, olive green; very fine to fine, some medium; contains some rootlets and sandstone fragments; less medium sand below 40 ft.....	35.0	45.0
Sand to sandstone, olive; sand is very fine to medium; little coarse; much rootlet fragments.....	45.0	50.0
Sand, olive; sand is very fine to fine, little medium to coarse; some rootlet fragments...	50.0	55.0
Sand, olive; very fine to fine, little medium; some rootlets.....	55.0	60.0

Test Hole #2-UE-99
(29N-14W-14daab)
Holt County

Location: NW NE NE SE Sec. 14, T. 29 N., R. 14 W., approximately 2,639 ft south and 462 ft west.
Ground elevation: 2,055 ft. (t) (Emmett NW, 7.5 min. quadrangle)
Depth to water: 4.8 ft (9-24-99)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Top soil: no sample	0.0	0.6
Sand, slightly silty, gray; sand is very fine to medium, little coarse; some very fine gravel below 15 ft	0.6	20.0
Sand, very fine to coarse, some medium sand to fine gravel; gray	20.0	30.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very clayey, bentonitic, light olive gray	30.0	40.0
Sandstone, silty, light olive; sand is very fine to fine, little medium; contains rootlets	40.0	45.0
Silt, very clayey, slightly sandy, light olive gray; sand is very fine	45.0	50.0
Sand, moderately to very silty, with sandstone, light olive gray; sand is very fine to fine with a trace of rootlets	50.0	55.0
Sand to sandstone, olive gray; sand is very fine to fine; trace of rootlets	55.0	60.0
Sand, light gray; very fine to fine; contains rootlets; olive gray below 70 ft; silty below 95 ft	60.0	99.0
Silt, very sandy, slightly clayey, light gray; sand is very fine, some fine	99.0	100.0
Sand to sandstone, silty, light olive; sand is very fine	100.0	110.0
Silt, very sandy, slightly clayey, light olive; sand is very fine	110.0	115.0
Sand, slightly to very silty, light olive; sand is very fine to fine	115.0	129.0
Silt, moderately clayey, slightly sandy, light olive; sand is very fine	129.0	135.0
Sand to sandstone, very silty, light olive; sand is very fine	135.0	145.0
Silt, sandy to sand, silty, moderately clayey, light olive; sand is very fine	145.0	165.0

Sand to sandstone, slightly silty, light olive; sand is very fine, some fine; moderately silty below 175 ft; contains rootlets.....	165.0	185.0
Sand, slightly silty, light olive; sand is very fine to fine; contains rootlets.....	185.0	190.0
Sand, light olive; very fine to fine; contains rootlets; slightly silty from 195 to 200 ft; below 223 ft variably clayey.....	190.0	250.0
Sand to sandstone, light olive; sand is very fine; rootlets from 260 to 265 ft.....	250.0	267.0
Sand to sandstone, light olive, in part lime cemented.....	267.0	277.0
Sand, very silty, light olive, in part lime cemented.....	277.0	287.0
Sand to sandstone, light olive; sand is very fine to fine, some lime cement.....	287.0	298.0
Sand to sandstone, silty, light olive; sand is very fine to fine; contains claystone fragments and limy material below 300 ft...	298.0	310.0
Sand to sandstone, slightly silty, light olive; sand is very fine to fine.....	310.0	316.0
Sand to sandstone, moderately to very silty, light olive; sand is very fine to fine; clayey below 325 ft.....	316.0	335.0
Sandstone, silty, light olive; sand is very fine to fine; contains reworked bentonitic claystone, limestone fragments; contains rare bone fragment below 340 ft.....	335.0	344.0
Sand to sandstone, olive gray to light gray; sand is very fine to fine; contains bentonitic claystone and siliceous fragments.....	344.0	356.0
Sand, slightly to moderately silty, olive gray; sand is very fine to fine; contains reworked claystone and siltstone fragments; contains less silt below 362 ft.....	356.0	380.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, shaley, pale olive, some yellow with gray.....	380.0	386.5
Shale, clayey, moderately calcareous, black...	386.5	400.0

