2000

Chase County Test Hole Logs

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CHASE COUNTY
Test-Hole Logs

Vincent H. Dreeszen

Nebraska Water Survey
Test-Hole Report No.15

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

March 2000

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March 2000

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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.

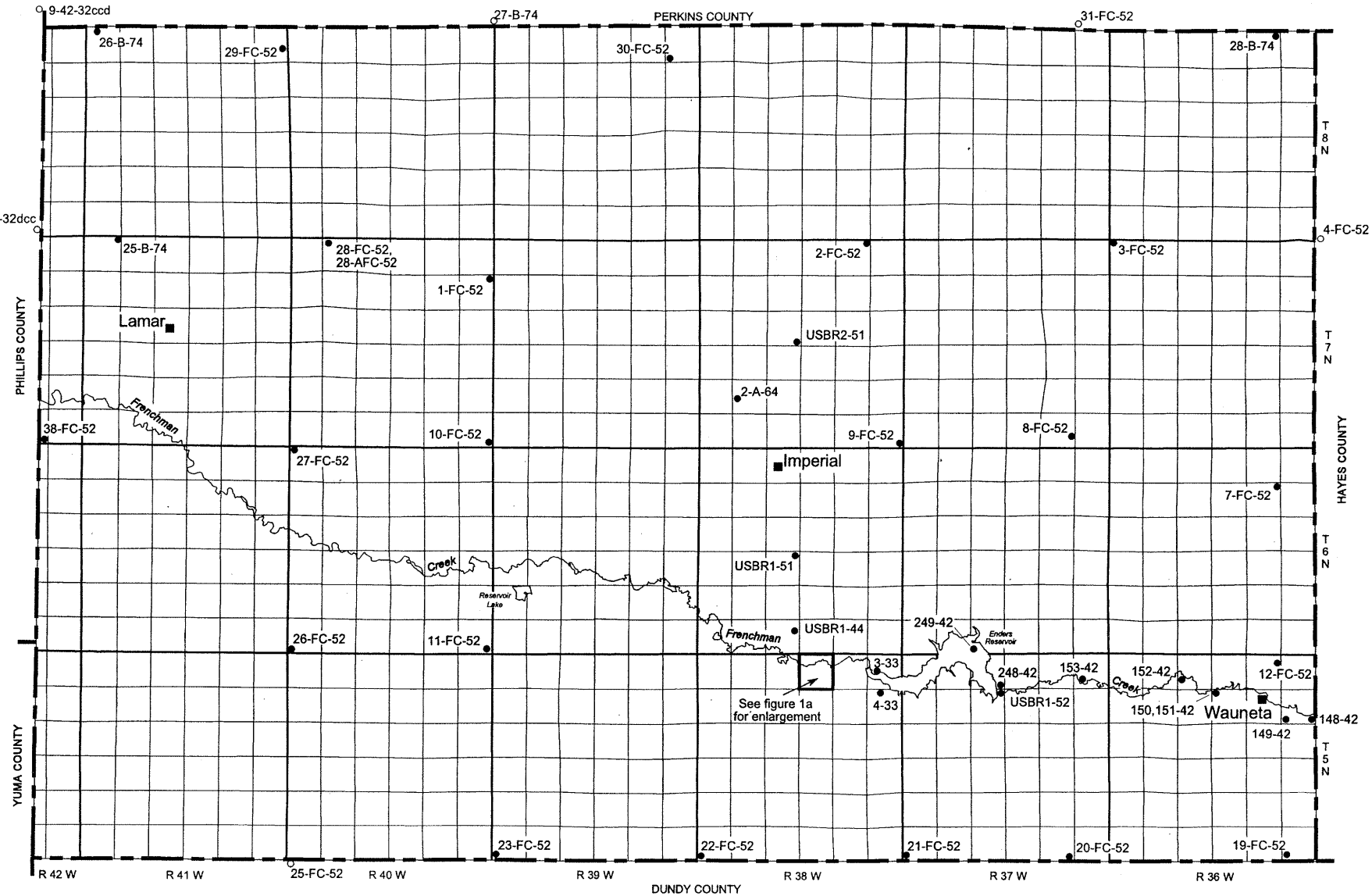
The map in this report (see figure 1) shows the location of all test holes drilled in the county since 1933.

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.

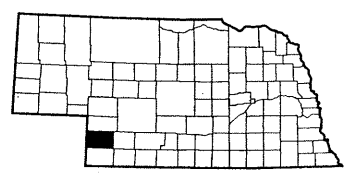
The method whereby the altitude of the land surface at testhole sites was determined is indicated in the heading of each log, as follows: a = altimeter, h = hand leveling, i = instrument, t = estimated from topographic map.

The test-hole records 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 or in press.



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

0 2 4 6 Miles
0 2 4 6 Kilometers



County Location Map

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

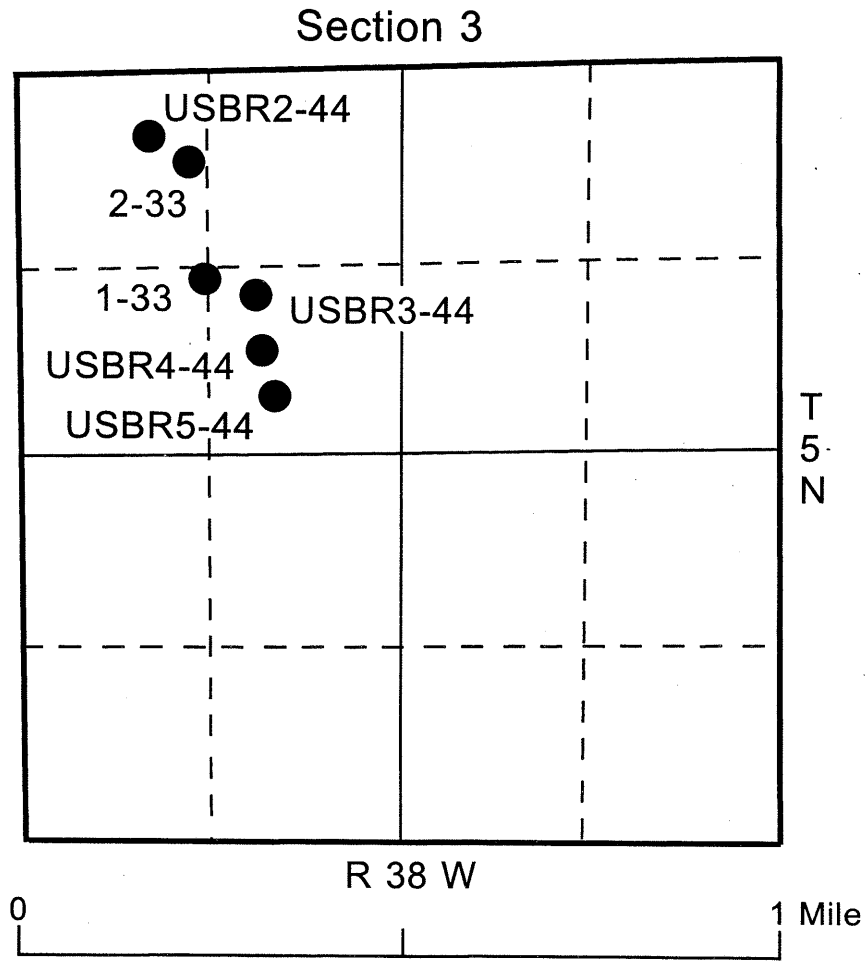
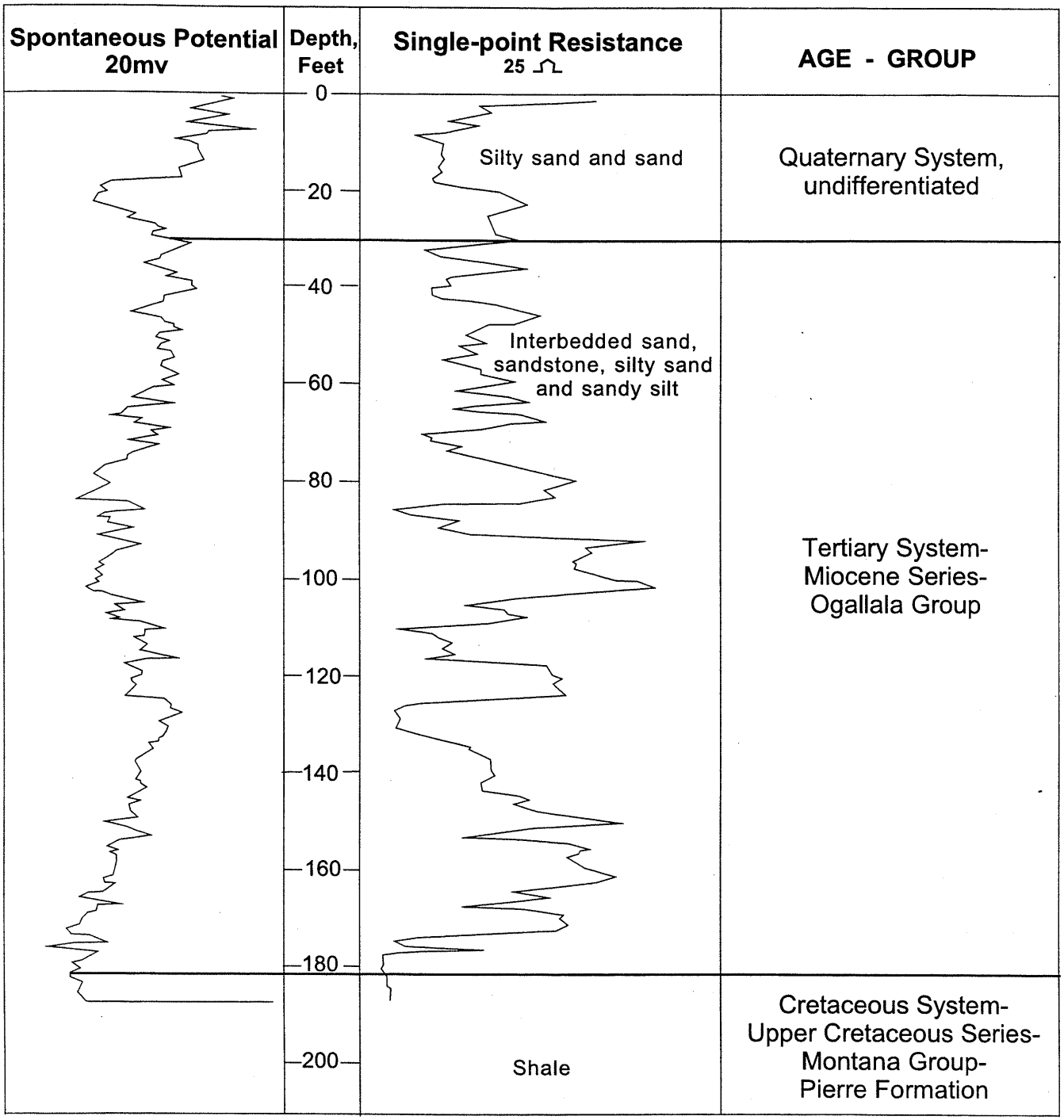


Figure 1a. Test-hole location of enlargement area in Chase County.

Figure 2. Chase County sample geophysical log 5-37-9aaa (USBR1-52)



Each test hole is identified by a number used in filing logs and samples by agency, numerical number and year(for example 2-FC-52, 26-B-74), 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 SW NW NW section 12-5N-36W is also located as 12-5-36ccbb or 12-5-36CCBB.

The logs of test holes drilled for the United States Bureau of Reclamation (USBR) are included in this report. A few test holes were drilled by the USBR in the 1940s and 1950s, most were drilled in 1952 for the USBR by a drilling firm under contract with USBR. The test drilling was done as a part of the program of the Department of Interior for development of the Missouri River Basin. The information was used in the investigation and publication of USGS Water-Supply Paper 1577, 1963. The report describes the hydrogeology of the Frenchman Creek Basin and includes the logs of test holes. The logs were also published in a test-hole log book for the Frenchman Creek Basin by the Conservation and Survey Division in 1957. The logs in the later publication includes water levels not reported in USGS Water-Supply Paper 1577. Test holes were also assigned field numbers in the test-hole log book, e.g. well number 5-36-2acc was labeled as 12-FC-52.

"The well cuttings from all test holes (1952), other than those in 1949 or otherwise noted, were collected and studied by Cardwell and Spiegel", p. 129, USGS Water-Supply Paper 1577. This report indicates that all test holes drilled for the study were electric logged. Driller's logs and the electric logs cannot be located at this time and may have been discarded. Samples for most of the test holes are on file in the Conservation and Survey Division core and sample library, although some samples are missing. The author of this report examined samples from some of the test holes. Absent the driller's and electric logs and due to the sampling procedure used in combining lithologic units into one long sample interval, the samples were difficult to interpret. Most of the logs are reproduced in this

report as initially published. The contact between some geologic units was reinterpreted e.g. originally it was thought that some test holes penetrated the Brule Formation. In a few test holes the unit penetrated may be a part of the Ogallala Group or in the northwest corner of the county the rock unit previously interpreted as the Brule Formation is more likely the Chadron Formation of the White River Group.

Similar problems of missing samples or samples that were difficult to interpret were found with some of the test holes drilled in the 1930s and 1940s. Some test hole locations as originally published have been changed based on the field log interpretation of location and modern maps.

Test holes are arranged in this publication by township, range and section starting with 5N-36W through 5N-41W and then to 6N-36W and so on.

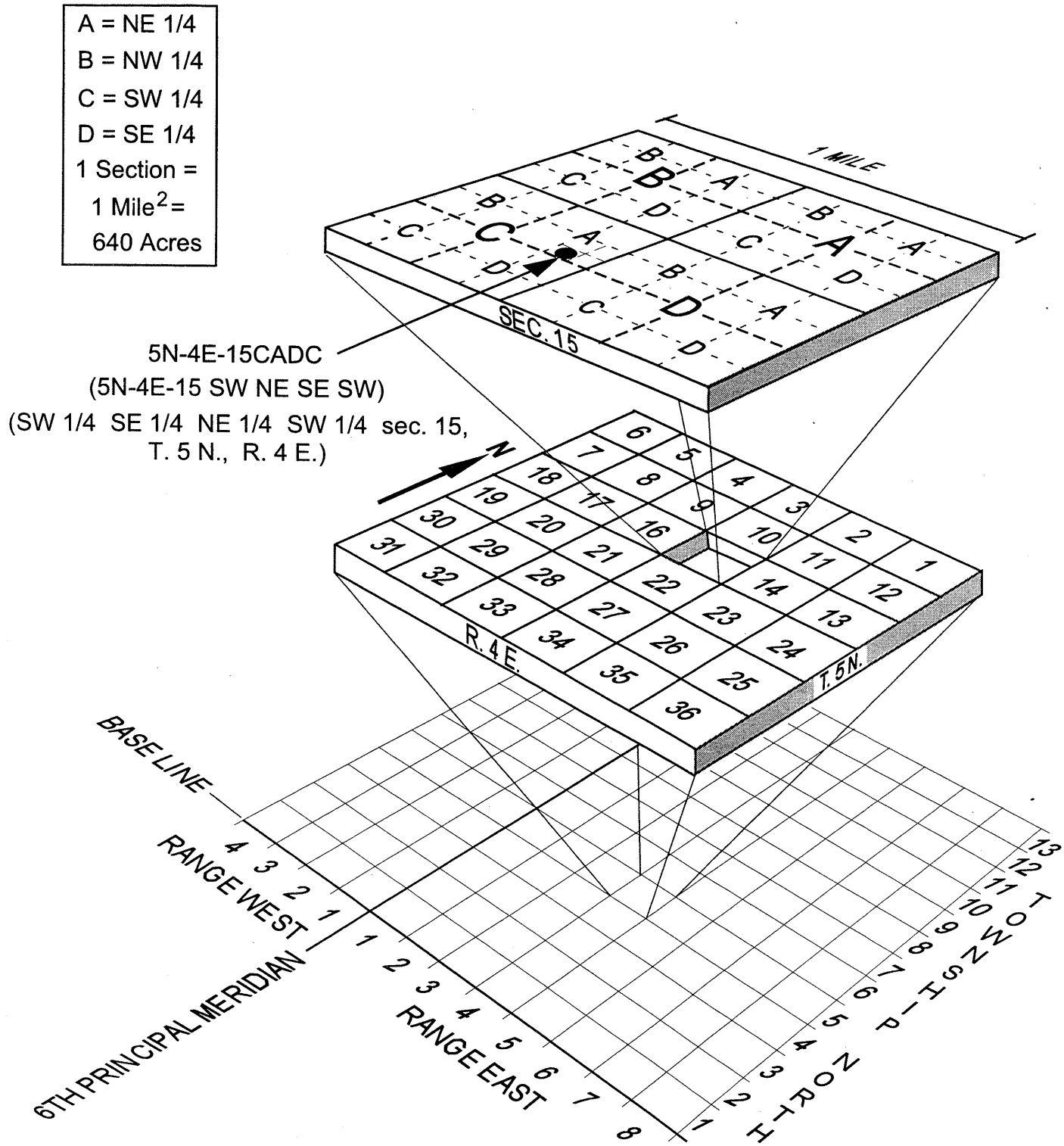


Fig. 3. System for identifying test-hole according to its location.

