

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Conservation and Survey Division

Natural Resources, School of

2000

Arthur County Test Hole Logs

R. F. Diffendal Jr.

University of Nebraska-Lincoln, rdiffendal1@unl.edu

James W. Goeke

University of Nebraska-Lincoln, jgoeke1@unl.edu

Follow this and additional works at: <https://digitalcommons.unl.edu/conservationsurvey>



Part of the [Geology Commons](#), [Geomorphology Commons](#), [Hydrology Commons](#), [Paleontology Commons](#), [Sedimentology Commons](#), [Soil Science Commons](#), and the [Stratigraphy Commons](#)

Diffendal, R. F. Jr. and Goeke, James W., "Arthur County Test Hole Logs" (2000). *Conservation and Survey Division*. 490.

<https://digitalcommons.unl.edu/conservationsurvey/490>

This Article is brought to you for free and open access by the Natural Resources, School of at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Conservation and Survey Division by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

ARTHUR COUNTY Test-Hole Logs

Written in Part and Revised and Compiled in Part
from Previous Works

by
R.F. Diffendal, Jr.
and
James W. Goeke

**Nebraska Water Survey
Test-Hole Report No. 3**

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



September 2000



TABLE OF CONTENTS

UNIVERSITY OF NEBRASKA-LINCOLN CREDITS	iii
ACKNOWLEDGMENTS.....	iv
INTRODUCTION	v
SELECTED REFERENCES	xiii
TEST-HOLE LOGS TABLE OF CONTENTS (by legal description)	xiv
TEST-HOLE LOGS TABLE OF CONTENTS (by year drilled)	xvi
CAUTION, Readers Please Note	xviii
TEST-HOLE LOGS	beginning on page 1

FIGURES

FIGURE 1a	Test-hole location map of Arthur County	vi
FIGURE 1b	Test-hole location map of enlargement area in Arthur County	vii
FIGURE 2	Arthur County sample geophysical log (37-B-71)	viii
FIGURE 3	System for identifying test-hole according to its location	xii

UNIVERSITY OF NEBRASKA-LINCOLN CREDITS

UNIVERSITY OF NEBRASKA-LINCOLN

Harvey Perlman - Interim Chancellor

INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES

Edna L. McBreen - Interim Vice Chancellor

CONSERVATION AND SURVEY DIVISION

Mark Kuzila - Director

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

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

It is the policy of the Conservation and Survey Division, as it is of the University of Nebraska-Lincoln, not to discriminate on the basis of and to provide information and educational programs to all regardless of sex, age, handicap, race, color, religion, marital status, veteran's status, national or ethnic origin or sexual orientation.

Publication and price lists are furnished upon request.

September 2000

ACKNOWLEDGMENTS

The following persons performed important field and office tasks in connection with the test drilling: J. Boellstorff, H. P. Burleigh, R. C. Cady, J. L. Deffenbaugh, R. Diffendal, V. H. Dreeszen, E. A. Duncan, R. A. Engberg, M. Ginsburg, J. Goeke, E. D. Gordon, O. C. Hansen, H. A. Haworth, D. L. Hill, M. Johnson, C. F. Keech, L. Larson, R. C. Lawrence, A. L. Lugn, J. W. Nelson, H. W. Pinneker, O. J. Scherer, R. L. Schreurs, F. Smith, G. R. Svoboda, J. B. Swinehart, H. S. Unger, H. A. Waite, H. Williamson, and L. K. Wenzel. Many other persons contributed during short periods of time to the test-hole drilling, both in the field and in the office. The review, arrangement, and final assembly of all the data were performed principally by R. F. Diffendal, Jr., and J. W. Goeke. Typing was done by Melba Stemm. Ann Mack drafted the figures. Duane Mohlman aided in revision and production.

Logs of test holes published by the Conservation and Survey Division from the Logs of Test Holes, Keith and Arthur Counties, Nebraska (1953), and Hydrologic Data for the Southern Sand Hills Area (1986, U.S.G.S. Open-File Report #86-411) are included in this report with minor modifications.

INTRODUCTION

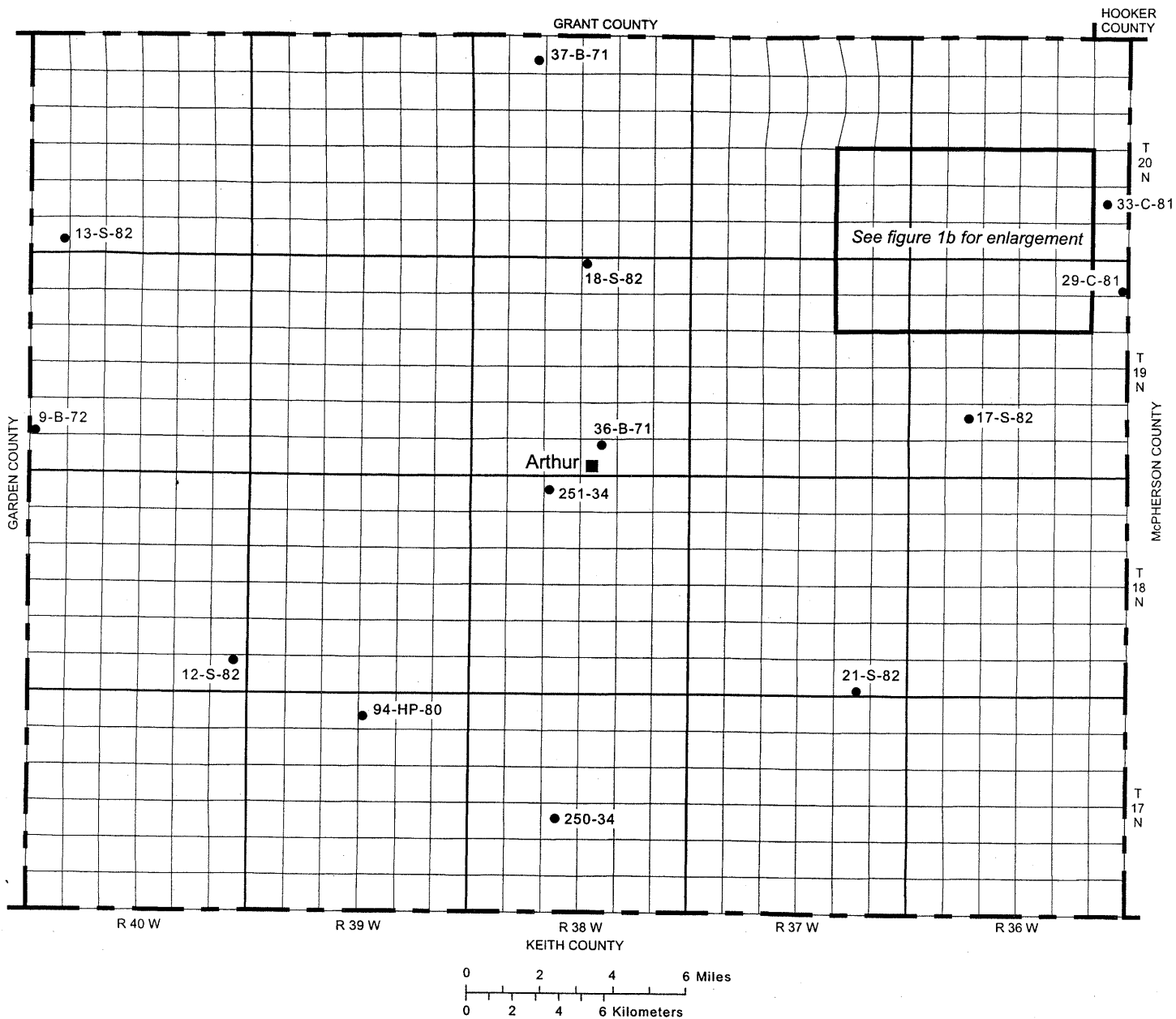
In 1930, the Conservation and Survey Division (CSD) of the University of Nebraska and the U.S. Geological Survey began a program of cooperative groundwater studies in Nebraska. Since then test drilling by use of rotary drilling equipment has been an integral part of that program. This report contains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

The maps in this report show the locations of all test holes drilled in the county since 1934 (Figure 1a-b).

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, cataloged, and stored. All samples are processed and kept on open file in the offices of the Conservation and Survey Division, 113 Nebraska Hall, University of Nebraska-Lincoln, 68588-0517.

Beginning in September 1951, some of the test holes have been logged electrically. Geophysical logs (e-logs) often can be used to determine formation boundaries more precisely than by field sampling, especially where differences in rock types from one formation to another occur at the boundary. Figure 2 is an example of geophysical logs of a test hole from Arthur County (37-B-71) with formation boundaries shown. Departures of the curves from the center lines generally indicate that the geologic unit is becoming coarser grained. A notation on each test-hole log indicates if geophysical logs are part of the original test-hole data in the CSD office in Lincoln, Nebraska.

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. In the case of Arthur County, descriptions of strata done in earlier test-hole reports are included with some revised formation information in this report.



● Test-hole description published in this report

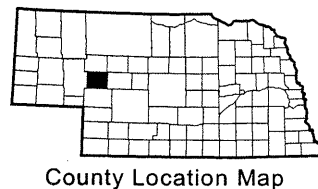
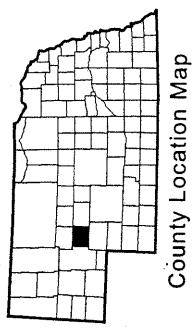
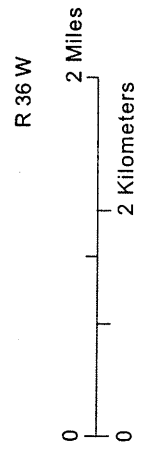
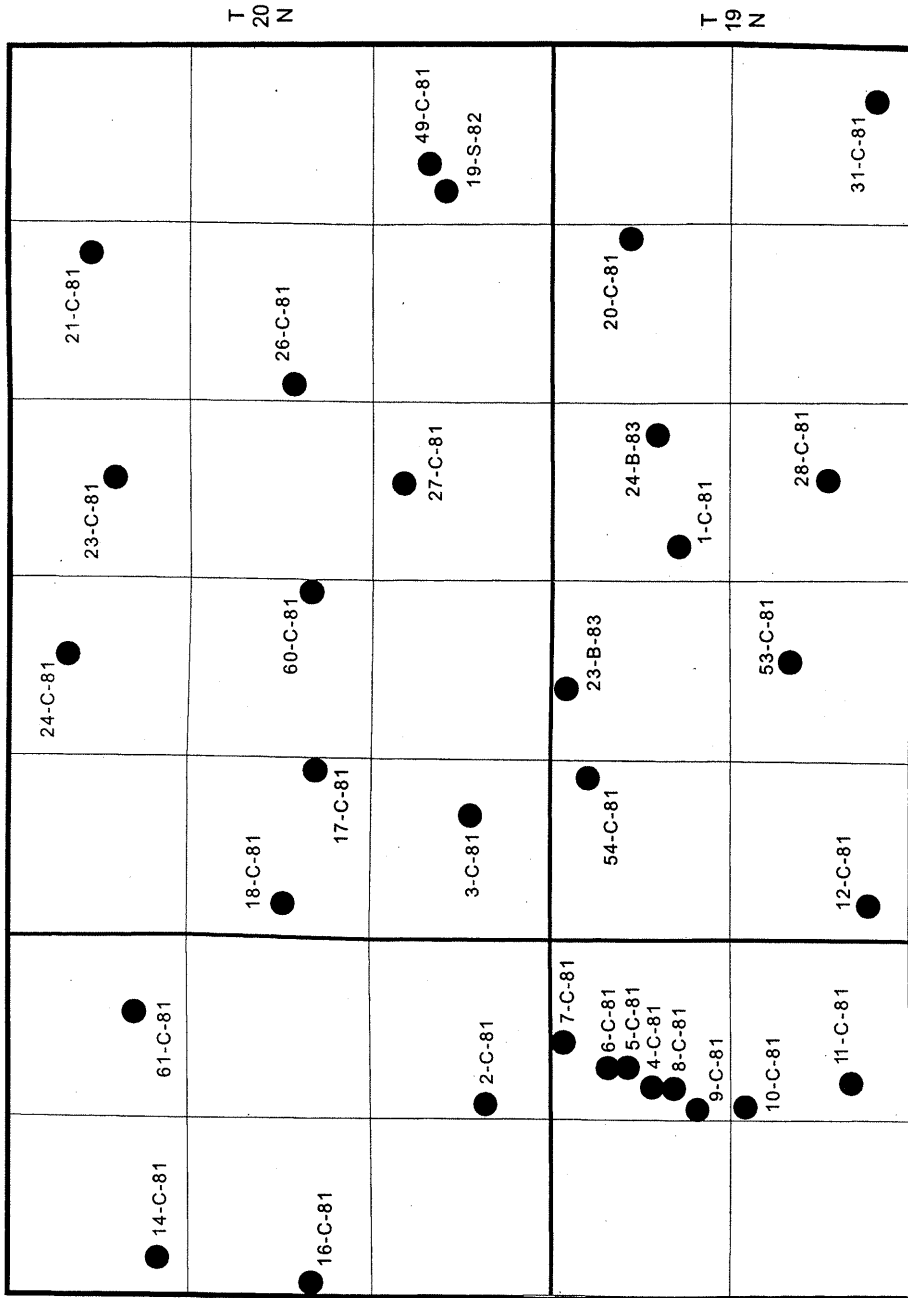


