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Cuming County Test Hole Logs

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CUMING COUNTY Test-Hole Logs

Raymond R. Burchett and Frank A. Smith

**Nebraska Water Survey
Test-Hole Report No. 20**

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

December 1993

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

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

Publication and price lists are furnished upon request.

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INTRODUCTION

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

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

Present techniques of test-hole logging and sampling include use of drilling mud suitable to drilling conditions, timing by stopwatch of the drilling of each 5-foot increment of depth, and removal of all cuttings from the test hole at intervals of 5 feet or less. During the drilling of the hole, cuttings from each interval are examined immediately; samples representing each 5-foot interval and each recognizable change in material are retained. After samples are washed, they are described lithologically and the color is evaluated by comparison with standard color charts. The samples then are dried, stored, and cataloged. Beginning in September 1951, the test holes have been logged electrically. All samples are processed and kept on open file in the offices of Conservation and Survey Division, 113 Nebraska Hall, University of Nebraska-Lincoln, 68588.

This publication is one of a series being issued to make more readily available the record of test holes drilled since 1930. The series of publications is made on a county basis and includes, with some exceptions, logs of all test holes drilled in each of the counties. The logs have not been reviewed for conformance with editorial standards and nomenclature.

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

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

Each test hole is identified by a number assigned in the field (for example #3-B-67, #41-79), and most are also identified by a number indicating its location within the land divisions of the U.S. Bureau of Land Management's survey of Nebraska. Location numbers of test holes east of the 6th principal meridian, which passes through Columbus in a north-south direction, are preceded by the capital letter A; those west of the principal meridian have no preceding letter. The first numeral indicates the township, the second the range, and the third the section. As shown in figure 1, the letters that follow the section number indicate the location of the test hole within the section, the first letter indicating the quarter section and the second letter indicating the quarter-quarter section. The letters A, B, C, and D are applied in counterclockwise direction beginning with A in the northeast quadrant. The last numeral is the serial number of the test hole within the quarter-quarter section. No number is shown unless more than one test hole is within the given quarter-quarter section.

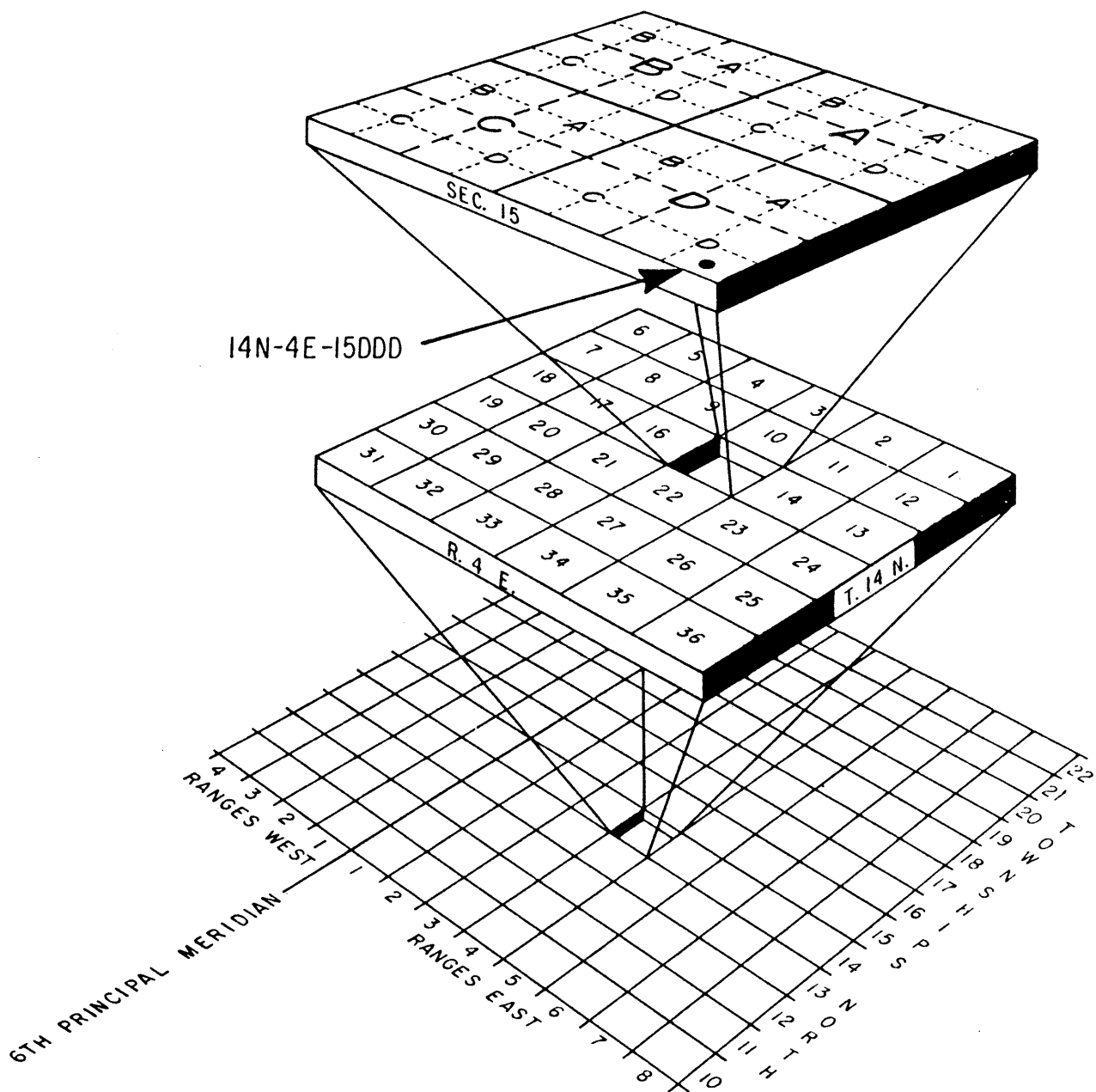
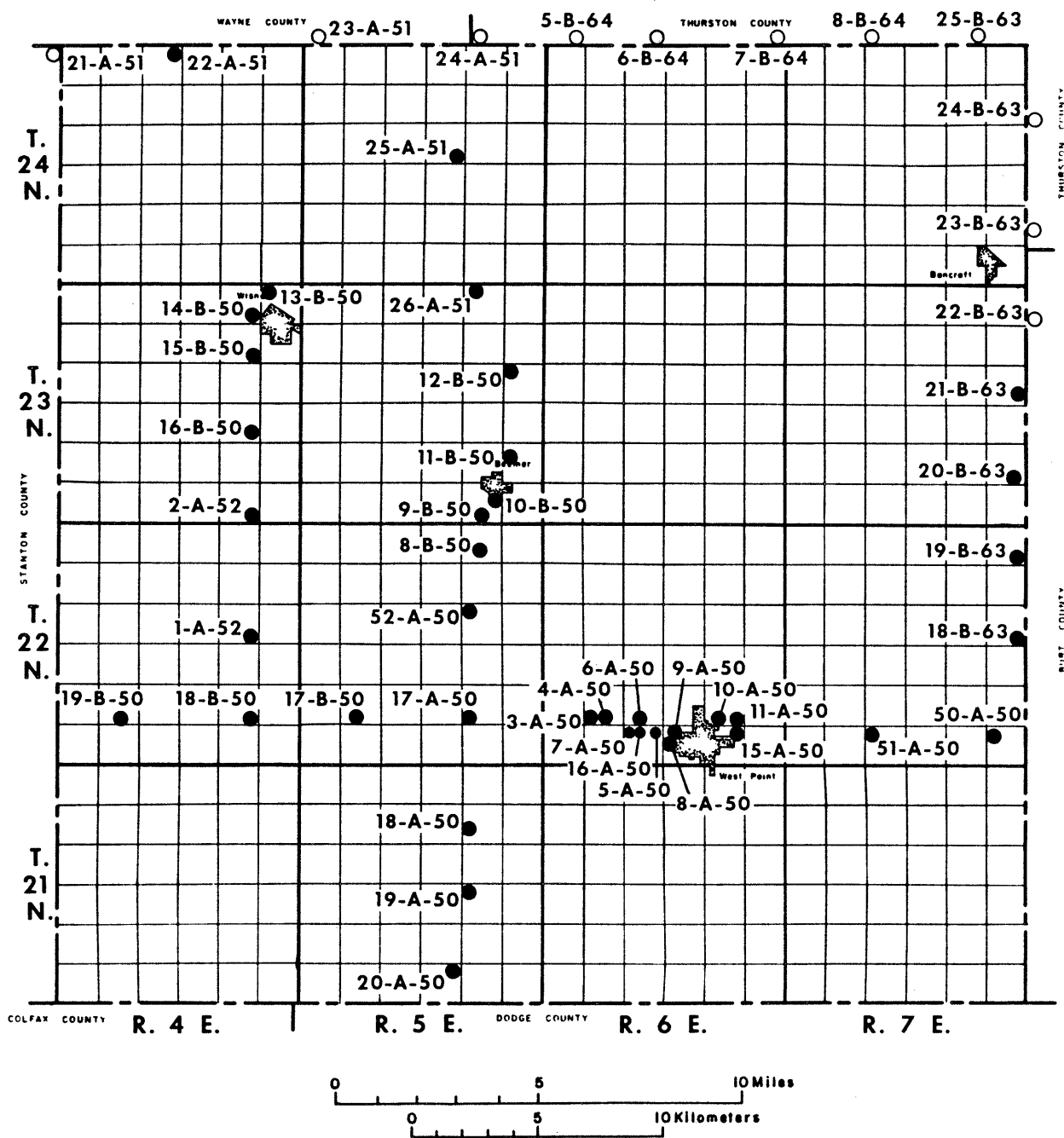


Fig. 1. System for identifying test-holes according to their location.

Cuming County

Twp	Rge	Sec	Test-hole number	Pg	Twp	Rge	Sec	Test-hole number	Pg
21N	05E	11	18-A-50	1	22N	06E	35	15-A-50	31
21N	05E	23	19-A-50	3	22N	07E	01	19-B-63	32
21N	05E	34	20-A-50	5	22N	07E	13	18-B-63	34
22N	04E	14	01-A-52	7	22N	07E	33	51-A-50	37
22N	04E	26	18-B-50	9	22N	07E	36	50-A-50	38
22N	04E	29	19-B-50	11	23N	04E	01	13-B-50	39
22N	05E	02	08-B-50	13	23N	04E	02	14-B-50	40
22N	05E	14	52-A-50	14	23N	04E	11	15-B-50	41
22N	05E	26	17-A-50	15	23N	04E	23	16-B-50	42
22N	05E	29	17-B-50	16	23N	04E	35	02-A-52	43
22N	06E	26	10-A-50	18	23N	05E	02	26-A-51	45
22N	06E	26	11-A-50	20	23N	05E	13	12-B-50	47
22N	06E	28	06-A-50	21	23N	05E	25	11-B-50	48
22N	06E	29	03-A-50	23	23N	05E	35	09-B-50	49
22N	06E	29	04-A-50	25	23N	05E	35	10-B-50	50
22N	06E	33	05-A-50	26	23N	07E	13	21-B-63	51
22N	06E	33	07-A-50	27	23N	07E	25	20-B-63	53
22N	06E	33	16-A-50	28	24N	04E	04	22-A-51	54
22N	06E	34	08-A-50	29	24N	05E	15	25-A-51	56
22N	06E	34	09-A-50	30					

Test hole logs are arranged in this publication by township,
range and section



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



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

Test Hole #18-A-50
(A21-5-11cbc)
Cuming County

Location: SW NW SW sec. 11, T. 21 N., R. 5 E., approximately
1,948 feet north and 7 feet east of southwest corner.
Ground elevation: 1,456 ft. (t). (Monterey 7.5 min. quadrangle).
Depth to water: 47.7 ft. (11-19-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil and road fill: silt, slightly clayey, dark brown to black.....	0.0	2.0
Silt, dark yellowish to grayish brown.....	2.0	18.5
Silt, grayish brown to brown, slightly calcareous; contains a few gastropod fragments below 20.0 ft..	18.5	34.5
Silt, slightly clayey, soil-like, dark reddish brown	34.5	36.5
Clay, slightly silty, medium reddish brown.....	36.5	39.5
Silt, soil-like, grayish brown.....	39.5	40.0
Till: clay, silty to slightly sandy, slightly to moderately calcareous, light grayish brown; contains very fine to coarse sand.....	40.0	74.0
Sand, dark grayish to yellowish brown.....	74.0	78.5
Till: clay, silty to sandy, moderately calcareous, dark grayish to yellowish brown.....	78.5	81.8
Clay, sandy to gravelly, interbedded with till, in part moderately calcareous, dark grayish brown....	81.8	84.5
Till: clay, silty to sandy, moderately to very calcareous, medium gray to dark grayish brown....	84.5	90.0
Silt, slightly clayey to sandy, moderately calcareous, light yellowish brown; contains very fine sand.....	90.0	97.0
Till: silt, clayey, to clay, silty, moderately calcareous, gray to brown.....	97.0	110.0
Till: clay, slightly sandy to gravelly, moderately calcareous, medium gray.....	110.0	119.5
Sand, dark yellowish brown; texture grades from very fine to very coarse.....	119.5	120.5
Till: clay, slightly sandy to gravelly, moderately calcareous, medium gray, very sandy below 132.0 ft.....	120.5	154.0
Sand and gravel; interbedded with sandy clay, dark bluish gray.....	154.0	171.0
Clay, silty, slightly calcareous, light gray, sandy in lower part.....	171.0	175.0
Sand, texture grades from very fine to coarse.....	175.0	177.0
Clay, silty to sandy, slightly calcareous, light brownish to greenish gray.....	177.0	184.0
Chalk, moderately calcareous, brownish yellow.....	184.0	186.0
Silt, sandy, to sand, silty, light brownish gray....	186.0	190.0
Sand, slightly clayey to silty, light brownish gray; texture of sand grades from very fine to medium...	190.0	192.0