SELECTED REFERENCES

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

Some Publications that are Guides to Earth Resources of Chase County

Waite, H. A., Reed, E. C., and Jones, D. S. Jr., *Groundwater in the Republican River Basin in Nebraska, Part IV, Hitchcock, Hayes, Dundy and Chase Counties.* Nebraska Water Resources Survey, Water Supply Paper 1, Conservation and Survey Division, University of Nebraska-Lincoln, 1944.

Cardwell, W. D. E., and Jenkins, E. D., *Ground-Water Geology and Pump Irrigation in the Frenchman Creek Basin above Palisade, Nebraska,* with a section on the Chemical Quality of the Water by Jochens, E. R., and Kreiger, R. A., U. S. Geological Survey Water-Supply Paper 1577, 1963.

Keech, C. F., *Logs of Test Holes, Frenchman Creek Basin, Nebraska.* Conservation and Survey Division, University of Nebraska-Lincoln, 1957.

Leonard, G. J., and Huntoon, P. W., *Groundwater Geology of Southwest Nebraska Ground Water Conservation District.* Nebraska Water Survey Paper Number 37, Conservation and Survey Division, University of Nebraska-Lincoln, 1974.

Lappala, E. G., *Quantitative Hydrogeology of the Upper Republican Natural Resources District,* Southwest Nebraska. U. S. Geological Survey Water-Resources Investigation 78-73, 1978.

Eversoll, D. A., Dreeszen, V. H., Burchett, R. R., and Prichard, G. E., *Bedrock Map Showing the Configuration of the Bedrock Surface, McCook 1° x 2° Quadrangle, Nebraska and Kansas and part of the Sterling 1° x 2° Quadrangle, Nebraska and Colorado.* U. S. Geological Survey Map I-1878, 1988.

Chase County
Test-Hole Table of Contents

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

Chase County
Test-Hole Table of Contents

Arranged by year drilled, test-hole number.

1964

1974

5-36-2aac
12-FC-52
Chase County

Location: SW NE NE sec 2-5N-36W
Ground elevation: 3,002.7 ft (i) Wauneta East 7.5 minute quadrangle
Depth to water: 48 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Tertiary System - Miocene Series - Ogallala Group:		
Silt, tan; contains very fine sand to fine gravel...	0.0	12.5
Sand, very fine, to gravel, coarse; contains nodules of caliche.....	12.5	15.0
Silt and sand, very fine to coarse, partly cemented, medium-brown.....	15.0	17.2
Caliche, hard, buff; contains streaks of sand, gravel, and silt.....	17.2	41.0
Caliche and siltstone, hard; contains very fine to coarse sand.....	41.0	47.7
Caliche and silt, soft.....	47.7	51.0
Silt, sandy, hard to soft; contains some caliche....	51.0	79.0
Sand, very fine, to gravel, medium, silty, slightly cemented.....	79.0	88.5
Caliche and silt; contains very fine to medium sand.	88.5	104.0
Sandstone, very fine to very coarse, gray-green; contains some very fine gravel.....	104.0	111.0
Sand, very fine, to gravel, medium, slightly cemented.....	111.0	115.0
Sand, very fine, to gravel, medium, silty.....	115.0	116.0
Sand, very fine, to gravel, medium, loose.....	116.0	121.0
Sand, very fine, to gravel, fine.....	121.0	129.8
Silt, clayey, buff.....	129.8	131.0
Silt; interbedded with siltstone and very fine to coarse sandstone.....	131.0	143.3
Silt, clayey, soft, light-brown; contains very fine to very coarse sand.....	143.3	161.0
Siltstone, tan; contains thin layers of caliche.....	161.0	171.0
Sandstone, very fine to fine; interbedded with siltstone and silt.....	171.0	181.0
Silt, clayey, hard; contains some caliche.....	181.0	189.0
Sand, very fine to very coarse, partly cemented; contains some silt and gravel.....	189.0	214.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, plastic, yellow to light blue-gray, and shale, yellow.....	214.0	217.0
Clay, plastic, dark-blue.....	217.0	221.0

5-36-4cbcb
152-42
Chase County

Location: NW SW NW SW sec 4-5N-36W, 300 ft N of railroad and 500 ft S of bridge, approximately 1900 ft N of SW cor sec
Ground elevation: 2970 ft (i) Wauneta West 7.5 minute quadrangle
Depth to water: Not measured
Note: Log #3, WSP #1, Part IV

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, fine.....	0.0	10.0
Sand and fine to medium coarse gravel, contains some limy fragments.....	10.0	30.0
Sand and gravel, gravel is medium to coarse, contains limy fragments; more sand below 40 ft, interval drilled slow.....	30.0	43.0
Tertiary System - Miocene Series - Ogallala Group:		
Lime rock, very hard.....	43.0	47.0

5-36-10bbbb1
151-42
Chase County

Location: NW NW NW NW sec 10-5N-36W, approximately 150 ft S of NW cor sec, 110 ft N of center of road
Ground elevation: 2955 ft (i) Wauneta West 7.5 minute quadrangle
Depth to water: Not measured
Note: Log #1, WSP #1, Part IV

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Loam, sandy, fine	0.0	5.0
Sand and fine to medium coarse gravel; contains some limy material and clay from 5 to 15 ft	5.0	25.0
Sand and gravel, gravel is fine to coarse, contains some limy grains; contains some clay below 69 ft	25.0	77.0
Clay, yellow, hard	77.0	83.0
Sand and gravel, some clay	83.0	92.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandrock, contains up to very coarse sand	92.0	116.0

5-36-10bbbb2
150-42
Chase County

Location: NW NW NW NW sec 10-5N-36W, approximately 230 ft S of NW cor sec, 30 ft N of center of road
Ground elevation: 2954 ft (i) Wauneta West 7.5 minute quadrangle
Depth to water: 4.7 ft 9/30/42
Note: Log #2, WSP #1, Part IV

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Loam, sandy, fine	0.0	5.0
Sand, with some medium to coarse gravel, contains some limy grains and clay	5.0	15.0
Sand and gravel, gravel is fine to medium, contains some limy grains; gravel is fine to coarse below 25 ft	15.0	35.0
Sand with fine gravel, contains limy grains	35.0	45.0
Sand and gravel, gravel is fine to coarse, contains limy grains; contains some clay below 68 ft	45.0	77.0
Clay, hard, yellow	77.0	83.0
Sand, gravel and clay	83.0	92.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandrock, sand is fine to very coarse, limy	92.0	116.0

5-36-12ccbb
149-42
Chase County

Location: NW NW SW SW sec 12-5N-36W, near NW cor sec, 138 ft S center of highway
Ground elevation: 2965 ft (i) Wauneta East 7.5 minute quadrangle
Depth to water: 45.4 ft 10/1/42
Note: Log #4, WSP #1, Part IV, samples examined

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, very slightly clayey, moderately sandy, sand is mostly very fine, light to medium brown-gray, very slightly calcareous.....	0.0	9.0
Silt, very slightly clayey, moderately to very sandy, sand is mostly very fine to fine, light yellow-brown, slightly calcareous, contains a few snail shell fragments and rare coarse sand and limy fragments.....	9.0	19.0
Silt, slightly clayey, moderately sandy, sand is mostly very fine, light medium brown, moderately calcareous; in part medium brown-gray and medium brown below 29 ft.....	19.0	39.0
Silt, very slightly clayey, very sandy, sand is mostly very fine to fine, very light yellow-brown, moderately calcareous, contains a few small lime cemented rootlets.....	39.0	57.0
Sand and gravel, common lithic limestone and sandstone grains; about 50 percent lithic gravel 73 to 83 ft and 93 to 97 ft.....	57.0	97.0
Tertiary System - Miocene Series - Ogallala Group:		
Siltstone-sandstone, sand is mostly very fine to medium, white, very calcareous.....	97.0	113.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Logged as "soapstone", sample inconclusive, probably a clay shale, very light gray to very light yellow-gray.....	113.0	129.0

5-36-12ddda
148-42
Chase County

Location: NE SE SE SE sec 12-5N-36W, approximately 600 ft S and 100 ft W of SE cor sec
Ground elevation: 2915 ft (i) Wauneta East 7.5 minute quadrangle
Depth to water: 9.7 ft 9/30/42
Note: Log #5, WSP #1, Part IV

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy.....	0.0	10.0
Sand and gravel, some lime grains.....	10.0	60.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand and lime.....	60.0	69.0

5-36-36ccc
19-FC-52
Chase County

Location: SW SW SW sec 36-5N-36W, drilled for U.S. Bureau of Reclamation, 1952.
Ground elevation: 3188.6 ft (i) Wauneta SE 7.5 minute quadrangle
Depth to water: 157 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, soft, tan	0.0	22.0
Silt, soft, tan; contains some caliche	22.0	36.0
Tertiary System - Miocene Series - Ogallala Group:		
Limestone, hard, buff and white	36.0	38.0
Caliche, hard to soft, buff to white	38.0	54.0
Silt, tan, and sand, very fine to very coarse, slightly cemented	54.0	76.0
Chert, glassy, translucent	76.0	77.0
Silt, light-brown; contains very fine to very coarse sand and caliche	77.0	112.0
Sand, very fine to very coarse; contains silt, caliche, and some very fine to medium gravel	112.0	122.0
Silt and siltstone; tan	122.0	132.0
Silt, cemented in layers; contains very fine to very coarse sand	132.0	142.0
Sand, very fine, to gravel, fine, silty	142.0	150.5
Silt, sandy; contains some caliche	150.5	161.5
Caliche, hard	161.5	162.0
Silt, sandy; interbedded with thin layers of fine sand and hard caliche	162.0	195.0
Sand, very fine, to gravel, medium, loose; contains some light-green silt	195.0	214.0
Clay, silty, hard, brown- to light-green; contains some caliche	214.0	223.5
Sand, very fine to medium, slightly cemented; interbedded with silt and caliche	223.5	231.5
Clay, hard, brown- to light-green; contains some very fine to medium sand and caliche	231.5	234.0
Clay, hard, light-green, and silt; contains very fine to medium sand and caliche	234.0	258.6
Sand, very fine to very coarse, silty, and silt, clayey, sandy	258.6	272.0
Clay, silty, dense, light-green to brown; contains very fine to coarse sand and caliche	272.0	292.0
Clay, hard, green to brown, and clay, sandy, hard, green to brown	292.0	305.5
Sand, very fine, to gravel, fine; contains green silt and clay	305.5	312.5

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

Clay, hard, plastic, yellow to light blue-gray.....	312.5	318.7

5-37-1cdba
153-42
Chase County

Location: NE NW SE SW sec 1-5N-37W, on east side of road and 500 ft N of bridge
Ground elevation: 3010 ft (i) Wauneta West 7.5 minute quadrangle
Depth to water: Not measured
Note: Log #7, WSP #1, Part IV

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very silty, sand is mostly very fine to medium with some coarser grains.....	0.0	11.0
Sand and gravel, gravel is mostly fine to medium, contains a few lithic calcareous grains.....	11.0	20.0
Silt, sandy and clayey, light gray, calcareous.....	20.0	22.0
Sand and gravel, gravel is fine to coarse, contains common lithic grains of Ogallala siltstone and sandstone.....	22.0	39.0

5-37-4dddd
248-42
Chase County

Location: SE SE SE SE sec 4-5N-37 W, near SE cor sec, 10 ft W of center of road
Ground elevation: 3042 ft (i) Enders 7.5 minute quadrangle
Depth to water: 8 ft 12/17/42
Note: Log #8, WSP #1, Part IV

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, very sandy, sand is mostly very fine to fine, dark brown-gray.....	0.0	8.0
Sand and gravel, gravel is mostly fine, contains some limy grains; gravel is fine to coarse below 18 ft.....	8.0	39.0
Tertiary System - Miocene Series - Ogallala Group:		
Limerock and sand.....	39.0	49.0

5-37-9aaa*
USBR 1-52
Chase County

Location: NE NE NE sec 9-5N-37W, drilled by U.S. Bureau of Reclamation, 1952 (samples studied by C.T. Jamison, Geologist, U.S. Bureau of Reclamation)
Ground elevation: 3057.6 ft (i) Enders 7.5 minute quadrangle
Depth to water: Artesian flow, February and March, 1952
Electric log
Note: Log first published in USGS Water-Supply Paper 1577, 1963; location given erroneously as bbc*

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, fine to medium silty, light-brown.....	0.0	7.0
Sand, fine, silty, dark-gray.....	7.0	20.5
Sand, fine to coarse, clean, brown.....	20.5	25.5
Sand, fine, silty, dark-gray.....	25.5	26.5
Sand, fine to coarse, clean, brown.....	26.5	29.3
Tertiary System - Miocene Series - Ogallala Group:		
Sand, fine to coarse, silty, gray; contains a few slightly cemented zones.....	29.3	44.7
Sand, fine to medium; contains some brown silt.....	44.7	46.0
Sand, medium to coarse, brown; contains small amount of gravel.....	46.0	52.8
Clay, buff; contains small amount of fine sand.....	52.8	57.8
Sandstone, hard, gray; contains a few soft seams....	57.8	61.6
Sand, fine, light-gray; contains a small amount of silt.....	61.6	65.3
Sand, fine, silty, gray.....	65.3	67.0
Sand, fine to medium; contains a few cemented zones.	67.0	69.5
Sand, fine, silty, light-green.....	69.5	74.0
Sand, fine to coarse, silty, gray.....	74.0	78.0
Sand, medium to coarse, clean, light-brown.....	78.0	83.4
Sand, fine to coarse; contains some brown silt.....	83.4	86.7
Clay, buff; contains small amount of sand.....	86.7	89.2
Sand, very fine, buff.....	89.2	90.8
Silt, light-green; contains large amount of chalk...	90.8	93.5
Sandstone, hard, gray.....	93.5	94.7
Sandstone, soft, gray.....	94.7	95.4
Sandstone, hard, gray.....	95.4	98.1
Sand, fine, light-brown; contains some silt.....	98.1	100.0
Sand, fine to medium cemented; contains some fine gravel; contains minor solution channels 1/16 inch in diameter.....	100.0	106.4
Sand, fine, silty, light-brown.....	106.4	112.2
Clay, buff.....	112.2	113.3
Sand, fine, silty, light-brown.....	113.3	124.9
Sand, fine, light-brown.....	124.9	127.3

