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Madison County Test Hole Logs

Raymond R. Burchett

University of Nebraska-Lincoln

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MADISON COUNTY Test-Hole Logs

Raymond R. Burchett

**Nebraska Water Survey
Test-Hole Report No. 59**

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



March, 1998



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

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

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

Publication and price lists are furnished upon request.

March 1998

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INTRODUCTION

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

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

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. All samples are processed and kept on open file in the offices of Conservation and Survey Division, 113 Nebraska Hall, University of Nebraska-Lincoln, 68588.

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 testhole sites was determined is indicated in the heading of each log, as follows: a = altimeter, h = hand leveling, i = spirit leveling, t = estimated from topographic map.

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 1, 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.

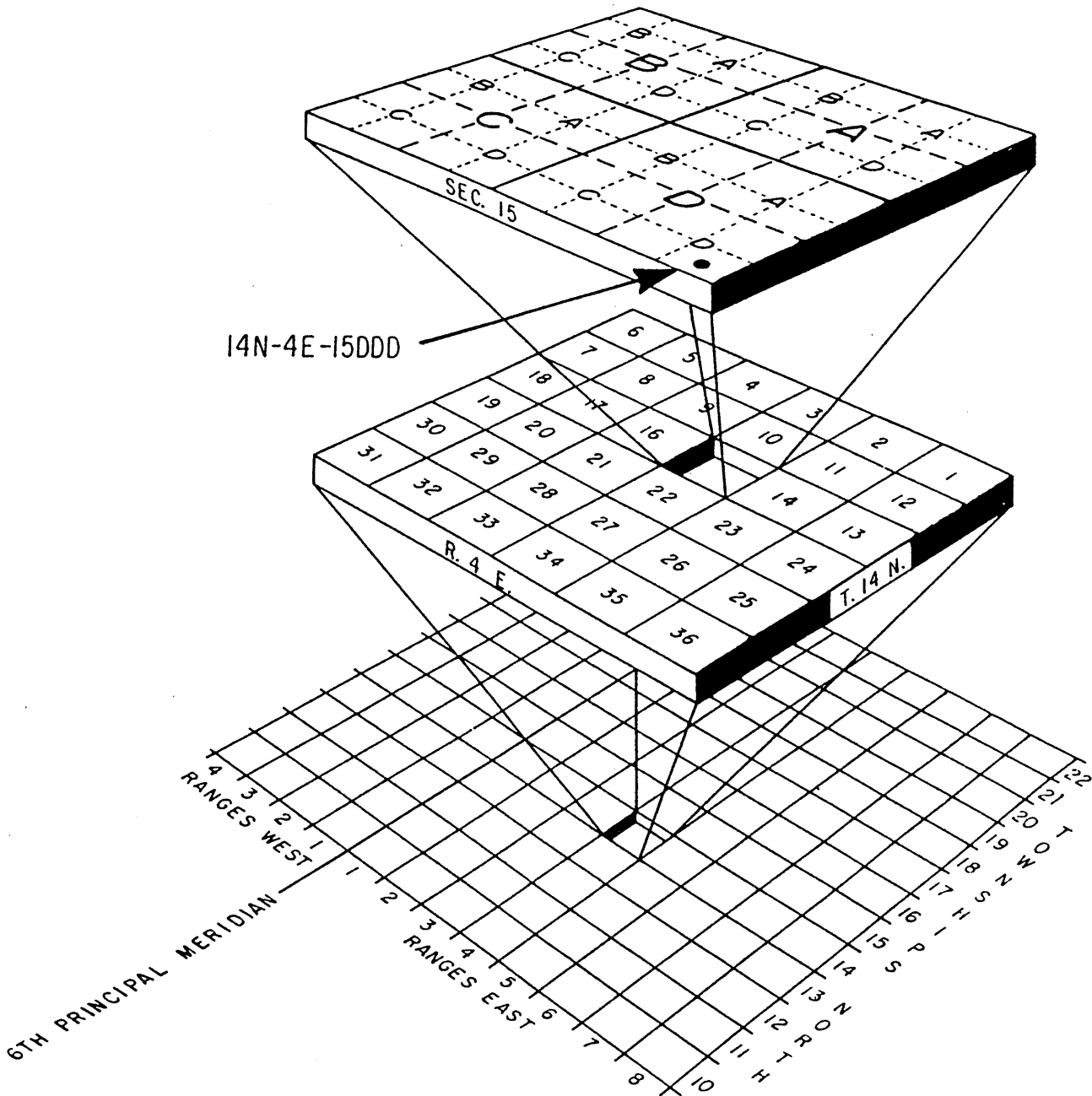


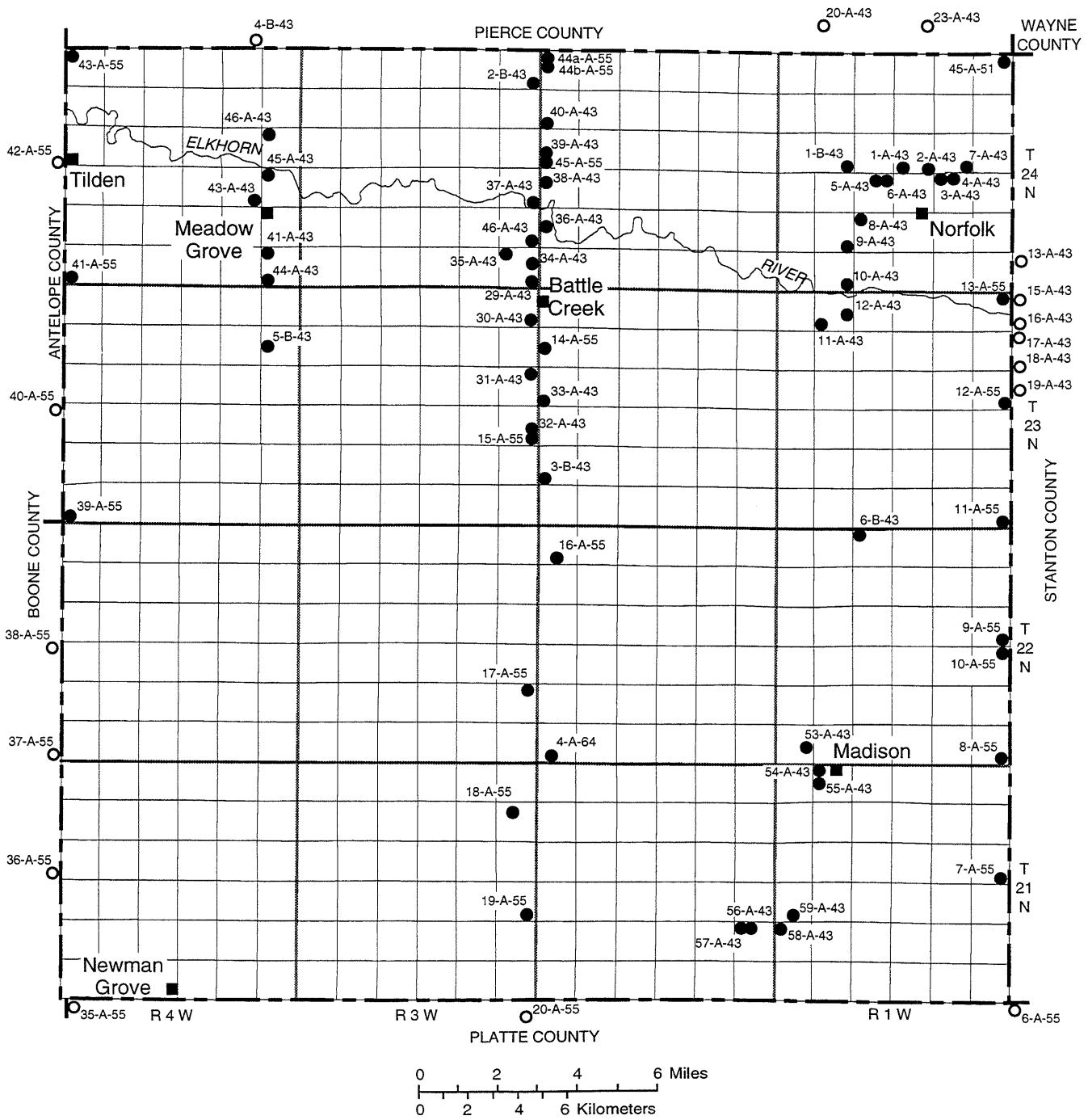
Fig. 1. System for identifying test-holes according to their location.

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



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

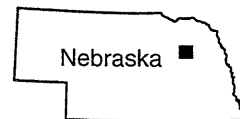


Fig. 2. Test-hole location map of Madison County.

**Test Hole #54-A-43
(21-1-5bbbb)
Madison County**

Location: NW NW NW NW sec. 5, T. 21 N., R. 1 W.
Ground elevation: 1,575.0 ft. (i). (Madison 7.5 min. quadrangle)
Depth to water: 11.1 ft. (9-21-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, medium to dark gray, dark brownish gray at top; contains some small pelecypods below 28 ft	0.0	38.0
Sand, gray; texture grades from medium to coarse....	38.0	54.0
Clay, silty to pebbly, medium-gray and dark gray; contains fine gravel.....	54.0	69.0

**Test Hole #55-A-43
(21-1-5dbbb)
Madison County**

Location: NW NW NW SW sec. 5, T. 21 N., R. 1 W.
 Ground elevation: 1,592.0 ft. (i). (Madison 7.5 min. quadrangle)
 Depth to water: 24.8 ft. (9-21-43).

Depth, in feet
From To

Quaternary System, undifferentiated:

Clay, silty, to silt, clayey, brownish gray to buff; contains small gastropods below 14 ft.....	0.0	22.0
Clay, silty, to silt, clayey, medium-gray to brownish gray.....	22.0	47.0
Sand, gray; texture grades from medium to coarse sand with some fine gravel.....	47.0	71.0
Clay, silty to pebbly, medium to dark gray; contains some sand and fine gravel.....	71.0	79.0

Test Hole #7-A-55
(21-1-13dddd)
Madison County

Location: SE SE SE SE sec. 13, T. 21 N. R. 1 W., approximately 212 feet north and 9 feet west of southeast corner.

Ground elevation: 1,645.0 ft. (t). (Madison SE 7.5 min. quadrangle)

Depth to water: 49.1 ft. (7-1-55).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill and soil, silt, very clayey, dark gray....	0.0	1.5
Silt, slightly clayey, medium brownish gray.....	1.5	4.0
Clay, very silty, medium brownish gray.....	4.0	5.5
Silt, moderately to very clayey, medium yellowish gray; light yellowish gray below 10 ft.....	5.5	15.0
Silt, slightly clayey, light yellowish gray.....	15.0	20.0
Silt, slightly clayey, medium olive gray with some mottled brownish yellow; coarser textured and slightly calcareous below 26.5 ft; medium yellowish gray below 33.5 ft; mottled yellowish brown below 36.5 ft.....	20.0	45.0
Silt, slightly clayey, medium olive gray with some mottled yellowish brown; in part slightly sandy, and contains some some ironstone fragments.....	45.0	49.7
Sand, slightly silty; texture grades from fine to very coarse sand with about 5 percent gravel; contains limestone and clay grains; contains silt layer from 53 to 53.5 ft.....	49.7	55.0
Silt, interbedded, slightly clayey and sandy, interbedded with sand and gravel; texture of sand grades from fine sand to medium gravel; contains limestone grains.....	55.0	60.0
Sand, texture grades from very fine to very coarse; contains a trace of gravel and some limestone grains.....	60.0	65.0
Sand and gravel, yellowish brown; texture grades from fine sand to fine gravel with some medium gravel; contains many limestone grains; contains silt layer from 68. to 68.8 ft.....	65.0	70.0
Sand, yellowish brown; texture grades from fine to very coarse sand with about 5 percent gravel; contains many limestone grains.....	70.0	75.8
Till, clay, very silty and slightly sandy to pebbly, moderately calcareous, medium gray; light olive gray from 75.8 to 77 ft; contains yellowish brown layers from 82.5 to 83.5 ft, 88 to 88.5 ft, and at 94 ft; moderately sandy to gravelly from 113 to 115 ft, and very sandy to gravelly from 115 to 118 ft.....	75.8	120.0

Sand and gravel, texture grades from fine sand to fine gravel with some medium gravel; contains limestone grains.....	120.0	121.0
Till, clay, very silty and slightly sandy to pebbly, moderately calcareous, medium olive gray; contains interbedded sand below 125 ft.....	121.0	126.0
Sand, texture grades from fine to very coarse with some fine gravel; contains some rounded clay grains and many limestone grains.....	126.0	129.0
Till, interbedded sand, medium gray, moderately calcareous; texture of sand grades from fine to very coarse.....	129.0	132.0
Sand, texture grades from fine to very coarse; contains much coarse to very coarse sand and some fine gravel; contains many limestone, clay and shale grains.....	132.0	136.0
Till, interbedded sand, moderately calcareous, medium olive gray; texture of sand grades from fine to very coarse with some fine gravel.....	136.0	140.0
Sand, very clayey and silty, moderately calcareous; texture of sand grades from fine to very coarse with some fine gravel.....	140.0	141.2
Till, clay, very silty and slightly sandy to pebbly, moderately calcareous, medium gray; very sandy to gravelly from 147.5 to 149 ft, and below 181 ft...	141.2	182.0
Sand and gravel, quartz with pink and green silicates and some limestone grains; texture grades from fine sand to medium gravel; contains about 20 percent gravel to 185 ft, and about 50 percent gravel below 185 ft.....	182.0	187.5
Till, silt, moderately clayey and very sandy, moderately calcareous, medium gray.....	187.5	188.0
Sand, quartz with pink, gray and green silicates and some limestone grains; texture grades from fine to very coarse.....	188.0	191.3
Till, silt, moderately clayey and moderately sandy, moderately calcareous, medium gray.....	191.3	192.8
Sand, quartz with light and dark silicates and some limestone grains; texture grades from fine to very coarse; contains a trace of fine gravel.....	192.8	194.7
Till, silt, clayey and moderately sandy, moderately calcareous, medium gray.....	194.7	195.9
Sand and gravel, quartz with pink and green silicates and some limestone grains; texture grades from medium sand to fine gravel.....	195.9	201.0
Till, clay, silty, slightly sandy and gravelly, moderately calcareous, medium gray.....	201.0	202.7
Sand and gravel, quartz with pink and green silicates and some limestone grains; texture grades from medium sand to fine gravel with a little medium gravel; contains 25 to 40 percent gravel...	202.7	215.0

Sand, quartz with some pink and green silicates and a few limestone grains; texture grades from fine to very coarse; contains 5 to 10 percent fine gravel to 220 ft.....	215.0	227.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, mottled white, yellow and light gray, chalky; light gray below 235 ft.....	227.5	261.5

**Test Hole #59-A-43
(21-1-19dccc)
Madison County**

Location: SE SE SE SW sec. 19, T. 21 N., R. 1 W., 2,375 feet west of southeast corner.

Ground elevation: 1,632.0 ft. (i). (Madison 7.5 min. quadrangle)

Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, brownish gray to pinkish tan.....	0.0	24.0
Clay, silty, medium gray; dark gray in lower part...	24.0	54.0
Sand, gray; texture grades from fine to coarse.....	54.0	59.0
Clay, silty to pebbly, medium to dark gray; yellowish gray in upper part.....	59.0	69.0

**Test Hole #58-A-43
(21-1-30bbbb)
Madison County**

Location: NW corner sec. 30, T. 21 N., R. 1 W.
 Ground elevation: 1,618.0 ft. (i). (Madison 7.5 min. quadrangle)
 Depth to water: 25.2 ft. (9-21-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, brownish gray; dark gray to black in upper part.....	0.0	29.0
Silt, clayey, to clay, silty, medium gray to dark gray; pebbly in lower part.....	29.0	52.0
Sand and gravel, dark gray; texture grades from coarse sand to medium gravel.....	52.0	60.0
Clay, silty to pebbly, dark gray; contains some sand and fine gravel.....	60.0	69.0

**Test Hole #56-A-43
(21-2-25bbbb)
Madison County**

Location: NW corner sec. 25, T. 21 N., R. 2 W., 69 feet east of northwest corner.

Ground elevation: 1,617.0 ft. (i). (Battle Creek 7.5 min. quadrangle)

Depth to water: 11.6 ft. (9-21-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, brown to dark gray in upper part; contains limy concretions.....	0.0	17.0
Clay, silty, to silt, clayey, light grayish green to brownish buff; contains some small gastropods from 24 to 29 ft.....	17.0	36.0
Sand, gray; texture grades from medium to coarse....	36.0	46.0
Clay, silty to pebbly, medium to dark gray; contains sand and fine gravel.....	46.0	59.0

**Test Hole #57-A-43
(21-2-25baab)
Madison County**

Location: NW NE NE NW sec. 25, T. 21 N., R. 2 W., 2,100 feet east of northwest corner.