Sand, light brown, texture grades from very fine to coarse.....	192.0	194.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Greenhorn Formation:		
Shale, dark gray, very calcareous, silty to chalky..	194.0	195.0
Shale, dark gray, chalky.....	195.0	200.5
Limestone, medium gray, shaly, interbedded with shale, limy.....	200.5	216.2
Graneros Formation:		
Shale, medium to dark gray, limy, petroliferous odor	216.2	258.0
Shale, dark gray, clayey to silty, very calcareous, petroliferous odor.....	258.0	265.0
Shale, medium to dark gray, clayey.....	265.0	270.0

Test Hole #19-A-50
(A21-5-23bbb)
Cuming County

Location: NW NW NW sec. 23, T. 21 N., R. 5 E., approximately
297 feet south and 5 feet east of northwest corner.
Ground elevation: 1,355 ft. (t). (Monterey 7.5 min. quadrangle).
Depth to water: 0.5 ft. (7-24-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: clay, slightly silty, dark brown to black....	0.0	1.0
Silt, dark brown to black.....	1.0	3.5
Silt, slightly clayey, medium yellowish brown.....	3.5	8.5
Silt, light bluish gray to dark bluish gray.....	8.5	23.0
Clay, slightly silty, dark gray.....	23.0	25.0
Clay, dark gray to black; contains gastropod fragments.....	25.0	27.0
Silt, clayey to sandy, dark bluish green; contains very fine sand and many gastropod fragments.....	27.0	30.0
Clay, silty to sandy, dark bluish gray; contains very fine to medium sand; contains many gastropod and pelecypod shells and wood fragments.....	30.0	39.0
Sand, dark bluish gray, texture grades from very fine to very coarse; contains many shell fragments	39.0	44.5
Sand and gravel; light brownish gray; texture grades from very fine sand to fine gravel.....	44.5	53.5
Clay, sandy, medium greenish gray; contains very fine to medium sand.....	53.5	56.0
Clay, sandy, slightly calcareous, light brownish gray; contains very fine sand.....	56.0	61.0
Clay, slightly silty, slightly calcareous, light greenish gray.....	61.0	66.0
Clay, slightly sandy, moderately calcareous, medium gray, contains very fine to medium sand.....	66.0	70.0
Clay, slightly silty, moderately calcareous, light greenish gray; contains a trace of sand and gravel and many shell fragments.....	70.0	75.0
Clay, silty, medium gray; contains a trace of very fine to medium sand, slightly calcareous from 75.0 to 85.0 ft., dark gray to brown below 88.0 ft.....	75.0	90.0
Silt, sandy, light bluish gray; contains very fine to medium sand with some coarse sand and gravel; contains many shell fragments.....	90.0	93.5
Sand, light bluish gray; texture grades from very fine to coarse; contains many shell fragments.....	93.5	95.5
Clay, silty to slightly sandy, slightly calcareous, medium greenish gray; contains very fine to medium sand.....	95.5	100.0
Clay, silty to sandy, interbedded with sand, dark bluish gray.....	100.0	103.5

Cretaceous System - Upper Cretaceous Series - Colorado Group:

Graneros Formation:

Shale, medium to dark gray, limy, very calcareous... 103.5 110.0

Test Hole #20-A-50
(A21-5-34aad)
Cuming County

Location: SE NE NE sec. 34, T. 21 N., R. 5 E., approximately
857 feet south and 5 feet west of northeast corner.
Ground elevation: 1,412 ft. (t). (Monterey 7.5 min. quadrangle).
Depth to water: 46.8 ft. (11-17-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: silt, slightly clayey, dark brown to black...	0.0	2.0
Silt, clayey, dark brown.....	2.0	3.0
Silt, slightly clayey, medium yellowish brown.....	3.0	5.0
Silt, yellowish brown, medium grayish brown below 15.0 ft.....	5.0	17.5
Silt, slightly calcareous, grayish brown.....	17.5	30.0
Silt, light grayish brown.....	30.0	34.5
Clay, light grayish brown with iron stain.....	34.5	35.5
Clay, slightly silty, reddish orange.....	35.5	42.0
Silt, clayey, dark reddish brown.....	42.0	44.5
Clay, slightly silty, medium reddish brown.....	44.5	46.5
Clay, silty to sandy, light brown; contains very fine to medium sand.....	46.5	56.5
Silt, very sandy, light gray; contains very fine to medium sand with some coarse sand.....	56.5	60.0
Silt, sandy, light gray; contains very fine sand....	60.0	62.0
Silt, slightly clayey, light gray, light brownish gray below 66.0 ft.....	62.0	70.0
Clay, silty, light brown with much iron stain.....	70.0	72.0
Clay, slightly silty, slightly calcareous, gray.....	72.0	74.0
Sand and gravel; yellowish brown; texture grades from very fine sand to medium gravel.....	74.0	80.0
Sand, dark yellowish brown; texture grades from very fine to very coarse.....	80.0	85.0
Sand and gravel; light yellowish brown, texture grades from very fine sand to very coarse gravel..	85.0	88.5
Till: clay, silty to sandy and gravelly, moderately calcareous, dark gray, very calcareous below 92.5 ft., medium greenish gray below 95.0 ft.....	88.5	98.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, medium yellowish brown, clayey.....	98.0	106.0
Limestone, light gray to white.....	106.0	107.0
Shale, dark gray, limy.....	107.0	117.5
Limestone, medium to dark gray, shaly, to shale, limy.....	117.5	128.0
Limestone, medium brownish gray, shaly, medium gray below 140.0 ft.....	128.0	157.0
Greenhorn Formation:		
Limestone, medium gray, shaly, interbedded with shale, limy.....	157.0	160.0

Graneros Formation:

Shale, medium gray, limy, petroliferous odor, medium brownish gray below 176.0 ft., dark gray below 180.0 ft.....	160.0	183.0
Limestone, medium gray.....	183.0	183.7
Shale, dark gray, limy.....	183.7	191.0
Shale, dark gray, clayey to silty, very calcareous, medium gray and slightly calcareous below 197.0 ft., light gray below 200.0 ft., non-calcareous below 205.0 ft.....	191.0	210.0

Test Hole #1-A-52
(A22-4-14ddd)
Cuming County

Location: SE SE SE sec. 14, T. 22 N., R. 4 E., approximately
370 feet north and 13 feet west of southeast corner.
Ground elevation: 1,523.0 ft. (t). (Aloys 7.5 min. quadrangle)
Depth to water: 41.4 ft. (6-27-52)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill: silt, black.....	0.0	1.0
Silt, slightly clayey, medium yellowish gray.....	1.0	10.0
silt, slightly calcareous, light gray with iron stain, moderately calcareous below 15.0 ft., contains a few gastropods below 25.0 ft.....	10.0	35.0
Silt, light gray.....	35.0	39.5
Silt, slightly clayey, soil-like, medium brown.....	39.5	40.8
Silt, moderately clayey, medium brown, iron-stained below 44.0 ft.....	40.8	50.0
Silt, slightly to moderately clayey, medium brown, very clayey below 60.0 ft.....	50.0	66.0
Clay, moderately silty to slightly sandy, medium brownish gray, contains very fine to fine sand....	66.0	69.0
Silt, slightly clayey to slightly sandy, medium brown, contains very fine to fine sand.....	69.0	73.0
Silt, very sandy, medium brown, contains fine to medium sand.....	73.0	75.0
Sand, silty, to silt, sandy, medium brown, contains very fine to medium sand.....	75.0	78.5
Sand, very silty, texture of sand grades from very fine to medium with some coarse.....	78.5	81.8
Sand and gravel, silty, texture grades from very fine sand to medium gravel.....	81.8	85.5
Till: clay, moderately silty to gravelly, moderately calcareous, light gray with iron stain.....	85.5	102.0
Sand and gravel, silty, moderately calcareous.....	102.0	102.5
Till: clay, silty to pebbly, moderately calcareous, light gray with iron stain, medium gray below 119.0 ft.....	102.5	132.2
Sand, silty, iron-stained, texture of sand grades from very fine to coarse.....	132.2	132.5
Sand and gravel, texture grades from fine sand to fine gravel, contains silt from 138.7 to 138.9 ft.	132.5	160.0
Sand, texture grades from fine to very coarse with a trace of fine gravel.....	160.0	190.0
Sand and gravel, texture grades from fine sand to fine gravel.....	190.0	200.0
Sand and gravel, texture grades from medium sand to medium gravel.....	200.0	203.2
Silt, clayey to sandy, medium brown, contains very fine sand.....	203.2	204.0

Sand and gravel, texture grades from medium sand to fine gravel.....	204.0	220.0
Sand, texture grades from fine to coarse.....	220.0	230.7
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, medium to dark gray, clayey to silty.....	230.7	250.0

Test Hole #18-B-50
(A22-4-26ddc)
Cumming County

Location: SW SE SE sec. 26, T. 22 N., R. 4 E., approximately
18 feet north and 1,307 feet west of southeast corner.
Ground elevation: 1,521 ft. (t). (Aloys 7.5 min. quadrangle).
Depth to water: 35.9 ft. (9-22-50).

	Depth, in feet	
	From	To
Road fill: silt, moderately clayey, yellowish brown	0.0	1.0
Silt, very clayey, medium yellowish brown.....	1.0	3.5
Silt, moderately clayey, medium yellowish brown, slightly to moderately calcareous below 8.5 ft....	3.5	14.5
Silt, slightly clayey, moderately calcareous, medium yellowish brown, slightly calcareous below 25.0 ft	14.5	36.0
Silt, grayish brown.....	36.0	37.0
Silt, slightly clayey, soil-like, grayish brown....	37.0	37.5
Silt, slightly clayey, brownish yellow.....	37.5	39.0
Clay, very silty, light brown.....	39.0	47.0
Silt, very clayey, light brown, moderately clayey below 53.0 ft.....	47.0	59.0
Till: clay, slightly sandy to gravelly, light gray with iron stain.....	59.0	62.5
Till: clay, moderately sandy to gravelly, light gray, very calcareous below 64.5 ft.....	62.5	74.0
Till: clay, silty to slightly sandy, light gray mottled dark gray.....	74.0	75.0
Sand and gravel; clayey, very calcareous; texture grades from sand to coarse gravel.....	75.0	76.3
Till: clay, silty to slightly sandy and gravelly, very calcareous, brownish yellow.....	76.3	77.0
Silt, moderately clayey, light gray, iron-stained from 78.0 to 80.0 ft.....	77.0	83.0
Silt, very clayey, slightly calcareous, light gray, contains limy nodules.....	83.0	84.0
Silt, slightly to moderately clayey, slightly cal- careous, light gray with a trace of iron stain....	84.0	84.5
Silt, moderately to very clayey, light gray with a trace of iron stain, in part moderately sandy, very fine from 86.0 to 89.5 ft.....	84.5	93.0
Silt, moderately clayey to sandy, light gray, con- tains very fine to medium with some coarse sand...	93.0	98.0
Sand, slightly silty, light gray; texture of sand grades from very fine to coarse.....	98.0	99.0
Silt, slightly clayey to sandy, light gray; contains very fine to fine sand.....	99.0	101.0
Silt, moderately clayey to slightly sandy, light gray; contains very fine to fine sand.....	101.0	105.0
Silt, light brown.....	105.0	109.5
Silt, moderately clayey to slightly sandy, light brown; contains very fine to fine sand.....	109.5	116.0
Silt, very sandy; contains very fine to fine sand...	116.0	118.0

Sand; texture grades from fine to coarse with some very coarse.....	118.0	122.0
Silt, moderately clayey to moderately sandy, light brown; contains very fine to fine sand.....	122.0	126.0
Sand and gravel; quartz and pink feldspar; texture grades from fine sand to fine gravel with some medium gravel.....	126.0	146.0
Silt, slightly clayey to moderately sandy, light gray.....	146.0	147.5
Sand; texture grades from fine to very coarse.....	147.5	150.0
Silt, sandy, to sand, silty, light gray; texture of sand grades from very fine to medium with some coarse.....	150.0	155.0
Sand and gravel; texture grades from fine sand to medium gravel.....	155.0	206.0
Clay, very silty, moderately calcareous, light gray.	206.0	210.0
Silt, very clayey, moderately calcareous, light brown.....	210.0	216.5
Silt, moderately clayey, moderately calcareous, light brownish gray.....	216.5	218.5
Silt, slightly to moderately clayey, moderately calcareous, medium gray, in part very clayey below 230.0 ft.....	218.5	247.0
Sand; texture grades from fine to coarse.....	247.0	249.0
Silt, moderately calcareous, medium gray, in part very clayey below 252.0 ft.....	249.0	254.0
Sand and gravel; quartz and some dark colored and green silicates; texture grades from sand to fine gravel with some medium gravel.....	254.0	266.4
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, dark gray, clayey, very calcareous.....	266.4	270.0

Test Hole #19-B-50
(A22-4-29dccd)
Cuming County

Location: SE SW SW SE sec. 29, T. 22 N., R. 4 E., approximately
14 feet north and 2,048 feet west of southeast corner.
Ground elevation: 1,605 ft. (t). (Aloys 7.5 min. quadrangle).
Depth to water: 160 ft. (10-3-50).