Figure 1a. Test-hole location map of Arthur County



● Test-hole description published in this report

Figure 1b. Test-hole location of enlargement area in Arthur County

Figure 2. Arthur County sample geophysical logs (37-B-71)

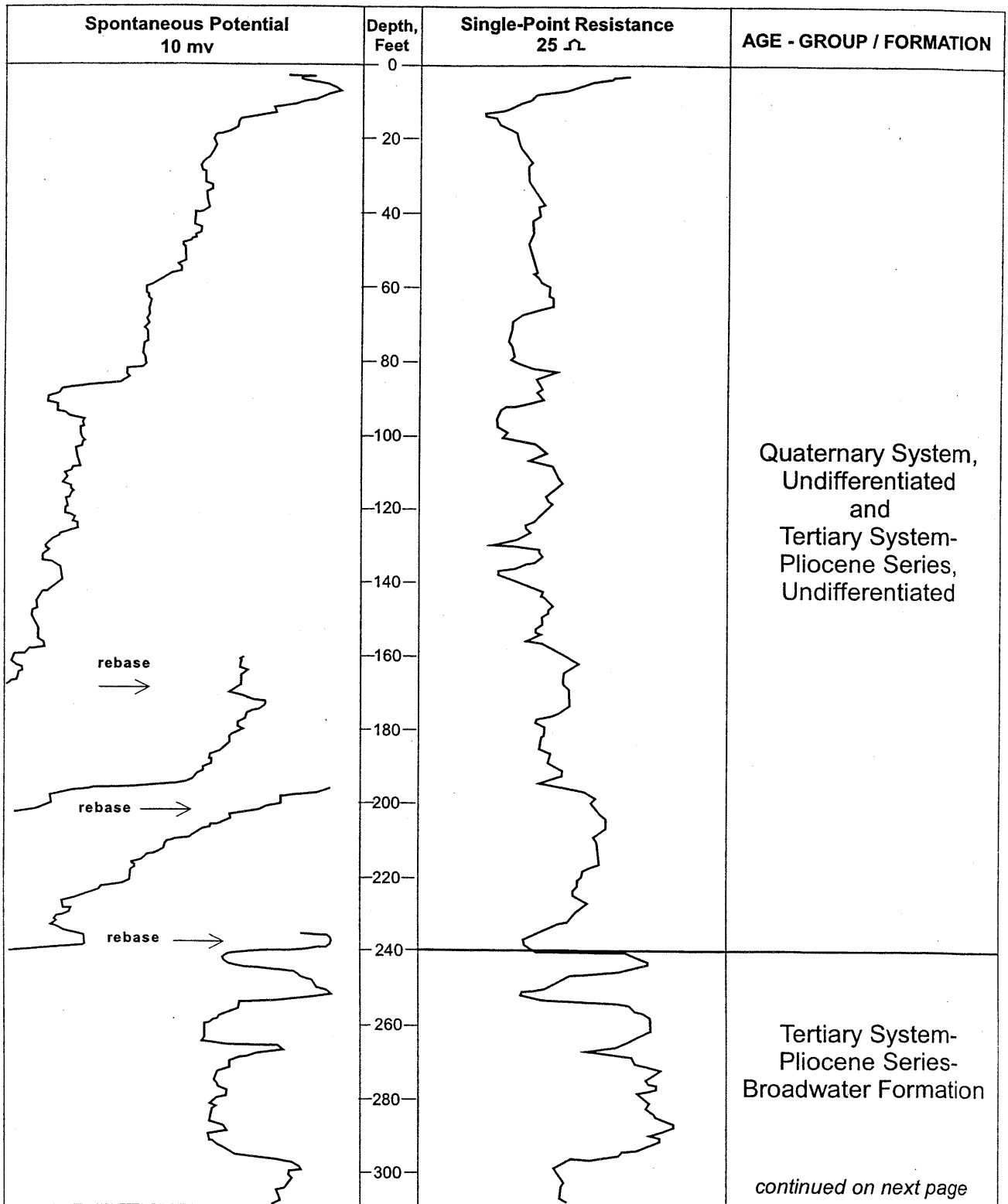
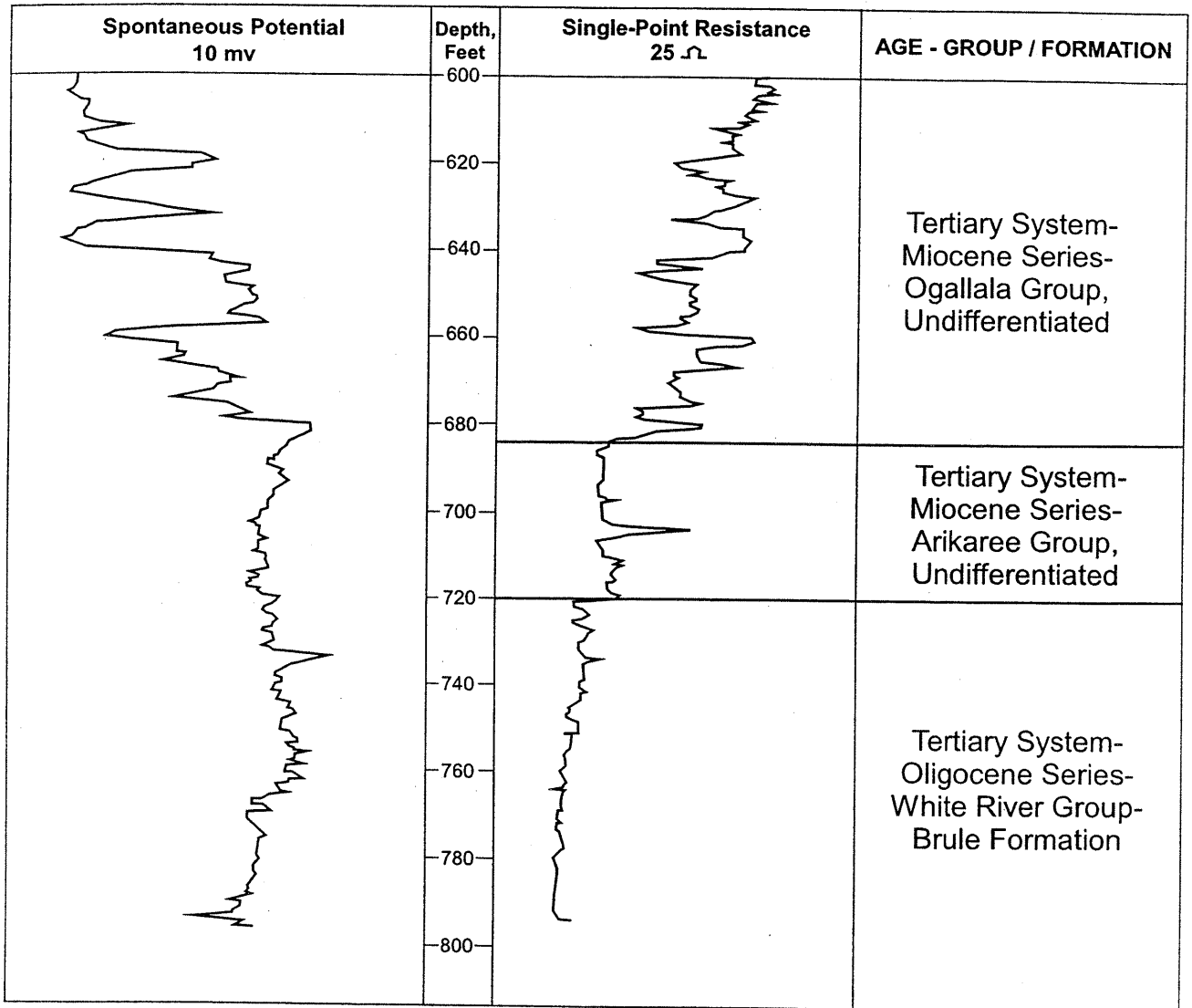


Figure 2 continued. Arthur County sample geophysical logs (37-B-71)



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

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

Each test hole is identified by a number assigned in the field (for example #07-C-81, #250-34), and also is 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 and so on to the quarter-quarter-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-quarter-quarter section if more than one well is present in that area. Figure 3 also shows the equivalent relationship between this system and the one used more commonly in Nebraska by citizens and many governmental units.