Ground elevation: 1,606.0 ft. (i). (Madison 7.5 min. quadrangle)

Depth to water: 10.4 ft. (9-21-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, to silt, clayey, medium gray to brownish gray; dark gray to black in upper part.....	0.0	12.0
Clay, silty, to silt, clayey, medium gray to greenish gray; contains some small pelecypods.....	12.0	32.0
Sand, gray; texture grades from medium to coarse....	32.0	48.0
Gravel, gray; texture grades from fine to medium with some sand.....	48.0	56.0
Clay, silty to pebbly, dark gray; contains some gravel.....	56.0	69.0

Test Hole #18-A-55
(21-3-12abba)
Madison County

Location: NE NW NW NE sec. 12, T. 21 N., R. 3 W., approximately 8 feet south and 2,040 feet west of northeast corner.

Ground elevation: 1,748.0 ft. (t). (Battle Creek SE 7.5 min. quadrangle)

Depth to water: unknown; test-hole caved at 83.0 ft; electric log

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.5
Soil, silt, very clayey, dark brownish gray.....	1.5	2.5
Silt, moderately to very clayey, medium yellowish gray.....	2.5	6.0
Silt, slightly clayey, medium yellowish gray; slightly calcareous from 10 to 46.5 ft; contains a few small limy nodules from 10 to 20 ft; light yellowish gray from 15 to 42 ft; contains a few snail shell fragments from 25 to 42 ft; medium brownish gray below 46.5 ft.....	6.0	47.5
Silt, moderately clayey, dark brownish gray.....	47.5	49.0
Silt, very clayey, medium brownish gray.....	49.0	52.0
Clay, very silty, medium brown; slightly sandy from 55 to 60.5 ft; moderately sandy from 60.5 to 62.5 ft; contains very fine to medium sand.....	52.0	62.5
Clay, very silty, dark gray.....	62.5	62.6
Silt, moderately clayey, slightly sandy, light yellowish gray; contains very fine to medium sand.....	62.6	65.0
Silt, light brownish gray; texture grades to very fine sand; slightly consolidated.....	65.0	66.4
Silt, slightly clayey, light yellowish gray.....	66.4	66.6
Silt, sandy, light brownish gray; texture grades from silt to very fine sand.....	66.6	69.5
Sand, texture grades from very fine to fine with some medium sand.....	69.5	80.0
Sand, texture grades from fine to medium with some coarse and trace of very coarse sand.....	80.0	88.0
Silt, moderately to very clayey, light olive gray...	88.0	91.7
Clay, silty, light olive gray; contains moderately clayey silt layer from 94.5 to 96.5 ft.....	91.7	100.5
Sand, texture grades from fine to very coarse; contains about 5 to 10 percent fine gravel.....	100.5	105.0
Sand and some gravel, texture grades from medium sand to fine gravel with some medium gravel, about 25 percent gravel.....	105.0	107.0
Sand, texture grades from fine to medium with some coarse to very coarse; contains 25 percent gravel below 115 ft.....	107.0	116.0

Silt, moderately clayey, dark brownish gray; medium brownish gray from 117 to 118 ft; light olive gray below 118 ft.....	116.0	121.5
Sand, texture grades from very fine to fine with some medium and a trace of coarse sand; contains a few rounded silt grains; contains silt layer from 123 to 124 ft, slightly clayey, light olive gray..	121.5	125.0
Sand, texture grades from very fine to medium with a trace of coarse sand; contains rounded silty clay grains below 130 ft.....	125.0	134.0
Silt, moderately clayey, light olive gray; contains a trace of very fine sand.....	134.0	135.0
Sand, very silty, in part clayey, light olive gray; texture of sand grades from very fine to fine with some medium sand; contains a few clay grains.....	135.0	140.0
Sand, texture grades from very fine to medium; contains silt layers from 142 to 142.2 ft, and from 144 to 144.2 ft, slightly clayey and slightly sandy; contains a trace of coarse sand from 145 to 150 ft; texture of sand grades from fine to coarse with a trace of very coarse sand from 155 to 162 ft, and 165 to 170 ft; slightly silty from 170 to 172.5 ft.....	140.0	177.5
Silt, slightly clayey, very sandy, light gray; contains many shell fragments.....	177.5	178.5
Silt, very clayey, slightly sandy, slightly calcareous, light olive gray; contains very fine to fine sand.....	178.5	180.0
Silt, slightly clayey, slightly sandy, slightly calcareous, light gray; slightly more sandy below 182 ft.....	180.0	185.0
Silt, coarse textured, slightly clayey, moderately calcareous, light olive gray; contains small limy nodules; moderately clayey and light brownish gray below 188.5 ft.....	185.0	190.5
Silt, slightly clayey, dark gray; medium gray and moderately calcareous below 191.5 ft.....	190.5	193.0
Sand, texture grades from very fine to fine; contains some medium sand below 195 ft; slightly calcareous to 195 ft.....	193.0	199.5
Clay, very silty, slightly calcareous, medium gray..	199.5	200.0
Silt, moderately clayey, slightly calcareous, dark brownish gray.....	200.0	200.5
Sand, slightly calcareous, medium gray; texture grades from very fine to fine with some medium sand.....	200.5	201.5
Silt, slightly clayey, slightly calcareous, medium gray; contains very fine sand and wood fragments from 203 to 203.5 ft.....	201.5	204.5

Sand, slightly calcareous, medium gray; texture grades from very fine to medium with a trace of coarse sand; contains medium brownish gray silt layer, slightly calcareous from 208 to 208.5 ft...	204.5	210.0
Sand, slightly calcareous, brownish gray; texture grades from medium to coarse with some very coarse sand and fine gravel; contains common rounded grains of chalky limestone and shale.....	210.0	215.0
Sand and some gravel, slightly calcareous, brownish gray; texture grades from medium sand to fine gravel with some medium gravel; contains about 30 percent gravel from 220 to 225 ft, and from 230 to 240 ft; contains 5 to 10 percent gravel from 226 to 230 ft, and below 240 ft; contains common rounded grains of chalky limestone and shale.....	215.0	245.0
Sand, slightly calcareous, brownish gray; texture grades from medium to very coarse; contains a trace of fine gravel; contains some rounded grains of chalky limestone and shale.....	245.0	255.0
Gravel and some sand, slightly calcareous; texture grades from coarse sand to medium gravel; contains common rounded grains of chalky limestone and shale.....	255.0	270.0
Sand and gravel, slightly calcareous, brownish gray; texture grades from medium sand to medium gravel; contains rounded grains of chalky limestone and shale; contains bone fragments.....	270.0	274.0
Silt, slightly clayey, very sandy, slightly calcareous, light olive gray; contains very fine to coarse sand.....	274.0	278.5
Sand, slightly calcareous; texture grades from fine to coarse with some very coarse sand.....	278.5	283.0
Silt, slightly clayey, slightly sandy, moderately calcareous, light brownish gray; contains very fine to medium sand.....	283.0	284.0
Sand, slightly calcareous, brownish gray; texture grades from medium to very coarse sand with a trace of gravel.....	284.0	287.0
Till, clay, very silty, slightly sandy to gravelly, moderately calcareous, medium gray; very sandy from 290 to 291.5 ft; contains a sand layer from 292.8 to 294.2 ft; texture grades from fine to coarse with some very coarse sand and fine gravel.	287.0	295.5
Sand and gravel, moderately calcareous, brownish gray; texture grades from coarse sand to fine and some medium gravel; contains common rounded grains of chalky limestone and shale; contains silty clay layers from 295.5 to 297 ft.....	295.5	300.0
Sand, slightly calcareous; texture grades from medium to very coarse sand with much very coarse sand and about 5 percent fine gravel.....	300.0	306.5

Cretaceous System - Upper Cretaceous Series - Colorado Group:

Niobrara Formation:

Shale, mottled light yellowish gray, white, and brownish yellow, interbedded, chalky.....	306.5	328.0
Shale, mottled light gray, light olive gray, and medium gray, interbedded, chalky.....	328.0	340.0

**Test Hole #19-A-55
(21-3-24dddd)
Madison County**

Location: SE corner sec. 24, T. 21 N., R. 3 W., approximately 10 feet north and 99 feet west of southeast corner.

Ground elevation: 1,736.0 ft. (t). (Battle Creek SE 7.5 min. quadrangle)

Depth to water: unknown; test-hole caved at 83.0 ft.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.5
Soil, silt, moderately clayey, dark brownish gray; medium brownish gray below 2.5 ft.....	1.5	5.0
Silt, slightly clayey, slightly calcareous, light brownish gray; contains limy nodules to 10 ft; medium brownish gray from 15 to 20 ft, and below 42.5 ft; contains some mottled light gray from 20 to 34 ft; slightly sandy from 34 to 36.8 ft; contains very fine to fine sand; contains snail shells below 40 ft.....	5.0	45.5
Silt, slightly clayey, dark brownish gray.....	45.5	47.7
Silt, very clayey, medium brownish gray.....	47.7	48.5
Clay, silty, medium brown; contains a trace of very fine to medium sand from 50 to 52 ft; slightly sandy below 52 ft; contains very fine to medium sand.....	48.5	60.0
Silt, very clayey, slightly sandy, medium brown; contains very fine to medium sand; contains a thin dark gray layer at 61 ft.....	60.0	68.5
Silt, moderately clayey, medium brownish gray; contains a small amount of very fine to medium sand..	68.5	70.0
Clay, very silty, medium brown; contains a trace of very fine to medium sand.....	70.0	73.5
Silt, very clayey, light brown.....	73.5	75.0
Silt, moderately clayey, slightly sandy, light brown; contains very fine to fine sand; silt coarser textured below 77 ft; moderately sandy below 83.5 ft; contains very fine to medium sand..	75.0	85.0
Silt, slightly clayey, very sandy, light brown; contains very fine to coarse sand and a trace of shell fragments; slightly more clayey below 87 ft.	85.0	88.5
Silt, moderately clayey, very sandy, dark brownish gray; contains very fine to coarse sand; less clayey below 90 ft.....	88.5	92.0
Sand, brownish gray; texture grades from very fine to medium with a trace of coarse sand.....	92.0	95.0

Sand and some gravel, slightly silty; texture of sand grades from fine to very coarse; contains about 20 percent fine gravel.....	95.0	96.8
Clay, very silty, light olive gray; contains a trace of very fine to fine sand.....	96.8	100.0
Clay, silty to very sandy, light olive gray; contains very fine to fine sand with a trace of coarser grains.....	100.0	102.5
Sand, brownish gray; texture grades from fine to coarse with a trace of very coarse sand and fine gravel; contains more very coarse sand and 5 to 10 percent fine gravel from 105 to 100 ft; yellowish brown from 110 to 115 ft.....	102.5	125.0
Clay, very silty, slightly calcareous, light olive gray.....	125.0	127.5
Silt, moderately clayey, dark brownish gray.....	127.5	128.0
Clay, very silty, light olive gray.....	128.0	130.0
Sand, brownish gray; texture grades from fine to medium with some coarse; contains a trace of very coarse sand and fine gravel from 140 to 145 ft....	130.0	150.6
Silt, slightly clayey, slightly sandy, slightly calcareous, medium brownish gray and medium olive gray; contains very fine to medium sand, in part very sandy.....	150.6	153.0
Silt, very clayey, slightly sandy, dark brownish gray; contains very fine to medium sand.....	153.0	153.5
Clay, very silty, slightly sandy, moderately calcareous, medium gray; contains very fine to medium sand and small limy nodules.....	153.5	160.5
Silt, moderately clayey, very sandy, slightly calcareous, light brownish gray; contains very fine to fine sand; slightly sandy from 163 to 165 ft; non-calcareous and moderately sandy from 165 to 170 ft; medium brownish gray from 165 to 16.5 ft; contains limy nodules below 171.5 ft.....	160.5	174.0
Silt, very clayey, slightly calcareous, light olive gray.....	174.0	175.0
Silt, slightly clayey, slightly calcareous, light olive gray; contains very fine to fine sand; very sandy at 177 ft.....	175.0	177.5
Silt, very clayey, slightly calcareous, light olive gray; non-calcareous and very sandy below 182 ft; contains very fine to fine sand.....	177.5	182.3
Sand, texture grades from fine to medium with some coarse sand; contains some very coarse sand and a trace of fine gravel from 185 to 190 ft.....	182.3	194.0
Silt, very clayey, slightly calcareous, light brownish gray; contains a trace of very fine sand; non-calcareous and less clayey below 195 ft.....	194.0	196.3
Sand, texture grades from very fine to medium; contains one or two thin silt layers.....	196.3	202.3

Silt, moderately clayey, slightly sandy, slightly calcareous, light olive gray; contains very fine sand; slightly clayey below 205 ft.....	202.3	209.8
Sand and some gravel, slightly calcareous; texture grades from medium sand to fine gravel; contains from 10 to 15 percent fine gravel to 215 ft, and below 225 ft; contains about 30 percent gravel from 215 to 225 ft; contains rounded grains of chalky limestone and shale.....	209.8	227.4
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, brownish yellow with mottled white and light yellowish gray, chalky; dark brownish gray from 250 to 252 ft; interbedded light and medium gray below 252 ft.....	227.4	280.0

**Test Hole #6-B-43
(22-1-4bbbc)
Madison County**

Location: SE NW NW NW sec. 4, T. 22 N., R. 1 W., approximately 400 feet east and 400 feet south of northwest corner.

Ground elevation: 1,691.0 ft. (i). (Enola 7.5 min. quadrangle)

Depth to water: 31.9 ft. (9-3-43).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, brownish gray; texture grades from fine to coarse.....	0.0	5.0
Clay, silty, medium greenish gray; in part pinkish gray.....	5.0	31.0
Sand, brownish gray; texture grades from fine to medium.....	31.0	35.0
Clay, silty, medium greenish gray and pinkish gray..	35.0	68.0
Sand and gravel, texture grades from coarse sand to fine gravel.....	68.0	72.0
Clay, silty, light greenish gray; contains embedded sand.....	72.0	87.0
Gravel, pinkish gray; fine texture.....	87.0	90.0

**Test Hole #9-A-55
(22-1-24dddd)
Madison County**

Location: SE SE SE SE sec. 13, T. 22 N., R. 1 W., approximately 290 feet north and 8 feet west of southeast corner.
 Ground elevation: 1,650.0 ft. (t). (Madison SE 7.5 min. quadrangle)
 Depth to water: unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil, dark brownish gray.....	0.0	1.0
Silt, moderately clayey, medium dark yellowish gray.....	1.0	2.5
Sand, very fine to fine grained; contains some medium sand.....	2.5	7.4
Silt, slightly clayey, medium yellowish gray.....	7.4	50.0

**Test Hole #10-A-55
(22-1-24aada)
Madison County**

Location: NE SE NE NE sec. 24, T. 22 N., R. 1 W., approximately 753 feet south and 8 feet west of northeast corner.
 Ground elevation: 1,655.0 ft. (t). (Madison SE 7.5 min. quadrangle)
 Depth to water: 39.9 ft. (7-19-55).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Soil, silt, slightly clayey, slightly sandy, medium brownish gray; contains very fine to fine sand....	1.0	2.5
Silt, slightly clayey, slightly calcareous, light and medium yellowish gray; contains limy nodules below 5.5 ft; contains some mottled light gray below 22 ft.....	2.5	29.7
Silt, slightly clayey, medium gray; slightly darker and contains a trace of very fine to fine sand below 32.6 ft.....	29.7	35.5
Till, clay, silty and slightly sandy to pebbly, mottled light and medium gray, yellowish gray, olive gray, and brownish gray; moderately calcareous below 40 ft; contains limy nodules and white limy areas from 40 to 55 ft; very sandy to gravelly from 84.8 to 85.8 ft; contains interbedded gravel from 88.8 to 90 ft; principally medium gray below 87.5 ft; slightly darker below 140 ft.....	35.5	175.8
Sand and gravel, texture grades from medium sand to fine gravel with some medium gravel, about 50 percent gravel.....	175.8	185.0
Sand, texture grades from fine to very coarse; contains about 10 percent fine gravel.....	185.0	190.0
Gravel and sand, texture grades from medium sand to fine and some medium gravel, about 70 percent gravel; contains chalky clay boulders or layers from 197 to 200 ft; contains from 50 to 60 percent gravel from 225 to 240 ft.....	190.0	244.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, slightly sandy, light gray; contains very fine sand; slightly calcareous below 250 ft; slightly clayey below 255 ft.....	244.0	265.0
Silt, very sandy; interbedded with sand, slightly calcareous, light gray; texture of sand very fine grained.....	265.0	270.0
Sand, slightly silty; texture grades from very fine to fine; contains silt layer from 277.5 to 278 ft; contains limy grains below 278 ft.....	270.0	280.0

Sand and gravel, slightly silty; texture grades from fine sand to fine gravel, about 50 percent gravel; contains many rounded limestone grains.....	280.0	286.1
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, light gray, light olive gray and medium gray, mottled and interbedded, chalky; principally light gray below 300 ft.....	286.1	320.0