	<u>Depth, in feet</u>	
	<u>From</u>	<u>To</u>
Quaternary System, undifferentiated:		
Road fill: silt and clay, medium brown.....	0.0	1.5
Silt, very clayey, light to yellowish brown.....	1.5	3.0
Silt, slightly clayey, medium yellowish brown, slightly calcareous below 5.0 ft.....	3.0	15.0
Silt, very clayey, slightly calcareous, medium gray- ish brown.....	15.0	16.0
Silt, moderately clayey, slightly calcareous, yellowish gray, moderately calcareous below 18.0 ft., non-calcareous below 39.0 ft.....	16.0	40.0
Silt, soil-like, dark brown.....	40.0	42.0
Silt, slightly clayey, medium brown.....	42.0	42.5
Silt, very clayey, light grayish brown.....	42.5	46.0
Till: clay, sandy to slightly gravelly, moderately calcareous, light gray with some iron stain.....	46.0	115.0
Sand, quartz, gray, green and brown silicates; tex- ture grades from very fine to coarse, slightly coarser below 130.0 ft.; contains some fine gravel below 150.0 ft.....	115.0	166.5
Silt, moderately clayey, light brown; contains limy nodules below 170.5 ft.....	166.5	172.0
Silt, moderately clayey to moderately sandy, slight- ly calcareous, light brown; contains very fine sand.....	172.0	175.0
Silt, very sandy, light brown; contains very fine to fine sand.....	175.0	176.5
Sand, very silty, light brown; texture of sand grades from very fine to medium.....	176.5	178.0
Silt, clayey to sandy, light gray.....	178.0	179.0
Silt, slightly clayey, light brown.....	179.0	185.5
Silt, moderately clayey to slightly sandy, light gray.....	185.5	191.0
Sand; texture grades from very fine to medium.....	191.0	193.5
Silt, moderately to very sandy, light gray.....	193.5	194.5
Sand and gravel, quartz and pink feldspar; texture grades from fine sand to medium gravel; contains light gray silt from 217.8 to 218.1 ft.....	194.5	220.0
Silt, very sandy, light gray; contains very fine to fine sand.....	220.0	225.5
Sand and gravel; quartz, and pink, green and black silicates; texture grades from fine sand to medium gravel, grades coarser with depth.....	225.5	268.0
Silt, slightly clayey, light yellowish gray.....	268.0	271.0

Clay, silty, medium gray with brown tint, moderately calcareous and light olive gray below 273.0 ft....	271.0	275.0
Silt, very clayey, very calcareous, light bluish gray.....	275.0	285.0
Silt, slightly clayey, very calcareous, medium gray.	285.0	295.0
Silt, slightly sandy, moderately calcareous, medium gray; contains very fine to fine sand.....	295.0	300.0
Silt; slightly clayey, medium gray, slightly calcareous from 300.0 to 310.0 ft.....	300.0	315.5
Silt, in part slightly clayey, light yellowish brown.....	315.5	321.0
Sand and gravel; quartz and some pink feldspar; texture grades from sand to fine gravel.....	321.0	323.5
Silt, in part sandy, light yellowish brown.....	323.5	325.0
Sand and gravel; texture grades from sand to medium gravel; contains some green silt below 335.5 ft...	325.0	338.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, clayey to silty, moderately calcareous, medium to dark gray.....	338.0	350.0

Test Hole #8-B-50
(A22-5-2bdc)
Cuming County

Location: SW SE NW sec. 2, T. 22 N., R. 5 E., approximately
2,150 feet south and 1,440 feet east of northwest corner.
Ground elevation: 1,338.0 ft. (t). (Beemer 7.5 min quadrangle)
Depth to water: 10.7 ft. (9-14-50)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil and road fill: silt, medium brown.....	0.0	0.5
Soil: clay, very silty, light brownish gray.....	0.5	1.5
Silt, clayey, black.....	1.5	4.0
Silt, slightly clayey, medium gray.....	4.0	5.0
Clay, very silty, medium gray, light gray below 7.5 ft., contains a few limy fragments below 9.5 ft...	5.0	10.0
Clay, very silty, light brownish gray.....	10.0	14.0
Sand, silty, medium gray, texture of sand grades from very fine to medium.....	14.0	21.0
Sand, quartz and bluish green silicates, texture grades from very fine to coarse, contains some fine to medium gravel below 30.0 ft.....	21.0	32.0
Till: silt, clayey to sandy and gravelly, moder- ately calcareous, medium to dark gray, interbedded with sand and gravel below 90.0 ft.....	32.0	97.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Greenhorn Formation:		
Limestone, light gray to white.....	97.0	99.5
Limestone, shaly, to shale, limy, medium to dark gray.....	99.5	110.0

Test Hole #52-A-50
(A22-5-14bbb)
Cuming County

Location: NW NW NW sec. 14, T. 22 N., R. 5 E., approximately
192 feet south and 199 feet east of northwest corner.
Ground elevation: 1,448 ft. (t). (Beemer 7.5 min. quadrangle).
Depth to water: 40.2 ft. (9-14-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: silt, slightly clayey, dark brown.....	0.0	1.0
Silt, dark yellowish brown.....	1.0	2.0
Silt, slightly clayey, medium yellowish brown.....	2.0	4.0
Silt, medium yellowish brown, slightly calcareous below 10.0 ft.; contains some gastropod fragments below 37.5 ft.....	4.0	40.0
Silt, soil-like, dark brown.....	40.0	43.0
Silt, dark brownish gray.....	43.0	46.0
Silt, slightly clayey, grayish brown, light brown below 50.0 ft.....	46.0	61.5
Silt, very clayey, light brown.....	61.5	70.0
Silt, slightly clayey, light brown.....	70.0	74.5
Clay, very silty, to silt, very clayey, medium yellowish brown.....	74.5	80.0
Silt, slightly clayey, light brown.....	80.0	86.5
Silt, very clayey, olive gray.....	86.5	90.0
Silt, light olive gray with some iron stain.....	90.0	96.0
Sand, iron-stained; texture grades from very fine to very coarse with some gravel.....	96.0	101.0
Till: clay, silty, moderately calcareous, medium gray; contains some sand and gravel.....	101.0	116.0
Silt, clayey to sandy, light brown; contains very fine sand; slightly calcareous from 116.0 to 120.0 ft.....	116.0	126.0
Sand, light brown; texture grades from very fine to very coarse with some fine gravel; contains some fine to medium gravel below 135.0 ft.....	126.0	150.0
Sand, light brown; texture grades from very fine to very coarse; contains some fine to medium gravel from 170.0 to 180.0 ft.....	150.0	189.0
Clay, silty to very sandy, light brown; contains very fine sand.....	189.0	194.0
Sand, light brown; texture grades from very fine to very coarse sand with some fine to medium gravel..	194.0	203.0
Silt, clayey to sandy, very calcareous, yellowish gray.....	203.0	204.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Greenhorn Formation:		
Shale, dark gray to black, silty, very calcareous, in part light gray below 209.0 ft.....	204.0	220.0

Test Hole #17-A-50
(A22-5-26ccc)
Cuming County

Location: SW SW SW sec. 26, T. 22 N., R. 5 E., approximately
27 feet north and 76 feet east of southwest corner.
Ground elevation: 1,487 ft. (t). (Monterey 7.5 min. quadrangle).
Depth to water: 37.8 ft. (7-9-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: silt, dark brown.....	0.0	0.6
Silt, dark yellowish brown.....	0.6	20.0
Silt, medium grayish brown, slightly calcareous from 20.0 to 30.0 ft.....	20.0	36.0
Clay, slightly silty, dark reddish brown, light brown below 40.0 ft.....	36.0	52.5
Clay, very silty, dark grayish brown.....	52.5	56.0
Clay, slightly silty, light gray.....	56.0	75.5
Silt, sandy, very calcareous, light gray to light yellow; contains very fine to coarse sand, con- tains many calcareous fragments.....	75.5	79.5
Clay, silty to sandy, moderately calcareous, dark brown; contains very fine to coarse sand; contains many calcareous fragments.....	79.5	104.5
Sand, dark yellowish brown; texture grades from very fine to coarse.....	104.5	112.0
Sand and silt, interbedded, medium grayish brown; contains very fine to coarse sand.....	112.0	124.5
Sand, dark bluish gray; texture grades from very fine to coarse.....	124.5	127.0
Silt, sandy, moderately calcareous, dark bluish gray; contains very fine to medium sand; contains some peat; contains very fine to fine sand and limy fragments below 138.0 ft.....	127.0	144.0
Sand, light gray with green tint; texture grades from very fine to very coarse.....	144.0	148.0
Silt, sandy, very calcareous, light gray; contains very fine to medium sand; contains many limy fragments.....	148.0	154.0
Silt, clayey to sandy, slightly calcareous, light reddish brown; contains very fine to fine sand....	154.0	160.0
Sand, dark brown; texture grades from very fine to very coarse.....	160.0	165.5
Clay, silty, moderately calcareous, light brown, light gray below 170.0 ft.....	165.5	183.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Colorado Formation:		
Shale, dark gray, clayey to silty, very calcareous..	183.5	200.0

Test Hole #17-B-50
(A22-5-29cd)
Cuming County

Location: SE corner SW sec. 29, T. 22 N., R. 5 E., approximately
16 feet north and 2,609 feet east of southwest corner.
Ground elevation: 1,450 ft. (t). (Monterey 7.5 min. quadrangle).
Depth to water: 55.8 ft. (9-22-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, moderately clayey, dark brown, medium yellowish brown below 1.0 ft.....	0.0	3.0
Silt, slightly to moderately clayey, medium yellowish brown.....	3.0	5.5
Silt, slightly to moderately calcareous, medium yellowish brown; contains some limy nodules.....	5.5	11.5
Silt, moderately clayey, moderately calcareous, medium yellowish brown.....	11.5	35.0
Silt, soil-like, dark reddish brown to black.....	35.0	35.7
Clay, silty, to silt, clayey, dark brown.....	35.7	37.0
Clay, silty, medium to light brown; contains some sand below 47.0 ft.....	37.0	48.5
Clay, silty, light gray.....	48.5	50.0
Silt, moderately clayey to slightly sandy, light yellowish gray; contains very fine sand, very sandy, fine to very coarse below 57.0 ft.....	50.0	58.5
Silt, light brown.....	58.5	60.0
Silt, very clayey, light gray.....	60.0	65.0
Silt, moderately clayey to slightly sandy, moderately calcareous, light gray.....	65.0	66.0
Sand, moderately calcareous, quartz and dark colored silicates; texture grades from fine to very coarse	66.0	66.5
Silt, slightly clayey to moderately sandy, moderately calcareous, light gray; contains many gastropods.....	66.5	69.0
Till: clay, slightly sandy to gravelly, moderately calcareous, light gray; contains limy fragments, iron-stained from 69.0 to 75.0 ft.....	69.0	78.0
Clay, very silty, moderately calcareous, medium to dark gray.....	78.0	84.0
Clay, moderately calcareous, dark to medium gray....	84.0	88.0
Sand, quartz with some red grains; texture grades from very fine to coarse.....	88.0	88.5
Clay, slightly sandy, light gray.....	88.5	89.0
Clay, moderately sandy, light gray.....	89.0	90.6
Sand, quartz; texture grades from fine to coarse....	90.6	91.2
Clay, moderately sandy, light gray.....	91.2	91.6
Sand, quartz; texture grades from fine to coarse....	91.6	92.2
Clay, light greenish gray.....	92.2	95.0
Silt, slightly clayey to very sandy, light yellowish gray; contains very fine to medium sand.....	95.0	96.5

Sand, silty, to silt, sandy, light yellowish gray; texture of sand grades from very fine to medium with some coarse and very coarse.....	96.5	100.5
Sand and gravel; quartz and pink feldspar; texture grades from fine sand to fine gravel, contains some medium gravel below 110.0 ft.....	100.5	124.0
Silt, very sandy, light gray; contains very fine to coarse sand.....	124.0	124.5
Sand and some gravel; texture grades from fine sand to fine gravel; contains medium gravel below 150.0 ft.....	124.5	158.0
Silt, very sandy, light grayish brown.....	158.0	160.0
Clay, medium brownish gray.....	160.0	165.0
Clay, very silty, slightly calcareous; contains a trace of sand and some limy nodules.....	165.0	170.0
Clay, sandy to gravelly, moderately calcareous, brownish yellow; contains fine sand to coarse gravel; contains limy fragments.....	170.0	175.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Limestone, light yellowish brown, shaly, to shale, limy.....	175.5	178.0
Shale, dark gray, clayey to silty, very calcareous, contains a trace of pyrite at 196.0 ft.....	178.0	200.0

Test Hole #10-A-50
(A22-6-26cdd)
Cuming County

Location: SE SE SW sec. 26, T. 22 N., R. 6 E., approximately
23 feet north and 2,233 feet east of southwest corner.
Ground elevation: 1,475 ft. (t). (West Point 7.5 min. quadrangle).
Depth to water: 47.8 ft. (5-31-50).

