Special Publication 88-2
ISSN 0275-0929

REPORT OF CORE-DRILLING BY THE OKLAHOMA GEOLOGICAL SURVEY IN PENNSYLVANIAN ROCKS OF THE NORTHEASTERN OKLAHOMA COAL BELT, 1983-86

by
LeRoy A. Hemish

Oklahoma Geological Survey
Charles J. Mankin, Director
The University of Oklahoma
Norman, Oklahoma

1988

SPECIAL PUBLICATION SERIES

The Oklahoma Geological Survey's Special Publication series is designed to bring timely geologic information to the public quickly and economically.

This Special Publication for the most part has been reproduced directly from author-prepared typescript. Review and editing of this material have been minimized for the sake of efficiency.

This publication, printed by the Oklahoma Geological Survey, is issued by the Oklahoma Geological Survey as authorized by Title 70, Oklahoma Statutes, 1981, Section 3310, and Title 74, Oklahoma Statutes, 1981, Sections 231-238. 500 copies have been prepared for distribution at a cost of $ 2,798 to the taxpayers of the State of Oklahoma. Copies have been deposited with the Publications Clearinghouse of the Oklahoma Department of Libraries.

CONTENTS

LIST OF FIGURES

REPORT OF CORE-DRILLING BY THE OKLAHOMA GEOLOGICAL SURVEY IN PENNSYLVANIAN ROCKS OF THE NORTHEASTERN OKLAHOMA COAL BELT, 1983-86

LeRoy A. Hemish

ABSTRACT

The Oklahoma Geological Survey completed several core-drilling projects in the northeastern Oklahoma coal belt during 1983-86. The purpose of the projects was to gather information on geologic characteristics of various coal beds and associated strata, and to examine strata where accuracy of existing interpretations of stratigraphy and structure were questionable.

Detailed descriptions of lithologic units cored in 85 holes, as well as stratigraphic interpretations, are presented in this report.

INTRODUCTION

A vital part of the Oklahoma Geological Survey (OGS) program for evaluating the coal resources of the state is the gathering of new data. Most of these data come from field work (measuring sections in active surface mines and on outcrops), and from information donated by industry (logs of coal-exploration drill holes). However, since the purchase of a core-drilling rig by OGS in 1981 (Oklahoma Geology Survey, 1981), several coal-coring studies have been completed, which have provided an appreciable amount of new data for Survey use. Presentation of the logs of core holes (Appendix) drilled by OGS during the initial coal study, undertaken in 1983, up to the latest study, completed in December 1986, is the focus of this report.

Purpose

The purpose of the core-drilling studies conducted by the OGS in the northeastern Oklahoma coal belt was to gather information concerning the geologic characteristics of the coal beds and associated strata. The data were then used (along with data from other sources) to determine the areal extent, amounts, and chemical characteristics of the coal deposits. The results are being published by the OGS in a series of county reports evaluating the coal resources and reserves of Oklahoma (Fig. 1).