**Test Hole #53-A-43
(22-1-31daaa)
Madison County**

Location: NE corner SE sec. 31, T. 22 N., R. 1 W., approximately 2500 feet north and 75 feet west of southeast corner.
 Ground elevation: 1,583.0 ft. (i). (Madison 7.5 min. quadrangle)
 Depth to water: 9.2 ft. (9-21-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, medium-gray; pinkish tan in lower part; contains some limy concretions.....	0.0	15.0
Sand, gray; texture grades from fine to medium.....	15.0	27.0
Clay, silty, to silt, clayey, medium-gray; in part pebbly.....	27.0	50.0
Sand, gray; texture grades from medium to coarse sand with some fine gravel.....	50.0	67.0
Clay, silty to pebbly, medium-gray.....	67.0	79.0

**Test Hole #8-A-55
(22-1-36dddd)
Madison County**

Location: SE SE SE SE sec. 36, T. 22 N., R. 1 W., approximately 11 feet north and 112 feet west of southeast corner.
 Ground elevation: 1,550.0 ft. (t). (Madison SE 7.5 min. quadrangle)
 Depth to water: 20.2 ft. (7-1-55).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.5
Soil, silt, moderately clayey, dark gray.....	1.5	3.0
Silt, very clayey, medium yellowish gray.....	3.0	6.0
Silt, slightly clayey, medium brownish gray.....	6.0	7.5
Silt, slightly clayey, medium yellowish gray; slightly calcareous below 10 ft; contains limy nodules from 10 to 20 ft; contains mottled brown- ish yellow silt from 20 to 35.5 ft; coarser tex- tured and medium gray below 35.5 ft.....	7.5	47.8
Sand, texture grades from very fine to fine with some medium sand.....	47.8	50.0
Sand, slightly calcareous; texture grades from very fine to coarse with some very coarse sand and a trace of fine gravel; contains some limestone grains; slightly coarser texture below 60 ft.....	50.0	70.0
Sand and gravel, texture grades from fine sand to fine gravel with some medium gravel, about 30 per- cent gravel.....	70.0	73.9
Till, clay, very silty, slightly sandy to pebbly, moderately calcareous, medium gray.....	73.9	105.4
Sand, slightly calcareous; texture grades from fine to very coarse; contains 5 to 10 percent fine gravel.....	105.4	110.0
Sand and gravel, slightly calcareous; texture grades from medium sand to medium gravel, about 60 per- cent gravel to 120 ft, and about 40 percent gravel below 120 ft.....	110.0	137.5
Silt, very clayey, moderately calcareous, light gray; moderately clayey below 140 ft; medium gray from 155 to 157.5 ft.....	137.5	160.0
Gravel and sand, texture grades from medium sand to medium gravel, about 75 percent gravel.....	160.0	170.6
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, light and medium gray, interbedded, chalky...	170.6	200.0

Test Hole #16-A-55
(22-2-6cddc)
Madison County

Location: SW SE SE SW sec. 6, T. 22 N., R. 2 W., approximately 8 feet north and 2,163 feet east of southwest corner.
 Ground elevation: 1,788.0 ft. (t). (Battle Creek 7.5 min. quadrangle)
 Depth to water: 103.6 ft. (7-21-55).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil, clay, very silty, dark brownish gray.....	0.0	1.5
Clay, very silty, dark gray.....	1.5	2.0
Silt, very clayey, medium brownish gray.....	2.0	3.0
Silt, slightly to moderately clayey, medium brownish gray; medium yellowish gray below 3 ft; slightly calcareous and contains many limy nodules below 5 ft.....	3.0	7.2
Silt, slightly clayey, slightly calcareous, medium yellowish gray; contains many limy nodules to 10 ft; contains some mottled light gray below 30 ft; slightly sandy from 40 to 41 ft, and very sandy below 41 ft; contains very fine to fine with some medium sand.....	7.2	45.0
Sand, very silty with interbedded sandy silt layers, slightly calcareous, medium yellowish gray; texture some coarse and a trace of very coarse.....	45.0	50.0
Sand, slightly silty; texture of sand grades from very fine to medium with some coarse and a trace of very coarse; contains a slightly clayey and sandy silt layer from 54.5 to 55 ft, and from 59.5 to 60 ft; medium yellowish gray.....	50.0	60.0
Silt, slightly clayey, very sandy, medium yellowish gray; contains very fine to coarse sand.....	60.0	65.0
Sand, very silty; texture of sand grades from very fine to medium with some coarse.....	65.0	69.5
Silt, slightly clayey, slightly sandy, medium yellowish gray with some mottled brown; contains very fine to coarse sand; moderately clayey and slightly calcareous below 71.5 ft.....	69.5	78.4
Silt, moderately clayey, dark gray; slightly sandy below 79.5 ft; contains very fine to fine sand; medium gray and very clayey below 81.3 ft.....	78.4	82.1
Clay, silty, very sandy, light brownish gray; contains very fine to medium sand.....	82.1	86.5
Clay, silty, medium yellowish gray; contains a trace of very fine to fine sand.....	86.5	92.9
Sand, moderately clayey, very silty, medium brown; texture of sand grades from very fine to medium...	92.9	96.5

Silt, moderately clayey, very sandy, medium brownish gray; contains very fine to medium sand; very clayey and in part less sandy below 99 ft.....	96.5	102.2
Clay, silty, slightly sandy, medium brownish gray; contains very fine to medium sand; moderately to very sandy from 105 to 108.1 ft; medium gray from 106 to 114.4 ft; light olive gray and contains very fine to fine sand below 114.4 ft.....	102.2	119.5
Sand, texture grades from very fine to medium with some coarse and a trace of very coarse; contains some fine gravel below 130 ft.....	119.5	135.0
Silt, slightly clayey, slightly sandy, light yellowish gray.....	135.0	137.5
Sand, texture grades from very fine to medium with a trace of coarse.....	137.5	145.0
Sand, texture grades from fine to very coarse; contains a trace of fine gravel and rounded rootlet grains; slightly finer texture and contains brownish yellow clay grains below 150 ft.....	145.0	155.0
Sand, texture grades from very fine to medium with some coarse and a trace of very coarse; contains rounded rootlet grains.....	155.0	160.0
Sand, texture grades from very fine to coarse with some very coarse.....	160.0	162.5
Clay, silty, light olive gray; contains a trace of very fine to fine sand.....	162.5	166.0
Silt, moderately clayey, very sandy, light olive gray; contains very fine to medium sand.....	166.0	170.0
Sand and some gravel, texture grades from fine sand to fine gravel, about 20 percent gravel; contains some medium gravel and many iron-stained grains below 180 ft.....	170.0	182.0
Silt, slightly clayey, medium brownish gray.....	182.0	184.0
Sand, texture grades from very fine to coarse with some very coarse and a trace of gravel; contains 10 to 15 percent gravel from 185 to 190 ft.....	184.0	192.0
Sand and gravel, texture grades from fine sand to fine gravel with some medium gravel, about 50 percent gravel.....	192.0	200.0
Sand and some gravel, texture grades from fine sand to fine gravel, about 30 percent gravel; contains iron-stained grains below 205 ft.....	200.0	208.0
Sand and gravel, texture grades from medium sand to medium gravel.....	208.0	210.0
Silt, slightly clayey, moderately sandy, light olive gray.....	210.0	212.0
Clay, very silty, in part slightly sandy, light olive gray.....	212.0	214.0
Sand, texture grades from fine to coarse with a trace of very coarse.....	214.0	221.3
Silt, very clayey, light gray.....	221.3	221.5

Sand, texture grades from very fine to medium with some coarse.....	221.5	223.5
Silt, very clayey, light gray and light yellowish gray.....	223.5	224.5
Sand, texture grades from fine to coarse; contains some very coarse sand and iron-stained grains to 230 ft.....	224.5	234.7
Silt, very clayey, very light gray; in part slightly sandy; contains very fine sand.....	234.7	235.5
Sand, texture grades from very fine to medium; contains very thin silty clay layers to 237 ft, and one from 237 to 237.5 ft; contains some coarse sand below 240 ft.....	235.5	245.0
Sand, texture grades from fine to coarse with some very coarse; contains about 5 percent gravel below 255 ft.....	245.0	260.0
Silt, texture grades from medium to very coarse; contains 5 to 10 percent fine gravel; contains fine sand from 275 to 280 ft, and no gravel below 275 ft.....	260.0	295.0
Sand and gravel, texture grades from coarse sand to fine gravel with some medium gravel, about 50 to 60 percent gravel; contains about 75 percent gravel from 305 to 310 ft, and from 315 to 320 ft.	295.0	322.3
Silt, very clayey, very light gray; probably contains gravel and boulders.....	322.3	327.0
Sand and gravel, texture grades from medium sand to fine gravel, about 30 percent gravel.....	327.0	330.3
Till, clay, silty, slightly sandy to pebbly, moderately calcareous, medium olive gray and medium gray.....	330.3	333.0
Sand and gravel, texture grades from medium sand to medium gravel, about 60 percent gravel; contains rounded clay and limestone grains below 335 ft....	333.0	335.5
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, slightly silty; texture of sand grades from very fine to fine.....	335.5	337.0
Clay, very silty, light gray; contains a trace of very fine to fine sand; contains small limy nodules below 340 ft.....	337.0	343.0
Clay, very silty, slightly calcareous, light brown; contains white limy areas below 345 ft; light brownish gray and moderately calcareous below 345 ft; very calcareous below 353 ft.....	343.0	355.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Limestone, white, chalky.....	355.0	357.0
Shale, mottled and interbedded white, yellowish gray and brownish yellow, chalky.....	357.0	390.0

Test Hole #4-A-64
(22-2-31cddd)
Madison County

Location: SE corner SW sec. 31, T. 22 N., R. 2 W., approximately 63 feet north and 2609 feet east of southwest corner.

Ground elevation: 1,758.0 ft. (t). (Battle Creek SE 7.5 min. quadrangle)

Depth to water: 82.3 ft. (10-5-64).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil.....	0.0	1.0
Silt, clayey, yellowish brown to olive.....	1.0	20.0
Silt, moderately clayey, pale olive.....	20.0	45.0
Silt, dark gray.....	45.0	47.0
Silt (soil-like) black.....	47.0	48.0
Clay, silty, dark gray.....	48.0	52.5
Clay, silty to sandy, olive gray.....	52.5	60.0
Silt, clayey to sandy, grayish brown.....	60.0	69.7
Sand, silty, light brownish gray.....	69.7	75.5
Clay, light olive gray.....	75.5	80.0
Silt, sandy, olive gray.....	80.0	86.3
Sand, very fine to coarse grained, some fine gravel; contains dark silicates.....	86.3	109.0
Silt, light olive gray.....	109.0	114.0
Sand, very fine to coarse.....	114.0	138.5
Clay, silty, sandy, light olive gray.....	138.5	142.0
Sand, silty, very fine to medium.....	142.0	144.8
Silt, clayey, olive gray.....	144.8	150.0
Sand, very fine to medium with some coarse.....	150.0	158.5
Sand, very fine to coarse with some medium gravel..	158.5	174.0
Silt, very clayey, olive gray.....	174.0	183.0
Sand, very fine to fine.....	183.0	184.9
Silt, olive gray.....	184.9	190.0
Sand, very fine to medium.....	190.0	195.0
Silt, very sandy, gray.....	195.0	215.0
Sand, very fine to fine, with some medium gravel...	215.0	240.0
Sand and gravel, fine sand to fine gravel.....	240.0	275.0
Gravel, sandy, fine to medium gravel, fine sand....	275.0	285.0
Sand and gravel, fine sand to fine gravel.....	285.0	290.0
Gravel, medium and sand, fine to coarse sand.....	290.0	300.0
Sand, fine to very coarse with some gravel.....	300.0	310.0
Gravel, fine gravel and fine sand.....	310.0	329.7
Silt, very clayey, sandy, pale olive to gray.....	329.7	331.5
Sand, fine to very coarse.....	331.5	341.7
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, pale yellow to gray, very calcareous.....	341.7	350.0

Test Hole #17-A-55
(22-3-25aaba)
Madison County

Location: NE NW NE NE sec. 25, T. 22 N., R. 3 W., approximately 10 feet south and 859 feet west of northeast corner.

Ground elevation: 1,808.0 ft. (t). (Battle Creek SE 7.5 min. quadrangle)

Depth to water: Unknown; test-hole caved at 63.0 ft. (7-20-55).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil, silt, slightly clayey, dark brownish gray.....	0.0	2.0
Silt, moderately clayey, medium yellowish gray.....	2.0	5.0
Silt, slightly clayey, medium yellowish gray; coarse textured; slightly calcareous below 10 ft.....	5.0	13.5
Silt, slightly clayey, slightly calcareous, medium yellowish gray; fine to coarse textured; contains snail shell fragments from 20 to 25 ft; slightly finer textured from 27 to 33 ft; in part moderately clayey and contains thin gray clay layers from 29 to 30 ft.....	13.5	35.0
Silt, slightly clayey, very sandy, slightly calcareous, medium yellowish gray; contains very fine to coarse sand.....	35.0	36.5
Sand, silty, slightly calcareous; texture of sand grades from very fine to coarse with some very coarse.....	36.5	40.0
Sand, light brownish gray; texture grades from very fine to coarse with some very coarse; finer textured below 48.7 ft; silty from 48.7 to 50 ft.....	40.0	52.8
Silt, slightly clayey, medium yellowish gray; slightly sandy from 52.8 to 53.5 ft.....	52.8	55.0
Silt, slightly clayey, slightly calcareous, medium yellowish gray; contains very fine to medium sand.	55.0	59.0
Silt, slightly clayey, medium to very sandy, slightly calcareous, medium brownish gray; contains very fine to medium sand; contains slightly less sand below 64.5 ft.....	59.0	68.0
Silt, slightly clayey, slightly calcareous, medium yellowish gray with mottled brownish yellow silt; coarse textured; contains a trace of very fine to fine sand from 70 to 71.5 ft.....	68.0	75.0
Silt, slightly clayey, slightly calcareous, medium yellowish gray.....	75.0	76.5
Silt, slightly to moderately clayey, medium gray....	76.5	77.5
Silt, moderately clayey, dark brownish gray.....	77.5	81.0

Clay, silty, dark brownish gray; medium brown below 83 ft; contains a trace of very fine to medium sand from 85 to 87 ft, and below 89.5 ft; slightly to in part moderately sandy from 87 to 89.5 ft....	81.0	90.0
Silt, very clayey, medium brown; contains a trace of very fine to medium sand to 92 ft; slightly sandy from 92 to 93.5 ft.....	90.0	95.0
Silt, very clayey, slightly sandy, medium to dark brownish gray; contains very fine to medium sand..	95.0	96.5
Clay, very silty, moderately sandy, light brown; contains very fine to coarse sand; slightly sandy below 100 ft.....	96.5	105.0
Silt, very clayey, medium yellowish gray; contains a trace of very fine to medium sand; slightly sandy and light brownish gray below 105.5 ft.....	105.0	106.0
Silt, slightly clayey, very sandy, light gray; contains very fine to medium sand.....	106.0	107.0
Silt, moderately clayey, moderately sandy, medium brownish gray; contains very fine to medium sand; less sandy from 108.5 to 112 ft; medium brown and contains very fine to fine sand below 110 ft; in part very sandy below 112 ft.....	107.0	115.5
Clay, silty, slightly to moderately sandy, light gray; contains very fine to medium sand; contains much mottled brownish yellow clay from 116.5 to 125 ft.....	115.5	130.0
Clay, silty, light yellowish gray; contains a trace of very fine to medium sand; light olive gray below 135 ft; contains mottled brownish yellow below 136.5 ft; moderately sandy from 136.5 to 138.5 ft.	130.0	140.0
Sand, texture grades from very fine to medium with a trace of coarse; contains thin silt layer at 141.5 ft.....	140.0	145.0
Sand, texture grades from fine to coarse with some very coarse; contains sandy silt layers from 148 to 149.2 ft, and from 157.5 to 157.6 ft; texture grades from fine to very coarse with about 5 percent gravel below 155 ft.....	145.0	168.2
Silt, moderately clayey, very sandy, light olive gray; contains very fine to medium sand.....	168.2	170.0
Silt, very sandy, very silty, light olive gray; texture of sand grades from very fine to medium...	170.0	172.0
Sand, texture grades from very fine to medium with a trace of coarse; contains thin brown silt layers at 179 ft; contains some coarse and a trace of very coarse sand below 185 ft.....	172.0	192.0
Silt, slightly clayey, very sandy, light olive gray; contains very fine to fine sand.....	192.0	192.5
Sand, texture grades from very fine to medium with a trace of coarse.....	192.5	195.8
Silt, slightly to very clayey, light olive gray.....	195.8	200.0

