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Wheeler County Test Hole Logs

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WHEELER COUNTY Test-Hole Logs

Raymond R. Burchett and Frank A. Smith

(Adapted from Dennis R. Lawton and Robert A. Hiergesell)

**Nebraska Water Survey
Test-Hole Report No.92**

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



March, 1992



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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.

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

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

Each test hole is identified by a number assigned in the field (for example #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.

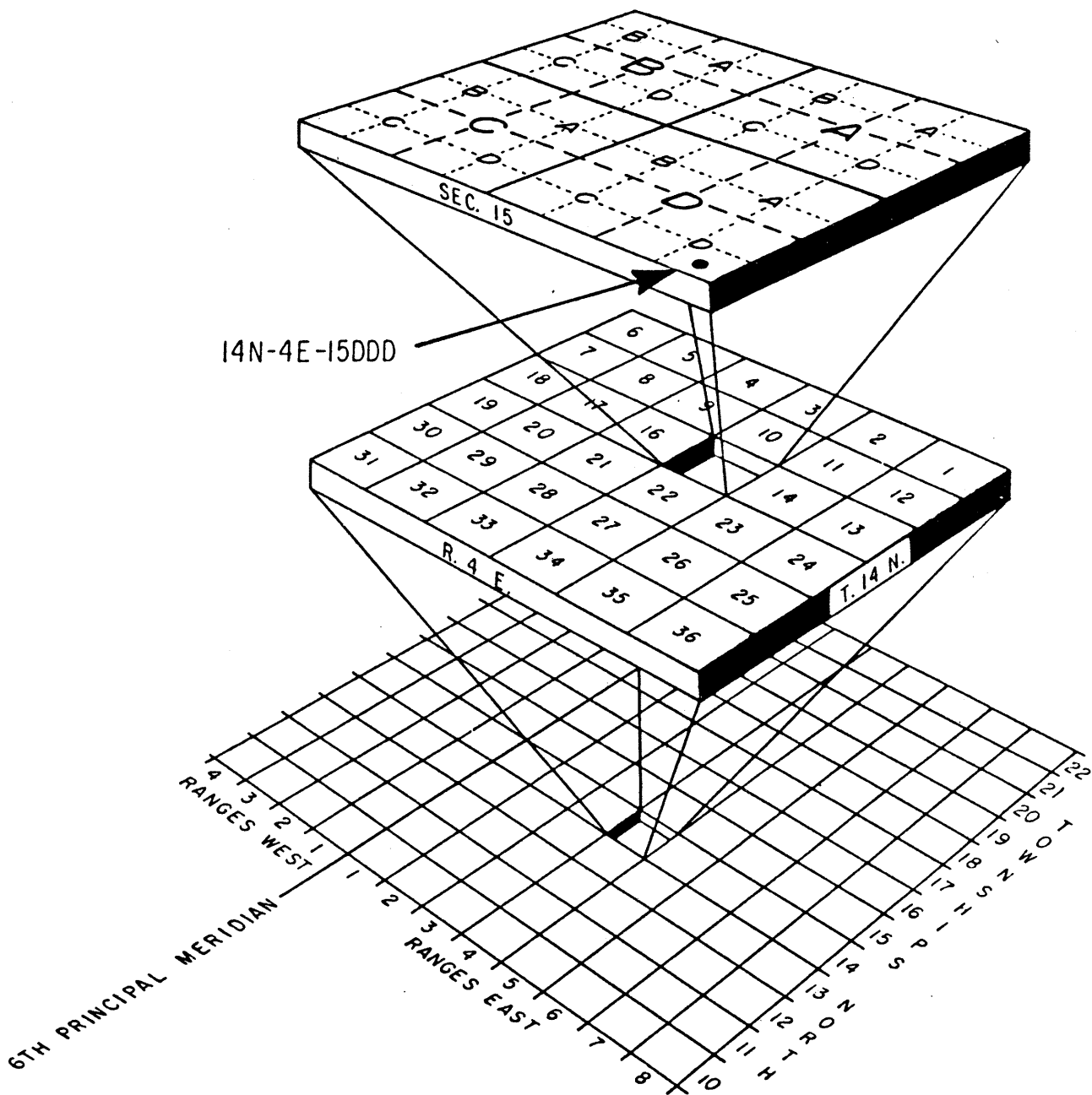
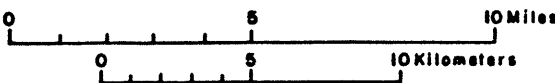
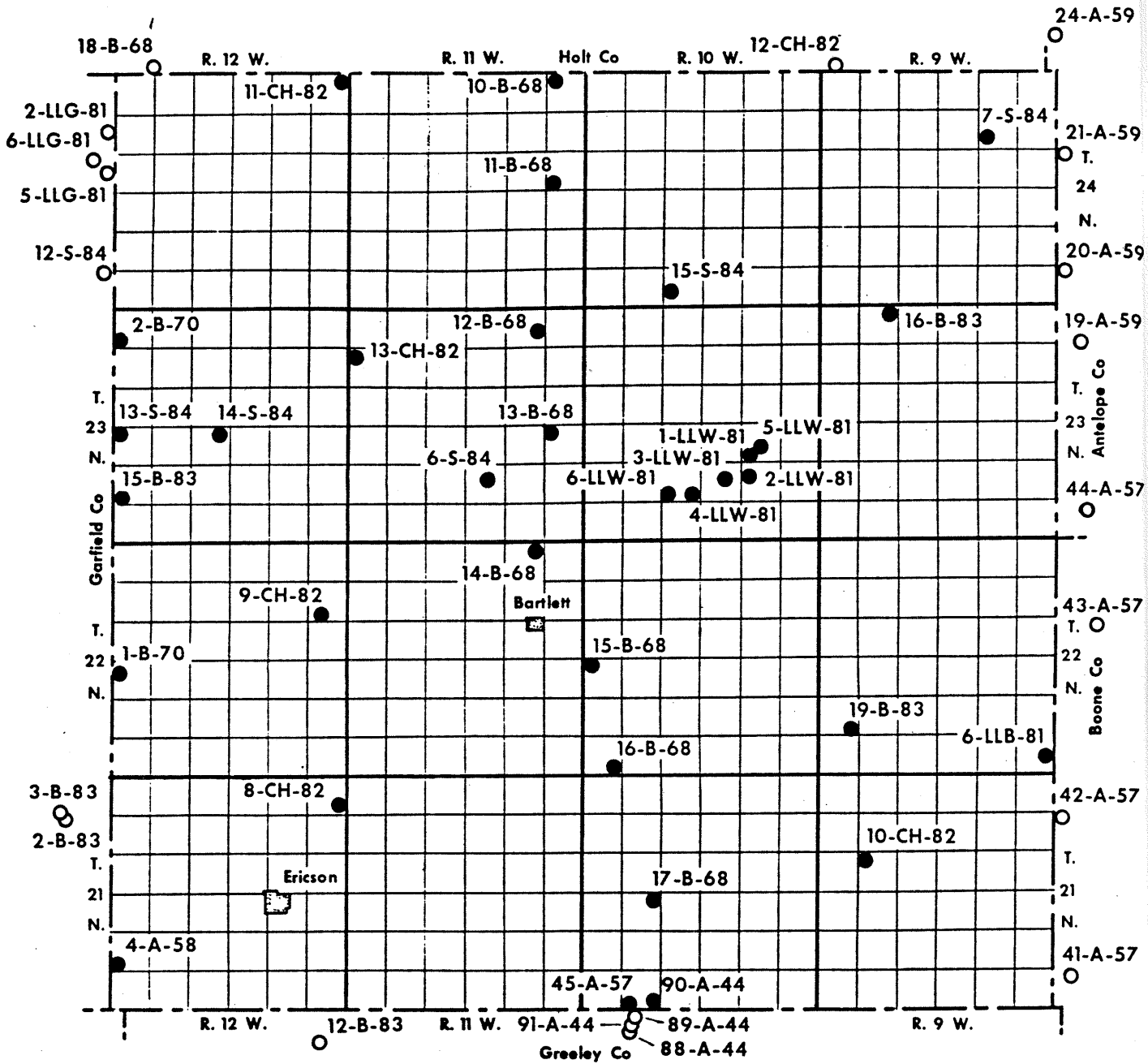


Fig. 1. System for identifying test-holes according to their location.

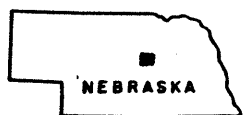
Wheeler County

Legal description			Test-Hole	Page
Twp	Rge	Sec	number	
21N	9W	17	10-CH-82	1
21N	10W	20	17-B-68	3
21N	10W	32	45-A-57	4
21N	10W	32	90-A-44	9
21N	12W	1	8-CH-82	10
21N	12W	30	4-A-58	12
22N	9W	30	19-B-83	14
22N	9W	36	6-LLB-81	16
22N	10W	19	15-B-68	17
22N	10W	31	16-B-68	19
22N	11W	2	14-B-68	21
22N	12W	12	9-CH-82	23
22N	12W	19	1-B-70	25
23N	9W	5	16-B-83	26
23N	10W	23	1-LLW-81	28
23N	10W	23	5-LLW-81	29
23N	10W	26	2-LLW-81	30
21N	10W	27	3-LLW-81	31
23N	10W	28	4-LLW-81	32
23N	10W	28	6-LLW-81	33
23N	11W	2	12-B-68	34
23N	11W	7	13-CH-82	35
23N	11W	24	13-B-68	37
23N	11W	27	6-S-84	39
23N	12W	6	2-B-70	40
23N	12W	19	13-S-84	41
23N	12W	21	14-S-84	42
23N	12W	30	15-B-83	43
24N	9W	11	7-S-84	45
24N	10W	33	15-S-84	46
24N	11W	1	10-B-68	47
24N	11W	13	11-B-68	49
24N	12W	1	11-CH-82	51

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



Test Hole #10-CH-82
(21-9-17bbb)
Wheeler County

Location: NW corner sec. 17, T. 21 N., R. 9 W., approximately
89 feet south and 70 feet east of northwest corner.
Ground elevation: 2,153.0 ft. (t). (Spalding 2 SW 7.5 min. quadrangle)
Depth to water: Unknown, no measurement.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, very sandy, slightly clayey, dark grayish brown; sand is very fine to fine.....	0.0	5.0
Silt, slightly clayey, yellowish brown; slightly lighter in color below 10 ft.....	5.0	30.0
Silt, slightly clayey, light olive brown; slightly more clayey below 40 ft; slightly calcareous from 65 to 80 ft.....	30.0	80.0
Silt, very clayey, olive gray.....	80.0	85.0
Silt, clayey, moderately sandy, dark olive gray, (soil-like); sand is very fine to fine.....	85.0	90.0
Clay, very sandy, silty, light olive gray; sand is very fine to fine.....	90.0	95.0
Silt, moderately sandy, slightly clayey, pale brown; sand is very fine to fine.....	95.0	100.0
Silt, very sandy, slightly clayey, pale brown; sand is very fine to fine.....	100.0	105.0
Sand, very fine to fine; slightly silty in part....	105.0	118.0
Silt, slightly sandy, slightly clayey, light olive brown.....	118.0	124.0
Sand, very fine to fine, slightly silty; contains some medium sand; very silty from 129 to 134 ft...	124.0	136.0
Silt, slightly clayey, slightly sandy, light yellowish brown.....	136.0	144.0
Sand, very fine to fine, slightly silty; moderately to very silty from 155 to 161 ft.....	144.0	168.0
Silt, very sandy; sand is very fine to fine; contains interbedded silty sand from 175 to 178 ft, and from 181 to 183 ft.....	168.0	187.0
Sand, very fine to fine; contains some medium sand; slightly to moderately silty in part.....	187.0	210.0
Sand, very fine to fine, moderately silty; contains some medium and trace of coarse sand; less silty below 240 ft.....	210.0	248.0
Silt, moderately sandy, pale olive.....	248.0	251.0
Sand, gravelly; fine sand to fine gravel; contains some medium gravel.....	251.0	280.0
Sand, fine to very coarse; contains some fine gravel	280.0	285.0
Sand, gravelly; fine sand to fine gravel; contains some medium gravel.....	285.0	290.0
Sand, very fine to very coarse; contains some very fine to fine gravel and trace of medium gravel....	290.0	332.0

Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine- to fine-grained, slightly consolidated, slightly silty.....	332.0	341.0
Silt, light gray to white, moderately sandy, slightly clayey.....	341.0	349.0
Sand, very fine to fine, slightly to moderately silty; contains some medium sand.....	349.0	383.0
Silt, light gray, slightly sandy, slightly clayey...	383.0	390.0
Sand, very fine to fine, slightly silty; contains some medium sand.....	390.0	409.0
Silt, light gray, slightly sandy; sand is very fine to fine.....	409.0	422.0
Sandstone, very fine- to medium-grained, silty.....	422.0	430.0
Silt, light gray, slightly sandy, slightly clayey; sand is very fine to fine.....	430.0	440.0
Sand, very fine to medium; contains some silty areas.....	440.0	460.0
Sand, very fine to fine, moderately to very silty...	460.0	465.0
Silt, pale olive, very sandy, slightly clayey; sand is very fine to fine.....	465.0	482.0
Sand, very fine to fine, slightly to moderately silty, slightly consolidated in part.....	482.0	495.0
Silt, pale olive, moderately to very sandy; sand is very fine to fine; contains interbedded silty sand layers and sandstone.....	495.0	580.0
Silt, pale olive, very sandy; sand is very fine to fine.....	580.0	630.0
Silt, pale olive, moderately sandy, very slightly clayey in parts; sand is very fine to fine.....	630.0	652.0
Silt, slightly sandy, slightly clayey.....	652.0	660.0
Silt, light yellowish brown, very clayey, slightly sandy; sand is very fine to fine; contains some claystone.....	660.0	684.0
Silt, light yellowish brown, clayey, sandy; contains claystone and siltstone fragments and leached shell fragments.....	684.0	712.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, very dark gray, clayey.....	712.0	720.0

Test Hole #17-B-68
(21-10-20aaa)
Wheeler County

Location: NE NE NE sec. 20, T. 21 N., R. 10 W., approximately
172 feet south and 11 feet west of northeast corner.
Ground elevation: 2,086.0 ft. (t). (Spalding 2 SW 7.5 min. quadrangle)
Depth to water: 55.85 ft. (7-27-68).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, silty.....	0.0	6.0
Silt, moderately sandy, slightly clayey, pale olive; sand is very fine.....	6.0	48.0
Silt, moderately sandy, slightly clayey, light yellowish brown; sand is very fine.....	48.0	60.0
Silt, moderately sandy, slightly clayey, olive and olive gray.....	60.0	80.0
Clay, very silty, gray; contains some very fine sand	80.0	105.0
Sand, very fine to fine, very silty.....	105.0	114.0
Silt, slightly clayey, slightly sandy.....	114.0	125.0
Sand, very fine to fine, slightly silty.....	125.0	134.0
Silt, slightly clayey, very sandy, greenish gray; sand is very fine.....	134.0	142.0
Sand, gravelly; very fine sand to fine gravel; con- tains trace of medium gravel.....	142.0	145.0
Gravel, sandy; fine sand to fine gravel; contains some medium gravel and trace of coarse gravel.....	145.0	165.0
Sand, very fine to very coarse; contains some very fine to fine gravel.....	165.0	189.0
Silt, very sandy, slightly clayey, pale yellow.....	189.0	191.0
Gravel, sandy; fine sand to fine gravel.....	191.0	219.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, pale olive; very fine to fine, silty in parts; unconsolidated in parts, pale olive; con- tains medium to coarse and some very coarse sand from 290 to 330 ft.....	219.0	415.0
Silt, pale yellow to pale olive, very sandy; sand is very fine to fine; contains some sandstone.....	415.0	461.0
Sand, very fine to fine, silty; contains some sand- stone.....	461.0	477.0
Silt, pale yellow to pale olive, moderately sandy, slightly clayey; sand is very fine to fine.....	477.0	493.0
Sand, very fine to very coarse; contains very fine to fine gravel from 528 to 550 ft; contains inter- bedded silt from 502 to 505 ft.....	493.0	562.0
Clay, yellow, very sandy, silty.....	562.0	582.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, tan, orange and pink (weathered shale).....	582.0	608.0
Shale, silty; contains mixture of weathered yellow shale with iron staining and black shale.....	608.0	640.0

Test Hole #45-A-57

(21-10-32ccd)

Wheeler County

Location: SE SW SW sec. 32, T. 21 N., R. 10 W., approximately 9 feet north and 951 feet east of southwest corner.

Ground elevation: 1,962.0 ft. (t). (Greeley NE 7.5 min. quadrangle).

Depth to water: 19.0 ft. (8-30-57).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	1.5
Silt, moderately sandy, moderately clayey, very dark gray; contains very fine to fine sand.....	1.5	3.5
Silt, moderately clayey, slightly sandy, very calcareous, light brownish gray; contains very fine to fine sand; contains some limy nodules, moderately calcareous, medium brown below 5 ft.....	3.5	6.5
Silt, very sandy, light yellowish brown-gray; contains very fine to fine sand; medium brownish gray, moderately sandy below 8.5 ft; moderately clayey from 8.5 to 10 ft; slightly clayey below 10 ft.....	6.5	12.0
Silt, very sandy, very dark gray; contains very fine to fine sand.....	12.0	12.9
Silt, slightly clayey, moderately sandy, medium brownish gray; contains very fine to fine sand....	12.9	16.0
Sand, slightly silty; texture of sand grades from very fine to fine with a trace of medium; contains coarse sand below 20 ft.....	16.0	25.5
Silt, slightly clayey, slightly sandy, very dark gray; contains very fine to fine sand.....	25.5	30.0
Silt, slightly clayey, medium brownish gray; contains coarse silt to very fine sand; medium dark brownish gray below 35 ft; contains some reworked shale.....	30.0	39.3
Sand, slightly silty; texture of sand grades from very fine to fine.....	39.3	43.7
Silt, slightly clayey, dark gray; contains some peaty material below 45 ft.....	43.7	46.5
Silt, slightly clayey, slightly sandy, moderately calcareous, medium dark gray; contains coarse silt to very fine sand.....	46.5	48.0
Sand, slightly silty; texture of sand grades from very fine to fine with some medium; contains fine to very coarse sand with a trace of fine gravel from 54 to 59.7 ft; contains a silt layer below 59.7 ft.....	48.0	60.0
Sand, texture of sand grades from fine to medium with a trace of coarse; contains a silt layer from 62 to 62.2 ft; contains no medium or coarse sand below 65 ft; contains some reworked claystone....	60.0	70.0
Sand, texture grades from fine to very coarse with some fine gravel.....	70.0	80.0

Silt, moderately clayey, slightly sandy, light gray; contains very fine to fine sand.....	80.0	81.0
Sand and gravel, texture grades from fine sand to coarse gravel; contains about 5 percent gravel....	81.0	85.5
Tertiary System - Miocene Series - Ogallala Group:		
Sand and silt, interbedded; texture of sand grades from very fine to fine with some medium.....	85.5	93.5
Sand, texture of sand grades from fine to medium with some coarse; contains a trace of silt.....	93.5	98.0
Silt, light gray, slightly clayey, moderately sandy; contains very fine to fine with some coarse sand..	98.0	101.5
Sandstone, moderately consolidated; contains very fine to fine sand.....	101.5	103.8
Silt, light olive gray, slightly clayey, moderately sandy; contains very fine to fine sand.....	103.8	105.0
Sandstone, moderately consolidated; contains very fine to fine sand; contains some rootlets; contains a silt layer below 126.5 ft; slightly clayey, slightly sandy.....	105.0	126.8
Sandstone, moderately consolidated; contains very fine to fine sand; contains some rootlets.....	126.8	130.5
Silt, light olive gray, slightly clayey; very sandy below 131.5 ft; contains very fine to fine sand...	130.5	133.4
Sandstone, moderately consolidated; contains very fine to medium sand; contains some rootlets; slightly less consolidated below 140 ft.....	133.4	150.6
Sand, texture of sand grades from very fine to fine; contains a silt layer from 151.5 to 152 ft; slightly clayey, slightly sandy; contains fine to medium with some coarse sand below 155 ft.....	150.6	160.0
Sandstone, poorly consolidated; contains fine to medium sand; contains some rootlets.....	160.0	168.0
Silt, light olive gray, slightly clayey, slightly sandy; contains coarse silt to very fine sand; moderately clayey below 169.8 ft.....	168.0	170.0
Sandstone, moderately consolidated; contains very fine to medium sand; contains some rootlets.....	170.0	189.3
Silt, light olive gray, slightly clayey, moderately sandy; contains very fine to fine sand.....	189.3	198.0
Sandstone, poorly consolidated; contains very fine to fine sand; contains some rootlets; contains some medium sand below 200 ft.....	198.0	208.5
Silt, light olive gray, slightly clayey, moderately sandy; contains very fine to fine sand.....	208.5	210.0
Sandstone, poorly consolidated; contains very fine to fine with some medium sand; contains some rootlets; contains a silt layer from 221.7 to 223.1 ft; slightly clayey.....	210.0	230.0
Sand, texture of sand grades from very fine to fine with some medium.....	230.0	234.0
Silt, light olive gray, slightly clayey, moderately sandy; contains very fine to fine with some medium sand.....	234.0	235.6

Sandstone, moderately consolidated; contains fine to medium sand.....	235.6	237.0
Silt, light gray, slightly clayey, very sandy, very calcareous; contains very fine to fine with some medium sand.....	237.0	240.0
Sand and silt, interbedded; texture of sand grades from very fine to fine; contains some limy areas; in part slightly consolidated.....	240.0	245.2
Silt, light olive gray, slightly clayey, moderately sandy, slightly calcareous; contains very fine to fine sand; contains some limy areas; moderately calcareous below 250 ft; contains a sandstone layer from 252 to 253.5 ft.....	245.2	255.0
Silt and silty sandstone, light olive gray, interbedded; noncalcareous; in part well cemented.....	255.0	260.0
Sandstone, moderately consolidated; contains very fine to fine with some medium sand; contains some limy areas and rootlets; contains slightly coarser sand below 265 ft.....	260.0	276.0
Silt, light olive gray, moderately clayey; coarse-textured.....	276.0	278.3
Sandstone, moderately consolidated; contains very fine to fine with some medium sand; contains some limy areas; contains a trace of reworked claystone	278.3	284.7
Silt, light olive gray, slightly clayey, moderately sandy; contains very fine to fine sand.....	284.7	287.5
Sandstone, moderately consolidated; contains very fine to fine sand; contains some limy areas, rootlets, and reworked claystone.....	287.5	290.0
Silt, light olive gray, moderately clayey, slightly sandy; contains very fine to fine sand with some coarse silt.....	290.0	292.7
Sandstone, poorly consolidated; contains very fine to fine with some medium sand; contains some limy areas and rootlets; moderately consolidated below 295 ft; contains some reworked claystone from 300 to 305 ft.....	292.7	318.2
Silt and silty sandy, light olive gray, interbedded; contains very fine to fine sand.....	318.2	320.5
Sand, texture grades from very fine to fine sand with some fine to medium gravel; contains some claystone, sandstone, and rootlets.....	320.5	325.0
Sand and sandstone, interbedded; texture of sand grades from very fine to fine; contains some limy areas.....	325.0	335.0
Sandstone, moderately consolidated; contains very fine to medium sand; contains some limy areas.....	335.0	337.5
Silt, light olive gray, moderately clayey, very sandy, moderately calcareous; contains very fine to fine sand; contains some limy areas; slightly less sandy below 340 ft.....	337.5	343.5
Sand, texture of sand grades from very fine to medium; in part consolidated; contains some limy nodules.....	343.5	345.8