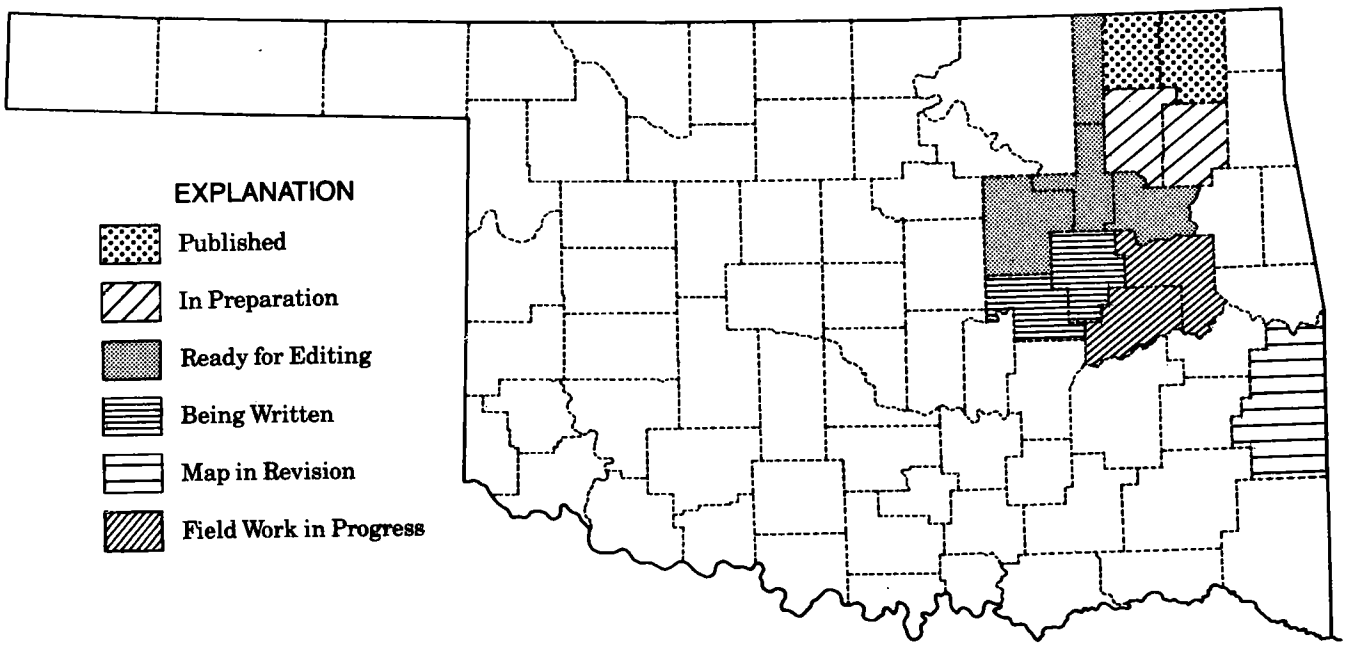


Figure 1. Status of county coal studies in Oklahoma.

A second purpose was to examine strata in parts of the Oklahoma coal belt where accuracy of interpretations of stratigraphy and structure were questionable. Revisions of geologic mapping in some areas in McIntosh, Muskogee, and Okfuskee Counties are in progress (Hemish, 1987c ; in preparation).

Methods

The elements of a core-drilling project have been discussed in detail by Hemish (1987a); therefore, only a brief overview of the methods will be included here.

Drill-hole sites are initially selected by the geologist in charge of a new project. All of the site selection, preliminary land work, logistical planning, supervision of drilling, and assimilation of data included in this report were done by the author.

Site preparation, drilling, core recovery, equipment maintenance, and site restoration were done by two OGS drilling technicians. Figure 2 is a photograph of the OGS drill rig (mounted on a 2.5-ton flat-bed truck) and the

Figure 2. The OGS core-drilling rig.

trailer used to transport drill rods, water, tools, and supplies. The trailer is towed by a four-wheel-drive vehicle, which is also used to haul additional supplies and to transport boxed cores collected during the drilling operation. The following description of the methods used for drilling and collecting cores are quoted from Hemish (1987a).

When the drilling site is reached, the rig is positioned and leveled; siting of the hole is determined by the geologist, generally by pacing from section lines; the location is plotted on a topographic map; and the legal description of the site is duly recorded. Water is then hauled for circulation in the drill hole, the mast is raised, the portable slush pit is set up, the required drill bit is attached, and drilling commences. Generally, a 5-7/8-in.-diameter hole is drilled to a depth of about 9 ft with a three-cone-type roller rock bit. Temporary surface casing is set (4-in. pcv pipe), which permits recirculation of drilling fluids.

If continuous coring is desired, a 10-ft core barrel with a 3-in.-diameter diamond bit is attached to the bottom of the drill stem. Two-in.-diameter core is cut, which is retrieved from the outer core barrel through the hollow drill stem by means of a wire-line hoist.

At the surface, the core is forced from the inner core barrel by means of water pressure and collected in trays, where it is washed, marked, described by the geologist, cut into 2-ft lengths, and boxed. The boxed cores are labeled and hauled to the OGS Core Library in Norman, where they are stored. If a specific segment of the core (such as a coal bed) is to be analyzed, it is removed from the tray prior to boxing and sealed in a clear, tough plastic bag (0.006 mils thick) for transport to the OGS laboratory.

Finally, the hole is plugged in accordance with State regulations and the site is restored. The rig and crew then move to the next scheduled drilling site.

Figure 3 shows the author preparing a section of core for description.