Sand, texture grades from very fine to medium with a trace of coarse.....	200.0	201.0
Silt, slightly clayey, light olive gray.....	201.0	202.5
Sand, texture grades from very fine to medium.....	202.5	205.0
Sand, texture grades from fine to coarse with some very coarse and a trace of fine gravel; contains thin silty clay layers from 208 to 210 ft.....	205.0	216.5
Silt, moderately clayey, light olive gray; slightly sandy and in part light brownish gray below 220 ft; contains very fine to fine sand.....	216.5	222.0
Clay, very silty, slightly sandy, light olive gray; contains very fine to fine sand.....	222.0	223.5
Silt, moderately clayey, moderately sandy, light olive gray; contains very fine to fine sand; slightly clayey and very sandy below 225 ft.....	223.5	226.0
Sand, texture grades from very fine to fine with some medium.....	226.0	230.0
Sand, texture grades from very fine to medium with a trace of coarse; very fine to coarse with some very coarse sand and fine gravel below 240 ft; contains a slightly clayey to very sandy light brownish gray silty layer from 243.5 to 244.2 ft, and one from 254.9 to 255 ft; contains slightly more very coarse sand and 5 percent fine gravel below 244.2 ft.....	230.0	255.0
Sand, texture grades from very fine to medium.....	255.0	258.0
Silt, slightly clayey, slightly calcareous, medium gray; contains a dark gray layer with shell fragments at 259 ft; contains some volcanic ash.....	258.0	260.0
Sand, texture grades from very fine to medium with a trace of coarse.....	260.0	264.8
Silt, very sandy, slightly calcareous, medium gray; contains very fine to fine sand.....	264.8	265.5
Clay and silt, interbedded, slightly sandy, slightly calcareous, medium gray; contains very fine to fine sand; very sandy from 267.5 to 268.5 ft.....	265.5	270.5
Sand, texture grades from very fine to medium with a trace of coarse to very coarse.....	270.5	275.0
Sand, texture grades from fine to very coarse with a trace of fine gravel; contains much coarse to very coarse sand.....	275.0	285.0
Sand and some gravel, texture grades from medium sand to fine gravel, about 30 percent gravel to 290 ft, and about 10 percent gravel below 290 ft; contains much coarse sand; contains some limestone grains below 310 ft.....	285.0	325.9
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, slightly sandy, light gray; contains very fine to fine sand and some volcanic ash to 330 ft, very fine sand below 330 ft; slightly calcareous below 335 ft; moderately sandy		

below 337 ft, some silty sand from 343 - 345 ft...	325.9	346.0
Sand, moderately silty; texture grades from very fine to fine; contains round siltstone grains.....	346.0	349.8
Silt, very sandy, interbedded with sand, very silty, light brownish gray; texture of sand grades from very fine to fine; slightly clayey from 357.5 to 360 ft, and in part clayey below 360 ft.....	349.8	374.0
Sand, texture grades from very fine to fine with a trace of medium.....	374.0	378.5
Silt, very sandy to sand, very silty, light brownish gray; texture of sand grades from very fine to fine; contains some siliceous rootlets.....	378.5	380.0
Sand, very silty, light brownish gray; texture of sand grades from very fine to fine; slightly silty below 384 ft.....	380.0	389.0
Silt, slightly clayey, in part sandy, light olive gray; contains very fine to fine sand.....	389.0	395.0
Sand, moderately to very silty, light brownish gray; texture of sand grades from very fine to fine.....	395.0	396.5
Silt, slightly clayey, in part sandy, light olive gray.....	396.5	399.5
Sand, texture grades from very fine to fine.....	399.5	401.5
Silt, moderately clayey, slightly sandy, light olive gray.....	401.5	403.0
Clay, very silty, medium brownish gray; contains a trace of very fine to fine sand.....	403.0	407.0
Silt, moderately clayey, moderately sandy, slightly calcareous, light brown; contains very fine sand..	407.0	410.0
Clay, silty, slightly sandy, slightly calcareous, light brown; contains very fine to medium sand....	410.0	416.0
Silt, moderately clayey, moderately sandy, slightly calcareous, light yellowish gray; contains very fine sand and a trace of coarser grains.....	416.0	420.0
Silt, slightly clayey, slightly calcareous, light yellowish gray; contains a trace of very fine sand; very sandy below 425 ft; contains rounded chalky shale grains.....	420.0	426.0
Sand, texture grades from very fine to medium with a trace of coarse and very coarse; contains rounded chalky shale grains; contains a slightly clayey silt layer from 430 to 431.5 ft.....	426.0	433.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, very light to medium gray, interbedded, chalky, argillaceous; contains some pyrite; interbedded with light yellowish gray and medium olive gray from 445.5 to 449 ft; contains aragonite fragments below 450 ft.....	433.0	470.0

**Test Hole #13-A-55
(23-1-1aaaa)
Madison County**

Location: NE NE NE NE sec. 1, T. 23 N., R. 1 W., approximately 10 feet south and 210 feet west of northeast corner.
 Ground elevation: 1,503.0 ft. (t). (Hoskins 7.5 min. quadrangle)
 Depth to water: 8.8 ft. (7-8-55).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil, silt, moderately clayey, dark brownish gray.....	0.0	2.0
Silt, very clayey, slightly sandy, medium brownish gray; slightly darker below 3 ft.....	2.0	4.5
Silt, slightly clayey, slightly sandy, slightly calcareous, medium brownish gray; contains very fine to fine sand.....	4.5	5.0
Silt, slightly clayey, very sandy, moderately calcareous, light brownish gray; contains very fine to medium sand and many limy nodules.....	5.0	8.3
Sand, texture grades from very fine to coarse with a trace of very coarse sand and fine gravel.....	8.3	10.0
Sand, texture grades from fine to very coarse; contains 10 to 15 percent gravel from 10 to 15 ft, from 20 to 25 ft, and below 30 ft; finer textured from 25 to 30 ft.....	10.0	35.0
Gravel and sand, texture grades from medium sand to medium gravel.....	35.0	53.3
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, light gray, chalky; medium gray below 60 ft..	53.3	90.0

**Test Hole #11-A-43
(23-1-5ccbb)
Madison County**

Location: NW NW SW SW sec. 5, T. 23 N., R. 1 W., approximately 1060 feet north and 20 feet east of southwest corner.
 Ground elevation: 1,550.0 ft. (i). (Enola 7.5 min. quadrangle)
 Depth to water: 14.4 ft. (8-4-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, light brown-gray; medium.....	0.0	14.0
Sand, light-gray; texture grades from fine to medium; contains some fine gravel below 19.0 ft..	14.0	29.0
Sand, light-gray; texture grades from fine to medium; contains some fine gravel below 47.0 ft..	29.0	64.0
Gravel, dark-gray; texture grades from fine to medium.....	64.0	80.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, calcareous, dark-gray, speckled white.....	80.0	89.0

**Test Hole #12-A-43
(23-1-5daaa)
Madison County**

Location: NE NE NE SE sec. 5, T. 23 N., R. 1 W.
 Ground elevation: 1,522.0 ft. (i). (Enola 7.5 min. quadrangle)
 Depth to water: 3.6 ft. (8-14-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, clay, silty, dark-gray to black.....	0.0	1.0
Sand, light-gray; texture grades from fine to coarse sand with a trace of fine gravel.....	1.0	36.0
Gravel, dark-gray; texture grades from fine to medium.....	36.0	54.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, medium to dark gray, speckled white, calcareous.....	54.0	59.0

Test Hole #12-A-55
(23-1-13dddd)
Madison County

Location: SE SE SE SE sec. 13, T. 23 N., R. 1 W., approximately 17 feet north and 157 feet west of southeast corner.
 Ground elevation: 1,549.0 ft. (t). (Madison NE 7.5 min. quadrangle)
 Depth to water: Unknown. Test hole caved at 19.0 ft.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, sand, slightly silty, medium brownish gray; texture of sand grades from very fine to medium with a trace of coarse.....	0.0	3.5
Sand, texture grades from very fine to medium with a trace of coarse.....	3.5	30.0
Sand, texture grades from very fine to fine with a trace of medium.....	30.0	40.0
Sand, texture grades from very fine to medium.....	40.0	51.3
Silt, moderately sandy, slightly peaty, dark brownish gray; contains wood fragments.....	51.3	54.0
Silt, moderately clayey, moderately sandy, medium gray; contains very fine to fine sand.....	54.0	54.8
Sand, slightly silty; texture of sand grades from very fine to fine with some medium.....	54.8	57.2
Silt, very clayey, slightly sandy, medium gray; contains very fine to fine sand; in part very sandy below 65 ft.....	57.2	66.8
Sand, texture grades from very fine to medium; contains a trace of rounded clay grains.....	66.8	70.0
Sand, texture grades from very fine to very coarse with a trace of fine gravel.....	70.0	75.0
Sand, texture grades from fine to very coarse; contains 10 to 15 percent fine gravel with a trace of medium gravel.....	75.0	80.0
Sand and gravel, texture grades from medium sand to medium gravel; contains from 50 to 75 percent gravel.....	80.0	94.7
Silt, slightly clayey, slightly sandy, medium brown; contains very fine to coarse sand.....	94.7	95.5
Clay, silty, light olive gray.....	95.5	96.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, medium gray, chalky, moderately calcareous...	96.0	97.0
Shale, light yellowish gray, chalky; interbedded with light brownish gray from 107 to 110 ft; mottled with light olive gray from 112.5 to 115 ft; light olive gray from 128.2 to 129.5 ft; light to medium gray below 129.5 ft.....	97.0	160.0

Test Hole #11-A-55
(23-1-36dddd)
Madison County

Location: SE SE SE SE sec. 36, T. 23 N., R. 1 W., approximately 268 feet north and 8 feet west of southeast corner.
 Ground elevation: 1,558.0 ft. (t). (Madison NE 7.5 min. quadrangle)
 Depth to water: 35.3 ft. (7-8-55).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very silty, medium dark gray; texture grades from very fine to fine with some medium sand.....	0.0	3.0
Sand, texture grades from very fine to medium.....	3.0	16.0
Silt, slightly clayey, medium yellowish gray, mottled brown; yellowish brown area from 27.5 to 28 ft; slightly calcareous below 25 ft; slightly sandy, contains very fine to fine sand from 39.2 to 41 ft; moderately clayey from 41 to 46.8 ft; medium brownish gray from 46.8 to 48 ft; medium gray below 48 ft.....	16.0	51.3
Sand, very silty; texture grades from very fine to coarse with some very coarse; very fine to very coarse with some fine gravel below 65 ft.....	51.3	67.0
Silty sand to sandy silt, slightly clayey, light gray.....	67.0	70.0
Sand, very silty, slightly clayey, light gray.....	70.0	75.0
Sand, gray; texture grades from fine to very coarse with some fine gravel.....	75.0	80.0
Gravel, quartz with pink silicates; texture grades from fine gravel with some medium with some fine to very coarse sand, about 75 percent gravel; grades from fine to medium with some coarse to very coarse sand below 90 ft, about 90 percent gravel.....	80.0	95.0
Sand, texture grades from very fine to very coarse with a trace of fine gravel; mostly medium sand; very silty from 98 to 100 ft.....	95.0	104.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, very sandy, light olive gray; contains very fine to fine sand.....	104.0	110.5
Sand, very silty with thin interbedded silt layers; texture grades from very fine to very coarse with some fine gravel.....	110.5	115.8
Sand, texture grades from very fine to medium with some very coarse sand and a trace of fine gravel..	115.8	117.4
Silt, slightly clayey, very sandy, light olive gray; contains very fine to fine sand.....	117.4	123.4

Silty sand and sand, interbedded, slightly consolidated, light olive gray; contains very fine to fine sand with some clay stone below 125 ft.....	123.4	127.0
Sandstone, slightly consolidated; texture grades from very fine to fine.....	127.0	127.5
Silt, slightly clayey, light olive gray; slightly more clayey below 130 ft.....	127.5	133.0
Silty sand to sandstone, slightly consolidated, light olive gray; texture grades from very fine to fine.....	133.0	133.3
Silt, slightly clayey, very sandy, light olive gray; contains very fine to fine sand.....	133.3	135.0
Sand, texture grades from very fine to medium with some coarse.....	135.0	140.0
Sand and sandy silt, interbedded; texture grades from very fine to medium with some coarse and very coarse; contains thin silt layer at 143 ft, and from 143.5 to 144 ft.....	140.0	145.0
Sand, very silty, light olive gray; texture grades from very fine to medium; fine to very coarse from 150 to 155 ft; very fine to coarse with a trace of very coarse below 155 ft.....	145.0	165.5
Silt, slightly clayey, light olive gray; contains a trace of very fine sand; very sandy from 169.5 to 172.5 ft, and contains very fine to medium sand; slightly calcareous below 169.5 ft; moderately clayey below 172.5 ft.....	165.5	175.7
Sand, moderately silty; texture grades from very fine to medium with a trace of coarse.....	175.7	177.5
Silt, moderately clayey, slightly sandy, slightly calcareous, light olive gray to light greenish gray; contains very fine sand.....	177.5	181.0
Sand and gravel, texture grades from fine sand to fine gravel; iron-stained; contains much reworked shale and limestone.....	181.0	182.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, light olive gray, chalky; light olive yellow from 185 to 188 ft; light olive gray to light gray from 188. to 188.5 ft; light gray from 188.5 to 189.5 ft; medium gray below 189.5 ft.....	182.0	210.0

**Test Hole #14-A-55
(23-2-7cbbb)
Madison County**

Location: NW NW NW SW sec. 7, T. 23 N., R. 2 W., approximately 2,530 feet north and 13 feet east of southwest corner.
 Ground elevation: 1,619.0 ft. (t). (Battle Creek 7.5 min. quadrangle)
 Depth to water: 14.6 ft. (7-13-55).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.5
Soil, silt, very sandy to sand, very silty, medium brownish gray.....	1.5	2.7
Clay, very silty, slightly sandy, medium brownish gray.....	2.7	4.3
Sand, very to slightly silty, light brown; texture grades from very fine to fine with some medium; contains some coarse and very coarse sand below 5 ft.....	4.3	7.9
Silt, slightly clayey, medium olive gray; contains a trace of very fine to fine sand.....	7.9	14.3
Sand, brownish gray; texture grades from very fine to medium with a trace of coarse; slightly finer, yellowish brown below 15 ft.....	14.3	17.6
Silt, slightly clayey, slightly sandy, medium brown; contains very fine to medium sand.....	17.6	18.7
Sand, brownish gray; texture grades from very fine to coarse with some very coarse.....	18.7	20.0
Sand and some gravel, interbedded silt layers; texture grades from very fine sand to fine gravel with some medium.....	20.0	25.0
Sand, brownish gray; texture grades from very fine to very coarse with a trace of fine gravel.....	25.0	25.7
Silt, slightly clayey, slightly sandy, light green; contains very fine to medium sand.....	25.7	26.9
Sand, brownish gray; texture grades from fine to very coarse with a trace of fine gravel.....	26.9	35.0
Sand and gravel, reddish brown; texture grades from fine sand to fine gravel, about 50 percent gravel; coarser grained with some medium gravel from 40 to 50 ft; 75 percent gravel from 50 to 55 ft; finer below 55 ft, about 25 percent gravel.....	35.0	60.0
Sand, texture grades from very fine to very coarse with a trace of fine gravel.....	60.0	63.3
Silt, slightly clayey, slightly sandy, light gray...	63.3	64.2
Sand, fine to very coarse with a trace of gravel and clay grains.....	64.2	70.0

Sand and some gravel, texture grades from fine sand to fine gravel with a trace of medium gravel, about 10 to 15 percent gravel.....	70.0	79.6
Tertiary System - Miocene Series - Ogallala Group:		
Sand and sandstone, interbedded, silty, slightly consolidated; contains very fine to fine sand.....	79.6	82.0
Silt, moderately to very clayey, very sandy, light gray; contains very fine to fine sand.....	82.0	85.0
Sand, very silty, very clayey, light olive gray; contains very fine to fine with some medium sand..	85.0	92.7
Sand and sandstone, interbedded, silty, slightly consolidated, light olive gray; contains very fine to fine sand.....	92.7	93.5
Silt, slightly to moderately clayey, very sandy, light olive gray; contains very fine to fine sand.	93.5	94.0
Clay, very silty, slightly sandy, in part very sandy, light olive gray; contains very fine to fine sand.....	94.0	97.3
Chalk, marly, white.....	97.3	100.0
Marl, very calcareous, white.....	100.0	102.0
Clay, very to moderately silty, slightly sandy, moderately to non-calcareous, light olive gray; contains very fine to fine sand.....	102.0	110.0
Clay, non-calcareous, greenish gray interbedded with marl, light yellowish gray.....	110.0	115.5
Marl, very light gray to white.....	115.5	117.0
Clay and marl, interbedded, light olive gray; contains reworked shale, medium olive gray below 117.5 ft.....	117.0	120.4
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, light yellowish brown, chalky; contains some interbedded white chalk from 126.8 to 129 ft; slightly reddish from 132.5 to 147 ft; mottled medium olive gray from 137.2 to 140 ft; mottled reddish brown from 157 to 163.5 ft; contains aragonite fragments at 137 ft, and from 145 to 147 ft; medium yellowish gray to brownish gray from 161.5 to 163.5 ft; medium gray below 163.5 ft.....	120.4	190.0

**Test Hole #33-A-43
(23-2-18cccb)
Madison County**

Location: NW SW SW SW sec. 18, T. 23 N., R. 2 W., approximately 390 feet north and 16 feet east of southwest corner.
 Ground elevation: 1,737.0 ft. (i).
 Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, medium brownish gray.....	0.0	1.0
Sand, brownish gray; texture grades from fine to coarse.....	1.0	9.0
Clay, silty, brownish gray; contains some sand.....	9.0	21.0
Sand, light to brownish gray; texture grades from fine to coarse; contains some gravel in lower part	21.0	79.0
Gravel, pinkish gray; texture grades from fine to medium.....	79.0	89.0
Sand, light-gray; fine texture.....	89.0	104.0
Sand, light-gray, and silt, clayey, light greenish gray; fine texture.....	104.0	119.0

**Test Hole #3-B-43
(23-2-30cccc)
Madison County**

Location: SW SW SW SW sec. 30, T. 23 N., R. 2 W., approximately 111 feet north and 57 feet east of southwest corner.
 Ground elevation: 1,771.0 ft. (i). (Battle Creek 7.5 min. quadrangle)
 Depth to water: 48.7 ft. (8-28-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, light to brownish gray; texture grades from fine to coarse with some gravel.....	0.0	4.0
Clay, silty, medium brownish gray.....	4.0	9.0
Clay, silty, greenish gray; in part pinkish gray; contains some interbedded sand below 60 feet.....	9.0	70.0
Clay, silty, dark gray to black.....	70.0	75.0
Clay, silty, light greenish gray; in part sandy.....	75.0	90.0

**Test Hole #30-A-43
(23-3-1dddd)
Madison County**

Location: SE SE SE SE sec. 1, T. 23 N., R. 3 W., approximately 47 feet north and 186 feet west of southeast corner.