USGS test hole identification
5N-4E-15CADC

CSD test hole identification
SW SE NE SW Sec. 15, 5N, 4E

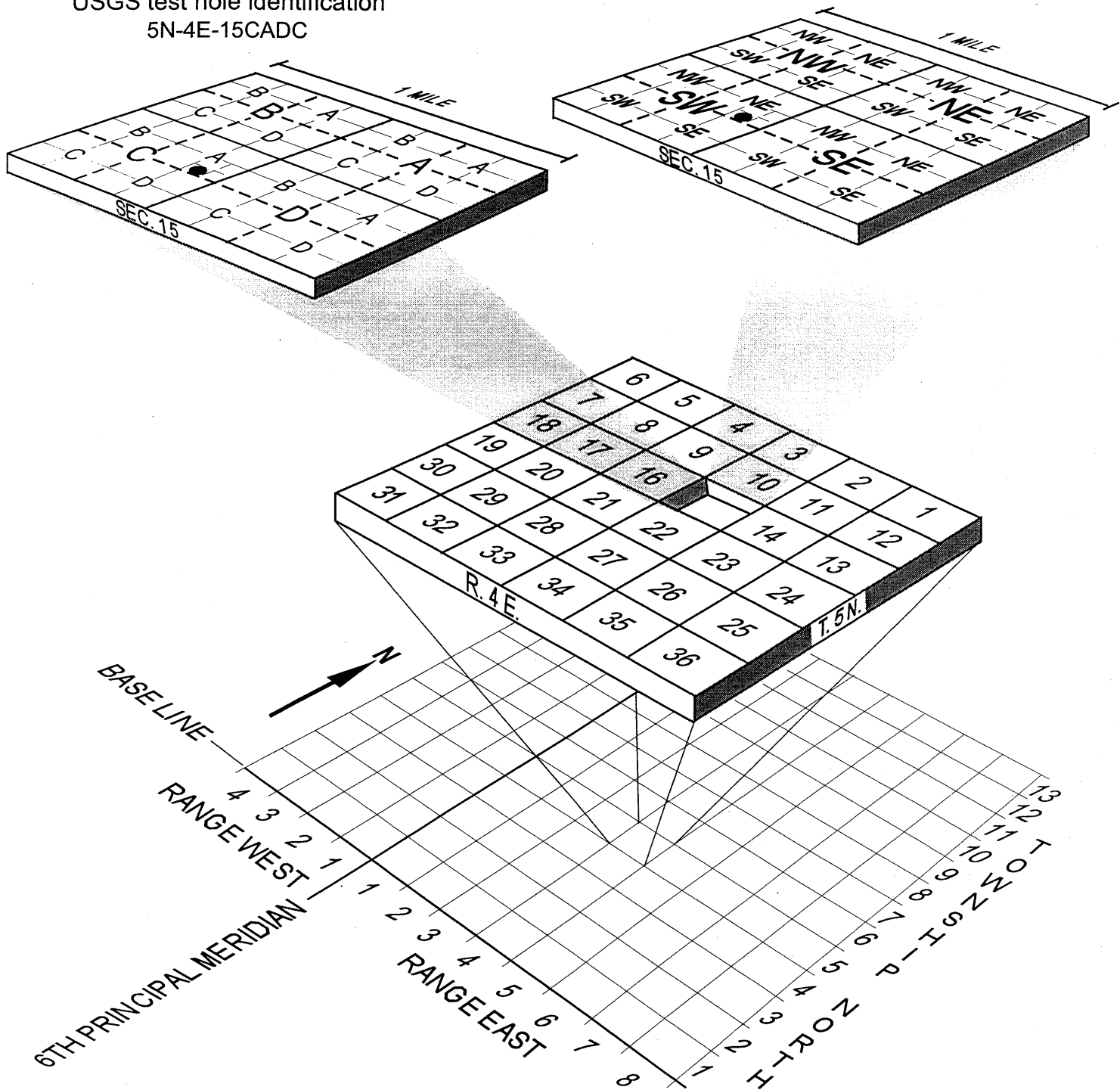


Fig. 3. System for identifying test-hole according to its location.

SELECTED REFERENCES

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

- Bleed, A.S. and C.A. Flowerday (eds.), 1998, An atlas of the Sand Hills: University of Nebraska, University of Nebraska, Conservation and Survey Division, Resource Atlas 5b, 260 p.
- Diffendal, R.F., Jr., 1991, Geologic map showing configuration of the bedrock surface, North Platte 1°x2° quadrangle, Nebraska: U.S. Geological Survey, Miscellaneous Investigations Map I-2277, 1 sheet, scale 1:250,000.
- Johnson, M. S., Goeke, J. W., and Engberg, R. A., 1986, Hydrologic data for the Southern Sand Hills Area, Nebraska: U. S. Geological Survey Open-File Report No. 86-411, 136 p.
- Swinehart, J.B. and others (Compilers) and G.M. Richmond (Editor), 1994, Quaternary geologic map of the Platte River 4°x6° quadrangle, United States: U.S. Geological Survey Miscellaneous Investigations Map I-1420, 1 sheet, scale 1:1,000,000.
- Yost, D. A. and Sherfey, L. E., 1977, Soil survey of Arthur and Grant Counties, Nebraska: U. S. Department of Agriculture, Soil Conservation Service, 51 p. + 122 maps.

**Arthur County
Test-Hole Logs Table of Contents**

Legal Descrip Twp Rge Sec	Test-Hole Number	Page
17N 38W 21BD	250-34	1
17N 39W 03CBCD	94-HP-80	2
18N 37W 35DCCA	21-S-82	4
18N 38W 04BC	251-34	6
18N 40W 36ABBB	12-S-82	7
19N 36W 01DDBA	29-C-81	9
19N 36W 03DAAA	20-C-81	10
19N 36W 04CBDA	01-C-81	11
19N 36W 04DABD	24-B-83	12
19N 36W 05BAAB	23-B-83	13
19N 36W 06AADC	54-C-81	14
19N 36W 07CCAB	12-C-81	15
19N 36W 08ACBD	53-C-81	16
19N 36W 09DBBA	28-C-81	17
19N 36W 11DCAA	31-C-81	18
19N 36W 29ACAC	17-S-82	19
19N 37W 01BAAA	07-C-81	21
19N 37W 01BDBA	06-C-81	22
19N 37W 01BDCB	05-C-81	23
19N 37W 01CBAA	04-C-81	24
19N 37W 01CBDB	08-C-81	25
19N 37W 01CCBA	09-C-81	26
19N 37W 12BBBB	10-C-81	27
19N 37W 12CBDD	11-C-81	28
19N 38W 03BBCC	18-S-82	29
19N 38W 34ABCD	36-B-71	31
19N 40W 30CCCC	09-B-72	34
20N 36W 20ACBA	24-C-81	36
20N 36W 21DBBC	23-C-81	37
20N 36W 22ADCA	21-C-81	38
20N 36W 25BDDA	33-C-81	39
20N 36W 27DBBD	26-C-81	40
20N 36W 29DADA	60-C-81	41
20N 36W 30CBAB	18-C-81	42
20N 36W 30DADA	17-C-81	43
20N 36W 31DBAD	03-C-81	44
20N 36W 33ABCB	27-C-81	45
20N 36W 35BCDD	19-S-82	46
20N 36W 35BDBD	49-C-81	48
20N 37W 23CCAD	14-C-81	49

20N 37W 24DBCB	61-C-81	. . . . .	50
20N 37W 26CDBA	16-C-81	. . . . .	51
20N 37W 36CBCA	02-C-81	. . . . .	52
20N 38W 05DAAA	37-B-71	. . . . .	53
20N 40W 31DADA	13-S-82	. . . . .	55

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

Arthur County
Test-Hole Logs Table of Contents

Arranged by year drilled, test-hole number.

1934

17N 38W 21BD	250-34	. . . . .	1
18N 38W 04BC	251-34	. . . . .	6

1971

19N 38W 34ABCD	36-B-71	. . . . .	31
20N 38W 05DAAA	37-B-71	. . . . .	53

1972

19N 40W 30CCCC	09-B-72	34
----------------	---------	-----------	----

1980

17N 39W 03CBCD	94-HP-80	2
----------------	----------	-----------	---

1981

19N 36W 04CBDA	01-C-81	. . . . .	11
20N 37W 36CBCA	02-C-81	. . . . .	. . .
20N 36W 31DBAD	03-C-81	. . . . .	44
19N 37W 01CBAA	04-C-81	. . . . .	24
19N 37W 01BDCB	05-C-81	. . . . .	23
19N 37W 01BDBA	06-C-81	. . . . .	22
19N 37W 01BAAA	07-C-81	. . . . .	21
19N 37W 01CBDB	08-C-81	. . . . .	25
19N 37W 01CCBA	09-C-81	. . . . .	26
19N 37W 12BBBB	10-C-81	. . . . .	27
19N 37W 12CBDD	11-C-81	. . . . .	28
19N 36W 07CCAB	12-C-81	. . . . .	15
20N 37W 23CCAD	14-C-81	. . . . .	49
20N 37W 26CDBA	16-C-81	. . . . .	51
20N 36W 30DADA	17-C-81	. . . . .	43
20N 36W 30CBAB	18-C-81	. . . . .	42
19N 36W 03DAAA	20-C-81	. . . . .	10
20N 36W 22ADCA	21-C-81	. . . . .	38
20N 36W 21DBBC	23-C-81	. . . . .	37

20N 36W 20ACBA	24-C-81	. . . . .	36
20N 36W 27DBBD	26-C-81	. . . . .	40
20N 36W 33ABCB	27-C-81	. . . . .	45
19N 36W 09DBBA	28-C-81	. . . . .	17
19N 36W 01DDBA	29-C-81	. . . . .	9
19N 36W 11DCAA	31-C-81	. . . . .	18
20N 36W 25BDDB	33-C-81	. . . . .	39
20N 36W 35BDBD	49-C-81	. . . . .	48
19N 36W 08ACBD	53-C-81	. . . . .	16
19N 36W 06AADC	54-C-81	. . . . .	14
20N 36W 29DADA	60-C-81	. . . . .	41
20N 37W 24DBCB	61-C-81	. . . . .	50

1982

18N 40W 36ABBB	12-S-82	. . . . .	7
20N 40W 31DADA	13-S-82	. . . . .	55
19N 36W 29ACAC	17-S-82	. . . . .	19
19N 38W 03BBCC	18-S-82	. . . . .	29
20N 36W 35BCDD	19-S-82	. . . . .	46
18N 37W 35DCCA	21-S-82	. . . . .	4

1983

19N 36W 05BAAB	23-B-83	. . . . .	13
19N 36W 04DABD	24-B-83	. . . . .	12

CAUTION

Readers Please Note!

All C-81 test holes drilled in Arthur County used only water during drilling. No drilling mud was used so the sample cuttings collected may be finer grained than the actual sediments or rocks being drilled through. These differences may be discerned when the field log sample descriptions are compared to the test-hole geophysical logs.

**Test Hole #250-34 (No E-log)
(17N-38W-21bd)
Arthur County**

Location: SE NW sec. 21, T. 17 N., R. 38 W. Distances not measured.
 Ground elevation: 3,550 ft (t). (Packard Ranch 7.5 min. quadrangle).
 Depth to Water: 29.5 ft (12-4-34).