	<u>Depth, in feet</u>	
	<u>From</u>	<u>To</u>
Quaternary System, undifferentiated:		
Sand, slightly silty, light yellowish brown, texture of sand grades from very fine to fine.....	0.0	2.0
Soil: sand, slightly silty, dark brownish gray.....	2.0	3.5
Sand, slightly silty, light brown; texture of sand grades from very fine to fine with some medium....	3.5	7.0
Sand, light yellowish gray; texture grades from very fine to fine with some medium, in part silty below 12.5 ft.....	7.0	14.0
Silt, slightly clayey, light brown.....	14.0	15.0
Sand, light yellowish gray; texture grades from very fine to medium.....	15.0	20.0
Sand, silty, light yellowish gray; texture of sand grades from very fine to fine.....	20.0	22.0
Silt, moderately sandy, medium brown; contains very fine sand.....	22.0	27.0
Silt, slightly to moderately clayey, slightly calcareous, light brownish yellow, light gray; contains a trace of very fine sand below 35.0 ft..	27.0	38.0
Silt, slightly clayey to sandy, slightly calcareous, brown; contains very fine sand.....	38.0	40.0
Silt, sandy, slightly calcareous, light brown; contains very fine sand.....	40.0	50.0
Silt, slightly clayey, slightly calcareous, light gray with iron stain.....	50.0	53.5
Silt, slightly clayey, slightly calcareous, medium bluish gray.....	53.5	60.0
Silt, slightly sandy, medium bluish gray; contains very fine sand.....	60.0	64.0
Silt, dark grayish brown; contains peat.....	64.0	67.0
Silt, very clayey, medium gray.....	67.0	71.0
Clay, light grayish blue, slightly silty below 73.5 ft.....	71.0	75.0
Clay, silty, medium gray.....	75.0	83.0
Clay, light gray with some iron stain.....	83.0	98.5
Till: clay, slightly sandy, slightly calcareous....	98.5	100.5
Till: clay, moderately sandy to gravelly, moderately calcareous, yellowish brown.....	100.5	111.0
Till: clay, silty to slightly sandy, very calcareous, medium brown.....	111.0	120.0
Till: clay, silty to very sandy and gravelly, moderately calcareous, light yellowish brown.....	120.0	122.5

Sand, clayey to silty, moderately calcareous, brownish yellow; texture grades from fine to very coarse sand with some fine gravel.....	122.5	124.0
Till: clay, sandy to gravelly, moderately calcareous, medium yellowish brown.....	124.0	130.5
Sand, slightly calcareous, yellowish brown; texture grades from fine to coarse with some very coarse..	130.5	142.5
Till: clay, silty to moderately sandy, moderately calcareous, light brownish gray.....	142.5	155.0
Silt, sandy, to sand, silty, slightly calcareous, light gray; texture of sand grades from fine to coarse with some very coarse.....	155.0	157.0
Sand; texture grades from fine to coarse with some very coarse.....	157.0	164.0
Silt, slightly clayey to sandy, light brownish gray; contains very fine sand.....	164.0	167.5
Clay, light gray, dark brown below 174.0 ft., light brown below 178.0 ft.....	167.5	186.0
Clay, sandy, yellow; contains very fine to coarse sand.....	186.0	190.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Greenhorn Formation:		
Chalk, yellow and white, shaly.....	190.0	195.0
Limestone, yellow and light brown; contains many shell fragments.....	195.0	206.5
Shale, white, light gray and yellow; limy, contains thin layers of shaly limestone.....	206.5	212.5
Shale, dark gray, limy, and interbedded limestone, shaly.....	212.5	222.5
Graneros Formation:		
Shale, dark gray, limy, clayey to silty.....	222.5	230.0
Shale, dark gray, limy.....	230.0	254.0
Shale, medium to dark gray, clayey, in part slightly calcareous.....	254.0	260.0

Test Hole #11-A-50
(22-6-26ddc)
Cuming County

Location: SW SE SE sec. 26, T. 22 N., R. 6 E., approximately
62 feet north and 856 feet west of southeast corner.
Ground elevation: 1,522 ft. (t). (West Point 7.5 min. quadrangle).
Depth to water: unknown, test hole caved at 24 ft.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: sand, slightly to moderately silty, grayish brown; texture of sand grades from very fine to medium.....	0.0	2.0
Sand, slightly silty, light grayish yellow; texture of sand grades from very fine to medium.....	2.0	16.0
Silt, slightly clayey to sandy, medium brown; contains very fine sand.....	16.0	20.0
Silt, sandy, to sand, silty; contains very fine to medium sand.....	20.0	24.5
Sand, light brown; texture grades from very fine to medium with a trace of coarse.....	24.5	40.0
Silt, slightly clayey to sandy, moderately calcareous, medium brown; contains very fine sand.....	40.0	44.0
Silt, slightly sandy, moderately calcareous, light gray and light yellowish brown; contains fine sand	44.0	53.0
Sand, light brownish yellow; texture grades from very fine to coarse.....	53.0	56.0
Silt, sandy, moderately calcareous, light gray; contains very fine to coarse sand.....	56.0	74.5
Silt, slightly sandy, moderately calcareous, medium bluish gray; contains very fine sand, slightly calcareous below 110.0 ft.....	74.5	115.5
Silt, slightly clayey to sandy, medium to dark gray; contains very fine sand.....	115.5	120.0

Test Hole #6-A-50
(A22-6-28cd)
Cuming County

Location: SE corner SW sec. 28, T. 22 N., R. 6 E., approximately
11 feet north and 2,615 feet east of southwest corner.
Ground elevation: 1,309.0 ft. (t). (West Point 7.5 quadrangle)
Depth to water: 6.5 ft. (5-24-50)

	<u>Depth, in feet</u>	
	<u>From</u>	<u>To</u>
Quaternary System, undifferentiated:		
Road fill: silt, clayey to sandy, moderately calcareous, light brownish gray, contains very fine sand.....	0.0	1.5
Soil: silt, moderately clayey to sandy, dark brownish gray, contains very fine to fine sand.....	1.5	2.5
Silt, moderately clayey to slightly sandy, slightly calcareous, medium brown, contains very fine sand.	2.5	3.8
Silt, slightly clayey to moderately sandy, soil-like, moderately calcareous, dark grayish brown, contains very fine to medium sand.....	3.8	4.5
Silt, slightly clayey to moderately sandy, moderately calcareous, light brownish gray, contains very fine to fine sand with some medium sand.....	4.5	5.0
Silt, sandy, very calcareous, light brownish gray, contains very fine to fine sand.....	5.0	6.5
Sand, brownish gray, texture grades from fine to coarse, texture grades from fine to very coarse with a trace of gravel below 10.0 ft.....	6.5	15.0
Silt, in part clayey, very calcareous, medium gray, contains wood fragments.....	15.0	20.0
Sand and gravel; quartz and green silicates, texture grades from fine sand to medium gravel.....	20.0	24.0
Silt, clayey, in part sandy, light gray, contains very fine sand.....	24.0	27.0
Sand; texture grades from fine to medium with a trace of coarse.....	27.0	36.0
Sand and gravel; texture grades from medium sand to medium gravel, contains light gray clayey silt from 47.0 to 47.3 ft.....	36.0	65.5
Till: clay, slightly sandy, moderately calcareous, dark gray.....	65.5	71.0
Clay, silty, moderately calcareous, light greenish gray.....	71.0	73.0
Till: clay, silty to slightly sandy, moderately calcareous, medium gray.....	73.0	84.0
Clay, greenish gray.....	84.0	85.0
Till: clay, silty to slightly sandy, moderately calcareous, medium gray.....	85.0	93.0
Shale, chalky (boulder).....	93.0	95.0
Till: clay, silty to slightly sandy, moderately calcareous, medium gray.....	95.0	100.0

Sand, clayey to slightly silty, texture of sand grades from fine to coarse, contains a few pelecypod fragments.....	100.0	104.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Graneros Formation:		
Shale, clayey, medium gray.....	104.0	111.5
Lower Cretaceous Series - Dakota Group:		
Shale, clayey, medium gray with brown tint.....	111.5	114.5
Shale, dark grayish green, sandy, contains very fine to fine sand.....	114.5	115.5
Shale, clayey, medium gray with brown tint.....	115.5	123.0
Sandstone, light gray, very fine- to fine-grained, in part shaly below 125.0 ft.....	123.0	128.5
Shale, medium gray, slightly clayey to very sandy, contains very fine to fine sand, contains some pyrite below 130.0 ft.....	128.5	144.5
Sandstone, light brownish-gray, very fine- to fine- grained.....	144.5	150.0

Test Hole #3-A-50
(A22-6-29ccc)
Cuming County

Location: SW SW SW sec. 29, T. 22 N., R. 6 E., approximately
22 feet north and 452 feet east of southwest corner.
Ground elevation: 1,392.0 ft. (t). (Monterey 7.5 min. quadrangle)
Depth to water: 34.0 ft. (5-22-50)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: silt, moderately clayey, medium brownish gray	0.0	0.5
Silt, moderately clayey, light yellowish brown, contains a few limy nodules and gastropod fragments below 4.0 ft.....	0.5	5.0
Silt, slightly clayey, slightly calcareous, light yellowish brown, contains gastropod fragments.....	5.0	15.5
Silt, slightly clayey, moderately calcareous, light yellowish brown to light gray, contains gastropods	15.5	34.5
Silt, slightly clayey, light brown with red tint....	34.5	37.5
Silt, very clayey, to clay, very silty, brown with red tint.....	37.5	43.0
Silt, moderately clayey, brown.....	43.0	49.0
Silt, very clayey, light gray.....	49.0	51.0
Till: clay, sandy, slightly to moderately calcareous, light gray.....	51.0	58.3
Sand, moderately calcareous, light yellowish brown, texture grades from fine to coarse.....	58.3	59.5
Till: clay, sandy to pebbly, moderately calcareous, light gray with iron stain.....	59.5	62.0
Sand, moderately calcareous, texture grades from fine to coarse.....	62.0	65.5
Till: clay, sandy to pebbly, moderately calcareous, light gray with iron stain, very calcareous and dark gray below 93.5 ft.....	65.5	117.5
Clay, silty, medium brown, contains limy nodules from 125.8 to 126.2 ft.....	117.5	126.2
Silt, very clayey, slightly calcareous, brown, contains some fine to medium sand from 126.2 to 127.0 ft.....	126.2	131.0
Silt, very clayey, in part slightly sandy, moderately calcareous, brown.....	131.0	135.0
Sand, texture grades from medium to very coarse with some fine gravel, contains chalk fragments below 140.0 ft.....	135.0	145.2
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Greenhorn Formation:		
Limestone, medium gray, shaly, to shale, chalky.....	145.2	148.0
Shale, dark gray, chalky.....	148.0	163.8
Shale, medium gray, chalky, to limestone, shaly.....	163.8	165.0
Shale, dark gray, chalky.....	165.0	170.0

Graneros Formation:

Shale, dark gray, silty to slightly clayey, very
calcareous, petroliferous odor, moderately
clayey from 175.0 ft.; contains pyrite below

200.0 ft.....	170.0	207.0
Shale, medium to dark gray, clayey.....	207.0	230.0

Test Hole #4-A-50
(A22-6-29dcd)
Cuming County

Location: SE SW SE sec. 29, T. 22 N., R. 6 E., approximately
8 feet north and 1,872 feet west of southeast corner.
Ground elevation: 1,347.0 ft. (t). (Monterey 7.5 quadrangle)
Depth to water: 43.9 ft. (5-22-50)

	<u>Depth, in feet</u>	
	<u>From</u>	<u>To</u>
Quaternary System, undifferentiated:		
Road fill and soil: silty, clayey, medium brownish gray.....	0.0	0.8
Soil: silt, moderately clayey, dark brownish gray..	0.8	1.5
Silt, moderately clayey, medium grayish brown, light yellowish brown below 2.0 ft., slightly clayey below 4.5 ft.....	1.5	10.0
Silt, slightly calcareous, light brownish yellow....	10.0	20.0
Silt, moderately clayey, moderately calcareous, light yellowish brown.....	20.0	30.5
Silt, slightly sandy, moderately calcareous, light yellowish brown, contains very fine to medium sand	30.5	34.0
Sand and silt, interbedded, contains very fine to medium with some coarse sand.....	34.0	37.0
Silt, slightly clayey, moderately calcareous, light gray with some iron stain.....	37.0	39.0
Sand, texture grades from very fine to medium.....	39.0	40.0
Silt, slightly clayey, moderately calcareous, light gray.....	40.0	45.5
Silt, very clayey, to clay, very silty, soil-like, dark gray.....	45.5	48.0
Silt, moderately clayey, light gray with some iron stain, contains sand in lower part.....	48.0	49.5
Sand, iron-stained, texture grades from fine to coarse with some very coarse.....	49.5	60.0
Sand, texture grades from fine to very coarse with some fine gravel.....	60.0	95.0
Clay, silty to slightly sandy, yellowish brown.....	95.0	97.0
Till: clay, silty to slightly ssandy, moderately calcareous, medium gray.....	97.0	116.0
Clay, very silty, light gray, contains limy nodules at 118.0 ft.....	116.0	118.5
Till: clay, silty to sandy, moderately calcareous, medium gray.....	118.5	182.0
Sand, quartz and dark green silicates, texture grades from fine to very coarse.....	182.0	190.0
Sand and gravel, texture grades from fine sand to fine gravel, contains some chalky shale fragments.	190.0	205.0
Sand, texture grades from fine to coarse with some very coarse.....	205.0	230.0
(Lost circulation)		

Test Hole #5-A-50
(A22-6-33bbb)
Cuming County

Location: NW NW NW sec. 33, T. 22 N., R. 6 E., approximately
116 feet south and 5 feet east of northwest corner.
Ground elevation: 1,353.0 ft. (t). (West Point 7.5 min. quadrangle)
Depth to water: 48.5 ft. (5-24-50)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: silt, clayey, dark brownish gray.....	0.0	1.0
Silt, moderately clayey, dark brown.....	1.0	1.5
Silt, slightly to moderately clayey, light yellowish brown.....	1.5	2.5
Silt, slightly clayey, light brownish yellow, moderately calcareous below 4.0 ft.....	2.5	33.0
Silt, very sandy, moderately calcareous, light brownish yellow, contains very fine to medium sand	33.0	34.5
Sand; texture grades from very fine to medium with some coarse.....	34.5	46.5
Silt, very calcareous, light gray and yellowish brown.....	46.5	48.0
Silt, slightly clayey, medium gray.....	48.0	51.5
Silt, very clayey, in part moderately sandy, soil-like, dark gray, contains very fine to medium sand	51.5	53.0
Sand, clayey to very silty, light gray, texture grades from very fine to fine with some medium....	53.0	56.0
Silt, slightly clayey, light gray.....	56.0	57.0
Sand, iron-stained, texture grades from fine to coarse with some very coarse, contains a trace of fine gravel below 65.0 ft.....	57.0	81.0
Sand; texture grades from very fine to medium with some coarse.....	81.0	87.0
Sand and gravel; texture grades from fine sand to fine gravel.....	87.0	101.5
Till: clay, silty to slightly sandy, moderately calcareous, medium gray.....	101.5	160.5
Sand, quartz and dark colored silicates, texture grades from fine to very coarse.....	160.5	167.0
Till: clay, sandy, moderately calcareous, dark gray	167.0	169.5
Sand and gravel, quartz and dark colored silicates, texture grades from medium sand to medium gravel..	169.5	191.5
Cretaceous System - Lower Cretaceous Series - Dakota Group:		
Shale, very sandy and clayey, interbedded; contains very fine to fine sand, dark gray.....	191.5	200.0
Shale, sandy, medium gray; contains very fine sand..	200.0	205.0
Shale, clayey to silty, grayish brown.....	205.0	240.0