Ground elevation: 1,598.0 ft. (i). (Battle Creek 7.5 min. quadrangle)

Depth to water: 5.7 ft. (8-20-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, gray; texture grades from fine to medium.....	0.0	2.0
Clay, silty, medium to dark gray; contains some sand	2.0	19.0
Clay, silty, dark gray to black.....	19.0	22.0
Silt, medium gray; contains some sand.....	22.0	52.0
Gravel, pink and dark gray; texture grades from fine to medium gravel with some coarse sand.....	52.0	84.0
Tertiary System - Miocene Series - Ogallala Group:		
Siltstone, sandy, to sandstone, silty, light gray; contains some interbedded calcareous siltstone to marl.....	84.0	99.0

**Test Hole #31-A-43
(23-3-13aaaa)
Madison County**

Location: NE corner sec. 13, T. 23 N., R. 3 W., approximately 70 feet south and 20 feet west of northeast corner.

Ground elevation: 1,642.0 ft. (i). (Battle Creek 7.5 min. quadrangle)

Depth to water: 22.0 ft. (8-20-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, light to brownish gray; contains some fine gravel.....	0.0	14.0
Gravel, pinkish gray; texture grades from fine to medium gravel with some sand.....	14.0	19.0
Clay, silty, to silt, clayey, medium greenish gray to pinkish tan.....	19.0	32.0
Sand and gravel, pinkish gray.....	32.0	39.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand and silt, light greenish gray and light-gray; texture of sand grades from fine to medium.....	39.0	59.0

Test Hole #15-A-55
(23-3-24ddaa)
Madison County

Location: NE NE SE SE sec. 24, T. 23 N., R. 3 W., approximately 1,147 feet north and 12 feet west of southeast corner.
 Ground elevation: 1,798.0 ft. (t). (Battle Creek 7.5 min. quadrangle)
 Depth to water: 109.9 ft. (7-19-55).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	3.0
Soil, silt, slightly clayey, slightly sandy, dark brownish gray.....	3.0	3.5
Silt, slightly clayey, slightly sandy, medium brownish gray; contains very fine to fine sand.....	3.5	5.0
Silt, slightly clayey, medium yellowish gray; light yellowish gray below 10 ft; slightly calcareous below 20 ft; slightly sandy from 38.8 to 43 ft, with a trace from 43 to 45 ft; contains very fine to fine sand; mottled yellowish brown from 40 to 45 ft.....	5.0	48.9
Silt, moderately clayey, slightly calcareous, medium yellowish gray; contains less clay below 50 ft....	48.9	55.0
Silt, slightly to in part moderately clayey, slightly calcareous, light yellowish gray; medium brownish gray from 77 to 82.5 ft; non-calcareous, medium olive gray below 82.5 ft.....	55.0	84.0
Silt, moderately clayey, dark brownish gray; contains a trace of very fine to fine sand; dark gray, slightly sandy below 85 ft; contains very fine to fine sand.....	84.0	86.0
Clay, very silty, slightly sandy, medium gray; contains very fine to medium sand; very sandy below 88.5 ft.....	86.0	90.0
Sand, very silty, slightly clayey, medium greenish gray; texture grades from very fine to medium sand	90.0	91.5
Clay, very silty, medium gray; light gray from 93.8 to 97.5 ft; medium brownish gray below 97.5 ft; moderately silty, very sandy from 95 to 100 ft; contains very fine to medium sand.....	91.5	101.5
Clay, very silty, slightly sandy, medium olive gray; contains very fine to medium sand.....	101.5	109.0
Sand, very silty, very clayey, medium olive gray; texture grades from very fine to medium sand.....	109.0	109.5
Clay, very silty, moderately sandy, medium olive gray; contains very fine to medium sand.....	109.5	114.0
Sand, very silty, moderately clayey, medium olive gray; texture grades from very fine to medium sand with a trace of coarse; no clay below 117.5 ft....	114.0	120.0

Sand, brownish gray; texture grades from very fine to medium.....	120.0	125.0
Sand, light gray silicates; texture grades from very fine to coarse with a trace of very coarse sand and fine gravel; slightly more very coarse sand and fine gravel below 130 ft.....	125.0	139.0
Clay, very silty, slightly sandy, medium brownish gray; contains very fine to medium sand; mottled yellowish brown and very sandy below 140 ft.....	139.0	145.8
Sand, very silty, slightly clayey, medium brownish gray; contains very fine to medium sand; very clayey below 148 ft.....	145.8	150.0
Sand, texture grades from very fine to medium with some coarse and a trace of very coarse.....	150.0	165.0
Sand, texture grades from fine to very coarse sand with some fine gravel.....	165.0	170.0
Sand, texture grades from very fine to medium with some coarse.....	170.0	179.0
Clay, very silty, slightly sandy, medium brownish gray; contains very fine to fine sand; contains some olive gray from 179 to 179.2 ft; slightly calcareous and slightly lighter color below 182.5 ft.....	179.0	187.0
Silt, very clayey, slightly sandy, non- to slightly calcareous, medium olive gray.....	187.0	188.5
Sand, texture grades from very fine to fine with some medium.....	188.5	190.3
Clay, very silty, slightly sandy, medium gray; contains very fine to fine sand; slightly lighter and very sandy below 193.5 ft.....	190.3	196.5
Sand, very silty, very clayey, medium gray; contains very fine to fine sand.....	196.5	198.0
Silt, very clayey, slightly sandy, medium gray.....	198.0	199.0
Sand, brownish gray; texture grades from very fine to fine with some medium.....	199.0	200.0
Sand and some gravel, brownish gray; texture grades from very fine sand to fine gravel, about 10 percent gravel.....	200.0	205.0
Sand and gravel, reddish brown; texture grades from medium sand to fine gravel with a trace of medium gravel, about 50 percent gravel; slightly finer below 210 ft, about 25 to 30 percent gravel.....	205.0	215.0
Sand, texture grades from very fine sand to fine gravel with a trace of medium gravel; contains a silty clay layer from 217 to 217.2 ft.....	215.0	220.0
Sand, texture grades from very fine to medium with some coarse and a trace of very coarse; contains thin silty clay layers from 227.4 to 227.6 ft, from 228 to 228.5 ft, and from 229 to 229.6 ft....	220.0	230.0
Sand and some gravel, texture grades from fine sand to fine gravel with a trace of medium gravel; contains a silty clay layer from 233.2 to 233.3 ft...	230.0	235.0

Silt, very clayey, slightly sandy, light olive gray.	235.0	237.0
Sand, texture grades from very fine to medium with a trace of coarse to very coarse.....	237.0	245.0
Sand and some gravel, texture grades from fine sand to fine gravel, about 10 to 15 percent gravel.....	245.0	249.0
Silt, moderately clayey, light olive gray.....	249.0	249.9
Sand and some gravel, considerable dark gray and green silicates; texture grades from fine sand to fine gravel, about 15 to 20 percent gravel; contains a trace of medium gravel from 255 to 260 ft, about 50 to 60 percent gravel; much finer below 265 ft, about 10 to 15 percent gravel.....	249.9	275.0
Sand, texture grades from very fine to very coarse sand with some fine gravel.....	275.0	280.0
Sand and gravel, brownish gray from 285 to 290 ft; principally quartz and pink to red silicates below 290 ft; texture grades from fine sand to fine gravel with a trace of medium gravel, about 50 percent gravel.....	280.0	295.0
Sand, texture grades from very fine to coarse with a trace of fine gravel; very silty below 307.5 ft.	295.0	310.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, very silty, slightly sandy, light gray to olive gray; contains very fine to fine sand.....	310.0	314.5
Silt, very clayey, moderately sandy, light gray to olive gray; contains very fine to fine sand.....	314.5	315.0
Clay, very silty, moderately to in part sandy, light gray to olive gray; very calcareous below 318.5 ft; contains very fine to fine sand.....	315.0	320.0
Silt, very clayey, moderately to in part very sandy, slightly calcareous, light gray to olive gray; non-calcareous from 322 to 325 ft; contains very fine to fine sand; slightly sandy and pinkish gray below 332 ft; contains a limy area at 339.4 ft....	320.0	339.5
Clay, very silty, slightly calcareous, light brownish gray; non-calcareous below 341.5 ft; contains a trace of very fine to fine sand.....	339.5	351.0
Gravel, very light gray to white; consists of reworked limestone, chalk and chalky shale; principally reworked chalk below 352.5 ft; very light yellowish brown from 352.5 to 355.5 ft; very light olive gray below 355.5 ft.....	351.0	358.7
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, light yellowish brown; light brownish yellow from 363 to 365 ft; interbedded light yellowish brown and brownish yellow from 365 to 370 ft; light yellowish brown below 370 ft.....	358.7	373.5
Shale, light medium gray, chalky; medium brownish gray from 374.5 to 376 ft; light gray below 405 ft	373.5	440.0

**Test Hole #32-A-43
(23-3-24daaa)
Madison County**

Location: NE corner SE sec. 24, T. 23 N., R. 3 W.
 Ground elevation: 1,786.0 ft. (i). (Battle Creek 7.5 min. quadrangle)
 Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, sandy, dark brownish gray.....	0.0	2.0
Sand, pinkish gray to light gray; texture grades from fine to coarse.....	2.0	24.0
Silt, clayey, medium gray to brownish gray; contains sand.....	24.0	49.0

**Test Hole #5-B-43
(23-4-12bccb)
Madison County**

Location: NW SW SW NW sec. 12, T. 23 N., R. 4 W., approximately 2100 feet south of northwest corner.

Ground elevation: 1,789.0 ft. (i). (Emerick 7.5 min. quadrangle)

Depth to water: unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, light gray; texture grades from fine to coarse	0.0	4.0
Clay, silty, pinkish brown and greenish gray.....	4.0	40.0
Clay, silty, light greenish gray; in part pink.....	40.0	70.0
Silt, clayey, light greenish gray.....	70.0	77.0
Sand, interbedded with clay, silty to sandy, gray; texture of sand grades from fine to coarse.....	77.0	88.0
Sand and gravel, gray to pink; texture grades from sand to medium gravel.....	88.0	105.0
Clay, silty, brownish red.....	105.0	111.0
Sand and gravel, light gray to pink; texture grades from fine sand to medium gravel.....	111.0	122.0
Clay, silty to sandy, light gray, in part dark gray.	122.0	130.0
Gravel and sand, pink; texture grades from sand to medium gravel.....	130.0	190.0

**Test Hole #39-A-55
(23-4-31cccc)
Madison County**

Location: SW SW SW SW sec. 31, T. 23 N., R. 4 W., approximately 8 feet north and 126 feet east of southwest corner.
 Ground elevation: 1,944.0 ft. (i). (Closter NE 7.5 min. quadrangle)
 Depth to water: Unknown, test hole caved at 200.1 ft.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Silt, slightly clayey, moderately calcareous, light yellowish gray, mottled light gray; contains some small limy nodules from 1 to 18 ft, and from 36 to 40 ft; slightly sandy from 18 to 29.5 ft, and below 33 ft; very sandy from 29.5 to 33 ft; contains very fine sand; moderate to light olive gray from 18 to 33 ft, and from 36 to 45 ft; light gray from 33 to 36 ft, and below 45 ft; mottled yellowish gray below 50 ft; contains thin sand streaks from 40 to 45 ft; non-calcareous below 50 ft.....	1.0	53.0
Silt, slightly clayey, slightly to very sandy, medium gray; contains very fine to fine sand with some medium sand from 55 to 56 ft; slightly red from 55 to 56 ft; mottled light gray, yellow and light brown below 55 ft.....	53.0	58.5
Sand, moderately clayey, very silty, light olive gray; very fine grained to sandy silt below 60 ft; contains a trace of medium sand below 60 ft.....	58.5	66.5
Silt, slightly clayey, slightly sandy, light olive gray; contains very fine to fine with a trace of medium sand; non-sandy from 72 to 72.5 ft; moderately sandy below 75 ft.....	66.5	75.5
Silt, very clayey, light gray, slightly mottled yellow; mottled light gray and yellow from 80 to 81 ft; light brown below 81 ft; moderately clayey from 91.5 to 95 ft; slightly clayey below 95 ft; slightly to moderately sandy and contains very fine to fine sand below 101 ft.....	75.5	103.0
Silty sand to sandy silt, light brown; texture grades from very fine to fine with some medium....	103.0	106.5
Silt, slightly to moderately clayey, light brown; slightly sandy and contains very fine to fine sand below 109.5 ft.....	106.5	110.0
Sand, texture grades from very fine to fine with a trace of medium; contains some clay grains.....	110.0	117.0
Silt, slightly clayey, slightly sandy, light brown; contains very fine sand; very clayey from 120.5 to 122 ft.....	117.0	128.0

Clay, silty, light brown; contains some very fine to fine sand below 131.5 ft.....	128.0	134.5
Silt, moderately to slightly clayey, light brown; slightly sandy and contains very fine to fine sand below 136.5 ft.....	134.5	138.0
Sand, slightly clayey, moderately to very silty, light brown; texture grades from very fine to fine with a trace of medium sand; slightly finer, iron-stained below 142 ft.....	138.0	149.0
Silt, slightly to in part moderately and very clayey, slightly sandy, light gray; contains very fine to fine sand, very sandy with a trace of medium sand below 158 ft; mottled yellowish gray below 156 ft.....	149.0	159.0
Silty sand to sandy silt, light gray; contains very fine to medium sand.....	159.0	160.5
Silt, moderately to very sandy, light gray; contains very fine to fine with a trace of medium sand.....	160.5	163.5
Sand, very silty; texture grades from very fine to fine with a trace of medium; non-silty, very fine to medium with a trace of coarse below 165.5 ft...	163.5	172.0
Silty sand to sandy silt, interbedded, light gray; contains very fine to medium sand.....	172.0	175.0
Silt, slightly clayey, slightly to moderately sandy, light brownish gray; contains very fine to fine sand; light gray, slightly mottled yellow below 176.5 ft.....	175.0	180.0
Sand, slightly silty; texture grades from very fine to fine; non-silty, very fine to medium from 183.5 to 185 ft; very fine to coarse from 185 to 190 ft; moderately to very silty below 190 ft.....	180.0	192.0
Silt, slightly sandy, light brownish gray; very fine grained.....	192.0	195.5
Sand, texture grades from very fine to coarse with a trace of very coarse.....	195.5	204.0
Silt, slightly to in part moderately clayey, slightly sandy, light gray; contains very fine sand; light olive gray from 205 to 212.5 ft; non-sandy below 206.5 ft.....	204.0	214.5
Sand, slightly silty; texture grades from very fine to medium with a trace of coarse.....	214.5	217.5
Silt, slightly to moderately clayey, in part very clayey, light gray; contains very fine to fine sand; contains a trace of medium sand from 230.5 to 233.5 ft; contains a trace of medium gravel from 233.5 to 235 ft; contains very fine sand to medium gravel below 235 ft.....	217.5	238.0
Sand and gravel, texture grades from fine sand to medium gravel; medium sand to medium gravel below 240 ft; slightly finer from 252 to 254 ft; contains a thin silt layer from 258.5 to 258.8 ft....	238.0	260.0

