1999

Hall County Test Hole Logs

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HALL COUNTY
Test-Hole Logs

VINCENT H. DREESZEN

Nebraska Water Survey
Test-Hole Report No. 40

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

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Publication and price lists are furnished upon request.

May 1999

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INTRODUCTION

In 1930, the Conservation and Survey Division (CSD) of the University of Nebraska and the U.S. Geological Survey (USGS) 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 CSD with financial assistance from other government agencies.

The map in this report (see figure 1) 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, most test holes have been logged electrically (see sample e-log in figure 2). All samples are processed and kept on open file in the offices of Conservation and Survey Division, 113 Nebraska Hall, University of Nebraska-Lincoln, 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.

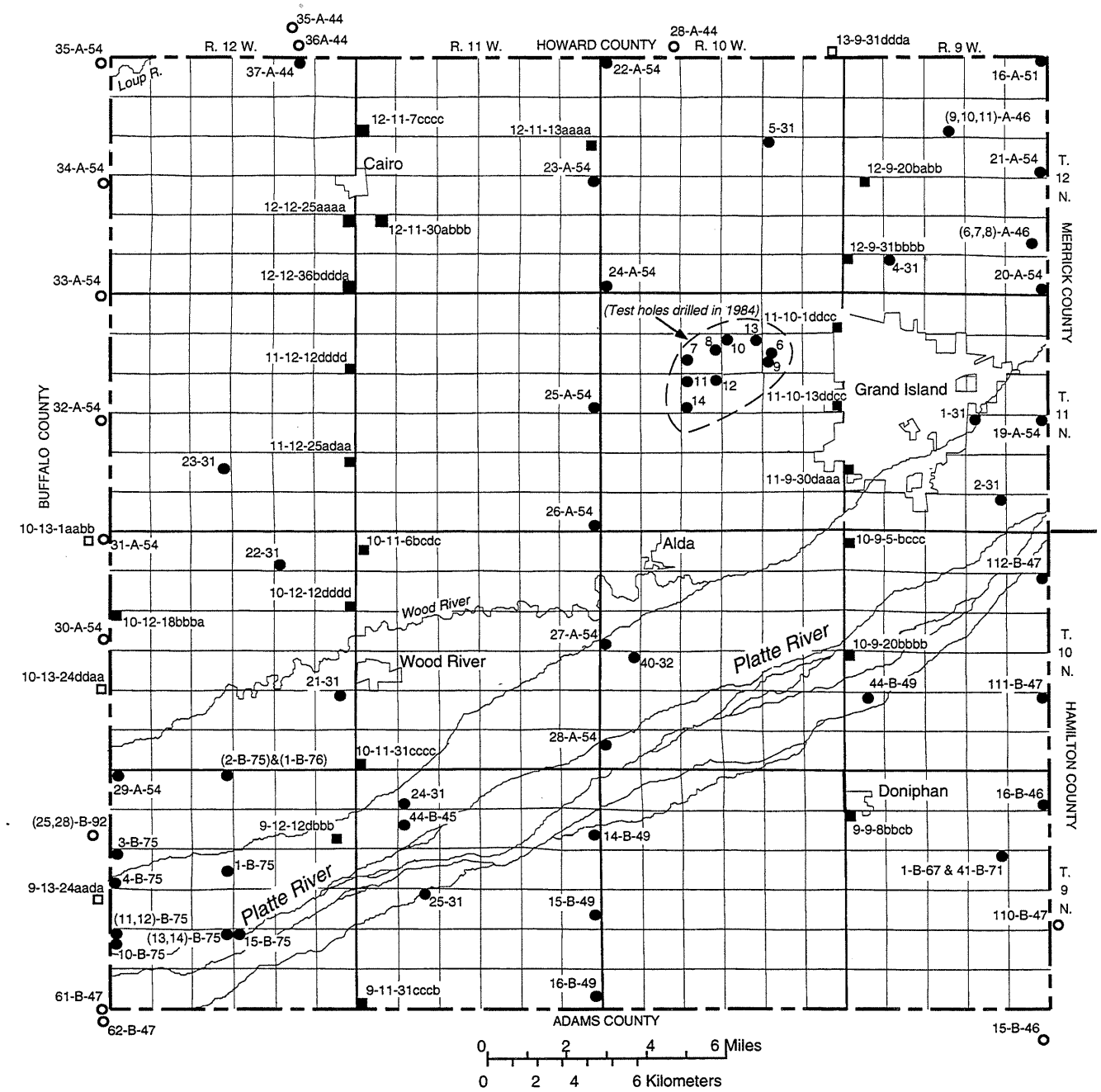
The test-hole records accurately reflect subsurface conditions only at the locations where the test holes were drilled. Interpretive data reflecting probable subsurface conditions between test-holes are being compiled for publication in county reports and are available for inspection in the office of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

Each test hole is identified by a number assigned in the field (for example #3-B-67, #41-79), and most are also identified by a number indicating its location within the land divisions of the U.S. Bureau of Land Management's survey of Nebraska. Location numbers of test holes east of the 6th principal meridian, which passes through Columbus in a north-south direction, are preceded by the capital letter A; those west of the principal meridian have no preceding letter. The first numeral indicates the township, the second the range, and the third the section. As shown in figure 3, the letters that follow the section number indicate the location of the test hole within the section, the first letter indicating the quarter section and the second letter indicating the quarter-quarter section. The letters A, B, C, and D are applied in counterclockwise direction beginning with A in the northeast quadrant. The last numeral is the serial number of the test hole within the quarter-quarter section. No number is shown unless more than one test hole is within the given quarter-quarter section. For example, a test hole located in the SW NW SW NW section 31-10N-10W is also located as 10-10-31bcbc or 10 10W 31 BCBC.

The logs of test holes drilled by the United States Bureau of Reclamation (USBR) are included in this report. Test holes were drilled in 1965 as a part of the Mid-State investigation to supplement the grid pattern of test drilling previously established by CSD and the USGS. Samples, field logs, and geologic logs are on file with CSD. Test holes were drilled with hydraulic rotary equipment. Some intervals were sampled with use of a split spoon or by coring equipment. The author, and/or Frank A. Smith, CSD geologist emertius, visually examined all of the available samples (some were submitted for laboratory analysis).

The author or other CSD scientist examined the available samples (samples from some 1931 test holes have been lost) microscopically. The age of sediments in the paleovalley fills is in question. Although included with the Quaternary in this report, some of the sediments may be late Tertiary (Pliocene) in age.

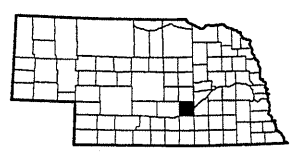
Test holes are arranged in this publication by township, range and section starting with 9N-9W and progressing numerically to 9N-12W and then to 10N-9W and so on.



● Test hole description published in this report

□○ Test hole description published in other report

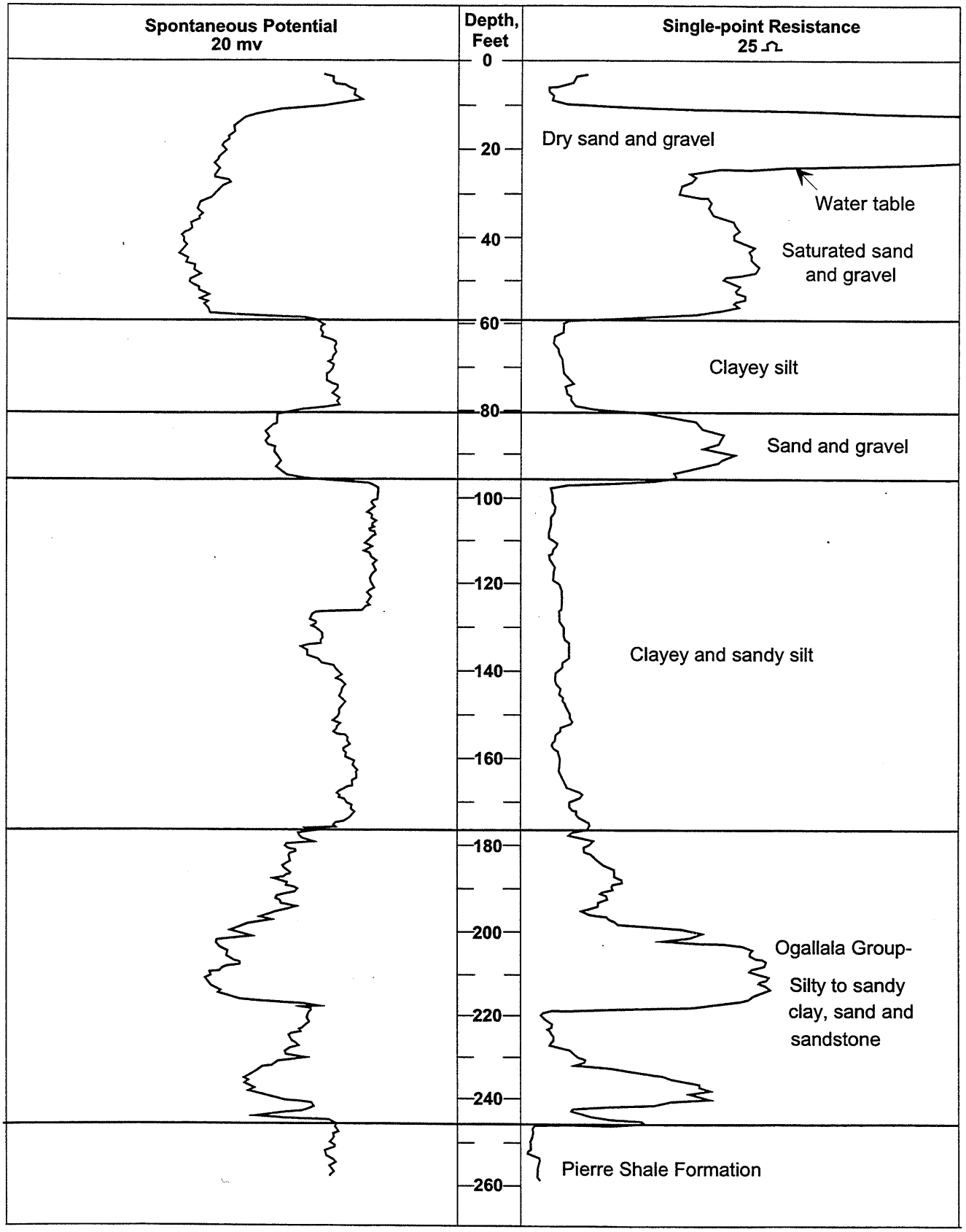
■ U.S. Bureau of Reclamation test hole description published in this report *(drilled in 1965)*



County Location Map

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

Figure 2. Electric Log of Test Hole 26-A-54 in Hall County



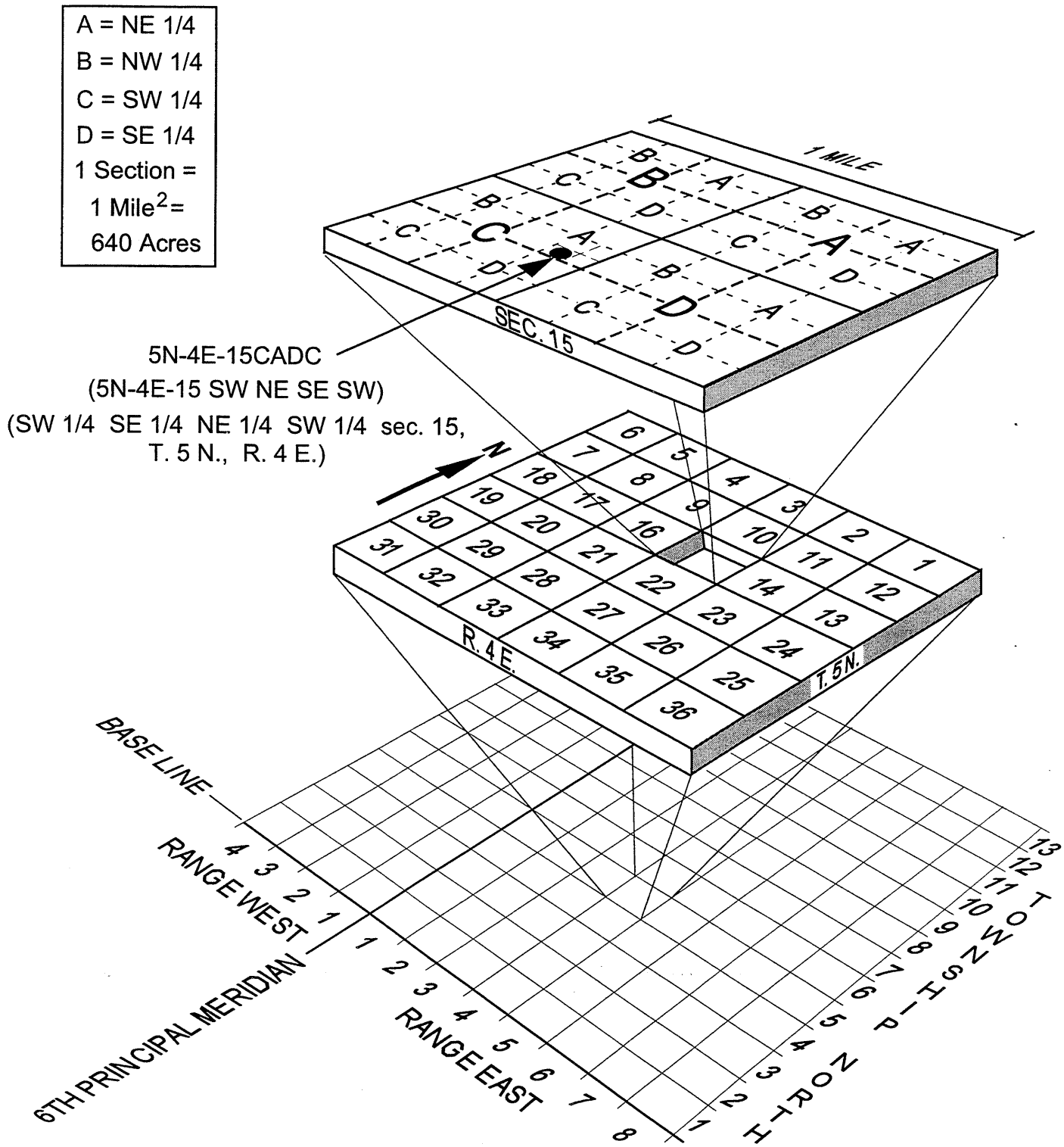


Fig. 3. System for identifying test-hole according to its location.

Hall County
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Letters in parenthesis are for Conservation and Survey Division internal use.

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

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Test-Hole Logs Table of Contents

Arranged by year drilled, test-hole number.

9-9-1dddd
16-B-46
Hall County

Location: 20 ft north and 63 ft west of SE cor sec 1-9N-9W
Ground elevation: 1,895 ft (t) Doniphan 7.5 min. quadrangle
Depth to water: 46.07 ft (5-23-46)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and soil, dark gray	0.0	1.5
Silt, slightly clayey, light gray, slight yellow brown stain to 5 ft, moderate stain below; a few iron-oxide pellets 5 to 8.5 ft	1.5	16.0
Silt, moderately clayey, medium brown	16.0	20.0
Silt, moderately clay, dark brown-gray	20.0	24.0
Silt, moderately clayey, slightly sandy, very fine to medium sand, light medium brown	24.0	30.0
Silt, slightly clayey, in part moderately sandy, sand is very fine to fine with a trace of medium to coarse sand, light brown and light brown-gray	30.0	34.0
Silt, slightly clayey, moderately sandy, mostly very fine to fine sand, light brown-gray; very light brown below 40 ft; some medium to coarse sand 45 to 51 ft	34.0	51.0
Sand, slightly silty, very fine to medium	51.0	65.0
Sand, very fine to medium, some coarse; fine to coarse, trace of very coarse below 70 ft	65.0	77.0
Silt, slightly clayey, slightly sandy, very fine to fine sand, medium grayish brown; a little dark gray-brown and light olive gray below 80 ft, slight yellow-brown stain	77.0	83.0
Sand, fine to very coarse, a little gravel, common gray and some pink silicates	83.0	87.5
Silt, slightly clayey, moderately sandy, sand is very fine to fine, light olive-gray; in part light brown-gray below 89.5 ft	87.5	92.5
Sand, fine to coarse, some very coarse	92.5	100.5
Sand and gravel, gravel is fine to medium with some coarse gravel below 110 ft	100.5	117.0
Silt, slightly clayey, moderately sandy, sand is very fine to fine, light gray-brown	117.0	136.0
Sand and gravel, much fine some medium gravel	136.0	170.0
Sand, medium to very coarse	170.0	177.0
Silt, slightly clayey, moderately sandy, sand is very fine to medium, light olive-gray	177.0	180.0
Sand and gravel, gravel is fine to medium, slightly less gravel 185 to 195 ft, olive gray and pink silicates	180.0	203.0

Silt, very clayey, light brown-gray; contains small limy nodules below 210 ft; contains fragments of yellow to light green calcareous siltstone or chalky shale below 220 ft.....	203.0	225.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, chalky, yellow, very calcareous; medium gray below 260 ft.....	225.0	227.0

9-9-8bbcb
USBR Mid-State Division (Profile 13)
Hall County

Location: 805 ft south and 61 ft east of NW cor sec 8-9N-9W
Ground elevation: 1,948.4 ft (i)
Depth to water: Not recorded
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, clayey (top soil) 95% low plasticity fines, 5% fine sand, maximum size fine sand, weak thread, slow dilatancy, dark brown.....	0.0	5.0
Silt, moderately clayey, 90% nonplasticity fines, no thread, slow dilatancy, light brownish gray, less clayey in lower part, light brown-yellow; very light brown below 22 ft.....	5.0	24.0
Silt, moderately clayey, 95% low medium plasticity medium thread, no dilatancy, many leaf imprints, dark brown (lost circulation in this zone).....	24.0	±30.0
Silt, moderately clayey, slightly sandy with some very sandy silt in middle portion, very light brownish gray to light olive gray.....	±30.0	42.0
Silty sand, 35% low plasticity fines, 65% fine sand, maximum size fine sand, very weak thread, no dilatancy, firm, light brown.....	42.0	55.0
Silty sand, 90% fine sand, 10% low plasticity fines, maximum size fine sand, dense, light gray, some yellow brown spots; some medium and trace of coarse sand below 62 ft.....	55.0	64.0
Silt, moderately clayey, moderately sandy, very fine to medium sand, slight plasticity light brownish gray, small yellow-brown spots.....	64.0	74.0
Silty sand, 70% fine sand, some medium and a trace of coarse sand, pink silicates and common white grains.....	74.0	82.0
Sandy silt, slightly clayey, moderately sandy ranging from 30 to 70% sand, principally fine sand, low plasticity, light yellow-brown (dark brown at 82 ft).....	82.0	99.0
Silt, clayey, slightly sandy, light to medium gray, slight plasticity.....	99.0	101.0
Sand, fine to coarse, about 10% fine gravel, maximum size 1/4 inch, pink with some gray silicates..	101.0	114.0

Silt, 80% low plasticity fines, 20% fine sand, slightly calcareous, weak thread, firm, light brown.....	114.0	116.0
Sand, fine to coarse, slightly gravelly about 10 to 20% gravel, maximum size 1/4 inch, less gravel below 142 ft, quartz with pink silicates.....	116.0	198.0
Silt, slightly clayey, coarse silt, contains some very fine sand, low plasticity fines, weak thread, no dilatancy, noncalcareous in upper few feet, slightly calcareous below, medium gray to 222 ft, light brownish gray to about 245 ft, light to medium gray below 245 ft; increase in sand content below 262 ft, scattered chalk grains in lower few feet.....	198.0	276.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, weathered, white, gray and brown-yellow (lost circulation between 282 and 290 ft).....	276.0	290.0

9-9-14aaab
1-B-67 and 41-B-71
Hall County

Location: 74 ft south and 411 ft west of NE cor sec. 14-9N-9W
Ground elevation: 1,915 ft (t) Doniphan 7.5 min. quadrangle
Depth to water: 64.17 ft (6-27-67)
Note: Test holes completed as observation wells, 41-B-71 drilled about 18 ft northwest of 1-B-67

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Not sampled.....	0.0	0.5
Silt, slightly clayey, moderately sandy, principally very fine sandy, dark brown gray; granular structure below 1 ft.....	0.5	1.5
Silt, moderately clayey, moderately sandy, principally very fine sand, mottled light and medium brown-gray; light brown-gray below 2 ft.....	1.5	2.5
Silt, slightly clayey, fine to very coarse silt, slightly sandy, principally very fine sand, light gray, moderately calcareous with a little secondary carbonate; slight yellow-brown iron oxide stain...	2.5	4.0
Silt, very slightly clayey, fine to coarse silt, slightly sandy, principally very fine sand, very light gray with moderate yellow-brown iron oxide stain 10 to 13 and 14 to 15 ft, very slightly calcareous below 14 ft.....	4.0	14.0
Silt, slightly clayey, fine to very coarse silt, very slightly sandy, sand is very fine, light olive gray; very slightly calcareous 17 to 20 ft..	14.0	22.5
Silt, slightly to moderately clayey, fine to coarse silt, very pale brown; light brown 23 to 24 ft and light medium brown below 24 ft.....	22.5	25.5
Silt, moderately to very clayey, medium brown-gray; medium dark brown-gray 26 to 27.5 ft and very dark brown-gray below 27.5 ft.....	25.5	29.5
Silt, moderately clayey, light medium brown-gray; slightly sandy below 31 ft and light brown-gray, sand is very fine to fine.....	29.5	32.5
Silt, slightly clayey, moderately sandy, sand is very fine to fine, light yellow- to olive-gray....	32.5	37.0
Silt, very sandy, sand is very fine to fine with some medium, light yellow-brown, a few small limonite rootlets and concretions.....	37.0	40.0

Sand, slightly silty interbedded with some very sandy silt, sand is principally very fine to fine, yellow-brown.....	40.0	47.0
Silt, slightly to moderately clayey, slightly sandy, sand is very fine to fine, light olive to brown-gray; rare medium sand grains 50 to 53.5 ft, slight yellow-brown; iron oxide stain and limonitic concretions 53.5 to 55 ft.....	47.0	56.0
Silt, slightly clayey, very light brown-gray.....	56.0	60.0
Silt, slightly clayey, slightly sandy, sand is very fine to fine, light brown-gray; moderately sandy 60 to 61 ft; some dark brown-gray below 64.5 ft...	60.0	65.5
Sand, very fine to fine; sandy silt lens at 73.5 ft.	65.5	75.0
Silt, very slightly clayey, moderately sandy, principally very fine sand, light medium olive- to yellow-gray; light olive-gray below 76 ft.....	75.0	80.0
Sand, very silty, sand is very fine to fine with some medium and a trace of coarse to very coarse; moderately silty below 90 ft; sandy silt layers below 85 ft; contains a trace of fine gravel below 92.9 ft; sandy silt is light olive-gray.....	80.0	95.0
Sand, slightly gravelly, quartz with pink red and gray silicates; about 20 percent gravel 95 to 100 ft and 10 percent below 100 ft.....	95.0	105.0
Sand, fine to coarse, may have thin silty layers....	105.0	110.0
Sand, some gravel, about 20 to 25 percent gravel, quartz with pink and red silicates, about 25 to 30% fine to medium gravel.....	110.0	130.0
Sand, slightly gravelly, sand is fine to very coarse, about 10 percent gravel above 135 ft.....	130.0	140.0

9-11-5ccc
24-31
Hall County

Location: Near the SW cor sec. 5-9N-11W, footage not recorded.
Ground elevation: 1,959 ft (i)
Depth to water: 7.5 ft (1931)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, very sandy, pale brown; sand is very fine to fine with a few coarser grains....	0.0	5.0
Silt, very sandy, in part sand, pale brown; sand is very fine to fine.....	5.0	10.0
Sand and gravel.....	10.0	65.0
Silt, slightly clayey, sandy, gray-brown, sand is very fine to fine.....	65.0	71.0