Test Hole #7-A-50
(A22-6-33aa)
Cuming County

Location: C SL NE NE sec. 33, T. 22 N., R. 6 E., approximately
1,301 feet south and 660 feet west of northeast corner.
Ground elevation: 1,305.0 ft. (t). (West Point 7.5 min. quadrangle)
Depth to water: 5.1 ft. (5-31-50)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and soil: silt, moderately clayey to slightly sandy, dark brownish gray.....	0.0	0.5
Silt, slightly clayey, yellowish brown.....	0.5	2.0
Silt, very clayey, light brownish gray.....	2.0	3.0
Silt, moderately clayey, in part slightly sandy, medium brownish gray, contains very fine sand and some limy nodules.....	3.0	6.5
Silt, very clayey, light brownish gray.....	6.5	11.0
Silt, clayey to slightly sandy, medium brownish gray, contains very fine to fine sand.....	11.0	12.0
Sand, quartz and light colored and green silicates, texture of sand grades from fine to very coarse...	12.0	20.0
Sand and gravel; texture grades from fine sand to medium gravel with some coarse gravel.....	20.0	61.0
Cretaceous System - Upper Cretaceous System - Colorado Group:		
Graneros Formation:		
Shale, dark gray, chalky.....	61.0	82.0
Shale, dark gray, clayey; contains some pyrite.....	82.0	96.0
Shale, medium gray, clayey.....	96.0	103.3
Shale, clayey, contains a trace of pyrite, contains many shell fragments.....	103.3	105.0
Lower Cretaceous Series - Dakota Group:		
Shale, dark grayish green; very sandy; contains very fine to fine sand; contains shell fragments.	105.0	108.0
Shale, medium to dark gray; slightly clayey to moderately sandy; contains very fine to fine sand...	108.0	115.0
Shale, medium to dark gray; very sandy; contains very fine to fine sand.....	115.0	120.0

Test Hole #16-A-50
(A22-6-33bdb)
Cuming County

Location: NW SE NW sec. 33, T. 22 N., R. 6 E., approximately
591 feet south and 1,425 feet east of northwest corner.
Ground elevation: 1,335 ft. (t). (West Point 7.5 min. quadrangle).
Depth to water: 31.8 ft. (7-11-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: silt, clayey, dark brown to black.....	0.0	1.7
Silt, slightly clayey, dark brown.....	1.7	2.7
Silt, dark brown, medium yellowish brown from 4.6 to 10.0 ft.....	2.7	26.0
Sand, light gray; texture grades from very fine to coarse; contains some fine to medium gravel below 30.0 ft.....	26.0	35.0
Sand and gravel; texture grades from fine sand to medium gravel.....	35.0	40.0
Sand; texture grades from very fine to coarse with some fine gravel.....	40.0	43.5
Silt, very sandy, light gray; contains very fine to medium sand.....	43.5	46.8
Sand and gravel; texture grades from very fine sand to medium gravel.....	46.8	67.0
Sand, quartz and bluish green silicates; texture grades from very fine sand to very coarse with some gravel.....	67.0	88.0
Silt, clayey to sandy, moderately calcareous, dark bluish gray; contains very fine to fine sand.....	88.0	142.0
Sand and gravel; quartz and light green silicates; texture grades from fine sand to medium gravel....	142.0	168.5
Limestone, light gray to white (boulder).....	168.5	170.0
Sand and gravel; grayish green; texture grades from fine sand to medium gravel.....	170.0	186.0
Cretaceous System - Lower Cretaceous Series - Dakota Group:		
Sandstone, dark brown, very fine-grained, contains much pyrite.....	186.0	195.0
Shale, clayey, dark brown, slightly calcareous.....	195.0	200.0

Test Hole #8-A-50
(A22-6-34bcb)
Cuming County

Location: NW SW NW sec. 34, T. 22 N., R. 6 E., approximately
1,650 feet south and 255 feet east of northwest corner.
Ground elevation: 1,302.0 ft. (t). (West Point 7.5 min. quadrangle)
Depth to water: 2.8 ft (5-31-50)

	<u>Depth, in feet</u>	
	<u>From</u>	<u>To</u>
Quaternary System, undifferentiated:		
Sand, very silty, light brown, texture of sand grades from very fine to fine.....	0.0	0.5
Soil: sand, very silty, dark brownish gray to black, texture of sand grades from very fine to fine.....	0.5	1.5
Sand, very silty, medium grayish brown, texture of sand grades from very fine to fine with a trace of medium.....	1.5	3.0
Sand, light brown, texture grades from very fine to medium.....	3.0	6.5
Silt, slightly clayey, medium brownish gray.....	6.5	7.5
Sand, light brownish gray, texture grades from very fine to medium.....	7.5	11.0
Sand, quartz and green silicates, texture grades from fine to coarse.....	11.0	20.0
Sand and gravel, texture grades from medium sand to medium gravel.....	20.0	57.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Graneros Formation:		
Shale, light yellowish to grayish brown, chalky.....	57.0	58.0
Shale, medium to dark gray, chalky.....	58.0	70.0

Test Hole #9-A-50
(A22-6-34bad)
Cuming County

Location: SW NE NW sec. 34, T. 22 N., R. 6 E., approximately
1,309 feet south and 1,798 feet east of northwest corner.
Ground elevation: 1,302.0 ft. (t). (West Point 7.5 min. quadrangle)
Depth to water: 5.4 ft. (5-31-50)

	<u>Depth, in feet</u>	
	<u>From</u>	<u>To</u>
Quaternary System, undifferentiated:		
Road fill: silt, slightly clayey to very sandy, dark brownish gray, contains very fine sand.....	0.0	0.5
Soil: silt, very sandy, dark grayish brown.....	0.5	1.5
Sand, moderately silty, medium grayish brown, texture of sand grades from very fine to fine with some medium.....	1.5	2.5
Sand, in part slightly silty, light brown, texture of sand grades from very fine to medium.....	2.5	7.5
Silt, slightly clayey to very sandy, slightly calcareous, medium gray, contains very fine to fine sand.....	7.5	9.5
Sand, texture grades from fine to very coarse with a trace of fine gravel.....	9.5	24.5
Silt, slightly clayey to slightly sandy, dark gray, contains very fine sand.....	24.5	25.0
Sand and gravel; quartz and green silicates, texture grades from medium sand to fine gravel with some coarser gravel.....	25.0	56.5
Clay, silty to slightly sandy, light green.....	56.5	57.5
Till: clay, slightly sandy, moderately calcareous, medium gray.....	57.5	65.5
Silt, clayey, slightly to moderately calcareous, light gray, contains many shell fragments below 68.5 ft.....	65.5	69.5
Sand, very calcareous, texture grades from fine to very coarse; contains many shell fragments.....	69.5	72.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Graneros Formation:		
Shale, yellowish brown, chalky, dark gray below 75.0 ft.....	72.0	85.5
Limestone, shaly, and shale, limy.....	85.5	86.0
Shale, dark gray, chalky, petroligerous.....	86.0	91.5
Shale, dark gray, clayey to slightly silty, slightly to moderately calcareous, dark gray, non-calcareous and medium gray below 97.0 ft.....	91.5	100.0

Test Hole #15-A-50
(A22-6-35aaa)
Cumming County

Location: NE corner sec. 35, T. 22 N., R. 6 E., approximately
91 feet south and 8 feet west of northeast corner.
Ground elevation: 1,496 ft. (t). (West Point 7.5 min. quadrangle).
Depth to water: 43.5 ft. (7-11-50).

	<u>Depth, in feet</u>	
	<u>From</u>	<u>To</u>
Quaternary System, undifferentiated:		
Soil: silt, very sandy, medium grayish brown; contains very fine to medium sand.....	0.0	1.5
Silt, sandy, light yellowish brown; contains very fine sand; contains some fine to medium sand below 6.5 ft.....	1.5	8.5
Sand, medium brown; texture grades from very fine to medium.....	8.5	20.0
Sand, silty, medium grayish brown; texture of sand grades from very fine to medium.....	20.0	30.0
Silt, slightly sandy, dark gray to yellowish brown; contains very fine sand.....	30.0	44.0
Sand, dark yellowish brown; texture grades from very fine to coarse.....	44.0	48.5
Silt, medium bluish gray; contains wood fragments, slightly clayey below 60.0 ft.....	48.5	98.7
Silt, dark brown; contains peat.....	98.7	103.5
Clay, slightly silty, medium bluish gray.....	103.5	110.0
Clay, light bluish gray.....	110.0	132.8
Silt, clayey to sandy, bluish gray.....	132.8	136.5
Silt, clayey to sandy, moderately calcareous, light brown; contains very fine to fine sand.....	136.5	140.0
Clay, sandy, moderately calcareous, light brown; contains very fine to fine sand; contains calcareous nodules.....	140.0	150.0
Clay, silty to sandy, slightly calcareous, light brown; contains very fine to fine sand; contains calcareous fragments.....	150.0	159.0
Sand, dark brown; texture grades from very fine to coarse with some very coarse.....	159.0	160.0
Sand and gravel; dark brown; texture grades from very fine sand to medium gravel.....	160.0	164.0
Silt, sandy, slightly calcareous, medium grayish brown; contains very fine to medium sand.....	164.0	167.5
Silt, clayey to sandy, slightly calcareous, grayish brown; contains very fine to fine sand.....	167.5	175.5
Sand and gravel; in part silty; texture grades from fine sand to coarse gravel.....	175.5	194.6
Silt, clayey to sandy, slightly calcareous, light gray to white, contains very fine to fine sand....	194.6	200.0
(Bedrock not reached).		

Test Hole #19-B-63
(A22-7-1ddc)
Cumming County

Location: SW SE SE sec. 1, T. 22 N., R. 7 E., approximately
1,071 feet west and 8 feet north of the southeast corner.
Ground elevation: 1,375 ft. (t). (West Point NE 7.5 min. quadrangle).
Depth to water: 32.05 ft. (9-20-63).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
No sample.....	0.0	0.5
Silt, moderately clayey, slightly calcareous, brown; some limy nodes; some gray and olive with yellow staining below 5 ft.; gastropod fossils below 11 ft.....	0.5	16.0
Silt, moderately clayey, dark yellowish brown and gray.....	16.0	16.5
Silt, moderately clayey, reddish brown.....	16.5	20.0
Silt, clayey, brown; some dark staining.....	20.0	27.0
Till: clay, silty, sandy, gravelly, mottled pale olive, some gray; mottled yellow and pale olive, slightly calcareous from 29 to 29.6 ft.; moderately calcareous below 29.6 ft.; pale brown below 30 ft.....	27.0	40.0
Till: clay, silty, sandy, gravelly, moderately calcareous, pale brown with yellow stain; light gray from 45.5 to 46 ft.; some gray below 50 ft..	40.0	57.4
Till: clay, silty, sandy, gravelly, moderately calcareous, pale olive; yellowish brown to brown with dark and yellow staining below 57.5 ft.....	57.4	60.1
Gravel, sandy, silty; fine sand to medium gravel...	60.1	68.0
Till: clay, silty, sandy, gravelly, moderately calcareous, light olive gray.....	68.0	70.0
Clay, moderately sandy, brown; sand is very fine to coarse with dark and yellow stain; light brownish gray in part; no visible sand below 76 ft.....	70.0	82.9
Clay, silty, brown with dark staining, in places sandy, sand is very fine to fine; gray from 89.4 to 90 ft.; light brownish gray from 90 to 91 ft.; dark grayish brown below 91 ft.....	82.9	92.2
Tertiary System - Miocene Series - Ogallala Group:		
Silt, light olive gray, moderately clayey, sandy, sand is very fine.....	92.2	96.0
Sand, slightly silty; sand is very fine to fine, trace of medium; some limy grains.....	96.0	125.0
Sandstone, moderately calcareous, sand is very fine to fine, dark staining; silty from 125.9 to 130 ft.....	125.0	130.5

Silt, olive gray, moderately clayey, sandy, moderately calcareous, sand is very fine, some reworked sandstone gravel fragments.....	130.5	135.0
Silt, light gray, very sandy, moderately clayey, very calcareous; sand is very fine, light brownish gray below 136 ft.....	135.0	139.0
Clay, olive gray, silty, slightly sandy below 145 ft., sand is very fine.....	139.0	145.0
Clay, dark gray, silty, slightly sandy; sand is very fine; light brownish gray from 150 to 153.7 ft...	145.0	155.0
Clay, dark grayish brown, silty, grayish brown below 160 ft.....	155.0	161.9
Cretaceous System - Lower Cretaceous Series - Dakota Formation:		
Sandstone, clayey, silty; sand is very fine; contains some ironstone; much yellow staining.....	161.9	164.0
Shale, yellowish brown, clay, silty; contains ironstone; gray with some yellow below 166.5 ft.....	164.0	170.0
Shale, brownish yellow, some gray, clay, silty, some ironstone.....	170.0	179.5
Shale, black, clay.....	179.5	184.0
Sandstone, silty; sand is very fine to fine, much iron staining.....	184.0	188.0
Silt, black, some gray, clayey.....	188.0	191.0
Sandstone; sand is very fine to fine, some iron staining; very silty below 191 ft.; some pyrite below 195 ft.....	191.0	198.0
Silt, dark gray, very sandy; sand is very fine.....	198.0	200.0
Sandstone; sand is very fine.....	200.0	202.0
Silt, gray, sandy; sand is very fine.....	202.0	205.0
Sandstone, moderately silty; sand is very fine; silty lens from 215 to 216 ft.....	205.0	217.0
Silt, gray, clayey.....	217.0	220.0
Lignite, black.....	220.0	223.2
Silt, grayish brown; clayey, gray with black, very sandy below 225 ft., sand is very fine.....	223.2	226.8
Clay, gray, silty.....	226.8	228.2
Silt, light gray, clayey, some siderite.....	228.2	230.0
Shale, gray, clay, silty, some siderite below 235 ft.....	230.0	260.5

Test Hole #18-B-63
(A22-7-13ddc)
Cuming County

Location: SW SE SE sec. 13, T. 22 N., R. 7 E., approximately
742 feet west and 8 feet north of the southeast
corner.