Test Hole #28-B-68
(29N-14W-17dddc)
Holt County

Location: SW SE SE SE Sec. 17, T. 29 N., R. 14 W., approximately 8 feet north and 402 feet west of the southeast corner.
Ground elevation: 2,106 ft. (t). (Emmet NW, 7.5 min quadrangle)
Depth to water: 8.43 ft. (8-17-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	5.0
Soil, silty, clayey, sandy	5.0	7.0
Sand, very fine to coarse	7.0	8.0
Silt, clayey, sandy, light brownish gray	8.0	10.0
Sand, very fine to coarse, trace very coarse; below 15 ft, very fine to medium, trace coarse	10.0	24.0
Sand and gravel, medium sand to fine gravel; below 25 ft, fine sand to coarse gravel	24.0	30.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine to fine, some medium; from 35 to 40 ft, some rootlet casts; below 40 ft, sand is very fine to medium, some coarse	30.0	53.0
Silt, sandy white	53.0	55.0
Sandstone, sand is very fine to fine, some medium	55.0	65.0
Marl, white	65.0	69.0
Silt, sandy, white, slightly calcareous	69.0	70.0
Sand, very silty; very fine to fine sand	70.0	75.0
Sandstone, sand is very fine to fine, some medium; interbedded sandy silt from 81 to 85 ft, 92 to 95 ft, and from 136 to 140 ft	75.0	148.0
Sand to sandstone, very silty; sand is very fine to fine	148.0	150.0
Sandstone to sand, sand is very fine to fine; in part silty; contains marly silt layer from 160 to 162 ft; below 162 ft, some medium sand	150.0	176.0
Silt, very sandy, clayey, pale olive to pale yellow, slightly calcareous to in part noncalcareous	176.0	200.0
Sandstone to sand, sand is very fine to fine; very silty from 202 to 215 ft; below 225 ft, sand is very fine to medium	200.0	239.0

Silt, sandy, slightly clayey, pale yellow.....	239.0	240.0
Sand to sandstone, sand is very fine to fine; some silt; very silty below 262 ft; some rootlet casts below 285 ft.....	240.0	286.0
Silt, very sandy, pale olive; sand is very fine to fine.....	286.0	290.0
Sandstone, sand is very fine to fine, some medium; rootlet casts; some silty areas....	290.0	297.0
Silt, clayey, sandy, olive to pale olive; sand is very fine to fine.....	297.0	315.0
Sandstone, silty, pale olive; sand is very fine; some interbedded silty lenses; some rootlet casts; below 330 ft, much reworked siltstone gravel.....	315.0	354.0
Silt, moderately sandy, pale olive; sand is very fine; slightly to moderately clayey below 358 ft.....	354.0	365.0
Sandstone, silty, pale olive; sand is very fine; contains some rootlets and limy nodules.....	365.0	375.0
Silt, clayey, very sandy, pale olive; sand is very fine to fine; contains some reworked siltstone; some volcanic ash from 380 to 390 ft.....	375.0	408.0
Silt, clayey, sandy, pale yellow; sand is very fine to fine.....	408.0	420.0
Silt to siltstone, moderately sandy, pale yellow; sand is very fine; below 422 ft some silty sandstone.....	420.0	428.0
Clay, silty, sandy, pale yellow; sand is very fine to fine, some medium.....	428.0	430.0
Silt, moderately clayey, moderately sandy, light brownish gray; sand is very fine.....	430.0	434.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, olive; light olive brown to light yellow brown below 435 ft.....	434.0	439.0
Shale, clayey, olive to gray.....	439.0	449.0
Shale, clayey, slightly calcareous, very dark gray.....	449.0	450.0