9-11-8bcbc
44-B-45
Hall County

Location: About 1/3 mile S and 50 ft E of NW cor sec. 8-9N-11W
Ground elevation: 1,957 ft (t) Wood River 7.5 min. quadrangle
Depth to water: 4.9 ft. (11-7-45).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, soil, dark brown.....	0.0	2.0
Silt, sandy to sand silty, sand is principally very fine to fine, light gray.....	2.0	4.0
Sand and gravel, fine sand to medium gravel.....	4.0	72.5
Silt, clayey, light olive-gray.....	72.5	76.5
Sand and gravel.....	76.5	79.0
Silt, very clayey, light gray to light olive-gray...	79.0	80.0
Silt, moderately clayey, moderately sandy, sand is very fine, pale brown; medium brown 85 to 100 ft, light brown 100 to 135 ft, moderately calcareous below 100 ft; common white limy areas and dense limy nodules below 120 ft.....	80.0	135.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very clayey, moderately sandy, sand is very fine to fine with some medium, light brown, limy cemented in part, some root casts.....	135.0	140.0
Silt, slightly clayey, moderately sandy, sand is very fine to fine with some medium, light brown-gray, very calcareous; some sandstone in interval.	140.0	146.5
Sandstone, slightly silty, sand is very fine to fine with some medium, very light gray and light-olive gray, limy cementation in part, root casts.....	146.5	155.0
Sand, silty, sand is very fine to medium, some limy cementation, light olive-gray with some light brown, root casts.....	155.0	163.0
Sandstone, silty, sand is very to fine, some limy cementation, light olive-gray, root casts; some hard limy cemented areas below 170 ft.....	163.0	180.0
Sandstone, slightly silty, sand is very fine to medium with a little coarse sand, root casts.....	180.0	190.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, weathered shale, very light gray, slight yellow brown stain, noncalcareous.....	190.0	195.0
Clay, weathered shale, light to medium yellow-brown, very calcareous, contains thin hard limestone or limestone-ironstone layer 197 to 197.8 ft.....	195.0	200.0

9-11-12daaa
14-B-49
Hall County

Location: 55 ft S and 114 ft W of NE cor SE1/4 sec 12-9N-11W
Ground elevation: 1,925.7 ft (i)
Depth to water: 2.3 ft (7-13-49)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, moderately sandy, dark brown-gray	0.0	0.5
Silt, very sandy, very light brownish gray, sand is fine to medium with some coarse	0.5	0.7
Sand, fine to coarse, light brown-gray; contains a few grains of fine to coarse gravel	0.7	2.0
Silt, very sandy, fine to coarse sand with a few gravel; grains, dark-gray	2.0	3.0
Sand and gravel, quartz with pink silicates, about 35 percent gravel to 10 ft and more than 50 percent gravel below; contains a few dark grains below 15 ft	3.0	20.0
Sand, some gravel, gravel mostly fine, quartz with pink and dark silicates	20.0	27.5
Silt, sandy, principally very fine to fine sand, light olive-gray	27.5	30.0
Sand, slightly silty, sand is fine to coarse, some very coarse sand to 37.5 ft	30.0	40.0
Sand, fine to coarse; about 15 percent very coarse sand and fine gravel below 45 ft; slightly silty 50 to 55 ft; contains silt layers 60 to 65 ft	40.0	67.0
Sand and gravel, about 50 percent gravel, light brownish gray, quartz with pink and yellow silicates	67.0	90.5
Silt, slightly clayey, light olive-gray	90.5	97.0
Silt, moderately clayey, light brown, noncalcareous; some secondary limy areas; slightly more clayey below 103 ft	97.0	105.0
Silt, slightly clayey, slightly sandy, sand is principally very fine, slightly calcareous, very light brown	105.0	110.0
Silt, moderately clayey, slightly sandy, sand is very fine, very light brown, some limy areas; moderately sandy below 115 ft; limy nodules below 120 ft, matrix noncalcareous	110.0	125.0

Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, sandy, sand is very fine to fine, medium brownish gray, very slightly calcareous	125.0	131.0
Sandstone, slightly clayey, silty, sand is very fine to fine, light brown to about 133 ft, light greenish gray below 133 ft, moderately calcareous; contains some rootlets	131.0	147.5
Sandstone, very fine to medium sand, very light greenish gray, moderately calcareous, rootlets common	147.5	164.5
Silt, clayey, moderately sandy, principally very fine to fine sand, very light gray; contains some limy nodules; light yellow-brown below 175 ft; contains dense limy nodules below 175 ft, contains fragments of aragonite and a few rootlets	164.5	186.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, light yellow-gray, a little medium gray, and yellow-orange, slightly calcareous	186.0	200.0
Shale, clayey, dark gray, moderately calcareous; slightly calcareous below 210 ft; thin bentonite layers in intervals 230 to 235 and 240 to 245 ft.	200.0	260.0

9-11-20aba
25-31
Hall County

Location: NE NW NE sec. 20-9N-11W, footage not recorded
Ground elevation: 1,955 ft. (i)
Depth to water: 2 ft (1931)
Note: Original log missing

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, sandy, light brown	0.0	2.0
Sand and gravel	2.0	25.0
Silt, moderately clayey, sandy, medium brown, sand is very fine	25.0	40.0
Sand, fine to medium with some coarse to very coarse and a trace of gravel	40.0	45.0
Sand and gravel	45.0	80.0
Sand, silty or silt, sandy; sand is principally very fine to fine	80.0	85.0
Silt, slightly clayey, sand is very fine; moderately calcareous, light brownish gray; light brown below 110 ft, some limy nodules	85.0	±125.0
Tertiary system - Miocene Series - Ogallala Group:		
Silt, slightly clayey, very sandy, light olive-gray, sand is very fine to fine, contains some root casts and limy cementation	±125.0	135.0
Sandstone, poorly consolidated, sand is very fine to fine, some root casts; moderately well consolidated below 142 ft	135.0	153.0

9-11-24daaa
15-B-49
Hall County

Location: 150 ft S and 12 ft W of NE cor SE1/4 sec. 24-9N-11W
Ground elevation: 1,992.8 ft (i)
Depth to water: 68.02 ft (7-13-49)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, silty sand, fine to medium brown-gray....	0.0	0.5
Silt, very sandy, sand is very fine to medium, light yellow-brown.....	0.5	1.0
Sand, very silty, sand is fine to coarse.....	1.0	3.0
Silt, very slightly clay, slightly sandy, sand is very fine, silt is coarse, very light yellow-gray, slight yellow stain, trace of small rusty rootlets, slightly calcareous to 10 ft; much yellow-brown stain 7 to 10 ft; very light gray below 10 ft.....	3.0	24.5
Silt, slightly clayey, very slightly sandy, silty is coarse, medium grayish brown; contains a few volcanic ash shards; moderately clayey below 25 ft, medium dark grayish brown.....	24.5	27.5
Silt, moderately clay, slightly to in part very sandy, sand is very fine to medium, medium brown and medium dark brown-gray, brown concretions; very sandy below 30 ft, light brown-gray.....	27.5	32.0
Silt, slightly clayey, very sandy, sand is very fine with some medium sand and trace of coarse, light brown-gray; slightly less sandy below 35 ft, very light gray.....	32.0	36.0
Sand, very fine to medium, a trace of coarse sand, common white grains, very light brown-gray; slightly silty below 43 ft.....	36.0	45.5
Silt, slightly clayey, very sandy, sand is very fine to fine, medium brown-gray; light brown-gray below 50 ft.....	45.5	56.5
Sand, slightly silty, sand is fine to coarse, trace very coarse.....	56.5	65.0
Sand, slightly silty, sand is very fine to fine with some medium; contains some slightly clayey to sandy layers, light gray, common yellow stain in upper part; contains a few small rusty nodules below 70 ft.....	65.0	78.0

Silt, moderately clayey, moderately sandy, principally very fine to fine sand, light medium brown-gray, slight yellow stain.....	78.0	83.5
Sand, very silty, sand is very fine to fine, light olive-gray.....	83.5	89.0
Sand, silty, sand is fine to coarse, a little very coarse sand, light olive-gray; contains silt layers 95 to 100 ft; slightly silty below 100 ft..	89.0	103.0
Sand, slightly gravelly, sand is fine to very coarse, about 10 percent fine gravel, quartz with pink, gray and green silicates.....	103.0	110.0
Sand, fine to coarse with a trace of very coarse, light medium gray.....	110.0	112.0
Sand, slightly gravelly, sand is fine to very coarse, about 15 percent fine gravel, quartz with pink and yellow silicates.....	112.0	130.0
Sand and gravel, sand is fine to very coarse, about 30 percent fine gravel with some medium gravel; gravel mostly fine below 140 ft.....	130.0	149.5
Silt, moderately clayey, light gray with some medium gray; slightly clayey below 153 ft, light gray-brown, slightly calcareous below 153 ft.....	149.5	154.5
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, moderately sandy, very fine to fine sand, medium brown, moderately calcareous, contains some limy nodules and rootlets.....	154.5	157.5
Siltstone-sandstone, slightly clayey, sand very fine to fine, light greenish gray, slightly calcareous, a few limy areas; contains some volcanic ash below 160 ft.....	157.5	164.0
Sandstone, moderately consolidated, silty and slightly clayey, sand is very fine to medium, light greenish gray, slightly calcareous; contains some limy areas and rootlets.....	164.0	169.0
Sand, slightly clayey, very silty, very light gray and whitish gray, moderately calcareous; contains a few rootlets.....	169.0	190.0
Silt, clayey, sandy, sand is very fine to medium, whitish gray, very calcareous, contains some nodular limestone and rootlets.....	190.0	192.5
Sandstone, slightly to moderately consolidated, light olive-gray, moderately calcareous; slightly calcareous, light green-gray below 215 ft.....	192.5	219.0
Sand, slightly consolidated, very fine to medium with a little coarse sand, light green-gray, some limy areas.....	219.0	230.0

Sand, clayey, principally very fine, light and medium gray, moderately calcareous; contains dense limy nodules or layers; some yellow stain below 235 ft.....	230.0	248.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, white, light gray, and yellow-brown, slightly calcareous; contains some cemented rusty brown concretions or layers.....	248.0	262.5
Shale, clayey, moderately calcareous; occasional rusty brown concretions to 285 ft.....	262.5	300.0

9-11-31cccb
USBR Mid-State Division (Profile 11)
Hall County

Location: 610 ft N and 22 ft E of SW cor sec. 31-9N-11W
Ground elevation: 2,008.1 ft (i)
Depth to water: Not recorded
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silty sand, 20 percent nonplasticity fines, 80 percent fine sand, a little medium, dark brown-gray, soft, massive; 0 to 1 ft, top soil with 5 percent organic silt.....	0.0	3.0
Sand, 10 percent nonplasticity fines, 90 percent very fine to fine, some medium, uniform sand, gray, dense.....	3.0	9.5
Silty sand, 10 percent nonplasticity fines, maximum size fine sand, uniform, weak thread, quick dilatancy, light gray, widely scattered silt lenses.....	9.5	19.0
Sandy, 5 percent nonplasticity fines, 65 percent fine and medium sand, 30 percent coarse to very coarse sand, light gray.....	19.0	63.0
Sandy silt, 70 percent low plasticity fines, 30 percent fine sand to medium sand, massive, light gray, dense.....	63.0	69.0
Sand, fine to very coarse, slightly gravelly, about 10 percent gravel up to 3/8 inch, cross bedded, clean, dense.....	69.0	78.0
Silt: sandy, 85 percent low plasticity fines, 15 percent fine sand, massive, weak thread, slow dilatancy, olive.....	78.0	81.0
Sand, slightly gravelly, fine to very coarse sand, abut 20 percent gravel, maximum size 5/8 inch, calcareous, clayey silt or clay ball 100 to 102 ft, slight iron oxide stain 97 to 101 ft.....	81.0	112.0
Sand, slightly gravelly, fine to very coarse sand, about 10 percent gravel up to 1/4 inch.....	112.0	130.0
Silt, moderately clayey, slightly sandy, principally very fine sand, uniform, medium thread, no dilatancy, light olive to green-gray.....	130.0	135.0

Silt, moderately clayey, 90 percent medium plasticity fines, slightly sandy below 162 ft, light medium brown, massive, firm; light gray, slightly calcareous 176 to 185 ft, light brown and in part slightly calcareous below 185 ft.....	135.0	199.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandy silt, 70 percent medium plasticity fines, 30 percent fine sand, maximum size medium sand, mottled light brown and light green-gray, trace of consolidation, white limy areas and fossil stems..	199.0	210.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay shale, 100 percent medium plasticity fines, bedded, yellow and light gray 200 to 212 ft, calcareous, chalky; medium dark gray below 212 ft, noncalcareous, thin limonite seams in upper part..	210.0	216.0

9-11-36ddaa
16-B-49
Hall County

Location: approximately 1,320 ft N and 6 ft W of SE cor sec. 36-9N-11W
Ground elevation: 1,978.1 ft (i)
Depth to water: 19.0 ft (perched) (7-16-49)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, soil, dark brown-gray.....	0.0	2.5
Silt, slightly clayey, slightly sandy, sand is fine, silt is coarse to very coarse, blocky structure, dark brown-gray to black.....	2.5	3.5
Silt, slightly to moderately clayey, slightly sandy, medium brown-gray, blocky structure.....	3.5	4.5
Silt, slightly clayey, slightly sandy, sand is very fine to medium, light brown-gray.....	4.5	6.0
Silt, slightly clayey, light yellow-gray, slight yellow stain, a few small limonitic nodules; slightly calcareous below 7 ft.....	6.0	8.5
Silt, coarse, very slightly clayey, light yellow gray, moderate yellow staining, slightly calcareous; moderately caclareous, a few limy nodules below 8.5 ft.....	8.5	11.5
Silt, moderately sandy, silt is coarse, sand is principally very fine, very light gray with some yellow stain, common rootlets, slightly calcareous, a few snail shells.....	11.5	25.0
Silt, slightly clayey, slightly sandy, silt is coarse, sand is very fine, very light gray with much light to dark yellow stain, in part very slightly calcareous.....	25.0	28.5
Silt, slightly clayey, slightly sandy, principally very fine sand, silt is coarse, medium brown-gray, slight dark brown stain, small rusty concretions, noncalcareous.....	28.5	30.5
Silt, very sandy, slightly clayey, sand is very fine to medium with a trace of coarse, very light brown-gray, a trace of dark brown-gray sandy to moderately clayey silt.....	30.5	36.5
Sand, very fine to medium, some coarse, very light gray; contains a trace of very coarse sand below 40 ft; thin light gray sandy silt layers 44.5 to 48 ft.....	36.5	48.0
Sand, fine to coarse, light gray.....	48.0	54.0

Silt, slightly clayey, very sandy, sand is very fine to medium, very light gray and light brown-gray...	54.0	55.0
Sand, very fine to coarse, light gray, quartz with a few pink silicates.....	55.0	64.0
Sand, very fine to fine, a trace of coarser grains, light yellow, much yellow stain.....	64.0	70.0
Sand, fine to coarse, a little very coarse, quartz with a few pink silicates; mostly very fine to medium sand below 75 ft.....	70.0	77.0
Silt, slightly clayey, very sandy, principally very fine to fine sand, light grayish brown.....	77.0	78.5
Sand, very fine to medium, silt layer 78.5 to 84 ft.	78.5	84.0
Sand, fine to very coarse, quartz with some pink silicates.....	84.0	91.5
Sand, some gravel, sand is fine to very coarse, about 25 percent fine gravel, quartz with some pink silicates; some yellow and olive silicates below 100 ft, silty clay layer or clay ball 105.5 to 106.5 ft, about 50 percent fine to medium gravel 106.5 to 120 ft; a few clay balls 125 to 130 ft; mostly sand and fine gravel below 130 ft, fewer pink silicates.....	91.5	138.5
Silt, moderately clayey, light gray to medium brown-gray; slightly clayey below 140 ft, light yellow-brown, slightly calcareous, contains some limy areas.....	138.5	143.0
Silt, slightly clayey, moderately sandy, principally very fine to fine sand, light brownish gray to brown, slightly calcareous, contains limy nodules and rootlets, granular structure; light medium brown below 150 ft, hard nodular limy layer 148.5 to 150 ft, thin layers 155 to 160 ft and 175 to 180 ft; moderately calcareous below 175 ft; many rootlets below 180 ft.....	143.0	184.5
Silt, clayey, marly, very calcareous, hard, white...	184.5	185.0
Silt, slightly to in part moderately clayey, slightly sandy, sand is very fine to medium, light brown, moderately calcareous, some limy areas, rare rootlets; slightly calcareous below 190 ft, a few dense limy nodules.....	185.0	190.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty, poorly consolidated, very light olive-gray and very light brown, slightly calcareous, some limy areas; sand is very fine to medium below 203 ft, white to very light greenish gray, very calcareous.....	190.0	210.0
Sandstone, silty, very fine to fine with some medium sand, very light greenish gray, very calcareous...	210.0	213.0

Silt, moderately clayey, moderately sandy, principally very fine sand, limy cemented areas, very light greenish gray; moderately sandy below 215 ft, noncalcareous	213.0	217.0
Sand, very fine to fine with some medium, light gray	217.0	220.0
Silt, slightly clayey, very sandy, sand is very fine to medium, light greenish gray	220.0	223.0
Sand, very fine to medium, light brownish gray, common dark grains	223.0	234.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, light yellow-brown and very light gray, some yellow stain, slightly calcareous	234.0	244.0
Clay shale, medium gray and dark gray, slightly calcareous; contains hard ironstone layers or nodules 247.5 to 250 ft; dark gray below 250 ft; some bentonite below 260 ft	244.0	265.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, chalky, light brownish gray and light gray, very calcareous	265.0	280.0

9-12-4aadb
2-B-75
Hall County

Location: 926 ft S and 393 ft W of NE cor sec 4-9N-12W
Ground elevation: 1,993 ft (t) Shelton 7.5 min. quadrangle)
Depth to water: Not recorded

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, very slightly clayey, very sandy, sand is very fine to fine with some medium and trace of coarser grains, dark gray.....	0.0	2.0
Silt, moderately clayey, slightly sandy, sand is very fine to medium with a few coarser grains, light brown-gray.....	2.0	5.0
Sand, slightly silty, very slightly clayey, sand is fine to very coarse.....	5.0	10.0
Sand, slightly gravelly, fine to very coarse sand with about 15% gravel.....	10.0	30.0
Sand and gravel, a few metamorphic grains.....	30.0	56.0
Silt, moderately clayey, slightly sandy, principally very fine sand, light olive gray; slightly clayey below 60 ft, slightly calcareous.....	56.0	64.8
Silt, slightly clayey, in part moderately clayey, slightly sandy, sand is very fine to fine with a trace of medium, slightly calcareous, light yellow-brown; light brown below 68 ft, some silt aggregates.....	64.8	70.0
Silt, moderately clayey, slightly sandy, principally very fine sand, medium brown, noncalcareous; in part slightly calcareous below 77.5 ft, contains a few small limy nodules, sand is very fine to fine with a trace of coarser grains.....	70.0	80.0
Silt, slightly clayey, moderately sandy, sand is fine to medium with a few coarse sand and gravel grains, light brown, slightly calcareous, contains a few limy nodules some of which appear to be gravel grains, one rounded root cast.....	80.0	87.7
Tertiary System - Miocene Series - Ogallala Group:		
Siltstone-sandstone, sand is very fine to fine with a trace of medium, white, very calcareous; some moderately clayey to moderately sandy silt below 90 ft, very light olive-gray, some limy areas.....	87.7	100.0

Sandstone, silty, sand is very fine to fine with a little medium sand, poorly consolidated, very light olive- to greenish-gray, a few small limy areas to about 107 ft.....	100.0	110.0

9-12-4aadb
1-B-76
Hall County

Location: 882 ft S and 620 ft W of NE cor sec 4-9N-12W
Ground elevation: 1,993 ft (t) Shelton 7.5 min. quadrangle
Depth to water: not recorded
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, moderately sandy, sand is very fine to medium, dark gray-brown.....	0.0	2.0
Sand, slightly silty, sand is very fine to coarse...	2.0	3.5
Sand, fine to very coarse, much medium to coarse; some very coarse sand below 5 ft.....	3.5	10.0
Sand and gravel, medium sand to fine, some medium gravel, 20 percent gravel; quartz with pink and a few dark silicates; 35 percent gravel below 15 ft.	10.0	20.0
Sand, fine to very coarse, 10 percent fine gravel...	20.0	30.0
Sand and gravel, medium sand to medium gravel, 25 percent gravel, quartz with light colored silicates; 35 to 45 percent gravel below 40 ft.....	30.0	58.0
Silt, slightly clayey, moderately sandy, sand is very fine with some fine, light medium olive-gray; in part moderately clayey below 65 ft, a few small limy areas.....	58.0	70.3
Silt, slightly to moderately clayey, moderately sandy, sand is very fine with some fine and a little medium sand, light medium brown, a few limy areas; slightly more sand below 72 ft, sand is very fine to fine with a little medium sand and rare coarse sand, contains a few limy nodules, moderately calcareous, contains a trace of shell fragments below 74 ft.....	70.3	75.0
Silt, moderately clayey, moderately sandy, sand is mostly very fine to fine, very light brown-gray, moderately calcareous, common limy areas.....	75.0	77.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, clayey to sandstone, sand is very fine to fine with some medium, common lime-cemented areas, very light brownish gray, moderately to very calcareous, contains some calcite.....	77.0	78.0
Marl, very slightly sandy, silty and clayey, white to very light olive-gray.....	78.0	80.0

Sandstone-siltstone, sand is very fine to medium, rare coarse sand, moderate induration, very light olive-gray, very calcareous, rare root holes; in part noncalcareous 82.5 to 84 ft and below 85 ft..	80.0	90.0
Silt, very clayey, contains some sand, noncalcareous but with marl 94.3 to 95 ft.....	90.0	95.0
Sandstone, in part silty to slightly clayey, sand is very fine to medium, slight consolidation, very light olive-gray, contains a few rootlets.....	95.0	118.5
Sandstone, white, very calcareous.....	118.5	119.3
Silt, slightly clayey, very sandy, sand is very fine to fine, very light olive-gray.....	119.3	120.0
Sand, silty and sandstone interbedded, sand is very fine to fine, light olive-gray, some rootlets; some medium sand below 125 ft.....	120.0	140.0
Sandstone, white, very calcareous.....	140.0	144.8
Silt, clayey, slightly to moderately sandy, sand is very fine to fine, very light olive-gray; calcareous and moderately consolidated 145 to 146 ft....	144.8	150.0
Sandstone, some interbedded, sand to slightly clayey silt, sand is very fine to fine with some medium, common moderately consolidated highly calcareous areas, rootlets; some coarse sand and some lithic gravel grains including calcareous sandstone 169 to 170 ft; very calcareous 170 to 172.8 ft; sandy marl 172.8 to 175 ft.....	150.0	175.0
Silt, slightly clayey, sand is very fine to medium, light olive-gray.....	175.0	182.0
Sandstone, silty to slightly clayey, sand is very fine to fine with some medium; light olive-gray; sand is very fine to medium below 185 ft, moderately calcareous, poorly consolidated.....	182.0	190.0
Sandstone, in part silty, sand is very fine to fine, very light olive-gray, moderately to very calcareous, moderately indurated.....	190.0	199.5
Silt, moderately clayey, sandy with some interbedded calcareous sandstone layers, sand is very fine to fine.....	199.5	205.0
Silt, moderately clayey, moderately sandy, sand is very fine to fine, light olive-gray, limy areas 214 to 215 ft; very sandy below 215 ft; very clayey below 222 ft, sand is very fine to medium with some gravel grains of clay or shale.....	205.0	222.3
Clay, in part sandy, very light olive-gray, contains some limy areas and some dense hard siliceous claystone.....	222.3	222.7

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

Clay, very light yellow- to green-gray, some limy areas, probably bentonitic.....	222.7	223.0
Clay, light gray with a little yellow-brown, non-calcareous but appears to have some limy areas....	223.0	225.0
Shale, clay, medium dark gray, noncalcareous, dark gray below 226.5 ft.....	225.0	230.0

9-12-6bbbb
29-A-54
Hall County

Location: 66 ft S and 11 ft E of NW cor sec 6-9N-12W
Ground elevation: 2,012 ft (t) Shelton 7.5 min. quadrangle
Depth to water: Hole caved at 22.8 ft (8-3-54) about 23 ft (E-log)
Electric Log