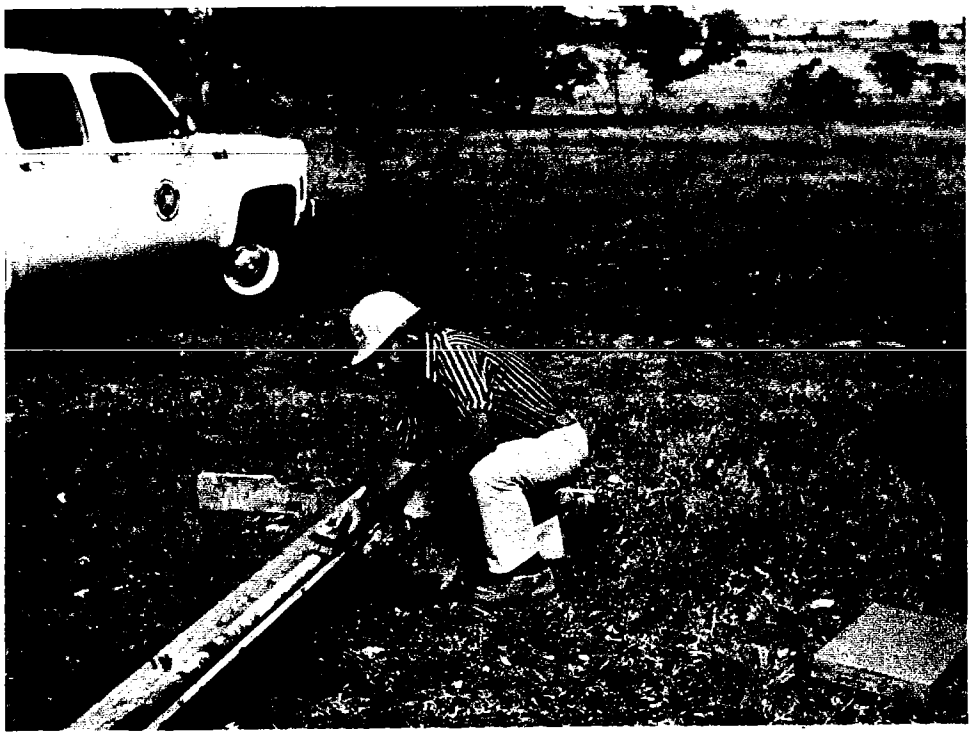


Figure 3. The author, cleaning core at the drill site.

Core samples of coal received by the OGS laboratory are processed and used for studies of chemical properties and petrographic properties. Portions of the crushed coal core not consumed in processing, as well as polished, crushed particle pellets used in petrographic studies, are stored at the Oklahoma Geological Survey.

Locations

Eighty-five holes were drilled in 10 counties by the OGS for coal studies conducting during 1983-86. All of the holes were drilled in the northeastern Oklahoma coal belt, which is in the southern part of the western region of the Interior Coal Province (Trumbull, 1960). Figure 4 shows the locations of the