Test Hole #29-B-68
(29N-14W-33cccc)
Holt County

Location: SW SW SW SW Sec. 33, T. 29 N., R. 14 W., approximately 92 feet north and 11 feet east of the southwest corner.
Ground elevation: 2,139 ft. (t). (Emmet NW, 7.5 min. quadrangle)
Depth to water: 6.84 ft (8-17-68)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, clayey, sandy.....	0.0	1.5
Sand, very fine to medium, some coarse.....	1.5	16.0
Clay, greenish gray to grayish brown.....	16.0	20.0
Sand and gravel, fine sand to fine gravel, trace of medium gravel.....	20.0	34.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, sand is very fine to fine; from 38 to 40 ft, silty; below 40 ft, very silty...	34.0	45.0
Sandstone, sand is very fine to fine, trace medium; below 55 ft, sand is very fine to medium; rootlet casts from 65 to 90 ft.....	45.0	150.0
Silt, marly, interbedded sandstone.....	150.0	151.0
Sandstone, sand is very fine to fine, with medium; contains interbedded silty clay....	151.0	188.0
Sand, very silty.....	188.0	190.0
Sandstone, sand is very fine to medium; rootlet casts from 200 to 209 ft; some marl and silty areas; very fine to medium sand below 225 ft.....	190.0	240.0
Silt, slightly clayey, moderately sandy, light olive gray; sand is very fine to fine.....	240.0	250.0
Sandstone, sand is very fine to medium; some limy silts; trace coarse sand below 255 ft.....	250.0	260.0
Silt, moderately sandy, pale olive; sand is very fine to medium; below 265 ft, very sandy, slightly clayey; sand is very fine to medium with some coarse.....	260.0	270.0
Sandstone to sandy silt; sand is very fine to medium.....	270.0	275.0
Silt to silty sand with sandstone, olive gray; sand is very fine to medium.....	275.0	280.0
Sandstone, silty; sand is very fine to fine, some medium; in part lime cemented; rootlet casts from 305 to 315 ft.....	280.0	320.0

Sand, silty, with lime cemented sandstone, light brownish gray to 330 ft; light olive gray below 330 ft.....	320.0	335.0
Sandstone, silty; sand is very fine to medium; contains rootlet casts.....	335.0	345.0
Silt, slightly clayey, in part sandy clay, calcareous, pale yellow; sand is very fine; from 355 to 365 ft interbedded sandstone...	345.0	367.0
Sandstone to sandy silt; some rootlet casts...	367.0	374.0
Silt, clayey, sandy, pale olive; sand is very fine to medium; light olive gray below 379 ft.....	374.0	380.0
Silt, very sandy, slightly calcareous, pale olive; sand is very fine to medium; contains interbedded silty sandstone.....	380.0	390.0
Sandstone, silty; light olive gray; sand is very fine to medium; some interbedded sandy silt.....	390.0	394.0
Silt, clayey, sandy, light olive gray; sand is very fine to medium; contains trace of sandstone below 405 ft.....	394.0	415.0
Sandstone, silty; sand is very fine to fine; rootlets to 420 ft; clayey, sandy, silt; from 420 to 422 ft, contains some siltstone.....	415.0	425.0
Silt to siltstone, moderately sandy, pale yellow; below 430 ft, olive gray to pale olive; sand is very fine to fine; some rootlet casts from 430 to 435 ft.....	425.0	443.0
Silt, clayey, in part sandy, light olive gray; sand is very fine.....	443.0	460.0
Tertiary System - Oligocene Series - White River Group:		
Chadron Formation:		
Sand, rounded grains siltstone and claystone; very fine to coarse sand, little very coarse.....	460.0	470.0
Sand and gravel, very fine sand to medium gravel, much reworked siltstone and claystone.....	470.0	475.0
Gravel, sandy; medium sand to coarse gravel; some frosted quartz grains and reworked siltstone and claystone.....	475.0	480.0
Sand, gravelly; very fine sand to fine gravel, principally reworked siltstone and claystone, some frosted quartz grains.....	480.0	488.0
Silt, slightly clayey, some siltstone, light olive gray.....	488.0	490.0

Clay, silty, light gray; below 495.5 ft, shale fragments.....	490.0	496.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, slightly calcareous, yellow brown, trace light gray.....	496.0	497.0
Shale, clayey, slightly calcareous, olive gray.....	497.0	500.0
Shale, clayey, moderately calcareous, very dark gray.....	500.0	510.0