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	1.0
Soil: silt, moderately clayey, slightly sandy, sand is very fine to fine, medium dark brown-gray, slightly calcareous	1.0	1.5
Silt, slightly clayey, in part slightly sandy, sand is very fine to fine, light yellow-gray, slightly calcareous	1.5	3.0
Clay, silty, light brown-gray, slightly calcareous; light yellow gray below 4 ft	3.0	4.5
Silt, slightly clayey, light yellow-gray, slightly calcareous	4.5	7.0
Soil: silt, moderately clayey, dark brown gray, very slightly calcareous	7.0	7.5
Silt, moderately to very clayey, light brown-gray, very slightly calcareous; very light yellow-gray below 8 ft; noncalcareous 8 to 8.5 ft	7.5	9.0
Sand and gravel, medium sand to fine, some medium gravel, approximately 40 percent gravel	9.0	10.0
Sand, some gravel, fine sand to fine gravel, approximately 15 percent gravel, quartz with pink silicates	10.0	20.0
Sand and gravel, fine sand to medium gravel, approximately 35 percent gravel	20.0	24.0
Sand, fine to very coarse	24.0	30.0
Sand and gravel, medium sand to fine gravel, approximately 30 percent gravel, quartz with pink silicates; approximately 45 percent gravel, some medium gravel below 35 ft	30.0	45.0
Sand and gravel, approximately 30 percent fine to medium gravel, quartz with yellow, olive, green and pink silicates, overall olive color; approximately 50 percent gravel below 50 ft	45.0	55.0
Sand, some gravel, fine sand to fine gravel, about 10 percent gravel, overall gray in color	55.0	58.0

Silt, slightly clayey, silt is coarse, light yellow-gray; slightly more clayey below 58.5 ft, light olive-gray; in part moderately clayey and slightly sandy below 60 ft, light olive-brown, all non-calcareous.....	58.0	64.0
Silt, moderately to very clayey, very slightly sandy, sand is very fine, light medium yellow-brown; light medium brown 68.5 to 72 ft; slightly sandy below 75 ft, sand is very fine to medium....	64.0	77.5
Tertiary System - Miocene Series - Ogallala Group:		
Siltstone-sandstone, sand is very fine to fine with some medium, very light olive-gray, moderately consolidated, clay and siliceous cementation, many rootlets and root holes.....	77.5	85.0
Silt, very sandy, coarse silt and very fine sand, very light olive-gray, slight induration.....	85.0	87.0
Sandstone, slightly clayey, sand is very fine to medium, poorly consolidated, very light olive-gray, moderately consolidated 90 to 91 ft, a few root holes; a little coarse sand below 91 ft.....	87.0	100.5
Sandstone, slightly clayey, sand is very fine to medium, light olive-gray, siliceous cementation...	100.5	115.0
Sandstone, slightly clayey, sand is very fine to fine, light olive-gray; silty below 114 ft.....	115.0	128.0
Silt, very clayey, light olive-gray.....	128.0	128.6
Marl, silty, well consolidated, very light olive-gray, very calcareous.....	128.6	130.0
Sandstone, slightly silty, sand is very fine to fine, some medium, light olive-gray, poorly consolidated, contains siliceous rootlets; very fine to medium sand below 140 ft; some limy cementation below 160 ft, slightly calcareous, contains limy nodules; very calcareous below 174 ft, common rootlets; marly limestone below 179 ft, slightly sandy, white.....	130.0	179.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, very light gray and light yellow-gray; moderately calcareous; mottled brown-yellow 195 to 210 ft; light gray and brownish gray below 210 ft; probably some bentonite layers below 215 ft.....	179.5	230.0

9-12-12dbbb
USBR Mid-State Division (Profile 11)
Hall County

Location: 21 ft S and 73 ft E of center sec 12-9N-12W
Ground elevation: 1,964.5 ft (i)
Depth to water: 6.1 ft (6-3-65)
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty (top soil), 10 percent low plasticity fines, sand very fine to medium, some coarse, dark brown-gray.....	0.0	0.8
Silt, moderately clayey, 95 percent medium plasticity fines, 5 percent sand, slightly calcareous, medium thread, no dilatancy, light-gray.....	0.8	1.8
Sand, very fine to fine, some medium and trace of coarse sand.....	1.8	5.0
Sand, slightly gravelly, about 15 percent gravel, slight iron-oxide stain 24 to 44 ft.....	5.0	70.0
Silt, very clayey, light brown.....	70.0	72.0
Silt, probably as above, may be some interbedded sand and gravel or may be sand and gravel with large clay balls.....	72.0	79.0
Silt, moderately to in part very clayey, moderately calcareous, white, limy areas and limy nodules; very calcareous below 102 ft, very light brown-gray.....	79.0	123.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty, 15 percent marly silt, 85 percent fine sand, light gray, scattered hard lenses, massive; 25 percent marly silt and 75 percent fine sand below 129 ft.....	123.0	132.0

9-12-16daaa
1-B-75
Hall County

Location: 361 ft S and 60 ft W of NE cor SE1/4 sec 16-9N-12W
Ground elevation: 1,985 ft (t) Shelton 7.5 min. quadrangle
Depth to water: Not recorded

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, very slightly clayey, very sandy, sand is very fine to medium, trace of coarse, dark brown-gray..	0.0	2.0
Sand, slightly silty, fine to very coarse sand, brown.....	2.0	4.0
Sand, slightly gravelly, medium sand to fine gravel, about 15 percent gravel.....	4.0	8.0
Sand and gravel, common pink silicates, clay layer or clay ball 28 to 28.2 ft.....	8.0	28.2
Sand, slightly gravelly, about 15 percent very coarse sand and fine gravel, a few metamorphic grains.....	28.2	44.0
Silt, moderately clayey, slightly sandy, principally very fine to fine sand, light medium olive-gray...	44.0	50.0
Silt, very clayey, light medium brown, a few small clay granules.....	50.0	51.5
Silt, moderately to very clayey, in part moderately sandy, sand is very fine to medium, a few brown clay skins, light brown with some olive-gray.....	51.5	60.0
Sand, fine to very coarse, quartz with light and dark silicates.....	60.0	78.0
Silt, moderately clayey, slightly sandy, sand is principally very fine, light brown.....	78.0	90.0
Note: interval logged in field as "clay", sample 80 to 90 ft is missing or mislabeled		

9-12-18bbbc
3-B-75
Hall County

Location: 400 ft S and 309 ft E of NW cor sec 18-9N-12W
Ground elevation: 2,006 ft (t) Shelton 7.5 min. quadrangle
Depth to water: Not recorded

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, very sandy, sand is very fine to medium, dark brown-gray.....	0.0	1.3
Sand, very fine to medium, some coarse and a trace of very coarse.....	1.3	10.0
Sand and gravel, common metamorphics.....	10.0	30.0
Sand, some gravel, slight yellow-brown stain.....	30.0	33.0
Sand and gravel, predominantly quartz with pink silicates.....	33.0	54.1
Silt, moderately clayey, slightly sandy, principally very fine to fine sand, light yellow-brown, slight yellow stain; very light olive-gray below 54.7 ft.	54.1	60.0
Silt, slightly clayey, slightly sandy, principally very fine sand, very light brown, slightly calcareous; moderately calcareous below 66 ft; large limy nodules 69 to 70 ft.....	60.0	70.0
Silt, moderately clayey, slightly sandy, principally very fine sand, light gray-brown, slightly to in part moderately calcareous.....	70.0	80.0
Silt, slightly clayey, coarse grained, slightly sandy, principally very fine sand, medium yellow-brown, noncalcareous, limy nodules; light reddish brown below 84.8 ft.....	80.0	100.0
Silt, slightly clayey, slightly sandy, sand is very fine, light yellow-brown, in part slightly calcareous.....	100.0	110.0
Silt, moderately clayey, moderately sandy, sand is very fine to fine with some medium and trace of coarser grains, light brown-gray; some light brown and a little olive-gray below 120 ft.....	110.0	122.0
Sand, silty, slightly clayey, sand is fine to coarse with a few very coarse sand and gravel grains, light brown-gray.....	122.0	127.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, slightly sandy, principally very fine to fine sand, very light olive and light green-gray, noncalcareous; some very clayey silt below 130 ft.....	127.0	136.0

Sandstone, silty, slightly clayey, sand is very fine to medium with a trace of coarse sand, poorly consolidated, a trace of limy areas, light olive-gray.....	136.0	140.0
Sand, very fine to fine with a little medium, contains a few rounded clay grains and rare root casts.....	140.0	150.0

9-12-18cccc
4-B-75
Hall County

Location: 22.5 ft N and 89.5 ft E of SW cor sec 18-9N-12W
Ground elevation: 2,007 ft (t) Denman 7.5 min. quadrangle
Depth to water: Not recorded

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, silty, coarse silt and very fine sand, dark gray.....	0.0	0.9
Silt, moderately sandy, coarse silt, sand is very fine, medium yellow-brown, slightly calcareous....	0.9	3.5
Sand and gravel, much fine to coarse gravel, slight dark stain to 10 ft; less gravel below 40 ft.....	3.5	46.0
Silt, slightly clayey, slightly sandy, sand is very fine and silt is coarse, light brown-yellow, slight yellow stain, noncalcareous, a little waxy clay in sample; very light yellow-gray below 48.5 ft, slightly calcareous.....	46.0	50.0
Silt, slightly clayey, slightly sandy, silt is coarse, sand is very fine, very light brown, moderately calcareous, silt aggregates; moderately clayey below 56 ft, small limy areas.....	50.0	67.5
Silt, moderately clayey, slightly sandy, sand is very fine to fine, light medium brown, slightly calcareous; slightly more clayey below 70 ft.....	67.5	80.0
Silt, slightly clayey, moderately sandy, sand is very fine to fine, light medium brown, slightly calcareous; possibly sand and gravel grains 91.8 to 93 ft.....	80.0	100.0
Silt, slightly clayey, moderately to very sandy, sand is fine to coarse with some coarse grains; may be some brown clayey silt 106 to 110 ft.....	100.0	127.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, very sandy, sand is fine to coarse with some coarser grains, very light olive-gray, bone fragment and some rounded lithic grains; mostly fine to medium sand below 130, a few root casts.....	127.0	124.0
Note: Top of Ogallala not certain, field log and samples of poor quality below 90 ft		

9-12-27bbcb
15-B-75
Hall County

Location: Near center W line NW1/4 NW1/4 sec. 27-19N-R12W
(Approximately 972 ft S of I-80 and 30 ft E of section line)
Ground elevation: 1,986 ft (t) Denman 7.5 min. quadrangle
Depth to water: Not recorded

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand and gravel, about 30 percent gravel, slight dark stain.....	0.0	10.0
Sand and gravel, about 50 percent fine to coarse gravel.....	10.0	22.0
Silt, moderately clay, moderately sand, sand is very fine to medium, some coarser grains, medium brown-yellow.....	22.0	24.0
Sand and gravel, considerable clayey to sandy silt in sample.....	24.0	30.0
Sand and gravel, about 25 percent gravel.....	30.0	40.0
Sand, fine to very coarse, about 5 percent gravel, about 10 percent gravel below 40 ft.....	40.0	66.8
Silt, moderately clayey, moderately sandy, sand is very fine to fine, medium yellow-brown.....	66.8	70.0

9-12-28aaaa
13-B-75
Hall County

Location: Near NE cor sec 28-9N-12W (approximately 432 ft S of I-80 and 9 ft W of section line)
Ground elevation: 1,986 ft (t) Denman 7.5 min. quadrangle
Depth to water: Not recorded

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, moderately sandy, sand is very fine to medium, trace of coarse dark gray....	0.0	0.9
Sand, fine to coarse.....	0.9	8.0
Sand, slightly gravelly, medium to very coarse sand, 5 percent gravel, slight dark stain.....	8.0	10.0
Sand and gravel, a little coarse gravel.....	10.0	19.0
Silt, slightly clayey, moderately sandy, sand principally very fine to fine, medium yellow-brown.....	19.0	26.0
Sand, slightly gravelly, fine to very coarse sand, about 10 percent gravel.....	26.0	30.0
Sand and gravel, about 30 percent gravel, much medium to coarse gravel below 60 ft.....	30.0	67.3
Silt, moderately clayey, slightly sandy, sand is very fine, light brown-gray; light medium brown below 70 ft.....	67.3	70.0

9-12-28aaad
14-B-75
Hall County

Location: Near NE cor NE1/4 sec 28-19N-12W (approximately 732 ft S of I-80 and 123 ft W of section line)
Ground elevation: 1,985 ft (t) Denman 7.5 min. quadrangle
Depth to water: Not recorded

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, medium to coarse, a little very coarse sand, moderate dark stain.....	0.0	10.0
Sand and gravel, slight dark stain.....	10.0	20.0
Sand, fine to coarse, a little sandy clay at about 23 ft.....	20.0	30.0
Sand and gravel, about 25 percent gravel.....	30.0	70.5
Silt, moderately clayey, slightly sandy, sand is very fine, light yellow-brown.....	70.5	80.0

9-12-30bccb
12-B-75
Hall County

Location: Near SW cor NW1/4 sec 30-9N-12W (approximately 68 ft S of I-80 and 115 ft E of section line)
Ground elevation: 2,008 ft (t) Denman 7.5 min. quadrangle
Depth to water: Not recorded

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, moderately sandy, very fine to fine with some medium sand and trace of gravel, dark brown-gray	0.0	1.5
Sand and gravel, slight dark stain	1.5	18.0
Silt, moderately clayey, slightly sandy, principally very fine to medium sand, light olive-gray, slightly calcareous; in part very sandy, some gravel below 20 ft	18.0	22.0
Sand and gravel, silty clay or clay ball 70.5 to 71 ft	22.0	80.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to medium, slightly consolidated, root casts	80.0	84.5
Sandstone, very fine to medium sand, moderately calcareous in part, very light olive-gray	84.5	90.0

9-12-30bccc
11-B-75
Hall County

Location: Near SW cor NW1/4 sec 30-9N-12W (approximately 327 ft S of I-80 and 19 ft E of section line)
Ground elevation: 2,007 ft (t) Denman 7.5 min. quadrangle
Depth to water: Not recorded

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, moderately sandy, sand is very fine to fine, dark brown-gray.....	0.0	3.0
Sand and gravel, moderate dark stain to 10 ft.....	3.0	17.0
Silt, very clayey, slightly sandy, sand is fine to coarse, light olive-gray, may be very sandy below 20 ft.....	17.0	23.0
Sand and gravel, less gravel below 70 ft.....	23.0	80.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, very fine to medium sand, very light olive-gray, moderately to very calcareous.....	80.0	90.0

9-12-30cbbb
10-B-75
Hall County

Location: Near NW cor SW1/4 sec 30-9N-12W (approximately 627 ft S of I-80 and 105 ft W of section line)
Ground elevation: 2,007 ft (t) Denman 7.5 min. quadrangle
Depth to water: Not recorded

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, very sandy, very fine to fine sand, dark gray.	0.0	1.5
Silt, slightly clayey, very sandy, sand is very fine to fine.....	1.5	2.5
Sand, fine to coarse, rare very coarse grains.....	2.5	10.0
Sand and gravel, about 25 percent gravel.....	10.0	30.0
Sand and gravel, about 30 to 50 percent gravel.....	30.0	60.0
Sand, fine to coarse, a little very coarse.....	60.0	72.0
Sand, some gravel, some sandy to clayey silt 72 to 72.8 ft.....	72.0	78.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, moderately sandy, light olive-gray, root holes.....	78.0	80.0
Sandstone, poorly consolidated, very light olive-gray, in part limy cemented, sand is very fine to medium, root casts common.....	80.0	90.0

10-9-5bccc
USBR Mid-State Division (Profile 13)
Hall County

Location: approximately 2,330 ft S and 165 ft E of NE cor sec 5-10N-9W
Ground elevation: 1,869.8 ft (i)
Depth to water: Not recorded
Note: Compiled from sample descriptions by F.A. Smith and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, very sandy, sand is primarily very fine, moderately calcareous, dark brown-gray.....	0.0	1.5
Sand, very silty, slightly clayey, sand is very fine to medium, light brownish gray, slightly iron-oxide stain.....	1.5	4.0
Sand, slightly gravelly, approximately 10 percent fine gravel.....	4.0	22.0
Sand, slightly gravelly, approximately 15 percent gravel, a little medium gravel.....	22.0	64.0
Sand, silty, slightly clayey, sand is principally very fine to medium, slight plasticity, light yellow-brown, bluish green wet.....	64.0	66.0
Sand, slightly gravelly, approximately 5 to 10 percent fine gravel, clean.....	66.0	89.5
Silt, moderately clayey, slightly sandy, very pale brown; alternate layers of fine to coarse sand below 94 ft, contains some reworked silt.....	89.5	97.0
Silt, moderately clayey, slightly sandy, sand is very fine, slightly calcareous, traces of limy streaks, very pale brown; slightly more clayey below 97 ft.....	97.0	102.0
Sand, fine to coarse.....	102.0	105.0
Silt, moderately clayey, slightly sandy, sand is very fine, moderately calcareous, scattered small limy areas, very pale brown, slight plasticity, matrix in part noncalcareous; light yellowish-brown 110 to 112 ft.....	105.0	152.0

10-9-12aaaa
112-B-47
Hall County

Location: 77 ft S and 22 ft W of NE cor sec 12-10N-9W
Ground elevation: 1,888.8 ft (i)
Depth to water: 52.5 ft (12-4-47)
Note: Test hole in road cut and road ditch

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, very slightly clayey, very light yellow-brown, rare yellow stain and small soft limy concretions, matrix essentially noncalcareous, very light brown below 9 ft	0.0	9.5
Silt, moderately clayey, slightly sandy, sand is fine to medium, rare coarse sand, very dark brown-gray	9.5	15.0
Silt, moderately clayey, slightly sandy, sand is fine to coarse, rare very coarse, medium brown, moderately sandy below 15 ft, mostly fine to medium sand, medium reddish brown	15.0	17.5
Sand, slightly silty and clayey, sand is very fine to coarse with a little very coarse, light brown; moderately silty below 24 ft, sand is very fine to medium, light brown-gray	17.5	26.0
Sand, fine to very coarse, mostly quartz, common white opaque grains; rare gravel grains below 30 ft	26.0	36.0
Sand, very silty, very fine to fine with some medium sand, very light gray	36.0	44.5
Silt, slightly clayey, slightly sandy, sand is very fine to fine, light gray	44.5	49.0
Sand, very fine to medium	49.0	57.0
Silt, slightly to moderately clayey, light gray; slightly sandy below 60 ft	57.0	63.0
Sand, fine to very coarse, quartz with a few pink silicates	63.0	78.0
Sand and gravel, about 40 percent very coarse sand to medium gravel, quartz with pink silicates, slight yellow stain	78.0	90.0
Sand and gravel, about 50 percent very coarse sand and gravel, quartz with pink and some gray silicates, a little yellow clayey silt below 105 ft	90.0	110.0
Sand and gravel, about 50 percent very coarse sand and gravel, quartz with pink silicates, some light gray silt in interval 120 to 125 ft	110.0	145.5

Silt, moderately clayey, medium yellow-brown, some light gray.....	145.5	146.5
Sand, fine to coarse, a little very coarse sand; fine to very coarse below 150 ft.....	146.5	156.0
Silt, moderately clayey, slightly sandy, sand is very fine to fine, light yellow-brown, a little very light gray; light medium gray-brown below 16 ft.....	156.0	165.0
Silt, moderately to in part very clayey, slightly sandy, principally very fine sand, light medium gray-brown, slightly calcareous, light yellow-brown below 170 ft, a few small limy nodules and root casts; light brown below 180 ft, moderately calcareous.....	165.0	184.0
Silt, moderately clayey, slightly sandy, sand is primarily very fine, light medium brown, matrix is slightly calcareous, common limy areas and limy nodules; abundant limy fragments including chalky limestone below 195 ft.....	184.0	200.0
Gravel and pebbles of chalky limestone.....	200.0	201.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalky shale, yellow and white, thin bentonite in internal 210 to 215 ft; started losing circulation at 208 ft, cavities 208 to 208.5 ft and 210.2 to 211 ft, complete circulation lost at 240 ft, very little sample obtained below 215 ft.....	201.5	240.0

1687'

10-9-20bbbb
USBR Mid-State Division (Profile 13)
Hall County

Location: 96 ft S and 93 ft E of NW cor sec 20-10N-9W
Ground elevation: 1,876.3 ft (i)
Depth to water: 4.2 ft (4-8-65)
Note: Compiled from sample descriptions by F.A. Smith and in interpretation of USBR geologic and field logs

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, silty, sand is principally very fine, micaceous, low plasticity, slightly calcareous, grayish brown, light gray below 0.2 ft.....	0.0	0.5
Sand, 95% fine to medium, maximum size coarse sand, 5 percent nonplasticity fines, a trace of very coarse sand and fine gravel.....	0.5	2.0
Sand, slightly gravelly, 90 percent fine to coarse sand, 5 percent up to 3/8 inch gravel (20 percent gravel 2 to 12 ft, 35 percent gravel below 12 ft) dense, cross bedded.....	2.0	20.0
Silt, moderately clayey, 95 percent low to medium plasticity fines, 5 percent fine sand (sand is very fine to fine, micaceous), firm, massive, medium thread, no dilatancy, very pale brown.....	20.0	25.0
Sand, slightly gravelly, much coarse to very coarse sand, 5 percent up to 3/8 inch gravel, (about 20-25 percent gravel), dense.....	25.0	89.0
Silt, clayey, 90 percent low plasticity fines, olive, (light green to bluish gray wet).....	89.0	91.0
Sand, 80 percent fine to medium, less than 5 percent gravel up to 3/8 inch, 10 percent coarse sand to 3/8 inch gravel, clean, cross bedded.....	91.0	118.0
Silt, slightly clayey, slightly sandy, principally very fine sand, weak thread, medium dilatancy, very light gray to white 118 to 124 ft, very pale brown below 124 ft, silt is coarse grained below 124 ft.....	118.0	139.0
Silt, very slightly sandy, about 10 percent sand, principally very fine sand, light olive-gray; contains small white streaks and some shell fragments.....	139.0	144.0
Sand, slightly silty, 10 percent fines, sand is fine to coarse, much medium to coarse sand, olive-gray (dark bluish gray wet) contains shell fragments, root casts and wood fragments.....	144.0	151.0

Silt, moderately clayey, moderately sandy, sand is very fine, weak thread, medium dilatancy, moderately calcareous, pale yellow (light bluish gray wet), contains a trace of shall fragments.....	151.0	157.0
Silt, as above, less sandy, light gray grading to grayish brown.....	157.0	170.0
Silt, moderately clayey, very slightly sandy, principally very fine sand, medium plasticity, light brown, slightly calcareous.....	170.0	189.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, moderately silty, slightly clayey, sand is very fine with some medium to coarse, slightly coarser sand with depth, principally quartz sand, clear to frosted grains, sub-rounded, a few dark and pink silicates, some rounded chalk or limestone grains.....	189.0	201.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, shaly, yellow and dark brown, principally gray below 213 ft, very calcareous.....	201.0	222.0