Sand, slightly clayey, and sandstone and silt, interbedded; texture of sand grades from very fine to medium; contains some limy areas.....	345.8	350.0
Sand, texture of sand grades from very fine to fine; contains some reworked siltstone; contains some limy areas; contains a limestone layer from 357.5 to 357.6 ft.....	350.0	358.0
Silt, light pinkish gray with brown tint, slightly clayey, slightly sandy, slightly calcareous; contains coarse silt to very fine sand; moderately sandy, light olive gray below 361 ft; contains some limy areas and limestone layers.....	358.0	365.0
Silt, light olive gray, slightly clayey, slightly calcareous; coarse-textured; contains some white and pink limestone layers.....	365.0	370.0
Silt, mottled brownish gray and pinkish gray, moderately clayey, slightly calcareous.....	370.0	371.0
Silt, light olive gray, slightly clayey, slightly calcareous, slightly sandy; contains coarse silt to very fine sand.....	371.0	373.0
Silt, light gray, slightly clayey, moderately sandy, very calcareous; contains very fine to fine sand..	373.0	375.0
Silt, light olive gray, slightly clayey, slightly sandy, moderately calcareous; contains very fine to fine sand; noncalcareous, slightly more clayey and sandy below 378 ft.....	375.0	380.0
Sandstone, moderately consolidated; contains very fine to fine sand; contains some rootlets and limy nodules.....	380.0	395.0
Silt, light olive gray, moderately clayey, slightly sandy; contains very fine to fine sand; contains some reworked claystone.....	395.0	396.0
Sand, texture of sand grades from very fine to fine; in part consolidated; contains some limy nodules and rootlets; contains a silt layer from 406 to 406.6 ft; slightly clayey; contains some sandstone below 410 ft.....	396.0	415.0
Silt, light olive gray, slightly clayey, moderately sandy; contains very fine to fine sand; contains some limy nodules and reworked claystone and siltstone.....	415.0	417.0
Sand, texture of sand grades from very fine to fine; in part consolidated; contains some limy nodules and rootlets.....	417.0	420.0
Silt, light olive gray, slightly clayey, moderately sandy; contains very fine to fine sand.....	420.0	424.5
Sand, texture of sand grades from very fine to medium.....	424.5	432.0
Limestone, white with dark specks.....	432.0	432.5
Silt, light olive gray, slightly clayey, moderately sandy, slightly calcareous; contains very fine to fine sand.....	432.5	433.0
Silt, light pinkish gray, slightly clayey; coarse-textured; slightly more clayey below 435 ft.....	433.0	436.7

Silt, light olive gray, moderately clayey, slightly sandy, slightly calcareous; contains very fine sand.....	436.7	440.0
Sandstone to siltstone, poorly consolidated; contains very fine to fine with some medium sand; contains some claystone.....	440.0	447.9
Silt, light olive gray, moderately clayey, slightly sandy; contains very fine to fine sand; slightly clayey from 450 to 452.5 ft.....	447.9	460.0
Silt, light olive gray, slightly clayey, moderately sandy; contains very fine to fine sand; contains some limonitic concretions; moderately clayey below 462 ft; mottled light gray and light pinkish gray from 462 to 467 ft; slightly calcareous from 465 to 467 ft; contains coarse silt to very fine sand below 465 ft; moderately calcareous from 467 to 470 ft; slightly more sandy below 470 ft; contains a limestone layer below 470.5 ft.....	460.0	474.0
Silt, light olive gray, moderately clayey, moderately sandy; contains very fine to fine with some medium sand; slightly clayey below 474.6 ft; contains no medium sand; contains some limonitic concretions.....	474.0	477.6
Sand, texture of sand grades from coarse to very coarse; contains some reworked siltstone and claystone; contains some limonitic concretions and limestone grains.....	477.6	480.7
Silt, light olive gray, moderately clayey, slightly sandy; contains very fine to fine sand; slightly calcareous, slightly less clayey, moderately sandy below 485 ft.....	480.7	488.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, mottled brownish yellow and dark gray, clayey, moderately calcareous; noncalcareous from 493.4 to 495 ft; slightly calcareous below 495 ft.	488.0	510.0

Test Hole #90-A-44
 (21-10-32dda)
 Wheeler County

Location: NE SE SE sec. 32, T. 21 N., R. 10 W., approximately 930 feet north and 600 feet west of southeast corner.
 Ground elevation: 1,993.1 ft. (i). (Spalding NW 7.5 min. quadrangle).
 Depth to water: 31.7 ft. (11-9-44).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, light gray to brown; texture grades from very fine to medium.....	0.0	19.0
Sand, light gray to brown; texture grades from very fine to medium; contains some silt.....	19.0	34.0
Silt, light gray.....	34.0	39.0
Sand, light gray to brown; texture grades from fine to medium; contains some rounded gray clay fragments.....	39.0	72.0
Sand, light gray; texture grades from fine to medium	72.0	139.0

Test Hole #8-CH-82
 (21-12-1dad)
 Wheeler County

Location: SE SE NE SE sec. 1, T. 21 N., R. 12 W., approximately
 1,381 feet north and 110 feet west of southeast corner.
 Ground elevation: 2,174.0 ft. (t). (Ericson 7.5 min. quadrangle).
 Depth to water: 116.6 ft. (10-26-82).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine, slightly silty; slightly more silty below 5 ft.....	0.0	9.0
Silt, slightly clayey, slightly sandy, light yellowish brown; sand is very fine to fine.....	9.0	35.0
Sand, very fine to fine, very silty.....	35.0	40.0
Silt, slightly clayey, slightly sandy, olive brown; very sandy below 62 ft; sand is very fine to fine.	40.0	70.0
Sand, very fine to fine, moderately silty; contains limy zones.....	70.0	78.0
Silt, very sandy, slightly clayey, slightly calcareous, pale olive; sand is very fine to fine.....	78.0	86.0
Sand, very fine to fine, moderately silty; contains some medium and coarse sand from 90 to 92 ft.....	86.0	93.0
Silt, moderately sandy, slightly clayey, light yellowish brown; sand is very fine to fine; very sandy from 104 to 108 ft.....	93.0	116.0
Sand, very fine to medium, slightly silty.....	116.0	126.0
Silt, moderately sandy, slightly clayey, pale olive; sand is very fine to fine.....	126.0	135.0
Sand, very fine to medium, slightly silty; contains some coarse sand.....	135.0	144.0
Silt, very sandy, light yellowish brown; sand is very fine to fine.....	144.0	149.0
Sand, very fine to medium, slightly silty.....	149.0	158.0
Silt, very sandy, light yellowish brown.....	158.0	169.0
Sand, gravelly; fine sand to fine gravel.....	169.0	174.0
Silt, moderately sandy, slightly clayey, olive; sand is very fine to fine; contains some coarse sand...	174.0	177.0
Sand, gravelly; fine sand to fine gravel; contains some medium gravel.....	177.0	215.0
Gravel, sandy; fine sand to medium gravel; contains some coarse gravel.....	215.0	225.0
Gravel, sandy; fine sand to fine gravel; contains some medium gravel and a little coarse gravel.....	225.0	234.0
Silt, clayey, slightly sandy; yellowish brown, pale brown, and olive.....	234.0	248.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine- to fine-grained, slightly silty.....	248.0	283.0
Sandstone, very fine- to fine-grained, moderately to very silty, slightly consolidated; less silty from 296 to 302 ft.....	283.0	317.0

Sand, very fine to fine, slightly silty; very silty from 332 to 342 ft; contains some sandstone.....	317.0	379.0
Sandstone, pale olive; very fine- to fine-grained, slightly silty.....	379.0	393.0
Sand, very fine to fine, slightly to moderately silty; contains sandstone.....	393.0	479.0
Sand, very fine to fine, moderately to very silty, slightly clayey.....	479.0	504.0
Sand, very fine to fine, slightly silty.....	504.0	514.0
Sand, very fine to fine, moderately to very silty; contains some sandstone.....	514.0	522.0
Sand, very fine to fine.....	522.0	534.0
Silt, pale blue, very sandy; sand is very fine to fine.....	534.0	550.0
Sand, very fine to fine; contains some medium to coarse sand below 580 ft; contains silty inter- beds from 560 to 565 ft, and from 572 to 576 ft...	550.0	590.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark grayish black.....	590.0	610.0

Test Hole #4-A-58
 (21-12-30ccc)
 Wheeler County

Location: SW SW SW sec. 30, T., 21 N., R. 12 W., approximately 4 feet north and 132 feet east of southwest corner.
 Ground elevation: 2,154.0 ft. (t). (Gables SE 7.5 min. quadrangle).
 Depth to water: 114.9 ft. (6-18-58).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Top soil: silt, very sandy, slightly clayey; sand is very fine to medium.....	0.0	2.0
Sand, very fine to medium.....	2.0	6.5
Silt, very sandy, slightly clayey, light yellowish gray; sand is very fine to medium; less sandy below 9 ft; some shells and iron stain from 20 to 25 ft.....	6.5	33.0
Sand, very silty; sand is very fine to medium.....	33.0	45.0
Silt, very sandy, slightly clayey, slightly calcareous, light yellowish gray; sand is very fine.....	45.0	50.0
Sand, very silty, in part slightly silty; sand is very fine to medium; some limy grains from 55 to 60 ft; trace of coarse sand below 60 ft.....	50.0	70.0
Sand, very fine to medium, some coarse.....	70.0	100.0
Silt, very sandy, slightly clayey, light olive brown; sand is very fine to medium.....	100.0	106.0
Sand, gravelly; fine sand to fine gravel.....	106.0	110.0
Gravel, sandy; fine sand to fine gravel; sand to medium gravel from 120 to 130 ft.....	110.0	138.0
Silt, very sandy, slightly clayey, light olive gray; sand is very fine to medium.....	138.0	142.0
Sand, moderately silty; sand is very fine to medium, come coarse.....	142.0	157.0
Sand, gravelly; fine sand to fine gravel.....	157.0	160.0
Gravel, sandy; fine sand to fine gravel.....	160.0	170.0
Sand, gravelly; fine sand to fine gravel.....	170.0	180.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to medium grained; contains rootlets, and some volcanic ash from 215 to 220 ft....	180.0	220.0
Sandstone, very fine to fine grained with some interbedded silty seams; contains volcanic ash layer from 235 to 240 ft, and rootlets.....	220.0	298.5
Clay, light olive gray, becomes marly in lower part.	298.5	305.0
Sandstone, very fine to fine grained with interbedded silty seams.....	305.0	335.0
Sand, very fine to medium with some coarse.....	335.0	350.0
Silt, medium olive gray, very sandy.....	350.0	357.5
Sandstone, very fine to fine grained; contains rootlets and some silty seams.....	357.5	371.3
Silt, light olive gray, very sandy and marly.....	371.3	395.0
Sandstone, very fine to fine grained; contains rootlets.....	395.0	410.0

Sand, very fine to medium grained.....	410.0	419.8
Silt, light to medium olive gray, very sandy; contains some marly lenses; becomes less sandy in lower part.....	419.8	451.0
Sandstone, very fine to fine grained; contains rootlets.....	451.0	460.0
Silt, medium olive gray, clayey.....	460.0	470.0
Sandstone, very fine to fine grained; contains rootlets.....	470.0	479.0
Silt, light olive gray, clayey, sandy.....	479.0	490.0
Sandstone, very fine to fine grained, silty; contains rootlets.....	490.0	510.0
Sand, very fine to medium, slightly silty; contains rootlets.....	510.0	574.9
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light yellowish gray, clayey.....	574.9	590.5
Shale, light gray to light yellowish brown, clayey; contains some bentonite.....	590.5	600.0