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand.....	0.0	8.0
Sand, slightly clayey.....	8.0	14.5
Sand, fine texture.....	14.5	44.0
Clay, silty, blue.....	44.0	45.0
Sand, clayey, blue.....	45.0	54.0
Sand.....	54.0	63.0

Test Hole #94-HP-90 (E-logs)
(17N-39W-3cbcd)
Arthur County

Location: SE SW NW SW sec. 3, T. 17 N., R. 39 W., 1,400 ft. north
 and 470 ft. east of southwest corner.
 Ground elevation: 3,620 ft. (t). Bear Hill 7.5 min. quadrangle).
 Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, very fine to fine, slightly to moderately silty, yellow brown.....	0.0	48.0
Sand, very fine to fine, trace medium, moderately to very silty, slightly to moderately clayey, grayish brown.....	48.0	70.0
Silty, very clayey, slightly to moderately sandy, grayish brown.....	70.0	74.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand, very fine to medium, trace coarse to very coarse, slightly to moderately silty, grayish brown.....	74.0	82.0
Silt, very sandy, very fine to medium, trace coarse, slightly clayey, grayish brown.....	82.0	88.0
Sand and gravel, very fine to very coarse sand and fine to medium gravel, silt seams at 93 ft.....	88.0	98.0
Silt, very sandy, very fine to medium, trace coarse, slightly to moderately clayey, grayish brown.....	98.0	109.0
Sand, very fine to very coarse, slightly to moderately silty, grayish brown.....	109.0	120.0
Silt, very sandy with interbedded sand, very fine to medium, grayish brown.....	120.0	127.0
Sand, very fine to coarse, trace very coarse sand and fine gravel.....	127.0	136.0
Sand, very fine to medium, trace coarse to very coarse, trace fine gravel, moderately to very silty, grayish brown.....	136.0	150.0
Sand and gravel, very fine sand to fine gravel, silt seam at 161 ft.....	150.0	164.0
Silt, moderately to very clayey, slightly sandy, gray.....	164.0	167.0
Sand and gravel, very fine to very coarse sand and fine to medium gravel.....	167.0	182.0
Silt, very sandy, very fine to medium, trace coarse, trace sandstone, trace rootlets, slightly to moderately clayey.....	182.0	213.0
Silt, moderately to very clayey, brown.....	213.0	216.0

Sand and gravel, very fine sand to fine gravel, slightly silty.....	216.0	230.0
Tertiary System - Miocene Series - Ogallala Group:		
undifferentiated:		
Silt, moderately to very clayey, slightly sandy, yellow brown.....	230.0	240.0
Sand, very fine to medium, trace coarse, slightly silty, grayish brown.....	240.0	245.0
Silt, moderately clayey, slightly to moderately sandy, grayish brown.....	245.0	249.0
Sand to sandstone, very fine to medium, trace coarse sand to fine gravel, slightly to moderately silty, rootlets, brown.....	249.0	340.0
Silt, slightly clayey, moderately to very sandy, very fine to fine, brown.....	340.0	344.0
Sand, very fine to medium, trace coarse, rootlets, trace sandstone, brown.....	344.0	358.0
Sandstone, very fine to fine, moderately to very silty, slightly clayey, brown.....	358.0	375.0
Sand to sandstone, very fine to very coarse, much medium, rootlets, slightly silty, brown.....	375.0	410.0
Clay, moderately silty, slightly sandy, light olive gray	410.0	423.0
Sand and gravel, very fine to very coarse sand and fine to medium gravel.....	423.0	467.0
Sand to sandstone, very fine to fine, trace medium to coarse, slightly to moderately silty, brown....	467.0	480.0
Sand to sandstone, very fine to fine, lime cemented, slightly to moderately silty, pale brown gray.....	480.0	500.0
Sandstone, very fine to fine, moderately to very silty, lime cemented, light gray.....	500.0	506.0
Sandstone, very fine to fine, slightly to moderately silty, lime cemented, light gray.....	506.0	540.0
Silt, moderately to very sandy, very fine to fine, moderately to very limy, light brownish gray.....	540.0	562.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Silt to siltstone, moderately clayey, moderately limy.....	562.0	600.0

Test Hole #21-S-82 (E-logs)
(18N-37W-35dcca)
Arthur County

Location: NE SW SW SE sec. 35, T. 18 N., R. 37 W., 366 ft north and 2,200 ft. east of southeast corner.

Ground elevation: 3,525 ft. (t). (Spotted Horse Valley 7.5 min. quadrangle).

Depth to water: Unknown.

Depth, in feet
From To

Quaternary System, and Tertiary System - Pliocene Series, undifferentiated:

Sand, very fine to fine, trace medium, slightly silty, pale yellow silt, brown.....	0.0	89.0
Sand, very fine to medium, slightly to moderately silty, silty seams, gray brown.....	89.0	180.0
Silt, slightly sandy, green to gray.....	180.0	188.0
Sand, very fine to medium, much fine, slightly to moderately silty green to gray.....	188.0	193.0
Silt, slightly sandy, very fine, greenish gray to gray.....	193.0	202.0
Sand, very fine to medium, trace coarse to very coarse, moderately silty, greenish gray.....	202.0	212.0
Silt, slightly sandy, very fine to medium, greenish gray.....	212.0	216.0
Sand, very fine to very coarse, mostly medium to coarse.....	216.0	226.0
Silt, yellow to brown.....	226.0	228.0

Tertiary System - Pliocene Series - Broadwater Formation:

Sand and gravel, fine to very coarse sand to fine gravel, trace medium gravel, silt seam at 261 ft..	228.0	272.0
Silt, slightly clayey, pale brown to pale olive.....	272.0	282.0
Sand and gravel, very fine to very coarse sand, fine to medium gravel, some coarse gravel.....	282.0	356.0

Tertiary System - Miocene Series - Ogallala Group, undifferentiated:

Silt, moderately sandy, very fine, reddish brown....	356.0	369.0
Sand, very fine to coarse, much medium to coarse, slightly to moderately silty, gray brown.....	369.0	392.0
Sandstone, very fine to medium, moderately to very silty, rootlets, olive to yellow olive.....	392.0	419.0
Sand, very fine to coarse, olive gray brown.....	419.0	426.0
Sandstone, very fine to medium, moderately to very silty, olive.....	426.0	428.0
Sand, very fine to very coarse, trace fine gravel, much medium to coarse, rare silt seams, gray brown.....	428.0	580.0
Siltstone, olive to pink.....	580.0	581.0

Sand, very fine to very coarse, trace fine gravel, much medium to coarse.....	581.0	620.0
Sand and sandstone, interbedded, very fine to coarse sand, moderately to very silty, volcanic ash at 635 ft, trace lime cemented zones, pale olive yellow to olive.....	620.0	647.0
Sand, very fine to very coarse, trace fine gravel, slightly silty and occasionally lime cemented, especially at 655 and 679 ft.....	647.0	698.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Sand to sandstone, very fine to very coarse, rare fine gravel, moderately silty, lime cemented, pale olive to pale yellow.....	698.0	710.0
Siltstone to silt, moderately clayey, reddish brown.	710.0	740.0

**Test Hole #251-34 (No E-logs)
(18N-38W-4bc)
Arthur County**

Location: SW NW sec. 4, T. 18 N., R. 38 W. No distances measured.
Ground elevation: 3,640 ft. (t). (Packard Ranch 7.5 min. quadrangle).
Depth to Water: 11.7 ft. (12-1-34).

Depth, in feet
From To

**Quaternary System and Tertiary System - Pliocene Series,
undifferentiated:**

Sand.....	0.0	8.0
Sand, fine; iron-stained below 62 ft.....	8.0	72.0

Test Hole #12-S-82 (E-logs)
(18N-40W-36abbb)
Arthur County

Location: NE NW NW NW sec. 36, T. 18 N., R. 40 W., 2,700 ft. east
 and 83 ft. south of northwest corner.
 Ground elevation: 3,654 ft. (t). (Williams Ranch 7.5 min. quadrangle).
 Depth to water: Unknown.

Depth, in feet
 From To

**Quaternary System and Tertiary System - Pliocene Series,
 undifferentiated:**

Sand, very fine to medium, trace coarse to very coarse, in part silty, especially at 35, 61 and 70 ft., olive gray to yellow brown.....	0.0	80.0
Silt, pale yellow to yellow brown.....	80.0	120.0

Tertiary System - Pliocene Series - Broadwater Formation:

Sand, very fine to very coarse, trace fine gravel, much fine to medium sand, moderately to very silty, pale yellow to reddish brown to dark greenish gray.....	120.0	146.0
Sand, very fine to medium, trace coarse to very coarse and fine gravel, moderately to very silty, reddish brown to yellow.....	146.0	180.0

**Tertiary System - Miocene Series - Ogallala Group,
 undifferentiated:**

Silt, slightly sandy, slightly clayey,,, pale brown to pale olive.....	180.0	200.0
Sand, very fine to coarse, slightly silty.....	200.0	214.0
Sand, very fine to medium, moderately to very silty, trace rootlets, reddish brown.....	214.0	245.0
Sand, very fine to coarse, trace very coarse, trace rootlets, trace silt, brown to olive brown.....	245.0	309.0
Sand to sandstone, very fine to coarse, trace very coarse, occasional silt to siltstone seams, gray brown.....	309.0	325.0
Sandstone, very fine to medium, trace coarse to very coarse, moderately silty, trace siltstone, olive brown to gray brown.....	325.0	380.0
Sand to sandstone, very fine to coarse, trace very coarse, much medium, trace brown and gray claystone and siltstone, brown.....	380.0	460.0
Sandstone, very fine to medium, lime cemented, moderately silty, very pale brown to grayish.....	460.0	492.0
Silt to siltstone, limy, brown to very pale brown...	492.0	510.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation:

Silt to siltstone, slightly to moderately sandy, very fine sand, limy, pale brown.....	510.0	550.0
Silt to siltstone, limy zones, slightly reddish brown to very pale brown.....	550.0	580.0

Test Hole #29-C-81 (E-logs)
(19N-36W-01ddba)
Arthur County

Location: NE NW SE SE sec. 1, T. 19 N., R. 36 W.
Ground elevation: 3,495 ft. (NRD Surveyor) (Lena 7.5 min. quadrangle).
Depth to water: 9.14 ft. (5-22-81).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, brown to dark brown; very fine to fine; slightly silty below 3.0 ft.....	0.0	8.0
Sand, tan to light gray; very fine to medium, slightly silty 18 to 31 ft.....	8.0	31.0

Test Hole #20-C-81 (E-logs)
(19N-36W-03daaa)
Arthur County

Location: NE NE NE SE sec. 3, T. 19 N., R. 36 W., 50 ft. west of center line on North-South paved trail just south of ½ section line.

Ground elevation: 3,538 ft. (t). (Lena 7.5 min. quadrangle).

Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, medium brown; very fine to fine, silty.....	0.0	2.0
Sand, light brown; very fine to fine, trace of medium sand.....	2.0	28.0

**Test Hole #1-C-81 (No e-logs)
(19N-36W-04cbda)
Arthur County**

Location: NE SE NW SW sec. 4, T. 19 N., R. 36 W.
Ground elevation: 3,532 ft. (Surveyor). (Lena 7.5 min. quadrangle).
Depth to water: 1.5 ft. (5-5-81).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, dark gray brown; very fine to fine.....	0.0	1.0
Sand, gray to tan; very fine to fine, trace of medium sand.....	1.0	10.0

Test Hole #24-B-83 (E-logs)
(19N-36W-04dabd)
Arthur County

Location: SE NW NE SE sec. 4, T. 19 N., R. 36 W. Location of elevation by Twin Platte NRD surveyor.
 Ground elevation: 3,685.62 ft. (i). (Lena 7.5 min. quadrangle).
 Depth to water: 164 ft. (8-21-83).