Silt, light-brown	127.3	129.0
Clay, lean, light-brown	129.0	131.5
Sand, fine, silty, light-brown	131.5	147.4
Sand, fine, silty, gray; contains a few slightly cemented zones	147.4	152.5
Sand, fine, slightly cemented, gray	152.5	156.2
Sand, fine, silty, light-brown	156.2	158.0
Sand, fine to medium light-brown	158.0	162.5
Sand, fine to coarse, silty, light-brown	162.5	169.6
Clay, silty, gray	169.6	170.7
Sand, medium, light-brown	170.7	177.7
Silt; contains layers of medium to coarse sand; brown	177.7	182.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, weathered, yellow	182.0	184.0

5-37-31ccc
21-FC-52
Chase County

Location: SW SW SW sec 31-5N-37W
Ground elevation: 3347.9 ft (i) Ough 7.5 minute quadrangle
Depth to water: 188 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silty, clayey	0.0	4.0
Silt, clayey, soft, tan	4.0	62.0
Clay, silty, soft, tan	62.0	102.0
Silt, clayey; contains some sand and caliche	102.0	126.0
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, sandy, silty, soft to hard, buff to white	126.0	142.0
Caliche, sandy, white to buff; interbedded with thin streaks of very fine to very coarse sand	142.0	157.5
Sand, cemented	157.5	158.5
Caliche, sandy, white to buff; interbedded with thin streaks of very fine to very coarse sand	158.5	161.4
Sandstone, very fine to very coarse	161.4	163.0
Caliche, sandy, white; contains thin stringers of very fine to very coarse sand	163.0	185.0
Silt, sandy, calcareous	185.0	189.5
Caliche, silty, soft, white to buff	189.5	192.5
Caliche, silty, hard, white to buff; contains streaks of silty sand and clay	192.5	193.5
Caliche, silty, soft, white to buff	193.5	200.0
Caliche, silty, hard, white to buff; contains streaks of silty sand and clay	200.0	201.0
Caliche, silty, soft, white to buff	201.0	202.0
Silt, sandy, gravelly, calcareous; interbedded with caliche	202.0	214.5
Sand, very fine, to gravel, very fine, silty, calcareous, loose	214.5	219.0
Caliche, sandy, silty, hard, buff to white	219.0	232.0
Caliche, sandy, cemented in thin zones, buff to white	232.0	245.0
Sand, very fine to coarse, gravelly, calcareous, cemented in zones, light-green	245.0	255.2
Caliche, white; contains light-green very fine to coarse sandstone	255.2	260.0
Sand, very fine to medium	260.0	262.0
Calicho; interbedded with very fine sand and greenish-brown dense clay	262.0	272.0
Sand, very fine, to gravel, medium, greenish stain; interbedded with thin streaks of caliche	272.0	283.7
Silt, clayey, sandy, calcareous, hard	283.7	297.0

Sand, very fine, to gravel, fine, silty; contains nodules of caliche and thin streaks of green clay.	297.0	316.9
Clay, silty, brown	316.9	321.6
Caliche, soft white	321.6	323.0
Sand, very fine to very coarse, silty, calcareous	323.0	330.0
Silt, sandy, hard, gray	330.0	332.0
Silt, clayey, and sand, very fine to very coarse; cemented	332.0	337.0
Clay, silty, sandy, tan	337.0	351.5
Sand, very fine to coarse, silty, loose	351.5	367.5
Tertiary System - Oligocene Series - White River Group:		
Brule(?) Formation (possibly Chadron Formation):		
Clay, silty, hard, yellow to tan; contains sand	367.5	382.0
Clay, hard, yellow to tan	382.0	386.7
Clay, hard, dense	386.7	387.7
Clay, hard, yellow to tan	387.7	397.0
Clay, hard, yellow to tan; interbedded with layers of white to green caliche	397.0	402.0
Clay, hard, yellow to tan	402.0	405.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay and shale, ferruginous, hard, yellow to light-blue	405.0	422.4
Shale, hard, dark-gray	422.4	427.4

5-37-35ddd
20-FC-52
Chase County

Location: SE SE SE sec 35-5N-37W
Ground elevation: 3,262.1 ft (i) Wauneta SW 7.5 minute quadrangle
Depth to water: 196 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silty, dark-brown	0.0	4.0
Silt, soft, dark-brown to tan	4.0	52.0
Silt, soft, dark-brown to tan; contains clay	52.0	62.0
Clay, plastic, tan; contains some silt	62.0	82.0
Clay, plastic, tan, contains silt and very fine to coarse sand	82.0	92.0
Silt, soft, tan; contains very fine to coarse sand	92.0	112.0
Silt, cemented in thin zones, soft, tan; contains some very fine to coarse sand and caliche	112.0	138.5
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, soft, white to buff; contains very fine to coarse sand	138.5	152.0
Caliche, hard to soft; interbedded with brown silt; contains very fine to very coarse sand	152.5	163.5
Sand, very fine, to gravel, fine; loose	163.5	177.0
Silt, clayey, soft, tan; contains very fine to fine sand	177.0	182.0
Caliche, hard, buff; interbedded with brown hard clay	182.0	194.5
Caliche, hard, white; contains very fine to very coarse sand and thin layers of chert	194.5	202.0
Caliche, hard to soft, white to buff; contains very fine sand to very fine gravel	202.0	212.0
Caliche and siltstone; hard; contains very fine to very coarse sand	212.0	224.0
Sand, very fine, to gravel, very fine, loose; contains silt and streaks of caliche	224.0	231.0
Caliche and silt; contains very fine to very coarse sand	231.0	242.0
Sand, very fine, to gravel, medium, slightly cemented to loose; contains silt and streaks of green clay	242.0	262.0
Sand, very fine, to gravel, fine, loose	262.0	271.7
Caliche, hard, white to buff; contains very fine to very coarse sand	271.7	274.3
Sand, very fine, to gravel, medium, loose; contains green and brown silt	274.3	282.0
Silt, cemented in zones; interbedded with caliche and very fine to fine sand	282.0	302.0

Silt and caliche; contains very fine to coarse sand; interbedded with very fine to coarse sand.....	302.0	323.0
Sand, very fine to medium, loose; contains some cemented zones.....	323.0	328.0
Caliche, hard, white.....	328.0	329.2
Clay, silty, green; contains very fine to medium sand.....	329.2	338.0
Caliche and silt, hard, gray; contains very fine to medium sand.....	338.0	352.0
Silt, hard, gray; contains very fine to very coarse sand and brown, slightly cemented, very fine to very coarse sandstone.....	352.0	364.0
Caliche, hard.....	364.0	365.0
Silt, hard, gray.....	365.0	371.5
Sand, very fine to coarse, silty; interbedded with gray hard sandy clay and caliche.....	371.5	382.0
Sand, very fine to very coarse, silty, clayey, gravelly.....	382.0	392.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, plastic, tan, yellow, and light blue-gray with yellow stain.....	392.5	402.0

5-38-1cab
3-33
Chase County

Location: NW NE SW sec 1-5N-38W, east side of road
Ground elevation: approximately 3125 ft (t) Enders 7.5 minute quadrangle
Depth to water: Not measured
Note: No samples, Log #9, WSP #1, Part IV

	Depth, in feet From	To
Quaternary System, unidifferentiated:		
Soil, silty loam, dark gray.....	0.0	10.0
Gravel and sand, coarse and fine interbedded; well rounded grains, unconsolidated.....	10.0	15.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, fairly hard, fine grained; contains much magnesia.....	15.0	16.0
Limestone, hard, white; pure limestone.....	16.0	18.0
Limestone and clay, interbedded; tough, compact, hard light gray clay, about one foot of limestone and the one foot of clay, etc.....	18.0	30.0
Clay, tough, compact, silty, light pink to red.....	30.0	45.0

5-38-3bac
USBR 2-44
Chase County

Location: SW NE NW sec 3-5N-38W, 400 ft S and 800 ft E of NW cor sec
Ground elevation: 3182 ft (i) Enders 7.5 minute quadrangle
Depth to water: Not measured
Note: USBR Dam Site Test, Log 2-R, WSP #1, Part IV

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, blow	0.0	10.0
Sand, fine	10.0	34.0
Sand, blow	34.0	38.0
Sand and gravel	38.0	58.0
Tertiary System - Miocene Series - Ogallala Group:		
Lime	58.0	96.0

5-38-3bbad
2-33
Chase County

Location: SE NE NW NW sec 3-5N-38W
Ground elevation: approximately 3170 ft (t) Enders 7.5 minute quadrangle
Depth to water: Not measured
Note: No sample, Log #10, WSP #1, Part IV

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, fine, gray; blow sand, unconsolidated.....	0.0	25.0
Sand, coarse; unconsolidated, well rounded grains..	25.0	54.0
Tertiary System - Miocene Series - Ogallala Group:		
Limestone, hard, white; contains a high content of magnesia; cuts into small angular chips.....	54.0	56.0
Clay, compact, white; fairly soft, cuts into slabby chips.....	56.0	65.0
Sandstone, medium hard, consolidated, green; has a high magnesia content, fine grained.....	65.0	91.0
Clay, compact, tough, calcarecus, light gray; slightly silty.....	91.0	95.0
Clay, silty, compact, tough, light pink.....	95.0	103.0

5-38-3bcaa
1-33
Chase County

Location: NE NE SW NW sec 3-5N-38W
Ground elevation: approximately 3200 ft (t) Enders 7.5 minute quadrangle
Depth to water: Not measured
Note: No sample, Log #11, WSP #1, Part IV

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, fine, gray; blow sand, unconsolidated.....	0.0	32.0
Sand, coarse; well rounded grains and unconsolidated.....	32.0	57.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, fine grained, light grayish green; contains some coarse gravel and has a high magnesia content.....	57.0	75.0
Clay, compact, tough, calcareous, silty, light gray.	75.0	85.0

5-38-3bdbc
USBR 3-44
Chase County

Location: SW NW SE NW sec 3-5N-38W, 1600 feet S and 1500 ft E of NW cor sec
Ground elevation: 3193 ft (i) Enders 7.5 minute quadrangle
Depth to water: Not measured
Note: USBR Dam Site Test, Log 3-R, WSP #1, Part IV

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, blow	0.0	58.0
Sand and gravel	58.0	62.0
Tertiary System - Miocene Series - Ogallala Group:		
Lime, soft, sandy	62.0	74.0
Sand and gravel	74.0	89.0
Lime, soft	89.0	90.0
Lime, soft, sandy	90.0	110.0
Lime, soft	110.0	115.0

5-38-3bbdc
USBR 4-44
Chase County

Location: SW SE NW NW sec 3-5N-38W, 1900 feet S and 1700 ft E of NW
Ground elevation: 3137 ft (i) Enders 7.5 minute quadrangle
Depth to water: Not measured
Note: USBR Dam Site Test, Log 4-R, WSP #1, Part IV

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, fine	0.0	6.0
Sand and gravel	6.0	8.0
Mud, black	8.0	18.0
Sand, fine	18.0	27.0
Tertary System - Miocene Series - Ogallala Group:		
Sandstone, soft	27.0	60.0
Limestone	60.0	67.0
Clay, brown	67.0	73.0
Sandstone, soft	73.0	80.0
Clay, sandy, light	80.0	83.0
Limestone, soft	83.0	89.0
Sand and gravel	89.0	133.0
Sandstone, soft	133.0	150.0

5-38-3bdca
USBR 5-44
Chase County

Location: NE SW SE NW sec 3-5N-38W, approximately 2000 ft S and 1800 ft E of NW cor sec
Ground elevation: 3192 ft (i) Enders 7.5 minute quadrangle
Depth to water: Not measured
Note: USBR Dam Site Test, Log 5-R, WSP #1, Part IV

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Top soil	0.0	2.0
Tertiary System - Miocene Series - Ogallala Group:		
Lime, soft	2.0	5.0
Clay, brown	5.0	12.0
Lime, soft	12.0	15.0
Clay, brown	15.0	26.0
Lime, soft	26.0	30.0
Limestone, solid	30.0	40.0
Lime, very soft	40.0	50.0
Lime, soft	50.0	70.0
Conglomerate	70.0	78.0
Clay, brown	78.0	80.0
Lime, soft	80.0	87.0
Clay, brown	87.0	91.0
Lime, soft	91.0	97.0
Clay, brown	97.0	100.0

5-38-12babb
4-33
Chase County

Location: NW NW NE NW sec 12-5N-38W
Ground elevation: approximately 3150 ft (t) Enders 7.5 minute quadrangle
Depth to water: Not measured
Note: No samples, Log #12, WSP #1, Part IV

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, loosely consolidated loam, gray.....	0.0	10.0
Tertiary System - Miocene Series - Ogallala Group:		
Limestone, soft, crumbly, silty, sandy; has a high magnesia content, contains some gravel.....	10.0	35.0
Sand, highly compacted, consolidated, fine, silty, gray; cuts into large slabby chips.....	35.0	42.0
Clay, compact, hard, tough, pink to red.....	42.0	53.0
Clay, tough, compact, limy, chalky; contains no sand or silt, almost pure white in color.....	53.0	63.0

5-38-31ccc
22-FC-52
Chase County

Location: SW SW SW sec 31-5N-38
Ground elevation: 3303.6 ft (i) Champion SW 7.5 minute quadrangle
Depth to water: 32 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System - undifferentiated:		
Soil, silty, clayey, dark-brown	0.0	2.5
Silt, clayey, sandy, dark-brown	2.5	5.0
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, silty, sandy, soft, gray	5.0	17.5
Silt, sandy, soft, light-brown	17.5	25.5
Silt, clayey, sandy, light-gray; contains small limonitic concretions	25.5	31.8
Caliche, silty, sandy, soft	31.8	43.0
Sand, very fine, to very coarse, silty, gravelly; interbedded with clayey silt	43.0	47.5
Limestone, hard, dense, buff	47.5	50.5
Sand, very fine, to gravel, medium; loose; contains nodules of caliche	50.5	61.1
Clay, silty, sandy	61.1	62.0
Caliche, sandy, hard to soft, white, buff, brown	62.0	75.4
Silt, sandy, calcareous zones, medium-brown	75.4	84.5
Sand, very fine, to gravel, medium, partly calcareous	84.5	88.5
Caliche, hard, white	88.5	99.5
Chert, white	99.5	100.5
Silt, brown, and sand, very fine to coarse	100.5	102.5
Caliche, hard, white	102.5	116.0
Caliche, sandy, gravelly, hard, white	116.0	118.0
Clay, silty, sandy, medium-brown; interbedded with caliche	118.0	132.0
Caliche, sandy, hard to soft, buff to light-brown	132.0	142.0
Silt and sand, very fine, to gravel, fine, calcareous	142.0	153.0
Caliche, sandy, silty, gravelly, white to buff	153.0	158.0
Caliche, hard, white to buff	158.0	159.0
Silt, sandy, soft, medium-brown	159.0	162.0
Sand, very fine to fine, silty, hard, brown	162.0	172.0
Caliche, hard, white	172.0	173.5
Sand, very fine to fine, silty, hard, brown	173.5	186.0
Sand, very fine, to gravel, very fine; contains streaks of caliche; green	186.0	196.2
Silt, hard, brown	196.2	199.0
Sand, very fine to coarse, green; contains streaks of caliche	199.0	208.0

Sand, very fine to fine, silty, and caliche, hard, white	208.0	215.5
Caliche, hard, white	215.5	217.0
Sand, very fine to medium, hard, green	217.0	226.5
Sand, very fine, to gravel, very fine, calcareous to loose	226.5	239.5
Clay, silty, soft, green	239.5	241.0
Sand, very fine, to gravel, very fine, calcareous to loose	241.0	242.0
Sand, very fine, to gravel, very fine, green	242.0	250.5
Clay, silty, green	250.5	254.0
Sand, very fine, pink	254.0	269.8
Clay, silty, green; contains brown claystone	269.8	273.0
Sand, very fine to fine, cemented, pink and gray	273.0	282.0
Sand, very fine, to gravel, very fine, well-cemented, pink and green	282.0	292.0
Sand, fine, to gravel, fine, loose, green	292.0	300.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, limonite-stain, yellow	300.5	305.5
Shale, blue	305.5	312.0