Test Hole #19-B-83
(22-9-30dda)
Wheeler County

Location: NE NE SE SE sec. 30, T. 22 N., R. 9 W., approximately
843 feet north and 98 feet west of southeast corner.
Ground elevation: 2,108.0 ft. (t). (Spalding 2 SW 7.5 min. quadrangle)
Depth to water: Unknown, no measurement. (9-16-83).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine; contains some medium sand..	0.0	8.0
Sand, very fine to fine, slightly silty.....	8.0	13.0
Silt, very sandy, moderately clayey, light olive brown; sand is very fine to fine.....	13.0	16.0
Silt, moderately clayey, light olive brown; contains some very fine sand; slightly calcareous below 30 ft; contains some iron staining.....	16.0	65.0
Silt, moderately to very sandy, pale yellow; sand is very fine to fine.....	65.0	76.0
Sand, very fine to fine, moderately silty; contains some medium sand.....	76.0	89.0
Silt, moderately clayey, moderately sandy, light olive brown; sand is very fine to fine with some medium sand.....	89.0	102.0
Sand, very fine to fine, slightly silty.....	102.0	106.0
Silt, moderately clayey, moderately sandy, pale brown; sand is very fine to fine with some medium sand.....	106.0	114.0
Sand, very fine to fine, silty; contains silt intervals from 120 to 122 ft, and from 128 to 130 ft; silt is olive gray.....	114.0	138.0
Silt, moderately sandy, slightly clayey, light yellowish brown; sand is very fine to fine; very sandy from 150 to 154 ft.....	138.0	156.0
Sand, very fine to fine with some medium sand.....	156.0	194.0
Silt, very sandy, olive; contains some sandstone....	194.0	200.0
Sand, very fine to fine, slightly silty; contains some medium sand and trace of coarse to very coarse sand.....	200.0	210.0
Silt, very sandy, slightly clayey, pale olive; sand is very fine to fine.....	210.0	212.0
Gravel, sandy; fine sand to fine gravel; contains some medium to coarse gravel.....	212.0	258.0
Silt, moderately clayey, slightly sandy, moderately calcareous, light yellowish brown; sand is very fine to fine.....	258.0	280.0
Silt, moderately clayey, moderately sandy, pale brown; sand is very fine to fine.....	280.0	299.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine- to fine-grained, silty; contains interbedded silt layers throughout.....	299.0	382.0
Silt, pale yellow, sandy to pale olive; sand is very fine to fine.....	382.0	398.0

Sandstone, very fine- to fine-grained.....	398.0	406.0
Silt, sandy; sand is very fine to fine; contains some sandstone.....	406.0	418.0
Sand, fine to coarse, silty; marly below 425 ft.....	418.0	432.0
Silt, pale yellow, sandy.....	432.0	443.0
Sandstone, very fine- to fine-grained, marly.....	443.0	452.0
Silt, pale yellow, sandy.....	452.0	469.0
Sand, very fine to medium, silty; contains inter- bedded sandstone; more silty from 500 to 510 ft...	469.0	522.0
Sand, fine to very coarse; contains some very fine gravel; less coarse from 545 to 549 ft.....	522.0	563.0
Silt, sandy; contains sandstone and some claystone..	563.0	566.0
Sand and gravel, fine sand to fine gravel, lithic fragments.....	566.0	584.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, pale yellow to olive yellow, silty.....	584.0	610.0

Test Hole #6-LLB-81
 (22-9-36dad)
 Wheeler County

Location: SE NE SE sec. 36, T. 22 N., R. 9 W., approximately 1,894 feet north and 11 feet west of southeast corner.
 Ground elevation: 2,039.0 ft. (t). (Spalding 2 SE 7.5 min. quadrangle).
 Depth to water: Unknown. Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, silty; sand is fine.....	0.0	68.0
Silt, slightly clayey, olive; grayish brown below 75 ft.....	68.0	90.0
Sand, silty; sand is very fine.....	90.0	94.0
Silt, moderately clayey, slightly calcareous, mottled light yellowish brown and dark yellowish brown	94.0	110.0
Silt, moderately clayey, slightly sandy, olive gray; pale olive below 122 ft.....	110.0	141.0
Silt, clayey, slightly sandy, dark gray.....	141.0	153.0
Sand, fine to medium.....	153.0	162.0
Silt, slightly clayey, sandy, grayish brown.....	162.0	167.0
Gravel, sandy; very coarse sand to fine gravel.....	167.0	195.0

Test Hole #15-B-68
(22-10-19bbb)
Wheeler County

Location: NE NW NW NW sec. 19, T. 22 N., R. 10 W., approximately
9 feet south and 558 feet east of northwest corner.
Ground elevation: 2,176.0 ft. (t). (Bartlett SE 7.5 min. quadrangle).
Depth to water: 103.1 ft. (7-15-68).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine, silty, dark grayish brown..	0.0	3.0
Sand, very fine to fine, silty, gray.....	3.0	5.0
Sand, very fine to fine, silty, slightly clayey, light yellowish brown.....	5.0	10.0
Sand, very fine to fine.....	10.0	21.0
Silt, moderately clayey, slightly sandy, light brownish gray; sand is very fine to fine.....	21.0	40.0
Silt, moderately to very sandy, slightly clayey, light brownish gray; sand is very fine to fine....	40.0	46.0
Sand, very fine to fine, slightly silty.....	46.0	58.0
Clay, very silty, moderately sandy, light brownish gray to brown.....	58.0	71.0
Sand, very fine to fine, silty.....	71.0	77.0
Silt, very sandy, slightly to moderately clayey, very pale brown.....	77.0	92.0
Sand, very fine to fine, silty.....	92.0	96.0
Silt, very clayey, slightly sandy, light brownish gray.....	96.0	100.0
Sand, very fine to fine, silty.....	100.0	107.0
Silt, slightly to moderately clayey, moderately to very sandy; light gray to light brownish gray below 107 ft; pale brown below 119 ft.....	107.0	128.0
Sand, very fine to fine; interbedded sandy silt from 135 to 139 ft, and from 147 to 150 ft; silt is grayish brown.....	128.0	155.0
Silt, moderately to very sandy, slightly clayey, pale brown; sand is very fine to fine.....	155.0	168.0
Sand, very fine to fine.....	168.0	174.0
Silt, very sandy, slightly clayey, very pale brown..	174.0	178.0
Sand, very fine to fine; contains trace of medium sand; becomes finer grained and silty near bottom.	178.0	212.0
Silt, very sandy, slightly clayey, light brownish gray.....	212.0	214.0
Sand, very fine to medium; contains some coarse sand to very fine gravel.....	214.0	220.0
Gravel, sandy; very fine to fine gravel; contains some medium gravel and very coarse sand; contains silt interbedded at 256 ft.....	220.0	263.0
Silt, moderately sandy, slightly clayey, grayish brown to light brownish gray; sand is very fine to fine with trace of medium.....	263.0	281.0

Tertiary System - Miocene Series - Ogallala Group:		
Silt, light gray, very sandy, slightly clayey.....	281.0	295.0
Sandstone, olive; very fine- to fine-grained, silty.	295.0	315.0
Silt, light brownish gray to light olive gray, sandy, moderately to very clayey.....	315.0	338.0
Silt, light olive gray, slightly to moderately clayey, moderately sandy; sand is very fine to fine...	338.0	382.0
Silt, light olive gray, very sandy; sand is very fine to fine; contains some medium to coarse sand.	382.0	403.0
Silt, olive yellow to light gray, very sandy, slightly clayey.....	403.0	413.0
Silt, light gray, very sandy; contains sandstone; sand is very fine to fine.....	413.0	438.0
Silt, pale yellow, very sandy, slightly to moderately clayey.....	438.0	453.0
Sandstone, very fine- to fine-grained, very silty...	453.0	462.0
Silt, light gray to pale olive, sandy, slightly clayey; sand is very fine to fine.....	462.0	476.0
Sandstone, very fine- to fine-grained, silty.....	476.0	482.0
Silt, pale olive, slightly to moderately clayey, moderately sandy; very sandy from 506 to 516 ft; sand is very fine to fine.....	482.0	530.0
Sand, very fine to fine, silty.....	530.0	540.0
Silt, pale olive, slightly to moderately clayey, sandy; sand is very fine to fine.....	540.0	569.0
Sand, very fine to coarse; contains trace of fine gravel.....	569.0	583.0
Silt, very sandy.....	583.0	600.0
Sand, very fine to fine, silty.....	600.0	614.0
Silt, light brownish gray, slightly to moderately clayey.....	614.0	627.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, silty, light brownish gray and light brown....	627.0	640.0

Test Hole #16-B-68
(22-10-31ddd)
Wheeler County

Location: NE SE SE SE sec. 31, T. 22 N., R. 10 W., approximately
582 feet north and 22 feet west of southeast corner.
Ground elevation: 2,130.0 ft. (t). (Bartlett SE 7.5 min. quadrangle).
Depth to water: 74.10 ft. (7-27-68).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine; slightly silty above 5 ft..	0.0	16.0
Silt, slightly clayey, slightly sandy, light olive brown; sand is very fine to fine.....	16.0	46.0
Silt, very sandy, slightly clayey, grayish brown; sand is very fine to fine.....	46.0	58.0
Sand, very fine to medium; contains some silt lenses	58.0	71.0
Silt, sandy, clayey, light olive gray; sand is very fine to fine.....	71.0	97.0
Silt, very sandy, slightly clayey, light brownish gray; sand is very fine to fine.....	97.0	110.0
Silt, moderately sandy, moderately clayey, pale olive.....	110.0	121.0
Sand, very fine to medium; contains some coarse sand; contains some interbedded silt.....	121.0	154.0
Silt, very sandy, slightly clayey, olive and light olive gray.....	154.0	170.0
Sand, very fine to medium; contains trace of coarse sand.....	170.0	185.0
Sand, gravelly; very fine to very coarse sand; contains very fine to fine gravel.....	185.0	200.0
Gravel, sandy; very fine to medium gravel; contains coarse and very coarse sand.....	200.0	241.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, pale olive to light olive gray, sandy.....	241.0	270.0
Silt, light olive gray, moderately to very clayey, slightly sandy; moderately to very sandy from 280 to 295 ft.....	270.0	295.0
Sandstone, very fine- to fine-grained, slightly to moderately consolidated; contains interbedded silt layers.....	295.0	325.0
Silt, light olive gray, very sandy, slightly clayey; sand is very fine to fine.....	325.0	337.0
Siltstone, slightly clayey, slightly sandy.....	337.0	355.0
Sandstone, very fine- to fine-grained, silty, slightly to moderately consolidated; contains some volcanic ash.....	355.0	445.0
Sand, very fine to very coarse; contains trace of fine gravel.....	445.0	455.0
Silt, light gray, moderately clayey, moderately sandy; sand is very fine to fine.....	455.0	473.0
Silt, light gray, very sandy, slightly clayey; sand is very fine to fine.....	473.0	500.0

Sand, very fine to fine, very silty; contains sandy silt.....	500.0	512.0
Silt, pale yellow to light gray, moderately clayey..	512.0	520.0
Silt, light gray, moderately to very sandy, slightly clayey; sand is very fine to fine.....	520.0	560.0
Sand, medium to coarse; contains trace of fine gravel.....	560.0	580.0
Silt, pale yellow, very sandy, slightly clayey; sand is very fine to fine.....	580.0	589.0
Silt, pale yellow, very clayey, very sandy; sand is very fine to fine.....	589.0	596.0
Sand, medium to coarse.....	596.0	600.0
Silt, pale yellow, very clayey, very sandy; sand is very fine to fine.....	600.0	610.0
Clay, very pale brown, silty, sandy; sand is very fine to fine.....	610.0	640.0
Silt, pale yellow, very clayey.....	640.0	655.0
Clay, very pale brown, silty, very calcareous.....	655.0	664.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black; contains iron staining.....	664.0	690.0

Test Hole #14-B-68
(22-11-2aaa)
Wheeler County

Location: SE NE NE NE sec. 2, T. 22 N., R. 11 W., approximately
557 feet south and 86 feet west of northeast corner.
Ground elevation: 2,130.0 ft. (Bartlett 7.5 min. quadrangle).
Depth to water: 33.91 ft. (7-15-68).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, slightly silty.....	0.0	13.5
Silt, very clayey, moderately sandy, light olive gray; sand is very fine to fine.....	13.5	18.5
Sand, very fine to fine; silty below 32 ft.....	18.5	36.0
Silt, slightly clayey, moderately sandy, pale olive; very sandy from 47 to 50 ft; very clayey from 50 to 52 ft; light olive gray color below 47 ft.....	36.0	55.0
Sand, very fine to fine; contains some medium sand..	55.0	60.0
Silt, moderately sandy, light olive brown to light olive gray; sand is very fine to fine.....	60.0	73.0
Silt, moderately sandy, slightly clayey, light olive gray to light brownish gray; sand is very fine to fine; marly in parts below 78 ft.....	73.0	84.0
Sand, very fine to fine, very silty.....	84.0	86.0
Silt, moderately to very clayey, moderately sandy, light olive gray; sand is very fine to fine.....	86.0	94.0
Sand, very fine to fine, very silty.....	94.0	98.0
Silt, very sandy, slightly clayey, pale olive.....	98.0	101.0
Sand, very fine to medium, silty; very silty from 114 to 118 ft, from 125 to 130 ft, and from 134 to 140 ft.....	101.0	142.0
Silt, very sandy, pale olive; sand is very fine to fine.....	142.0	144.0
Sand, very fine to medium.....	144.0	168.0
Silt, sandy, slightly clayey; sand is very fine to fine.....	168.0	171.0
Sand and gravel, fine sand to fine gravel; contains some medium gravel.....	171.0	207.0
Clay, silty, pale brown; contains trace of very fine to fine sand.....	207.0	242.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy; sand is very fine to fine.....	242.0	245.0
Sand, very fine to fine; contains some medium to coarse sand; slightly consolidated in parts.....	245.0	260.0
Sandstone, very fine- to fine-grained, moderately to well-consolidated.....	260.0	270.0
Sand, very fine to fine; contains some medium sand and some silt lenses.....	270.0	278.0
Silt, light gray, very sandy, slightly to moderately clayey.....	278.0	291.0
Sand and sandstone, silty; sand is very fine to fine; contains interbedded very silty layers.....	291.0	366.0