Sand, texture grades from very fine to coarse with a trace of very coarse.....	260.0	264.4
Silt, slightly clayey, slightly sandy, light gray; contains very fine sand.....	264.4	265.0
Sand and gravel, texture grades from medium sand to fine gravel; slightly finer from 270 to 275 ft; contains some medium gravel below 280 ft.....	265.0	290.0
Sand, texture grades from medium to very coarse with some fine gravel; contains some very thin silt layers.....	290.0	300.3
Silt, slightly clayey, slightly sandy, light olive gray; contains very fine to medium sand.....	300.3	303.0
Sand, moderately to very silty, light gray, mottled yellowish brown; texture grades from very fine to medium with a trace of fine gravel.....	303.0	306.0
Sand and gravel, texture grades from medium sand to fine gravel; contains thin light gray sandy silt layers to 308 ft; texture grades from fine sand to fine gravel and contains large amount very coarse sand below 310 ft.....	306.0	320.5
Silt, slightly sandy, light gray, interbedded with thin sand and gravel layers; contains fine sand to fine gravel.....	320.5	321.5
Sand and gravel, texture grades from very fine sand to fine gravel; contains a trace of medium gravel below 325 ft.....	321.5	330.0
Sand, texture grades from very fine to very coarse with a trace of fine gravel.....	330.0	335.0
Sand and gravel, texture grades from medium sand to medium gravel.....	335.0	340.0
Sand, texture grades from very fine to very coarse with a trace of fine gravel.....	340.0	345.0
Sand and gravel, texture grades from fine sand to fine gravel; contains a trace of medium gravel below 360 ft; mostly very coarse sand; slightly finer from 370 to 380 ft.....	345.0	390.0
Sand and some gravel, texture grades from fine sand to fine gravel; contains light gray silt layers at 391.5 ft, 393 ft, and 398 ft; slightly finer below 395 ft.....	390.0	400.0
Sand, moderately silty, light gray; texture grades from very fine to medium sand with a trace of very coarse gravel.....	400.0	402.0
Silt, slightly to moderately clayey, light gray; interbedded with fine sand to fine gravel layers..	402.0	404.0
Sand and gravel, texture grades from fine sand to fine gravel with some medium gravel; contains a few thin silt layers to 410 ft; slightly finer below 410 ft.....	404.0	415.0

Tertiary System - Miocene Series - Ogallala Group:

Sand, moderately to slightly silty, light gray; texture grades from very fine to medium; contains some coarse below 420 ft.....	415.0	426.5
Silt, very to moderately clayey, light gray, in part yellowish brown; contains a thin very fine to coarse sand layer about 430 ft.....	426.5	431.5
Sand, texture grades from very fine to fine with some medium; silty to 432 ft.....	431.5	439.5
Clay, slightly to moderately silty, light gray; contains a trace of very fine sand below 440 ft.....	439.5	445.0
Silt, very clayey, slightly sandy, light gray; contains very fine sand; white shale, contains a few limy nodules from 450 to 455 ft; moderately clayey to 460 ft, slightly clayey below 460 ft; slightly to moderately sandy from 455 to 460 ft, and from 465 to 470 ft; moderately to very sandy from 460 to 465 ft, and below 470 ft; contains fine sand below 447 ft; contains some medium sand below 455 ft.....	445.0	475.0
Sand, slightly silty; texture grades from very fine to fine; contains thin light gray silt layer from 485.7 to 486.5 ft, and at 488.2 ft; texture grades from very coarse from 490 to 500 ft; contains some medium sand below 500 ft.....	475.0	506.0
Silt, moderately to slightly clayey, light gray; contains very fine sand from 508 to 510 ft, from 512.5 to 515 ft, and below 520 ft; light brownish gray from 512.5 to 523 ft; mottled slightly yellow below 525 ft; contains scattered white specks from 512.5 to 515 ft; slightly calcareous from 512.5 to 520 ft, and below 533 ft.....	506.0	535.0
Sand, texture grades from fine to coarse with some fine gravel; contains large amount of chalky shale.....	535.0	537.0

Cretaceous System - Upper Cretaceous Series - Colorado Group:

Niobrara Formation:

Shale, medium red, light gray to white, yellow, medium gray and brown, chalky; probably reworked..	537.0	541.0
Shale, medium dark gray, chalky.....	541.0	560.0

**Test Hole #45-A-51
(24-1-1aaaa)
Madison County**

Location: NE NE NE NE sec. 1, T. 24 N., R. 1 W., approximately 23 feet north and 145 feet west of corner fencepost.
 Ground elevation: 1,587.0 ft. (t). (Hoskins 7.5 min. quadrangle)
 Depth to water: 6.3 ft. (10-26-51).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty, dark brownish gray; texture of sand grades from fine to medium.....	0.0	0.5
Sand, yellowish to grayish brown; texture grades from fine to medium; contains a thin soil-like layer at top and a trace of coarse sand below 10 ft.....	0.5	25.0
Sand, texture grades from fine to very coarse; grades coarser with depth.....	25.0	34.5
Silt, slightly to moderately clayey, yellowish to grayish brown, limonitic-stained.....	34.5	35.0
Sand, light brown, texture grades from fine to medium.....	35.0	37.0
Sand, slightly calcareous, light gray with a green tint; texture grades from fine to coarse.....	37.0	40.8
Silt and sand, silty, interbedded, light bluish gray.....	40.8	44.6
Silt, sandy, slightly calcareous, light bluish gray; contains very fine sand.....	44.6	46.5
Sand and gravel, slightly calcareous; texture grades from medium sand to fine gravel.....	46.5	48.0
Silt, slightly clayey, light bluish gray, limonitic-stained.....	48.0	50.0
Silt, clayey, light brown, mottled bluish gray.....	50.0	55.0
Silt, slightly calcareous, medium brownish gray.....	55.0	56.5
Silt, slightly to moderately clayey, slightly calcareous, light gray.....	56.5	58.0
Sand, medium-gray; texture grades from very fine to medium.....	58.0	60.9
Silt, slightly clayey to moderately sandy, slightly calcareous, medium gray.....	60.9	63.2
Clay, slightly to moderately silty, moderately calcareous, medium gray.....	63.2	71.8
Till, clay, moderately sandy to silty, moderately calcareous, medium gray.....	71.8	95.8
Sand and gravel, slightly calcareous, pink and green; texture grades from fine sand to fine gravel.....	95.8	99.0
Clay, very sandy and silty, moderately calcareous, light grayish to yellowish brown.....	99.0	101.2

Till, clay and sand, interbedded, slightly calcareous; contains fine to coarse sand.....	101.2	105.3
Silt, clayey, light bluish gray to greenish gray....	105.3	107.0
Chalk, white to very light yellow.....	107.0	111.8
Gravel and some sand, slightly calcareous; texture grades from medium sand to coarse gravel.....	111.8	112.2
Tertiary System - Miocene Series - Ogallala Group:		
Silt, clayey, light grayish green to brown.....	112.2	120.0
Silt, slightly sandy to moderately clayey, moderately to very calcareous, light yellow.....	120.0	122.0
Silt, slightly clayey to sandy, very calcareous; contains very fine to fine sand and chalk fragments, light yellow to brownish yellow.....	122.0	130.0
Silt, sandy to moderately clayey, yellowish brown; contains very fine sand.....	130.0	133.5
Silt, moderately sandy, very calcareous, light yellow; contains chalk fragments.....	133.5	140.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, silty, white to light yellow.....	140.0	144.5
Chalk, dark brownish gray.....	144.5	147.0
Chalk, dark gray.....	147.0	148.5
Chalk, medium to light gray.....	148.5	160.0

**Test Hole #07-A-43
(24-1-14dddd)
Madison County**

Location: SE corner sec. 14, T. 24 N., R. 1 W., approximately 32 feet north and 36 feet west of southwest corner.
 Ground elevation: 1,584.0 ft. (i). (Norfolk 7.5 min. quadrangle)
 Depth to water: 70.5 ft. (7-28-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, brownish gray; texture grades from fine to coarse.....	0.0	13.0
Sand and gravel, texture grades from coarse sand to fine gravel.....	13.0	59.0
Gravel, pink; texture grades from fine to medium gravel with some sand; contains chalk pebbles below 74 feet.....	59.0	99.0
Gravel, texture grades from fine to coarse.....	99.0	109.0

**Test Hole #01-A-43
(24-1-15ccdd)
Madison County**

Location: SE SE SW SW sec. 15, T. 24 N., R. 1 W., approximately 70 feet north and 1170 feet east of southwest corner.
 Ground elevation: 1,530.0 ft. (i). (Norfolk 7.5 min. quadrangle)
 Depth to water: 17.3 ft. (7-15-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, medium gray to pinkish gray; dark gray in upper and lower parts; in part sandy to pebbly.	0.0	26.0
Sand, light gray; texture grades from fine to medium.....	26.0	32.0
Gravel, dark gray; fine texture; contains yellow gray chalk pebbles below 38 feet.....	32.0	44.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, calcareous, dark gray, speckled white.....	44.0	89.0

**Test Hole #02-A-43
(24-1-15dccd)
Madison County**

Location: SE SW SW SE sec. 15, T. 24 N., R. 1 W., approximately 184 feet north and 2070 feet west of southeast corner.

Ground elevation: 1,522.0 ft. (i). (Norfolk 7.5 min. quadrangle)

Depth to water: 9.2 ft. (7-20-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, dark gray.....	0.0	4.0
Sand, gray; texture grades from fine to medium.....	4.0	18.0
Gravel, dark gray; texture grades from fine to medium; contains some chalk pebbles.....	18.0	35.0
Sand, gray; texture grades from fine to medium.....	35.0	41.0
Gravel, dark gray; fine texture.....	41.0	58.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, calcareous, medium gray, speckled white.....	58.0	109.0

**Test Hole #1-B-43
(24-1-17ddda)
Madison County**

Location: NE SE SE SE sec. 17, T. 24 N., R. 1 W., approximately 525 feet north of southeast corner.
 Ground elevation: 1,648.0 ft. (i). (Norfolk 7.5 min. quadrangle)
 Depth to water: Unknown.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, to silt, clayey, brownish gray; dark in upper part.....	0.0	15.0
Silt, clayey, pink to reddish brown.....	15.0	27.0
Sand, gray; texture grades from medium to coarse....	27.0	30.0
Clay, silty, medium gray to pink; in part sandy.....	30.0	58.0
Clay, silty to sandy, brownish gray to dark gray; in part pebbly; carbonaceous in upper part.....	58.0	67.0
Sand, gray; texture grades from fine to medium; contains interbedded silty clay, gray to pink.....	67.0	91.0
Gravel, texture grades from fine to medium.....	91.0	100.0
Clay, silty to pebbly and chalky, light yellowish gray and pinkish gray.....	100.0	113.0
Clay, silty to pebbly, dark gray.....	113.0	138.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Hard layer; probably limestone.....	138.0	138.1

**Test Hole #05-A-43
(24-1-21abaa)
Madison County**

Location: NE corner NW NE sec. 21, T. 24 N., R. 1 W., approximately
 15 feet south and 1350 feet west of northeast corner.
 Ground elevation: 1,607.0 ft. (i). (Norfolk 7.5 min. quadrangle)
 Depth to water: 72.3 ft. (7-23-43).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, brownish gray, in part pinkish gray....	0.0	24.0
Clay, silty. medium gray to brownish gray, in part sandy to slightly pebbly.....	24.0	53.0
Clay, silty, dark gray; carbonaceous in upper part..	53.0	57.0
Clay, silty, brownish gray to reddish gray; in part pebbly.....	57.0	62.0
Sand, light gray; texture grades from fine to medium and contains some pink clay.....	62.0	69.0
Sand, light gray; texture grades from fine to coarse and contains some pink fine gravel.....	69.0	89.0
Gravel and sand, pink and light gray; texture grades from fine sand to fine gravel.....	89.0	94.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Limestone, dark greenish gray, siliceous; in part yellow.....	94.0	95.0

**Test Hole #06-A-43
(24-1-21aaaa)
Madison County**

Location: NE corner sec. 21, T. 24 N., R. 1 W., approximately 55 feet south and 39 feet west of northeast corner.
 Ground elevation: 1,563.0 ft. (i). (Norfolk 7.5 min. quadrangle)
 Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, greenish gray to pinkish brown.....	0.0	37.0
Clay, silty to pebbly, carbonaceous, dark gray.....	37.0	43.0
Sand, gray; texture grades from fine to medium; contains silty to pebbly clay, medium gray to pinkish gray.....	43.0	54.0
Gravel and sand, texture grades from coarse sand to fine gravel.....	54.0	57.0
Clay, pebbly, medium gray, interbedded with sand and gravel.....	57.0	71.0
Gravel, dark gray; fine texture.....	71.0	72.0
Sand and gravel, texture grades from coarse sand to fine gravel; contains some interbedded pebbly clay	72.0	78.0
Sand, texture grades from fine to coarse sand with some fine gravel.....	78.0	88.0

**Test Hole #03-A-43
(24-1-23bbbb)
Madison County**

Location: NW corner sec. 23, T. 24 N., R. 1 W., approximately 50 feet south and 95 feet east of northwest corner.

Ground elevation: 1,520.0 ft. (i). (Norfolk 7.5 min. quadrangle)

Depth to water: Unknown.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, dark brownish gray.....	0.0	3.0
Sand, light gray to brownish gray; texture grades from fine to medium; contains some fine gravel and shale pebbles below 18 feet.....	3.0	39.0
Sand and gravel, darkish gray; texture grades from fine sand to fine gravel; contains some chalk pebbles.....	39.0	49.0
Gravel, darkish gray; texture grades from fine to medium; contains chalk pebbles.....	49.0	56.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, medium gray to dark gray, speckled white, calcareous.....	56.0	74.0

**Test Hole #04-A-43
(24-1-23baaa)
Madison County**

Location: NE corner NW sec. 23, T. 24 N., R. 1 W., approximately 54 feet south and 2610 feet east of northwest corner.
 Ground elevation: 1,523.0 ft. (i). (Norfolk 7.5 min. quadrangle)
 Depth to water: 11.4 ft. (7-22-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, light gray to brownish gray; texture grades from fine to medium.....	0.0	27.0
Sand and some gravel, light gray to brownish gray; texture grades from fine sand to fine gravel.....	27.0	35.0
Clay, silty, medium gray to brownish gray.....	35.0	39.0
Sand and some gravel, medium gray; texture grades from medium sand to fine gravel.....	39.0	49.0
Gravel, darkish gray; fine texture; contains chalk pebbles.....	49.0	54.0
Shale, medium gray to dark gray, speckled white, calcareous.....	54.0	69.0

**Test Hole #8-A-43
(24-1-28bbbc)
Madison County**

Location: SW NW NW NW sec. 28, T. 24 N., R. 1 W., approximately 530 feet south and 15 feet east of northwest corner.
 Ground elevation: 1,537.0 ft. (i). (Norfolk 7.5 min. quadrangle)
 Depth to water: 8.3 ft. (7-30-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, clay, silty, dark gray.....	0.0	1.0
Gravel and sand, iron-strained; texture grades from sand to medium gravel.....	1.0	4.0
Clay, silty to pebbly, darkish gray; brown in upper part.....	4.0	24.0
Gravel, darkish gray; texture grades from fine to medium gravel with some coarse sand; contains chalk pebbles below 39 feet.....	24.0	69.0

**Test Hole #9-A-43
(24-1-29cccb)
Madison County**

Location: NW SW SW SW sec. 29, T. 24 N., R. 1 W., approximately 525 feet north of southeast corner.
 Ground elevation: 1,525.0 ft. (i). (Norfolk 7.5 min. quadrangle)
 Depth to water: Unknown.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, light gray; texture grades from fine to coarse with a trace of fine gravel.....	0.0	37.0
Gravel, darkish gray; texture grades from fine to medium.....	37.0	47.0
Clay, silty to pebbly, darkish gray; contains gravel	47.0	54.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, yellowish gray, calcareous.....	54.0	59.0
Shale, medium to dark gray, speckled white, calcareous.....	59.0	99.0

**Test Hole #10-A-43
(24-1-32addd)
Madison County**

Location: SE corner NE sec. 32, T. 24 N., R. 1 W., approximately 2630 feet south and 100 feet west of northeast corner.
 Ground elevation: 1,525.0 ft. (i). (Norfolk 7.5 min. quadrangle)
 Depth to water: 7.4 ft. (8-4-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, darkish gray.....	0.0	2.0
Sand, light gray; texture grades from fine to medium; contains fine gravel below 13 ft.....	2.0	39.0
Gravel, darkish gray; texture grades from fine to medium with some sand.....	39.0	56.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, darkish gray, speckled white, calcareous.....	56.0	69.0

**Test Hole #44A-A-55
(24-2-6-bbba)
Madison County**

Location: NE NW NW NW sec. 06, T. 24 N., R. 2 W., approximately 18 feet south and 368 feet east of northwest corner.
 Ground elevation: 1,738.0 ft. (t). (Pierce SE 7.5 min. quadrangle)
 Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very silty, light yellowish brown.....	0.0	8.5
Silt, moderately to very sandy, light yellowish brown, very fine to fine grained.....	8.5	10.0
Silt, (soil-like) dark brownish gray.....	10.0	11.5
Silt, moderately clayey, light yellowish gray.....	11.5	50.0
(Lost circulation)		

Test Hole #44B-A-55
(24-2-6bbbb)
Madison County

Location: NW NW NW NW sec. 06, T. 24 N., R. 2 W., approximately
 286 feet south and 7 feet east of northwest corner.