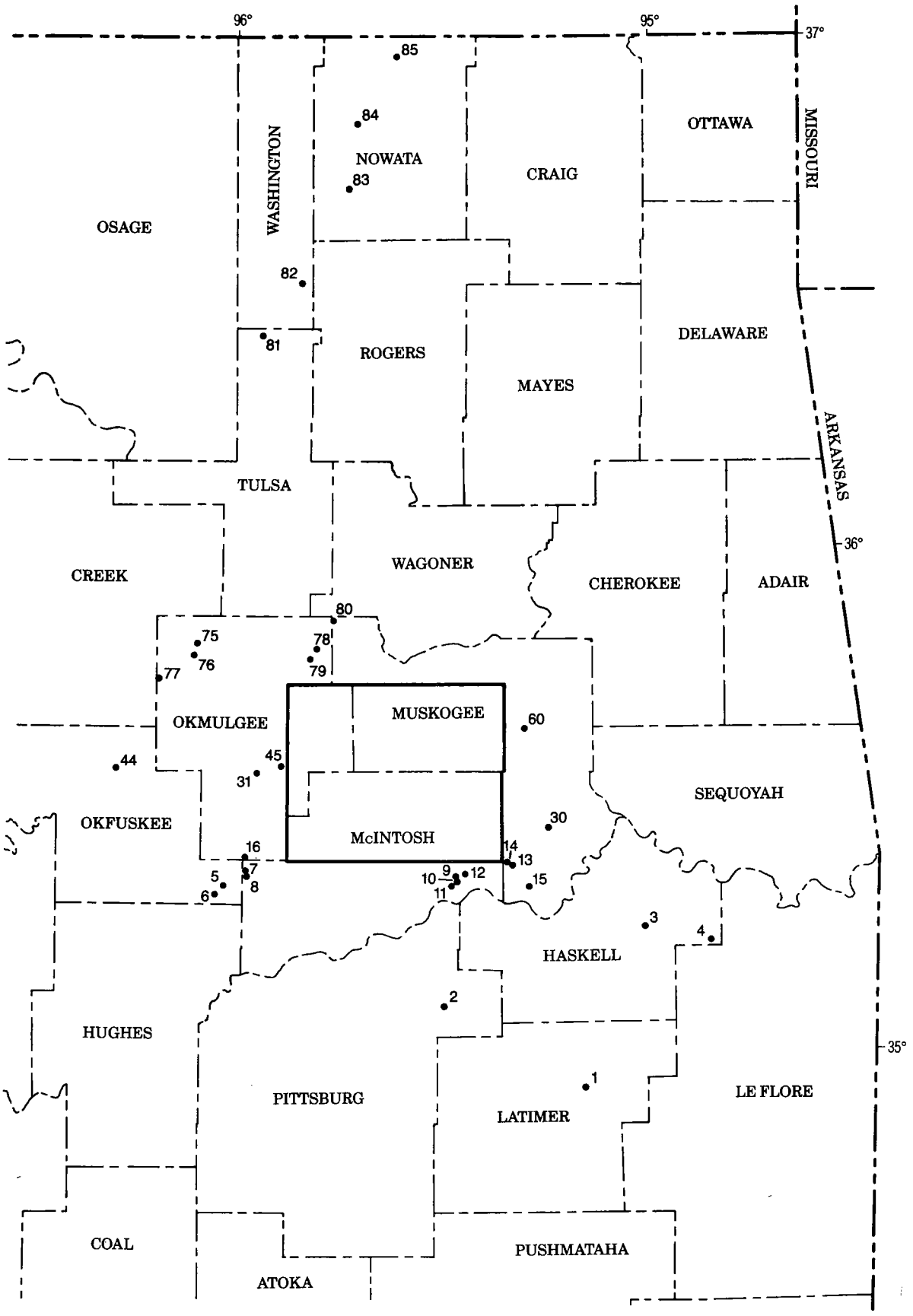
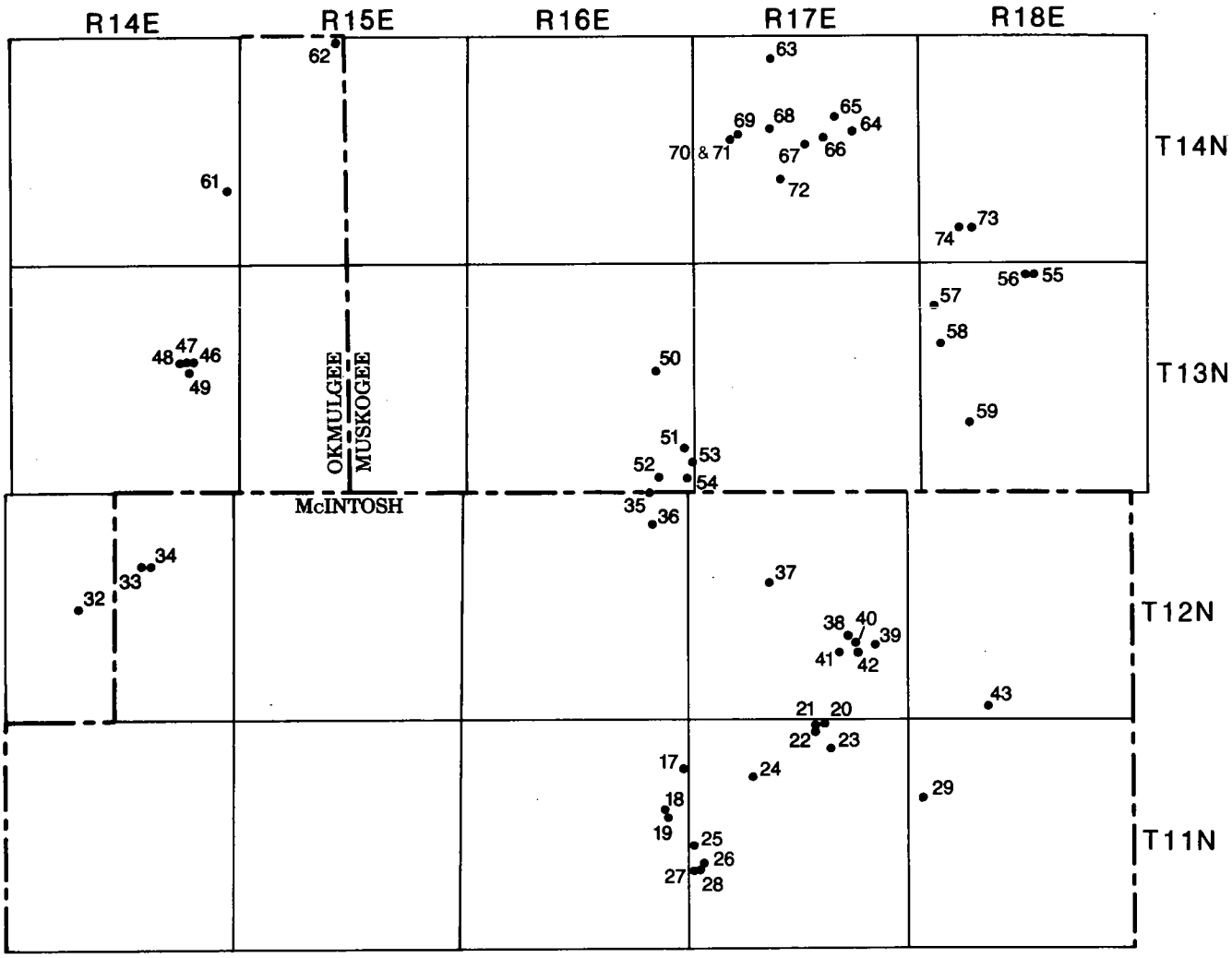
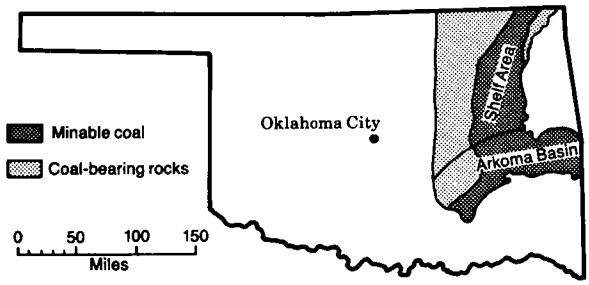


Figure 4. Locations of core-hole sites in northeastern Oklahoma. Inset map shows location of the northeastern Oklahoma coal belt as well as the Arkoma basin and the shelf area.