10-9-25aaaa
111-B-47
Hall County

Location: 123 ft S and 8 ft W of NE cor sec 25-10N-9W
Ground elevation: 1,901.5 ft (i)
Depth to water: 60 ft (12-3-47)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, silt, medium brown-gray.....	0.0	0.5
Silt, slightly clayey, slightly sandy, very fine to fine sand, medium brown.....	0.5	2.0
Silt, slightly clayey, moderately sandy, sand is very fine to fine with some medium sand, medium dark brown-gray; slightly more clay below 2 ft, light medium brown-gray.....	2.0	3.5
Silt, slightly clayey, very slightly sandy, very fine sand, slightly calcareous, very light yellow-brown; very light brown-gray below 7 ft; less clayey below 10 ft; essentially noncalcareous below 15 ft, very light yellow-brown.....	3.5	19.8
Silt, slightly clayey, moderately sandy, sand is fine to coarse, medium dark gray-brown; slightly more clayey below 24.5 ft, medium gray-brown.....	19.8	27.0
Silt, slightly clayey, in part moderately clayey, moderately sandy, sand is very fine to medium brown, moderate yellow stain.....	27.0	30.5
Sand, very fine to medium, some coarse, light brown, moderate yellow stain; sand is fine to coarse with a little very coarse below 35 ft, light brown-gray, slight yellow stain.....	30.5	40.0
Sand, very fine to medium, some coarse; mostly very fine to medium below 45 ft, slightly silty, very light brown-gray, a few dark grains.....	40.0	48.0
Silt, very slightly clayey, very sandy, sand is very fine to fine, trace of medium, very light gray, slight yellow stain; light gray below 50 ft.....	48.0	56.5
Silt, moderately clayey, slightly sandy, sand is very fine to medium, medium dark brown.....	56.5	57.5
Sand, in part silty, sand is very fine to coarse with a trace of very coarse, very light brown-gray.....	57.5	60.0
Sand, very fine to coarse, some very coarse; considerable medium to coarse sand below 80 ft.....	60.0	83.0
Silt, slightly sandy, brown-gray, yellow stain.....	83.0	84.0

Sand, fine to very coarse; approximately 15 percent gravel below 90 ft, highly yellow stained.....	84.0	95.5
Sand and gravel, highly yellow stained to 100 ft, approximately 50 percent gravel, quartz with pink silicates.....	95.5	124.5
Silt, sandy, light olive-green.....	124.5	127.5
Sand, fine to very coarse, a little fine gravel.....	127.5	130.0
Sand and gravel, approximately 40 to 50 percent gravel.....	130.0	150.0
Sand, some gravel, much medium to very coarse sand, approximately 15 to 20 percent gravel.....	150.0	168.0
Sand, some gravel, approximately 15 percent gravel, quartz with green and some pink silicates.....	168.0	170.0
Sand and gravel, approximately 30 percent gravel, quartz with pink and a few gray and green silicates.....	170.0	213.5
Silt, moderately clayey, moderately sandy, principally very fine, some fine sand, bright yellow-brown, noncalcareous; light and medium gray below 215 ft, slightly calcareous; light brownish gray below 218 ft.....	213.5	226.0
Silt, moderately clayey, very slightly sandy, light medium gray and light brown-gray, slightly calcareous, a few limy areas.....	226.0	230.0
Silt, very clayey, light medium gray with a trace of dark gray, moderately calcareous, a few shell fragments.....	230.0	235.0
Silt, moderately clayey, moderately sandy, sand is very fine with some fine sand, light gray; noncalcareous; very light brown below 239.5 ft.....	235.0	245.0
Silt, moderately to in part very clayey, slightly sandy, principally very fine sand, light medium brown, noncalcareous.....	245.0	250.0
Silt, moderately clayey, slightly to moderately sandy, very fine to fine sand, very light brown, moderately calcareous, limy areas and nodules.....	250.0	255.0
Silt, moderately clayey, slightly sandy, principally very fine sand, light brown-gray to pale brown....	255.0	260.0
Silt, very clayey, very slightly sandy, sand is very fine, light brown, slightly calcareous, small limy areas.....	260.0	270.0
Silt, slightly clayey, coarse silt, slightly sandy, sand is very fine, granular structure, slightly calcareous, light yellow-brown; slightly more clayey below 275 ft, a few light brown dense limestone layers.....	270.0	295.0

Silt, moderately to very clayey, very slightly sandy, sand is very fine, light brown, slightly calcareous; moderately to very calcareous below 310 ft, a few small root casts.....	295.0	330.0
Sand, probably silty, very fine to medium.....	330.0	336.0
Silt, moderately clayey, slightly sandy, sand is very fine with a little fine to medium sand; light brown, slightly calcareous; moderately sandy below 340 ft, sand is fine to medium with a little coarse sand; contains a few lithic chalky limestone grains below 350 ft.....	336.0	358.0
Sand, fine to medium, much quartz, rare chalk grains; fine to coarse below 360 ft.....	358.0	366.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, light and medium gray, very calcareous.....	366.0	370.0

10-9-29abbb
44-B-49
Hall County

Location: Approximately 2,500 ft W and 308 ft S of NE cor 29-10N-9W
Ground elevation: 1,881 ft (t) Doniphan 7.5 min. quadrangle
Depth to water: 8.2 ft (8-17-49)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty, sand is fine to medium, some coarse, rare gravel grains, medium brown-gray.....	0.0	2.0
Sand, very fine to coarse; fine to very coarse 8.5 to 10 ft; some fine gravel below 8.5 ft; 25 percent very coarse sand and fine gravel below 10 ft.	2.0	20.0
Silt, slightly clayey, moderately sandy, mostly very fine to fine sand, very light yellow-gray, slight yellow stain; slightly more clayey and sandy below 26 ft, sand is very fine to medium.....	20.0	32.0
Sand, probably silty, very fine to medium with some coarse to very coarse sand.....	32.0	40.0
Sand and gravel, quartz with some pink and a few dark silicates, approximately 25 to 35 percent gravel; approximately 50 percent gravel below 60 ft.....	40.0	70.0
Sand, fine to coarse, approximately 20 percent very coarse sand and fine gravel; approximately 5 to 10 percent fine gravel below 85 ft.....	70.0	100.0
Sand, fine to very coarse, considerable coarse to very coarse sand, about 10 percent fine gravel, quartz with light colored and a few dark silicates, overall light colored; approximately 25 percent fine gravel below 110 ft.....	100.0	134.5
Silt, slightly clayey, mostly moderately sandy, sand is very fine to medium, light medium olive-gray...	134.5	141.5
Sand, fine to very coarse; about 15 percent fine gravel below 145 ft.....	141.5	151.0
Silt, moderately clayey, very slightly sandy, sand is very fine, very pale brown, moderately calcareous, a few limy areas and trace of limy nodules; contains a little very clayey silt.....	151.0	154.5
Silt, slightly to moderately clayey, slightly sandy, sand is very fine, very light brown-gay to very light olive-gray, moderately calcareous; contains a little fine sand below 160 ft, silt is coarse, very pale brownish gray.....	154.5	164.0

Silt, moderately clayey, very slightly sandy, sand is very fine, light brown-gray, moderately calcareous, contains a few limy nodules; light yellow-brown below 170 ft, rare limy areas; moderately sandy below 170 ft, sand is very fine to fine; slightly more calcareous below 180 ft, in part only slightly sandy; common limy areas below 185 ft; slightly more clayey below 195 ft, contains a trace of dense limy nodules.....	164.0	203.0
Silt, slightly to moderately clayey, slightly sandy, sand is mostly very fine, light yellow-brown, moderately calcareous, granular structure, granules have small root holes.....	203.0	215.0
Silt, slightly to moderately clayey, slightly sandy, sand is mostly very fine, light brown, moderately calcareous, contains limy nodules or limy layers, contains a small bone 215 to 220 ft.....	215.0	230.0
Silt, moderately to in part very clayey, very slightly sandy, sand is mostly very fine, light medium brown, slightly to in part moderately calcareous, contains some small limy nodules; contains rare sand and gravel grains below 250 ft....	230.0	257.0
Silt, moderately to very clayey, slightly sandy, sand is fine to coarse with a trace of gravel, light brown, moderately calcareous, contains a few chalk grains; moderately sandy below 265 ft...	257.0	271.5
Calcareous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, medium yellow.....	271.5	278.0
Shale, chalky, medium gray, moderately speckled; light gray below 295 ft.....	278.0	300.0

10-10-18cccc
27-A-54
Hall County

Location: 5 ft N and 118 ft E of SW cor sec 18-10N-10W
Ground elevation: 1,914 ft (t) Alda 7.5 min. quadrangle
Depth to water: 6.9 ft (7-29-54)
Electric Log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	1.0
Silt, very sandy, sand is very fine to fine with a few coarser grains, dark brown-gray, slightly calcareous	1.0	2.0
Silt, moderately sandy, coarse silt to very fine sand, light brown-gray, slightly calcareous; slightly clayey below 3 ft	2.0	4.0
Sand, fine to very coarse, quartz with pink silicates; approximately 10 percent fine to medium gravel below 5 ft, common dark stained grains	4.0	10.0
Sand and gravel, approximately 30 percent fine to medium gravel, dark stain to 15 ft	10.0	18.0
Sand, fine to very coarse, contains about 10 percent fine gravel	18.0	25.0
Sand and gravel, gravel is fine with some medium, approximately 40 percent gravel, quartz with pink silicates, rare dark grains	25.0	30.0
Sand, fine to very coarse, much medium to coarse sand, contains approximately 10 percent gravel below 35 ft	30.0	40.0
Sand and gravel, gravel is fine with some medium, approximately 25 to 30 percent gravel	40.0	50.0
Sand, some gravel, gravel is fine with some medium, approximately 15 to 20 percent gravel	50.0	62.3
Silt, very clayey, light yellow-gray, possibly clay ball	62.3	62.5
Sand and gravel, medium sand to fine gravel, a little medium gravel, approximately 40 percent gravel	62.5	99.5
Silt, very clayey, contains a trace of embedded sand, light gray; moderately clayey below 101.5 ft	99.5	102.5
Sand, slightly silty, sand is very fine	102.5	106.0
Clay, silty, light brown, slightly calcareous	106.0	108.5

Silt, slightly clayey, moderately sandy, coarse silt to very fine sand, light medium brown, slightly calcareous, aggregate structure, small tooth in upper part; moderately clayey below 110 ft, less calcareous; a few lightly indurated aggregates below 115 ft; light grayish brown below 118 ft, contains a few volcanic glass shards, essentially noncalcareous; light medium gray below 120 ft.....	108.5	123.0
Silt, slightly clayey, silt is very fine to coarse, very slightly sandy, sand is very fine, light brown; slightly calcareous; small brown limy concretions below 125 ft; silt aggregates below 127.5 ft, contains volcanic ash shards; light brown-gray 127.5 to 130 ft; light gray-brown below 130 ft; rare embedded fine to medium sand 132 to 135 ft, in part very clayey; contains calcareous siltstone or concretions below 130 ft; light brown-gray below 137 ft, matrix only slightly calcareous, ash shards more abundant.....	123.0	140.0
Silt, ashy and volcanic ash, light gray, considerable light yellow-brown waxy clay in sample.....	140.0	143.8
Silt, moderately to very clayey, slightly sandy, sand is very fine to medium, noncalcareous, light medium gray.....	143.8	145.0
Silt, very slightly clayey, very sandy, sand is very fine with some fine sand, rare medium sand, light olive-gray, rare rootlets.....	145.0	150.0
Sand, vry fine to fine with some medium and a trace of coarse.....	150.0	154.5
Silt, moderately to very clayey, slightly sandy, principally very fine sand, light olive-gray, contains a trace of waxy clay in upper part; light medium brown-gray below 160 ft; slightly calcareous, contains hard calcareous siltstone layer 167.5 to 168 ft.....	154.5	170.0
Silt, moderately to very clayey, very slightly sandy, sand is very fine to medium, light medium to light olive-gay, noncalcareous, light olive-brown 177 to 180 ft, and light brown-gray below 180 ft.....	170.0	185.5
Silt, very clayey, very slightly sandy, sand is very fine, light reddish brown; moderately clayey below 190 ft; light yellow-brown 190 to 195 ft and very light brown below 195 ft; slightly calcareous 190 to 195 ft and moderately calcareous below 195 ft..	185.5	200.0
Silt, slightly clayey, slightly sandy, sand is very fine, moderately calcareous; moderately clayey, slightly calcareous below 203.5 ft.....	200.0	209.5

Calcareous siltstone-limestone, dense, very light brownish gray.....	209.5	211.5
Silt, moderately clayey, slightly to in part moderately sandy, much fine, a little fine to medium and a trace of coarse sand, light brown-gray, slightly calcareous; moderately calcareous below 217 ft, a few limy areas and limy concretionary rootlet-type nodules.....	211.5	220.0
Silt, moderately clayey, moderately sandy, principally very fine to fine sand, very light brown, slightly calcareous; mottled light medium brown and olive-gray 228 to 230 ft, light medium olive-gray below 230 ft; very slightly calcareous below 230 ft.....	220.0	234.5
Silt, moderately clayey, moderately to very sandy, sand is fine to medium with some coarse and very coarse sand; contains a few chalk, yellow clay and ironstone grains; rare gravel grains below 245 ft, chalk grains more abundant below 245 ft; about 2 ft of sand and gravel at base.....	234.5	247.8
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, bright yellow-brown, noncalcareous.....	247.8	251.0
Shale, clay, medium dark gray, slightly calcareous; moderately calcareous below 260 ft; bentonite layers 264 to 264.1 ft and 248.8 to 248.9 ft.....	251.0	268.7
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, chalky, light and medium gray, very calcareous.....	268.7	280.0

10-10-19aaa
40-32
Hall County

Location: near NE cor sec 19-10N-10W, footage not recorded
Ground elevation: 1,904 ft (i)
Depth to water: 6.0 ft (7-16-32)
Note: Original log and samples missing

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, sandy, soil, light brown.....	0.0	4.0
Sand and gravel, silty clay layers or clay balls 42 to 43 ft and 62 to 63 ft.....	4.0	102.0
Silt or clay, yellow-gray, logged as shale in the field (previously published log books, 1953 and 1965 indicate interval is "shale").....	102.0	108.0

10-10-31bcbc
28-A-54
Hall County

Location: 1,683 ft S and 9 ft E of NW cor sec 31-10N-10W
Ground elevation: 1,928 ft (t) Alda 7.5 min. quadrangle
Depth to water: Approximately 7.5 ft (E-log) caved at 7.56 ft (8-3-54)
Electric log: 0-170 ft

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and soil; sand, very silty, sand is very fine to medium, medium dark brown-gray; medium brown-gray below 1.5 ft.....	0.0	3.0
Silt, slightly clayey, moderately sand, sand is principally very fine to medium, light medium gray, brown tint, slightly calcareous.....	3.0	4.5
Silt, slightly clayey, moderately sandy, sand is principally very fine to fine, light yellow-brown, very slightly calcareous; noncalcareous below 5 ft.....	4.5	7.5
Sand, some gravel, fine sand to medium gravel, approximately 20 percent gravel, quartz with a few pink and dark silicates; approximately 30 percent gravel 15 to 20 ft.....	7.5	27.5
Sand, a little gravel, approximately 10 percent fine to medium gravel, quartz with a few pink, dark and light colored silicates.....	27.5	40.0
Sand and gravel, approximately 35 to 40 percent gravel, overall light color; approximately 50 percent gravel 65 to 70 ft.....	40.0	75.0
Silt, slightly clayey, very sandy, sand is very fine to fine with some medium and trace of coarse sand, medium yellow, some light gray.....	75.0	80.0
Sand, fine to very coarse, approximately 5 percent fine gravel.....	80.0	85.0
Sand, some gravel, much fine to coarse sand, 15 percent very coarse sand and fine gravel, quartz with a few pink and light colored silicates.....	85.0	94.5
Silt, moderately to in part very clayey, contains some embedded sand, light olive to light yellow-gray.....	94.5	97.0
Sand, some gravel, approximately 15 percent very coarse sand and fine gravel.....	97.0	103.5
Silt, moderately clayey, slightly to in part moderately sandy, very fine to fine with some medium sand, light olive-gray; bright yellow-brown below 104 ft.....	103.5	106.0

Clay, silty, some embedded fine to coarse sand, light yellow-brown, slightly calcareous, a few limy areas and white limy nodules; interval contains a little brown waxy clay.....	106.0	109.5
Sand, fine to coarse, quartz with a few rounded clay and limy grains.....	109.5	116.0
Clay, silty, very slightly sandy, sand is very fine to medium, medium gray-brown, slightly calcareous, contains a trace of secondary lime.....	116.0	117.5
Silt, slightly clayey, slightly sandy, silt is coarse, sand is principally very fine, very light brown, slightly calcareous.....	117.5	120.0
Silt, very slightly clayey, light gray-brown, slightly calcareous, granular structure.....	120.0	129.0
Silt, slightly clayey, slightly sandy, sand is very fine to fine, light olive-gray, slightly calcareous, contains a few volcanic ash shards.....	129.0	131.0
Silt, slightly clayey, slightly sandy, silt is coarse, sand is very fine to fine, very light brown, slightly calcareous; light medium brown 132.5 to 134 ft; a few volcanic ash shards below 134 ft.....	131.0	135.0
Silt, ashy and volcanic ash, fine to very coarse silt, very light yellow-brown.....	135.0	140.0
Silt, moderately to in part very clayey, medium brown-gray, logged as medium dark gray, noncalcareous.....	140.0	141.0
Silt, moderately clayey, slightly sandy, sand is very fine, medium brown-gray noncalcareous; medium brown below 144 ft.....	141.0	148.0
Silt, very clayey, medium reddish brown, noncalcareous; light brown below 150 ft, contains a trace of secondary lime.....	148.0	153.0
Silt, moderately clayey, slightly sandy, sand is principally very fine, light yellow-brown, slightly calcareous, contains a few limy areas; medium brown 156.5 to 162 ft; very light brown below 162 ft, moderately calcareous; contains a little embedded fine to medium sand 165 to 170 ft; light yellow brown 166.5 to 170 ft.....	153.0	170.0
Silt, moderately clayey, slightly sandy, sand is principally very fine, light medium brown, slightly calcareous; medium yellow-brown below 177.5 ft, contains a trace of limy areas; light brown and light yellow-brown below 180 ft, moderately calcareous, common limy areas.....	170.0	188.0

Silt, slightly clay, moderately sandy, sand is very fine with some fine, light brown, moderately calcareous; some limy cementation 195 to 198 ft; slightly calcareous below 198 ft.....	188.0	200.0
Silt, moderately slightly sandy, sand is very fine, medium brown, moderately calcareous; light medium brown below 205 ft, some limy areas.....	200.0	207.5
Silt, slightly clayey, slightly sandy, sand is very fine, light brown and pale brown, moderately calcareous, slightly indurated layers; in part moderately clayey 215 to 218.5 ft; contains a few rootlets and a trace of limy nodules 215 to 218.5 ft.....	207.5	220.0
Sand and gravel, probably silty, mostly grains of calcareous sandstone, rounded clay and limy grains, rootlets, and a few gravel grains of quartz and metamorphics.....	220.0	227.5
Silt, moderately clayey, slightly sandy, sand is very fine to medium with a trace of coarse sand, light medium brown, moderately calcareous; contains slightly more coarse sand and a trace of very coarse sand below 230 ft.....	227.5	232.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, moderately sandy, sand is very fine to fine with some medium, light medium-olive gray, slight brown tint, rare small limy areas; some light olive-gray clay below 235 ft, some limy concretions.....	232.0	236.5
Sand, silty, slightly clayey, rare coarse sand and fine gravel, some lithic grains of clay and ironstone, a few rootlets, light olive-gray, slight brown tint.....	236.5	238.0
Silt, moderately clayey, moderately sandy, sand is very fine to fine with some medium, light olive-gray, noncalcareous.....	238.0	243.5
Silt, moderately clayey, slightly sandy, sand is very fine to medium, light medium brown, slightly calcareous; light brown below 245 ft, contains a trace of limy.....	243.5	250.0
Silt, slightly clayey, very sandy, sand is very fine to medium with a few coarser grains, light brown, olive tint, very slightly calcareous, a few limy grains.....	250.0	254.5
Sand, slightly clayey, sand is fine to coarse with a trace of very coarse sand and fine gravel, contains a few rounded lithic grains and rootlets....	254.5	255.0

Silt, moderately clayey, moderately sandy, sand is very fine to medium with a trace of coarse sand, light olive-gray, very slightly calcareous, contains a trace of limy areas; in part light brown below 259 ft.....	255.0	262.0
Sand, in part slightly clayey, sand is very fine to medium with some coarse and a trace of very coarse sand, a few rootlets; contains a trace of fine gravel below 265 ft, rare chalk grains.....	262.0	267.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, white, very calcareous.....	267.0	267.7
Shale, chalky, light gray, very calcareous.....	267.7	300.0

10-11-6bcdc
USBR Mid-State Division (Profile 11)
Hall County

Location: 43 ft N and 810 ft E SW cor NW1/4 sec 6-10N-11W
Ground elevation: 1,962.6 ft (i)
Depth to water: 37.3 ft (4-9-65)
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, very clayey, about 100 percent slightly plastic, contains a trace of fine sand, maximum size #200, dark brown-gray (top soil).....	0.0	1.8
Silt, approximately 95 percent, medium plastic, calcareous silt, less than 5 percent fine sand, moderately slow dilatancy, low dry strength, maximum size #100, light brownish-gray, dry in upper part, wet in lower part.....	1.8	12.0
Sand, very fine to medium with a trace of coarse sand.....	12.0	22.0
Sand, fine to very coarse, much medium to coarse sand, approximately 10 to 15 percent gravel, maximum size 3/8 inch, subangular to subrounded quartz and granitic sand, speckled pink and brown; approximately 5 percent gravel below 44 ft.....	22.0	59.0
Silt, moderately clayey, essentially 100 percent slightly plastic, slightly calcareous silt to 96 ft, widely scattered lime streaks and concretions to 123.2 ft, slight toughness, moderately quick dilatancy, low dry strength, moderately firm, drive sample can be broken with moderate finger pressure, maximum size #200, light yellow brown grading to very light gray 59 to 96 ft, light brown below 96 ft, noncalcareous.....	59.0	131.0
Silt, moderately clayey, essentially 100 percent slightly plastic, noncalcareous silt, slight toughness, moderately slow dilatancy, maximum size #200, dark brown-gray (soil zone).....	131.0	137.0
Silt, moderately clayey, approximately 80 percent, slightly plastic noncalcareous silt, approximately 20 percent fine sand with a trace of medium, moderately slow dilatancy, slight toughness, maximum size #30, medium brown in upper part grading to light brown.....	137.0	148.0
Sand, mostly fine with some medium and coarse.....	148.0	148.5

Tertiary System - Miocene Series - Ogallala Group:		
Silty sand, approximately 80 percent fine subrounded to well rounded, mainly quartz sand, about 20 percent slightly plastic, noncalcareous fines, quick dilatancy, maximum size #50, light grayish brown to light greenish gray; poorly consolidated, common sandstone aggregates to 163 ft, thin very calcareous layer 163 to 163.5 ft.....	148.5	187.0
Sand, slightly silty, approximately 90 percent, fine to medium with a trace of coarse quartz and granitic, subrounded to subangular sand, about 10 percent slightly plastic fines, maximum size 3/16 inch, light brown speckled yellow pink and black..	187.0	194.0
Silt, very clayey, slightly sandy, approximately 85 percent calcareous medium plasticity silt, approximately 15 percent fine, mainly quartz sand, medium toughness, slow dilatancy, maximum size #50, very light greenish gray; light brown below 208 ft, maximum size #100, slight dry strength....	194.0	224.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, noncalcareous, moderately firm, breaks down to a medium plasticity clay, firm, rusty yellow 221 to 224 ft, dark gray below 204 ft.....	224.0	232.5

10-11-31cccc
USBR Mid-State Division (Profile 11)
Hall County

Location: 203 ft N and 110 ft E of SW cor sec 31-10N-11W
Ground elevation: 1,968.1 ft (i)
Depth to water: Not recorded
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretatin of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to coarse with much fine to medium sand, 5 percent very coarse sand and gravel.....	0.0	5.0
Sand, gravelly, approximately 20 percent gravel to 32 ft and 30 percent below 32 ft.....	5.0	50.5
Silt, very clayey, very slightly sandy, principally very fine sand, light medium gray grading to light medium brown.....	50.5	56.0
Silt, moderately clayey, moderately sandy, sand is very fine with some fine, light medium brown to 68 ft, light brownish gray below, small limy areas 72 to 72.5 ft.....	56.0	72.5
Silt, slightly clayey, slightly sandy, sand is fine to coarse, light brown, very sandy below 74.5 ft..	72.5	75.0
Silt, moderately clayey, in part slightly sandy to gravelly, light brown-gray.....	75.0	79.0
Sand, slightly gravelly, approximately 20 to 30 percent gravel.....	79.0	82.0
Silt, slightly to in part moderately clayey, very light gray to greenish gray, noncalcareous.....	82.0	92.0
Silt, moderately clayey, very light gray to very light brown, slightly calcareous grading to moderately calcareous, small root or stem casts common, some small limy concretions; very light brown 112 to 132 ft, silt coarse to very coarse, some very fine sand, slightly calcareous; slightly clayey below 152 ft, some small shells.....	92.0	166.0
Silt, slightly clayey, slightly sandy, silt is coarse to very coarse, sand is principally very fine, noncalcareous, light gray, medium gray below 170 ft.....	166.0	172.0
Sand, fine to very coarse, trace of gravel, quartz with pink and green silicates.....	172.0	173.0
Silt and sand, sandy silt with lenses of fine to coarse sand, silt is medium gray, sand is greenish gray, silt is slightly calcareous.....	173.0	182.0