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, very fine, slightly silty, some organics, brown to dark brown.....	0.0	4.0
Sand, very fine to fine, brown.....	4.0	8.0
Sand, very fine, moderately to very silty, light yellow brown.....	8.0	10.0
Sand, very fine to fine, pale brown.....	10.0	160.0
Sand, very fine to fine, slightly silty, silt is light olive gray, sand is pale brown.....	160.0	185.0
Sand, very fine to medium, trace of coarse sand with thin pale olive silt seams, sand is pale brown....	185.0	190.0
Sand, very fine to fine with trace medium, pale brown.....	190.0	194.5
Silt, moderately sandy, greenish gray.....	194.5	195.0
Sand, very fine to fine, rare medium, interbedded silt seams.....	195.0	200.0

Test Hole #23-B-83 (E-logs)
(19N-36W-05baab)
Arthur County

Location: NW NE NE NW sec. 5, T. 19 N., R. 36 W. Location of elevation by Twin Platte NRD surveyor.
 Ground elevation: 3,707.56 ft. (i). (Lena 7.5 min. quadrangle).
 Depth to water: 172 ft. (8-20-83).

	Depth, in feet	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, very fine to fine, slightly silty, some organics, brown.....	0.0	1.0
Sand, very fine to fine, pale brown.....	1.0	10.0
Sand, very fine to fine, few silt seams, pale brown.	10.0	15.0
Sand, very fine to fine, pale brown.....	15.0	175.0
Sand, very fine to fine, trace of medium, pale brown.....	175.0	180.0
Sand, very fine to fine, pale brown.....	180.0	192.3
Silt, very sandy, very fine sand, olive to pale olive.....	192.3	193.3
Sand, very fine to fine with thin silt seams, pale brown.....	193.3	195.0
Silt, very sandy, very fine sand, olive to pale olive.....	195.0	195.5
Sand, very fine to fine, pale brown.....	195.5	200.0

Test Hole #54-C-81 (E-logs)
(19N-36W-06aadC)
Arthur County

Location: SW SE NE NE sec. 6, T. 19 N., R. 36 W.
 Ground elevation: 3,557 ft. (Surveyor). (Bean Soup Lake 7.5 min. quadrangle).
 Depth to water: 14 ft. (6-5-81).

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, light brown to red brown.....	0.0	38.0
Silt, sandy, olive to blue gray.....	38.0	78.0
Silt and sand, interbedded, light gray.....	78.0	203.0
Sand, olive, with some gravel.....	203.0	213.0
Silt, sandy, olive.....	213.0	223.0
Sand, with some silt interbeds, light gray.....	223.0	282.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand and gravel, gray green.....	282.0	312.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Sandstone, very fine, pale olive, with rhizoliths...	312.0	323.0

**Test Hole #12-C-81 (E-logs)
(19N-36W-07ccab)
Arthur County**

Location: NW NE SW SW sec. 7, T. 19 N., R. 36 W.
Ground elevation: 3,559 ft. (Surveyor). (Bean Soup Lake 7.5 min.
quadrangle).
Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, brown, very fine to fine with some coarser sand in places; silt interbeds.....	0.0	91.0
Silt, pale olive, clayey in part, sandy in part.....	91.0	98.0

Test Hole #53-C-81 (E-logs)
(19N-36W-08acbd)
Arthur County

Location: SE NW SW NE sec. 8, T. 19 N., R. 36 W.
Ground elevation: 3,531 ft. (Surveyor). (Lena 7.5 min. quadrangle).
Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, light brown, very fine to fine, many shell fragments.....	0.0	2.0
Sand, grayish brown, very fine to fine, shell fragments.....	2.0	5.0
Sand, medium gray, very fine to fine.....	5.0	15.5

Test Hole #28-C-81 (E-logs)
(19N-36W-09dbba)
Arthur County

Location: NE NW NW SE sec. 9, T. 19 N., R. 36 W.
 Ground elevation: 3,539 ft. (Surveyor) (Lena 7.5 min. quadrangle).
 Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series,		
undifferentiated:		
Sand, medium brown, very fine to fine.....	0.0	3.0
Sand, light brown, with clayey silt interbeds.....	3.0	23.0
Sand, medium gray, with light olive silt interbeds..	23.0	32.0
Sand, light brown, very fine to fine.....	32.0	43.0

Test Hole #31-C-81 (E-logs)
(19N-36W-11dcaa)
Arthur County

Location: NE NE SW SE sec. 11, T. 19 N., R. 36 W.
 Ground elevation: 3,512 ft. (Surveyor) (Lena 7.5 min. quadrangle).
 Depth to water: 17.26 ft. (5-26-81).

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, medium brown, very fine to fine.....	0.0	3.0
Sand, light brown, with tan to brown sandy silt interbeds.....	3.0	78.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand and gravel, light brown.....	78.0	82.0
Silt, light brown, sandy.....	82.0	83.0
Sand and gravel, light brown.....	83.0	98.0

Test Hole #17-S-82 (E-logs)
(19N-36W-29acac)
Arthur County

Location: SW NE SW NE sec. 29, T. 19 N., R. 36 W.
 Ground elevation: 3,530 ft. (t). (Bucktail 7.5 min. quadrangle).
 Depth to water: Unknown.

	Depth, in feet	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, very fine to fine, trace medium to coarse, brown to light brown.....	0.0	40.0
Silt, moderately sandy, slightly clayey, light to blue gray.....	40.0	55.0
Sand, very fine to medium, trace coarse, slightly to moderately silty, brown.....	55.0	78.0
Silt, slightly to moderately clayey, moderately sandy, blue gray.....	78.0	81.0
Sand, very fine to fine, trace medium to coarse, trace brown and blue green silt seams, brown.....	81.0	115.0
Silt, moderately to very sandy, slightly to moderately clayey, gray green.....	115.0	117.0
Sand, very fine to medium, much medium, in part silty, silt is gray green brown.....	117.0	166.0
Silt, slightly clayey, moderately sandy, gray green.	166.0	174.0
Sand, very fine to medium, brown.....	174.0	177.0
Silt, very slightly clayey, very sandy, very fine to medium sand, blue green.....	177.0	185.0
Sand, very fine to medium, slightly silty, brown....	185.0	203.0
Silt, very sandy, very slightly clayey, blue green..	203.0	219.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand, very fine, coarse, much fine, trace very coarse sand to fine gravel, slightly to moderately silty, brown.....	219.0	260.0
Sand and gravel, fine sand to fine gravel, much coarse to very coarse, blue green.....	260.0	294.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Sandstone to sand, very fine to very coarse, much medium to coarse, rare fine gravel, rootlets, slightly silty, trace lime cement, brown.....	294.0	340.0
Sand to sandstone, very fine to very coarse, much fine to medium rootlets, rare gray green silt seams, brown.....	340.0	450.0
Sandstone to sand, very fine to fine, slightly to moderately silty, moderately to very limy, very pale brown.....	450.0	474.0
Sand, very fine to medium, trace coarse.....	474.0	484.0

Sandstone, very fine to very coarse, much medium, slightly to moderately silty, gray brown to olive.	484.0	546.0
Sand to sandstone, very fine to coarse, much medium to coarse, slightly to moderately silty, silt is pale olive to pale yellow, sand is gray brown.....	546.0	594.0
Silt, moderately sandy, olive.....	594.0	596.0
Sand to sandstone, very fine to medium, trace coarse, rare fine gravel, occasional brown siltstone to claystone seams, gray brown.....	596.0	639.0
Silt, moderately sandy, very fine to coarse, olive..	639.0	641.0
Sand to sand and gravel, very fine sand to fine gravel, much coarse sand, rootlets, rare lime cemented seam, trace silt, olive to gray brown....	641.0	724.0
Silt, slightly clayey, slightly sandy, brown to pale olive gray.....	724.0	733.0
Sand, very fine to coarse, brown.....	733.0	736.0
Silt, slightly to moderately clayey, moderately to very sandy, very fine to medium, pale olive to light gray brown.....	736.0	783.0
Sand to sand and gravel, very fine sand to fine gravel, much coarse to very coarse sand, anorthositic 835 to 840 ft.....	783.0	849.0
Silt, moderately to very sandy, brown with occasional pink streaks.....	849.0	853.0
Sand, very fine to coarse, much brown to pink siltstone.....	853.0	857.0
Silt to siltstone, moderately clayey, brown to pale yellow.....	857.0	878.0
Sand, very fine to very coarse, much reworked brown, olive and white siltstone, trace rootlets.....	878.0	900.0

Test Hole #7-C-81 (E-logs; poor)
(19N-37W-01baaa)
Arthur County

Location: NE NE NE NW sec. 1, T. 19 N., R. 37 W.
 Ground elevation: 3,661 ft. (Surveyor). (Bean Soup Lake 7.5 min. quadrangle).
 Depth to water: Unknown.

	Depth, in feet	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, medium brown, very fine to fine.....	0.0	3.0
Sand, brown, very fine to fine with interbedded silt.....	3.0	138.0
Sand, brown, very fine to fine with many interbeds of green to gray sandy silt.....	138.0	173.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand and gravel, granitic.....	173.0	213.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Sand, brown, with white calcareous silt interbeds...	213.0	238.0

Test Hole #6-C-81 (E-logs)
(19N-37W-01bdba)
Arthur County

Location: NE NW SE NW sec. 1, T. 19 N., R. 37 W.
 Ground elevation: 3,611 ft. (Surveyor). (Bean Soup Lake 7.5 min. quadrangle).
 Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, light brown, very fine to fine with interbeds of sandy silt.....	0.0	63.0
Clay, brown to green, silty.....	63.0	68.0
Sand, light brown, very fine to fine, with interbeds of silt.....	68.0	138.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand and gravel.....	138.0	168.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Sand, light olive, very fine to fine, with silt interbeds.....	168.0	178.0

Test Hole #5-C-81 (E-logs)
(19N-37W-01bdcb)
Arthur County

Location: NW SW SE NW sec. 1, T. 19 N., R. 37 W.
Ground elevation: 3,557 ft. (Surveyor). (Bean Soup Lake 7.5 min.
quadrangle).
Depth to water: Unknown.

Depth, in feet
From To

Quaternary System and Tertiary System - Pliocene Series,
undifferentiated:

Sand, red brown, very fine to fine.....	0.0	3.0
Sand, brown, with a few gray sandy silt interbeds...	3.0	78.0

**Test Hole #4-C-81 (No e-logs)
(19N-37W-01cbaa)
Arthur County**

Location: NE NE NW SW sec. 1, T. 19 N., R. 37 W.
Ground elevation: 3,549 ft. (Surveyor). (Bean Soup Lake 7.5 min.
quadrangle).
Depth to water: Unknown.

Depth, in feet
From To

Quaternary System, undifferentiated:

Sand, brown, very fine to fine.....	0.0	3.0
Silt, clayey, black to gray.....	3.0	9.5
Sand, brown, very fine to silt.....	9.5	15.0

**Test Hole #8-C-81 (E-logs)
(19N-37W-01cbdb)
Arthur County**

Location: NW SE NW SW sec. 1, T. 19 N., R. 37 W.
Ground elevation: 3,583 ft. (Surveyor). (Bean Soup Lake 7.5 min.
quadrangle).
Depth to water: Unknown.