Ground elevation: 1,442 ft. (t). (West Point SE 7.5 min. quadrangle).

Depth to water: 33.3 ft. (9-20-63).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill, no sample.....	0.0	0.5
Silt, moderately clayey, dark grayish brown; dark brown below 1 ft.....	0.5	2.0
Silt, moderately clayey, dark yellowish brown; brown from 9.5 to 10 ft.; brown with some gray below 9.5 ft.; contains dark staining.....	2.0	13.0
Silt, moderately clayey, slightly calcareous; brown with some gray; contains dark staining; gastropod fragments below 14.5 ft.....	13.0	15.0
Silt, moderately clayey, slightly calcareous, olive, with yellow staining; some gastropod fragments below 16.4 ft.; moderately calcareous from 17.3 to 25.3 ft.; some limy grains below 20 ft.....	15.0	31.5
Silt, slightly clayey, dark brown, some dark grains.....	31.5	33.0
Silt, moderately clayey, yellowish brown, some yellow and dark staining; brown below 34.2 ft....	33.0	35.0
Clay, silty, reddish brown; brown below 40 ft., some yellow stain.....	35.0	45.0
Silt, moderately clayey, yellowish brown with yellow staining.....	45.0	50.0
Clay, silty, brown; reddish brown below 51.1 ft.; some dark and yellow staining.....	50.0	55.0
Clay, silty, yellowish brown; pale brown below 60 ft; some yellow and dark staining.....	55.0	65.0
Clay, silty, olive gray; brownish gray from 67 to 69 ft; pale brown from 70 to 72.7 ft.; contains some dark and yellow stain.....	65.0	74.4
Clay, silty, moderately calcareous, light gray to pale brown, some limy grains; slightly calcareous below 75 ft.....	74.4	76.3
Clay, silty, moderately calcareous, olive gray; pale olive, slightly sandy, very calcareous below 81.5 ft.; contains some limy grains and yellow staining.....	76.3	82.3

Till: clay, silty, sandy, very calcareous, yellowish brown, very calcareous; contains limy grains; gravelly from 85 to 90 ft.; brown below 90 ft....	82.3	90.3
Till: clay, silty, sandy, gravelly, very calcareous, pale olive; moderately calcareous below 95 ft; some brown from 97 to 100 ft.; trace of peaty material from 103 to 103.5 ft.; contains some dark and yellow staining.....	90.3	107.4
Till: clay, silty, sandy, gravelly, moderately calcareous, dark grayish brown; some limy nodes and peaty material.....	107.4	110.0
Till: clay, silty, sandy, gravelly, moderately calcareous, yellowish brown and olive gray; some yellow and dark staining; some peaty material below 116.5 ft.....	110.0	120.0
Till: clay, silty, sandy, gravelly, moderately calcareous, pale brown; light brownish gray below 125 ft; contains yellow and dark staining.....	120.0	141.6
Clay, silty, gray to grayish brown; some limy grains; light olive brown below 142.9 ft., some yellow staining.....	141.6	145.0
Clay, silty, very dark gray; wood fragments at 145.4 ft.....	145.0	153.9
Clay, silty, light brownish gray; slightly sandy below 154.7 ft., sand is very fine to fine; yellowish brown from 154.7 to 155 ft.....	153.9	156.1
Clay, silty, slightly sandy, light olive gray; sand is very fine to fine; some dark staining.....	156.1	157.5
Clay, silty, light brownish gray, some grayish brown; in places limy areas and dark staining....	157.5	163.0
Clay, silty, sandy, gray with bluish tint; sand is very fine to fine.....	163.0	163.9
Silt, moderately clayey, very sandy, bluish gray; sand is very fine to fine; gray with bluish tint below 165 ft., sand is very fine to fine.....	163.9	166.4
Clay, silty, very sandy, light brownish gray; sand is very fine to fine; grayish brown from 169.7 to 170.3 ft.; pale brown below 173.8 ft.....	166.4	175.0
Silt, moderately clayey, very sandy, pale brown; sand is very fine to fine.....	175.0	185.0
Silt, moderately clayey, very sandy, light gray with brownish tint; sand is very fine to fine; olive tint below 190 ft.; slightly gravelly below 200 ft., fine sand to medium gravel.....	185.0	204.0
Gravel, sandy; fine sand to coarse gravel.....	204.0	214.0
Boulder possible.....	214.0	214.8
Silt, slightly clayey, slightly sandy, soil-like, light brownish gray with some brown; sand is very fine.....	214.8	215.0
Clay, silty, slightly sandy, yellowish brown, some brown; sand is very fine to coarse; some yellow and dark staining.....	215.0	216.0

Clay, silty, grayish brown, some yellow and dark staining.....	216.0	218.0
Clay, slightly silty, slightly sandy, dark gray to grayish brown; sand is very fine to coarse.....	218.0	220.0
Clay, silty, bluish gray; gray below 228 ft.....	220.0	235.1
Cretaceous System - Lower Cretaceous Series - Dakota Group:		
Silt, yellowish brown, very sandy, sand is very fine to very coarse.....	235.1	238.0
Sand, moderately silty; sand is very fine to fine, some ironstone fragments.....	238.0	244.5
Shale, yellow brown, clay, silty, some gray.....	244.5	249.0
Shale, dark gray, clay, sandy below 252.5 ft.; sand is very fine to fine, some pyrite below 265 ft...	249.0	289.4
Shale, dark gray to gray, clay, some pyrite, brownish gray and gray below 296.8 ft.....	289.4	300.0

Test Hole #51-A-50
(A22-7-33bba)
Cuming County

Location: NE NW NW sec. 33, T. 22 N., R. 7 E., approximately
37 feet south and 785 feet east of northwest corner.
Ground elevation: 1,455 ft. (t). (West Point 7.5 min. quadrangle).
Depth to water: 36.8 ft. (9-6-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: silt, dark brown to black.....	0.0	1.0
Silt, slightly clayey, dark yellowish brown, medium yellowish brown below 1.5 ft.....	1.0	3.0
Silt, very clayey, medium yellowish brown.....	3.0	5.5
Silt, medium yellowish brown.....	5.5	11.5
Silt, slightly calcareous, yellowish gray, yellowish brown from 20.0 to 30.0 ft.....	11.5	35.5
Silt, soil-like, dark brown.....	35.5	36.5
Silt, slightly clayey, yellowish brown.....	36.5	38.5
Clay, very silty, to silt, very clayey, grayish to yellowish brown.....	38.5	66.5
Clay, slightly silty, light brownish gray.....	66.5	75.0
Clay, light olive gray.....	75.0	86.5
Till: clay, light yellowish to dark gray; contains peat and lime nodules.....	86.5	90.5
Till: clay, slightly sandy, light brownish gray; contains very fine to coarse sand.....	90.5	95.0
Till: clay, sandy, very calcareous, medium to yellowish gray; contains very fine to coarse sand, moderately calcareous below 110.0 ft., contains some interbedded sand below 160.0 ft.....	95.0	170.0
Sand, silty, medium gray; texture of sand grades from very fine to medium.....	170.0	197.5
Silt, very sandy, slightly calcareous, light brown- ish gray; contains very fine sand.....	197.5	214.0
Sand, quartz and light green silicates; texture grades from very fine to coarse.....	214.0	229.5
Cretaceous System - Lower Cretaceous Series - Dakota Group:		
Silt, medium gray; very sandy to shale.....	229.5	232.0
Silt, yellowish orange, very sandy, contains very fine sand.....	232.0	233.0
Sandstone, dark brownish gray, very fine- to medium- grained, silty.....	233.0	248.0
Coal.....	248.0	248.5
Shale, dark gray, clayey to silty, contains coal below 264.0 ft.....	248.5	265.0

Test Hole #50-A-50
(A22-7-36bbb)
Cuming County

Location: NW NW NW sec. 36, T. 22 N., R. 7 E., approximately
180 feet south and 27 feet east of northwest corner.
Ground elevation: 1,395 ft. (t). (West Point 7.5 min. quadrangle).
Depth to water: 56.1 ft. (9-6-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: silt, slightly clayey, dark brown.....	0.0	0.5
Silt, slightly clayey, medium yellowish brown.....	0.5	2.0
Silt, slightly calcareous, yellowish brown.....	2.0	25.0
Silt, slightly clayey, soil-like, dark brown.....	25.0	28.0
Silt, moderately clayey, medium brownish gray.....	28.0	30.0
Silt, slightly clayey, medium yellowish brown.....	30.0	34.5
Clay, moderately silty, medium yellowish brown.....	34.5	37.5
Clay, moderately silty, medium yellowish brown.....	37.5	46.0
Till: clay, silty to sandy, moderately calcareous, light yellowish brown.....	46.0	50.0
Till: clay, slightly sandy, moderately calcareous, light brownish gray; contains very fine to medium sand.....	50.0	97.5
Till: clay, very sandy to gravelly, moderately cal- careous, medium brownish gray; interbedded with sand and gravel below 100.0 ft.....	97.5	105.0
Till: clay, sandy, moderately calcareous, light brownish gray.....	105.0	107.0
Till: clay, slightly silty, medium brownish gray...	107.0	110.0
Till: clay, slightly sandy to gravelly, medium brownish gray.....	110.0	112.0
Till: clay, slightly sandy, medium gray.....	112.0	115.0
Till: clay, slightly sandy, slightly calcareous, light grayish brown.....	115.0	125.0
Sand, clayey, slightly calcareous, light gray; tex- ture of sand grades from very fine to medium.....	125.0	130.0
Silt, moderately sandy, light gray, contains very fine to fine sand.....	130.0	139.5
Sand, light brown; texture grades from very fine to coarse; contains some very coarse sand below 150.0 ft.; contains some fine gravel below 160.0 ft.....	139.5	175.0
Sand and gravel; quartz, feldspar, and green and yellow silicates; texture grades from medium sand to fine gravel.....	175.0	215.0
Cretaceous System- Upper Cretaceous Series - Dakota Group:		
Shale, brownish orange; clayey to silty.....	215.0	225.0
Sandstone and interbedded sandy shale, dark brown...	225.0	227.5
Shale, medium to dark gray, clayey, light gray below 237.0 ft.....	227.5	240.0

Test Hole #13-B-50
(A23-4-1bba)
Cuming County

Location: NE NW NW sec. 1, T. 23 N., R. 4 E., approximately
21 feet south and 706 feet east of northwest corner.
Ground elevation: 1,533 ft. (t). (Altona 7.5 min. quadrangle).
Depth to water: unknown, test hole caved at 34 ft. (9-20-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and soil: silt, very clayey, medium brown	0.0	0.5
Soil: silt, moderately clayey, medium brown.....	0.5	1.0
Silt, slightly clayey, medium yellowish brown.....	1.0	4.0
Silt, slightly calcareous, light yellowish brown....	4.0	33.5
Silt, gray with iron stain.....	33.5	38.0
Silt, soil-like, medium brown.....	38.0	39.0
Silt, very clayey, olive gray.....	39.0	40.0
Clay, very silty, medium brown.....	40.0	45.0
Clay, slightly silty, olive gray.....	45.0	56.0
Silt, very clayey, light brownish gray, light yellowish brown; contains a trace of fine to medium sand below 60.0 ft.....	56.0	62.0
Silt, clayey to sandy, slightly calcareous, light brownish yellow; contains very fine to coarse sand	62.0	65.0
Till: silt, clayey to sandy and gravelly, slightly calcareous, light yellowish brown, moderately cal- careous below 90.0 ft., olive gray below 114.0 ft.	65.0	124.0
Sand and gravel; quartz, pink feldspar and sili- cates; texture grades from very fine to very coarse sand with some fine gravel.....	124.0	150.0
Sand; texture grades from very fine to very coarse..	150.0	160.0
Sand and gravel; texture grades from very fine sand to medium gravel.....	160.0	170.5
Clay, very silty, dark gray.....	170.5	171.5
Sand and gravel; texture grades from very fine sand to very coarse gravel with some pebbles.....	171.5	172.5
Silt, clayey to very sandy, olive gray; contains very fine to medium sand.....	172.5	176.0
Sand and gravel; texture grades from very fine sand to pebbles.....	176.0	179.5
Silt, clayey, light olive gray.....	179.5	181.0
Sand and gravel; texture grades from very fine sand to medium gravel.....	181.0	190.0
Sand; texture grades from very fine to very coarse..	190.0	209.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, dark gray, clayey, very calcareous, petro- liferous odor, light gray to white below 215.0 ft.	209.5	230.0

Test Hole #14-B-50
(A23-4-2dda)
Cuming County

Location: NE SE SE sec. 2, T. 23 N., R. 4 E., approximately
892 feet north and 122 feet west of southeast corner.
Ground elevation: 1,378 ft. (t). (Wisner 7.5 min. quadrangle).
Depth to water: 12 ft. (9-20-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil: silt, medium yellowish brown.....	0.0	1.0
Silt, medium brownish gray.....	1.0	3.5
Silt, slightly clayey, soil-like, dark gray.....	3.5	4.7
Clay, very silty, medium gray.....	4.7	5.5
Clay, slightly silty, dark gray.....	5.5	8.0
Silt, medium brownish gray.....	8.0	10.0
Silt, very sandy, medium gray; contains very fine to medium sand.....	10.0	16.0
Sand, medium gray; texture grades from very fine to medium.....	16.0	19.0
Silt, very sandy, medium gray; contains very fine to medium sand.....	19.0	23.5
Sand, light brown; texture grades from very fine to coarse.....	23.5	25.0
Sand and gravel; texture grades from very fine sand to medium gravel.....	25.0	35.0
Silt, very clayey to sandy, slightly calcareous, light brown.....	35.0	37.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Clay, dark gray; slightly silty.....	37.5	40.0
Shale, dark gray; clayey, contains shell fragments and pyrite.....	40.0	45.0
Shale, clayey to slightly silty, very calcareous; contains some limestone.....	45.0	80.0

Test Hole #15-B-50
(A23-4-11ddd)
Cuming County

Location: SE corner sec. 11, T. 23 N., R. 4 E., approximately
5 feet north and 78 feet west of southeast corner.
Ground elevation: 1,371 ft. (t). (Wisner 7.5 min. quadrangle).
Depth to water: 6.8 ft. (9-20-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil and road fill: silt, very sandy, medium gray; contains very fine to fine sand.....	0.0	1.0
Silt, slightly clayey to very sandy, medium gray; contains very fine to fine sand.....	1.0	2.5
Silt, very sandy, black; contains peat.....	2.5	3.0
Sand, very silty, dark brownish gray; contains very fine to fine sand.....	3.0	5.0
Silt, very sandy, dark gray; contains very fine to fine sand, contains a few gastropods.....	5.0	14.5
Silt, dark gray.....	14.5	15.0
Sand, gray; texture grades from very fine to coarse, grades coarser with depth.....	15.0	30.0
Sand and gravel, quartz and bluish green silicates; texture grades from sand to medium gravel.....	30.0	43.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, medium to dark gray; clayey, very calcareous.	43.5	60.0

Test Hole #16-B-50
(A23-4-23daa)
Cuming County

Location: NE corner SE sec. 23, T. 23 N., R. 4 E., approximately
2,626 feet north and 22 feet west of southeast corner.
Ground elevation: 1,445 ft. (t). (Wisner 7.5 min. quadrangle).
Depth to water: 51 ft. (9-20-50).