Test Hole #53-HP-79
(29N-16W-9bbbb)
Holt County

Location: NW NW NW NW Sec. 9, T. 29 N., R. 16 W., approximately 272 feet south and 22 feet east of the northwest corner.
Ground elevation: 2,226 ft. (t). (Stuart, 7.5 min. quadrangle)
Depth to water: Not measured. Electric log estimate about 8 ft. (10-79)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium; at 9 ft dark silty sand layer.....	0.0	10.0
Sand, slightly silty; sand is very fine to medium with little coarse.....	10.0	16.0
Soil, silty, dark gray.....	16.0	20.0
Sand, moderately silty; sand is very fine to fine, trace of medium; below 26 ft no medium sand.....	20.0	28.0
Silt, very clayey, slightly sandy, light brownish gray; sand is very fine to fine...	28.0	32.0
Sand, very silty; sand is very fine to fine...	32.0	42.0
Sand, very fine to medium, trace of coarse; below 45 ft, contains very coarse sand with a trace of very fine to fine gravel.....	42.0	50.0
Sand, gravelly; very fine sand to fine gravel, with a little medium gravel and trace coarse gravel.....	50.0	100.0
Sand, very fine to very coarse, some fine gravel.....	100.0	105.0
Sand, gravelly; very fine sand to fine gravel, some medium gravel.....	105.0	110.0
Sand, very fine to very coarse, little fine to medium gravel.....	110.0	124.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, sandy, very pale brown; sand is very fine to fine; below 130 ft light brown.....	124.0	136.0
Sand, very fine to fine, little medium.....	136.0	144.0
Silt, slightly sandy, clayey, pale brown; sand is very fine.....	144.0	155.0
Sand, moderately silty; sand is very fine to fine.....	155.0	165.0
Silt, very sandy, slightly clayey, brown; sand is very fine.....	165.0	175.0

Silt, slightly clayey, white, little very fine sand; possible some volcanic ash.....	175.0	180.0
Silt, moderately clayey, in part sandy, pale yellow; sand is very fine to fine.....	180.0	182.0
Sand, very fine to medium; some rootlets; below 195 feet, slightly silty; sand is very fine to fine, trace volcanic ash.....	182.0	200.0
Sandstone, sand is very fine to fine; some rootlets; from 210 to 215 ft and below 220 ft, sand is very fine to medium.....	200.0	225.0
No sample.....	225.0	230.0
Sand, very fine to medium; some rootlets and sandstone.....	230.0	235.0
No Sample.....	235.0	240.0
Sand, very fine to medium; contains rootlets and some sandstone; below 245 ft, some silt fragments.....	240.0	250.0
Sand, moderately silty; sand is very fine to medium; below 252 ft, less silty.....	250.0	275.0
Sand, very fine to fine; trace of silt fragments and medium sand.....	275.0	310.0
Sand, slightly silty; sand is very fine to fine, trace medium; some silt fragments; some interbedded silt lenses.....	310.0	345.0
No sample.....	345.0	350.0
Sand to sandstone, slightly silty; sand is very fine to fine, little medium.....	350.0	355.0
Silt, very sandy, pale yellow; sand is very fine to fine.....	355.0	360.0
Sand, very fine to fine, some medium; few silt fragments; below 370 ft, fine sand to medium gravel, principally reworked silty clay and siltstone fragments.....	360.0	383.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, gray with yellow.....	383.0	385.0
No sample.....	385.0	390.0
Shale, clayey, slightly calcareous, gray and yellowish brown.....	390.0	395.0
No sample.....	395.0	400.0
Shale, clayey, gray and yellowish brown.....	400.0	410.0

Test Hole #11-A-44
(30N-11W-29baaa)
Holt County

Location: NE NE NE NW Sec. 29, T. 30 N., R. 11 W., approximately 2,612 feet east and 7 feet south of the northwest corner.
Ground elevation: 1,997 ft. (t). (Meek SW, 7.5 min. quadrangle)
Depth to water: 23.9 ft. (7-14-44)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Top soil and road fill; contains gravel.....	0.0	5.0
Gravel, medium; below 10 ft coarse.....	5.0	15.0
Gravel, sandy; sand is fine to coarse.....	15.0	20.0
Gravel, very coarse.....	20.0	30.0
Gravel, medium.....	30.0	35.0
Gravel, coarse; some sandy clay; below 45 ft some limestone fragments and silty clay....	35.0	50.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sandy, tan; contains sandstone fragments	50.0	65.0
Limestone, white.....	65.0	70.0

Test Hole #8-A-44
(30N-12W-10cccc)
Holt County

Location: SW SW SW SW Sec. 10, T. 30 N., R. 12 W., approximately 66 feet east and 6 feet north of the southwest corner.
Ground elevation: 2,017 ft. (t). (Meek SW, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 62 ft.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Topsoil and road fill, dark brown to black; some sand and clay	0.0	5.0
Gravel, medium	5.0	15.0
Gravel, fine to medium	15.0	20.0
Gravel, very coarse	20.0	25.0
Gravel, medium to coarse	25.0	35.0
Gravel, medium to coarse	35.0	40.0
Gravel, coarse; below 50 ft, medium	40.0	60.0
Gravel, very coarse	60.0	65.0
Pebbles	65.0	70.0
Tertiary System - Miocene Series - Ogallala Group:		
Limestone	70.0	75.0
Sandstone and limestone	75.0	85.0