5-39-31ccc
23-FC-52
Chase County

Location: SW SW SW sec 31-5N-39W
Ground elevation: 3395.5 ft (i) Reservoir Lake SE 7.5 minute quadrangle
Depth to water: 26 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silty, brown	0.0	3.0
Silt, sandy, tan	3.0	12.0
Caliche, soft, gray	12.0	15.0
Sand, very fine, silty, brown	15.0	18.0
Clay, silty, brown	18.0	22.0
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, sandy, gray	22.0	25.5
Sand, very fine, to gravel, medium, gray	25.5	37.5
Sand, very fine, calcareous, hard, green	37.5	48.0
Caliche, sandy, gray	48.0	51.0
Sand, very fine, silty, calcareous, tan	51.0	52.0
Siltstone, soft, brown	52.0	55.0
Sand, very fine, brown; contains streaks of hard clay	55.0	79.0
Sand, very fine; contains brown clay	79.0	87.0
Sand, very fine, to gravel, very fine	87.0	94.5
Clay, sandy, brown	94.5	97.5
Caliche, partly silicified, hard, white	97.5	104.5
Sand, very fine, calcareous, loose, tan	104.5	112.5
Caliche, soft, white	112.5	119.5
Sand, very fine, clayey, tan	119.5	124.5
Caliche, sandy, gray	124.5	126.0
Sand, very coarse, calcareous	126.0	137.2
Caliche, sandy	137.2	139.5
Sand, very fine, to gravel, coarse, black, well-cemented	139.5	143.5
Sand, medium to gravel, medium, loose, black	143.5	159.0
Caliche, sandy, hard, white	159.0	166.0
Sand, very fine to very coarse, silty	166.0	169.0
Caliche, hard, white	169.0	170.0
Sand, very fine, silty, tan	170.0	177.5
Sand, very fine to very coarse	177.5	179.0
Caliche, sandy, gray	179.0	180.0
Sand, very fine, silty, hard, tan	180.0	188.5
Caliche, sandy, hard, white	188.5	197.0
Caliche, cherry, very hard, white	197.0	203.0
Sand, very fine, to gravel, very fine, loose, gray	203.0	209.5

Sand, fine, to gravel medium; contains gray cemented layers of clay and caliche.....	209.5	232.0
Sand, very fine, to gravel, medium; contains green hard cemented layers.....	232.0	242.0
Sand, very fine, to gravel, fine; contains green lightly cemented layers.....	242.0	267.0
Clay, sandy, hard, red-brown; contains green hard claystone.....	267.0	278.0
Clay, sandy, hard, light-gray to tan.....	278.0	297.0
Claystone, hard, brown.....	297.0	305.2
Sand, fine, to gravel, very fine, loose, gray.....	305.2	309.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, limonite-stain, hard, yellow.....	309.0	315.0
Shale, hard, blue.....	315.0	322.0

6-36-11aad
7-FC-52
Chase County

Location: SE NE NE sec 11-6N-36W
Ground elevation: 2956.3 ft (i) Dittons Creek SE 7.5 minute quadrangle
Depth to water: 4.3 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine	0.0	5.0
Sand, very fine to fine; contains medium sand to fine gravel and some silt	5.0	27.0
Sand, very fine, to gravel, medium; contains nodules of caliche	27.0	41.0
Sand, very fine, to gravel medium	41.0	46.0
Tertiary System - Miocene Series - Ogallala Formation:		
Caliche, white, and sandstone, very fine, greenish-gray	46.0	53.0
Silt, clayey, sandy, white; interbedded with well cemented sandstone, fine, and light-brown plastic clay	53.0	62.0
Sand, very fine, to gravel, medium	62.0	71.0
Silt, soft, gray; contains some very fine sand	71.0	76.0
Sand, very fine, to gravel, medium	76.0	82.5
Sandstone, very fine to medium, greenish-gray to white	82.5	97.0
Silt, cemented in layers, tan; contains very fine to medium sand	97.0	111.0
Sand, very fine to gravel, medium, slightly cemented in layers	111.0	147.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, limonitic, plastic, yellow	147.0	151.0

6-37-33cccc
249-42
Chase County

Location: SW SW SW SW sec 33-6N-37W,near SW cor of sec, 50 ft E of center of highway
Ground elevation: 3071 ft (i) Enders 7.5 minute quadrangle
Depth to water: 25 ft 12/17/42
Note: Log #6, WSP #1, Part IV, samples examined

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, very sandy, sand is mostly very fine to medium, dark brown-gray.....	0.0	15.0
Silt, slightly to moderately clayey, medium dark brown-gray, slightly calcareous, contains snail and pelecypod shell fragments; probably grades into a sandy silt in lower part.....	15.0	25.0
Sand and gravel, gravel is fine to medium, rare lithic sandstone grains.....	25.0	42.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, calcareous, logged as sand, lime and clay.....	42.0	48.0
Sand, some gravel, sample mostly very coarse sand and fine gravel, pink.....	48.0	51.0
Sand, lime and clay, drilled hard.....	51.0	53.0
Sand and some gravel, some clay, considerable calcareous sandstone in sample; drilled hard 72 to 79 ft.....	53.0	72.0

6-38-21aaa
USBR 1-51
Chase County

Location: NE NE NE sec 21-6N-38W
Ground elevation: 3293.2 ft (i) Champion 7.5 minute quadrangle
Depth to water: 121 ft (1951)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, fine, well-sorted; contains very fine sand....	0.0	6.0
Caliche, soft, white.....	6.0	6.5
Sand, very fine; contains fine sand to medium gravel.....	6.5	19.5
Clay, silty, brown.....	19.5	23.0
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, soft, white.....	23.0	36.0
Sand, fine to medium; contains silt.....	36.0	43.0
Caliche, soft, white.....	43.0	46.0
Clay, brown; contains silt and sand.....	46.0	53.0
Sand, coarse, cemented with calcium carbonate.....	53.0	59.0
Clay, sandy, brown.....	59.0	63.0
Gravel, fine; contains very fine to very coarse sand.....	63.0	74.0
Clay, sandy, tan.....	74.0	76.0
Gravel, very fine to fine; contains fine to very coarse sand and medium gravel.....	76.0	86.0
Clay, sandy, light-brown.....	86.0	88.0
Sand, very coarse; contains very fine to coarse sand and very fine to medium gravel.....	88.0	91.0
Clay, brown; contains sand and silt.....	91.0	96.0
Sand, fine; contains very fine to very coarse sand and very fine to fine gravel.....	96.0	102.0
Caliche, soft, white.....	102.0	104.0
Clay, silty, brown.....	104.0	107.0
Caliche, hard, gray; contains fine sand.....	107.0	108.0
Gravel, very fine to fine.....	108.0	112.0
Clay, silty, brown.....	112.0	118.0
Sand, very fine to fine, tightly cemented.....	118.0	124.0
Clay, silty, calcareous brown.....	124.0	132.0
Caliche, very hard, white.....	132.0	135.0
Caliche, soft, white.....	135.0	149.0
Sand, very fine; contains fine sand and clay.....	149.0	159.0
Clay, silty, hard, tan.....	159.0	162.0
Sand, medium, calcareous; contains very fine to fine sand.....	162.0	173.0
Caliche, soft, white.....	173.0	182.0
Caliche, siliceous, hard, white.....	182.0	183.0
Sand, very fine, cemented with calcium carbonate....	183.0	194.0

Caliche, silty, hard, white	194.0	204.0
Sand, very fine, calcareous; contains silt	204.0	225.0
Clay, silty, calcareous, soft, gray-brown	225.0	235.0
Siltstone, tan; contains thin streaks of brown clay.	235.0	252.0
Sand, very coarse; contains very fine to medium gravel	252.0	261.0
Clay, sandy, calcareous, gray	261.0	289.0
Sand, very coarse; contains very fine gravel	289.0	299.0
Clay, sandy, soft, gray	299.0	304.0
Sand, medium to coarse, green; contains fine sand	304.0	322.0
Siltstone, hard, tan	322.0	326.0
Clay, silty, tan	326.0	327.0
Gravel, fine to medium	327.0	329.0
Clay, silty, tan	329.0	336.0
Caliche, hard, white	336.0	337.0
Sand, fine to very coarse, green; contains very fine sand	337.0	356.0
Clay, silty, tan	356.0	364.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, blue-gray	364.0	370.0

6-38-33adaa
USBR 1-44
Chase County

Location: NE NE SE NE sec 33-6N-38W, 1600 ft S and 300 ft W of NE cor sec
Ground elevation: 3195 ft (i) Chambers 7.5 minute quadrangle
Depth to water: Not measured
Note: USBR Dam Site Test, Log 1-R, WSP #1, Part IV

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, blow	0.0	7.0
Clay, sandy	7.0	15.0
Sand and clay	15.0	25.0
Sand, blow	25.0	49.0
Sandy and gravel	49.0	62.0
Tertiary System - Miocene Series - Ogallala Group:		
Lime	62.0	78.0
Sand, coarse	78.0	86.0
Lime	86.0	112.0

6-40-6bbb
27-FC-52
Chase County

Location: NW NW NW sec 6-6N-40W
Ground elevation: 3445.7 ft (i) Lamar 7.5 minute quadrangle
Depth to water: 39 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy; contains a little clay	0.0	2.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to very coarse, calcareous; contains some caliche	2.0	6.0
Caliche, buff	6.0	10.0
Sand, fine, to gravel, coarse, loose	10.0	30.0
Silt, sandy, partly cemented	30.0	32.0
Clay, sandy, gravelly, buff to brown; contains thin streaks of caliche	32.0	41.0
Caliche, sandy, gravelly, hard, buff	41.0	42.5
Clay, silty, sandy, brown; contains thin cemented zones	42.5	62.0
Clay, silty, sandy, brown; contains thin streaks of caliche and chert	62.0	72.0
Caliche, sandy, gravelly, hard	72.0	88.5
Chert, white	88.5	89.5
Clay, silty, sandy, light-brown	89.5	92.0
Caliche, sandy, gravelly, hard	92.0	123.0
Clay, sandy, gravelly, soft	123.0	131.5
Sand, very fine, to gravel, medium, loose	131.5	137.5
Clay, silty, hard, light-tan	137.5	166.0
Sand, very fine to very coarse; contains some gray clay	166.0	172.0
Clay, sandy, soft, light-green to tan	172.0	176.5
Clay, sandy, dense, dark-brown	176.5	182.0
Sand, very fine, to gravel, fine, calcareous	182.0	190.0
Caliche, sandy	190.0	194.5
Sand, coarse to very coarse, silty, loose; contains some gravel	194.5	201.7
Clay, silty, sandy, tan	201.7	208.0
Caliche, sandy	208.0	211.0
Sand, very coarse, to gravel, very fine, silty, loose; contains fine to medium gravel and very fine to coarse sand	211.0	229.0
Clay, silty, soft	229.0	232.0
Clay, silty, soft; contains thin streaks of sand and gravel	232.0	241.8
Sand, fine to very coarse; contains some gravel; interbedded with soft clay	241.8	252.0

Silt, sandy, tan.....	252.0	264.5
Sand, very fine, to gravel, fine, silty; interbedded with silt.....	264.5	274.0
Clay, plastic, tan.....	274.0	284.2
Sand, very fine, to gravel, fine, silty; contains some caliche and clay.....	284.2	310.0
Clay, silty, soft.....	310.0	312.0
Clay, silty, sandy, soft; interbedded with thin layers of sand and fine gravel.....	312.0	317.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, plastic, yellow, and shale, dark-brown.....	317.0	322.0

6-40-31ccc
26-FC-52
Chase County

Location: SW SW SW sec 31-6N-40W
Ground elevation: 3441.4 ft Arterburn Lake 7.5 minute quadrangle
Depth to water: 15 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, silty, light-brown	0.0	3.0
Clay, silty, sandy, dark-gray	3.0	12.0
Caliche, sandy, soft, light-gray	12.0	17.0
Clay, sandy, soft, tan	17.0	23.7
Sand, very fine, loose, tan	23.7	24.2
Caliche, sandy, soft, white	24.2	26.0
Clay, sandy, soft, tan	26.0	28.0
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, sandy, hard, white	28.0	39.0
Sand, very fine to medium, loose, tan	39.0	42.0
Caliche, soft, white	42.0	43.0
Clay, sandy, soft, gray	43.0	49.0
Sand, very fine to very coarse, cemented, brown	49.0	59.0
Caliche, sandy, hard, white	59.0	61.0
Sand, very fine, cemented, brown	61.0	70.0
Clay, very sandy, gray to brown	70.0	72.0
Caliche, soft, white	72.0	82.5
Sand, medium, to gravel, coarse, loose	82.5	88.0
Clay, silty, soft, green	88.0	94.5
Sand, very fine, to gravel, very fine, cemented, brown	94.5	100.0
Caliche, soft, white	100.0	101.0
Sand, very fine, cemented, green	101.0	102.0
Sand, very fine, cemented, brown	102.0	104.0
Sand, very fine, cemented, hard, brown; interbedded with sandy clay	104.0	110.0
Caliche, sandy, soft, light-gray to green	110.0	120.0
Sand, very fine, cemented, hard, gray	120.0	122.0
Sand, very fine, to gravel, very fine, loose, tan; contains thin streaks of caliche	122.0	134.0
Sand, very fine, to gravel, very fine, silty, loose, green	134.0	142.0
Caliche, hard, white	142.0	143.0
Sand, very fine, to gravel, very fine, loose, green stain	143.0	149.0
Sand, very fine; contains tan, hard, cemented streaks of caliche	149.0	152.0
Sand, very fine, cemented, hard, brown; contains streaks of clay	152.0	159.0

Sand, very fine, loose, tan.....	159.0	162.0
Sand, very fine, to gravel, very fine, silty, loose, red to buff.....	162.0	174.0
Sand, very fine, to gravel, very fine, silty, contains brown cemented streaks of clay.....	174.0	182.0
Clay, sandy, soft, red to tan.....	182.0	186.3
Clay, sandy, calcareous, soft, light-gray.....	186.3	195.5
Sand, fine, to gravel, medium-green.....	195.5	204.0
Clay, sandy, soft, tan.....	204.0	218.5
Sand, fine, to gravel, medium, loose, green.....	218.5	239.5
Clay, sandy, soft, tan.....	239.5	242.0
Sand, fine, to gravel, medium, loose, green.....	242.0	249.5
Clay, sandy, soft, tan.....	249.5	255.5
Sand, fine, to gravel, medium, loose, green.....	255.5	273.5
Sand, very fine to medium, silty, clayey, calcareous cement, soft, brown.....	273.5	292.0
Sand, very fine, to gravel, fine; silty, clayey, calcareous, lightly cemented, brown.....	292.0	304.7
Sand, fine, to gravel, fine; loose, dark-gray to black.....	304.7	313.0
Sand, very fine to fine, silty, calcareous, brown...	313.0	316.0
Clay, sandy, soft, tan.....	316.0	318.5
Sand, fine, to gravel, fine; loose, dark-gray to black.....	318.5	325.5
Sand, fine, to gravel, very fine; loose, dark-gray to black.....	325.5	331.5
Sand, very fine, to gravel, fine; silty, loose, brown; contains layers of caliche and clay.....	331.5	340.0
Tertiary System - Oligocene Series - White River Group:		
?Brule Formation:		
Clay and siltstone, very hard, cream to pink.....	340.0	349.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, limonite-stain, soft, yellow.....	349.0	352.0