Silt, slightly clayey and very sandy, sand is principally very fine to fine, light brown-gray, very slightly calcareous	182.0	189.0
Silt, moderately clayey, moderately sandy, sand is very fine, light gray	189.0	192.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay: No sample, logged as "clay with lots of oxidation"	192.0	195.0
Shale, logged as being "reworked", light gray with some yellow and black	195.0	199.0
Shale, clay shale, noncalcareous, dark gray to black, vertical joint in upper part of core, iron oxide in joint	199.0	203.0

10-12-2ccc
22-31
Hall County

Location: Near the SW cor sec 2-10N-12W, footage not recorded
Ground elevation: 1,975 ft (i)
Depth to water: Not recorded
Note: Original log missing

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, soil, light gray-brown.....	0.0	2.0
Silt, light yellow.....	2.0	22.0
Sand and gravel.....	22.0	54.0
Silt, sandy, probably very fine to fine sand, light brown, calcareous, may be in part clayey.....	54.0	124.0

10-12-12dddd
USBR Mid-State Division (Profile 11)
Hall County

Location: 102 ft N and 50 ft W of SE cor 12-10N-12W
Ground elevation: 1,962.5 ft (i)
Depth to water: 31 ft (4-8-65)
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, clayey, (top soil), medium, plasticity fines, organic matter in top 6 inches, dark brown.....	0.0	3.0
Silt, clayey, approximately 100 percent medium plasticity, noncalcareous, medium toughness, slow dilatancy, maximum size #200, dark brown.....	3.0	5.5
Sand, slightly gravelly, poorly graded, medium to very coarse sand, about 20 percent fine gravel to 22 ft, about 10 to 15 percent gravel below 22 ft, maximum size 3/16 inch, subrounded to subangular, light grayish brown, speckled pink, brown, gray and black.....	5.5	66.0
Silt, moderately clayey, essentially 100 percent slightly plastic silt, calcareous below 90 ft, low toughness, slow dilatancy, moderately firm but crumbles with slight finger pressure, maximum size #200, scattered limy concretions below 75 ft, medium brown to 105 ft, light brown below 105 ft..	66.0	112.5

10-12-18bbba
USBR Mid-State Division (Profile 10)
Hall County

Location: 36 ft S and 450 ft E NW cor sec 18-10N-12W
Ground elevation: 2,001 ft (i)
Depth to water: 33.2 ft (4-8-65)
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly plastic, organic material in top 6 inches, dark gray.....	0.0	2.5
Silt, slightly clayey, essentially 100 percent slightly plastic calcareous silt, a trace of fine sand; moderately quick dilatancy, no dry strength, slight toughness, maximum size #100, very light gray.....	2.5	18.0
Sand, poorly graded, approximately 95 percent fine, mainly quartz, subrounded to well rounded sand, less than 5 percent fines, quick dilatancy, maximum size #50, medium brownish gray.....	18.0	23.0
Sand, approximately 90 percent, mainly fine with subrounded, medium grained, mainly quartz, subrounded to well-rounded sand, about 10 percent slightly plastic, slightly calcareous fines, maximum size #16, medium brownish gray.....	23.0	32.0
Sand, approximately 85 percent, mainly fine to medium grained with subrounded coarse, quartz and granitic subangular to well rounded sand, approximately 15 percent mainly fine granitic subrounded very coarse sand and fine gravel, maximum size 1/2 inch, light brownish gray speckled pink, black and gray.....	32.0	48.0
Silt, slightly clayey, essentially 100 percent noncalcareous, slightly plastic fines, a trace of very fine sand, moderately quick dilatancy, low dry strength, maximum size #200, medium brown.....	48.0	90.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very silty, approximately 75 percent mainly fine with a trace of medium grained subrounded to well rounded sand, mainly quartz, approximately 25 percent noncalcareous, slightly plastic fines, maximum size #16, very light olive-gray.....	90.0	132.0

10-12-25aba
21-31
Hall County

Location: probably NE NW NE sec 25-10N-12W
Ground elevation: 1,968 ft (i)
Depth to water: about 12 ft (1931)
Note: Original log missing.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, sandy, soil, dark brown.....	0.0	2.0
Silt, clayey, brown.....	2.0	6.0
Sand and gravel, contains thin clay layers or clay balls 30 to 40 ft.....	6.0	67.0
Silt, clayey, sandy, dark brown, slightly calcareous, may contain some limy nodules.....	67.0	87.0

11-9-23bbaa
1-31
Hall County

Location: Approximately 1000 ft E and 100 ft S of NW cor sec 23-11N-9W
Ground elevation: 1,840 ft (i)
Depth to water: 7.5 ft (6-17-31)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil, silty and sandy	0.0	1.5
Silt, clayey, yellow-brown	1.5	2.0
Sand, fine to coarse, some very coarse	2.0	18.0
Sand and gravel, gravel up to 3/16 inch	18.0	40.0
Sand, some gravel	40.0	59.0
Sand and gravel, gravel up to 3/16 inch, clay layer or clay ball at 80 ft	59.0	83.0
Sand, some gravel	83.0	96.0
Sand and gravel, gravel up to 1/2 inch. a few pebbles 102 to 109 ft	96.0	109.0
Sand, fine to very coarse, a little gravel	109.0	137.0
Silt, clayey, in part sandy, olive-gray	137.0	146.0
Sand and some gravel, much coarse to very coarse sand	146.0	175.0
Sand and some gravel, common clear quartz and gray-green silicates, clay or clay ball 183 to 184 ft	175.0	185.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation: (1655)		
Shale, very calcareous, gray, upper foot weathered	185.0	228.0

11-9-24aaad
19-A-54
Hall County

Location: 403 ft S and 11 ft W of NE cor sec 24-11N-9W
Ground elevation: 1,828 ft (t) Grand Island 7.5 min. quadrangle
Depth to water: 5.0 ft (7-15-54)
Electric Log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	2.0
Sand, some gravel, gravel is fine, approximately 20 percent gravel	2.0	5.0
Sand and gravel, gravel is fine to medium, approximately 45 percent gravel, brown	5.0	25.0
Sand and gravel, gravel mostly fine, 35 to 40 percent very coarse sand and fine gravel, pink silicates; some medium gravel below 40 ft; lighter in color below 55 ft; 50 percent gravel below 65 ft; gravel is fine below 80 ft	25.0	90.0
Sand, some gravel, fine to ver coarse sand, approximately 10 to 20 percent fine gravel, approximately 30 percent gravel below 115 ft	90.0	120.0
Sand, fine to very coarse, approximately 10 percent fine gravel	120.0	129.0
Silt, slightly clayey, slightly to in part very sandy, sand is very fine to medium, mottled light olive-gray and medium brown-gray	129.0	140.0
Sand, fine to medium, some coarse, rare very coarse sand, common small dark sand grains, highly polished; mostly fine to medium sand below 150 ft.	140.0	155.0
Sand, fine to medium, a little coarse to very coarse sand, contains a trace of lithic sandy day grains, quartz with a few light colored silicates	155.0	165.0
Sand, fine to very coarse, about 5 percent fine gravel, quartz with light and gray silicates, rare pink silicates; approximately 25 percent very coarse sand and fine gravel below 170 ft, gray silicates dominant	165.0	178.6
Silt, slightly clayey, moderately sandy, sand principally very fine, light brown-gray, slightly calcareous; contains very fine to fine below 182 ft, very light gray, brown tint	178.6	185.0

To T. 1650

Silt, slightly to moderately clayey, slightly sandy, principally very fine sand, very light brown-gray, slightly calcareous, contains a trace of limy nodules in upper part; in part moderately sandy, sand is very fine to fine below 187.5 ft; some soft limy areas below 190 ft.....	185.0	195.5
Silt, very sandy, sand is very fine to fine, slightly calcareous, light brown.....	195.5	200.0
Silt, slightly clayey, moderately sandy, sand principally very fine, light brown, slightly calcareous.....	200.0	205.0
Silt, moderately clayey, very slightly sandy, sand is very fine, very light brown, slightly to moderately calcareous, contains a few limy nodules.....	205.0	210.0
Silt, slightly clayey, silt is coarse, slightly sandy, principally very fine sand, very light brown, slightly calcareous, silt tends to aggregate; some small root holes below 215 ft.....	210.0	220.0
Silt, moderately clayey, very slightly sandy, principally very fine sand, light brown, slightly calcareous; light medium brown from 224.5 to 226.5 ft and 230 to 231 ft.....	220.0	231.0
Silt, moderately to very clayey, very slightly sandy, light medium brown, contains some white limy areas; very clayey below 235 ft, common limy areas and nodular limestone or chalk fragments....	231.0	245.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation: (1533)		
Shale, chalky, pale yellow with some bright yellow-orange, some chalky limestone.....	245.0	277.5
Shale, chalky, light gray.....	277.5	280.0

11-9-30daaa*
USBR Mid-State Division (Profile 13)
Hall County

*Also called 11-9-30cb (narrow section)
Location: 86 ft S and 1.5 ft W of the NE cor S half sec 30-11N-9W
114 ft W of center line US highway 381 (1965)
Ground elevation: 1,863.1 ft (i)
Depth to water: 11.8 ft (3-31-65)
Note: Compiled from sample descriptions by F.A. Smith and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, clayey, slightly sandy, 10 percent fine sand, dark grayish brown, granular (top soil).....	0.0	1.5
Silt, slightly clayey, slightly sandy, 10 percent fine sand, low plasticity fines, light olive-gray.	1.5	2.5
Sand, moderately silty, 12 percent low plasticity fines, sand is fine to medium with a trace of coarse, light brown-gray.....	2.5	5.0
Sand, fine to very coarse, approximately 15 percent fine gravel 5 to 12 ft.....	5.0	14.0
Sand, gravelly, approximately 40 percent fine gravel with a trace of gravel up to 1 inch, clean, cross bedded.....	14.0	33.0
Silt, sandy, slightly clayey, sand is very fine to fine with some medium, low plasticity fines, weak thread, low dilatancy, light olive-gray to pale olive (light bluish gray wet).....	33.0	41.0
Sand, slightly gravelly, fine to very coarse sand with approximately 15 percent fine gravel, trace of gravel up to 1 inch, clean, cross bedded.....	41.0	80.5
Silt, moderately clayey, slightly sandy, sand is very fine, moderately calcareous, light brown.....	80.5	84.0
Sand, slightly gravelly, sand is fine to very coarse, about 5 percent fine gravel, trace of gravel up to 1 inch, clean, dense.....	84.0	94.0
Silt, very clayey, moderately calcareous, pale brown.....	94.0	94.5
Silt, slightly clayey, very slightly sandy, sand is very fine, slightly calcareous, low plasticity, pale yellow to pale olive gray, common granular silt aggregates.....	94.5	113.0

Silt, clayey, slightly sandy, sand is very fine to fine, slightly calcareous, light brown; driller logged alternating layers of fine to medium sand from approximately 122 to 136 ft.....	113.0	136.0
Silt, clayey, slightly to moderately sandy, sand is principally very fine, slight plasticity, moderately calcareous, light gray to 144 ft, pale brown below 144 ft.....	136.0	201.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation: (1662)		
Chalk, shaly, light gray, yellow and yellowish-brown; medium gray below 210 ft, white speckled...	201.0	222.0

11-9-35aaac
2-31
Hall County

Location: Approximately 600 ft S and 500 ft W of NE cor 35-11N-9W
Ground elevation: 1,843.4 ft. (i)
Depth to water: 6.8 ft (6-19-31)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, topsoil	0.0	1.5
Silt, sandy, yellow	1.5	2.5
Sand, fine	2.5	3.0
Sand and gravel	3.0	37.0
Clayey silt, plastic, light yellow to olive-gray	37.0	40.0
Sand and gravel, fairly coarse	40.0	77.0
Sand and some gravel, thin clay layer or clay ball at 77 ft	77.0	97.0
Sand and gravel, clay layer or clay ball at 140 ft	97.0	146.0
Sand and gravel, common clear quartz and light greenish gray silicates	146.0	165.0
No samples 165 to 171 ft, logged in field as light gray and bluish gray shale. No evidence of shale in sample from 171 to 187 ft (1678?)		
?**Tertiary System - Miocene Series - Ogallala Group:**		
Silt, moderately clayey, very sandy, slightly consolidated, light olive-gray and light green-gray, some limy areas	165.0	187.0

11-10-1ddcc
USBR Mid-State Division (Profile 13)
Hall County

Location: Approximately 106 ft N and 1060 ft E of SE cor sec 1-11N-10W
Ground elevation: 1,865.9 ft (i)
Depth to water: 12.5 ft (4-22-65)
Note: Compiled from sample descriptions by F.A. Smith and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, very sandy, 40 percent low plasticity fines, 60 percent fine sand (some medium) dark brown gray	0.0	0.5
Silt, very sandy, 35 percent low plasticity fines, 65 percent fine sand, no thread, medium dilatancy, light brownish-gray	0.5	3.0
Silt, clayey, sandy, principally fine sand, medium thread, no dilatancy, light gray	3.0	6.0
Sand, fine to very coarse, less than 5 percent fine gravel up to 1/4 inch, clean, cross bedded	6.0	61.0
Silt, moderately clayey, moderately sandy, some principally very fine to fine, light olive to light gray (light bluish gray wet)	61.0	70.0
Sand, fine to coarse, some very coarse, approximately 5 percent gravel up to 3/8 inch, clean cross bedded	70.0	85.0
Silt, clayey, slightly sandy, principally very fine to fine, pale yellow	85.0	88.0
Sand, very fine to medium, some interbedded light gray silt layers	88.0	111.0
Sand, in part silty, very fine to medium sand with some coarser grains	111.0	137.0
Silt, clayey, slightly sandy, principally very fine sand, slightly calcareous, low plasticity, light olive to gray; moderately sandy below 140 ft, light gray (light bluish gray wet), thin silt beds	137.0	142.0
Sand, silty, much very fine to fine sand, a little medium and coarse sand, some clay grains, moderately calcareous, light gray (light bluish gray wet)	142.0	145.0
Silt, slightly clayey, moderately sandy, sand is very fine to medium, dark brown-gray, some organic material	145.0	149.0

Sand, slightly silty, 5 percent low plasticity fines, sand is fine to very coarse, a trace of fine gravel, cross bedded, gray.....	149.0	157.5
Silt, moderately clayey, slightly sandy, sand is very fine to fine, moderately calcareous, light gray (light bluish gray wet), weak thread, no dilatancy.....	157.5	164.0
Sand, silty, mostly fine with 10 percent medium to coarse, calcareous, light gray.....	164.0	166.0
Silt, clayey, slightly sandy, sand is very fine, slightly calcareous, low to slight plasticity; light gray; moderately calcareous below 172 ft; small hard silt particles 216 to 221 ft, hard limy lens at 216 ft; light brown below 218 ft; small hard limy lenses or nodules and secondary limy areas below 232 ft.....	166.0	274.0
Sand, silty, 70 percent fine sand, traces of medium to coarse, light gray.....	274.0	281.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, shaly, white and yellow, very calcareous.....	281.0	286.0
Shale, chalky, light gray, very calcareous, driller logged interval as clay shale, geologic log suggests "reworked Niobrara chalk".....	286.0	302.0

11-10-9ccbb
7-B-84
Hall County

Location: Approximately 1,291 ft N and 208 ft E of SW cor sec 9-11N-10W
Ground elevation: 1,894 ft (t) Abbott 7.5 min. quadrangle
Depth to water: 4.8 ft (7-16-84)
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
No sample.....	0.0	1.5
Silt, sandy, clayey, light brown-gray, a little gravel including limestone grains.....	1.5	5.0
Silt, slightly clayey, in part very sandy, light yellow-gray, some yellow-brown stain, sand is fine to coarse.....	5.0	10.0
Sand, medium to very coarse, some silty clay grains.	10.0	15.0
Sand, some gravel, quartz with light colored and pink silicates, a few metamorphic grains, approximately 20 to 30 percent gravel.....	15.0	25.0
Sand, some gravel, medium to very coarse sand, 15 percent gravel, gray silt lens at 40 ft.....	25.0	40.0
Sand and gravel, quartz with light colored silicates, a few metamorphic grains, overall light gray in color, approximately 40 to 50 percent gravel; clayey silt 46 to 47 ft, light olive; a few clay grains or thin layers of silt below 63 ft.....	40.0	65.0
Silt, coarse grained, moderately sandy, very fine, some fine sand, medium brown, slightly calcareous, silt tends to aggregate; moderately calcareous, very pale brown below 67.5 ft.....	65.0	70.0
Silt, moderately clayey, moderately sandy, very fine to fine sand, light olive, noncalcareous.....	70.0	75.0
Silt, slightly clayey, slightly sandy, principally very fine sand, pale brown, moderately calcareous, small limy nodules; some large limy nodular limestone below 80 ft.....	75.0	85.0
Silt, in part slightly clayey, slightly sandy, silt is coarse, sand principally very fine, light olive-gray, slightly calcareous.....	85.0	90.0
Silt, slightly clayey, moderately sandy, principally very fine to fine sand, moderately calcareous, common small root holes and root casts, light olive-gray to 95 ft, a few volcanic ash shards....	90.0	95.0

Silt, slightly to in part moderately clayey, slightly sandy, principally very fine to fine sand, very light olive-gray, moderately calcareous, rare root holes.....	95.0	100.0

11-10-9adaa
8-B-84
Hall County

Location: Approximately 1,584 ft S and 69 ft W of NE cor sec 9-11N-10W
Ground elevation: 1,886 (t) Abbott 7.5 min. quadrangle
Depth to water: 11.33 ft (7-16-84)
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, slightly silty, very fine to fine, some medium and a trace of coarse sand.....	0.0	5.0
Sand, slightly silty, very fine to medium, a little coarse to very coarse sand.....	5.0	9.0
Silt, moderately clayey, in part sandy, light yellow brown, sand is fine to coarse.....	9.0	12.0
Sand and gravel, quartz with pink silicates 30 to 40 percent gravel.....	12.0	19.5
Silt, moderately clayey, light yellow-brown, may be a clay ball.....	19.5	20.0
Sand and gravel, coarse sand to medium gravel, 50 percent gravel.....	20.0	25.0
Sand and gravel, 30 to 40 percent gravel, a few metamorphic grains, a few lithic clay grains below 67 ft.....	25.0	67.0
Silt, slightly clayey, slightly sandy, principally very fine to fine sand, light olive-gray.....	67.0	70.0
Sand, some gravel.....	70.0	72.0
Silt, moderately clayey, slightly sandy, light yellow to light olive-gray, light brown in lower part.....	72.0	75.0
Silt, very clayey, in part sandy, light medium brown, noncalcareous but with some limy areas.....	75.0	80.0
Silt, slightly clayey, slightly sandy grading to very sandy, sand is very fine to fine with some medium to coarse sand, light brown-gray.....	80.0	85.0
Sand, very fine to medium, trace of coarse sand, thin fine-grained layers or lithic silt and clay grains.....	85.0	90.0
Sand, very fine to medium, trace of coarse sand, a few lithic grains; some coarse to very coarse sand below 95 ft.....	90.0	98.0

Tertiary System - Miocene Series - Ogallala Group:

Silt, very slightly clayey, very sandy, principally very fine to fine sand, may be slightly consolidated, very light brown-gray and olive gray, common small root casts and some sandstone fragments, contains a few volcanic ash shards; field log notes small gastropods from 105 to 110 ft.....	98.0	120.0
Sand, probably silty, very fine to fine with some medium sand; contains rounded grains of clayey and sandy silt, a few root casts; very fine to medium sand with a trace of coarse sand below 125 ft.....	120.0	130.0

Note: Top of Ogallala Group uncertain, may be as low as 110 ft

(1766)

(1776)

11-10-10aaaa
13-B-84
Hall County

Location: 45 ft S and 213 ft W of NE cor sec 10-11N-10W
Ground elevation: 1,881 ft (t) Abbott 7.5 min. quadrangle
Depth to water: 8.9 ft (7-16-84)
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, slightly silty, very fine to medium, trace of coarse sand, medium brown-gray.....	0.0	5.0
Sand, fine to very coarse, trace of fine gravel, a few clay grains.....	5.0	7.0
Silt, moderately clayey, slightly to in part very sandy, sand is fine to coarse, medium to dark brown with a little light olive-gray, slight yellow stain.....	7.0	10.0
Sand and gravel, gravel is fine to medium, probably some clay balls.....	10.0	62.0
Silt, slightly to in part moderately clayey, moderately to very sandy, principally very fine sand, light brown, a little brown waxy clay 70 to 75 ft.	62.0	78.0
Sand, may be some gravel.....	78.0	88.0
Silt, clayey to sandy, medium dark brown-gray, some yellow-gray and some light olive-gray.....	88.0	94.0
Sand, silty in upper part, principally very fine to medium sand, a few rounded clay grains; may be some coarse sand in lower few feet.....	94.0	100.0
Note: Samples and field log of poor quality below 60 ft		

11-10-10bbba
10-B-84
Hall County

Location: 221 ft S and 385 ft E of NW cor sec 10-11N-10W
Ground elevation: 1,890 ft (t) Abbott 7.5 min. quadrangle
Depth to water: 7.9 ft (7-16-84)
Electric log

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, slightly silty, sand is fine to medium with a trace of coarse sand, light brown-gray.....	0.0	4.5
Silt, slightly clayey, moderately to very sandy, sand is fine to coarse, dark brown-gray.....	4.5	7.0
Silt, moderately clayey, moderately sandy, sand is very fine to medium, light yellow-brown.....	7.0	8.8
Sand, fine to very coarse, about 10 percent fine gravel.....	8.8	10.0
Sand, moderately gravelly, quartz with pink silicates, approximately 15 to 20 percent gravel; overall lighter color below 20 ft.....	10.0	30.0
Sand and gravel, quartz with light silicates, a few metamorphic grains, approximately 50 percent gravel.....	30.0	67.5
Silt, moderately clayey, slightly sandy, principally very fine sand, very light brown and very light olive-gray; slightly calcareous below 69 ft, limy nodule at 70 ft; limy areas 70 to 75 ft, trace of brown clayey silt.....	67.5	80.0
Silt, slightly clayey, silt is coarse, moderately sandy, principally very fine sand, light medium brown; a few limy areas; may be sandy in part below 90 ft; a little brown waxy clay.....	80.0	94.0
Silt, chalky, soft, very light brown, very calcareous.....	94.0	95.0
Silt, moderately clayey, light brown, moderately calcareous, root casts.....	95.0	100.0
Silt, slightly clayey, slightly sandy, silty is coarse, sand is principally very fine, light brown, slightly calcareous.....	100.0	105.0
Silt, moderately clayey, in part very clayey, very light brownish gray, moderately calcareous.....	105.0	110.0