Sand, very fine to fine, very silty, slightly clayey in part; contains sandstone.....	366.0	388.0
Sand, very fine to medium; contains some coarse sand	388.0	396.0
Silt, pale olive, very sandy; sand is very fine to fine; contains sandstone.....	396.0	442.0
Silt, pale yellow to olive, moderately clayey, sandy; marly in parts; more sandy from 462 to 478 ft.....	442.0	506.0
Sand, very fine to fine.....	506.0	522.0
Sand, very fine to fine, silty.....	522.0	540.0
Silt, pale yellow to pale olive, sandy, slightly clayey, marly in parts.....	540.0	547.0
Clay, light gray to white, silty, marly; contains sandy silt.....	547.0	555.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, yellow, silty; contains some light gray shale	555.0	570.0

Test Hole #9-CH-82
(22-12-12cdd)
Wheeler County

Location: SW SE SE SW sec. 12, T. 22 N., R. 12 W., approximately
74 feet north and 492 feet west of southeast corner.
Ground elevation: 2,133.0 ft. (t). (Bartlett NW 7.5 min. quadrangle).
Depth to water: 26.02 ft. (10-26-82).

	<u>Depth, in feet</u>	
	<u>From</u>	<u>To</u>
Quaternary System, undifferentiated:		
Silt, slightly sandy, slightly clayey, light olive brown; sand is very fine to fine with trace of medium; some iron staining; very sandy below 47 ft	0.0	54.0
Sand, very fine to fine; contains some medium sand; contains thin interbedded silty sand layers.....	54.0	105.0
Sand, very fine to medium; contains some coarse sand; contains thin interbedded silty sand layers.	105.0	134.0
Sand, fine to very coarse; contains some fine gravel	134.0	140.0
Sand, gravelly; fine sand to fine gravel; contains some medium gravel; finer textured from 149 to 152 ft; contains silty, clayey fragments from 166 to 169 ft.....	140.0	169.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, light olive gray, moderately silty.....	169.0	176.0
Sand, very fine to fine, moderately silty.....	176.0	183.0
Silt, pale olive, moderately sandy, slightly clayey; contains some sandstone.....	183.0	194.0
Sand, very fine to medium; contains trace of sandstone.....	194.0	205.0
Sandstone, very fine- to medium-grained, slightly silty; contains some coarse sand; moderately to very silty from 232 to 237 ft.....	205.0	241.0
Silt, light gray to pale olive, very sandy, slightly clayey; sand is very fine to fine.....	241.0	275.0
Sand, very fine to medium.....	275.0	284.0
Sand, very fine to medium, moderately to very silty.	284.0	293.0
Sand, very fine to coarse; contains trace of siltstone.....	293.0	306.0
Silt, pale olive, moderately sandy, slightly clayey.	306.0	310.0
Sand, very fine to medium, slightly silty.....	310.0	331.0
Sand, very fine to medium, moderately to very silty.	331.0	335.0
Sand, very fine- to medium-grained, slightly silty; contains some coarse sand; slightly consolidated in part; contains interbedded layers of very silty sand and sandy silt.....	335.0	429.0
Silt, pale olive, very sandy, slightly clayey; sand is very fine to fine.....	429.0	447.0
Sand, very fine to medium; slightly consolidated in part.....	447.0	469.0
Sand, very fine to medium, very silty, slightly consolidated in part.....	469.0	474.0
Sand, very fine to fine, slightly silty; contains some sandstone.....	474.0	489.0

Silt, pale olive, moderately to very sandy, slightly clayey.....	489.0	501.0
Sand, very fine to fine, slightly silty; contains some medium sand.....	501.0	507.0
Sand, very fine to coarse; contains some very coarse sand.....	507.0	525.0
Silt, pale olive, moderately sandy, slightly to moderately clayey.....	525.0	528.0
Silt, very sandy; sand is very fine to fine.....	528.0	555.0
Silt, pale brown, moderately to very clayey, slightly sandy.....	555.0	577.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, yellow (weathered shale).....	577.0	592.0
Clay, yellow; contains some light gray clay.....	592.0	600.0

Test Hole #1-B-70
 (22-12-19bbc)
 Wheeler County

Location: SW SW NW NW sec. 19, T. 22 N., R. 12 W., approximately
 1,250 feet south and 30 feet east of northwest corner.
 Ground elevation: 2,095.0 ft. (t). (Gables SE 7.5 min. quadrangle).
 Depth to water: Unknown. No measurement. (7-6-70).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine; contains some medium sand..	0.0	9.7
Silt, moderately sandy, slightly clayey, black; sand is very fine to fine; contains some carbonaceous material.....	9.7	10.2
Sand, very fine to fine.....	10.2	32.0
Sand, very fine to medium; contains some coarse to very coarse sand.....	32.0	64.0
Gravel, fine to coarse.....	64.0	72.0
Gravel, sandy; very fine sand to very coarse gravel.	72.0	83.0
Silt, moderately sandy, moderately clayey, grayish brown; sand is very fine.....	83.0	90.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to fine, silty; contains some medium sand and is less silty from 102 to 112 ft; contains some root casts.....	90.0	124.0
Silt, pale olive, clayey.....	124.0	126.0
Sandstone, very fine- to fine-grained, slightly consolidated, silty.....	126.0	155.0
Silt, pale yellow, very sandy, slightly clayey; contains sandstone.....	155.0	180.0
Sandstone, very fine- to fine-grained, silty; contains interbedded sandy silt; sandstone is slightly to moderately consolidated.....	180.0	305.0
Sandstone, very fine- to fine-grained, very silty; slightly clayey from 316 to 322 ft.....	305.0	347.0
Silt, pale olive, clayey, sandy; sand is very fine to fine.....	347.0	353.0
Sandstone, very fine- to fine grained, silty, moderately consolidated.....	353.0	369.0
Sand, very fine to medium; contains trace of coarse sand.....	369.0	388.0
Sand, very fine to medium, silty.....	388.0	394.0
Sand, slightly gravelly; very fine sand to medium gravel.....	394.0	455.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light gray and light yellowish brown.....	455.0	470.0

Test Hole #16-B-83
(23-9-5aaa)
Wheeler County

Location: NE NE NE NE sec. 5, T. 23 N., R. 9 W., approximately 283 feet south and 40 feet west of northeast corner.
Ground elevation: 2,031.0 ft. (t). (Deloit 7.5 min. quadrangle).
Depth to water: 41.4 ft. (10-14-83).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine, silty; contains some medium and trace of coarse sand.....	0.0	5.0
Sand, very fine to fine; contains some medium sand..	5.0	13.0
Silt, moderately sandy, slightly clayey, light yellowish brown; contains sandy layer at 17 ft, and 20 ft; sand is very fine to fine.....	13.0	21.0
Silt, moderately clayey, slightly sandy, light yellowish brown; sand is very fine to fine.....	21.0	32.0
Sand, very fine to fine.....	32.0	41.0
Silt, moderately clayey, moderately sandy, light brownish gray; sand is very fine to fine.....	41.0	50.0
Sand, very fine to fine with some medium.....	50.0	59.0
Silt, very sandy, light brownish gray; contains interbeds of very fine to fine sand.....	59.0	72.0
Sand, very fine to fine; contains some medium sand..	72.0	98.0
Silt, very sandy, light yellowish brown.....	98.0	100.0
Sand, very fine to fine; contains some medium sand..	100.0	126.0
Silt, sandy, moderately clayey, light yellowish brown; sand is very fine to medium.....	126.0	128.0
Sand and gravel, fine sand to fine gravel; contains some medium and coarse gravel; contains light olive brown clayey silt at 146 ft.....	128.0	153.0
Silt, slightly clayey, pale olive.....	153.0	155.0
Silt, very sandy, pale brown; sand is very fine to coarse.....	155.0	170.0
Clay, silty, pale brown.....	170.0	184.0
Sand, gravelly; fine sand to fine gravel with some medium gravel.....	184.0	189.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, light olive gray, very sandy, very silty; sand is very fine to fine.....	189.0	194.0
Sand, fine to coarse; contains trace of very coarse sand.....	194.0	202.0
Silt, pale olive, slightly sandy, moderately clayey; contains some strong brown friable silt.....	202.0	208.0
Silt, very sandy; sand is very fine to fine.....	208.0	213.0
Silt, pale olive; very clayey from 214 to 216 ft, and from 226 to 228 ft; very sandy between 210 and 226 ft.....	213.0	228.0
Sand, fine to medium; contains trace of coarse sand.	228.0	236.0
Sand, very fine to medium, silty; contains interbedded silt and sandstone; contains root casts; coarser-grained near bottom.....	236.0	288.0

Sand, medium, well-sorted; contains some coarse sand and some sandstone below 320 ft.....	288.0	328.0
Silt, pale yellow, moderately sandy; sand is fine to medium.....	328.0	337.0
Sand, very fine to fine; sand is well-sorted in places; contains some sandstone below 345 ft.....	337.0	354.0
Sandstone, very fine- to fine-grained, silty.....	354.0	364.0
Sandstone, very fine to fine, slightly consolidated.	364.0	373.0
Sandstone, very fine- to fine-grained, silty.....	373.0	407.0
Sand, fine to medium, slightly silty; contains trace of coarse sand.....	407.0	410.0
Sand, medium, well-sorted; contains silt layers at 428 ft.....	410.0	430.0
Sand, fine to medium, slightly silty.....	430.0	444.0
Sand, fine to medium, moderately to very silty; slightly consolidated in places.....	444.0	463.0
Sand, fine, well-sorted.....	463.0	471.0
Sand, fine, silty.....	471.0	476.0
Sand, fine, well-sorted.....	476.0	496.0
Siltstone and silty claystone, brown.....	496.0	502.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black.....	502.0	510.0

Test Hole #1-LLW-81
 (23-10-23ccd)
 Wheeler County

Location: SE SE SW SW sec. 23, T. 23 N., R. 10 W., approximately
 40 feet north and 1,100 feet east of southwest corner.
 Ground elevation: 2,030.0 ft. (t). (Spalding 2 NW 7.5 min. quadrangle)
 Depth to water: Unknown. Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine; slightly silty from 24 to 32 ft.....	0.0	32.0
Silt, moderately to very clayey, slightly sandy, dark gray.....	32.0	61.0
Sand, very fine to medium, slightly silty; silt lenses from 73 to 74 ft, and from 79 to 83 ft.....	61.0	96.0
Silt, moderately to very clayey.....	96.0	103.0
Sand and gravel, medium sand to medium gravel.....	103.0	120.0