Index map showing the Oklahoma part of the Western Region of the Interior Coal Province.

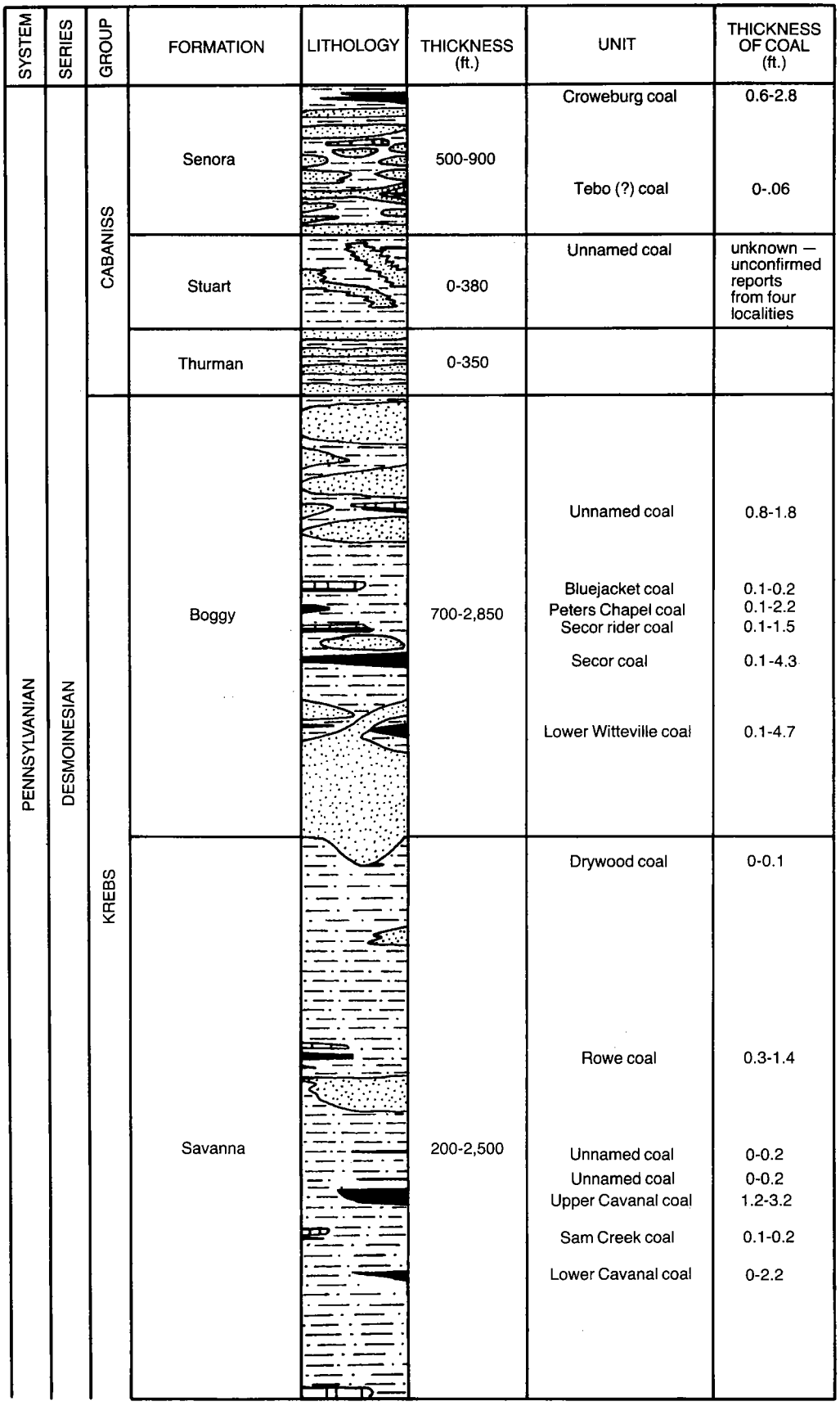
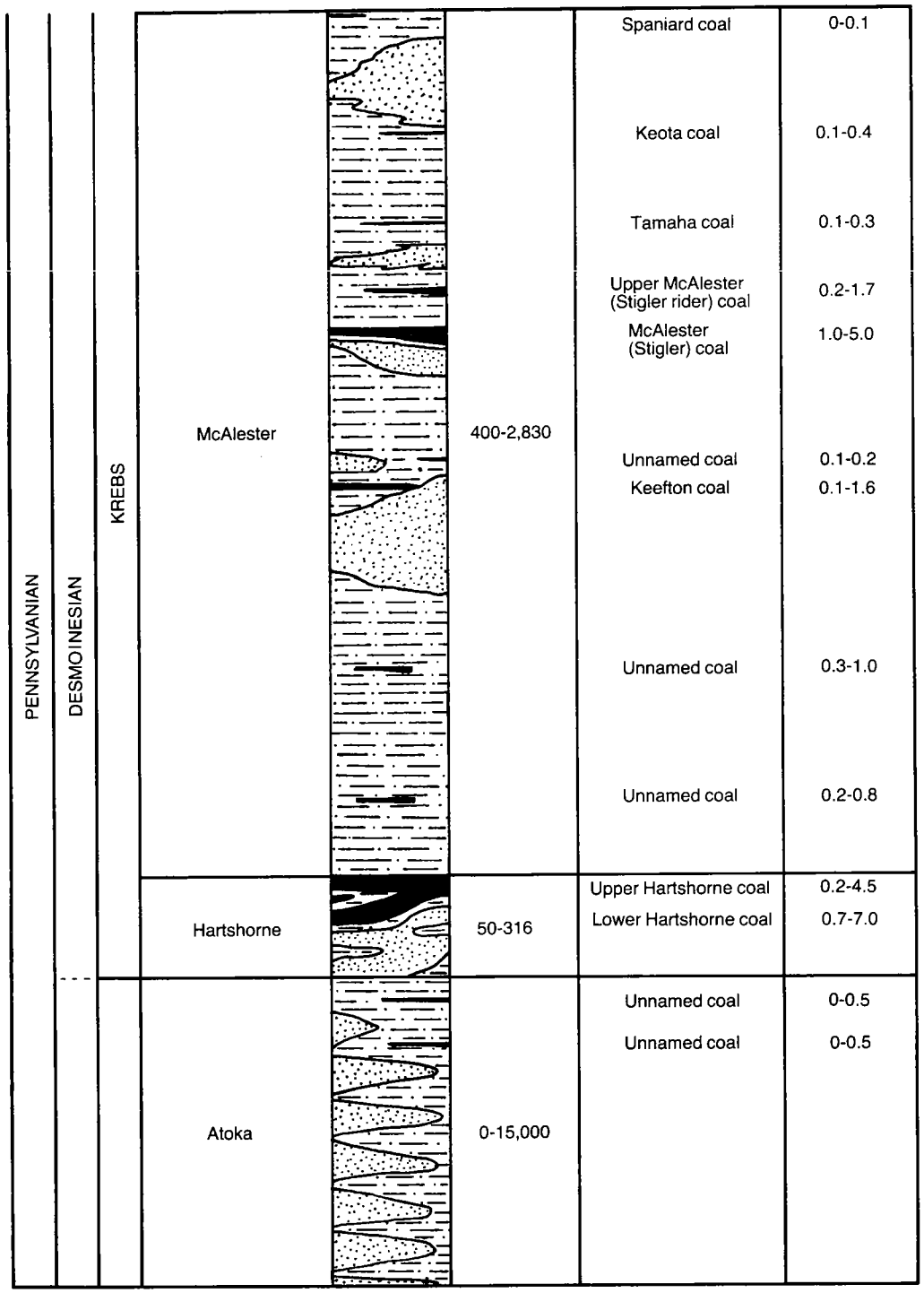