Test Hole #6-A-44
(30N-12W-12cccc)
Holt County

Location: SW SW SW SW Sec. 12, T. 30 N., R. 12 W., approximately 32 feet north and 8 feet east of the southwest corner.
Ground elevation: 2,001 ft. (t). (Meek SW, 7.5 min. quadrangle)
Depth of water: 20.3 ft. (7-5-44)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Top soil, dark brown to black; some fine gravel	0.0	5.0
Gravel, very coarse	5.0	10.0
Sand and gravel, coarse sand to fine gravel	10.0	15.0
Gravel, medium; below 20 ft coarse	15.0	30.0
Gravel, silty, clayey; some limestone	30.0	35.0
Rubble zone; contains limestone fragments	35.0	40.0
Tertiary System - Miocene Series - Ogallala Group		
Clay, silty; contains some limestone	40.0	45.0
Limestone	45.0	50.0

Test Hole #5-A-44
(30N-12W-13cccc)
Holt County

Location: SW SW SW SW Sec. 13, T. 30 N., R. 12 W., approximately 75 feet east and 6 feet north of the southwest corner.
Ground elevation: 1,993 ft. (t). (Meek SW, 7.5 min. quadrangle)
Depth to water: 34.4 ft. (7-5-44)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Topsoil, dark brown to black; some gravel, fine to coarse	0.0	5.0
Sand and gravel, fine sand to medium gravel	5.0	15.0
Gravel, fine; some clay, light tan to yellow	15.0	25.0
Gravel, medium to coarse; some sandy silt; sand is fine	25.0	30.0
Clay, silty, sandy, tannish brown; sand is fine	30.0	35.0
Gravel, coarse; some sandy silt and limestone.	35.0	40.0
Tertiary System - Miocene Series - Ogallala Group:		
Limestone, gray, green and white	40.0	50.0

Test Hole #7-A-44
(30N-12W-15cccc)
Holt County

Location: SW SW SW SW Sec. 15, T. 30 N., R. 12 W., approximately 74 feet east and 5 feet north of the southeast corner.
Ground elevation: 2,021 ft. (t). (Meek SW, 7.5 min. quadrangle)
Depth to water: Unknown. (7-7-44)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Topsoil and road fill, dark brown to black..	0.0	5.0
Gravel, coarse.....	5.0	10.0
Gravel, medium.....	10.0	50.0

Test Hole #4-A-44
(30N-12W-21dddd)
Holt County

Location: SE SE SE SE Sec. 21, T. 30 N., R. 12W., approximately 43 feet west and 10 feet north of the southeast corner.
Ground elevation: 2,023 ft. (t). (Meek SW, 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 25.5 ft. (7-4-44)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Topsoil and fine sand, light tan.....	0.0	5.0
Gravel, medium; below 10 ft, some sand.....	5.0	15.0
Gravel, some sand.....	15.0	20.0
Gravel, medium.....	20.0	25.0
Gravel, sandy.....	25.0	30.0
Gravel.....	30.0	40.0

Test Hole #3-A-44
(30N-12W-24cccc)
Holt County

Location: SW SW SW SW Sec. 24, T. 30 N., R. 12 W., approximately 60 feet north and 9 feet east of southwest corner.
Ground elevation: 2,004 ft. (t). (Meek SW, 7.5 min. quadrangle)
Depth to water: 21.4 ft. (7-1-44)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand and gravel, fine sand to medium gravel...	0.0	5.0
Sand, very fine; below 10 ft, medium gravel...	5.0	15.0
Medium gravel to fine sand.....	15.0	20.0
Coarse gravel, with some sand.....	20.0	25.0
Medium gravel, with sand.....	25.0	35.0
Coarse gravel, with some silty sand.....	35.0	40.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty, very calcareous	40.0	55.0
Limestone, sandy, green to tan.....	55.0	70.0