Depth, in feet
From To

**Quaternary System and Tertiary System - Pliocene Series,
undifferentiated:**

Sand, brown, very fine to fine.....	0.0	30.5
Sand, brown, with white silt interbeds.....	30.5	43.0
Sand, brown, very fine to medium.....	43.0	68.0
Silt, gray to olive gray, sandy.....	68.0	95.0
Sand, olive gray, fine.....	95.0	100.0
Silt, olive gray, sandy.....	100.0	118.0

Test Hole #9-C-81 (E-logs)
(19N-37W-01ccba)
Arthur County

Location: NE NW SW SW sec. 1, T. 19 N., R. 37 W.
 Ground elevation: 3,660 ft. (t). (Bean Soup Lake 7.5 min. quadrangle).
 Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, grayish brown to olive brown, very fine to fine, with silt.....	0.0	12.0
Sand, pale brown, very fine to fine, trace of medium sand.....	12.0	60.0
Sand, grayish brown to light olive brown, very fine to fine, with silt interbeds.....	60.0	96.0
Sand, pale olive, silty.....	96.0	139.0
Silt, olive, sandy.....	139.0	158.0
Sand, olive gray, silty.....	158.0	177.0

Test Hole #10-C-81 (E-logs)
(19N-37W-12bbbb)
Arthur County

Location: NW NW NW NW sec. 12, T. 19 N., R. 37 W.
 Ground elevation: 3,754 ft. (Surveyor). (Bean Soup Lake 7.5 min. quadrangle).
 Depth to water: Unknown.

	Depth, in feet	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, dark grayish brown to light brownish gray, very fine to fine with silty interbeds, some medium sand.....	0.0	228.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand and gravel.....	228.0	242.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Sand, olive gray, silty.....	242.0	258.0

Test Hole #11-C-81 (E-logs)
(19N-37W-12cbdd)
Arthur County

Location: SE SE NW SW sec. 12, T. 19 N., R. 37 W.
Ground elevation: 3,569 ft. (Surveyor). (Bean Soup Lake 7.5 min.
quadrangle).
Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, dark brown, silty, very fine to fine.....	0.0	4.0
Sand, pale brown to brown, very fine to fine, trace medium sand.....	4.0	11.0
Silt, brown, sandy.....	11.0	13.0
Sand, pale brown, very fine to fine.....	13.0	25.0

Test Hole #18-S-82 (E-logs)
(19N-38W-3bbcc)
Arthur County

Location: SW SW NW NW sec. 3, T. 19 N., R. 38 W., 1,020 ft. south and 88 ft. east of northwest corner.

Ground elevation: 3,650 ft. (t). (K C Lake 7.5 min. quadrangle).

Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, very fine to medium, slightly moderately silty, grayish brown.....	0.0	69.0
Sand, very fine to medium, trace coarse, slightly silty, grayish brown.....	69.0	75.0
Sand, very fine to medium, moderately silty, grayish brown.....	75.0	78.0
Sand, very fine to medium, slightly silty, gray brown.....	78.0	85.0
Sand, very fine to medium, moderately silty, gray...	85.0	89.0
Sand, very fine to medium, slightly silty, greenish gray.....	89.0	120.0
Silt, slightly sandy, gray to green.....	120.0	125.0
Sand, very fine to medium, slightly silty, gray green.....	125.0	130.0
Silt, slightly clayey, gray green.....	130.0	132.0
Sand, very fine to fine, slightly to moderately silty, gray green.....	132.0	152.0
Silt, moderately sandy, very pale brown.....	152.0	157.0
Sand, very fine to fine, trace medium to coarse, slightly to moderately silty, very pale brown.....	157.0	185.0
Silt, moderately sandy, very fine to fine, very pale brown.....	185.0	191.0
Sand, very fine to fine, moderately to very silty, very pale brown.....	191.0	201.0
Silt, moderately to very sandy, very fine to fine, trace medium, very pale brown.....	201.0	205.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand and gravel, very fine to very coarse sand, much very coarse, fine to medium gravel, granitic and anorthositic.....	205.0	220.0
Silt, very sandy, pale brown.....	220.0	223.0
Sand and gravel, very fine to very coarse sand to fine gravel, trace medium gravel, much coarse to very coarse sand.....	223.0	232.0
Sand, very fine to very coarse, much medium to coarse, trace gravel, slightly silty.....	232.0	245.0

Sand and gravel, very fine to very coarse sand to fine gravel, much coarse to very coarse sand.....	245.0	303.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Sand, very fine to medium, moderately silty, pale olive to olive gray.....	303.0	315.0
Sand and sandstone, very fine to very coarse, many rootlets, in part slightly to moderately silty, reddish brown.....	315.0	420.0
Sandstone, very fine to medium, lime cemented, slightly to moderately silty, very pale brown to brown to pale olive.....	420.0	451.0
Sand to sandstone, very fine to coarse sand, slightly to moderately silty, especially at 469 ft, olive.....	451.0	471.0
Sand, very fine to coarse, much medium, trace olive claystone seams, olive to gray brown.....	471.0	499.0
Silt, gray to brown.....	499.0	501.0
Sand, very fine to medium, trace coarse, occasional silt seams.....	501.0	564.0
Sandstone, moderately silty, trace rootlets, pale olive to brown.....	564.0	567.0
Sand to sandstone, very fine to medium, trace coarse, slightly to moderately silty, pale brown to brown.....	567.0	615.0
Sand, very fine to coarse, much medium, trace very coarse, rootlets, occasional sandstone and silt siltstone seams, gray volcanic ash 680 to 690 ft, silts, pale olive to pale yellow, sand is brown...	615.0	700.0
Siltstone, moderately clayey, reddish brown to pale yellow brown.....	700.0	741.0
Silt, very sandy, much medium, reddish brown and olive.....	741.0	744.0
Sand, very fine to very coarse, much medium to coarse, slightly silty.....	744.0	775.0
Silt, very sandy, very fine to very coarse, slightly to moderately clayey, very pale brown to pale olive.....	775.0	782.0
Sand, very fine to very coarse, much medium, trace fine gravel, occasional thin silt and siltstone seams, reddish brown.....	782.0	855.0
Sandstone, lime cemented with lime cemented siltstone seams, very pale to gray brown.....	855.0	873.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone, brown.....	873.0	910.0

Test Hole #36-B-71 (E-logs)
(19N-38W-34abcd)
Arthur County

Location: SE SW NW NE sec. 34, T. 19 N., R. 38 W., approximately
 900 ft. south and 2,200 ft. west of northeast corner.
 Ground elevation: 3,655 ft. (t). (Arthur 7.5 min. quadrangle).
 Depth to water: Unknown.

	Depth, in feet	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, very fine, very silty, dark brown to brown....	0.0	12.0
Sand, very fine to coarse, much medium, light brown.	12.0	50.0
Sand, very fine to fine, trace medium, moderately silty with silty seams, silt slightly to moderately clayey, light gray to brown.....	50.0	142.0
Silt, slightly to moderately clayey, slightly to very sandy, very fine, interbedded sand seams, dark greenish gray.....	142.0	160.0
Sand, very fine to medium, much fine, slightly silty, brown.....	160.0	174.0
Silt, slightly to moderately clayey, very sandy, very fine, light brown to brown.....	174.0	187.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand and gravel, very fine sand to fine gravel, trace medium gravel, gray green.....	187.0	220.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Silt, very sandy, very fine to fine, trace medium, slightly to moderately clayey, gray green to olive green.....	220.0	247.0
Sand, very fine to medium, slightly silty, light brown.....	247.0	256.0
Silt, moderately clayey, very sandy, very fine to medium, trace coarse to very coarse, light brown..	256.0	270.0
Sand and gravel, very fine sand to fine gravel, trace medium gravel, slightly silty, reddish brown.....	270.0	302.0
Silt, moderately clayey, slightly sandy, very fine to fine, brown to olive.....	302.0	310.0
Sand to sandstone, very fine to fine, trace medium to very coarse, slightly to moderately silty, trace rootlets, brown to reddish brown.....	310.0	333.0
Silt, moderately clayey, moderately sandy, very fine to medium, pale yellow.....	333.0	336.0
Sandstone, very fine to fine, rootlets, seeds, slightly silty, brown.....	336.0	342.0

Sand to sandstone, very fine to medium, rootlets, brown.....	342.0	408.0
Sandstone to sand, very fine to medium, silty, in part limy, rootlets, olive brown.....	408.0	457.0
Silt, very sandy, very fine to fine, moderately clayey, pale olive to pale yellow.....	457.0	476.0
Sand, very fine to medium, slightly silty, trace rootlets, brown.....	476.0	483.0
Silt, very sandy, very fine to fine, moderately clayey, pale olive to pale yellow.....	483.0	488.0
Sand, very fine to medium, slightly to moderately silty, silt is pale olive to pale yellow, sand is brown.....	488.0	517.0
Silt to siltstone, slightly to moderately sandy, very fine to fine, slightly clayey, pale yellow to pale olive.....	517.0	527.0
Sand, very fine to medium, moderately silty, pale yellow to olive brown.....	527.0	533.0
Silt to siltstone, moderately to very clayey, slightly sandy, very fine to fine, manganese stains, pale olive to pale yellow.....	533.0	536.0
Sand to sandstone, very fine to medium, trace coarse, rootlets, pale gray to brown.....	536.0	556.0
Sandstone, very fine to medium, slightly silty, limy to lime cemented, rootlets, pale gray to white.....	556.0	572.0
Sand to sandstone, very fine to medium, rootlets, brown.....	572.0	586.0
Silt to siltstone, slightly sandy, very fine to medium, marly, olive green to white.....	586.0	596.0
Sand, very fine to medium, brown.....	596.0	605.0
Silt, moderately clayey, pale yellow to brown.....	605.0	608.0
Sand, very fine to very coarse, trace fine gravel, much medium, interbedded thin yellow to brown silt seams, brown.....	608.0	646.0
Silt, slightly to moderately sandy, very fine to medium, lime cemented, pale yellow to white.....	646.0	655.0
Sand to sandstone, very fine to very coarse, much medium to coarse, slightly silty, rootlets, brown.....	655.0	672.0
Silt, with interbedded sand, very fine to medium, lime cemented, moderately to very clayey, olive to white.....	672.0	682.0
Sand to sandstone, very fine to very coarse, trace fine gravel, rootlets.....	682.0	698.0
Silt, very sandy, very fine to fine, moderately clayey, pale olive to brown.....	698.0	702.0
Sand, very fine to fine, moderately silty, brown....	702.0	705.0
Silt, moderately to very sandy, very fine to fine, brown to reddish brown.....	705.0	746.0
Silt to siltstone, moderately to very clayey, moderately to very limy, light brown and white.....	746.0	765.0

Tertiary System - Oligocene Series - White River Group:

Brule Formation:

Silt to siltstone, moderately to very clayey,
slightly limy, light to dark reddish brown..... 765.0 800.0

Test Hole #9-B-72 (E-logs)
(19N-40W-30cccc)
Arthur County

Location: SW SW SW SW sec. 30, T. 19 N., R. 40 W., 111 ft. north and 26 ft. east of southwest corner.

Ground elevation: 3,740 ft. (t). (Velma SW 7.5 min. quadrangle).

Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, very fine to fine, trace medium to coarse, slightly silty, paleosol 15 to 18 ft, brown to dark gray brown.....	0.0	32.0
Sand, very fine to medium, moderately silty, light brown.....	32.0	37.0
Sand, fine to coarse, trace very coarse, slightly silty, light brown to pale yellow.....	37.0	64.0
Sand, very fine to coarse, slightly clayey, moderately silty, light olive gray to olive green....	64.0	76.0
Silt, very sandy, very fine to fine, trace medium to coarse, slightly clayey, pale olive.....	76.0	106.0
Sand, very fine to fine, trace medium, slightly silty, pale olive.....	106.0	122.0
Silt, very sandy, very fine to fine, very slightly clayey, pale olive.....	122.0	125.0
Tertiary System - Pliocene Series - Broadwater Formation::		
Sand and gravel, fine to very coarse sand and fine to medium gravel, trace coarse gravel.....	125.0	176.0
Silt, very sandy, very fine to medium, slightly clayey, light olive gray.....	176.0	179.0
Sand and gravel, fine to very coarse sand and fine gravel.....	179.0	192.0
Sand, very fine to medium, slightly to moderately silty, pale olive.....	192.0	203.0
Sand and gravel, fine to very coarse sand and fine to coarse gravel, slightly silty.....	203.0	213.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Sand, very fine to medium, trace coarse, limy fragments with manganese stain, rootlets, light brown to pale olive.....	213.0	234.0
Silt, diatomaceous, white.....	234.0	244.0
Sand, very fine to medium, moderately silty, light gray.....	244.0	252.0
Sandstone to sand, very fine to medium, trace coarse, rootlets, trace olive green silt, brown to pale olive.....	252.0	300.0

Silt, very sandy, very fine to fine, pale yellow....	300.0	305.0
Sand, very fine to medium, light brown.....	305.0	312.0
Sandstone, very fine to fine, rootlets, seed frag- ments, slightly silty, pale olive to olive.....	312.0	360.0
Silt, very sandy, very fine to fine, slightly clayey, pale yellow.....	360.0	364.0
Sandstone, very fine to fine, trace rootlets, slightly silty, olive to olive yellow.....	364.0	409.0
Silt, very sandy, very fine to fine, trace medium, pale yellow.....	409.0	413.0
Sandstone, very fine to fine, slightly silty, olive.	413.0	419.0
Silt, very sandy, very fine to fine, pale yellow....	419.0	421.0
Sandstone, very fine to fine, trace medium to coarse, trace rootlets, slightly silty, light gray.....	421.0	470.0
Tertiary System - Miocene Series - Arikaree Group, undifferentiated:		
Sandstone, very fine to fine, moderately to very silty, slightly to very clayey, slightly to very limy and lime cemented, interbedded silts and sands, brown to light gray to pale olive to white.	470.0	598.0
Silt, slightly sandy, very fine, very limy, white...	598.0	605.0
Siltstone, slightly sandy, very fine, moderately limy, slightly clayey, brown.....	605.0	640.0

Test Hole #24-C-81 (E-logs)
(20N-36W-20acba)
Arthur County

Location: NE NW SW NE sec. 20, T. 20 N., R. 36 W.
 Ground elevation: 3,573 ft. (Surveyor). (Lena 7.5 min. quadrangle).
 Depth to water: Unknown.

	Depth, in feet	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, medium brown, very fine.....	0.0	8.0
Sand, light brown, very fine to fine.....	8.0	21.0
Silt, light brown, clayey.....	21.0	29.0
Sand, light brown, very fine to fine with silt interbeds.....	29.0	58.0
Sand, silty, light to medium gray, with silt interbeds.....	58.0	236.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand and gravel, interbedded silt and sandy silt beds.....	236.0	315.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Sandstone, olive, very fine.....	315.0	328.0

Test Hole #23-C-81 (E-logs)
(20N-36W-21dbbc)
Arthur County

Location: SW NW NW SE sec. 21, T. 20 N., R. 36 W.
Ground elevation: 3,535 ft. (Surveyor). (Lena 7.5 min. quadrangle).
Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, dark brown, very fine with silt.....	0.0	2.0
Sand, light to medium brown, very fine to fine, with silt interbeds.....	2.0	21.0

**Test Hole #21-C-81 (E-logs)
 (20N-36W-22adca)
 Arthur County**

Location: NE SW NW NE sec. 22, T. 20 N., R. 36 W.
 Ground elevation: 3,524 ft. (Surveyor). (Lena 7.5 min. quadrangle).
 Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, brown, very fine to fine, silty.....	0.0	3.0
Sand, dark brown, very fine to fine, silty, shell debris at 6.0 to 7.0 ft.....	3.0	8.0
Sand, light gray, very fine to fine, with silt interbeds.....	8.0	58.0
Silty sand, olive gray to gray, with silt interbeds, very fine to trace coarse sand.....	58.0	98.0

Test Hole #33-C-81 (E-logs)
(20N-36W-25bdda)
Arthur County

Location: NE SE SE NW sec. 25, T. 20 N., R. 36 W.
Ground elevation: 3,500 ft. (Surveyor). (Lena 7.5 min. quadrangle).
Depth to water: 4.53 ft. (5-26-81).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, medium brown, very fine to fine.....	0.0	3.0
Sand, light brown, very fine to fine, with silty sand interbeds.....	3.0	26.0

Test Hole #26-C-81 (No e-logs)
(20N-36W-27dbbd)
Arthur County

Location: SE NW NW SE sec. 27, T. 20 N., R. 36 W.
Ground elevation: 3,512 ft. (Surveyor). (Lena 7.5 min. quadrangle).
Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Clay, silty, black, organic, shell fragments, sandy toward base.....	0.0	5.0
Sand, light brown, very fine, silty.....	5.0	19.0

**Test Hole #60-C-81 (E-logs)
(20N-36W-29dada)
Arthur County**

Location: NE SE NE SE sec. 29, T. 20 N., R. 36 W.
Ground elevation: 3,560 ft. (Surveyor). (Lena 7.5 min. quadrangle).
Depth to water: 27.0 ft. (6-10-81).

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, light brown, very fine to fine.....	0.0	8.0
Sand, light gray, very fine to fine, with silty interbeds.....	8.0	43.0

Test Hole #18-C-81 (E-logs)
(20N-36W-30cbab)
Arthur County

Location: NW NE NW SW sec. 30, T. 20 N., R. 36 W.
 Ground elevation: 3,578 ft. (Surveyor). (Bean Soup Lake 7.5 min. quadrangle).
 Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, pale brown, very fine to fine, some sandy silt interbeds.....	0.0	23.0
Silt, very dark grayish brown to black, sandy.....	23.0	32.0
Sand, light brown, very fine to fine, some sandy silt interbeds.....	32.0	70.0
Silt, gray, sandy with clay.....	70.0	73.0
Sand, gray to light gray, very fine to fine, with sandy silt and a few silty clay interbeds.....	73.0	225.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand and gravel, granitic, with four sandier intervals.....	225.0	309.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Sandstone, light brownish gray to grayish brown, rhizoliths, hackberry endocarps.....	309.0	395.5
Sand, olive, very fine to coarse, occasional calcareous cement, some rhizoliths, some sandy silt interbeds.....	395.5	433.0
Sandstone, olive, with rhizoliths, endocarps.....	433.0	448.0
Sand, olive, calcareous intervals, some sandstone...	448.0	498.0
Sandstone, pale yellow to light brownish gray, some calcareous cement.....	498.0	534.0
Sand, light brownish gray, very fine to medium.....	534.0	558.0
Sandstone, olive, irregular calcareous cement, some interbeds of claystone.....	558.0	588.0
Sand, olive, very fine to medium with some silt interbeds.....	588.0	618.0

Test Hole #17-C-81 (E-logs)
(20N-36W-30dada)
Arthur County

Location: NE SE NE SE sec. 30, T. 20 N., R. 36 W.
Ground elevation: 3,556 ft. (Surveyor). (Bean Soup Lake 7.5 min.
quadrangle).
Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Sand, dark grayish brown, very fine to fine, silty..	0.0	4.0
Sand, light brownish gray to grayish brown, with some thin gray silt interbeds.....	4.0	20.0

**Test Hole #3-C-81 (E-logs)
(20N-36W-31dbad)
Arthur County**

Location: SE NE NW SE sec. 31, T. 20 N., R. 36 W.
Ground elevation: 3,552 ft. (Surveyor). (Bean Soup 7.5 min.
quadrangle).
Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Topsoil, brownish gray, silty sand.....	0.0	2.5
Silt, light olive gray, sandy.....	2.5	5.0
Sand, light brown, very fine to fine, trace medium..	5.0	21.0

Test Hole #27-C-81 (E-log)
(20N-36W-33abcb)
Arthur County

Location: NW SW NW NE sec. 33, T. 20 N., R. 36 W.
Ground elevation: 3,551 ft. (Surveyor). (Lena 7.5 min. quadrangle).
Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series,		
undifferentiated:		
Sand, medium brown, very fine to fine.....	0.0	3.0
Sand, light brown, very fine to medium.....	3.0	35.0
Sand, light olive brown, very fine, silty.....	35.0	38.0

Test Hole #19-S-82 (E-logs)
(20N-36W-35bcdd)
Arthur County

Location: SE SE SW NW sec. 35, T. 20 N., R. 36 W. Distances and elevation by Twin Platte NRD Survey.
 Ground elevation: 3,549 ft. (i). (Lena 7.5 min. quadrangle).
 Depth to water: Unknown.

Depth, in feet
 From To

Quaternary System and Tertiary System - Pliocene Series, undifferentiated:

Sand, very fine to fine, trace medium, slightly to moderately silty, pale brown.....	0.0	90.0
Sand, very fine to fine, moderately silty with layers of dark gray brown silt, brown.....	90.0	199.0
Silt, moderately sandy, very fine to fine, gray.....	199.0	215.0
Sand, very fine to fine, trace medium, slightly silty, gray brown.....	215.0	223.0
Sand, very fine to fine, moderately to very silty, gray brown to yellow brown.....	223.0	260.0
Sand, very fine to coarse, much medium to coarse....	260.0	302.0
Silt, moderately clayey, gray green to yellow brown.	302.0	305.0

Tertiary System - Pliocene Series - Broadwater Formation:

Sand and gravel, fine sand to fine gravel, much coarse to very coarse sand, trace medium gravel, blue green to green.....	305.0	332.0
---	-------	-------

Tertiary System - Miocene Series - Ogallala Group, undifferentiated:

Sandstone, very fine to fine, trace medium, rootlets, slightly silty, brown.....	332.0	390.0
Sandstone, very fine to fine, moderately to very silty, rootlets, limy, pale brown.....	390.0	410.0
Sand, very fine to coarse, much medium, peppery, gray brown.....	410.0	425.0
Sandstone, very fine to medium, trace coarse, in part limy, slightly silty, brown to pale brown....	425.0	540.0
Sandstone, very fine to fine, trace medium to coarse, moderately to very silty, gray brown to olive gray.....	540.0	580.0
Sand to sandstone, very fine to very coarse, much medium, peppery, olive gray.....	580.0	637.0
Sandstone, very fine to very coarse, very silty, pale olive.....	637.0	643.0
Sand, very fine to very coarse, brown to olive.....	643.0	650.0
Sandstone, very fine to coarse, moderately silty, with siltstone.....	650.0	659.0

Sand to sandstone, very fine to coarse, slightly to moderately silty, trace limy streaks, yellow to brown.....	659.0	677.0
Sandstone, very fine to medium, moderately silty, trace lime cement, rootlets, pale brown to brown..	677.0	682.0
Sand to sandstone, very fine to coarse, trace white and yellow silts.....	682.0	720.0
Silt and sandstone, interbedded, very fine to medium, lime cemented, pale brown to white.....	720.0	765.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone, trace pink centers, brown to reddish brown.....	765.0	800.0

Test Hole #49-C-81 (E-logs)
(20N-36W-35bdbd)
Arthur County

Location: SE NW SE NW sec. 35, T. 20 N., R. 36 W.
 Ground elevation: 3,546 ft. (Surveyor). (Lena 7.5 min. quadrangle).
 Depth to water: 20 ft. (6-3-81).