Figure 5. Generalized stratigraphic column of coal-bearing strata of the Arkoma basin. Modified in part from Knechtel (1949, p. 50, pl. 4) and Friedman and Woods (1982, pl. 4).


PENNSYLVANIAN
DESMOINESIAN
KREBS
McAlester
400-2,830
Spaniard coal
0-0.1
Keota coal
0.1-0.4
Tamaha coal
0.1-0.3
Upper McAlester (Stigler rider) coal
0.2-1.7
McAlester (Stigler) coal
1.0-5.0
Unnamed coal
0.1-0.2
Keefton coal
0.1-1.6
Unnamed coal
0.3-1.0
Unnamed coal
0.2-0.8
Hartshorne
50-316
Upper Hartshorne coal
0.2-4.5
Lower Hartshorne coal
0.7-7.0
Atoka
0-15,000
Unnamed coal
0-0.5
Unnamed coal
0-0.5

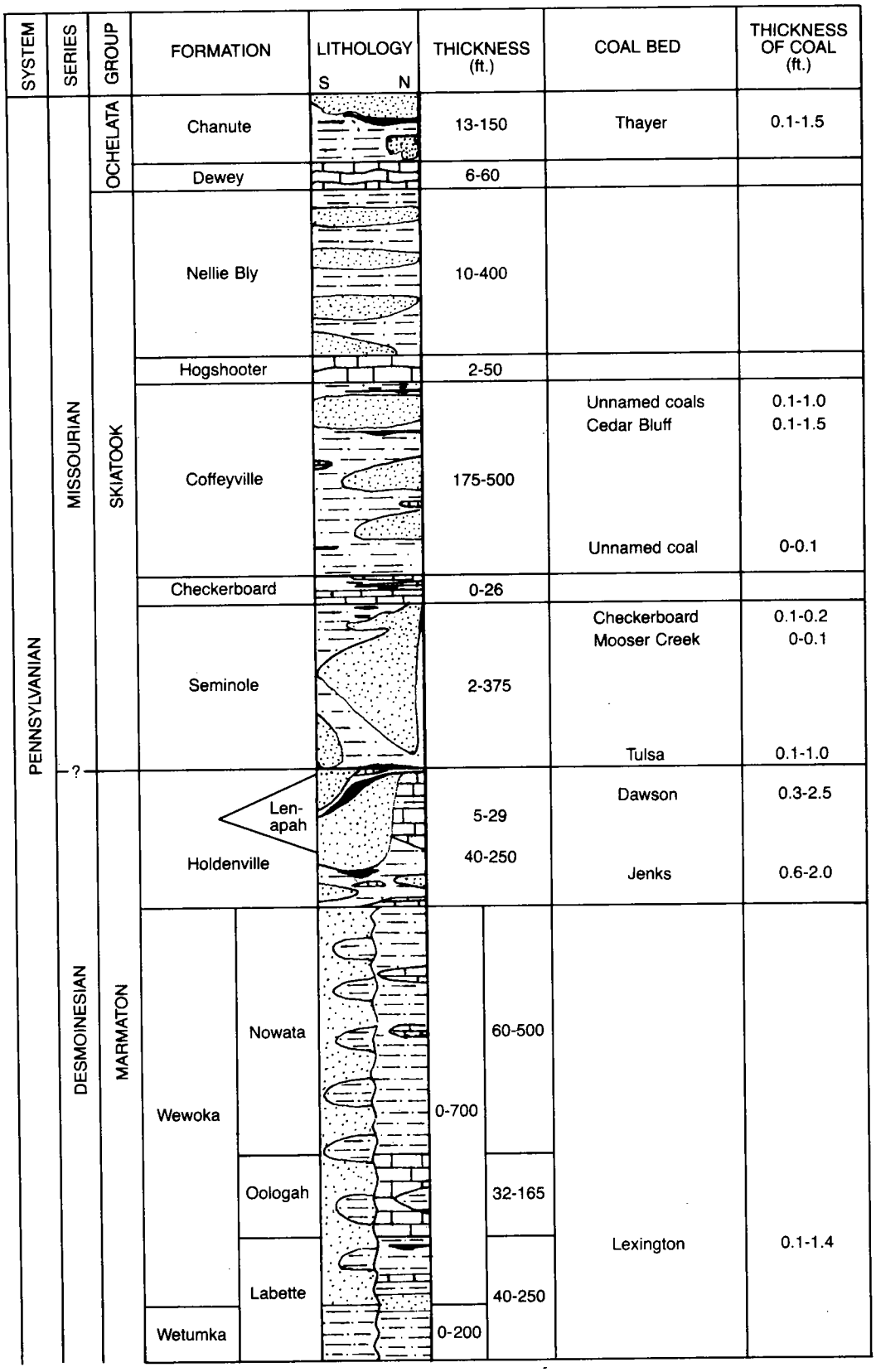
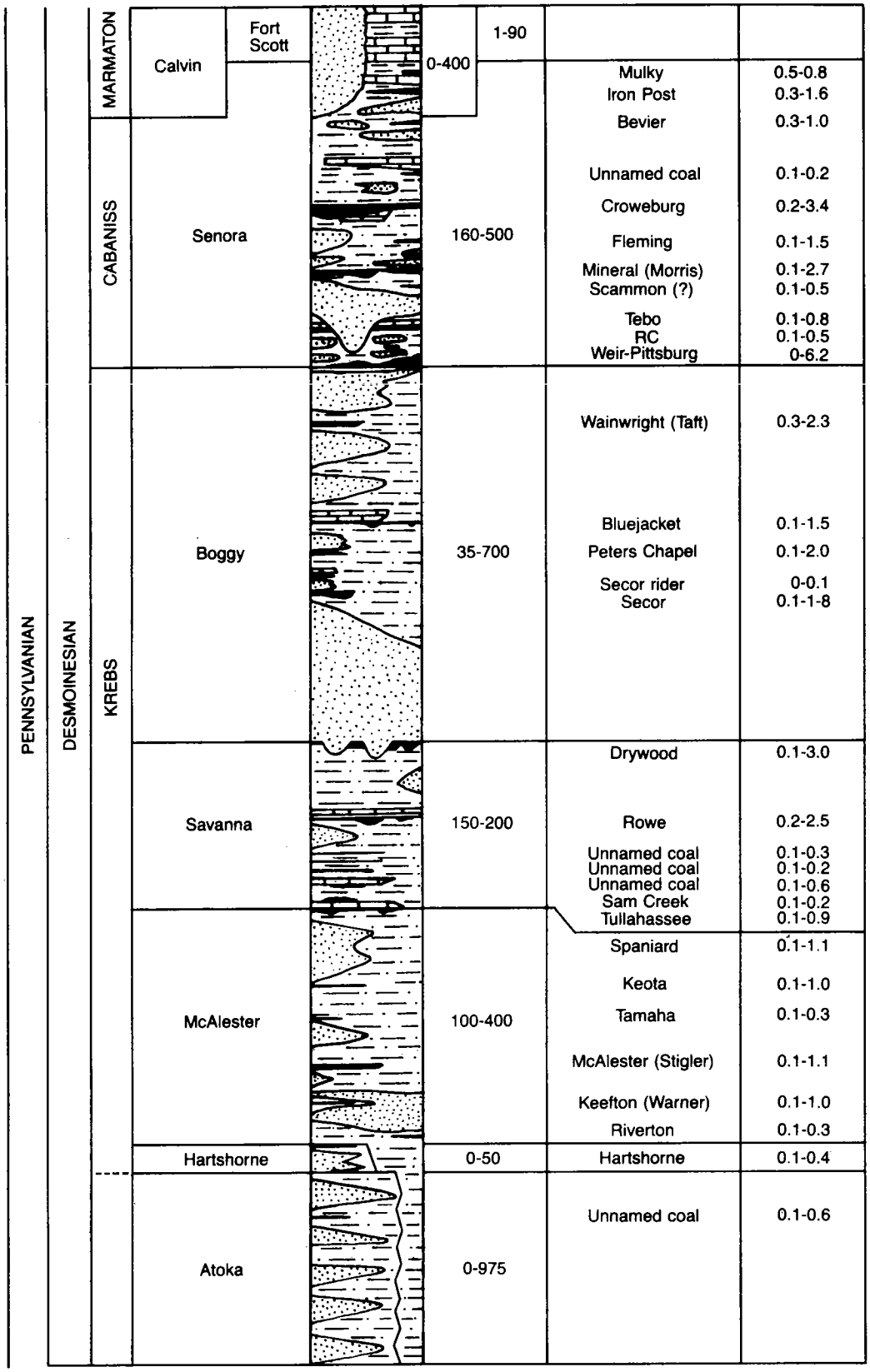