	<u>Depth, in feet</u>	
	<u>From</u>	<u>To</u>
Quaternary System, undifferentiated:		
Road fill: silt, very sandy, medium brown; contains very fine to fine sand.....	0.0	0.5
Soil: silt, very sandy, brown to black; contains very fine to fine sand.....	0.5	3.5
Silt, slightly clayey to very sandy, yellowish brown; contains very fine to fine sand.....	3.5	5.5
Sand, medium brown; texture grades from very fine to medium.....	5.5	13.0
Silt, light to yellowish brown.....	13.0	20.0
Silt, very sandy, yellowish brown; contains very fine to fine sand.....	20.0	25.0
Sand, very silty, medium brown; texture of sand grades from very fine to medium.....	25.0	30.0
Silt, grayish to yellowish brown.....	30.0	33.0
Silt, bluish gray, medium grayish brown and slightly calcareous below 36.0 ft.....	33.0	40.0
Silt, slightly clayey, slightly calcareous, olive brown to medium gray.....	40.0	46.0
Silt, dark olive green.....	46.0	47.0
Silt, slightly clayey, medium gray with blue tint...	47.0	65.0
Sand, very silty; texture of sand grades from very fine to fine with some medium.....	65.0	80.0
Sand, grayish brown; texture grades from very fine to coarse.....	80.0	90.0
Sand, quartz and bluish green silicates; texture grades from very fine to coarse.....	90.0	100.0
Sand and gravel; texture grades from very fine sand to fine gravel.....	100.0	118.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, dark gray; clayey, slightly to moderately calcareous.....	118.0	130.0

Test Hole #2-A-52
(A23-4-35ddddd)
Cuming County

Location: SE SE SE SE sec. 35, T. 23 N., R. 4 E., approximately
6 feet north and 135 feet west of southeast corner.
Ground elevation: 1,490.5 ft. (t). (Wisner 7.5 min. quadrangle)
Depth to water: 44.3 ft. (6-27-52)

	<u>Depth, in feet</u>	
	<u>From</u>	<u>To</u>
Quaternary System, undifferentiated:		
Road fill: silt, slightly clayey, medium brownish gray.....	0.0	1.5
Silt, slightly clayey, medium brown, moderately clayey below 2.0 ft.....	1.5	3.5
Silt, slightly clayey, medium brownish yellow, slightly calcareous and medium yellowish gray below 15.0 ft.....	3.5	40.5
Silt, slightly clayey, light gray with iron stain...	40.5	43.0
Silt, slightly sandy, soil-like, medium brownish gray, contains fine sand.....	43.0	43.7
Silt, slightly to moderately clayey, medium brown...	43.7	45.5
Silt, very clayey, medium brown, contains trace of fine sand.....	45.4	47.0
Clay, slightly silty to sandy, medium brownish gray, contains very fine to medium sand.....	47.0	49.0
Clay, moderately silty to sandy, medium brownish gray, contains very fine to medium sand, very silty and contains a trace of gravel below 51.0 ft.....	49.0	52.0
Clay, silt, sand and gravel.....	52.0	54.8
Sand and gravel, texture grades from fine sand to coarse gravel.....	54.8	56.5
Till: clay, silty to sandy, slightly calcareous, medium brown.....	56.5	58.0
Till: clay, silty to gravelly, slightly calcareous, iron-stained.....	58.0	65.3
Sand, texture grades from fine to coarse.....	65.3	67.3
Till: clay, silty to gravelly, moderately calcareous, medium brownish gray, contains many limy fragments.....	67.3	87.5
Sand, texture grades from fine to very coarse with some fine gravel.....	87.5	105.0
Sand and gravel, texture grades from sand to medium gravel.....	105.0	128.5
Clay, very silty, light green.....	128.5	129.0
Sand, quartz and some pink feldspar, texture grades from fine to very coarse.....	129.0	130.0
Sand and gravel, texture grades from medium sand to medium gravel.....	130.0	140.0

Sand, texture grades from fine to very coarse with some fine gravel.....	140.0	145.0
Sand and gravel, texture grades from medium sand to medium gravel.....	145.0	150.0
Sand, texture grades from fine to very coarse with some fine gravel.....	150.0	160.0
Sand, texture grades from fine to coarse.....	160.0	164.0
Silt, very sandy, light greenish gray, contains very fine to fine sand.....	164.0	165.5
Sand and gravel, texture grades from sand to fine gravel.....	165.5	174.3
Silt, moderately clayey, medium gray.....	174.3	189.0
Sand and gravel, quartz and dark colored silicates, texture grades from medium sand to medium gravel..	189.0	190.0
Silt, moderately clayey, in part sandy, medium gray, contains fine to coarse sand.....	190.0	192.0
Sand and gravel, texture grades from medium sand to medium gravel.....	192.0	193.7
Silt, very clayey, medium gray, contains a trace of sand.....	193.7	194.3
Sand and gravel, texture grades from medium sand to fine gravel.....	194.3	195.2
Silt, moderately clayey, medium gray, moderately sandy.....	195.2	208.5
Silt, moderately to very sandy, medium gray, contains very fine to medium sand.....	108.5	209.0
Silt, slightly clayey, medium gray, in part slightly sandy.....	209.0	219.0
Silt, slightly clayey to sandy, medium brownish gray, contains very fine to medium sand.....	219.0	220.0
Sand and gravel, interbedded with silt, slightly clayey to sandy, medium yellowish gray.....	220.0	228.3
Sand and gravel, texture grades from sand to fine gravel with some medium gravel.....	228.3	229.6
Clay, silty to andy, medium yellowish gray, contains very fine to medium sand.....	229.6	230.7
Sand and gravel, texture grades from fine sand to medium gravel.....	230.7	234.8
Silt, slightly clayey to very sandy, medium brownish yellow, contains fine to medium sand.....	234.8	235.3
Clay, very silty, slightly calcareous, medium gray..	235.3	236.0
Sand and gravel, texture grades from fine sand to medium gravel with a trace of coarse gravel.....	236.0	237.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale: medium to dark gray, moderately silty, moderately calcareous.....	237.0	250.0

Test Hole #26-A-51
(A23-5-2bab)
Cuming County

Location: NW NE NW sec. 2, T. 23 N., R. 5 E., approximately
9 feet south and 1,897 feet east of northwest corner.
Ground elevation: 1,370 ft. (t). (Altona 7.5 min. quadrangle).
Depth to water: 4.8 ft. (9-6-51).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	1.5
Soil: silt, moderately clayey, dark brownish gray..	1.5	2.5
Silt, slightly to moderately clayey, medium grayish brown.....	2.5	3.5
Silt, moderately clayey, dark gray.....	3.5	6.0
Silt, very clayey, dark gray.....	6.0	6.5
Clay, moderately silty, dark gray.....	6.5	13.0
Silt, very clayey, medium gray, grayish brown below 14.5 ft.....	13.0	16.5
Silt, moderately clayey, light brown.....	16.5	17.5
Clay, moderately silty, light gray.....	17.5	17.7
Silt, moderately clayey to slightly clayey, light yellowish brown.....	17.7	24.5
Silt, slightly clayey to sandy, moderately calcareous, contains very fine sand.....	24.5	26.0
Sand, moderately calcareous; texture grades from very fine to very coarse.....	26.0	27.0
Silt, very calcareous, contains peat, wood and gastropods.....	27.0	27.5
Sand, quartz, green and dark colored silicates and limy fragments; texture grades from fine to very coarse with some fine gravel.....	27.5	41.0
Till: clay, silty to slightly sandy, moderately calcareous, light yellowish to medium gray.....	41.0	59.0
Clay, moderately silty to slightly sandy, medium yellowish gray.....	59.0	59.4
Till: clay, silty to sandy and gravelly, moderately calcareous, medium gray.....	59.4	63.0
Clay, moderately to very silty, light gray; contains many limy nodules.....	63.0	68.5
Till: clay, silty to sandy and gravelly, moderately calcareous, medium gray.....	68.5	96.5
Clay, very silty, moderately calcareous, light greenish gray, light to medium gray below 96.8 ft.	96.5	102.5
Silt, very clayey, moderately calcareous; contains a trace of sand.....	102.5	105.0
Clay, very silty, moderately calcareous, light brownish gray, light gray below 108.0 ft.....	105.0	109.5
Silt, very clayey, moderately calcareous, light brown, medium gray; contains a trace of fine to coarse sand below 111.0 ft.....	109.5	114.5

Cretaceous System - Upper Cretaceous Series - Colorado Group:

Carlile Formation:

Shale: medium gray with white specks; clay, silty, very calcareous.....	114.5	118.0
Bentonite, white to light gray.....	118.0	118.7
Shale: medium gray with white specks; clay, silty, very calcareous.....	118.7	124.0

Greenhorn Formation:

Shale, light yellowish brown; limy.....	124.0	124.2
Limestone, yellowish to grayish brown, shaly.....	124.2	124.5
Shale, brownish gray to yellowish brown; limy, and limestone, shaly.....	124.5	130.0

Test Hole #12-B-50
(A23-5-13bdd)
Cuming County

Location: SW SW NW sec. 13, T. 23 N., R. 5 E., approximately
2,195 feet south and 12 feet east of northwest corner.
Ground elevation: 1,422 ft. (t). (Beemer 7.5 min. quadrangle).
Depth to water: unknown, test hole caved at 64 ft. (9-20-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil and road fill: clay, very silty, medium gray- ish brown.....	0.0	1.0
Soil: silt, dark gray.....	1.0	1.5
Silt, very clayey, medium brown.....	1.5	4.5
Silt, medium yellowish brown, slightly calcareous below 15.0 ft.....	4.5	18.0
Silt, slightly clayey, slightly calcareous, light grayish brown.....	18.0	33.0
Silt, light yellowish brown to light olive gray.....	33.0	35.0
Silt, slightly clayey, soil-like, brownish gray.....	35.0	38.0
Silt, slightly clayey, medium brown, medium yellow- ish brown below 40.0 ft.....	38.0	57.0
Clay, very silty, medium yellowish brown.....	57.0	73.0
Clay, very sandy, light brown; contains very fine to medium sand.....	73.0	76.0
Clay, very silty to slightly sandy, medium gray; contains very fine to medium sand.....	76.0	78.0
Silt, very clayey to slightly sandy, light yellowish gray.....	78.0	80.0
Sand and gravel; texture grades from very fine sand to fine gravel; contains some medium gravel below 90.0 ft.....	80.0	95.0
Till: silt, clayey to sandy, slightly calcareous, medium brown; contains very fine to coarse sand, medium gray below 97.5 ft.....	95.0	183.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Greenhorn Formation:		
Limestone, light to dark gray, interbedded with shale, limy, moderately calcareous; contains some shell fragments.....	183.0	195.0

Test Hole #11-B-50
(A23-5-25bcb)
Cuming County

Location: NW SW NW sec. 25, T. 23 N., R. 5 E., approximately
1,933 feet south and 12 feet east of northwest corner.
Ground elevation: 1,375 ft. (t). (Beemer 7.5 min. quadrangle).
Depth to water: unknown, test hole caved at 14.5 ft. (9-14-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill: silt, sandy to gravelly, medium brown...	0.0	0.5
Soil and road fill: clay, very silty, dark gray, dark brown below 1.5 ft.....	0.5	2.0
Silt, very clayey, medium brown.....	2.0	3.5
Silt, slightly clayey, yellowish brown.....	3.5	4.5
Silt, medium brown.....	4.5	5.0
Silt, yellowish brown.....	5.0	9.0
Silt, dark brown.....	9.0	9.5
Silt, slightly calcareous, yellowish brown, contains a few gastropod fragments.....	9.5	36.5
Clay, very silty, yellowish brown.....	36.5	37.0
Sand, silty, brownish gray; texture grades from very fine to medium.....	37.0	40.0
Sand, light brown; texture grades from very fine to very coarse with some fine gravel.....	40.0	44.5
Silt, yellowish gray, medium gray below 46.0 ft.....	44.5	50.0
Silt, very sandy, medium gray; contains very fine to coarse sand.....	50.0	54.0
Sand, quartz and bluish green silicates; texture grades from very fine to very coarse with some gravel.....	54.0	60.0
Sand and gravel; texture grades from fine sand to medium gravel.....	60.0	86.5
Till: silt, sandy, greenish brown; contains very fine to medium sand.....	86.5	87.0
Till: silt, clayey to sandy, slightly calcareous, medium gray; contains very fine to medium sand....	87.0	158.0
Sand and gravel; quartz and bluish green silicates; texture grades from very fine sand to medium gravel.....	158.0	178.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Graneros Formation:		
Shale, medium to dark gray; clayey, slightly calcar- eous from 178.5 to 180.0 ft.....	178.5	193.5