Test Hole #5-LLW-81
(23-10-23dbd)
Wheeler County

Location: SW SE NW SE sec. 23, T. 23 N., R. 10 W., approximately
1,525 feet north and 1,815 feet west of southeast corner.
Ground elevation: 2,017.0 ft. (t). (Spalding 2 NW 7.5 min. quadrangle)
Depth to water: Unknown. Not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium; sand is silty from 21 to 26 ft.....	0.0	30.0
Silt, moderately to very clayey, slightly sandy, dark olive gray.....	30.0	35.0
Silt, slightly to moderately sandy, olive; very sandy from 43 to 52 ft.....	35.0	67.0
Sand, very fine to fine, slightly silty.....	67.0	84.0
Silt, moderately sandy, olive yellow.....	84.0	91.0
Sand and gravel, coarse sand to medium gravel.....	91.0	125.0
Silt and siltstone, slightly to moderately sandy, slightly to moderately clayey, pale brown to yellowish brown.....	125.0	176.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, yellowish brown, silty; very fine to fine	176.0	193.0
Silt and siltstone.....	193.0	196.0
Sandstone, very fine to fine, slightly silty.....	196.0	209.0
Silt, light gray; calcareous zones.....	209.0	217.0
Sandstone, very fine to medium.....	217.0	237.0
Sandstone, very fine to fine, some medium, silty....	237.0	317.0
Siltstone and silt, slightly to moderately clayey; contains interbedded sandstone.....	317.0	386.0
Sandstone, very fine to fine.....	386.0	400.0
Siltstone and silt; sandy from 402 to 412 ft.....	400.0	414.0
Sandstone and sand, fine to medium; some very fine and some coarse.....	414.0	433.0
Silt, sandy.....	433.0	435.0
Sand and gravel, coarse sand to fine gravel.....	435.0	440.0
Sandstone and sand, very fine to medium; contains some reworked claystone.....	440.0	453.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale.....	453.0	470.0

Test Hole #2-LLW-81
 (23-10-26bcb)
 Wheeler County

Location: NW NW SW NW sec. 26, T. 23 N., R. 10 W., approximately
 1,480 feet south and 80 feet east of northwest corner.
 Ground elevation: 2,039.0 ft. (t). (Spalding 2 NW 7.5 min. quadrangle)
 Depth to water: Unknown. Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, fine to medium; some very fine; trace of coarse.....	0.0	24.0
Silt, moderately clayey, slightly sandy, olive gray; moderately sandy below 45 ft.....	24.0	56.0
Sand, very fine to medium; trace of coarse.....	56.0	67.0
Silt, sandy, olive gray.....	67.0	75.0
Sand, very fine to coarse; silt lenses at 85.5 ft, and at 95.5 ft.....	75.0	105.0
Silt, moderately clayey.....	105.0	109.0
Sand and gravel, medium sand to fine gravel.....	109.0	120.0

Test Hole #3-LLW-81
 (23-10-27acc)
 Wheeler County

Location: SW SW SW NE sec. 27, T. 23 N., R. 10 W., approximately
 2,151 feet south and 2,522 feet west of northeast corner.
 Ground elevation: 2,054.0 ft. (t). (Spalding 2 NW 7.5 min. quadrangle)
 Depth to water: Unknown. Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine; some medium to coarse sand below 15 ft.....	0.0	29.0
Silt, very sandy; interbedded silty sand.....	29.0	57.0
Sand, very fine to medium, silty.....	57.0	70.0
Silt, slightly to very sandy; sandy zones from 72 to 75 ft, at 78 ft, and from 85 to 87 ft.....	70.0	91.0
Sand, fine to coarse; some very fine; silt lenses from 98 to 100 ft, and from 111.5 to 112.5 ft.....	91.0	120.0
Silt, moderately sandy, slightly clayey.....	120.0	124.0
Sand and gravel, coarse sand to fine gravel.....	124.0	135.0

Test Hole #4-LLW-81
 (23-10-28ddd)
 Wheeler County

Location: SE corner sec. 28, T. 23 N., R. 10 W., approximately 4 feet north and 44 feet west of southeast corner.

Ground elevation: 2,058.0 ft. (t). (Spalding 2 NW 7.5 min. quadrangle)

Depth to water: Unknown. Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, fine to medium; trace of coarse.....	0.0	22.0
Silt, slightly sandy, slightly clayey, olive.....	22.0	33.0
Silt, very sandy, slightly clayey, olive.....	33.0	45.0
Silt, slightly sandy, slightly clayey, light brown- ish gray.....	45.0	51.0
Sand, fine to medium; some very fine; trace of coarse.....	51.0	58.0
Sand, very silty; contains interbedded sandy silt...	58.0	71.0
Sand, very fine to medium, silty.....	71.0	90.0
Sand, fine to coarse; trace of very fine; sand is coarser from 103 to 110 ft; contains silt lenses from 110 to 113 ft, and from 117 to 124 ft.....	90.0	124.0
Sand and gravel, coarse sand to fine gravel.....	124.0	140.0

Test Hole #6-LLW-81
 (23-10-28ccc)
 Wheeler County

Location: SW corner sec. 28, T. 23 N., R. 10 W., approximately 50 feet north and 13 feet east of southwest corner.

Ground elevation: 2,067.0 ft. (t). (Spalding 2 NW 7.5 min. quadrangle)

Depth to water: Unknown. Not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, fine to medium; some very fine.....	0.0	25.0
Silt, slightly clayey, slightly sandy, olive to olive gray; very sandy from 38 to 40 ft.....	25.0	49.0
Sand, very fine to medium, slightly silty.....	49.0	67.0
Sand, fine to medium; some coarse.....	67.0	81.0
Sand, very fine to medium, moderately silty; sand is coarser from 108 to 112 ft.....	81.0	121.0
Silt, moderately sandy, slightly clayey.....	121.0	123.0
Sand and gravel, coarse sand to fine gravel.....	123.0	140.0

Test Hole #12-B-68
 (23-11-2daa)
 Wheeler County

Location: NE NE NE SE sec. 2, T. 23 N., R. 11 W., approximately
 56.3 feet south and 9 feet west of northeast corner.
 Ground elevation: 2,068.0 ft. (t). (Bartlett 7.5 min. quadrangle).
 Depth to water: 4.59 ft. (7-12-68).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, very silty, very dark brown.....	0.0	0.5
Silt, moderately sandy, very dark brown; sand is very fine to fine.....	0.5	3.0
Sand, very fine to fine; contains trace of medium sand.....	3.0	75.0
Sand, very fine to medium; trace of coarse sand to very fine gravel.....	75.0	95.0
Sand and gravel, fine sand to medium gravel.....	95.0	119.0
Silt, moderately clayey, sandy, yellowish brown to brown; sand is very fine to fine.....	119.0	147.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, olive; very fine- to fine-grained, silty.	147.0	177.0
Silt, pale olive, very sandy, slightly clayey; sand is very fine; contains some interbedded sandstone.	177.0	186.0
Sandstone, very silty; sand is very fine to fine....	186.0	197.0
Silt, pale olive to pale yellow, very sandy, very slightly clayey.....	197.0	205.0
Sandstone, very fine-grained, silty.....	205.0	220.0
Silt, light gray to olive, sandy, slightly clayey...	220.0	235.0
Sandstone, very fine- to fine-grained, silty; sand is very fine to fine.....	235.0	290.0
Silt, sandy, very slightly clayey; contains interbedded sandstone; sand is very fine to fine.....	290.0	310.0
Sandstone, very fine- to fine-grained, silty; contains interbedded sandy silts.....	310.0	347.0
Silt, pale olive to pale yellow, sandy, marly.....	347.0	355.0
Sand, very fine to fine, silty; contains sandstone..	355.0	375.0
Silt, pale yellow, sandy, slightly to moderately clayey; contains interbedded sandstone; marly in parts.....	375.0	450.0
Clay, pale yellow, silty, sandy; sand is very fine to fine.....	450.0	475.0
Clay, white and brownish olive, sandy, silty, marly; contains weathered shale fragments.....	475.0	492.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, olive yellow to light gray, silty.....	492.0	510.0

Test Hole #13-CH-82
(23-11-7dbb)
Wheeler County

Location: SW NW NW NW sec. 7, T. 23 N., R. 11 W., approximately
346 feet south and 50 feet east of northwest corner.
Ground elevation: 2,115.0 ft. (t). (Bartlett NW 7.5 min. quadrangle).
Depth to water: 3.0 ft. (10-29-82).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, clayey, sandy, very dark gray; sand is very fine to fine.....	0.0	5.0
Sand, very fine to fine; contains some medium sand..	5.0	63.0
Sand, very fine to coarse; contains some very coarse sand.....	63.0	68.0
Sand and gravel, fine sand to fine gravel; contains some medium gravel from 95 to 100 ft; contains silt lens at 104 ft.....	68.0	121.0
Clay, silty, sandy, pale yellow; sand is very fine to fine.....	121.0	125.0
Clay, silty, sandy, light yellowish brown; sand is very fine.....	125.0	132.0
Gravel, sandy; fine sand to fine gravel; contains some medium gravel.....	132.0	156.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, light olive gray, very sandy, moderately clayey; sand is very fine to fine.....	156.0	162.0
Sandstone, very fine- to fine-grained, slightly consolidated.....	162.0	180.0
Sandstone, very fine- to fine-grained, silty, slightly consolidated.....	180.0	189.0
Silt, pale olive, sandy; slightly clayey below 195 ft.....	189.0	201.0
Sandstone, very fine- to medium-grained, slightly consolidated; contains interbedded silty layers...	201.0	240.0
Sandstone, very fine- to fine-grained, very silty...	240.0	255.0
Sand, very fine to medium; contains some coarse sand	255.0	272.0
Silt, pale yellow, slightly sandy; sand is very fine to fine.....	272.0	276.0
Sand, very fine to medium; contains some coarse sand	276.0	294.0
Sandstone, very fine- to fine-grained, silty; contains interbeds of silt; sandstone is more consolidated below 370 ft.....	294.0	382.0
Silt, olive, very sandy; sand is very fine to fine..	382.0	390.0
Sandstone, very fine- to fine-grained, very silty...	390.0	426.0
Silt, pale olive, very sandy, slightly clayey; sand is very fine to fine.....	426.0	448.0
Sandstone, very fine- to medium-grained, moderately silty.....	448.0	468.0
Silt, pale olive, very sandy, slightly to moderately clayey; sand is very fine to fine.....	468.0	498.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Clay, yellow and olive; some iron staining.....	498.0	533.0
Shale, dark gray.....	533.0	540.0

Test Hole #13-B-68
(23-11-24aab)
Wheeler County

Location: NW corner sec. 24, T. 23 N., R. 11 W., approximately
8 feet south and 13 feet east of northwest corner.
Ground elevation: 2,093.0 ft. (t). (Bartlett 7.5 min. quadrangle).
Depth to water: Unknown, no measurement. (7-12-68).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Road fill; sand, silty, gravelly; poor sample.....	0.0	10.0
Sand, very fine to fine; contains some medium and trace of coarse sand.....	10.0	25.0
Silt, slightly clayey, sandy, olive gray; sand is very fine to fine.....	25.0	40.0
Sand, very fine to fine; contains some medium sand; contains interbedded olive gray silt layers.....	40.0	68.0
Silt, very sandy, slightly clayey, light gray to pinkish gray; sand is very fine to fine.....	68.0	85.0
Sand, very fine to fine; contains some medium sand..	85.0	103.0
Silt, sandy, slightly clayey, light gray; sand is very fine to fine.....	103.0	106.0
Sand, very fine to fine; contains trace of medium sand.....	106.0	113.0
Silt, moderately sandy, moderately clayey, light olive gray; sand is very fine to fine.....	113.0	113.5
Sand, very fine to medium; contains few silt lenses.	113.5	125.0
Sand and gravel, fine sand to fine gravel; contains many fine magnesium minerals above 130 ft.....	125.0	158.0
Clay, silty, sandy, yellowish brown to pinkish gray.	158.0	165.0
Silt, moderately clayey, very sandy, light gray; sand is very fine to fine.....	165.0	170.0
Silt, moderately clayey, slightly sandy, yellowish brown and pale brown.....	170.0	211.0
Silt, slightly to moderately clayey, slightly sandy, light brownish gray.....	211.0	240.0
Sand, very fine to very coarse; contains some very fine gravel and some sandstone.....	240.0	250.0
Gravel, sandy; very fine sand to fine gravel.....	250.0	258.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, pale yellow, very sandy; sand is very fine to fine.....	258.0	265.0
Sandstone, very fine- to fine-grained, silty; con- tains some medium sand; contains interbedded silt.	265.0	320.0
Silt, pale yellow, slightly sandy; sand is very fine to fine.....	320.0	325.0
Sandstone, very fine- to fine-grained, silty; very silty and silt intervals from 335 to 345 ft.....	325.0	367.0
Silt, pale yellow, very sandy, slightly to moder- ately silty; contains marly zones and interbedded sandstone.....	367.0	415.0
Sandstone, very fine- to fine-grained; contains marly silts.....	415.0	429.0