	Depth, in feet	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, dark brown, very fine to fine.....	0.0	5.0
Sand, light brown, very fine to medium, silt interbeds.....	5.0	28.0
Sand, light to medium gray, very fine to medium, silt interbeds.....	28.0	104.0
Sand, light olive gray to olive gray, very fine to medium.....	104.0	163.0
Sand, gray, very fine to medium.....	163.0	207.0
Silt, gray brown to yellowish brown, sandy.....	207.0	218.0
Sand, yellowish brown, silty, very fine to medium...	218.0	244.0
Sand, grayish brown, very fine to coarse.....	244.0	281.0
Silt, orange to white, sandy.....	281.0	282.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand and gravel, granitic.....	282.0	308.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Sandstone, olive gray, rhizoliths and hackberry endocarps.....	308.0	338.0

**Test Hole #14-C-81 (E-logs)
(20N-37W-23ccad)
Arthur County**

Location: SE NE SW SW sec. 23, T. 20 N., R. 37 W.
Ground elevation: 3,582 ft. (Surveyor). (Bean Soup Lake 7.5 min.
quadrangle).
Depth to water: Unknown.

Depth, in feet
From To

**Quaternary System and Tertiary System - Pliocene Series,
undifferentiated:**

Sand, dark grayish brown, very fine to fine, silty..	0.0	2.0
Sand, black, silty.....	2.0	2.4
Sand, grayish brown, very fine to medium, silty interbeds.....	2.4	48.0
Sand, light brown to light gray, very fine to medium, sandy silt interbeds.....	48.0	98.0

Test Hole #61-C-81 (E-logs)
(20N-37W-24dbcb)
Arthur County

Location: NW SW NW SE sec. 24, T. 20 N., R. 37 W.
Ground elevation: 3,568 ft. (Surveyor). (Bean Soup Lake 7.5 min.
quadrangle).
Depth to water: Unknown.

Depth, in feet
From To

Quaternary System, undifferentiated:

Sand, light olive gray to olive gray, silty, many shell fragments.....	0.0	15.0
---	-----	------

Test Hole #16-C-81 (E-logs)
(20N-37W-26cdba)
Arthur County

Location: NE NW SE SW sec. 26, T. 20 N., R. 37 W.
Ground elevation: 3,619 ft. (Surveyor). (Bean Soup Lake 7.5 min.
quadrangle).
Depth to water: Unknown.

Depth, in feet
From To

Quaternary System, undifferentiated:

Sand, olive brown, very fine to fine, silty.....	0.0	2.5
Sand, pale brown, very fine to fine, with sandy silt interbeds.....	2.5	57.0

Test Hole #2-C-81 (No e-logs)
(20N-37W-36cbca)
Arthur County

Location: NE SW NW SW sec. 36, T. 20 N., R. 37 W.
Ground elevation: 3,565 ft. (Surveyor). (Bean Soup Lake 7.5 min.
quadrangle).
Depth to water: Unknown.

	<u>Depth, in feet</u>	
	From	To
Quaternary System, undifferentiated:		
Topsoil, dark brown to black, silty sand.....	0.0	1.5
Sand, light gray brown, very fine to fine, light gray silt interbeds.....	1.5	10.0

Test Hole #37-B-71 (E-logs)
(20N-38W-5daaa)
Arthur County

Location: NE NE NE SE sec. 5, T. 20 N., R. 38 W., approximately 2,400 ft. north and 45 ft. west of southeast corner.
 Ground elevation: 3,680 ft. (t) (K C Lake 7.5 min. quadrangle).
 Depth to water: 11.9 ft. (9-10-71).

	<u>Depth, in feet</u>	
	From	To
Quaternary System and Tertiary System - Pliocene Series, undifferentiated:		
Sand, very fine to fine, slightly to very silty, brownish black to gray brown.....	0.0	15.0
Sand, very fine to fine, trace medium, in part slightly silty, light grayish brown.....	15.0	67.0
Sand, very fine to medium, very silty, slightly clayey, dark grayish brown.....	67.0	80.0
Sand, very fine to medium, light gray brown.....	80.0	92.0
Silt, very sandy, very fine to medium, greenish gray.....	92.0	101.0
Sand, very fine to fine, trace medium, slightly silty, light grayish brown.....	101.0	128.0
Silt, very sandy, very fine to fine, slightly clayey, greenish gray.....	128.0	130.0
Sand, very fine to fine, slightly to moderately silty, greenish gray.....	130.0	136.0
Silt, very sandy, very fine to fine, slightly clayey, greenish gray.....	136.0	140.0
Sand, very fine to fine, in part silty, light gray brown.....	140.0	233.0
Tertiary System - Pliocene Series - Broadwater Formation:		
Sand, very fine to fine, moderately to very silty, trace sandstone and rootlets, greenish gray.....	233.0	240.0
Sand, very fine to very coarse, trace fine gravel, 10 to 20 percent gravel, greenish gray.....	240.0	246.0
Sand, fine to medium, moderately to very silty, greenish gray.....	246.0	253.0
Sand and gravel, very fine sand to fine gravel, much coarse to very coarse sand, greenish.....	253.0	296.0
Sand, very fine to medium, moderately silty, greenish gray.....	296.0	317.0
Sand and gravel, very fine sand to fine gravel, greenish gray.....	317.0	335.0
Tertiary System - Miocene Series - Ogallala Group, undifferentiated:		
Sandstone, very fine to medium, moderately to slightly silty, rootlets, seeds, brown.....	335.0	390.0

Sand to sandstone, fine to coarse, rootlets, olive brown.....	390.0	433.0
Sand, fine to medium, slightly to moderately silty, moderately limy, light brown to olive brown.....	433.0	445.0
Sand, very fine to medium, trace coarse, moderately to very silty, slightly clayey, trace rootlets, light olive gray to olive.....	445.0	484.0
Sand, fine to very coarse, much medium to coarse, rare fine gravel, trace thin siltstone seams, rootlets, olive.....	484.0	557.0
Silt, slightly clayey, light olive gray.....	557.0	561.0
Sand, very fine to coarse, much medium to coarse, thin olive silt seams, olive to brownish gray.....	561.0	584.0
Silt, moderately clayey, slightly sandy, pale olive.	584.0	588.0
Sand to sandstone, very fine to coarse, trace very coarse, trace silt seams, rootlets, brownish gray.	588.0	645.0
Sand to sandstone, very fine to medium, trace rootlets, trace seeds, moderately limy, brown to pale yellow.....	645.0	684.0
Tertiary System - Miocene Series - Arikaree Group, undifferentiated:		
Siltstone, very sandy, very fine, moderately to very limy, lime cemented, brown to very light brown....	684.0	720.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Siltstone, in part limy, slightly sandy, very fine, dark brown.....	720.0	800.0

Test Hole #13-S-82 (E-logs)
(20N-40W-31dada)
Arthur County

Location: NE SE NE SE sec. 31, T. 20 N., R. 40 W., 2,000 ft. north
 and 260 ft. west of southeast corner.
 Ground elevation: 3,760 ft. (t). (Bourquim Hill 7.5 min. quadrangle).
 Depth to water: Unknown.

Depth, in feet
 From To

**Quaternary System and Tertiary System - Pliocene Series,
 undifferentiated:**

Silt, moderately sandy, very fine, in part limy, pale olive.....	0.0	22.0
Sand, very fine to medium.....	22.0	30.0
Sand, very fine to medium, moderately silty, pale olive.....	30.0	46.0
Sand, very fine to medium, slightly silty, light gray.....	46.0	77.0
Silt, slightly moderately sandy, olive and brown....	77.0	95.0
Sand, very fine to fine, moderately to very silty, especially at 101 ft, olive and brown.....	95.0	131.0
Silt, brown.....	131.0	135.0
Sand, very fine to fine, moderately silty, pale olive.....	135.0	154.0
Silt, clayey, limy, pale yellow.....	154.0	160.0
Sand, very fine to fine, moderately silty, pale olive.....	160.0	167.0
Silt, pale yellow.....	167.0	169.0

Tertiary System - Pliocene Series - Broadwater Formation:

Sand and gravel, very fine sand to fine gravel, trace medium gravel.....	169.0	195.0
---	-------	-------

**Tertiary System - Miocene Series - Ogallala Group,
 undifferentiated:**

Silt, clayey, pale yellow.....	195.0	200.0
Sandstone and sand, very fine to medium, slightly silty, rootlets and seed fragments, especially sandy and coarse, trace fine gravel 244 to 248 ft, olive brown.....	200.0	248.0
Sandstone, very silty, olive.....	248.0	253.0
Sand and sandstone, very fine to medium, trace coarse, rootlets, olive.....	253.0	272.0
Sand, very fine, to medium very silty, olive.....	272.0	274.0
Sand and sandstone, very fine to medium, trace coarse, slightly silty, rootlets, pale olive.....	274.0	290.0
Sandstone to sand, very fine to medium, trace coarse, rootlets, slight to moderately silty, brown.....	290.0	315.0

Sand, very fine to medium, trace hackberry seed fragments, pale olive.....	315.0	324.0
Sandstone, very fine to medium rootlets, slightly silty, olive.....	324.0	328.0
Sand, very fine to medium, rootlets, olive.....	328.0	333.0
Sandstone and sand, very fine to medium, with interbedded olive silt seams, olive to pale olive.....	333.0	375.0
Sand, very fine to medium, trace olive silt, pale olive.....	375.0	393.0
Sandstone, very fine to medium, moderately silty, very sandy at 397 ft.....	393.0	401.0
Sand, very fine to medium, trace coarse, trace silt, pale olive to brown.....	401.0	441.0
Sand, very fine to medium, moderately silty, pale olive to pale yellow.....	441.0	445.0
Sand, very fine to medium, slightly silty, pale yellow.....	445.0	453.0
Sand, very fine to medium, moderately to very silty, pale yellow.....	453.0	456.0
Interbedded silt, olive, and sand, very fine to medium, pale olive.....	456.0	467.0
Sand and sandstone, very fine to medium, trace coarse to very coarse, with rare fine gravel, occasional silt, siltstone, and claystone seams, rootlets, brown to pale olive.....	467.0	617.0
Siltstone and claystone, pale olive.....	617.0	626.0
Sand and sandstone, very fine to very coarse, trace olive and brown siltstone, brown to pale brown....	626.0	660.0
Tertiary System - Oligocene Series - White River Group:		
Brule Formation:		
Sandstone, very fine to fine, lime cemented, pale brown to brown.....	660.0	674.0
Siltstone, limy, pale brown to brown.....	674.0	720.0