6-40-36ddd
11-FC-52
Chase County

Location: SE SE SE sec 36-6N-40W
Ground elevation: 3394.3 ft (i) Reservoir Lake 7.5 minute quadrangle
Depth to water: 69 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to fine, silty	0.0	10.0
Sand, very fine, to gravel, very fine; frosted and well-rounded grains	10.0	11.0
Silt, sandy, tan	11.0	13.0
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, white	13.0	15.0
Silt and caliche; contains some cemented zones	15.0	31.0
Silt, sandy, tan and gray, and caliche	31.0	47.5
Sand, very fine, to gravel, fine; contains silt and caliche	47.5	56.5
Caliche, silty, sandy	56.5	61.0
Siltstone, sandy, and silt	61.0	71.0
Siltstone and caliche, hard to soft	71.0	84.5
Silt, sandy, hard, light-brown	84.5	92.0
Sand, very fine, to gravel, very fine, and caliche	92.0	94.0
Silt, sandy, hard, light-brown	94.0	103.5
Sandstone, very fine to fine	103.5	107.5
Silt, clayey, hard, gray	107.5	111.0
Silt and caliche, sandy	111.0	123.0
Caliche, hard to soft, gray with some yellow stain	123.0	126.2
Caliche, sandy, hard, gray	126.2	135.6
Caliche, sandy, soft, gray	135.6	141.0
Sandstone, very fine to coarse, greenish-gray, and caliche, gray	141.0	148.0
Sand, very fine, to gravel, fine, silty, calcareous	148.0	161.0
Caliche, sandy, and silt; contains some cemented zones	161.0	171.0
Silt, sandy, gravelly, hard; contains some cemented zones	171.0	207.0
Sand, very fine, to gravel, medium, loose	207.0	212.7
Silt, sand, gravelly, calcareous	212.7	227.0
Sand, very fine, to gravel, fine	227.0	235.5
Silt, sandy, gravelly; interbedded with sandstone	235.5	261.0
Sand, very fine, to gravel, medium, loose	261.0	264.0
Silt, sandy	264.0	269.0
Sand, very fine, to gravel, fine, loose; contains silt	269.0	279.0
Sand, very fine, to gravel, medium, slightly cemented	279.0	285.0

Silt, sandy, hard; contains some cemented zones.....	285.0	301.0
Silt, clayey, sandy; contains some cemented layers..	301.0	311.0
Silt, clayey, sandy, tan; interbedded with siltstone.....	311.0	323.5
Sand, very fine to very coarse, gravelly, greenish stain; contains fragments of limonitic shale.....	323.5	334.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, plastic, yellow, light blue-gray and pink; contains dark-brown shale.....	334.0	341.0

7-36-6bbb
3-FC-52
Chase County

Location: NW NW NW sec. 6-7N-36W
Ground elevation: 3205.1 ft (i) Dittons Creek 7.5 minute quadrangle
Depth to water: 76 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, silty, light-brown	0.0	0.8
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine; contains some fine sand	0.8	11:0
Caliche and clay; contains some medium sand to fine gravel	11.0	24.2
Caliche; contains slightly cemented, fine sandstone.	24.2	25.0
Sand, fine, to gravel, coarse, loose	25.0	39.7
Caliche, buff	39.7	41.0
Caliche, buff; interbedded with layers of white to light-brown, soft to hard clay	41.0	54.0
Sand, very fine, to gravel, medium	54.0	58.0
Clay, sandy, soft, light-brown	58.0	61.0
Clay, hard, light-brown; contains very fine to medium sand	61.0	83.0
Sand, very fine, to gravel, medium, loose; contains cemented streak at 96.5 ft	83.0	98.4
Sandstone, fine, and clay, hard, light-brown	98.4	104.0
Sand, very fine, to gravel, coarse, loose; contains some thin cemented streaks	104.0	124.4
Clay, sandy, medium-hard, light-brown	124.4	135.5
Sand, fine to coarse; interbedded with well-cemented sandstone, fine, and hard clay	135.5	142.6
Sand, very fine, to gravel, fine	142.6	145.0
Clay, sandy, soft, light-brown, and sandstone, fine	145.0	151.0
Silt, sandy, gravelly, light-brown and sandstone, fine, buff	151.0	160.3
Sand, fine, to gravel, medium, loose; interbedded with fine sandstone and white soft clay	160.3	169.0
Sand, fine, to gravel, medium; interbedded with thin layers of clay and sandstone	169.0	184.8
Caliche, hard, white, and silt, soft, buff	184.8	193.5
Clay, soft, white	193.5	199.0
Sandstone, very fine to medium, well-cemented, light-brown	199.0	201.0
Tertiary System - Oligocene Series - White River Group:		
?Brule Formation*:		
Silt, sandy, light-brown	201.0	206.0

Clay, silty, sandy, some cemented zones, white to buff.....	206.0	240.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, sandy, some limonite-stain, hard, yellow-brown.....	240.0	251.0

*Interval from 210 ft to 240 ft may be a part of the Ogallala Group

7-37-35daa
8-FC-52
Chase County

Location: NE NE SE sec 35-7N-37W
Ground elevation: 3085.7 ft (i) Dittons Creek 7.5 minute quadrangle
Depth to water: 21 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to fine; contains a small amount of buff silt	0.0	2.6
Sand, very fine to fine, medium-brown; contains some medium sand to fine gravel	2.6	4.5
Silt, soft, tan; interbedded with very fine sand to medium gravel and caliche	4.5	18.0
Sand, very fine, to gravel, coarse, loose; contains nodules of caliche	18.0	38.5
Sandstone, very fine to very coarse, silty, fossiliferous, light-brown	38.5	42.2
Caliche, silty, hard, and sandstone, very fine to very coarse, light-brown	42.2	48.7
Caliche, hard to soft, white	48.7	67.0
Sandstone and sand, very fine to coarse, green-brown; well-rounded grains	67.0	72.0
Silt, sandy, gray; interbedded with sandstone and caliche	72.0	79.4
Sand, very fine, to gravel, medium; loose	79.4	84.0
Caliche, sandy, buff, and silt, sandy	84.0	99.5
Silt, clayey, soft, light-brown	99.5	106.8
Sand, very fine to very coarse, silty, gravelly, loose	106.8	117.8
Silt, clayey, sandy, hard, tan to light-brown, and sandstone	117.8	133.0
Sand, very fine to very coarse, slightly cemented; interbedded with thin layers of white to brown soft clay	133.0	144.5
Sand, fine, to gravel, medium, loose	144.5	148.5
Silt, clayey, sandy, hard, brown	148.5	157.0
Sand, very fine to very coarse, silty, gravelly, loose	157.0	168.2
Sand, very fine to very coarse, silty, gravelly, cemented	168.2	171.0
Sand, very fine to very coarse, silty, gravelly, loose	171.0	178.0
Silt, sandy, gravelly, hard, brown	178.0	188.0
Silt, sandy, gravelly, cemented, hard, brown	188.0	189.0
Silt, sandy, gravelly, hard, brown	189.0	191.0
Silt, clayey, sandy, white	191.0	193.5

Sand, very fine, to gravel, medium; contains some clayey layers.....	193.5	218.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, some limonite-stain, plastic, tan.....	218.5	238.5
Clay, plastic, blue.....	238.5	241.0

7-38-2aaa
2-FC-52
Chase County

Location: NE NE NE sec 2-7N-38W
Ground elevation: 3274.7 ft (i) Imperial Muni. Airport 7.5 minute quadrangle
Depth to water: 78 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, medium-brown	0.0	1.2
Silt, sandy, light-brown	1.2	6.0
Clay, hard, medium-brown, and sand, very fine to fine	6.0	16.0
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, sandy, buff, and clay, sandy, soft, white	16.0	31.0
Clay, soft, white, and clay, hard, medium-brown; contains some sand and thin streaks of caliche	31.0	51.0
Clay, sandy, gray, and clay, sandy, medium-brown	51.0	54.0
Clay, sandy, hard, medium-brown	54.0	66.7
Sand, very fine, to gravel, medium, loose	66.7	77.3
Caliche, hard, light-brown	77.3	81.0
Caliche and clay, soft, sandy, light-brown	81.0	90.0
Clay, sandy, hard	90.0	92.7
Sand, fine, to gravel, medium	92.7	98.0
Clay, silty, hard, dark-brown	98.0	106.0
Clay, soft, white; contains some caliche	106.0	116.8
Sandstone, very fine to coarse	116.8	117.8
Clay, soft, white; contains some caliche	117.8	125.0
Clay, sandy, gravelly, brown	125.0	134.3
Clay, sandy, soft, white; contains some well-cemented zones	134.3	138.0
Silt and sand, very fine to coarse, gravelly	138.0	141.0
Sand, very fine, to gravel, medium	141.0	156.0
Caliche, hard, white	156.0	157.0
Clay, sandy, hard, gray	157.0	162.3
Clay, sandy, soft, white, and caliche	162.3	171.0
Sandstone, fine	171.0	177.2
Sandstone, fine, and clay, soft, gray	177.2	179.9
Sand, very fine, to gravel, fine	179.9	186.7
Clay, sandy, hard, light-brown; contains some cemented zones	186.7	189.0
Sand, medium, to gravel, medium, loose	189.0	198.4
Sand, medium, to gravel, medium, cemented	198.4	199.4
Sand, medium, to gravel, medium, loose	199.4	204.7
Clay, sandy, soft, white, and silt, sandy, hard, gray	204.7	225.5

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, fissile, yellow-brown, and clay, limonitic, hard, yellow.....	225.5	251.0
Clay, hard, plastic, blue.....	251.0	255.4

7-38-16ddd
USBR 2-51
Chase County

Location: SE SE SE sec 16-7N-38W
Ground elevation: 3288.2 ft (i) Imperial 7.5 minute quadrangle
Depth to water: 87 ft (1951)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silty, black	0.0	1.3
Tertiary System - Miocene Series - Ogallala Group:		
Silt, tan	1.3	6.0
Sand, very fine to medium	6.0	9.0
Caliche, soft, white	9.0	30.0
Silt, hard, tan; contains very fine sand and calcium carbonate	30.0	65.0
Sand, medium; contains very fine sand to fine gravel	65.0	70.0
Gravel, very fine to medium	70.0	72.0
Clay, silty, brown	72.0	87.0
Gravel, fine to medium	87.0	90.0
Caliche, hard, white	90.0	91.0
Clay, silty, brown	91.0	103.0
Caliche, hard, white	103.0	104.0
Clay, silty, brown	104.0	117.0
Caliche, hard, white	117.0	118.0
Clay, silty, brown	118.0	123.0
Siltstone, soft, brown	123.0	125.0
Caliche, hard, white	125.0	126.0
Gravel, very fine to medium	126.0	129.0
Sand, very fine; contains silt and fine sand	129.0	139.0
Sand, coarse; contains very fine sand to fine gravel	139.0	148.0
Caliche, soft, white	148.0	149.0
Gravel, medium, well-sorted; contains fine gravel	149.0	152.0
Caliche, hard, white	152.0	158.0
Siltstone, hard, green	158.0	160.0
Clay, silty, soft, green	160.0	163.0
Caliche, hard, white	163.0	165.0
Clay, sandy, green	165.0	179.0
Clay, silty, brown	179.0	196.0
Caliche, hard, white	196.0	198.0
Clay, silty, brown	198.0	203.0
Sand, very fine; contains fine sand to very fine gravel	203.0	212.0
Siltstone, hard, brown	212.0	252.0
Sand, fine; contains very fine to medium sand	252.0	258.0
Caliche, hard, white	258.0	259.0

Sand, very coarse, hard, cemented with calcium carbonate; contains medium sand to very fine gravel...	259.0	267.0
Caliche, hard, white.....	267.0	269.0
Sand, very fine, cemented with calcium carbonate; contains fine to medium sand.....	269.0	279.0
Caliche, hard, light-green.....	279.0	284.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
?Pierre Formation:		
Clay, sandy, hard, yellow.....	284.0	320.0

7-38-29cbbb
2-A-64
Chase County

Location: NW NW NW SW sec 29-7N-38W, approximately 2605 ft N and 112 ft E of SW cor sec
Ground elevation: 3291 ft (t) Imperial 7.5 minute quadrangle
Depth to water: 56.5 ft 7/9/64
Note: Log of observation well
Electric log, resistivity only

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, slightly sandy, sand is very fine to medium, dark brown; slightly calcareous below 1 ft, contains limy nodules.....	0.0	3.0
Silt, slightly clayey, moderately sandy, sand is very fine to medium, dark yellow-brown, very calcareous.....	3.0	5.5
Silt, slightly clayey, very sandy, sand is mostly very fine to fine, yellow-brown, reddish tint, moderately calcareous.....	5.5	6.0
Tertiary System - Miocene Series - Ogallala Group:		
"Caliche", sandy silt, carbonate cementation, very pale brown, very calcareous, moderate induration..	6.0	14.2
Silt, slightly clayey, very sandy, sand is very fine to fine, light brown, slightly calcareous.....	14.2	18.3
"Caliche", carbonate cemented silty sand, sand is very fine to medium with some coarse sand and gravel, very pale brown, very calcareous; moderate induration 19 to 20 ft.....	18.3	21.5
Silt, slightly clayey, sandy, sand is very fine to fine, light yellow to reddish brown, moderately calcareous, contains limy cemented areas; contains some medium to very coarse sand below 23.7 ft; very calcareous below 24 ft.....	21.5	25.0
Siltstone, sandy, sand is very fine to medium with some coarse to very coarse sand, very pale brown, very calcareous, contains limy cemented areas.....	25.0	28.0
Sand, some gravel, silty, sand is fine to very coarse, gravel is fine with some medium, very pale brown, very calcareous.....	28.0	30.0
Silt, slightly clayey, pale brown, slightly calcareous, contains limy areas; sandy below 31.5 ft, marly, moderately calcareous.....	30.0	32.5
Siltstone, sandy, sand is very fine to fine, pale brown; very calcareous below 34.5 ft.....	32.5	35.0
Siltstone-sandstone, sand is very fine to fine, very pale brown, very calcareous; contains some medium sand 36 to 40 ft.....	35.0	40.0

Siltstone, light brown, very calcareous.....	40.0	41.5
Siltstone-sandstone, sand is mostly very fine to fine, contains a trace of coarse to very coarse, light brown, very calcareous.....	41.5	42.5
Siltstone-sandstone, sand is mostly very fine to medium, light yellow-brown, very calcareous.....	42.5	45.3
Silt, slightly clayey, very sandy, sand is fine to coarse, yellow-brown, contains some soft to hard limy areas.....	45.3	50.0
Silt, moderately clayey, light yellow-brown, moderately calcareous.....	50.5	51.0
Silt, slightly to moderately clayey, very sandy, sand is very fine to very coarse, contains a little fine gravel, dark yellow-brown; light yellow brown below 53 ft, contains a few limy areas; slightly calcareous below 55 ft.....	51.0	59.0
Sand and gravel, sand is fine to very coarse, gravel is fine with some medium, approximately 50 percent gravel, slight limy cementation.....	59.0	66.0
Silt, moderately clayey, moderately sandy, sand is very fine to medium, light yellow-brown, slightly calcareous, contains limy nodular grains; slightly clayey, very sandy below 70 ft.....	66.0	72.2
Silt, slightly clayey, very sandy, sand is very fine to medium, yellow-to reddish brown, slightly calcareous; moderate induration, very calcareous 72.2 to 74.4 ft, very pale brown.....	72.2	75.0
Siltstone, moderately clayey, interbedded with silty sandstone, sand is very fine to fine with some medium, yellow-brown; very calcareous below 78 ft.	75.0	81.0
Silt, slightly clayey, very sandy, sand is fine to very coarse, very light brown.....	81.0	82.3
Sand, slightly clayey, sand is fine to very coarse, contains a trace of fine gravel.....	82.3	85.0
Sand, slightly gravelly, sand is fine to very coarse, gravel is mostly fine, approximately 20 percent gravel; contains some interbedded sandstone.....	85.0	90.0
Sand and gravel, gravel is fine with some medium, approximately 50 percent gravel, contains some limy cemented silty areas.....	90.0	103.0
Silt, slightly clayey, sandy, sand is mostly very fine to medium, contains some coarse to very coarse sand, very pale brown, moderately calcareous; moderate induration 105 to 106 ft; slightly calcareous 109 to 110 ft.....	103.0	116.0
Sand, some gravel, sand is mostly fine, slightly calcareous.....	116.0	117.0
Limestone, marly, white, very calcareous.....	117.0	118.5