Ground elevation: 1,730.0 ft. (t). (Pierce SE 7.5 min. quadrangle)

Depth to water: 22.7 ft. (9-29-55).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	1.0
Sand, very silty, dark gray; texture grades from very fine to fine with a trace of medium sand; slightly silty, fine to coarse from 3 to 5 ft; slightly to moderately silty below 6 ft.....	1.0	7.0
Silt, moderately to very sandy, light yellowish gray, slightly brown, mottled light gray; contains very fine to medium sand.....	7.0	9.0
Sandy silt to silty sand, light yellowish brown, mottled medium gray; contains very fine to fine with a trace of medium sand.....	9.0	11.0
Silt, slightly clayey, medium brownish gray, slightly sandy; contains very fine to fine sand below 14 ft.....	11.0	15.0
Sand, slightly silty; texture grades from very fine to medium; texture grades from very fine to coarse with some very coarse from 20 to 30 ft; contains some coarse sand below 30 ft.....	15.0	36.5
Silt, slightly to moderately clayey, medium brownish gray; mottled yellow and dark yellowish brown from 37 to 40 ft; contains rare very fine sand grains from 40 to 44 ft; mottled slightly yellow from 44 to 44.5 ft; dark gray below 44.5 ft.....	36.5	45.0
Silt, moderately to very clayey, light brownish gray, mottled dark gray.....	45.0	52.0
Silt, slightly to moderately clayey, slightly sandy, light gray; coarse textured silt to very fine sand; slightly to moderately sandy and contains very fine to medium sand from 55 to 60 ft; contains very fine to fine sand below 60 ft.....	52.0	69.5
Sand, texture grades from very fine to fine with some medium; contains clay grains and iron concretions from 69.5 to 70 ft; texture grades from very fine to medium below 80 ft.....	69.5	82.4
Clay, silty, slightly sandy, light brownish gray; slightly darker below 83 ft; mottled light yellow and yellow from 83 to 85 ft; contains very fine sand.....	82.4	86.0

Silt, slightly to moderately sandy, light brownish gray, mottled light yellowish brown.....	86.0	88.5
Sand, texture grades from very fine to medium with some coarse; contains rootlets at 88.5 ft; contains thin light gray silt layers from 100 to 102 ft.....	88.5	105.0
Silt, slightly clayey, slightly to moderately sandy, light brownish gray; light gray, mottled yellowish brown below 108 ft; contains very fine to fine sand.....	105.0	109.0
Sand, texture grades from very fine to coarse; very fine to medium below 110 ft; slightly silty from 110 to 112 ft, and below 115 ft.....	109.0	123.5
Silt, slightly to moderately clayey, slightly to moderately sandy, light brownish gray; contains very fine sand; in part very sandy below 125 ft...	123.5	130.0
Silt, moderately to very clayey, light gray; mottled yellowish brown below 135 ft.....	130.0	137.0
Sand with some gravel, texture grades from very fine sand to fine gravel with a trace of medium gravel; contains clayey area from 137 to 137.5 ft.....	137.0	140.5
Silt, slightly to moderately clayey, slightly to moderately sandy, moderately to very calcareous, light gray; contains very fine to fine sand.....	140.5	148.5
Clay, silty, very calcareous, light gray; contains a trace of very fine to fine sand; medium gray from 153 to 155 ft; slightly darker from 155 to 158 ft; light olive gray, mottled medium gray below 158 ft; non-calcareous below 155 ft.....	148.5	160.0
Silt, very coarse textured silt to very fine sand, light olive gray; slightly calcareous, slightly consolidated below 163.5 ft.....	160.0	165.0
Sand, texture grades from very fine to fine; slightly silty from 165 to 167 ft; texture grades from fine to very coarse with some fine to medium gravel below 170 ft, well sorted, mostly coarse to very coarse sand.....	165.0	182.5
Silt, moderately clayey, light brown.....	182.5	183.3
Sand and some gravel, texture grades from fine sand to fine gravel, mostly very coarse sand, about 10 percent gravel.....	183.3	185.0
Sand and gravel, texture grades from coarse sand to fine gravel with a trace of very fine to medium sand.....	185.0	190.0
Sand with some gravel, texture grades from very fine sand to fine gravel, about 10 to 15 percent gravel	190.0	200.0
Sand, texture grades from very fine to very coarse..	200.0	205.0
Sand with some gravel, texture grades from very fine sand to fine gravel, about 10 percent gravel; contains chalky fragments from 205 to 210 ft; slightly silty below 215 ft.....	205.0	218.0

Sand, slightly clayey, slightly silty; texture grades from very fine to medium; contains a trace of coarse sand below 220 ft.....	218.0	222.5
Tertiary System - Miocene Series - Ogallala Group:		
Clay, silty, slightly sandy, light gray; contains very fine to medium sand.....	222.5	223.0
Sand, slightly silty; texture grades from very fine to medium with a trace of coarse sand.....	223.0	223.8
Silt, slightly clayey, slightly sandy, light gray...	223.8	224.4
Sand, slightly silty; texture grades from very fine to medium with some coarse and a trace of very coarse.....	224.4	225.2
Silt, slightly clayey, slightly to very sandy, slightly calcareous, light gray; possibly interbedded with thin siltstone layers; contains very fine to fine sand; non-calcareous, very sandy to sandy; contains very fine to medium sand below 230 ft.....	225.2	235.0
Sand, very silty, very sandy to sandstone below 238 ft; contains very fine to fine sand; slightly silty, slightly more consolidated below 240 ft....	235.0	243.5
Clay, silty, slightly sandy, slightly calcareous, light gray; contains very fine sand.....	243.5	248.5
Silt, slightly to moderately clayey, slightly sandy, slightly to non-calcareous, light gray; coarse textured silt to very fine sand.....	248.5	255.0
Sandstone and silt, interbedded, moderately consolidated, slightly calcareous; coarse textured silt to very fine sand.....	255.0	263.7
Silt, slightly to very clayey, slightly to non-calcareous, light gray; contains coarse textured silt to very fine sandstone to 264 ft; contains chalk fragments below 265 ft.....	263.7	270.0
Sand, slightly silty; texture grades from very fine to fine with with some medium.....	270.0	278.0
Silt, slightly sandy, light gray; contains very fine sand.....	278.0	280.0
Sand, slightly silty, slightly consolidated; texture grades from very fine to fine; texture grades from very fine to medium below 285 ft.....	280.0	303.0
Silt, slightly to moderately sandy, light gray; contains coarse textured silt to very fine to fine sand; contains some slightly consolidated sandstone below 310 ft.....	303.0	315.0
Sand, slightly to moderately silty, slightly consolidated; texture grades from very fine to fine.....	315.0	320.0
Silt, slightly sandy, slightly consolidated, light gray; contains very fine to fine sand; slightly clayey from 325 to 330 ft.....	320.0	332.5

Sand, texture grades from very fine to medium with a trace of coarse; texture grades from very fine to fine from 335 to 345 ft; slightly silty at 337 ft, and from 338 to 338.2 ft, and from 340 to 345 ft; texture grades from very fine to medium below 345 ft.....	332.5	351.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, chalky, siliceous limestone to chert; re-worked.....	351.5	352.5
Shale, light yellowish gray, chalky; light brown to yellowish gray from 353 to 354.5 ft; medium brownish gray from 354.5 to 363 ft; medium gray below 363 ft.....	352.5	370.0

**Test Hole #40-A-43
(24-2-7cccc)
Madison County**

Location: SW corner sec. 7, T. 24 N., R. 2 W., approximately 20 feet north and 40 feet east of southwest corner.
 Ground elevation: 1,684.0 ft. (i). (Pierce SE 7.5 min. quadrangle)
 Depth to water: 7.2 ft. (8-28-43).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, light gray; texture grades from fine to coarse brownish gray in upper part.....	0.0	14.0
Silt, clayey, medium gray.....	14.0	27.0
Sand, light gray, and silt, clayey, light greenish gray; texture of sand grades from fine to medium..	27.0	56.0
Clay, silty, dark brownish gray.....	56.0	58.0
Clay, silty, light greenish gray; contains sand.....	58.0	68.0
Sand and clay, silty, greenish gray.....	68.0	79.0
Clay, silty, greenish gray; contains sand.....	79.0	89.0
Sand and clay, silty, greenish gray; contains some fine gravel.....	89.0	97.0
Clay, silty, calcareous, medium to dark gray.....	97.0	109.0

**Test Hole #39-A-43
(24-2-18cccc)
Madison County**

Location: SW corner sec. 18, T. 24 N., R. 2 W., approximately 25 feet north and 35 feet east of southwest corner.

Ground elevation: 1,593.0 ft. (i). (Pierce SE 7.5 min. quadrangle)

Depth to water: 19.6 ft. (8-28-43).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, gray; texture grades from fine to medium.....	0.0	2.0
Clay, silty to sandy, brownish gray to pinkish tan..	2.0	14.0
Sand, light gray to brownish gray; texture grades from fine to coarse with some fine gravel.....	14.0	34.0
Gravel, fine to medium, pinkish gray, in part dark gray; texture grades from fine to medium gravel with some coarse sand.....	34.0	74.0
Gravel and sand, light pinkish gray; texture grades from coarse sand to fine gravel.....	74.0	114.0
Sand, light gray; texture grades from medium to coarse with some fine gravel.....	114.0	139.0

**Test Hole #45-A-55
(24-2-18cccc)
Madison County**

Location: SW SW SW SW sec. 18, T. 24 N., R. 2 W., approximately 128 feet north and 9 feet east of southwest corner.
Ground elevation: 1,595.0 ft. (t). (Pierce SE 7.5 min. quadrangle)
Depth to water: Unknown. Test hole caved at 19.1 ft.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill.....	0.0	0.5
Sand, slightly to moderately silty, dark gray; texture grades from very fine to medium; no silt below 5 ft.....	0.5	6.0
Silt, slightly clayey, slightly to moderately sandy, medium brown; contains very fine to medium sand; moderately clayey below 8 ft; very fine sand from 10 to 13 ft; very sandy, very fine to medium below 13 ft.....	6.0	13.5
Sand, texture grades from very fine to coarse; slightly finer from 25 to 30 ft; texture grades from very fine to very coarse with a trace of fine gravel from 36 to 40 ft; texture grades from very fine to very coarse with some fine to medium gravel below 40 ft, about 10 percent gravel; contains light gray silt layers from 41 to 41.1 ft, and from 47.4 to 47.6 ft; ironstone below 45 ft...	13.5	50.2
Clay, moderately silty, slightly sandy, light brownish gray to yellowish gray; contains very fine to medium sand.....	50.2	50.8
Sand and gravel, texture grades from coarse sand to medium gravel; contains a trace of very fine to medium sand; slightly to moderately iron-stained; contains some coarse gravel from 55 to 80 ft; texture grades from very fine to very coarse with some fine to medium gravel below 80 ft, about 10 percent gravel.....	50.8	85.0
Sand, texture grades from very fine to coarse with a trace of very coarse sand and fine gravel; slightly coarser grained below 95 ft.....	85.0	110.0
Sand and gravel, texture grades from medium sand to fine gravel with some medium gravel and a trace of very fine to medium sand.....	110.0	120.0
Sand, texture grades from very fine to very coarse with a trace of fine gravel.....	120.0	130.0

Sand and some gravel, texture grades from medium to very coarse sand with some fine gravel and a trace of very fine to medium sand; contains chalk fragments and some rootlets; texture grades from very fine to very coarse sand with some fine gravel below 140 ft, about 15 percent gravel.....	130.0	150.0
Sand, texture grades from fine to very coarse with a trace of very fine sand; contains rootlets and chalk fragments.....	150.0	152.6
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Limestone, light brown to yellowish gray to medium gray, siliceous, cherty; drilled very hard.....	152.6	153.7
Shale, light yellow, mottled light gray, chalky.....	153.7	154.5
Limestone, dark gray, siliceous, slightly calcareous	154.5	154.6
Shale, medium brownish gray, chalky; medium brown from 155.2 to 158 ft, and from 158.5 to 160 ft; medium grayish brown from 158 to 158.5 ft; medium gray from 161.5 to 165 ft; light gray below 165 ft; speckled white from 165 to 175 ft.....	154.6	180.0

**Test Hole #38-A-43
(24-2-19bccb)
Madison County**

Location: NW SW SW NW sec. 19, T. 24 N., R. 2 W., approximately 2140 feet south and 11 feet east of northwest corner.
 Ground elevation: 1,577.0 ft. (i). (Pierce SE 7.5 min. quadrangle)
 Depth to water: Unknown. (caved at 5.5 ft.).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, clayey to sandy, darkish gray.....	0.0	2.0
Sand, gray; texture grades from fine to coarse.....	2.0	11.0
Gravel, pinkish gray, in part black; texture grades from fine to medium gravel with some sand.....	11.0	84.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Silt, chalky, white.....	84.0	105.0

**Test Hole #36-A-43
(24-2-30cbbb)
Madison County**

Location: NW NW NW SW sec. 30, T. 24 N., R. 2 W., approximately 2630 feet north and 160 feet east of southwest corner.
Ground elevation: 1,570.0 ft. (i). (Pierce 7.5 min. quadrangle)
Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty to sandy, darkish gray to black.....	0.0	4.0
Sand, light gray; texture grades from medium to coarse sand with some fine gravel.....	4.0	44.0
Gravel, pink and darkish gray; texture grades from fine to medium gravel with some sand.....	44.0	59.0
Sandstone, fine-grained, light gray.....	59.0	69.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Silt, chalky, white; in part pink.....	69.0	99.0
Silt, chalky, white to pink and yellow; contains some reworked chalk.....	99.0	114.0
Shale, medium to dark gray, speckled white, calcareous.....	114.0	129.0

**Test Hole #02-B-43
(24-3-1ddda)
Madison County**

Location: NE SW SW SW sec. 1, T. 24 N., R. 3 W., approximately 342 feet north of southeast corner.

Ground elevation: 1,721.0 ft. (i). (Pierce SE 7.5 min. quadrangle)

Depth to water: 47.1 ft. (8-24-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, brownish gray; texture grades from fine to coarse.....	0.0	9.0
Clay, silty, in part sandy, light gray to greenish gray.....	9.0	25.0
Sand, light gray; texture grades from fine to medium.....	25.0	28.0
Clay, silty, light gray to pinkish gray; contains sand.....	28.0	38.0
Clay, silty to sandy, darkish gray.....	38.0	43.0
Clay, silty to sandy, light gray to greenish gray; contains some interbedded fine to medium sand.....	43.0	80.0

**Test Hole #37-A-43
(24-3-24dddd)
Madison County**

Location: SE SE SE SE sec. 24, T. 24 N., R. 3 W., approximately 150 feet north and 24 feet west of southeast corner.
 Ground elevation: 1,575.0 ft. (i). (Pierce SE 7.5 min. quadrangle)
 Depth to water: Unknown.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, gray; texture grades from fine to coarse sand with some fine gravel; medium darkish brown in upper part; contains some fine gravel.....	0.0	29.0
Gravel, pinkish gray; texture grades from fine to medium; contains some layers of medium gray clayey silt below 39 ft.....	29.0	49.0
Gravel, gray; texture grades from fine to medium gravel with some sand.....	49.0	69.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Silt, chalky, white to yellowish white.....	69.0	99.0
Silt, chalky, white and pink; contains weathered and reworked chalk.....	99.0	119.0
Shale, medium to dark gray, speckled white, calcareous.....	119.0	129.0

Test Hole #46-A-55
(24-3-25dddd)
Madison County

Location: SE SE SE SE sec. 25, T. 24 N., R. 3 W., approximately 10 feet north and 128 feet west of southeast corner.
 Ground elevation: 1,574.0 ft. (t). (Pierce SE 7.5 min. quadrangle)
 Depth to water: 7.2 ft. (9-29-55).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Roadfill and soil, silt, medium gray to brownish gray with some sand.....	0.0	2.0
Soil, silt, slightly to moderately clayey, dark gray	2.0	3.5
Silt, slightly clayey, slightly to moderately sandy, medium brownish gray; contains coarse silt to very fine sand; light brownish gray below 4 ft.....	3.5	6.0
Sand, texture grades from very fine to very coarse; slightly silty, light gray from 10 to 20 ft; very to moderately silty, dark gray below 20 ft; contains a trace of fine gravel below 20 ft.....	6.0	30.0
Sand and gravel, texture grades from fine sand to medium gravel with a trace of very fine sand, about 30 percent gravel.....	30.0	35.0
Sand, texture grades from very fine to coarse with some very coarse.....	35.0	40.0
Sand and gravel, texture grades from very fine sand to fine gravel with a trace of medium gravel, about 30 percent gravel; texture grades from very coarse sand to medium gravel with a trace of medium to coarse sand from 45 to 50 ft, about 50 percent gravel; contains more medium gravel and fine to medium sand below 50 ft, about 30 percent gravel.....	40.0	55.0
Sand, texture grades from very fine to very coarse; mostly very fine to medium sand.....	55.0	60.0
Sand and gravel, texture grades from medium sand to medium gravel, about 30 to 35 percent gravel; contains a trace of light gray very sandy silt from 65 to 70 ft; contains a light brownish gray clay layer at 73 ft.....	60.0	74.9
Clay, very sandy, medium greenish gray; contains very fine to medium sand with a trace of coarse to very coarse.....	74.9	76.2
Silt, slightly sandy, chalky, medium greenish gray and light greenish gray; mottled yellow; contains very fine sand; contains thin white areas from 77.5 to 78 ft; light gray, slightly green below 78 ft.....	76.2	79.0