11-10-11bca
6-B-84
Hall County

Location: Approximately 1,650 ft S and 1,000 ft E of NW cor sec 11-11N-10W
Ground elevation: 1,877 ft (t) Abbott 7.5 min. quadrangle
Depth to water: 5.1 ft (7-11-84)
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, very sandy, slightly clayey, sand is very fine to medium, dark brown.....	0.0	3.0
Silt, moderately clayey, moderately sandy, sand is very fine to medium, dark brown, some yellow stain.....	3.0	4.2
Sand, fine to coarse, a little very coarse sand; some fine gravel below 10 ft.....	4.2	20.0
Sand, slightly gravelly, fine to medium gravel.....	20.0	33.0
Sand and gravel.....	33.0	35.0
Sand, slightly gravelly.....	35.0	56.0
Silt with some interbedded sand, possibly some gravel, may be some clay balls.....	56.0	70.0
Sand, medium to very coarse, 10 to 15 percent gravel.....	70.0	85.0
Sand and gravel, light colored silicates, some milky quartz, approximately 30 percent gravel, some clay balls or thin lenses of clayey silt, light olive-gray and brown gray.....	85.0	95.0
Sand and gravel, approximately 30 to 40 percent gravel, quartz with pink silicates and a few metamorphic grains.....	95.0	115.0
Sand, fine to very coarse, approximately 10 percent gravel, common rounded grains of clay, sandstone and root casts.....	115.0	120.0
Sand, very fine to medium, a little coarse sand and trace of gravel, common rounded grains of clay, silt, sandstone and root casts to about 140 ft; slightly coarser sand below 140 ft.....	120.0	150.0

11-10-11cbcb
9-B-84
Hall County

Location: Approximately 1,735 ft N and 290 ft E of SW cor sec 11-11N-10W
Ground elevation: 1,882 ft (t) Abbott 7.5 min. quadrangle
Depth to water: 9.03 ft (7-16-84)
Electric log

	Depth in feet From	To
Quaternary System, undifferentiated:		
Sand, silty, fine to coarse sand, about 10 percent very coarse sand and gravel.....	0.0	4.9
Silt, moderately clayey, in part very clayey, slightly sandy, sand is fine to medium, light brown and light yellow-gray.....	4.9	10.0
Sand, medium to very coarse, approximately 10 percent gravel, common pink silicates.....	10.0	15.0
Sand and gravel, gravel is fine to coarse, about 40 percent gravel, pink silicates common, clayey silt or clay ball 29.9 to 30 ft.....	15.0	30.0
Sand and gravel, quartz with light colored and pink silicates, some pink and red, approximately 30 to 40 percent gravel; considerable coarse gravel below 55 ft.....	30.0	61.0
Silt, moderately to in part very clayey, moderately sandy, principally very fine to fine sand, light yellow-brown, some light gray, noncalcareous; moderately clayey, light brown below 65 ft.....	61.0	70.0
Silt, moderately clayey, moderately sandy, sand is very fine to medium, very light brown, limy areas and limy nodules.....	70.0	75.0
Sand, fine to very coarse, some gravel.....	75.0	81.0
Silt, moderately clayey, slightly sandy, principally very fine sand, light brown and light brown-gray, noncalcareous.....	81.0	90.0
Clay, silty, light medium reddish brown, some waxy clay, slightly calcareous, some nodular limestone, light brown; moderately calcareous below 95 ft....	90.0	100.0

11-10-13ddcc
USBR Mid-State Division (Profile 13)
Hall County

Location: 72 ft N and 1,195 ft W of SE cor sec 13-11N-10W
Ground elevation: 1,878.2 ft (i)
Depth to water: 25.4 ft (4-26-65)
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, silty, 90 percent fine sand, some medium sand, 10 percent non plasticity fines, dark brown-gray..	0.0	3.0
Silt, moderately clayey, slightly sandy, 95 percent medium plasticity fines, 5 percent fine sand with some coarser grains, dark brown-gray.....	3.0	5.5
Sand, gravelly, fine to very coarse sand, approximately 25 percent gravel up to 3/8 inch size, fairly clean, considerable pink and red silicates.	5.5	20.0
Silt, very sandy, slightly clayey, light olive-gray.	20.0	27.0
Sand, gravelly, fine to very coarse sand, approximately 25 percent gravel to 50 ft and 35 percent gravel below, pink and red silicates, slight iron-oxide stain below 50 ft.....	27.0	61.0
Silt, clayey, slightly sandy, light brown and olive gray, may be a clay ball.....	61.0	63.0
Sand, slightly gravelly, fine to very coarse sand, about 10 percent fine gravel, quartz with pink silicates.....	63.0	76.0
Clay, silty, medium plasticity, very light gray with some dark gray and slight iron-oxide stain, may be a clay ball.....	76.0	79.0
Sand, slightly gravelly, fine to very coarse sand with 10 percent fine gravel, quartz with some pink silicates.....	79.0	88.0
Silt, slightly clayey, slightly sandy, principally very fine sand, low plasticity, very light brown-gray, matrix essentially noncalcareous; a few small calcareous root casts and limy nodules below 107 ft; in part moderately sandy below 117 ft, very fine to medium sand.....	88.0	120.0
Sand, silty, sand is very fine to medium with some coarser grains, driller logged as having alternating layers of medium plasticity reworked clay, small green silt fragments.....	120.0	±152.0

Tertiary System - Miocene Series - Ogallala Group:

Sand and clay, cored interval, sample of clay submitted to laboratory, top of Ogallala Group not certain..... (1726)	±152.0	154.0

11-10-16aaaa
12-B-84
Hall County

Location: 46 ft S and 53 ft W of NE cor sec 16-11N-10W
Ground elevation: 1,886 ft (t) Abbott 7.5 min. quadrangle
Depth to water: 2.34 ft (7-16-84)
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, fine to very coarse, some light brown-gray sandy clay.....	0.0	5.0
Sand, slightly gravelly, approximately 15 percent fine to medium gravel.....	5.0	9.0
Silt, moderately clayey, sandy, mostly very fine to medium sand, dark brown-gray.....	9.0	10.0
Sand and gravel, fine, some medium gravel, approximately 30 percent very coarse sand and gravel, overall light colored quartz with some pink silicates, a few metamorphics and lithic grains of Ogallala sediments.....	10.0	58.0
Silt, moderately to in part very clayey, moderately sandy, very fine, some fine sand, light olive-gray.....	58.0	63.0
Sand, probably silty, fine to coarse, some very coarse, trace of gravel, quartz with some pink and olive silicates.....	63.0	77.0
Silt, moderately clayey, slightly sandy, light brown, some root or stem holes; some very light olive-gray, a few root casts.....	77.0	95.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, sandy to clayey and sandstone, a few calcareous rootlets, matrix noncalcareous, light olive-gray.....	95.0	100.0

11-10-16bbcb
11-B-84
Hall County

Location: 904 ft S and 289 ft E of NW cor sec 16-11N-10W
Ground elevation: 1,896 ft (t) Abbott 7.5 min. quadrangle
Depth to water: hole caved at 6.5 ft (7-16-84), approximately 7 ft (E-log)
Electric log

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, silty, slightly clayey, sand is fine to coarse.....	0.0	4.0
Silt, moderately clayey, in part moderately sandy, sand is fine to coarse, medium brown-gray.....	4.0	5.8
Sand, slightly silty, sand is fine to coarse, some very coarse.....	5.8	9.0
Silt, moderately clayey, moderately sandy, sand is very fine to medium with a few coarser grains, light brown-gray.....	9.0	10.0
Sand and gravel, gravel is fine to medium, approximately 40 percent gravel, probable silt layer at 12 ft, largely quartz with pink silicates; overall lighter in color below 20 ft.....	10.0	28.5
Silt, slightly clayey, moderately sandy, sand is very fine to fine with some medium, light medium olive-gray.....	28.5	30.0
Sand and gravel, 25 to 35 percent gravel, quartz with light colored and pink silicates; a few gray silicates below 40 ft and common dark gray silicates below 50 ft.....	30.0	62.0
Silt, moderately clayey, moderately sandy, light olive-gray, dense limy nodule in sample (Electric log suggests sand 62 to 66 ft).....	62.0	70.0
Silt, moderately clayey, slightly to in part very sandy, grain size of sand questionable, light olive- to brown-gray, a trace of limy nodules.....	70.0	75.0
Sand, probably silty, fine to medium sand, a little coarse sand and fine gravel, rounded grains of clay and sandy silt.....	75.0	81.0
Silt, slightly sandy, moderately clayey, principally very fine sand, very light greenish gray, a little light green waxy clay.....	81.0	90.0
Sand, very fine to medium with some coarse, 10 percant very coarse sand and fine gravel; mostly fine to medium sand below 95 ft.....	90.0	100.0

Note: Records indefinite, Ogallala Group may have been penetrated in interval 95 to 100 ft

11-10-16cbca
14-B-84
Hall County

Location: Approximately 1,876 ft N and 489 ft E of SW cor sec 16-11N-10W
Ground elevation: 1,899 ft (t) Abbott 7.5 min. quadrangle
Depth to water: 19.85 ft (7-16-84)
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, silty and slightly clayey, fine to coarse with a little very coarse sand, medium brown.....	0.0	5.0
Silt, slightly clayey, very sandy, sand is very fine to fine with some coarser grains, medium yellow-brown.....	5.0	7.7
Silt, moderately clayey, slightly sandy, sand is principally very fine to fine, light brown-gray...	7.7	10.4
Sand and gravel, approximately 30 percent gravel, quartz with pink silicates; a few metamorphic grains below 25 ft; overall very light in color below 40 ft, a little coarse gravel.....	10.4	51.8
Silt, slightly clayey, moderately sandy, sand is very fine to medium, light medium gray, slightly calcareous, common snail and pelecypod shell fragments.....	51.8	54.0
Sand, silty, some gravel, a few snail shells, dark gray sandy silt about 55 to 55.8 ft.....	54.0	60.0
Sand, gravelly, approximately 30 percent gravel, quartz, feldspar and some metamorphics, silt lens or clay ball at 68 ft.....	60.0	70.0
Silt, slightly clayey, moderately sandy, principally very fine to fine sand, light brown; some medium sand below 80 ft; moderately sandy below 84 ft....	70.0	84.5
Sand, fine to coarse, some very coarse, a trace of fine gravel.....	84.5	88.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, slightly to moderately sandy, mostly very fine to fine sand, light green-gray.....	88.0	90.0
Sand, very silty, slightly clayey, sand is very fine to fine with some medium, light olive and light green-gray.....	90.0	95.0
Sand, very fine to fine with some medium, may be silty.....	95.0	100.0

11-11-13ddad
25-A-54
Hall County

Location: 783 ft N and 176 ft W of SE cor sec 13-11N-11W
Ground elevation: 1,910 ft (t) Abbott 7.5 min. quadrangle
Depth to water: 13.61 ft (7-29-54)
Electric log

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	1.0
Silt, very slightly clayey, very sandy, very fine to fine, some medium sand, dark brown-gray.....	1.0	2.0
Silt, slightly clayey, very sandy, sand is very fine to medium, medium brown-gray.....	2.0	3.5
Sand, fine to medium, a little coarse; fine to coarse below 5 ft.....	3.5	7.0
Silt, very clayey, light yellow-brown; slight yellow stain, contains a trace of sand.....	7.0	9.0
Sand, fine to coarse, some very coarse.....	9.0	15.0
Sand, fine to very coarse, about 10 percent fine gravel, quartz with pink and light colored silicates, slight rusty brown stain; no stain below 20 ft, a few dark silicates, overall light colors; about 25 percent gravel below 30 ft.....	15.0	35.0
Sand and gavel, approximately 50 percent gravel, quartz with light and dark colored silicates, overall light colors.....	35.0	60.0
Silt, slightly clayey, coarse silt, slightly sandy, sand is mostly very fine, medium brown, samples break up into very small aggregates.....	60.0	68.0
Silt, moderately clayey, slightly sandy, coarse silt, sand is very fine, light medium yellow-brown, medium reddish brown below 75.5 ft, moderately sandy.....	68.0	75.5
Silt, very clayey, moderately sandy, mostly very fine sand, medium reddish brown; common limy areas and limy nodules below 80 ft, light yellow and light medium brown, slightly to moderately calcareous below 85 ft.....	75.5	86.5

Silt, slightly clayey, moderately sandy, silt is coarse, sand is very fine, light yellow-brown, slightly calcareous; moderately clayey below 91 ft, contains a little fine and a trace of medium sand, light medium yellow-brown; common limy areas and limy nodules 93 to 95 ft, a few limy areas below 95 ft.....	86.5	103.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, moderately sandy, sand is very fine to medium, very light yellow-brown.....	103.0	105.0
Silt, moderately clayey, moderately sandy, sand is very fine to medium, light olive-gray, limy areas and slight consolidation.....	105.0	110.0
Siltstone-sandstone, sand is very fine to fine with some medium, vey light olive-gray, silica, lime, and clay cementation, common rootlets.....	110.0	112.0
Calcareous siltstone, clayey, white; slightly sandy below 115 ft.....	112.0	116.0
Sandstone, sand is very fine to fine, white and very light olive-gray, contains limy cemented layers...	116.0	125.0
Sandstone, sand is mostly very fine to fine, light olive-gray; contains some slightly clayey and silty layers; some calcareous cementation to 130 ft.....	125.0	142.0
Silt, slightly clayey, very sandy, very light olive-gray, limy areas.....	142.0	145.0
Sandstone, sand is very fine to fine with some medium, some limy cementation.....	145.0	154.5
Sand, moderately silty, sand is very fine to fine, slight consolidation, slightly calcareous, very light olive-gray.....	154.5	159.5
Sandstone, sand is very fine to fine, slightly calcareous, very light olive-gray, very calcareous below 161 ft.....	159.5	175.0
Silt, moderately clayey, slightly sandy, sand is very fine to fine, moderately calcareous, very light olive-gray.....	175.0	178.0
Silt, very clayey, slightly sandy, sand is mostly very fine, very light olive-gray, noncalcareous...	178.0	185.5
Sandstone, slightly clayey, moderately silty, sand is very fine to fine, very light olive-gray, contains lithic grains of clay and aragonite below 190 ft; common lithic gravel grains below 195 ft..	185.5	196.0
Cretaceous System - Upper Cretaceous Series, Montana Group:		
Pierre Formation:		
Shale, clay, medium gray with some dark gray, moderately calcareous; slightly calcareous below 211.5 ft, bentonite at 219 ft.....	196.0	220.0

11-11-36dddd
26-A-54
Hall County

Location: 165 ft N and 12 ft W of SE cor sec 36-11N-11W
Ground elevation: 1,923 ft (t) Alda 7.5 min. quadrangle
Depth to water: caved at 23.9 ft (7-29-54) approximately 24 ft (E-log)
Electric log

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	1.5
Silt, slightly clayey, slightly sandy, principally very fine sand, medium brown-gray; light brown-gray below 4.5 ft; slightly calcareous below 5.5 ft, contains some limy nodules.....	1.5	6.5
Silt, slightly to moderately clayey, slightly sandy, medium brown-gray; contains very fine to medium sand below 7.5 ft, light medium-gray; slightly calcareous below 9.5 ft.....	6.5	10.0
Sand, medium to very coarse, contains approximately 10 percent fine gravel.....	10.0	15.0
Sand and gravel, approximately 20 percent gravel 15 to 20 ft and 60 percent gravel 20 to 25 ft.....	15.0	25.0
Sand, medium to very coarse; contains a trace of fine gravel to 30 ft and about 15 percent below 30 ft.....	25.0	35.0
Sand and gravel, medium sand to medium gravel, approximately 50 percent gravel; slightly less gravel 45 to 50 ft and below 55 ft.....	35.0	59.0
Sand, slightly clayey, very coarse silt to very fine sand, medium olive-gray; slightly less clayey below 60 ft.....	59.0	61.5
Silt, moderately clayey, light yellow-brown, slight olive tint; light medium yellow brown below 60 ft, a little very clayey silt.....	61.5	65.0
Silt, moderately to very clayey, some embedded very fine to medium sand, light medium brown, contains a trace of small brown clay grains; slightly sandy below 67.5 to 69 ft, sand is fine to medium; moderately sandy 69 to 70 ft, light medium brown; contains a trace of coarse sand below 70 ft and rare very coarse sand below 75 ft.....	65.0	77.0
Silt, moderately clayey, slightly sandy, sand is mostly very fine to fine, light brown-gray.....	77.0	79.5
Sand and gravel, about 50 percent fine to medium gravel, granitic, overall light colored.....	79.5	97.0

Silt, moderately clayey, slightly sandy, sand is principally very fine, light medium olive-gray; slightly clayey, moderately sandy below 99.5 ft, light yellow-brown.....	97.0	105.0
Silt, moderately to very clayey, very slightly sandy, sand is very fine, medium brown; slightly sandy below 110 ft, medium reddish brown; medium dark gray-brown below 112 ft; very clayey below 113 ft, contains a trace of fine to medium sand...	105.0	114.5
Silt, moderately clayey, slightly sandy, sand is very fine to fine, light medium yellow-brown; medium brown 115.5 to 117.5 ft and light medium brown below 117.5.....	114.5	118.5
Silt, slightly clayey, slightly sandy, sand is very fine to fine, light reddish brown; moderately sandy below 120 ft, rare medium sand below 125 ft.	118.5	130.0
Silt, slightly clayey, slightly sandy, sand is very fine to fine, light medium yellow-brown, moderately clayey below 135 ft; medium brown below 140 ft.....	130.0	140.5
Silt, moderately clayey, slightly sandy, sand is very fine to fine, light brown-gray; light yellow-brown below 145.5 ft; granular structure 150 to 154 ft; contains rare small limy nodules below 155 ft.....	140.5	156.5
Silt, moderately clayey, very slightly sandy, sand is very fine, very light yellow-brown, slightly calcareous; very light brown below 160 ft, small limy areas, trace of white limy nodules; very clayey below 165 ft, moderately calcareous.....	156.5	166.0
Marl, very slightly sandy, sand is very fine to medium, white.....	166.0	168.5
Silt, slightly to in part very clayey, very slightly sandy, sand is very fine to medium, very light brown, moderately to very calcareous.....	168.5	170.0
Silt, slightly clayey, moderately sandy, sand is very fine to fine with a trace of medium, very light yellow-brown, moderately calcareous.....	170.0	176.0
Tertiary System - Miocene Series - Ogallala Formation:		
Silt, slightly clayey, moderately sandy, sand is very fine to medium with a trace of coarse, very light yellow to olive-brown, slightly calcareous, slightly consolidated; very sandy below 180 ft, essentially noncalcareous, contains a trace of sandy limy nodules.....	176.0	182.5

Silt, slightly clayey, moderately sandy, sand is very fine to fine with a little medium, very light yellow- to olive-gray, in part slightly calcareous, slightly consolidated, a few root holes, some is sandstone below 180 ft, sand is fine to medium with a trace of coarse to very coarse sand.	182.5	185.0
Sandstone, silty, sand is very fine to fine with some medium, very light olive-gray, moderately calcareous, contains volcanic ash.....	185.0	190.0
Siltstone, slightly sandy, sand is mostly very fine to fine, white; very calcareous, contains volcanic ash.....	190.0	192.0
Silt, moderately clayey, moderately sandy, mostly very fine to fine sand, very light greenish gray, some siliceous cementation, contains some volcanic ash; moderately consolidated below 197.5 ft, contains numerous root holes and rootlets, sand is very fine to medium.....	192.0	200.0
Sandstone, silty, very fine to medium sand with a little coarse to very coarse sand, very light olive-gray, contains some rootlets; a few very coarse sand and gravel grains below 205 ft including rounded flat clay grains.....	200.0	218.0
Siltstone, very slightly sandy, white, very calcareous.....	218.0	218.5
Siltstone-claystone, light green-gray, contains a trace of limy areas.....	218.5	222.0
Calcareous siltstone and limestone, white.....	222.0	224.0
Clay, silty, in part slightly sandy, slightly consolidated, very light olive- to green-gray.....	224.0	225.5
Silt, moderately clayey, slightly sand, sand is very fine to medium, very light olive-gray, slightly calcareous.....	225.5	231.0
Sand and gravel, contains many lithic grains of shale, clay, clayey silt and aragonite; contains a clayey and sandy silt layer 242 to 244 ft.....	231.0	246.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, medium dark gray, moderately calcareous; contains bentonite layers 252 to 252.2 ft and at 258 and 259 ft.....	246.0	260.0

11-12-12dddd
USBR Mid-State Division (Profile 11)
Hall County

Location: 88 ft N and 55 ft W of SE cor sec 12-11N-12W
Ground elevation: 1,939.9 ft (i)
Depth to water: 27.0 ft (4-8-65)
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, very clayey (top soil) about 90 percent plasticity fines; about 10 percent fine sand, medium toughness, dark brown-gray.....	0.0	2.5
Silt, slightly clayey, about 90 percent slightly plastic, noncalcareous silt, about 10 percent fine sand, low toughness, low dry strength, medium dilatancy, maximum size #100, light grayish brown, in part limonite-stained; below 22 ft common decomposed roots and iron-manganese stain.....	2.5	22.0
Sand, fine to very coarse, trace of fine gravel.....	22.0	32.0
Sand, gravelly, fine to very coarse sand, approximately 30 to 40 percent gravel up to 1 inch, subangular to subrounded, quartz and granitic grains, brownish gray, mottled pink and gray.....	32.0	47.5
Silt, slightly clayey, approximately 95 percent slightly plastic, calcareous silt, less than 5 percent fine sand, slow dilatancy, medium dry strength, light grayish brown, light bluish gray wet.....	47.5	50.0
Silt, moderately clayey, 95 percent slightly plastic highly calcareous silt, less than 5 percent fine sand, numerous veinlets of white calcite and sparse hard limestone nodules up to 1 1/4 inch, slow dilatancy, medium dry strength, maximum size #100, light brown.....	50.0	69.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty, 85 percent fine subrounded to subangular sand, noncalcareous, slightly cemented, about 15 percent slightly plastic fines, rapid dilatancy, no dry strength, maximum size #50, light olive-gray.....	69.0	90.0
Silt, sandy, approximately 60 percent fine quartz sand, about 40 percent slightly plastic fines, very light olive gray, lightly cemented, dense....	90.0	103.0

Silt, sandy, approximately 60 percent slightly plastic fines, approximately 40 percent fine quartz sand, slightly consolidated with calcium carbonate and siliceous cement, maximum size #50, light grayish brown with greenish cast.....	103.0	140.0
Silty sand, approximately 75 percent fine-grained quartz sand, approximately 25 percent slightly plastic fines, slightly cemented, noncalcareous, maximum size #50, some root casts, light brownish gray.....	140.0	153.0
Silt, slightly clayey, moderately sandy, about 70 percent slightly plastic calcareous silt, approximately 30 percent fine quartz sand, maximum size #50, white to very light olive gray.....	153.0	167.0
Sand, moderately silty, approximately 75 percent very fine to fine quartz sand, 25 percent slightly plastic fines, noncalcareous, loosely cemented, maximum size #50, light olive to brownish gray; calcareous root casts below 203 ft.....	167.0	220.0
Silt, moderately clayey, approximately 80 percent medium plasticity, slightly calcareous, approximately 20 percent fine sand, slight toughness, slight dry strength, maximum size #50, very light olive-gray grading to light brown below 225 ft, some silty fine sand layers below 233 ft, some clastic grains of shale near base.....	220.0	249.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, laminated clay shale, black, some yellow-brown iron-oxide streaks in top 3 ft.....	249.5	253.4

11-12-25adaa
USBR Mid-State Division (Profile 11)
Hall County

Location: 1,350 ft S and 65 ft W of NE cor sec 25-11N-12W
Ground elevation: 1,950.5 ft (i)
Depth to water: 32.2 ft (4-8-65)
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly plastic, organic material in top 6 inches.....	0.0	2.5
Silt, approximately 95 percent slightly to moderately calcareous silt, less than 5 percent fine sand, low dry strength, maximum size #100, very light yellow-gray, common iron-oxide stain 12 to 15 ft, very light gray below 15 ft.....	2.5	20.0
Sand, gravelly, approximately 35 to 40 percent, subrounded granitic, fresh gravel, maximum size to 1 1/4 inch, brownish gray.....	20.0	49.5
Silt, moderately clayey, approximately 100 percent slightly plastic, silt, low dry strength, medium dilatancy, no toughness, maximum size #200, slightly calcareous to 56 ft, highly calcareous below 56 ft, light brownish gray.....	49.5	62.2
Silt, slightly clayey, approximately 95 percent slightly plastic calcareous silt, silt is coarse to very coarse, 5 percent fine sand, slight dry strength, moderately quick dilatancy, maximum size #50, light gray to light brownish gray; driller noted scattered sandstone fragments.....	62.2	72.2