Silt, very sandy, slightly clayey; sand is very fine to fine; moderately to very clayey from 429 to 430 ft; contains interbedded sandstone.....	429.0	470.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light yellowish brown, silty.....	470.0	480.0

Test Hole #6-S-84
(23-11-27acb)
Wheeler County

Location: NW NW SW NE sec. 27, T. 23 N., R. 11 W., approximately
1,350 feet south and 2,630 feet west of northeast corner.
Ground elevation: 2,118.0 ft. (t). (Bartlett 7.5 min. quadrangle).
Depth to water: Unknown, not measured.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine; contains some medium sand; slightly silty from 14 to 18 ft.....	0.0	20.0
Sand, very fine to fine, slightly to moderately silty.....	20.0	27.0
Sand, very fine to fine.....	27.0	45.0
Silt, moderately clayey, sandy, light brownish gray; sand is very fine.....	45.0	54.0
Sand, very fine to fine; contains interbedded silty and clayey layers.....	54.0	69.0
Sand, very fine to fine, slightly to moderately silty; less silty from 75 to 78 ft.....	69.0	94.0
Sand, very fine to fine; contains some medium sand; silty from 102 to 109 ft.....	94.0	118.0
Silt, moderately clayey, sandy, pale yellow; sand is very fine.....	118.0	123.0
Sand, very fine to medium; contains a trace of coarse sand.....	123.0	130.0
Sand, very fine to coarse; contains some very coarse sand and a trace of very fine gravel.....	130.0	135.0
Sand, very fine to very coarse; contains a trace of very fine to fine gravel.....	135.0	140.0
Sand, gravelly; very fine sand to fine gravel with some medium gravel.....	140.0	145.0

Test Hole #2-B-70
(23-12-6ccc)
Wheeler County

Location: NW SW SW SW sec. 6, T. 23 N., R. 12 W., approximately
422 feet north and 9 feet east of southwest corner.
Ground elevation: 2,195.0 ft. (t). (Gables 7.5 min. quadrangle).
Depth to water: Unknown, no measurement. (7-6-70).

	<u>Depth, in feet</u>	
	<u>From</u>	<u>To</u>
Quaternary System, undifferentiated:		
Silt, very sandy, slightly clayey, pale brown; sand is very fine to medium; moderately clayey below 15 ft.....	0.0	18.5
Sand, very fine to fine.....	18.5	21.0
Sand, very fine to fine, very silty, slightly clayey	21.0	28.0
Sand, very fine to medium.....	28.0	30.0
Silt, moderately clayey, moderately sandy, pale yellow; sand is very fine to fine.....	30.0	35.0
Sand, very fine to fine.....	35.0	42.0
Silt, moderately to very sandy, slightly to very clayey, light gray to olive gray and brown.....	42.0	49.0
Sand, very fine to fine; contains some medium sand and contains silt lenses in lower part.....	49.0	110.0
Sand, gravelly; very fine sand to medium gravel.....	110.0	130.0
Gravel, sandy; very fine sand to coarse gravel.....	130.0	166.0
Clay, silty, moderately sandy, light brown to light gray.....	166.0	185.0
Gravel, sandy; very fine sand to coarse gravel.....	185.0	215.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to very coarse.....	215.0	240.0
Sand, very fine to fine, slightly consolidated in parts; contains some medium sand.....	240.0	285.0
Sandstone, very fine- to fine-grained, well-consolidated, lime-cemented.....	285.0	300.0
Sand, very fine to fine; contains some medium sand and some sandstone.....	300.0	320.0
Silt, pale yellow, clayey, sandy.....	320.0	325.0
Sand, very fine to fine; contains some sandstone....	325.0	337.0
Silt, white, slightly clayey, limy.....	337.0	355.0
Sandstone, very fine- to fine-grained, silty, limy, moderately to well-consolidated.....	355.0	380.0
Sandstone, very fine- to fine-grained, silty.....	380.0	390.0
Silt, pale yellow, very sandy, slightly clayey; contains very silty sand.....	390.0	410.0
Sandstone, very fine- to fine-grained, silty.....	410.0	420.0
Silt, pale yellow, very sandy, slightly clayey; contains some limy zones.....	420.0	498.0
Silt, pale olive to pale yellow, moderately clayey, sandy; possibly contains some fine to very coarse sand and very fine gravel below 510 ft.....	498.0	516.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, brownish yellow.....	516.0	540.0

Test Hole #13-S-84
(23-12-19bbb)
Wheeler County

Location: NW NW NW NW sec. 19, T. 23 N., R. 12 W., approximately
14 feet south and 70 feet east of northwest corner.
Ground elevation: 2,237.0 ft. (t). (Gables 7.5 min. quadrangle).
Depth to water: Unknown, test-hole caved at 69.0 ft.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine.....	0.0	8.0
Sand, very fine to fine, very silty; sand is clayey in parts.....	8.0	25.0
Silt, moderately sandy, slightly clayey, light gray to pale yellow.....	25.0	62.0
Sand, very fine to fine, very silty.....	62.0	68.0
Silt, very sandy, slightly clayey, light gray; sand is very fine to fine.....	68.0	72.0
Sand, very fine to fine, slightly silty; contains some medium sand; very silty from 72 to 76 ft.....	72.0	88.0
Silt, slightly to moderately sandy, slightly clayey, white.....	88.0	94.0
Sand, very fine to fine; sand is well-sorted.....	94.0	104.0
Silt, moderately clayey, slightly sandy, pale yellow; sand is very fine.....	104.0	110.0
Sand, very fine to fine.....	110.0	114.0
Sand, very fine to fine, silty.....	114.0	128.0
Silt, moderately clayey, slightly sandy, light gray; sand is very fine to fine; slightly calcareous....	128.0	140.0
Sand and gravel; fine sand to fine gravel; contains some medium gravel and trace of coarse gravel below 175 ft.....	140.0	204.0
Silt, slightly sandy, slightly clayey; very sandy from 211 to 214 ft.....	204.0	219.0
Sand, very fine to medium; possibly contains coarser sand, poor sample.....	219.0	229.0
Sand, very fine to fine, very silty.....	229.0	237.0
Silt, slightly sandy, slightly clayey, light gray; sand is very fine to fine.....	237.0	244.0
Sand, gravelly; fine sand to fine gravel; contains some medium gravel.....	244.0	249.0
Silt, very sandy; contains some very fine gravel....	249.0	254.0
Sand and gravel, fine sand to medium gravel; con- tains some coarse gravel.....	254.0	300.0

Test Hole #14-S-84
 (23-12-21aaa)
 Wheeler County

Location: NW NE NE NE sec. 21, T. 23 N., R. 12 W., approximately
 37 feet south and 420 feet west of northeast corner.

Ground elevation: 2,179.0 ft. (t). (Bartlett NW 7.5 min. quadrangle)

Depth to water: Unknown, not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine.....	0.0	22.0
Sand, very fine to fine, slightly silty.....	22.0	32.0
Silt, sandy, pale olive.....	32.0	35.0
Sand, very fine to fine, silty.....	35.0	53.0
Silt, moderately clayey, slightly sandy, light gray.	53.0	58.0
Sand, very fine to fine, silty; less silty from 60 to 64 ft.....	58.0	72.0
Silt, moderately clayey, slightly sandy, light gray; sand is very fine to fine.....	72.0	78.0
Silt, moderately to very sandy, slightly clayey, light gray; sandier below 97 ft.....	78.0	102.0
Sand, very fine to medium; contains some coarse sand	102.0	108.0
Sand, fine to very coarse; contains some very fine gravel.....	108.0	112.0
Sand and gravel; fine sand to fine gravel; contains some medium gravel.....	112.0	120.0

Test Hole #15-B-83
(23-12-30ccd)
Wheeler County

Location: SW SE SW SW sec. 30, T. 23 N., R. 12 W., approximately
337 feet north and 706 feet east of southwest corner.
Ground elevation: 2,217.0 ft. (t). (Gables 7.5 min. quadrangle).
Depth to water: 65.29 ft. (7-15-83).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Silt, very sandy, slightly clayey, dark grayish brown; sand is very fine to fine.....	0.0	2.5
Sand, very fine to fine; contains some medium sand..	2.5	12.0
Clay, very dark gray.....	12.0	14.0
Sand, very fine to fine, silty.....	14.0	15.0
Silt, very sandy, slightly clayey, brown; sand is very fine to fine.....	15.0	18.0
Sand, very fine to fine; contains some medium sand..	18.0	44.0
Silt, slightly clayey, brown.....	44.0	60.0
Silt, slightly clayey, slightly sandy, pale olive; sand is very fine to fine.....	60.0	79.0
Silt, sandy, slightly clayey, pale olive; sand is very fine to fine; contains sand layers at 79 ft, 87 ft, 91 ft, and 95 ft.....	79.0	96.0
Silt, moderately sandy, moderately clayey, pale olive.....	96.0	104.0
Silt, very sandy; sand is very fine to fine; contains sand layer at 108 ft.....	104.0	111.0
Sand, very fine to medium; contains some coarse to very coarse sand and some very fine gravel.....	111.0	118.0
Sand and gravel, fine sand to fine gravel; contains some medium gravel and trace of coarse gravel; contains pale olive silt layers from 150 to 152 ft, and from 164 to 166 ft.....	118.0	180.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, pale olive; very fine- to medium-grained, slightly consolidated; silty from 180 to 188 ft; contains root casts.....	180.0	278.0
Silt and siltstone, pale olive, sandy.....	278.0	286.0
Sand, fine to medium.....	286.0	298.0
Silt, pale olive, very sandy, slightly clayey.....	298.0	304.0
Sand, fine to medium, very slightly consolidated; silty from 312 to 316 ft.....	304.0	330.0
Sand, very fine to fine, moderately to very silty; siltiest between 339 and 344 ft, 348 and 352 ft, 364 to 370 ft, and 376 to 378 ft.....	330.0	422.0
Silt, pale olive, sandy; sand is very fine to fine; contains sand layer from 427 to 429 ft.....	422.0	434.0
Sand, fine to medium; contains some sandstone.....	434.0	447.0
Sandstone, fine- to medium-grained, silty.....	447.0	466.0
Sand, fine to medium; contains silty interbeds from 476 to 484 ft.....	466.0	507.0

Silt and siltstone, sandy; sand is fine to medium with some coarse to very coarse sand.....	507.0	518.0
Sand, fine to medium; some coarse sand and sandstone	518.0	544.0
Siltstone and claystone, pale olive.....	544.0	554.0
Sandstone, fine- to medium-grained.....	554.0	558.0
Silt, olive, clayey.....	558.0	560.0
Silt and siltstone, olive, pale brown, and yellowish brown, very sandy.....	560.0	579.0
Silt, pale yellow, sandy, moderately clayey; con- tains some sandstone and siltstone.....	579.0	592.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, brownish yellow.....	592.0	605.0
Clay, light gray to dark gray.....	605.0	620.0

Test Hole #7-S-84
 (24-9-11cb-ctr)
 Wheeler County

Location: C NW SW sec. 11, T. 24 N., R. 9 W., approximately 1,980 feet north and 660 feet east of southwest corner.

Ground elevation: 1,976.0 ft. (t). (Deloit 7.5 min. quadrangle).