Test Hole #2-LN-00 (E-log)
(30N-12W-31dddd)
Holt County

Location: SE SE SE SE Sec. 31, T. 30 N., R. 12 W., approximately 194 ft north and 30 ft west of southeast corner.
Ground elevation: 2,022 ft. (t) (Atkinson SE, 7.5 min. quadrangle).
Depth to water: 22.02 ft. (6-15-00)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: silt, sandy, dark brown; sand is very fine.	0.0	3.0
Sand, light gray; sand is very fine to very coarse, trace of very fine to fine gravel.....	3.0	5.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, lime cemented to limestone; gray; sand is very fine.....	5.0	10.0
Sandstone, silty; sand is very fine; contains trace of rootlets.....	10.0	17.5
Sandstone, lime cemented, olive gray; sand is very fine; below 32.5 ft, olive brown.....	17.5	37.5
Sandstone, moderately silty, olive brown; sand is very fine, little fine.....	37.5	44.5
Silt, moderately sandy, light gray; sand is very fine to fine.....	44.5	47.5
Sandstone, sand is very fine to fine, olive gray; contains rootlets.....	47.5	62.5
Silt, very sandy, slightly clayey, olive; sand is very fine to fine.....	62.5	69.5
Sand to sandstone, very fine to fine, olive; contains rootlets; from 92.5 to 97.5 ft, some hackberry seeds.....	69.5	97.5
Sand, very silty, in part clayey, olive; sand is very fine to fine.....	97.5	106.0
Silt, moderately clayey, moderately calcareous, in part sandy, olive to light gray; sand is very fine to fine.....	106.0	109.5
Sandstone, sand is very fine to fine, olive; contains rootlets.....	109.5	137.5
Silt, very sandy, slightly clayey, very calcareous, light olive; sand is very fine.....	137.5	142.5
Sandstone, sand is very fine to medium, olive....	142.5	147.5
Sand, very fine to fine, little medium; gray.....	147.5	166.0
Limestone, marly, light gray; contains some very fine sand.....	166.0	168.0

Sand, very fine to medium, olive; below 174.5 ft, very silty, sand is very fine to fine.....	168.0	187.5
Sand, very fine to medium, olive to olive gray; below 207.5 ft, principally very fine to fine; below 232.5 ft, some rootlets.....	187.5	237.5
No sample.....	237.5	239.0
Silt, very clayey, very calcareous, olive gray; contains sand grains.....	239.0	243.0
Clay, in part sandy, moderately calcareous, bentonitic, olive gray; sand is very fine to fine; contains lime nodules.....	243.0	251.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Shale Formation:		
Shale, clayey, slightly calcareous, light gray to yellow with iron stain.....	251.5	257.5

Test Hole #A-5-96
(31N-14W-21baaa)
Holt County

Location: NE NE NE NW Sec. 21, T. 31 N., R. 14 W., approximately 175 feet south and 2,639 feet east of the northwest corner.
Ground elevation: 2,082 ft. (i). (Atkinson NW, 7.5 min. quadrangle)
Depth to water: 35.79 ft. (1-2-97). Well screened between 150-160 ft.

	Depth, in feet	
	From	To
Quaternary System, undifferented:		
Topsoil	0.0	3.0
Sand, gravelly; medium sand to medium gravel; below 10 ft, some coarse gravel	3.0	30.0
Sand, gravelly; medium sand to medium gravel; from 40 to 50 ft some very coarse gravel; from 50 to 60 ft thin interbedded clayey silt layer	30.0	70.0
Sand, gravelly; medium sand to fine gravel	70.0	79.0
Clay, pale yellow, some gray	79.0	90.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, clayey, sandy, pale olive and pale yellow	90.0	110.0
Sandstone, sand is fine; contains rootlet casts	110.0	140.0
Silt, clayey, sandy, pale olive; sand is fine	140.0	155.0
Clay, weathered, gray; contains some very fine to fine sand	155.0	160.0