Silt, slightly clayey, very sandy, in part indurated as sandstone, sand is mostly very fine to medium with some coarse to very coarse sand, whitish gray, very calcareous; contains some root-cast fragments below 121 ft.....	118.5	125.0
Sandstone, sand is very fine to fine with some medium, whitish gray, brown tint, very calcareous; moderate induration; marly in part 125 to 130 ft, contains rootlets; contains some medium to coarse sand below 130 ft; moderately calcareous below 135.5 ft, contains some very coarse sand and a trace of fine gravel.....	125.0	140.0
Sand and gravel, gravel is mostly fine to medium, 40 percent gravel; contains some coarse gravel below 145 ft, approximately 70 percent gravel.....	140.0	148.0
Sandstone-siltstone, sand is mostly very fine to fine, very calcareous; marly 148 to 148.4 ft; contains some medium to very coarse sand 150 to 153 ft and 154.5 to 155 ft.....	148.0	155.0
Silt, slightly clayey, very sandy, sand is mostly fine, very calcareous in upper part, slightly calcareous below; contains some coarse to very coarse sand below 160 ft.....	155.0	165.0
Silt, moderately clayey, moderately sandy, sand is very fine to fine, whitish gray; very calcareous, contains marl and limestone layers; slightly clayey, slightly sandy below 164 ft; contains very fine to medium sand below 170 ft.....	165.0	175.0
Sandstone, silty, sand is very fine to fine with some medium to coarse, very light gray, slightly calcareous.....	175.0	176.5
Silt, very clayey, in part slightly sandy, sand is very fine to fine with a trace of medium to coarse, very pale brown, slightly calcareous.....	176.5	178.5
Silt, slightly clayey, very sandy, sand is mostly very fine to fine, light yellow-brown.....	178.5	180.0
Sandstone, silty, sand is very fine to medium, whitish gray, very calcareous, slightly indurated.	180.0	185.0
Sand, silty, slightly clayey, sand is fine to very coarse.....	185.0	188.9
Silt, slightly clayey, moderately sandy, sand is very fine to fine, olive, contains some mica.....	188.9	190.0
Sandstone, silty, sand is very fine to fine, dark yellow-brown, slightly calcareous, contains limy cemented areas.....	190.0	192.6
Silt, slightly clayey, moderately sandy, sand is very fine to fine, light brown; contains some lime cementation 193.7 to 195 ft; some indurated layers below 195 ft, noncalcareous.....	192.6	197.5

Sand and gravel, gravel is fine to medium with some coarse, 60 percent gravel 197.5 to 210 ft; very little coarse gravel below 210 ft, gravel is mostly fine, 40 percent gravel; approximately 60 percent gravel below 220 ft; contains thin silty clay lens at 228.5 ft, light brown, slightly calcareous	197.5	230.0
Sandstone, sand is very fine to fine, some medium and a little coarse to very coarse sand, light yellow-brown, contains rootlets	230.0	235.0
Sandstone, sand is very fine to fine, pale brown, slightly calcareous	235.0	239.0
Silt, moderately to very clayey, very sandy, sand is mostly very fine, light yellow-brown, slightly calcareous, contains marly areas	239.0	240.0
Sandstone, silty, sand is very fine to coarse, light yellow-brown, contains some limy indurated areas	240.0	250.0
Sand, slightly gravelly, gravel is mostly fine, approximately 20 percent gravel	250.0	258.3
Sandstone, silty, sand is very fine to medium with some coarse, light yellow-brown, moderately to very calcareous, contains some rootlets to 259.8 ft; slightly clayey below 259.8 ft	258.3	264.7
Sandstone, silty, slightly clayey, sand is mostly very fine to fine, light yellow-brown, slightly calcareous; contains rootlets to 265 ft; moderate induration below 268 ft	264.7	270.0
Sand, fine to very coarse, contains a trace of fine gravel	270.0	272.5
Silt, slightly clayey, moderately to very sandy, sand is very fine to fine with some medium and a trace of coarse, pale brown, moderately calcareous; slightly calcareous below 280 ft, moderately sandy, yellow-brown	272.5	283.0
Siltstone, moderately clayey, moderately sandy, yellow, very calcareous	283.0	285.4
Silt, slightly clayey, very sandy, sand is fine to coarse, very pale brown, very calcareous; contains some very coarse sand and a little gravel below 290 ft, contains some lithic grains	285.4	293.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, pale olive; some yellow 295 to 300 ft; contains thin indurated calcareous layers 296.7 to 297, 298.6 to 299, 302.7 to 303, 304.3 to 304.4, 304.8 to 305 and several 306 to 313 ft; slightly calcareous below 313 ft; dark gray below 316.1 ft; contains some coarse silt to very fine sand layers 324.7 to 324.8 and below 325 ft	293.0	330.0

7-38-36ddd
9-FC-52
Chase County

Location: SE SE SE sec 36-7N-38W
Ground elevation: 3246.9 ft (i) Imperial Muni. Airport 7.5 minute quadrangle
Depth to water: 106 ft (1952)
Note: log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silty, sandy, brown	0.0	1.3
Silt, sandy, soft, buff, sand is very fine to fine, slightly calcareous	1.3	8.0
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, sandy, hard, buff to white; contains well-cemented zones	8.0	21.0
Caliche, sandy, soft to hard, white to buff	21.0	48.0
Silt and caliche, sandy, light-brown to gray	48.0	61.0
Silt, sandy, gravelly, tan	61.0	69.0
Sand, very fine, to gravel, medium, loose	69.0	71.0
Silt, sandy, light-brown	71.0	84.0
Sand, very fine, to gravel, medium, loose	84.0	87.0
Sand, very fine, to gravel, medium, silty	87.0	91.0
Sand, very fine, to gravel, medium, loose	91.0	96.5
Silt, clayey, sandy, soft, light-brown	96.5	115.0
Caliche and sand, very fine, to gravel, medium	115.0	117.0
Sand, very fine, to gravel, medium	117.0	121.0
Silt, clayey, sandy; contains slightly cemented zones	121.0	134.5
Clay, white	134.5	135.0
Silt, clayey, sandy; contains slightly cemented zones	135.0	141.5
Silt, sandy, soft, white to brown, and caliche, white	141.5	161.0
Caliche, sandy, gravelly, white, and silt, sandy, tan	161.0	168.8
Sand, very fine, to gravel, medium, loose	168.8	177.7
Silt, sandy, tan, and caliche	177.7	201.0
Caliche and silt, white to green-gray; contains very fine to very coarse sand and thin stringers of sandstone	201.0	212.0
Silt, clayey, hard, tan; contains sand and gravel; slightly cemented in zones	212.0	231.0
Silt, clayey, brown	231.0	237.0
Silt, clayey, brown; interbedded with very fine to very coarse sand	237.0	241.0
Sand, very fine, to gravel, fine, silty, loose	241.0	253.8
Silt, sandy, soft, buff	253.8	262.2

Sand, very fine, to gravel, fine, silty.....	262.2	270.0
Silt, sandy.....	270.0	271.0
Sand, very fine, to gravel, fine, silty.....	271.0	278.8
Silt, sandy, buff.....	278.8	281.0
Sand, very fine, to gravel, fine, silty.....	281.0	291.0
Sand, very fine, to gravel, medium, silty, interbedded with layers of silt.....	291.0	300.6
Tertiary System - Oligocene Series - White River Group:		
?Brule Formation*:		
Siltstone, clayey, in part sandy, sand is mostly very fine, light brown to light reddish brown, slight to in part moderately calcareous.....	300.6	321.0
Siltstone, clayey, slightly sandy, silt is fine to very coarse, sand is mostly very fine, light brown, slightly calcareous.....	321.0	341.0
Sandy clay or clayey sand, sand is fine to very coarse, yellow-brown, slightly calcareous, contains a few lithic clay and ironstone grains.....	341.0	352.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, plastic, yellow-brown, very slightly calcareous.....	352.0	356.0
Shale, clay, medium dark gray, slightly calcareous..	356.0	361.0

*Interval from 330.6 ft to 352 ft may be a part of The Ogallala Group

7-40-5bbc1
28-FC-52
Chase County

Location: SW NW NW sec 5-7N-40W
Ground elevation: 3463.6 ft (i) Lamar 7.5 minute quadrangle
Depth to water: 62 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silty, dark-brown	0.0	2.5
Silt, blocky, light-gray; contains streaks of organic material	2.5	4.0
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, sandy, buff; interbedded with light-brown plastic clay	4.0	27.3
Clay, sandy, plastic, light-brown; interbedded with thin streaks of plastic clay	27.3	46.0
Sand, fine to medium, calcareous	46.0	49.0
Clay, silty, sandy, soft, plastic, light-brown	49.0	56.0
Sand, fine to coarse, well-cemented; contains some caliche	56.0	66.0
Sand, fine, to gravel, medium, slightly cemented	66.0	69.5
Clay, silty, hard	69.5	71.0
Clay and caliche	71.0	76.0
Clay, soft, buff, and clay, hard, light-brown, silty	76.0	106.6
Caliche, hard, buff; interbedded with clay	106.6	125.0
Silt, clayey, and sand, fine to coarse	125.0	131.0
Silt, hard, and sand, cemented, very fine to coarse	131.0	146.0
Clay, soft, and sand, fine to coarse	146.0	150.0
Sand, medium, to gravel, fine	150.0	151.5
Clay, silty, soft, medium-brown	151.5	166.0
Clay and sand, fine to coarse	166.0	167.0
Sand, medium, to gravel, very fine, loose	167.0	171.0
Sand, medium, to gravel, medium, black and green	171.0	177.0
Clay	177.0	178.0
Sand, medium, to gravel, medium, black and green	181.0	181.0
Sand, very fine to medium, cemented	181.0	182.0
Caliche, silty, hard, green	182.0	184.0
Clay, silty, hard, medium-brown	184.0	192.0
Sand, very fine to medium	192.0	201.0
Silt, clayey, sandy	201.0	215.0
Caliche, hard	215.0	215.5
Sand, fine, cemented	215.5	219.5
Sand, fine, to gravel, medium	219.5	230.0

Brule(?) Formation*		
Silt, clayey, medium-brown	230.0	241.0
Sand, medium, to gravel, fine; interbedded with silt	241.0	250.0
Sand, fine, to gravel, very fine	250.0	260.5
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, limonitic, hard, yellow	260.5	275.5
Clay, soft, plastic, blue	275.5	276.5

*Interval from 230.0 to 260.5 ft is probably a part of the Ogallala Group and is not Brule

7-40-5bbc2
28-AFC-52
Chase County

Location: SW NW NW sec 5-7N-40W
Ground elevation: 3462.6 ft (i) Lamar 7.5 minute quadrangle
Depth to water: 61 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil, silty, dark-brown; contains streaks of organic material	0.0	1.5
Silt, sandy, light-brown	1.5	5.0
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, sandy, well-cemented, hard, buff	5.0	8.0
Caliche, sandy; interbedded with thin layers of light-brown, soft, sandy, gravelly clay	8.0	11.0
Clay, soft, yellow-brown, and silt, soft	11.0	14.0
Sand, fine, to gravel, medium	14.0	24.1
Clay, silty, medium-hard, light-brown; interbedded with light-brown caliche	24.1	36.5
Caliche, sandy, gravelly	36.5	40.0
Clay, hard, light-brown; interbedded with thin layers of soft clay and silt	40.0	51.0
Silt, clayey, sandy	51.0	57.0
Sand, very fine, to gravel, medium; loose	57.0	66.1
Clay, hard, medium-brown	66.1	81.0
Clay, hard; contains fine sand; interbedded with caliche	81.0	91.0
Caliche and sand, very fine to coarse	91.0	97.0
Sand, very fine, to gravel, fine, loose	97.0	101.0
Caliche, hard; interbedded with thin beds of white soft clay	101.0	117.5
Sand, very fine, to gravel, fine, slightly cemented.	117.5	121.1
Caliche, soft to hard, buff to light-brown	121.1	132.3
Sand, fine, to gravel, medium, calcareous; interbedded with light-brown soft clay	132.3	141.0
Clay, silty, sandy, gravelly, soft	141.0	148.5
Sand, fine, to gravel, medium, loose	148.5	152.4
Clay, sandy, hard	152.4	160.5
Sand, fine to coarse, loose	160.5	165.3
Clay, sandy, hard, medium-brown; interbedded with white soft clay	165.3	171.0

7-40-12aaa
1-FC-52
Chase County

Location: NE NE NE sec 12-7N-40W
Ground elevation: 3399.3 ft (i) Chase 7.5 minute quadrangle
Depth to water: 57 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silty, sandy, dark-brown	0.0	1.5
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, silty, medium-hard, buff	1.5	2.0
Caliche, sandy, hard, buff	2.0	13.2
Clay, sandy	13.2	16.0
Sand, very fine to medium; interbedded with hard caliche	16.0	20.0
Caliche, hard, buff	20.0	21.0
Sand, medium, slightly cemented; interbedded with caliche	21.0	23.0
Sand, medium to coarse; interbedded with caliche	23.0	29.5
Clay, sandy, soft, medium-brown	29.5	31.0
Caliche, soft to hard	31.0	32.0
Caliche, brown; interbedded with stringers of brown clay and thin beds of brown cemented coarse sand	32.0	41.0
Sand, fine to medium, medium-brown	41.0	51.0
Clay, sandy, light-brown	51.0	59.7
Sand, medium to coarse, pink; contains some very coarse sand to fine gravel	59.7	75.2
Clay, light-brown	75.2	83.0
Sand, fine to medium; contains thin stringers of caliche	83.0	96.1
Sand, fine to medium; contains some very fine sand	96.1	102.0
Clay, soft, light-brown	102.0	105.5
Sand, coarse; contains medium sand to fine gravel	105.5	111.0
Sand, fine to coarse	111.0	118.6
Clay, plastic, gray; contains some caliche	118.6	121.0
Sand, medium to coarse	121.0	122.5
Sand, medium, to gravel, fine	122.5	125.3
Sand, very fine to fine, cemented.,	125.3	129.5
Sand, medium; contains fine to coarse sand	129.5	130.5
Sand, coarse, to gravel, fine	130.5	131.0
Clay, hard to soft; contains cemented zones of sand	131.0	138.5
Sand, fine, cemented; interbedded with hard to soft clay	138.5	153.0
Sand, fine to medium, slightly cemented	153.0	155.0
Sand, fine, cemented	155.0	160.0

Sand, fine to medium, loose; interbedded with cemented layers; contains some coarse sand.....	160.0	176.5
Sand, very fine to coarse; contains very fine to medium gravel; bed grades downward from very fine to coarse.....	176.5	202.0
Sand, fine to medium, slightly cemented; contains some very fine sand.....	202.0	210.0
Sand, coarse, to gravel, very fine.....	210.0	223.7
Clay, silty, plastic, buff to light-brown.....	223.7	229.0
Sand, coarse; interbedded with buff plastic clay....	229.0	231.0
Sand, medium to coarse, loose to cemented; interbedded with buff plastic clay.....	231.0	261.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, sandy, plastic, yellow-brown.....	261.0	291.0
Shale, hard, plastic, dark-blue.....	291.0	301.0