Cretaceous System - Upper Cretaceous Series - Colorado Group:

Niobrara Formation:

Silt, moderately to very clayey, slightly sandy, chalky, dark gray; contains very fine sand; probably reworked shale.....	79.0	79.3
Shale, mottled light gray and yellow, chalky; bentonitic from 80 to 85 ft; slightly greenish gray below 82 ft.....	79.3	85.0
Shale, light yellow, mottled light gray to white, chalky; not mottled from 86 to 88.5 ft, 95 to 98 ft, and from 100 to 105 ft; bentonitic from 93 to 98 ft; contains some medium yellow below 105 ft...	85.0	110.0

**Test Hole #29-A-43
(24-3-36dddc)
Madison County**

Location: SW SE SE SE sec. 36, T. 24 N., R. 3 W., approximately 100 feet north and 650 feet west of southeast corner.
 Ground elevation: 1,587.0 ft. (i). (Pierce SE 7.5 min. quadrangle)
 Depth to water: 12.4 ft. (8-14-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, clayey to sandy, darkish gray to brownish gray.....	0.0	17.0
Gravel, darkish gray; fine texture; contains sandstone pebbles and some darkish gray silty clay....	17.0	24.0
Sand, gray; texture grades from fine to coarse sand with some fine gravel.....	24.0	47.0
Gravel, darkish gray and pink; fine texture; texture grades from medium to coarse in lower part; contains sand.....	47.0	74.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Sandstone, silty, light greenish gray.....	74.0	84.0
Sandstone, silty; contains light gray to white calcareous siltstone.....	84.0	89.0

**Test Hole #34-A-43
(24-3-36addd)
Madison County**

Location: NE corner SE SE NE sec. 36, T. 24 N., R. 3 W.,
 approximately 2000 feet south and 17 feet west of northeast corner.
 Ground elevation: 1,580.0 ft. (i). (Pierce SE 7.5 min. quadrangle)
 Depth to water: 12.6 ft. (8-25-43).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, light gray; texture grades from fine to medium.....	0.0	3.0
Silt, clayey, medium to dark gray.....	3.0	11.0
Sand, gray; texture grades from fine to medium.....	11.0	49.0
Gravel, pinkish gray; texture grades from fine to medium gravel with some sand.....	49.0	69.0

**Test Hole #35-A-43
(24-4-36adda)
Madison County**

Location: NE SE SE NE sec. 36, T. 24 N., R. 3 W., approximately 2100 feet south and 17 feet west of northeast corner.
 Ground elevation: 1,580.0 ft. (i). (Pierce SE 7.5 min. quadrangle)
 Depth to water: 12.5 ft. (8-23-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, black loam.....	0.0	4.0
Loam and sand, black.....	4.0	9.0
Sand, gray.....	9.0	14.0
Quick sand, light gray.....	14.0	54.0
Gravel, red, medium grade.....	54.0	69.0

**Test Hole #43-A-55
(24-4-6bbbb)
Madison County**

Location: NW corner sec. 6, T. 24 N., R. 4 W., approximately 56 feet south and 21 feet east of northwest corner.
 Ground elevation: 1,695.0 ft. (t). (Tilden 7.5 min. quadrangle)
 Depth to water: 19.9 ft. (9-26-55).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Soil, silt, slightly sandy, dark brownish gray.....	0.0	1.5
Silt, medium grayish brown; slightly clayey below 2 ft.....	1.5	3.0
Silt, slightly clayey, slightly sandy, light yellowish gray; contains very fine sand; light brownish gray to yellow below 10 ft.....	3.0	11.0
Sand, silty; texture grades from very fine to coarse with a trace of very coarse.....	11.0	12.5
Sandy silt and silty sand, interbedded, light brownish gray; contains very fine to coarse sand.....	12.5	20.0
Sand, silty; texture grades from very fine to medium with a trace of coarse; contains light yellowish brown silt layers at 21.5 and 22.5 ft.....	20.0	25.0
Sand, texture grades from very fine to very coarse with a trace of fine gravel; iron-stained from 30 to 38 ft.....	25.0	40.0
Sand and gravel, texture grades from very fine sand to fine gravel with a trace of medium gravel, about 25 percent gravel.....	40.0	45.0
Gravel with some sand, iron-stained; texture grades from fine to coarse gravel with some medium to very coarse sand, about 75 percent gravel; contains some very fine to fine sand below 50 ft.....	45.0	54.7
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly sandy, light gray; contains very fine sand.....	54.7	56.0
Sand, poorly consolidated; texture grades from very fine to medium; slightly more consolidated below 65 ft; contains sandstone layers from 68 to 70 ft; contains rootlets from 65 to 74 ft; slightly finer below 74 ft.....	56.0	76.8
Silt, moderately clayey, slightly sandy, light gray; contains very fine to fine sand.....	76.8	84.5
Sand to sandstone, slightly to moderately consolidated; texture grades from very fine to fine.....	84.5	85.5
Silt, slightly clayey, slightly sandy, light gray; contains very fine sand.....	85.5	87.5

Sand to sandstone, moderately consolidated; texture grades from very fine to fine; contains light gray sandy silt layers at 90 ft, and below 105 ft; contains rootlets from 95 to 100 ft, and below 105 ft	87.5	109.0
Silt, moderately clayey, slightly sandy, light yellowish gray; contains very fine sand.....	109.0	110.5
Sand, slightly silty, slightly consolidated; texture grades from very fine to fine.....	110.5	112.0
Silt, slightly sandy, light gray; contains very fine sand.....	112.0	113.0
Sand, silty, slightly consolidated; texture grades from very fine to medium.....	113.0	115.0
Silt, moderately clayey, slightly sandy, light olive gray.....	115.0	120.3
Sand, slightly silty, moderately to poorly consolidated; very fine-grained.....	120.3	126.0
Silt, slightly to moderately clayey, slightly sandy, light olive gray; contains very fine sand.....	126.0	129.5
Sand, slightly silty to silty sand; texture grades from very fine to medium; slightly silty, very fine to coarse below 135 ft.....	129.5	137.0
Silt, moderately to very clayey, slightly to very sandy, light olive gray; contains very fine to fine sand.....	137.0	140.0
Sand, slightly silty; texture grades form very fine to fine with a trace of medium sand; texture grades from very fine to medium below 145 ft; contains clay grains from 150 to 155 ft; in part slightly consolidated.....	140.0	183.0
Silt, moderately to very clayey, slightly sandy, light gray; contains very fine to fine sand; slightly clayey below 200 ft; moderately sandy below 202.5 ft; contains interbedded sandy claystone and claystone, slightly silty, slightly sandy from 197 to 200 ft.....	183.0	205.0
Sand, slightly silty, light gray; texture grades from very fine to medium.....	205.0	207.0
Silt to siltstone, slightly clayey, moderately consolidated, light gray.....	207.0	208.5
Silt, slightly clayey, slightly sandy, light gray; contains very fine sand.....	208.5	212.5
Sand to sandstone, moderately silty, light brownish gray; contains light gray wilt layers at 215 ft; very fine-grained; very fine to medium below 220 ft.....	212.5	226.0
Silt, slightly sandy, light gray; coarse textured silt to very fine sand.....	226.0	230.0
Sand, in part slightly silty, slightly consolidated, light gray; texture grades from very fine to fine; less consolidated below 240 ft; slightly to moderately silty below 248 ft.....	230.0	259.0

Silt, slightly clayey, slightly to moderately sandy, light gray; contains very fine sand; moderately to very clayey below 260 ft; contains very fine sand; non-sandy from 260 to 270 ft; very fine sand below 270 ft.....	259.0	275.0
Silt, slightly clayey, light gray; interbedded with coarse sand to fine gravel; contains bone fragments.....	275.0	279.0
Sand, slightly silty; texture grades from very fine to fine with a trace of medium sand.....	279.0	285.0
Sand, texture grades from very fine to coarse; contains reworked silt, clay, jasper, bone fragments, etc.; texture grades from very fine to very coarse below 290 ft.....	285.0	294.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, light brownish gray to yellow, chalky; medium gray, slightly yellow from 295.5 to 296 ft; medium brown below 296 ft.....	294.5	297.5
Shale, chalky, medium brownish gray to gray, very calcareous; contains a thin bentonite seam from 297.5 to 297.8 ft.....	297.5	320.0

**Test Hole #46-A-43
(24-4-13bbbb)
Madison County**

Location: NW corner sec. 13, T. 24 N., R. 4 W., approximately 10 feet south and 10 feet east of northwest corner.
 Ground elevation: 1,642.0 ft. (i). (Meadow Grove 7.5 min. quadrangle)
 Depth to water: 7.6 ft. (9-7-43).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, gray; texture grades from fine to coarse; contains some brownish gray to darkish gray silty clay.....	0.0	9.0
Sand, gray; texture grades from medium to coarse with some pink gravel.....	9.0	29.0
Gravel, darkish gray and pink; texture grades from fine to medium gravel with some coarse sand.....	29.0	84.0
Tertiary System - Miocene Series - Ogallala Group:		
Siltstone, sandy, and sandstone, silty, light gray, in part white.....	84.0	119.0
Sand, very fine to fine, little medium, much coarse.	119.0	139.0

**Test Hole #43-A-43
(24-4-23ddda)
Madison County**

Location: NE SE SE SE sec. 23, T. 24 N., R. 4 W., approximately 600 feet north and 10 feet west of southeast corner.
 Ground elevation: 1,628.0 ft. (i). (Meadow Grove 7.5 min. quadrangle)
 Depth to water: 10.6 ft. (9-2-43).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, to silt, clayey, dark brownish gray; in part pinkish tan.....	0.0	14.0
Sand, gray; texture grades from fine to medium sand; contains a trace of fine to medium gravel below 29 ft.....	14.0	39.0
Sand and some gravel, gray and pink; texture grades from fine sand to medium gravel.....	39.0	59.0
Gravel, pink and darkish gray; texture grades from fine to medium gravel with some sand.....	59.0	75.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty, grading to sandy siltstone, greenish gray.....	75.0	129.0
Siltstone, in part slightly calcareous, light gray; contains rootlets.....	129.0	139.0

**Test Hole #45-A-43
(24-4-24bbbb)
Madison County**

Location: NW corner sec. 24, T. 24 N., R. 4 W., approximately 10 feet south and 10 feet east of northwest corner.

Ground elevation: 1,620.0 ft. (i). (Meadow Grove 7.5 min. quadrangle)

Depth to water: 4.8 ft. (9-7-43).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, gray; texture grades from medium to coarse; contains darkish gray to black silty clay.....	0.0	9.0
Sand and some gravel, gray; texture grades from medium sand to fine gravel.....	9.0	24.0
Gravel, darkish gray, in part pink; texture grades from fine to medium gravel with some coarse sand..	24.0	41.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty, light gray; contains rootlets.....	41.0	54.0
Siltstone, light gray.....	54.0	64.0
Sandstone, silty, light greenish gray.....	64.0	79.0
Sandstone, silty, and siltstone, light gray to white	79.0	89.0
Sandstone, silty, light gray.....	89.0	119.0

**Test Hole #41-A-55
(24-4-31cccd)
Madison County**

Location: SE SW SW SW sec. 31, T. 24 N., R. 4 W., approximately 15 feet north and 431 feet east of southwest corner.
 Ground elevation: 1,785.0 ft. (t). (Tilden 7.5 min. quadrangle)
 Depth to water: 60.34 ft. (9-21-53).

Depth, in feet
From To

Quaternary System, undifferentiated:

Silt, slightly clayey, slightly calcareous, light yellowish gray; coarse textured, in part slightly to moderately sandy; contains very fine sand from 10 to 20 ft; in part very sandy to a trace of very fine sand from 20 to 27 ft; contains a trace of fine to coarse sand from 55 to 56 ft; contains limy nodules from 0 to 10 ft; mottled light gray from 43 to 45 ft; light gray and light yellowish gray below 45 ft..... 0.0 56.0

Tertiary System - Miocene Series - Ogallala Group:

Sand and gravel, texture grades from medium sand to fine gravel with some medium gravel; slightly iron-stained; principally quartz with some pink silicates, about 30 percent gravel..... 56.0 60.0

Sand, texture grades from fine to very coarse with some fine gravel; contains light gray, slightly clayey, moderately sandy silt from 67.5 to 68.5 ft; thin silt layer from 74.5 to 75 ft; slightly finer grained below 70 ft; iron-stained below 75 ft..... 60.0 80.0

Sand and some gravel, texture grades from medium sand to fine gravel, about 10 to 15 percent gravel, highly iron-stained..... 80.0 85.5

Sand, texture grades from fine to very coarse with a trace of fine gravel; slightly coarser grained from 90 to 95 ft, about 5 percent gravel; contains a thin silt layer at 98.5 ft, and from 100 to 102 ft..... 85.5 105.0

Sand and some gravel, texture grades from fine to very coarse with some fine gravel, about 10 percent gravel; principally quartz with some pink silicates; slightly coarser below 115 ft, about 15 percent gravel..... 105.0 126.0

Sand and gravel, texture grades from medium sand to fine gravel with some medium gravel, about 50 percent gravel; 60 percent below 135 ft..... 126.0 151.5

Silt, moderately clayey, slightly sandy, light olive gray; contains fine to coarse sand..... 151.5 154.5

Sand and gravel, texture grades from medium sand to fine gravel with some medium gravel, about 60 percent gravel from 154.5 to 160 ft, and below 195 ft; 70 percent gravel from 160 to 170 ft, and from 175 to 180 ft; 50 percent gravel from 170 to 175 ft, and from 180 to 195 ft; contains some thin silt layers from 154.5 to 156.5 ft; contains clay layer from 189 to 190 ft.....	154.5	211.5
Silt, moderately clayey, light olive gray.....	211.5	212.5
Silt, moderately clayey, marly, very calcareous, white; contains a trace of fine sand below 215 ft.	212.5	217.5
Silt, slightly clayey, moderately sandy, light olive gray with a little gray; contains very fine to medium sand; very sandy from 220 to 225 ft; interbedded with less sandy silt from 225 to 230 ft; contains some silty sand layers with a trace of rootlets from 230 to 235 ft; slightly consolidated be;pw 230 ft.....	217.5	240.0
Sand, slightly silty, slightly consolidated, light olive gray; texture grades from very fine to fine; slightly calcareous below 250 ft.....	240.0	290.0
Silt, slightly clayey, slightly to moderately sandy, light olive gray; in part slightly consolidated; contains very fine to fine sand.....	290.0	306.5
Sand, slightly silty; texture grades from very fine to fine with some medium.....	306.5	310.0
Silt, slightly clayey, in part slightly sandy, slightly consolidated, light olive gray; contains very fine to fine sand.....	310.0	312.0
Siltstone to sandstone, light olive gray; contains very fine to fine sand.....	312.0	320.0
Sand, texture grades from very fine to fine with some medium; contains a trace of rounded light gray silt grains from 320 to 330 ft; contains silt layers from 354.5 to 355 ft, and from 358 to 359 ft.....	320.0	364.3
Quartzite, clear; contains very fine sand grains....	364.3	365.6
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Limestone, dark to light gray to brownish gray, siliceous, moderately calcareous.....	365.6	366.2
Shale, medium brownish gray, chalky; medium gray from 371 to 375 ft; light gray from 375 to 389 ft; medium gray below 389 ft; partly cemented from 366.2 to 367 ft; thin calcareous layers from 383 to 385 ft.....	366.2	390.0

**Test Hole #41-A-43
(24-4-36bb)
Madison County**

Location: NW corner sec. 36, T. 24 N., R. 4 W., approximately 8 feet south and 72 feet east of northwest corner.
 Ground elevation: 1,648.0 ft. (i). (Meadow Grove 7.5 min. quadrangle)
 Depth to water: 6.8 ft. (9-2-43).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, medium gray to darkish gray, black in upper part; contains fine to medium sand.....	0.0	29.0
Clay, silty, to silt, clayey, medium gray to darkish gray.....	29.0	45.0
Sand, gray; texture grades from fine to coarse sand with some fine gravel; contains some silty clay...	45.0	64.0
Gravel, pinkish gray; texture grades from fine to medium; contains sand.....	64.0	84.0
Gravel, pinkish gray; texture grades from fine to medium.....	84.0	102.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Sandstone, fine-grained, medium gray to light gray..	102.0	124.0
Sandstone, fine-grained, light gray.....	124.0	129.0

**Test Hole #44-A-43
(24-4-36cccc)
Madison County**

Location: SW corner sec. 36, T. 24 N., R. 4 W., approximately 10 feet north and 10 feet east of southwest corner.

Ground elevation: 1,713.0 ft. (i). (Meadow Grove 7.5 min. quadrangle)

Depth to water: 37.9 ft. (9-7-43).

Depth, in feet
From To

Quaternary System, undifferentiated:

Sand, gray; texture grades from fine to medium; contains silty clay, medium gray to brownish gray....	0.0	19.0
Clay, silty, medium to light brownish gray, sandy in lower part.....	19.0	39.0
Clay, silty, to silt, clayey medium gray; contains sand and fine gravel below 59.0 ft.....	39.0	79.0