31N 15W 20BCCB 01-LN-00

Test Hole #1-LN-00 (E-log)
(31N-15W-20bccb)
Holt County

Location: NW SW SW NW Sec. 20, T. 31 N., R. 15 W., approximately 2,274 ft south and 65 ft east of the northwest corner.
Ground elevation: 2,138 ft. (t). (Stuart NE, 7.5 min. quadrangle).
Depth to water: 9.5 ft. (6-15-00)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil: silt, sandy, dark brown; sand is very fine to fine.....	0.0	1.0
Sand, gravelly with some pebbles; medium sand to fine gravel; contains clayey silt.....	1.0	10.0
Sand, gravelly; coarse sand to coarse gravel; some very coarse gravel with pebbles below 32.5 ft...	10.0	37.5
Sand, gravelly; medium sand to medium gravel; less medium gravel from 42.5 to 47.5 ft, some coarse gravel below 47.5 ft.....	37.5	57.5
Sand, gravelly; fine sand to fine gravel; coarse sand to coarse gravel from 62.5 to 72.5 ft.....	57.5	72.5
Sand, gravelly; coarse sand to medium gravel; contains some silty clay, light yellowish brown....	72.5	77.5
Tertiary System - Miocene Series - Ogallala Group:		
Clay, slightly silty, sandy, slightly calcareous, light olive brown; sand is very fine to medium; contains rootlets.....	77.5	88.0
Clay, silty, sandy, light yellowish brown; sand is very fine to fine; contains trace of rootlets...	88.0	108.0
Clay, with siltstone and sandstone, pale olive; sand is very fine.....	108.0	113.0
Clay, silty, sandy, moderately calcareous, white to light gray; sand is very fine.....	113.0	118.0
Siltstone to sandstone, sand is very fine to fine, slightly calcareous, light olive brown.....	118.0	128.0
Silt, slightly clayey, sandy, pale olive; sand is very fine.....	128.0	133.0
Sandstone, sand is very fine to fine; contains silty areas.....	133.0	148.0
Sand, silty; sand is very fine to fine, less fine below 153 ft.....	148.0	158.0
Clay, silty, sandy, moderately calcareous, light gray; sand is very fine.....	158.0	163.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Shale Formation:		
Shale, clayey, light gray to yellow orange.....	163.0	178.0

Test Hole #52-HP-79
(31N-16W-16bbbb)
Holt County

Location: NW NW NW NW Sec.16, T. 31 N., R. 16 W., approximately 228 feet south and 25 feet east of the northwest corner.
Ground elevation: 2,200 ft. (t). (Stuart NW, 7.5 min. quadrangle)
Depth to water: Not measured.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium.....	0.0	5.0
Sand, is very fine to fine.....	5.0	10.0
Sand, slightly silty; sand is very fine to medium, little coarse to very coarse, rare fine gravel.....	10.0	15.0
Sand, very fine to coarse, little very coarse, rare fine gravel.....	15.0	20.0
Sand, very fine to medium, some coarse to very coarse, little very fine to fine gravel; below 30 ft, rare medium gravel.....	20.0	35.0
Sand, gravelly; very fine sand to fine gravel, trace of medium gravel; below 65 ft, rare coarse gravel.....	35.0	70.0
Sand, gravelly; very fine sand to fine gravel.	70.0	75.0
Gravel, sandy; very fine sand to fine gravel, little medium gravel.....	75.0	89.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, silty, gray and pale yellow; sand is very fine.....	89.0	91.0
Silt, very sandy to sand, very silty; light yellowish brown; some interbedded sandy clay lenses; sand is very fine to fine.....	91.0	98.0
Sand, slightly silty; sand is very fine; some siliceous grains.....	98.0	103.0
Sand, slightly silty; sand is very fine to fine; rare clay gravel fragments.....	103.0	120.0
Silt, very sandy; light yellowish brown; sand is very fine to fine; some volcanic ash; below 135 ft, some clay fragments, rootlets; below 145 ft, some volcanic ash..	120.0	155.0
Sand, very fine to medium; below 175 ft, some silty clay.....	155.0	178.0
Silt, slightly clayey, pale olive; some volcanic ash.....	178.0	190.0

Sand, slightly silty; sand is very fine to fine	190.0	195.0
Silt, very sandy, light olive gray; sand is very fine to fine; contains volcanic ash	195.0	200.0
Sand, very silty; sand is very fine to medium; below 203 ft, contains some reworked silt fragments; below 210 ft, contains some very coarse sand	200.0	220.0
Sand, slightly gravelly; very fine sand to fine gravel; below 235 ft, rare medium gravel	220.0	240.0
Sand, very fine to very coarse, little very fine to fine gravel	240.0	244.0
Silt, clayey, olive gray	244.0	245.0
Gravel, sandy; fine sand to medium gravel; principally ironstone, clay shale, chert, limy fragments	245.0	249.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, light olive brown to dark gray.	249.0	260.0