11-12-28ada
23-31
Hall County

Location: NE cor SE1/4 NE1/4 sec 28-11N-12W (distance from sector lines not available)
Ground elevation: 1,975 ft (i)
Depth to water: 30 ft (1931)
Note: Original log and samples missing; test hole incorrectly shown in section 29 in previous log books.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, sandy, brown.....	0.0	2.0
Silt or clay, brown.....	2.0	8.0
Silt or clay, bluish green, slightly calcareous.....	8.0	35.0
Sand and gravel.....	35.0	54.0
Silt, sandy, in part clayey, sand is fine, contains rounded fragments of Ogallala.....	54.0	±70.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, sandy, in part clayey, calcareous, sand is fine, some consolidation.....	±70.0	105.0

12-9-1aaaa
16-A-51
Hall County

Location: 323 ft S and 7 ft W of NE cor sec 1-12N-9W
Ground elevation: 1,814.5 ft (i)
Depth to water: Unknown. Test hole caved at 7.2 ft (7-30-51)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	2.5
Soil, silt, clayey, sandy, dark brown; sand is very fine to medium	2.5	3.5
Sand, very fine to very coarse; slightly coarser textured below 5 ft; contains silt layer from 11.8 to 12 ft	3.5	20.0
Sand and gravel; medium sand to fine gravel with some medium to coarse gravel (50 percent gravel); contains no coarse gravel below 30 ft	20.0	37.5
Silt, moderately clayey, moderately sandy, mostly very fine sand, light gray	37.5	40.0
Silt, slightly clayey, sandy, light greenish gray; sand is very fine	40.0	42.5
Sand, fine to very coarse with some fine gravel, quartz with common light and dark silicates; slightly coarser texture from 45 to 50 ft	42.5	51.8
Tertiary System - Miocene Series - Ogallala Formation:		
Sand, silty, slightly clayey, light greenish gray; sand is very fine to fine	51.8	52.0
Sandstone, well consolidated; sand is very fine to medium; silty below 59 ft; slightly less consolidated below 63 ft; light gray; sand is very fine to fine with some medium; contains no medium sand from 69.5 to 73 ft; contains some limy areas	52.0	77.0
Sand, slightly clayey, very silty; sand is very fine to fine; contains some limy areas	77.0	78.5
Sand, very fine to medium with some coarse; contains some limy areas and clay grains	78.5	85.5
Clay, silty, granular structure, light greenish gray	85.5	86.5
Cretaceous System - Upper Cretaceous Series - Montana Group: Pierre Formation:		
Shale, clayey, yellowish gray with some medium gray.	86.5	88.5
Shale, clayey, medium gray	88.5	90.5

Shale, clayey, medium gray and yellowish brown; moderately calcareous; contains some limonitic concretions.....	90.5	96.5
Shale, clayey, medium gray, moderately calcareous; contains limonitic concretions from 108 to 110 ft; light grayish brown from 130 to 131.5 ft.....	96.5	136.0
Shale, clayey, light gray to medium gray, moderately calcareous; contains bentonitic layers from 136 to 136.2 ft and 145 to 145.5 ft.....	136.0	145.5
Shale, medium gray, clayey, very calcareous; contains bentonite layer from 165.5 to 166 ft.....	145.5	170.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, light gray, chalky, very calcareous.....	170.0	180.0

12-9-10dcbc
9, 10, and 11-A-46
Hall County

Location: Approximately 940 ft north and 320, 220 and 120 ft east of SW cor SE sec 10-12N-9W (cluster of three test holes)
Ground elevation: 1,833 ft (t) St. Libory 7.5 min. quadrangle
Depth to water: Not recorded
Note: Compilation of field logs, total depths of 89, 65, and 99 ft

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Loam: silty dark brown-gray	0.0	1.0
Silt, light brown	1.0	1.9
Clay, silty, yellow	1.9	4.4
Loam: silty, slightly clayey, slightly sandy, dark brown-gray	4.4	5.0
Clay, silty, sandy, brownish to yellowish gray	5.0	5.9
Sand, medium to coarse, scattered pebbles	5.9	10.0
Sand and gravel, pinkish color	10.0	24.0
Sand and gravel, greenish color	24.0	59.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty, fine, green	59.0	64.0
Sand, silty, slightly clayey, fine sand, green; cemented and chalky layers below 68 ft, white and light green	64.0	82.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, weathered, yellow-brown, bentonitic clays 86 to 89 ft; yellow and light gray below 89 ft	82.0	99.0

12-9-13ddad
21-A-54
Hall County

Location: 807 ft N and 8 ft W of SE cor sec 13-12N-9W
Ground elevation: 1,824 ft (t) St. Libory 7.5 min. quadrangle
Depth to water: 7.68 ft (7-20-54)
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and soil, slightly moderately clayey, slightly sandy, fine to coarse, dark gray.....	0.0	1.5
Silt, slightly clayey, slightly sandy, very fine to fine sand with a few coarser grains, very dark gray.....	1.5	2.5
Silt, moderately clayey, moderately sandy, fine to coarse sand, dark brown-gray.....	2.5	3.0
Sand, silty, slightly clayey, sand is fine to coarse with a trace of very coarse, medium brown-gray....	3.0	4.0
Silt, moderately clayey, moderately sandy, fine to coarse sand, light olive-gray, slight yellow stain.....	4.0	4.5
Sand, fine to very coarse, about 5 percent fine gravel, quartz with pink silicates.....	4.5	6.0
Sand and gravel, approximately 30 percent gravel....	6.0	10.0
Sand, some gravel, approximately 15 percent gravel, approximately 20 percent gravel below 25 ft.....	10.0	32.0
Sand and gravel, approximately 40 to 50 percent fine to medium gravel.....	32.0	51.7
Silt, very clayey, slightly sandy, principally very fine sand, light yellow-gray, much secondary lime, a few limy nodules.....	51.7	52.5
Clay, silty, very slightly sandy, pale yellow, a little secondary lime.....	52.5	53.0
Silt, very clayey, very slightly sandy, very light brownish-gray, moderately calcareous, some secondary lime.....	53.0	60.0
Marl, clayey silt, whitish gray.....	60.0	62.0
Silt, moderately clayey, slightly sandy, principally very fine sand, very light gray, brown tint, slightly calcareous; slightly clayey below 65 ft, very light brown-gray, granular structure.....	62.0	66.8
Silt, moderately clayey, slightly sandy, sand is fine to medium with a trace of coarse, very light brown-gray, slightly calcareous.....	66.8	67.5

Silt, slightly clayey, moderately sandy, sand is fine to medium with some coarser grains, light medium brown, slightly calcareous, a trace of secondary lime.....	67.5	69.5
Silt, very clayey, a little embedded fine to medium sand, light brown, noncalcareous, a little secondary lime in upper part.....	69.5	73.5
Silt, moderately clayey, slightly to in part very sandy, fine to coarse sand, light medium brown, noncalcareous; a little mottled light gray below 76 ft, some secondary lime.....	73.5	80.0
Sand, fine to coarse, about 15 percent very coarse sand and fine gravel, quartz with some pink silicates.....	80.0	83.8
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately clayey, moderately sandy, sand is very fine to medium, a few coarser grains, light brown- to light olive-gray, some secondary lime, poorly cemented; very sandy to sand 85 to 85.5 ft, some coarse to very coarse sand, trace of fine gravel.....	83.8	85.8
Silt, moderately clayey, very sandy, very fine to medium, a little coarse sand, poorly cemented; sand is fine to very coarse below 87.5 ft.....	85.8	89.5
Silt, moderately clayey, moderately sandy, sand is fine to medium with a trace of coarse sand, light olive-brown.....	89.5	90.5
Sand, silty, slightly clayey, sand is fine to very coarse, trace of fine gravel.....	90.5	91.9
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, light yellowish gray, slightly calcareous.....	91.9	97.5
Shale, clayey, medium and medium dark gray, slightly calcareous, bentonite layers 111.3 to 111.4 ft, 139.2 to 139.3 ft and from 148.3 to 148.6 ft.....	97.5	158.9
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, chalky, light gray, very calcareous.....	158.9	170.0

12-9-20babb
USBR Mid-State Division (Profile 13)
Hall County

Location: 212 ft S and 1,410 ft E of NW corner sec 20-12N-9W
Ground elevation: 1,854 ft (i)
Depth to water: 5.2 ft (5-12-65)
Note: Compiled from sample descriptions by F.A Smith and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, silty, 65 percent fine sand, 35 percent low plasticity fines, no thread, dark brown.....	0.0	0.8
Sand, very fine to medium, 5 percent low plasticity.	0.8	3.0
Silt, slightly clayey, moderately sandy, 70 percent medium plasticity fines, 30 percent very to fine sand, medium thread, no dilatancy, dark brown-gray (buried soil zone); slightly more sand below 65 ft.....	3.0	8.5
Sand, slightly gravelly, fine sand to fine gravel, approximately 5 percent gravel, lenses of 1 to 2 inch silt 8.5 to 16 ft.....	8.5	32.0
Sand, gravelly, fine sand to fine gravel, approximately 20 percent gravel; below 42 ft, some medium gravel, approximately 30 percent gravel.....	32.0	65.0
Silt, slightly clayey, slightly sandy, sand principally very fine, medium thread, quick dilatancy, pale olive (light bluish gray wet).....	65.0	68.0
Silt, slightly clayey, slightly sandy, sand is principally very fine, medium to weak thread, slow dilatancy, moderately calcareous, very pale brown, common white limy areas and concretions (up to 1/2 inch).....	68.0	79.0
Silt, slightly clayey, slightly sandy, sand is principally very fine, 15 percent sand, weak thread, slow dilatancy, moderately calcareous, a few small limy nodules, widely scattered limy areas, sample recovery largely hard silt aggregates or particles.....	79.0	109.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Fat clay, Pierre shale, highly weathered, light yellowish brown and yellow-gray, very calcareous..	109.0	113.5
Shale, fat clay, lightly weathered to 136 ft, many rust streaks up to 1/4 inch thick, noncalcareous, dark gray, many thin beds of selenite.....	113.5	136.0

12-9-25dbcc
6, 7, and 8-A-46
Hall County

Location: Approximately 1,350 ft N and 100 to 300 ft E of SW cor NW SE sec 25-12N-9W (cluster of three test holes)
Ground altitude: 1,832.8 ft (i)
Depth to water: Not recorded
Note: Compiled from 3 field logs, total depths are 79, 99 and 139 ft

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Loam, sandy, grades downward to clean coarse sand with some gravel grains.....	0.0	5.0
Sand and gravel, fine sand to medium gravel, pinkish to light brown.....	5.0	17.0
Silt, clayey and sandy, light gray.....	17.0	25.0
Silt and silty sand, light brown.....	25.0	29.0
Sand and gravel, medium sand to medium gravel.....	29.0	69.0
Silt, clayey, slightly sandy, silt is coarse and sand is very fine, light gray.....	69.0	81.0
Silt, moderately to very clayey, sandy, sand is principally very fine to fine, light brown.....	81.0	92.0
Rubble zone: brown sandy clay with sand, gravel, and fragments of Ogallala origin.....	92.0	97.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, yellow, appears to have some white hard limestone concretions, matrix mostly noncalcareous.....	97.0	106.0
Shale, clayey, medium dark gray, bentonitic layer at 122 ft; some yellow iron-oxide streaks below 130 ft, slightly calcareous.....	106.0	139.0

12-9-31bbbb
USBR Mid-State Division (Profile 13)
Hall County

Location: (narrow section) 97 ft S and 201 ft E of NW cor sec 31-12N-9W
Ground elevation: 1,861.3 ft (i)
Depth to water: Not recorded
Note: Compiled from sample descriptions by F.A. Smith and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, moderately clayey, moderately sandy, sand is very fine to fine with some medium, 85 percent medium plasticity fines, medium thread, no dilatancy, very slightly calcareous, dark brown-gray..	0.0	1.5
Silt, very clayey (lean clay), slightly sandy, sand is very fine to medium, medium thread, no dilatancy, very slightly calcareous, light gray-brown to pale olive, small limy areas and nodules.....	1.5	5.0
Sand, fine to very coarse, much fine to coarse sand, trace of fine gravel, numerous thin lenses of dark gray silt.....	5.0	9.0
Sand, fine to very coarse, approximately 5 percent fine gravel to 18 ft and 10 percent below 18 ft...	9.0	25.0
Sand, slightly gravelly, 10 to 20 percent fine gravel with some gravel up to 1 1/4 inch, a few widely scattered silt lenses 25 to 59 ft not over 2 inches thick, reddish brown with some light gray.....	25.0	84.0
Silt, very clayey, slightly sandy, sand is very fine, 90 percent low to medium plasticity fines, medium thread, no dilatancy, light olive-gray (light bluish gray wet), very slightly calcareous.	84.0	90.0
Sand, fine to very coarse, dark organic stain.....	90.0	90.5
Silt, clayey, slightly sandy, sand is very fine to fine, 90 percent low to medium plasticity fines, medium thread, no dilatancy, light olive-gray (light bluish gray wet), moderately calcareous below about 98 ft.....	90.5	113.0
Silt, moderately clayey, slightly sandy, principally very fine sand, low plasticity, moderately calcareous, hard large limy concretions at 142 ft, concretions have numerous small holes, scattered limy areas and small concretions throughout pale brown; numerous from silt particles.....	113.0	155.0

12-9-33bbcc
4-31
Hall County

Location: Near SW corner of NW 1/4 sec 33-12N-9W
Ground elevation: 1,851.96 ft (i)
Depth to water: 5.5 ft (6-25-31)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, slightly sandy, dark gray to black	0.0	1.5
Silt, clayey light gray, very calcareous	1.5	4.0
Sand, fine to coarse, scattered grains of very coarse sand and gravel	4.0	11.0
Sand, fine to very coarse, some fine gravel	11.0	27.0
Sand and gravel	27.0	40.0
Sand, slightly gravelly, approximately 20 percent gravel	40.0	55.0
Sand, fine to very coarse, approximately 5 percent gravel from 75 to 82 ft	55.0	83.0
Silt, clayey, light brown, moderately calcareous, logged as bluish gray; field log indicates angular chunks with some limonite and hollow stem-like pipes; may be some sand and gravel in interval	83.0	93.0
Silt, clayey, moderately calcareous, light brown, logged as blue-gray small limy nodules, medium brown below 105 ft	93.0	107.0
Silt, clayey, slightly sandy, moderately calcareous, medium brown, some small limy nodules, sand is very fine to fine; limy areas and very calcareous below 134 ft, hard layers (probably limy concretions)	107.0	154.0

12-9-36dddd
20-A-54
Hall County

Location: 13 ft N and 278 ft W of SE cor sec 36-12N-9W
Ground elevation: 1,819 ft (t) Grand Island 7.5 min. quadrangle
Depth to water: 7.33 ft (7-19-54)
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and soil, silt, slightly clayey, moderately sandy, fine to medium sand, dark gray to black; dark gray below 2 ft.....	0.0	3.0
Silt, slightly clayey, very sandy, sand is fine to medium with a trace of coarse, medium brown-gray..	3.0	3.6
Silt, moderately clayey, slightly sandy, principally very fine sand, light gray; medium dark gray below 6 ft.....	3.6	7.0
Sand, silty, very fine to fine with some medium, black, highly carbonaceous.....	7.0	8.5
Sand, medium to very coarse, a little fine gravel; approximately 15 percent gravel below 10 ft.....	8.5	15.0
Sand and gravel, approximately 50 percent very coarse sand and fine gravel, quartz with some pink and rare green silicates; approximately 30 percent gravel 20 to 25 ft and 50 percent gravel below 25 ft.....	15.0	30.0
Sand, fine to coarse, some very coarse; approximately 20 percent very coarse sand and fine gravel below 45 ft.....	30.0	50.0
Sand and gravel, approximately 30 percent fine to medium gravel; silty clay layer about 51 to 52 ft, light gray.....	50.0	65.0
Silt, moderately clayey, slightly sandy, sand is very fine, light olive-gray; in part very sandy below 67 ft, sand is very fine to fine, very light brown-gray, slightly calcareous, limy areas 69.5 to 70 ft; very light brown below 70 ft.....	65.0	71.5
Silt, moderately clayey, slightly sandy, principally very fine sand, very light brown-gray, slightly calcareous.....	71.5	77.5
Silt, moderately to very clayey, slightly sandy, principally very fine sand, light medium gray-brown, a few small dark iron-manganese pellets, a few small limy areas, slightly calcareous.....	77.5	79.0

Silt, moderately clayey, slightly sandy, principally very fine sand, very light brown-gray, slightly calcareous; light gray below 79.8; moderately calcareous with common soft secondary lime, white and very light gray.....	79.0	80.5
Silt, slightly clayey, silt is coarse, slightly sandy, principally very fine sand, light yellow-brown, slightly calcareous.....	80.5	83.7
Silt, moderately to very clayey, silt is coarse, slightly sandy, principally very fine sand, light medium brown, slightly calcareous, contains small limy areas; limy nodules below 87 ft.....	83.7	90.0
Silt, slightly to moderately clayey, silt is fine to very coarse, slightly sandy, sand is very fine, light yellow-brown, slightly calcareous; less sandy below 91.3, light brown, a few limy areas...	90.0	93.5
Silt, very clayey, very slightly sandy, light medium brown, limy areas; contains limy nodules below 95 ft; a little embedded fine to medium sand below 97 ft; medium brown, slightly sandy below 100 ft, principally very fine to fine with rare medium to coarse sand grains; very light brown below 103 ft, common limy areas; moderately sandy below 112 ft..	93.5	112.7
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, light brown-yellow with some mottled medium gray, white and yellow, moderately calcareous, bentonite layers 116 to 116.5 ft, 123 to 123.9 ft, at 128.5 ft and from 130.3 to 130.5 ft..	112.7	130.5
Shale, clay, mottled gray, brown and yellow, noncalcareous, thin bentonite layer at 138 ft.....	130.5	138.5
Shale, clay, medium dark gray, noncalcareous, bentonite layer 141.5 to 142.5 ft, gray, yellow and white, shale is moderately calcareous below 142 ft.....	138.5	144.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, chalky, medium yellow-gray 144 to 145 ft; light gray below 145 ft and light yellow-gray 149.5 to 150 ft; contains a trace of pyrite 151.5 to 155 ft; higher clay content 158 to 162 ft.....	144.0	170.0

12-10-6bbbb
22-A-54
Hall County

Location: 2 ft S and 180 ft E of NW cor sec 6-12N-10W
Ground elevation: 1,933 ft (t) St. Paul SW 7.5 min. quadrangle
Depth to water: 37.0 ft. (7-23-54)
Electric log

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine, trace of medium, light brown-gray; slightly silty below 0.5 ft.....	0.0	2.0
Sand, very slightly silty, sand is very fine to medium, much medium, rare coarse sand, light brown.....	2.0	10.0
Sand, fine to coarse, much medium to coarse, rare very coarse.....	10.0	11.0
Sand, very silty, slightly clayey, sand is very fine to fine, some medium, medium dark brown.....	11.0	11.5
Sand, fine to coarse, much medium to coarse.....	11.5	14.0
Sand, fine to medium, dark speckled.....	14.0	22.5
Silt, very slightly clayey, moderately sandy, coarse silt to very fine sand, light yellow-brown, some small rusty concretions.....	22.5	29.0
Sand, very fine to fine, some medium.....	29.0	30.0
Sand, fine to coarse, much medium, contains rare lithic sandstone grains.....	30.0	35.0
Silt, slightly clayey, slightly sandy, sand is very fine to fine, light olive-gray, slight yellow stain; very slightly calcareous below 40 ft.....	35.0	43.0
Sand, fine to coarse, much medium; much medium to coarse sand with a trace of very coarse sand below 45 ft, contains rare lithic grains of clay and sandstone.....	43.0	47.0
Silt, moderately clayey, in part slightly clayey, light olive-gray, slightly calcareous, slight yellow stain, contains a few small clay grains.....	47.0	50.0
Clay, in part silty, very light olive-gray, slightly calcareous.....	50.0	51.0
No sample, no sample recovered, probably coarse silt to fine sand.....	51.0	53.7
Silt, clay and sandy silt, silt is coarse, light gray and medium dark gray, slightly calcareous, contains a few rounded clay grains and shell fragments.....	53.7	55.0

Sand, very fine to fine, much fine and a little medium sand; rare coarser grains below 60 ft.....	55.0	65.0
Sand, fine to medium, some coarse and a trace of very coarse, much medium; mostly very fine to medium 70 to 75 ft; mostly very fine to fine below 75 ft.....	65.0	80.0
Sand, fine to coarse, a little very coarse, common lithic grains of sandstone and rootlets, some wood fragments.....	80.0	85.0
Sand, some gravel, fine to very coarse sand with 10 to 15 percent gravel, quartz with pink and a few dark silicates.....	85.0	90.0
Sand and gravel, about 40 percent gravel, quartz with pink silicates and a few metamorphic grains; about 50 percent gravel below 95 ft.....	90.0	111.8
Silt, moderately to very clayey, very slightly sandy, sand is very fine, medium yellow; light medium brown below 112.5 ft, slightly calcareous, contains small limy areas.....	111.8	115.0
Silt, moderately clayey, slightly sandy, mostly very fine sand, light brown and light brown-gray interbedded, mostly moderately calcareous, limy nodules common; light yellow-brown below 124.5, moderately to very calcareous.....	115.0	127.5
Silt, slightly clayey, moderately sandy, mostly very fine sand, light yellow-brown, moderately calcareous, rare limy nodules; very light brown below 131 ft, very calcareous; silt is coarse to very coarse below 133.5 ft, moderately calcareous, granular structure.....	127.5	133.6
Marl, clayey silt, some limy and siliceous cemented areas, white, a few root holes and volcanic ash shards.....	133.6	138.0
Silt and volcanic ash, rare embedded very fine to medium sand, very light olive gray to very light gray, slightly indurated, lime and siliceous cement, slightly to moderately calcareous.....	138.0	142.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, slightly clayey, sand is very fine to medium, very light olive-gray, some limy cementation, rootlets.....	142.0	145.0
Sandy siltstone, sand is very fine to fine with a trace of medium, lime and siliceous cementation, very light olive-gray, contains some volcanic ash to 150 ft.....	145.0	156.0

Sandstone, sand is very fine to medium with a little coarse sand, poorly consolidated, some calcareous areas, contains a few rootlets and a trace of lithic grains	156.0	166.0
Volcanic ash, silty and clayey, slight induration, very light green-gray	166.0	167.0
Sand, fine to coarse, some very coarse and a trace of gravel	167.0	170.0
Sand, some gravel, approximately 25 to 30 percent gravel, quartz with some light and pink colored silicates, a few dark grains	170.0	175.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, chalky to very calcareous, very light gray, very light brown-yellow and very light brown-gray to 180 ft, light gray below 180 ft, bentonite layers 181.5 to 181.8 ft, at 184.5 ft and 185.6 to 185.8 ft; moderately to very calcareous below 185 ft	175.0	185.8
Shale, clayey, light gray, moderately calcareous, occasional aragonite fragments, bentonite layers 203.5 to 203.7 ft, 205.5 to 205.7 ft, at 208 ft, and at 216 ft; medium gray 196.5 to 210 ft; dark gray 210 to 217 ft; slightly calcareous below 215 ft	185.8	217.0
Shale, dark gray, noncalcareous, thin bentonite layers	217.0	230.0

12-10-14bbbb
5-31
Hall County

Location: On farm near NW cor sec 14-12N-10W
Ground elevation: 1,872.7 ft (i)
Depth to water: 7.5 ft. (7-2-31)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine with some medium.....	0.0	3.0
Silt, moderately clayey, sandy 6 to 9 ft, light grayish brown, contains some small limy nodules...	3.0	9.0
Sand, very fine to medium, some coarse sand below 30 ft.....	9.0	37.5
Sand, fine to very coarse, some gravel grains.....	37.5	65.0
Sand, slightly gravelly, sand is fine to very coarse, gravel is fine; some yellow clay grains below 85 ft and a greenish clay layer at 88 ft....	65.0	103.0
Silt, slightly clayey, slightly sandy, silt is coarse, sand is principally very fine to fine, light pale brown, moderately calcareous, contains some limy nodules and small root casts.....	103.0	±123.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, dark gray with much yellow-brown.....	±123.0	126.0
Shale, clay, dark gray, some yellow brown, some thin bentonite layers.....	126.0	139.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, medium gray, very calcareous.....	139.0	144.5