7-40-36ddd
10-FC-52
Chase County

Location: SE SE SE sec 36-7N-40W
Ground elevation: 3378.1 ft (i) Chase 7.5 minute quadrangle
Depth to water: 52 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silty, clayey, dark-brown	0.0	1.5
Tertiary System - Miocene Series - Ogallala Group:		
Clay, silty, dark-brown	1.5	4.0
Silt, sandy, gravelly, tan	4.0	17.0
Silt, sandy, gravelly, tan; contains thin stringers of caliche	17.0	21.0
Silt and sand, very fine to very coarse; contains very fine to medium gravel	21.0	24.0
Caliche, hard, white	24.0	28.5
Silt, sandy, tan; contains cemented layers	28.5	31.0
Caliche, hard, white	31.0	37.3
Silt, sand, and caliche; contains slightly cemented zones	37.3	43.5
Silt, sand, gravelly, light-brown	43.5	53.0
Sand, coarse, to gravel, medium	53.0	55.0
Silt, sandy, gravelly, light-brown	55.0	61.5
Silt, soft; contains cemented zones	61.5	71.0
Silt, clayey, sandy, medium-brown; interbedded with caliche and siltstone	71.0	82.0
Sand, very fine, to gravel, coarse, loose	82.0	95.5
Silt, calcareous, hard; contains thin layers of siltstone	95.5	111.0
Silt, hard, and caliche, hard to soft, white	111.0	121.0
Caliche, soft to hard, white; interbedded with silt and greenish-gray, sandstone, fine	121.0	131.0
Caliche, soft to hard, white; interbedded with thin layers of sandstone	131.0	141.0
Caliche, white, and silt	141.0	146.0
Silt, sandstone and caliche; contains very fine to coarse	146.0	165.2
Sandstone, very fine to coarse; interbedded with stringers of silt and caliche	165.2	172.5
Caliche, sandy, hard, white	172.5	181.0
Sand and silt; calcareous	181.0	186.5
Caliche, sandy, hard, white	186.5	189.0
Silt and caliche, soft	189.0	194.0
Siltstone	194.0	195.0
Silt, sandy, hard, light-brown; contains some caliche	195.0	226.0

Sand, very fine, to gravel, medium, loose, green stain	226.0	235.5
Sand, very fine to coarse; contains very coarse sand to very fine gravel	235.5	241.0
Sand, very fine to coarse; contains very coarse sand to very fine gravel, silt, and caliche	241.0	251.0
Sand, very fine, to gravel, fine, loose, green stain	251.0	256.5
Silt, sandy, soft, buff	256.5	270.5
Sand, very fine to fine	270.5	276.0
Silt, sandy, hard, tan and buff; contains cemented zones	276.0	281.0
Sand, very fine to coarse, silty, and silt, sandy	281.0	299.0
Sand, very fine, to gravel, medium, loose	299.0	311.0
Sand, very fine, to gravel, very fine, silty	311.0	312.0
Silt, sandy	312.0	315.0
Sand, very fine, to gravel, very fine, silty	315.0	331.0
Sand, very fine to very coarse, loose, and silt, gravelly	331.0	351.0
Sand, very fine, to gravel, medium, silty, loose	351.0	381.0
Sand, very fine, to gravel, medium; interbedded with silt	381.0	386.6
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, yellow, and shale, dark-brown	386.6	399.5
Clay, plastic, blue	399.5	401.0

7-41-6aaaa
25-B-74
Chase County

Location: NE NE NE NE sec 6-7N-41W, 202 ft S and 6 ft W of NE cor sec
Ground elevation: 3547 ft (t) Amherst SE 7.5 minute quadrangle
Depth to water: 78.3 ft 8/14/74
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, dark brown, moderately calcareous below 0.7 ft.....	0.0	1.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, sand is fine to coarse, pale brown, moderately to very calcareous.....	1.0	2.3
Sandstone, moderately silty, sand is fine to very coarse, light pinkish brown, very calcareous; moderate induration below 4 ft; trace of fine gravel 5 to 18.2 ft; much coarse sand 18.2 to 20 ft; contains reddish brown silt layer 20 to 20.2 ft.....	2.3	20.2
Sandstone, sand is fine to very coarse, light brown, moderately calcareous; contains rare gravel grains, moderately to very calcareous.....	20.2	34.0
Sandstone, moderately silty, slightly clayey, sand is fine to very coarse, light brown; moderately to very silty below 35 ft.....	34.0	40.0
Sandstone, slightly silty, slightly clayey, sand is fine to very coarse, light brown, moderately calcareous; contains hackberry seeds below 95 ft, much coarse sand.....	40.0	50.0
Sand, fine to very coarse, some fine gravel, much coarse to very coarse sand.....	50.0	55.0
Sand and gravel, gravel is fine to medium, contains much very coarse sand and fine gravel; slightly more medium gravel below 60 ft, approximately 30 percent gravel; contains sandy silt layer at 73.5 ft, contains interbedded sandy silt layers 75 to 87 ft; some thin limy cemented areas 85 to 85.5 ft.....	55.0	87.0
Silt, very sandy, sand is fine to very coarse with some fine to medium gravel, light olive-gray, slightly calcareous.....	87.0	90.0
Sandstone, moderately silty, sand is fine to very coarse, very light brown to whitish gray, moderately to very calcareous; contains limy nodules; moderately well indurated below 95 ft.....	90.0	95.8

Sand, moderately silty, sand is very fine to medium with a trace of coarse to very coarse, very pale brown to whitish gray, moderately calcareous, contains limy nodules; indurated, very calcareous below 97 ft; contains slightly more very coarse sand and contains a little fine gravel below 100 ft; only slightly calcareous below 103 ft.....	95.8	107.5
Sand, moderately to very silty, sand is fine to coarse with a trace of very coarse sand and fine gravel, slightly calcareous; very silty below 113 ft; moderately calcareous below 127 ft; contains very sandy silt layers 135 to 136.5 ft.....	107.5	140.0
Sand, moderately silty, sand is fine to very coarse, in part slightly calcareous.....	140.0	142.0
Sand and gravel, gravel is fine to medium, in part slightly calcareous; contains thin silty layers 145 to 150 ft.....	142.0	161.7
Sand, some gravel, slightly silty, very slightly calcareous; contains interbedded very sandy silt below 165 ft.....	161.7	175.0
Silt, moderately sandy, sand is very fine to medium, slightly calcareous; very sandy 179.5 to 182 ft, moderately calcareous; reddish brown and white below 182 ft.....	175.0	185.0
Sand, slightly to moderately silty, sand is fine to coarse with a trace of very coarse; moderately calcareous; moderately to very silty below 188 ft, in part indurated as silty sandstone, very calcareous.....	185.0	189.5
Sand, fine to very coarse, contains a trace of fine gravel; slightly more gravel below 195 ft, slightly silty below 197.2 ft.....	189.5	200.5
Silt, moderately sandy, sand is very fine to medium, very light brown, moderately calcareous.....	200.5	203.5
Sand, slightly silty, sand is very fine to medium with a trace of coarse, moderately to very calcareous; contains interbedded sandy silt 205 to 206.5 ft; moderately silty below 206.5 ft, slightly calcareous.....	203.5	210.0
Sand, some gravel, gravel is fine, slightly calcareous; silty 214.8 to 216.9 ft; noncalcareous below 225 ft.....	210.0	230.2
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, mottled yellow and dark gray, noncalcareous; medium to dark gray below 252 ft.....	230.2	260.0

7-42-35dca
38-FC-52
Chase County

Location: NE SW SE sec 35-7N-42W
Ground elevation: 3551.5 ft (i) Amherst SE 7.5 minute quadrangle
Depth to water: 31 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silty, soft, dark-brown	0.0	2.0
Sand, very fine to coarse, silty, loose, tan	2.0	19.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sandy, soft, gray; contains pebbles of caliche	19.0	22.0
Sand, very fine, to gravel, very fine, loose, green.	22.0	27.0
Clay, silty, soft, gray; contains streaks of caliche	27.0	36.0
Sand, very fine, to gravel, coarse, loose, tan	36.0	43.0
Clay, silty, medium-hard, red-brown	43.0	52.0
Sandstone, silty; contains brown, very fine gravel.	52.0	56.0
Caliche, sandy, soft, white	56.0	63.0
Sandstone, silty, calcareous, hard, white to tan	63.0	73.0
Clay, sandy, soft, red-brown	73.0	81.0
Sand, very fine, to gravel, fine, loose, green	81.0	95.0
Clay and caliche, sandy, tan to white	95.0	102.0
Sandstone, very fine, silty, medium-hard, brown	102.0	106.0
Clay, silty, sandy, medium-hard, tan	106.0	111.5
Clay, hard, blocky, olive-green	111.5	115.0
Clay, silty, calcareous, hard, brown to gray; contains streaks of caliche	115.0	122.0
Clay, silty, calcareous, tan; contains sand and gravel	122.0	129.0
Sand, very fine, to gravel, fine; contains clay and caliche	129.0	131.0
Silt, clayey, sandy, light-brown	131.0	137.0
Sand, very fine, to gravel, medium, loose	137.0	143.0
Clay, silty, brown to buff; contains very fine to fine sand and caliche	143.0	148.0
Clay, silty, sandy, brown	148.0	153.0
Sand, very fine, to gravel, medium, loose	153.0	159.0
Silt, hard, tan; contains sand, clay, and caliche	159.0	163.5
Sand, very fine, to gravel, medium, loose	163.5	169.5
Clay, hard	169.5	170.5
Sand, fine to very coarse, loose; contains gravel	170.5	182.0
Sand, very fine to coarse, gravelly; contains thin streaks of silt and clay	182.0	192.0
Sand, very fine, to gravel, medium; loose	192.0	210.0
Clay, silty, sandy, calcareous, tan	210.0	216.5

Sand, very fine to very coarse, cemented zones; contains some silt and caliche.....	216.5	225.0
Clay, silty, sandy, tan.....	225.0	239.0
Sand, very fine, to gravel, very fine.....	239.0	251.5
Clay, silty, sandy, hard, tan to green.....	251.5	265.5
Sand, very fine to very coarse, loose.....	265.5	271.0
Caliche, hard, white, and hard sandy, silty clay....	271.0	275.0
Sand, fine, to gravel, fine, partly cemented.....	275.0	285.0
Clay, sandy, hard, tan.....	285.0	296.0
Clay, soft, white, and tan silt.....	296.0	302.0
Clay, hard, plastic, tan.....	302.0	306.5
Sand, very fine to very coarse, silty.....	306.5	312.0
Clay, silty, hard, tan.....	312.0	314.0
Sand, very fine to very coarse; contains caliche....	314.0	326.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, sandy, hard, plastic, yellow-tan.....	326.0	355.0
Clay, hard, plastic, blue to blue-gray.....	355.0	362.0

8-36-2aaaa
28-B-74
Chase County

Location: NE NE NE NE sec 2-8N-36W, 9 ft S and 248 ft W of NE cor sec
Ground elevation: 3279 ft (t) Dittons Creek NE 7.5 minute quadrangle
Depth to water: 163.9 ft 8/14/74
Electric log

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, moderately sandy, sand is very fine to fine with a little medium to coarse, dark brown.....	0.0	3.0
Sand, very fine to medium, much fine sand, light yellow-brown.....	3.0	5.0
Sand, very fine to coarse, much medium sand, contains rare very coarse sand grains; below 10 ft much fine to medium sand, rare gravel grains; below 15 ft contains 5 percent very coarse sand and fine gravel, contains a few lithic limy grains.....	5.0	16.0
Silt, slightly clayey, slightly sandy, sand is mostly very fine, light brown, moderately calcareous, contains soft and hard limy areas; moderately sandy 30 to 35 ft; very slightly clayey, slightly sandy 35 to 40 ft.....	16.0	40.0
Silt, slightly clayey to moderately clayey, slightly sandy, sand is mostly very fine, light medium reddish brown, slightly calcareous 43.5 to 48.5 ft, very light brown; slightly calcareous 48.5 to 52.5 ft; moderately to very calcareous and marly 52 to 60 ft, very pale brown.....	40.0	60.0
Silt, slightly clayey, slightly sandy, sand is very fine, light brown to very pale brown, slightly to in part very calcareous; marly 64.1 to 65 ft and 68.9 to 70 ft.....	60.0	70.0
Silt, slightly clayey, slightly sandy, sand is mostly very fine, light brown, slightly calcareous; limy nodules 75 to 82 ft, in part marly 82 to 85 ft, slightly to moderately sandy below 82 ft; contains limy nodules 95 to 105.5 ft.....	70.0	105.5
Silt, slightly clayey, slightly sandy, sand is mostly very fine, light brown, slightly calcareous; contains some marly areas.....	105.5	117.5

Silt, moderately clayey, slightly sandy, sand is mostly very fine, slightly to moderately calcareous; contains limy nodules 117.5 to 121.7 ft; light reddish brown, moderately calcareous 121.7 to 123.2 ft, light brown below 123.2 ft, slightly calcareous; light yellow-brown, moderately calcareous 126.1 to 126.3 ft.....	117.5	126.3
Silt, slightly clayey, slightly to moderately sandy, mostly very fine sand, light brown, moderately calcareous, contains rare medium sand grains; slightly to moderately calcareous below 130.4 ft, very pale brown; contains some very calcareous limy beds.....	126.3	138.5
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, moderately to very silty, sand is mostly very fine to fine, moderately calcareous, whitish gray to very pale brown; contains a little medium sand below 140 ft.....	138.5	145.0
Silt, very sandy, very light brown, sand is very fine to medium, much very fine to fine sand, very light brown, moderately calcareous, contains marly areas.....	145.0	146.5
Sand, slightly silty, sand is very fine to fine with some medium and rare coarse sand and gravel grains, light brown, moderately calcareous, slightly indurated; sample 150 to 155 ft has considerable moderately clayey and slightly sandy silt; sand is fine to very coarse below 155 ft, contains a trace of fine gravel.....	146.5	163.5
Sand and sandstone, slightly silty, sand is fine to coarse, whitish gray to very light brown, slightly to in part moderately calcareous, contains some siliceous rootlets.....	163.5	167.3
Sandy silt and silty sandstone interbedded, sand is mostly fine to very coarse, very light brown; slightly to moderately calcareous, contains some fine gravel 167.3 to 170 ft; sand is mostly very fine to fine 173 to 175 ft; contains some fine and a trace of medium to coarse gravel 180.5 to 181.7 ft.....	167.3	181.7
Silt, very sandy, sand is fine to coarse, contains a trace of fine gravel, light brown, slightly calcareous.....	181.7	185.0
Sand, fine to very coarse, contains some fine gravel; contains some fine to medium gravel 200 to 205 ft.....	185.0	206.0
Silt, moderately clayey, slightly sandy, sand is mostly very fine to medium, light olive-gray and light brown, slightly calcareous; mottled greenish gray and reddish brown below 210 ft; very slightly calcareous below 212.5 ft, contains limy nodules; reddish brown, slightly clayey below 218 ft.....	206.0	220.0

Silt, slightly clayey, very sandy, sand is fine to medium with a trace of coarse to very coarse, reddish brown, slightly calcareous.....	220.0	222.5
Sand, slightly silty, sand is very fine to very coarse, light reddish brown, very slightly calcareous, a few limy areas.....	222.5	225.3
Silt, slightly clayey, moderately to very sandy, sand is fine to medium with a trace of coarse, light brown, slightly calcareous; contains some fine grained limy cemented sandstone below 230 ft.	225.3	232.8
Silt, slightly clayey, very slightly sandy, mottled reddish brown and greenish gray, slightly calcareous; moderately clayey below 235 ft; contains hard limy layer 237.5 to 237.7 ft; slightly sandy below 237.7 ft.....	232.8	239.2
Silt, slightly clayey, slightly sandy, mottled reddish brown and greenish gray, noncalcareous; contains some limy siltstone layers below 248.5 ft.....	239.2	260.0
Silt, slightly clayey, moderately to very sandy, sand is very fine to fine with some medium, light reddish brown, slightly to in part moderately calcareous.....	260.0	267.5
Sand, moderately silty, sand is mostly very fine to fine, light brown, slightly calcareous; in part indurated and moderately calcareous below 270 ft..	267.5	275.0
Sand, fine to coarse, very slightly calcareous.....	275.0	277.0
Sand, slightly silty, sand is mostly very fine to fine, contains a trace of medium to coarse sand, light brown, in part slightly calcareous.....	277.0	280.2
Sandstone, slightly silty, sand is very fine to coarse, very light brown, very calcareous; contains some sandy silt below 280.8 ft, reddish brown.....	280.2	282.0
Silt, slightly sandy, sand is fine, reddish brown and olive-gray, moderately calcareous; contains some lime cemented sandy layers and greenish silty clay.....	282.0	286.0
Sand, moderately silty, sand is fine to coarse with a trace of very coarse, light brown, moderately calcareous; slightly silty, slightly finer grained below 290 ft, slightly calcareous.....	286.0	293.5
Sand, some gravel, gravel is fine to medium; slightly silty 295 to 298 ft.....	293.5	298.0
Sand, some gravel, very silty, contains some greenish gray clay; slightly clayey below 300 ft.....	298.0	305.0
Silt, slightly clayey, very sandy, sand is fine to coarse, light brown, slightly calcareous; light brown-gray below 320 ft; contains some interbedded silt below 325 ft; limy cemented in part below 332.5 ft.....	305.0	345.0