Depth to water: Unknown, not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine; contains some medium sand..	0.0	8.0
Silt, moderately sandy, moderately clayey, pale yellow.....	8.0	13.0
Silt, slightly clayey, pale yellow.....	13.0	27.0
Silt, slightly clayey, pale yellow to pale olive, slightly calcareous; contains very fine sand in lower part.....	27.0	50.0
Silt, slightly clayey, slightly calcareous, light olive gray; contains some very fine sand.....	50.0	58.0
Sand, gravelly; very fine sand to fine gravel; contains some medium gravel.....	58.0	75.0

Test Hole #15-S-84
 (24-10-33cbb)
 Wheeler County

Location: NW corner SW sec. 33, T. 24 N., R. 10 W., approximately
 2,630 feet north and 50 feet east of southwest corner.
 Ground elevation: 2,059.0 ft. (Deloit SW 7.5 min. quadrangle).
 Depth to water: Unknown, not measured.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine; contains some medium sand..	0.0	22.0
Sand, very fine to fine; appears to be finer grained than above; slightly silty in parts; siltier below 61 ft.....	22.0	68.0
Silt, moderately sandy, slightly clayey, light gray.	68.0	75.0
Sand and gravel, fine sand to fine gravel; contains some medium gravel; coarser below 80 ft.....	75.0	90.0

Test Hole #10-B-68
(24-11-1bbb)
Wheeler County

Location: NW corner sec. 1, T. 24 N., R. 11 W., approximately
77 feet south and 45 feet east of northwest corner.
Ground elevation: 2,040.0 ft. (Goose Lake 7.5 min. quadrangle).
Depth to water: 1.58 ft. (7-12-68).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine, silty.....	0.0	5.0
Sand, very fine to fine; contains trace of silt.....	5.0	15.0
Silt, peaty, black.....	15.0	17.5
Sand, very fine to fine; contains trace of medium and coarse sand.....	17.5	20.0
Sand, very fine to fine, peaty, grayish brown.....	20.0	21.5
Sand, very fine to medium; contains trace of coarse and very coarse sand.....	21.5	30.0
Silt, sandy, black; sand is very fine to fine.....	30.0	34.0
Sand, very fine to medium; contains trace of coarse to very coarse sand.....	34.0	40.0
Sand and gravel, medium sand to fine gravel; con- tains some medium and coarse gravel.....	40.0	85.0
Sand, fine to coarse; contains some very coarse sand	85.0	94.0
Silt, slightly to moderately clayey, slightly sandy, light gray to pale olive.....	94.0	112.0
Sand, very fine to medium; contains some coarse to very coarse sand.....	112.0	115.0
Sand and gravel, medium sand to very fine gravel; contains some fine gravel.....	115.0	138.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to medium, silty; contains some coarse sand.....	138.0	157.0
Sandstone, very fine to fine, slightly consolidated, silty; contains root casts.....	157.0	185.0
Silt, pale yellow, sandy, slightly clayey; sand is very fine to fine.....	185.0	192.0
Sand, very fine to fine, silty.....	192.0	198.0
Silt, pale yellow, sandy; sand is very fine to fine.	198.0	205.0
Sandstone, very fine- to fine-grained, silty, slightly consolidated.....	205.0	217.0
Silt, pale yellow, sandy; sand is very fine to medium.....	217.0	224.0
Sandstone, pale olive; very fine- to fine-grained; contains interbedded silt.....	224.0	262.0
Silt, pale yellow, sandy, slightly clayey; sand is very fine to fine.....	262.0	270.0
Sandstone, very fine- to fine-grained, silty; con- tains interbedded silt and marl.....	270.0	282.0
Silt, pale olive, sandy, slightly clayey; sand is very fine to fine.....	282.0	287.0
Sandstone, very fine- to fine-grained, silty; con- tains silt interbed from 292 to 295 ft.....	287.0	316.0

Silt, pale yellow, sandy, slightly clayey; contains interbedded sandstone.....	316.0	332.0
Silt, pale olive, slightly to moderately clayey.....	332.0	348.0
Sandstone, very fine to fine, silty; contains interbedded silt from 350 to 363 ft.....	348.0	375.0
Silt, olive yellow, moderately to very sandy.....	375.0	380.0
Sand, very fine to fine, silty; contains some medium sand.....	380.0	416.0
Silt, pale olive, slightly to moderately clayey, slightly to moderately sandy; sand is very fine to fine.....	416.0	434.0
Sandstone, very fine- to fine-grained; very silty...	434.0	443.0
Sandstone, very fine- to medium-grained, slightly consolidated; contains some coarse sand.....	443.0	452.0
Silt and sandstone, sand is very fine to fine; contains some medium to coarse sand; silt is slightly clayey in parts.....	452.0	500.0

Test Hole #11-B-68
(24-11-13ccc)
Wheeler County

Location: SW corner sec. 13, T. 24 N., R. 11 W., approximately
39 feet north and 40 feet east of southwest corner.
Ground elevation: 2,058.0 ft. (Goose Lake 7.5 min. quadrangle).
Depth to water: 3.93 ft. (7-12-68).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, slightly silty; contains some coarse to very coarse sand.....	0.0	6.0
Silt, slightly to moderately clayey, gray.....	6.0	9.0
Sand, very fine to fine; contains trace of medium sand.....	9.0	13.0
Silt, slightly clayey, pale olive.....	13.0	16.0
Sand, very fine to fine.....	16.0	20.0
Silt, moderately clayey, grayish brown.....	20.0	28.0
Silt, moderately sandy, slightly clayey, light olive gray.....	28.0	36.0
Silt, moderately clayey, pale olive.....	36.0	48.0
Sand and gravel, medium sand to fine gravel; contains some medium to coarse gravel.....	48.0	100.0
Clay, very silty, sandy, light olive brown.....	100.0	105.0
Clay, silty, sandy, yellowish brown to brown; sand is very fine; marly in parts.....	105.0	126.0
Sand and gravel, medium sand to fine gravel; contains some medium gravel.....	126.0	136.0
Silt, slightly clayey, sandy, light brownish gray; sand is very fine to coarse.....	136.0	140.0
Gravel, very fine to medium, sandy; sand is medium to very coarse.....	140.0	158.0
Sand, fine to very coarse; contains trace of very fine gravel.....	158.0	170.0
Silt, slightly clayey, sandy, light brownish gray...	170.0	175.0
Sand and gravel, medium sand to fine gravel.....	175.0	187.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine- to fine-grained, silty.....	187.0	198.0
Silt, pale yellow, very sandy; sand is very fine to fine.....	198.0	203.0
Sandstone, very fine- to fine-grained.....	203.0	209.0
Silt, pale yellow, slightly clayey, sandy; sand is very fine to fine.....	209.0	215.0
Sandstone, very fine- to fine-grained, silty.....	215.0	221.0
Clay, pale olive, silty, sandy, marly; sand is very fine to fine.....	221.0	228.0
Sandstone, very fine- to fine-grained; contains interbedded silt; contains medium to very coarse sand from 250 to 258 ft.....	228.0	277.0
Silt, pale olive, sandy, slightly clayey, marly.....	277.0	286.0

Sandstone, very fine- to fine-grained, silty, marly; contains very silty zones from 295 to 298 ft, and from 323 to 334 ft.....	286.0	344.0
Silt, pale olive, slightly clayey; contains interbedded sandstone.....	344.0	372.0
Sandstone, fine-grained; contains some medium to very coarse sand.....	372.0	388.0
Silt, pale yellow, slightly to moderately clayey, sandy; sand is very fine to fine; sand content increases toward bottom.....	388.0	395.0
Sandstone, very fine- to fine-grained, silty; contains some coarse sand.....	395.0	417.0
Silt, pale olive, very sandy, marly, slightly clayey in parts; contains interbedded sandstone.....	417.0	456.0
Sandstone, very fine- to fine-grained, very silty...	456.0	468.0
Silt, pale olive, very sandy; contains interbedded sandstone.....	468.0	482.0
Sandstone, very fine- to fine-grained, silty.....	482.0	495.0
Silt, pale olive, very sandy; contains interbedded sandstone; sand is very fine to fine.....	495.0	508.0
Sandstone, very fine- to fine-grained; contains interbedded silt.....	508.0	532.0
Silt, pale yellow, sandy, slightly clayey; sand is very fine to fine.....	532.0	550.0
Sandstone, very fine- to fine-grained, silty.....	550.0	588.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, light gray to white, silty, marly.....	588.0	592.0
Clay, olive gray, silty.....	592.0	610.0

Test Hole #11-CH-82
(24-12-1aaa)
Wheeler County

Location: NE corner sec. 1, T. 24 N., R. 12 W., approximately
85 feet south and 36 feet west of northeast corner.
Ground elevation: 2,075.0 ft. (t). (Goose Lake SW 7.5 min. quadrangle)
Depth to water: Unknown, no measurement.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine; moderately silty below 5 ft	0.0	10.0
Silt, moderately to very clayey, moderately sandy, olive gray; sand is very fine to fine; very sandy from 33 to 39 ft.....	10.0	50.0
Silt, very sandy, olive gray, moderately calcareous; sand is very fine to fine with trace of medium....	50.0	60.0
Silt, moderately clayey, moderately sandy, light olive gray; contains very sandy interbed from 64 to 66 ft.....	60.0	69.0
Sand, very fine to fine, very silty; contains some medium sand.....	69.0	73.0
Silt, moderately sandy, light olive gray.....	73.0	76.0
Clay, silty, very calcareous, light gray; contains some very fine sand.....	76.0	80.0
Clay, silty, moderately calcareous, light olive gray; contains some very fine sand.....	80.0	83.0
Clay, silty, light gray.....	83.0	93.0
Clay, silty, moderately to very sandy, very calcareous, pale yellow; contains some light gray silt; sand is very fine to fine with trace of medium....	93.0	100.0
Clay, silty, moderately sandy, moderately calcareous, light gray; sand is very fine to fine.....	100.0	110.0
Silt, moderately clayey, pale olive; slightly calcareous in part; contains some very fine sand.....	110.0	120.0
Sand, very fine to medium, silty; contains some coarse sand to fine gravel.....	120.0	123.0
Silt, very sandy, moderately clayey, pale olive; sand is very fine to fine with some medium sand to fine gravel; contains root casts.....	123.0	128.0
Sand, very fine to medium, silty; contains some coarse sand to fine gravel.....	128.0	140.0
Sand, fine to coarse; contains much well-sorted medium sand.....	140.0	155.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, pale yellow to light olive gray, moderately sandy, slightly clayey; sand is very fine to fine.	155.0	164.0
Sandstone, very fine- to medium-grained, silty, slightly consolidated.....	164.0	183.0
Sand, fine to medium; contains some coarse to very coarse sand.....	183.0	188.0
Sandstone, very fine- to medium-grained, silty, slightly consolidated.....	188.0	204.0

Sandstone, very fine- to medium-grained, silty.....	204.0	220.0
Sandstone, very fine- to fine-grained, silty; contains interbedded sandy silt; contains clayey silt from 259 to 261 ft, and from 295 to 299 ft.....	220.0	332.0
Silt, pale olive, sandy.....	332.0	336.0
Sand, very fine to fine, moderately to very silty; less silty from 354 to 356 ft.....	336.0	358.0
Silt, pale olive, very sandy; sand is very fine to fine.....	358.0	363.0
Sand, very fine to fine, slightly silty; contains some sandstone.....	363.0	374.0
Sand, pale olive, very silty; sand is very fine to fine.....	374.0	381.0
Sand, very fine to medium, slightly silty.....	381.0	396.0
Sand, pale olive, very fine to medium, moderately silty; very silty from 396 to 399 ft.....	396.0	406.0
Sand, very fine to medium, slightly silty; contains some coarse sand.....	406.0	414.0
Silt, pale olive, very sandy; sand is very fine to medium.....	414.0	419.0
Sand, very fine to medium; contains some coarse sand	419.0	429.0
Sand, fine to very coarse; contains some very fine gravel.....	429.0	436.0
Silt, pale olive, slightly sandy, slightly clayey; sand is very fine to fine; moderately sandy in places.....	436.0	448.0
Sand, very fine to fine, moderately silty; contains some medium sand.....	448.0	461.0
Silt, pale olive, very sandy; sand is very fine to fine.....	461.0	469.0
Sand, very fine to medium; contains some coarse to very coarse sand from 473 to 476 ft.....	469.0	488.0
Sand, fine to coarse; contains some very coarse sand and some sandstone.....	488.0	545.0
Sand, very fine to medium, silty in parts; contains trace of coarse sand; several sandstone beds; contains silt interbed from 574 to 578 ft.....	545.0	590.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black.....	590.0	610.0