12-10-31cccb
24-A-54
Hall County

Location: 404 ft N and 10 ft E of SW cor sec 31-12N-10W
Ground elevation: 1,897 ft (t) Abbott 7.5 min. quadrangle
Depth to water: 12.87 ft (7-23-54)
Electric log

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	1.5
Soil: silt, slightly clayey, moderately sandy, sand is very fine to fine, very dark brown-gray.....	1.5	2.5
Silt, moderately to very clayey, slightly sandy, sand is mostly very fine, medium brown-gray; moderately clayey below 4 ft, slightly calcareous with limy areas, light brown-gray.....	2.5	5.0
Silt, slightly clayey, moderately sandy, sand is very fine to fine, slightly calcareous, light brown-gray.....	5.0	8.3
Soil: silt, slightly clayey, moderately to very sandy, rare limy areas, dark brown-gray.....	8.3	9.2
Silt, very clayey, slightly sandy, mostly very fine sand, medium gray, brown tint; silty clay below 10 ft, very slightly calcareous.....	9.2	11.5
Silt, moderately clayey, slightly sandy, sand is very fine, very slightly calcareous, medium gray, light brown-gray below 12 ft, in part slightly calcareous, trace of secondary lime; common limy concretions below 15 ft.....	11.5	15.7
Silt, slightly clayey, slightly sandy, sand is very fine to fine, medium dark gray, noncalcareous; wood fragments below 16 ft.....	15.7	19.0
Sand, medium to very coarse.....	19.0	20.0
Sand, some gravel, approximately 10 percent gravel, overall light colored, quartz with a few pink and some gray silicates; contains a thin silt layer at 28.5 ft; approximately 30 to 40 percent gravel below 35 ft.....	20.0	46.5
Sand, clay coated grains and many pore spaces filled with clay, sand is fine to coarse, light olive to light greenish gray; mostly fine to medium sand below 50 ft.....	46.5	55.5
Sand, very fine to medium, trace of coarse.....	55.5	60.0
Sand, very fine to fine, a little medium.....	60.0	65.0

Sand, fine to coarse, trace of very coarse, mostly quartz with some pink and gray silicates; some clay grains 70 to 75 ft.....	65.0	80.0
Sand, fine to medium, a little coarse sand, dark speckled.....	80.0	85.0
Sand, fine to very coarse, approximately 15 to 20 percent fine gravel, common lithic grains of clay, sandy clay and a few sandstone fragments.....	85.0	93.0
Silt and volcanic ash, silts are clayey to slightly sandy, slight indurated siliceous and lime cementation, very light olive-gray, rootlets common; very light gray below 99 ft.....	93.0	100.5
Silt, slightly clayey, coarse silt, slightly sandy, sandy mostly very fine, light olive-gray, noncalcareous; slightly to moderately clayey below 103.5 ft, light olive, some aggregates.....	100.5	106.5
Silt, moderately clayey, in part very clayey, slightly sandy, sand is very fine, light brown; light medium yellow-brown, a few limy areas 100 to 112.5 ft; light medium reddish brown below 112.5 ft; light brown below 115 ft, slightly sandy, sand is very fine to fine with a trace of medium; a few limy areas and nodules below 116.5 ft, light medium brown; moderately calcareous 120 to 125 ft.....	106.5	127.0
Silt, slightly to moderately clayey, slightly sandy, sand is very fine, light yellow brown, slightly calcareous; light brown 130 to 135 ft, contains some hard limy cemented areas and rare root holes.	127.0	137.0
Silt, slightly to moderately clayey, slightly sandy, sand is very fine with some fine sand, light brown, slightly calcareous; moderately calcareous below 145 ft, in part moderately sandy, sand is very fine to fine with a trace of medium sand, very slightly calcareous to noncalcareous, a few limy areas and a few limy nodules 150 to 153.5 ft.	137.0	160.0
Silt, moderately to in part very clayey, slightly sandy, sand is very fine to fine, light yellow-brown, very slightly calcareous, trace of limy areas and limy nodules.....	160.0	170.5
Silt, slightly clayey, silt is coarse, sand is mostly very fine, light brown, moderately calcareous, slightly indurated, aggregates; some fine sand below 175 ft; light yellow-brown, slightly calcareous below 177 ft, no induration.....	170.5	180.0

Silt, moderately clayey, slightly sandy, sand is very fine with some fine, light yellow-brown, a few limy areas; small limy nodules 180 to 185 ft and larger dense limy nodules 185 to 190 ft, some aggregates.....	180.0	195.0
Silt, slightly clayey, slightly sandy, sand is mostly very fine, very light yellow-gray, moderately calcareous, aggregates, a few volcanic ash shards.....	195.0	198.0
Silt, moderately clayey, slightly sandy, sand is mostly very fine, light brown, slightly calcareous, some limy cementation; contains some light brown clay 198 to 200 ft; contains a few root holes below 200 ft, moderately calcareous, contains a few lithic grains of clay and shale.....	198.0	206.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, mottled very light gray and light yellow brown, essentially noncalcareous; much yellow brown 215 to 220 ft, slightly calcareous below 220 ft.....	206.0	225.0
Shale, clayey, light medium gray, slightly calcareous; dark gray below 240 ft, bentonite layer at 244 ft.....	225.0	250.0

12-11-7cccc
USBR Mid-State Division (Profile 11)
Hall County

Location: 30 ft N and 105 ft E of SW corner sec 7-12N-11W
Ground elevation: 1,964.3 ft (i)
Depth to water: 51.9 ft (3-12-65)
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, slight plasticity, small amount of organic matter	0.0	1.4
Silt, slightly clayey, essentially 100 percent slightly plastic, noncalcareous silt, no toughness, moderately quick dilatancy, low dry strength, maximum size #200, light yellow grading to very light yellow-gray	1.4	16.0
Sand, fine-grained, subrounded to well-rounded	16.0	27.0
Sand, as above but with scattered lenses of medium and coarse sand	27.0	32.5
Sand, as above, approximately 95 percent fine sand with a trace of medium sand, less than 5 percent nonplastic fines	32.5	65.0
Sand, as above but with scattered lenses of medium and coarse sand	65.0	75.0
Sand, as above but with scattered grains of green sandstone and blue "shale"	75.0	90.0
Sand, as above, approximately 95 percent fine sand and less than 5 percent nonplastic fines	90.0	116.0
Sand, silty, approximately 80 percent fine subrounded quartz sand, approximately 20 percent slightly plastic fines, compact, noncalcareous, maximum size #40, light olive-gray	116.0	134.5
Silt, clayey, approximately 85 percent, slightly plastic, noncalcareous fines, approximately 15 percent, subrounded quartz sand, considerable dark brown organic staining, includes small amount of white volcanic ash and small decayed wood fragments, low dry strength and toughness, maximum size #50, mottled grayish brown and dark brown	134.5	138.0
Silty sand, 85 percent fine sand, 15 percent nonplasticity fines, maximum fine sand, dense, gray	138.0	141.5
Sand, fine, 95 percent fine sand, 5 percent nonplasticity fines, maximum size fine sand, dense	141.5	154.0

Sand, fine to medium, 80 percent fine sand, 15 percent medium sand, a trace of coarse sand, 5 percent plasticity fines, weak thread, moderate dilatancy, dense, gray.....	154.0	172.7
Silt, 90 percent slightly plastic, calcareous silt, coarse ground silt, about 10 percent fine sand, slight toughness, moderately quick dilatancy, slight dry strength, light olive gray.....	172.7	183.0
Silt, 95 percent coarse silt, less than 5 percent fine sand, nonplasticity fines, slight toughness and dry strength, light brown, light brown-gray below 226 ft.....	183.0	243.0
Silt, very clayey, high plasticity fines, firm, subwaxy luster, contains many thin-shelled calcareous snail shells, matrix essentially calcareous, a few small limy concretions, dark gray.....	243.0	245.0

12-11-13aaaa
USBR Mid-State Division (Profile 12)
Hall County

Location: 197.5 ft S and 26 ft W of NE cor sec 13-12N-11W
Ground elevation: 1,908.7 ft (i)
Depth to water: 16.8 ft (3-25-65)
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silty sand, 80 percent fine, subangular to subrounded, mainly quartz; 20 percent slightly plastic, maximum size #50, dark brown, moist (topsoil).....	0.0	1.5
Silty sand, 90 percent fine, subangular to subrounded; 10 percent nonplastic, quick dilatancy, maximum size #50, variably medium tan-brown to light brownish gray, scattered lenses of fine sandy silt.....	1.5	42.5
Silty sand, 60 percent fine sand, 40 percent slightly plastic silt, quick dilatancy, no toughness, maximum size #100, medium brownish gray, moist....	42.5	43.0
Silt, slightly sandy, 85 percent slightly plastic silt, 15 percent fine sand, maximum size #100, medium gray moist; dark gray, moderately clayey below 44 ft, slightly calcareous.....	43.0	47.0
Sand, poorly graded, approximately 95 percent medium to very coarse sand, some fine gravel, approximately 20 percent gravel with maximum size 3/16 inch below 67 ft, grains are subangular to well rounded, quartz and granitic grains, a few gray silicates below 56 ft, common gray silicates below 62 ft.....	47.0	74.5
Silt, very clayey (lean clay) essentially 100 percent medium plasticity, medium toughness, no dilatancy, maximum size #200, medium yellow brown (light bluish gray wet).....	74.5	77.0
Sand, poorly graded, sand fine to very coarse, about 20 percent fine gravel, gray silicates common.....	77.0	78.5

Silt, moderately clayey (lean clay), 90 percent slightly plastic coarse silt, 10 percent very fine sand, moderately quick dilatancy, slight toughness, maximum size #200, light grayish to pinkish brown, very light brown below 104 ft, widely scattered limy strips and limy nodules, matrix essentially noncalcareous.....	78.5	112.0
Sand, approximately 90 percent very fine to fine, subangular to subrounded quartz sand, 10 percent calcareous fines, maximum size #40, scattered layers of silt sand up to 1 ft thick, sand is medium to coarse, light gray.....	112.0	135.0
Silt, essentially 100 percent, slightly plastic, calcareous silt, slightly sandy in part, sand is very fine, slight toughness, quick dilatancy, slightly compacted, maximum size #200, very light brown-gray; light medium brown below 146 ft, scattered white limy streaks, small hard silt particles throughout; moderately clayey below 168 ft.....	135.0	198.0
Sandy silt, 65 percent slightly plastic calcareous silt, 35 percent fine to medium, subangular and subrounded quartz and granitic sand, maximum size #8, medium grayish brown, some yellow.....	198.0	200.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, (lean clay) essentially 100 percent medium plastic, calcareous clay, medium toughness, no dilatancy, very light gray and yellow brown to 204 ft, mostly light gray and medium gray to 210 ft, dark brownish gray below 210 ft.....	200.0	222.0

12-11-24aaaa
23-A-54
Hall County

Location: 120 ft S and 10 ft W of NE cor sec 24-12N-11W
Ground elevation: 1,906 ft (t) St. Paul 7.5 min. quadrangle
Depth to water: hole caved at 8.9 ft (7-23-54), approximately 9 ft (E-log)
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill: silt, slightly clayey, moderately sandy, sand is very fine to medium, medium yellow-brown, moderate yellow stain.....	0.0	1.5
Soil: silt, moderately clayey, moderately sandy, sand is very fine to medium, dark brown-gray; medium yellow-brown below 2 ft.....	1.5	2.5
Silt, slightly clayey, in part moderately sandy, sand is very fine to fine with some medium, light yellow-gray, slight yellow stain; moderately sandy 4.5 to 5 ft and very sandy below 5 ft.....	2.5	8.0
Sand, very fine to medium, rare coarse sand, much fine sand.....	8.0	24.0
Silt, slightly clayey, moderately sandy, sand is very fine to fine, very light yellow-to olive-gray, slight yellow stain; medium dark gray below 26.5 ft.....	24.0	29.3
Sand, fine to medium, some coarse, dark speckled....	29.3	34.0
Silt, slightly to in part moderately clayey, moderately sandy, sand is very fine to fine, light medium gray, contains some carbonaceous fragments; dark gray below 35 ft.....	34.0	38.0
Sand, fine to very coarse, quartz with common gray and some pink grains, the coarser sand is mostly lithic flat and rounded grains of medium gray silty clay; approximately 10 percent fine gravel 40 to 45 ft, many lithic grains; approximately 15 percent gravel below 45 ft, few lithic grains..	38.0	45.0
Sand and gravel, much coarse to very coarse sand, approximately 30 percent gravel 50 to 55 ft and 50 percent gravel below 55 ft, mostly quartz with light colored silicate, some dark and pink grains.	45.0	63.2

Silt, moderately clayey, very slightly sandy, sand is mostly very fine, light medium olive-gray; light medium brown 64.5 to 65 ft; light yellow-brown 65 to 67 ft; in part very clayey below 67 ft; very light yellow-brown 67 to 70 ft and pale brown below 70 ft.....	63.2	71.0
Clay, very light brown and reddish brown, waxy luster.....	71.0	72.0
Silt, slightly clayey, slightly sandy, mostly very fine sand, light brown, in part granular structure, contains rare medium sand and some brown clay grains; in part moderately clayey and in part very sandy below 78 ft, sand is very fine to fine, rare irregularly shaped limy concretions.....	72.0	80.0
Silt, slightly clayey and silt, very sandy, interbedded, sand is very fine to fine, light brown....	80.0	86.0
Silt, slightly clayey, very sandy, sand is very fine to fine with some medium, light brown, slightly calcareous; sand is very fine to medium with rare coarse below 90 ft, some limy areas; very pale brown below 92 ft, may have some limy cemented areas, contains a few root holes.....	86.0	92.0
Sand, fine to medium, some coarse, contains either lithic gravel grains of poorly cemented sandstone, sandy clay and rootlets or layers of same, a few lithic grains are rounded.....	92.0	103.5
Sand, slightly clayey, sand is very fine to fine with a little medium, slightly indurated, rootlets and root holes common, noncalcareous, volcanic ash layer about 106.5 to 110 ft.....	103.5	110.0
Silt, slightly clayey, slightly sandy, silt is coarse, sand is very fine with a little fine and medium, light medium olive-gray.....	110.0	113.5
Sand, fine, some very fine and medium.....	113.5	115.0
Sand, fine to very coarse, much medium to coarse sand, approximately 5 percent fine gravel, quartz with light and common pink silicates, lithic grains of rootlets and sandy clay common.....	115.0	124.0
Silt, moderately clayey, slightly to in part moderately sandy, sand is very fine to fine with some medium, light medium olive-gray, slight yellow stain, contains small veins or root filling of calcite; in part very clayey and only partly sandy below 125.5 ft, light medium gray, secondary lime common, contains rare small gray clay grains; some fine to medium sand below 127.5 ft, contains a few shell fragments, slightly calcareous.....	124.0	129.0

Silt, slightly clayey, moderately sandy, silt is coarse, sand mostly very fine, light gray, moderately calcareous, contains a few limy areas; light olive below 134 ft, slightly calcareous; very sandy below 138.5 ft, sand is very fine to medium, very slightly calcareous, medium gray.....	129.0	140.0
Sand, slightly silty and in part slightly clayey, light gray, contains rare lithic sandstone grains.	140.0	147.0
Sand, very silty, slightly clayey, sand is very fine to medium with a trace of coarser grains, medium dark gray, contains shell fragments to 150 ft; interbedded with some sand below 150 ft, rare gravel grains.....	147.0	155.0
Sand, some gravel, approximately 25 percent very coarse sand and fine gravel overall gray in color, quartz with light gray silicates, trace of pink...	155.0	165.0
Silt, moderately clayey, moderately sandy, sand is very fine to fine with rare coarser grains, light olive, essentially noncalcareous, rare secondary lime, light medium gray 167 to 169.5 and light gray below 169.5 ft, very slightly calcareous.....	165.0	170.0
Silt, slightly clayey, moderately sandy, much coarse silt to very fine sand, light yellow- to light olive-gray, slightly calcareous.....	170.0	173.5
Silt, very clayey, slightly sandy, mostly very fine sand, light medium olive-gray, essentially noncalcareous; very light olive-gray below 175 ft, moderately calcareous, contains limy cemented areas and concretions.....	173.5	176.0
Silt, slightly clayey, slightly sandy, coarse silt to very fine sand, light olive-gray, slightly calcareous; very slightly clayey below 179.5 ft; very light yellow-brown 181.5 to 185 ft and very pale brown below 185 ft, slight induration.....	176.0	190.0
Silt, moderately clayey, slightly sandy, sand is very fine, very light brown, slightly calcareous, light medium brown 193.5 to 197 ft and light yellow brown below 197 ft, moderately calcareous; slight limy cementation below 197 ft.....	190.0	197.0
Silt, slightly clayey, moderately sandy, silt, coarse and sand is very fine, light yellow-brown, slightly calcareous; medium yellow-brown below 200 ft, some fine sand, contains a few shell fragments; light medium brown below 205 ft; moderately sandy, contains very fine to medium sand below 210 ft, moderately calcareous.....	197.0	213.5
Sand, fine to very coarse.....	213.5	214.5

Silt, moderately to very clayey, slightly sandy, sand is very fine to medium, medium brown, slightly calcareous, contains limy areas; very light brown below 215 ft, moderately to very calcareous; moderately clayey below 218.5 ft, some limy cemented areas, concretions and root holes; contains some coarse sand to gravel 222 to 222.5 ft; medium brown below 222.5 ft.....	214.5	225.0
Silt, moderately clayey, very sandy, sand is fine to very coarse, light yellow-brown.....	225.0	229.5
Sand, fine to very coarse, a little gravel, some yellow-brown clay grains.....	229.5	236.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clayey, light yellow-brown, light yellow gray and light gray, slightly calcareous, bentonite layer 253.5 to 253.7 ft; medium gray 260.5 to 265 ft; medium dark gray below 265 ft.....	236.0	270.0

12-11-30abbb
USBR Mid-State Division (Profile 11)
Hall County

Location: 33 ft S and 47 ft E of NW cor NE1/14 sec 30-12N-11W
Ground elevation: 1,943.9 ft (i)
Depth to water: 37.6 ft (3-12-65)
Note: USBR Geologic log of observation well, samples not available.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, top soil, 85 percent low plasticity fines, 15 percent fine sand, maximum size medium sand, dark brown.....	0.0	5.5
Silt, "loess", 85 percent low to medium plasticity, 15 percent fine, maximum size medium sand, light gray, noncalcareous.....	5.5	8.0
Silt, 90 percent low to non-plasticity fines, 10 percent fine sand, maximum size medium sand, gray, noncalcareous.....	8.0	38.0
Silt, "weak soil zone", 90 percent low plasticity fines, 10 percent fine sand, maximum size fine sand, organic stained.....	38.0	40.0
Sand, 70 percent fine, 30 percent medium to coarse, trace of gravel.....	40.0	76.9

12-12-2abac
37-A-44
Hall County

Location: approximately 600 ft S and 1,840 ft W of NE cor sec 2-12N-12W
Ground elevation: 1,997 ft (i)
Depth to water: not known, dry at 17 ft (8-19-44)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, fine to medium.....	0.0	9.0
Sand, fine to medium, some coarse to very coarse....	9.0	19.0
Sand, slightly silty, sand is very fine to fine with some coarse to very coarse.....	19.0	69.0

12-12-25aaaa
USBR Mid-State Division (Profile 11)
Hall County

Location: 73 ft S and 54 ft W of NE cor sec 25-12N-12W
Ground elevation: 1,946.7 (i)
Depth to water: 39.5 ft (1-6-65)
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, clayey, slightly plastic, organically stained dark brown-gray.....	0.0	5.0
Silt, slightly clayey, essentially 100 percent slightly plastic, noncalcareous silt, a trace of fine sand, slight toughness and dry strength, moderately quick dilatancy, maximum size #100, very light gray, slight iron-oxide stain.....	5.0	39.0
Silty sand, 65 percent fine to medium, subangular to subrounded sand, 35 percent slightly plastic fines, quick dilatancy, slight dry strength, maximum size #10, dark brown.....	39.0	41.4
Sand, 95 percent fine to very coarse sand, 5 percent non-plasticity fines, clean, clear quartz and dark silicates.....	41.4	50.9
Sand, gravelly, medium to very coarse sand, 25 percent gravel to 3/8 inch, clean, common gray silicates.....	50.9	60.9
Sand and gravel, 50 percent coarse sand, 50 percent gravel, maximum size 3/4 inch, clean.....	60.9	65.0
Silt, very clayey, essentially 100 percent medium plastic, noncalcareous clay, slow dilatancy, medium toughness, medium dry strength, maximum size #200, yellow brown grading to light gray.....	65.0	67.0
Silt, moderately clayey, essentially 100 percent slightly plastic, noncalcareous silt, a trace of very fine sand, slight toughness and dry strength, maximum size #100, light brown-gray to light brown, rare limestone nodules.....	67.0	90.0
Silt, slightly clayey, similar to interval above, light brown, many limestone nodules in upper few inches, common root casts below 93 ft; silt is coarse to very coarse below 120 ft.....	90.0	138.0

Silt, silt is coarse to very coarse, slightly sandy, principally very fine sand, approximately 25 percent sand, 75 percent non-plasticity fines, crumbles easily, weak thread, quick dilatancy, maximum size #100, very light gray to light grayish brown.....	138.0	160.0
Silt, 95 percent slightly plastic calcareous silt, silt is coarse-grained, 5 percent very fine sand, low dry strength, slight toughness, quick dilatancy, maximum size #100, light brown to about 174 ft, very light gray below 174 ft, scattered small limy nodules; large limestone concretions below 196 ft.....	160.0	197.5
Sand, probably silty, approximately 90 percent fine to medium subrounded sand, approximately 10 percent slightly plastic calcareous fines, a few small limy concretions, maximum size #16.....	197.5	205.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, light gray, waxy, firm, calcareous, can be scratched with finger nail, breaks with firm finger pressure, 1 to 2 ft bed of brown-yellow lean clay about 211 ft to 213 ft, very light gray 212 to 213 ft, light gray, some yellow-brown streaks below 213 ft.....	205.0	220.0
Shale, clay, waxy, firm, dark gray with some limonite streaks, calcareous.....	220.0	230.9

12-12-36ddda
USBR Mid-State Division (Profile 11)
Hall County

Location: 525 ft N and 55 ft W of SE cor sec 36-12N-12W
Ground elevation: 1,939.2 ft (i)
Depth to water: 31.0 ft (3-12-65)
Note: Compiled from sample descriptions by V.H. Dreeszen and interpretation of USBR geologic and field logs.

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slight plasticity, organically stained, black.	0.0	4.0
Silt, slightly clayey, essentially 100 percent slightly plastic silt, a trace of fine sand, slight toughness and dry strength, moderate quick dilatancy, calcareous from 4 ft to 22.3 ft, maximum size #100, light gray with some light yellow-gray.....	4.0	24.5
Sand, about 80 percent fine quartz sand, about 20 percent slightly plastic fines, slightly calcareous, maximum size #40, light gray.....	24.5	27.0
Sand, gravelly, 70 percent fine to coarse sand, 25 percent fine and coarse gravel, subangular to well rounded, granitic, predominantly quartz, maximum size 1 inch, about 5 percent nonplastic fines, clean.....	27.0	42.3
Sand, fine to coarse, predominantly medium, slight amount of fine gravel up to 3/8 inch, clean.....	42.3	44.0
Sand, gravelly, 70 percent fine to coarse sand, predominantly coarse, 25 percent fine to coarse gravel, 5 percent nonplastic fines, maximum size 1 inch.....	44.0	56.0
Silt, slightly clayey, essentially 100 percent slightly plastic, highly calcareous silt, slight toughness and dry strength, maximum size #200, light brownish gray to about 62 ft, light brown to pinkish brown below 62 ft, widely scattered limy concretions; slightly sandy below 78 ft, common limy concretions.....	56.0	84.3
Tertiary System - Miocene Series - Ogallala Group:		
Sand, slightly silty, about 80 percent fine subangular to subrounded fine quartz sand, 20 percent nonplastic fines, maximum size #50, one 3/4 inch limy concretion, light olive-gray.....	84.3	85.8