Test Hole #9-B-50
(A23-5-35cdd)
Cuming County

Location: SE SE SW sec. 35, T. 23 N., R. 5 E., approximately
454 feet north and 2,630 feet east of southwest corner.
Ground elevation: 1,335.0 ft. (t). (Beemer 7.5 min. quadrangle).
Depth to water: 7.2 ft. (9-14-50)

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil and road fill: silt, sandy, light brown.....	0.0	0.5
Silt, sandy, medium gray.....	0.5	1.0
Silt, slightly clayey to sandy, dark brown.....	1.0	2.0
Silt, very sandy, brownish gray.....	2.0	3.5
Sand, light brown, texture grades from very fine to medium.....	3.5	5.0
Sand, silty, medium gray, texture of sand grades from very fine to fine.....	5.0	10.0
Sand, quartz and bluish green silicates, texture grades from very fine to medium, very fine to very coarse below 15.0 ft., contains some fine to medium gravel below 30.0 ft.....	10.0	43.0
Silt, sandy, medium gray.....	43.0	45.0
Till: clay, silty to sandy, moderately calcareous, medium gray, contains very fine to fine sand.....	45.0	61.5
Cretaceous System - Upper Cretaceous System - Colorado Group:		
Carlile Formation: (?)		
Shale, dark gray; limy, to limestone, shaly, contains a few shell fragments.....	61.5	80.0

Test Hole #10-B-50
(A23-5-35adb)
Cumming County

Location: NW SE NE sec. 35, T. 23 N., R. 5 E., approximately
1,734 feet south and 1,309 feet west of northeast corner.
Ground elevation: 1,339 ft. (t). (Beemer 7.5 min. quadrangle).
Depth to water: 8.5 ft. (9-14-50).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill: silt, very sandy, light yellowish brown.	0.0	4.5
Soil: silt, brown to black.....	4.5	6.0
Silt, very clayey to slightly sandy, brownish gray; contains very fine to fine sand.....	6.0	7.0
Silt, slightly clayey to very sandy, slightly cal- careous, light brownish gray; contains very fine sand.....	7.0	13.0
Sand, medium brown; texture grades from very fine to very coarse.....	13.0	20.0
Sand, quartz and bluish green silicates; texture grades from very fine to very coarse with some fine gravel.....	20.0	30.0
Sand and gravel; texture grades from fine sand to fine gravel.....	30.0	45.0
Silt, clayey to sandy, brownish yellow; contains very fine to fine sand.....	45.0	50.0
Clay, greenish gray.....	50.0	55.0
Silt, clayey to very sandy, greenish gray; contains very fine to medium sand; contains limy fragments below 58.0 ft.....	55.0	61.5
Till: silt, clayey to sandy, moderately calcareous, medium gray; contains very fine to very coarse sand; contains gravel and pebbles from 70.0 to 75.5 ft.....	61.5	94.0
Sand, quartz and bluish green silicates; texture grades from very fine to coarse with some very coarse sand to fine gravel.....	94.0	113.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Greenhorn Formation:		
Shale, dark gray; limy, to limestone, shaly.....	113.5	130.0

Test Hole #21-B-63
(A23-7-13dda)
Cuming County

Location: NE SE SE sec. 13, T. 23 N., R. 7 E., approximately
1.094 feet north and 9 feet west of the southeast
corner.

Ground elevation: 1,404 ft. (t). (West Point 7.5 min. quadrangle).

Depth to water: 47.76 ft. (9-20-63).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
No sample.....	0.1	1.0
Silt, moderately clayey, in part very clayey, yellowish brown; brown from 2 to 4 ft.; dark yellowish brown below 4 ft.....	1.0	7.5
Silt, moderately clayey, slightly calcareous, olive in places, some gray, some limy nodes; gastropod fossil below 9 ft; in places some yellow and dark stain; moderately calcareous between 22.2 and 28 ft.....	7.5	30.0
Silt, moderately clayey, brown, some yellow stain..	30.0	32.5
Silt, moderately clayey, reddish brown, some dark grains; very clayey, brown below 35.5 ft.....	32.5	40.3
Till: clay, silty, sandy, very calcareous, yellowish brown; gravelly, limy nodes; yellow staining below 41.5 ft.; pale olive below 43 ft.; in places some dark staining, brown color and limy grains; moderately calcareous below 60 ft.....	40.3	65.0
Till: clay, silty, sandy, gravelly, brown, moderately calcareous, some limy grains; below 65.8 ft. some pale olive.....	65.0	70.1
Till: clay, silty, sandy, gravelly, moderately calcareous, olive gray, some pale olive and yellow brown; in places some limy nodes and yellow staining; slightly calcareous and dark staining below 80 ft.....	70.1	82.5
Till: clay, silty, moderately calcareous, light olive gray.....	82.5	83.5
Till: clay, silty, sandy, gravelly, moderately calcareous, pale olive, some staining; slightly calcareous from 84.7 to 85.8 ft and below 90 ft..	83.5	97.5
Till: clay, silty, sandy, moderately calcareous, grayish brown; some staining; some limy nodes....	97.5	98.8
Clay: silty, slightly calcareous, pale brown; gray to grayish brown with limy nodes below 100 ft....	98.8	105.7
Till: clay, silty, sandy, moderately calcareous, yellowish brown with some gray; pale brown with limy nodes below 107.2 ft.....	105.7	109.0

Till: clay, silty, sandy, slightly calcareous, dark gray; pale brown below 110 ft.....	109.0	110.5
Till: clay, silty, sandy, slightly calcareous, dark gray, some pale brown.....	110.5	112.8
Till: clay, silty, sandy, gravelly, slightly calcareous, dark gray.....	112.8	116.8
Silt, moderately clayey, slightly calcareous, olive gray; moderately sandy, olive below 117.5 ft., sand is very fine to coarse.....	116.8	119.3
Till: clay, silty, sandy, gravelly, slightly calcareous, dark gray.....	119.3	121.0
Sand, gravelly; fine sand to coarse gravel; some silt lenses.....	121.0	125.0
Till: clay, silty, sandy, gravelly, slightly calcareous, dark gray.....	125.0	137.8
Sand, gravelly; fine sand to coarse gravel.....	137.8	139.6
Till: clay, silty, sandy, gravelly, slightly calcareous, dark gray.....	139.6	150.0
Clay, moderately silty, dark gray; gray below 155 ft.....	150.0	157.0
Gravel, sandy; fine sand to medium gravel.....	157.0	160.0
Sand, gravelly; fine sand to medium gravel.....	160.0	180.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Graneros Formation:		
Shale, yellow brown, clay, silty; in places some iron staining; gray from 187.2 to 192.5 ft; mottled yellow with bluish gray below 192.5 ft...	180.0	193.0
Lower Cretaceous Series - Dakota Group:		
Sandstone, iron stained; sand is very fine to fine.	193.0	197.4
Shale, black, clay, silty, some carbonaceous material; gray below 199.6 ft.....	197.4	199.7
Sandstone; sand is very fine to fine.....	199.7	201.5
Shale, gray, clay, silty, sandy; sand is very fine to fine.....	201.5	210.0
Sand, silty, sand is very fine to fine; less silt below 220 ft.....	210.0	224.0
Silt, dark gray, clayey, sandy; sand is very fine; some pyrite; mica flakes and carbonaceous material.....	224.0	244.0
Sand, silty; sand is very fine to fine; contains pyrite.....	244.0	245.0
Silt, clayey, sandy; sand is very fine to fine.....	245.0	247.0
Shale, clay, dark gray between 250 and 250.8 ft; sandy gray below 250.8 ft.....	247.0	260.5

Test Hole #20-B-63
(A23-7-25dcd)
Cuming County

Location: SE SW SE sec. 25, T. 23 N., R. 7 E., approximately
1,331 feet west and 9 feet north of the southeast
corner.

Ground elevation: 1,355 ft. (t). (West Point 7.5 min. quadrangle).

Depth to water: 34.36 ft. (9-20-63).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
No sample	0.0	1.0
Clay, moderately silty, moderately calcareous, yellow gray; some limy nodes.....	1.0	3.0
Silt, slightly clayey, slightly calcareous, yellowish brown; some limy grains and yellow stain; gastropod fossils and in part light gray below 5 ft.....	3.0	12.5
Silt, slightly clayey, slightly calcareous, pale olive gray.....	12.5	14.5
Silt, slightly clayey, moderately calcareous, yellowish brown, some yellow staining; slightly calcareous, brown below 16 ft.....	14.5	19.5
Clay, silty, reddish brown to brown, some yellow stain; slightly sandy below 42.6 ft., sand is very fine.....	19.5	44.0
Silt, very sandy, yellowish brown; sand is very fine to very coarse, some fine to coarse gravel.....	44.0	45.0
Sand, slightly silty; sand is very fine to medium..	45.0	51.5
Clay, very sandy, light grayish brown; sand is very fine to medium.....	51.5	53.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Greenhorn Formation:		
Limestone, light yellow, chalky.....	53.5	53.8
Shale, light brownish yellow; clay, marly.....	53.8	54.5
Limestone, chalky, some circulation loss at 54.5 ft.....	54.5	55.7
Limestone, yellow brown, chalky and shaly.....	55.7	68.0
Graneros Formation:		
Shale, light yellow brown, some white speckling below 68.5 ft; clay, marly.....	68.0	72.0
Limestone, brown.....	72.0	72.8
Shale, dark brownish gray, clay, very calcareous, some interbedded limestone lenses.....	72.8	76.0
Shale, dark gray, clay, very calcareous; contains pyrite and aragonite fragments.....	76.0	90.5

Test Hole #22-A-51
(A24-4-4aaa)
Cuming County

Location: NE NE NE sec. 4, T. 24 N., R. 4 E., approximately
110 feet south and 8 feet west of northeast corner.
Ground elevation: 1,538 ft. (t). (Altona 7.5 min. quadrangle).
Depth to water: 31.7 ft. (8-22-51).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	0.5
Soil: silt, slightly clayey, slightly calcareous, medium brown.....	0.5	1.0
Silt, in part slightly clayey, medium yellowish brown.....	1.0	2.0
Silt, moderately clayey, light brownish yellow, very clayey below 2.5 ft.....	2.0	4.5
Silt, slightly clayey, light brownish yellow, light grayish yellow and slightly to moderately calcar- eous below 10.0 ft.....	4.5	40.5
Silt, slightly clayey, soil-like, medium grayish brown.....	40.5	42.5
Clay, silty, light brown.....	42.5	46.5
Silt, very clayey, light brown.....	46.5	50.0
Silt, slightly clayey, light yellowish brown.....	50.0	57.0
Clay, very silty, light brown.....	57.0	65.0
Clay, moderately silty, light gray; slightly calcar- eous below 71.0 ft.....	65.0	72.0
Till: clay, silty to sandy and gravelly, moderately calcareous, light grayish brown.....	72.0	91.0
Sand and gravel; moderately calcareous; texture grades from fine sand to coarse gravel.....	91.0	93.0
Till: clay, silty to sandy and gravelly, moderately calcareous, light gray.....	93.0	106.5
Sand, moderately calcareous; texture grades from fine to very coarse.....	106.5	109.0
Silt, clayey to very sandy, moderately calcareous, light yellowish gray; contains fine to very coarse sand.....	109.0	110.0
Sand, moderately calcareous; texture grades from very fine to very coarse with some fine gravel....	110.0	116.5
Silt, slightly clayey to very sandy, slightly cal- careous, medium brownish yellow; contains very fine to very coarse sand.....	116.5	119.5
Till: clay, very silty to very sandy and gravelly, moderately calcareous, light to medium gray.....	119.5	142.0
Clay, slightly silty, light gray; contains a trace of sand.....	142.0	146.0
Till: clay, silty to sandy and gravelly, moderately calcareous, light to medium gray.....	146.0	162.0
Silt, very sandy, light gray; contains very fine to fine sand.....	162.0	165.0

Sand and gravel; quartz, green silicates and pink feldspar; texture grades from fine sand to medium gravel.....	165.0	167.0
Clay, very silty to sandy, slightly to moderately calcareous, light gray.....	167.0	210.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, light gray, clayey to silty.....	210.0	212.0
Shale, medium gray, clayey.....	212.0	226.5
Shale, dark gray, clayey, very calcareous; contains pyrite and layers of limestone.....	226.5	240.0

Test Hole #25-A-51
(A24-5-15ddd)
Cuming County

Location: SE SE SE sec. 15, T. 24 N., R. 5 E., approximately
290 feet north and 8 feet west of southeast corner.
Ground elevation: 1,495 ft. (t). (Altona SE 7.5 min. quadrangle).
Depth to water: 41.4 ft. (9-6-51).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill.....	0.0	0.5
Soil: silt, clayey, medium brownish gray.....	0.5	2.0
Silt, moderately clayey, light yellowish brown; moderately calcareous below 5.0 ft.....	2.0	10.0
Silt, slightly clayey, moderately calcareous, light gray with iron stain.....	10.0	16.0
Silt, moderately clayey, moderately calcareous, light yellowish brown; slightly clayey below 19.5 ft.....	16.0	30.0
Silt, slightly clayey, medium yellowish gray.....	30.0	34.0
Silt, slightly clayey, dark brown; medium brownish gray below 35.0 ft.....	34.0	36.5
Clay, very silty, light grayish brown; moderately calcareous below 55.0 ft.....	36.5	64.5
Clay, silty to slightly sandy and pebbly, very calcareous, light yellow; light brownish gray below 68.0 ft.....	64.5	72.8
Clay, very silty, very calcareous, mottled light gray and dark gray; light brown below 74.3 ft.....	72.8	78.0
Till: clay, silty to moderately sandy and gravelly, very calcareous, light yellowish gray; medium gray below 138.2 ft.....	78.0	225.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Carlile Formation:		
Shale, dark gray, clayey to silty, very calcareous..	225.5	240.0