Sand, very fine to coarse, much medium; interbedded with some sandy to clayey silt below 345 ft, moderately calcareous	345.0	350.5
Sand, slightly silty, sand is fine to coarse, much medium sand; slightly indurated below 355 ft	350.5	358.0
Sandstone, sand is very fine to medium, much fine sand, light brown-gray, slightly calcareous	358.0	361.0
Sandstone, sand is fine to coarse, much medium sand, whitish gray to very pale brown, very calcareous, contains manganese staining; moderately silty below 365 ft, less indurated, moderately calcareous, pale brown; contains interbedded silt and limy cemented areas below 385 ft, contains lenses of fine to very coarse sand and fine gravel; contains some limy nodular areas below 390 ft, contains some reddish brown siltstone below 395 ft	361.0	400.2
Sand, moderately silty, sand is very fine to medium with a trace of very coarse, slightly to in part moderately calcareous, light brownish gray; slightly less silty below 405 ft	400.2	410.0
Sandstone, sand is very fine to medium, whitish to light olive-gray, moderately calcareous; mostly very fine to fine sand 415 to 418.3 ft; very calcareous below 417.5 ft; contains calcareous sandy silt below 420.3 ft	410.0	421.9
Sandstone, sand is mostly very fine to fine sand, light brown, moderately calcareous; interval contains some unconsolidated fine to coarse sand	421.9	425.0
Sand, slightly silty, sand is very fine to coarse, light brown, in part limy cemented; contains some very coarse sand below 435 ft; contains some silty layers and limy nodules below 438 ft	425.0	440.0
Silt, clayey, mottled reddish brown and light green, in part slightly calcareous, contains bone and seed fragments	440.0	445.0
Sand, moderately to very silty, sand is fine to coarse, contains limy cemented area; sand is medium to very coarse with some fine to medium gravel below 450 ft, contains silt lenses 450 to 455 ft and 462.5 to 470 ft; slightly silty 470 to 472.5 ft, contains limy nodular areas	445.0	480.0
Sand, slightly silty, sand is fine to coarse with a trace of very coarse, slightly calcareous; contains a trace of fine gravel below 485 ft; contains some white clayey siltstone below 490 ft	480.0	492.5
Sand, moderately silty, sand is mostly fine to very coarse, slightly calcareous, contains lithic gravel grains of shale	492.5	506.5
Sand, slightly clayey, very silty, sand is fine to very coarse with a trace of fine gravel, grayish brown, slightly calcareous	506.5	515.0

Sand, slightly silty, sand is fine to very coarse with a trace of fine gravel.....	515.0	519.7
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, light yellow-gray, very slightly calcareous, common yellow mottling 520 to 525 ft; mostly dark gray below 525 ft.....	519.7	530.0

8-39-1ccc
30-FC-52
Chase County

Location: SW SW SW sec 1-8N-39W
Ground elevation: 3364.0 ft (i) Imperial NW 7.5 minute quadrangle
Depth to water: 83 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 1963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silty, very sandy, brown	0.0	1.0
Sand, very fine to medium, silty, loose, tan	1.0	17.0
Sand, very fine to very-coarse, well-rounded grains, loose, tan	17.0	20.0
Tertiary System - Miocene Series - Ogallala Group:		
Caliche, sandy, soft, pink	20.0	23.0
Clay, sandy, hard, brown	23.0	24.0
Caliche, hard, gray	24.0	27.0
Sand, very fine, to gravel, medium, silty, loose, pink	27.0	37.0
Caliche, sandy, clayey, hard, gray to pink	37.0	45.5
Clay, silty, sandy, calcareous, hard, tan	45.5	66.0
Sand, very fine, to pebbles, silty, loose	66.0	72.0
Sand, very fine, to gravel, medium, cemented, green.	72.0	84.0
Clay, silty, soft, brown	84.0	96.0
Clay, silty, calcareous, very hard, gray	96.0	103.0
Sand, very fine, to gravel, very fine; loose; green.	103.0	104.0
Caliche, silty, siliceous, very hard, white	104.0	106.5
Clay, silty, calcareous, hard, gray-green	106.5	115.0
Clay, silty, soft, brown	115.0	119.0
Sand, fine, to gravel, very coarse, loose, green	119.0	138.8
Clay, silty, soft, red-brown	138.8	145.0
Sand, very fine to medium, clayey, cemented, hard	145.0	149.0
Sand and gravel, gravel is fine to medium, rare pebbles	149.0	153.0
Tertiary System - probably Pre-Ogallala:		
Siltstone, slightly clayey, sandy, sand is mostly very fine, very light brown, contains limy areas	153.0	164.0
Silt, moderately clayey, in part sandy, sand is mostly very fine, medium reddish brown, slightly calcareous	164.0	174.0
Silt, moderately to in part very clayey, medium brown, slightly calcareous, contains some mica	174.0	184.5
Siltstone, very slightly sandy, whitish gray, very calcareous	184.5	195.0
Sandstone, sand is very fine to fine with some medium, brown, in part limy cementation, sand is mostly sub-rounded to well-rounded quartz	195.0	233.0

Silt, slightly clayey, very light olive to light yellow-gray, moderately to very calcareous, some induration as siltstone.....	233.0	242.0
Tertiary System - White River Group - Oligocene Series:		
Chadron Formation:		
Siltstone, moderately clayey, very light green-gray, essentially noncalcareous.....	242.0	272.0
Siltstone, very clayey, very light olive-gray, non-calcareous, moderately well indurated; in part very light brown below 282 ft.....	272.0	292.0
Siltstone, very clayey, very light olive-gray, contains a trace of very fine to fine sand; contains a thin very sandy clay layer 303 to 304 ft, gray..	292.0	304.0
Siltstone, clayey, in part very sandy, sand is very fine to fine, very light olive-gray, contains a little very light brown-gray.....	304.0	332.0
Clay, in part sandy, sand is very fine to fine, very light greenish gray with a little very light brown, reddish brown and yellow.....	332.0	349.0
Sand, fine to very coarse, sand is mostly clear quartz, grains are sub-angular to sub-rounded, contains a trace of lithic ironstone grains.....	349.0	357.0
Sand, fine to very coarse with some fine gravel, mostly clear quartz; sand is mostly fine to coarse below 357 ft.....	357.0	365.0
"Sandy clay, soft, green" - no sample available.....	365.0	369.0
Sand, fine to very coarse with a trace of fine gravel, mostly clear quartz, some smoky quartz and dark grains.....	369.0	377.0
Cretaceous System - Upper Cretaceous System - Montana Group:		
Pierre Formation:		
Clay, very light gray and very light yellow-gray, some red-brown stain; sample 382 to 389.5 ft was logged as clay, sample not conclusive.....	377.0	389.5
"Shale, hard, blue", small sample of medium dark gray clay, slightly indurated.....	389.5	392.0

Note: Samples below 149 ft described by V.H. Dreeszen, CSD, Jan 2000

8-41-1daa
29-FC-52
Chase County

Location: NE NE SE sec 1-8N-41W
Ground elevation: 3477.1 ft (i) Lamar 7.5 minute quadrangle
Depth to water: 94 ft (1952)
Note: Log first published in USGS Water-Supply Paper 1577, 19963

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, silty, dark-brown	0.0	0.5
Tertiary System - Miocene Series - Ogallala Group:		
Silt, sandy, clayey, calcareous, tan	0.5	7.0
Sand, medium, to gravel, very coarse; contains pebbles	7.0	14.5
Clay, sandy, soft, gray to brown	14.5	27.5
Sand, fine, to gravel, fine, loose	27.5	34.5
Clay, sandy, calcareous, hard, brown to gray	34.5	46.0
Sand, very fine, to gravel, very coarse, loose	46.0	69.0
Clay, sandy, soft, red-brown	69.0	84.0
Sand, very fine, to pebbles	84.0	94.0
Tertiary System - possibly Pre-Ogallala:		
Clay, sandy, hard, gray	94.0	96.0
Caliche, sandy, white, and sand, very fine, cemented; hard	96.0	114.0
Clay, sandy, soft, gray	114.0	118.0
Caliche, sandy, hard, white; contains streaks of hard, cemented, very fine sand	118.0	130.0
Sand, very fine, tightly cemented, tan	130.0	151.0
Clay, sandy, medium-hard, green	151.0	154.0
Sand, very fine, clayey, green-gray; contains layers of white hard caliche	154.0	176.0
Clay, sandy, hard, tan	176.0	187.0
Sand, very fine, clayey, cemented, brown; interbedded with streaks of white medium-hard sandy caliche	187.0	215.0
Tertiary System - Oligocene Series - White River Group:		
Chadron Formation:		
Siltstone, sandy, very hard, gray-green	215.0	257.0
Siltstone, clayey, hard, red	257.0	261.0
Sandstone, very fine to coarse, subrounded to rounded grains, very hard	261.0	289.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, sandy, limonite-stain, hard, orange; contains red and green mottled claystone, probably Pierre	289.0	296.0
Shale, hard, blue	296.0	312.0

8-41-6babb
26-B-74
Chase County

Location: NW NW NE NW sec 6-8N-41W, approximately 7 ft S and 1138 ft E of NW cor sec
Ground elevation: 3581 ft (t) Amherst NE 7.5 minute quadrangle
Depth to water: 127.5 ft 8/14/74
Electric log

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, sandy, dark brown-gray and brown, very calcareous, contains limy nodules.....	0.0	2.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, moderately silty, sand is very fine to coarse, very light brown, marly, very calcareous..	2.0	5.0
Sandstone, moderately silty, sand is very fine to fine with some medium, much very fine sand, very light pinkish brown and white, very calcareous, slight dark brown stain; very silty below 7 ft, pinkish white, contains limy nodular area.....	5.0	10.0
Siltstone, slightly sandy, sand is mostly very fine, pinkish white, very calcareous; contains a trace of fine to very coarse sand.....	10.0	12.0
Sand and gravel, moderately silty, gravel is mostly fine, brown, slightly calcareous; contains some medium to coarse gravel below 15 ft; very silty 23.8 to 24.2 ft; in part indurated below 24.5 ft..	12.0	30.0
Sandstone, sand is fine to very coarse, contains a little fine gravel, reddish brown, slightly calcareous.....	30.0	35.7
Silt, very sandy, sand is fine to very coarse, pale brown, slightly calcareous.....	35.7	36.7
Silt, slightly sandy, sand is mostly fine, pale brown, slightly calcareous; moderately sandy below 40 ft, sand is fine to medium with some coarse....	36.7	42.5
Sand and gravel, gravel is fine to coarse, rare pebbles, dark brown, very slightly calcareous, some induration.....	42.5	44.5
Silt, slightly clayey, very sandy, sand is fine to very coarse, brown, contains limy indurated areas.	44.5	57.0
Silt, slightly to moderately clayey, reddish brown, moderately calcareous; sandy below 59 ft.....	57.0	60.0
Sandstone, very silty, sand is mostly very fine to fine, brown, moderately to very calcareous, moderately indurated.....	60.0	61.5

Sand, very silty, sand is very fine to fine, reddish brown, slightly calcareous; interbedded with sandy silt and sandstone below 63.3 ft, moderately calcareous	61.5	65.0
Silt, moderately sandy, sand is very fine to medium, reddish brown, mostly noncalcareous	65.0	68.8
Sandstone, very silty, sand is very fine to medium with a little coarse to very coarse, light brown, very calcareous, moderately well indurated	68.8	70.0
Silt, very sandy, sand is mostly very fine to fine, light yellow-brown, slightly calcareous	70.0	73.0
Sand, very silty, sand is very fine to medium with a trace of coarse and very coarse sand, light brown, slightly calcareous; contains more coarse sand below 75 ft, moderately calcareous	73.0	77.0
Sandstone, moderately silty, sand is mostly very fine to fine with some medium and a few coarser grains, light brown; moderately to only slightly indurated	77.0	82.0
Sand, some gravel, gravel is fine to medium, color is red to greenish; gravel is mostly fine below 90 ft	82.0	95.8
Silt, slightly sandy, sand is very fine to fine, reddish brown and greenish gray; contains some thin limy areas below 98.5 ft; contains some medium to coarse sand and fine gravel below 99 ft.	95.8	100.0
Silt, moderately sandy, sand is mostly very fine to medium, light brown, slightly calcareous; limy cemented 102.4 to 103.5 ft	100.0	105.0
Sand, moderately to very silty, sand is mostly fine to coarse, light brown, moderately calcareous; contains seeds 110 to 120 ft; slightly calcareous 115 to 120 ft, contains a trace of fine gravel; reddish brown below 120 ft	105.0	124.5
Sand, slightly silty, sand is fine to very coarse, contains a little fine gravel, very slightly calcareous	124.5	130.3
Sandstone, sand is mostly very fine to medium, light brown, very calcareous; interbedded slightly to well indurated; contains thin intervals of loose fine to coarse sand	130.3	140.5
Sandstone, moderately to very silty, sand is very fine to fine with a trace of medium; contains some interbedded very sandy silt, all light brown and moderately to very calcareous; contains some seeds 140 to 151.5 ft	140.5	165.0
Sandstone, sand is very fine to medium, light brown, slightly calcareous	165.0	175.0
Sand, mostly very fine to fine, light brown, slightly calcareous, some limy cemented layers; moderately calcareous below 180 ft, slightly indurated as sandstone	175.0	188.0

Silt, very sandy, sand is very fine to medium, light brown, slightly calcareous.....	188.0	189.5
Sandstone, sand is very fine to fine, light brown, slightly calcareous, contains seeds; contains some interbedded sandy silt and coarser grained sandstone below 200 ft.....	189.5	210.0
Sandstone, slightly silty, sand is mostly very fine to fine with a little medium to coarse sand, light brown, very slightly calcareous.....	210.0	220.0
Siltstone, moderately sandy, sand is very fine to fine, light brown, slightly calcareous; contains some mottled greenish gray below 221 ft; slightly clayey, only induration below 225 ft, mostly greenish gray.....	220.0	229.0
Sandstone, slightly silty, sand is very fine to medium, greenish gray, slightly calcareous.....	229.0	235.0
Sand, fine to coarse, much medium and a trace of very coarse, light brown; moderately silty, slightly clayey below 238 ft, pale olive.....	235.0	240.0
Siltstone, moderately sandy, light brown, moderately calcareous.....	240.0	241.5
Sand, fine to very coarse, much coarse to very coarse sand.....	241.5	247.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, clay, bright yellow, noncalcareous; contains some white and light gray streaks below 255 ft; contains some light gray, lavender and red below 271.8 ft; very slightly calcareous below 275.5 ft.	247.0	283.0
Shale, clay, mottled light and dark gray; contains some thin ironstone layers below 295 ft; mostly dark gray below 286.5 ft.....	283.0	290.0