Figure 6. Generalized stratigraphic column of coal-bearing strata of the northeastern Oklahoma shelf area. After Hemish (1987b, fig. 2).


PENNSYLVANIAN
DESMOINESIAN
MARMATON
CABANISS
KREBS
Calvin
Fort Scott
Senora
Boggy
Savanna
McAlester
Hartshorne
Atoka
0-400
1-90
160-500
35-700
150-200
100-400
0-50
0-975
Mulky 0.5-0.8
Iron Post 0.3-1.6
Bevier 0.3-1.0
Unnamed coal 0.1-0.2
Croweburg 0.2-3.4
Fleming 0.1-1.5
Mineral (Morris) 0.1-2.7
Scammon (?) 0.1-0.5
Tebo 0.1-0.8
RC 0.1-0.5
Weir-Pittsburg 0-6.2
Wainwright (Taft) 0.3-2.3
Bluejacket 0.1-1.5
Peters Chapel 0.1-2.0
Secor rider 0-0.1
Secor 0.1-1-8
Drywood 0.1-3.0
Rowe 0.2-2.5
Unnamed coal 0.1-0.3
Unnamed coal 0.1-0.2
Unnamed coal 0.1-0.6
Sam Creek 0.1-0.2
Tullahassee 0.1-0.9
Spaniard 0.1-1.1
Keota 0.1-1.0
Tamaha 0.1-0.3
McAlester (Stigler) 0.1-1.1
Keefton (Warner) 0.1-1.0
Riverton 0.1-0.3
Hartshorne 0.1-0.4
Unnamed coal 0.1-0.6

85 drill holes. The legal description of the location of each drill site is given in the core-log heading and is accurate within an area of 0.625 acre.

Geology

All of the holes were drilled in rocks of Pennsylvanian age (Miser, 1954), in either the Arkoma basin part of the Oklahoma coalfield or the northeastern Oklahoma shelf area (Fig. 4). All coal beds cored during the study occur in rocks of the Desmoinesian and Missourian Series. Figure 5 is a generalized stratigraphic column of coal-bearing rocks of the Arkoma basin; Figure 6 is a generalized column of the coal-bearing rocks of the northeastern Oklahoma shelf area. Names and other pertinent facts concerning the various coal beds have been discussed by Hemish (1987b). Stratigraphic names of units cored are given in the core logs. Lithologic descriptions of the cores and interpretations of the stratigraphy were done by the author.

CORE-HOLE LOGS

Core-hole logs are numbered from 1 to 85 according to their location by section, township, and range, progressing from south to north and west to east, and are keyed to the numbers on the location map (Fig. 4). The alpha-numeric identification enclosed in parentheses includes identification as a core-hole (letter C), a county abbreviation, and a number indicating drilling sequence.

The lithologic column at the left side of each page diagrammatically shows the sequence of rocks described in the log; lithologic symbols are explained in Figure 7.

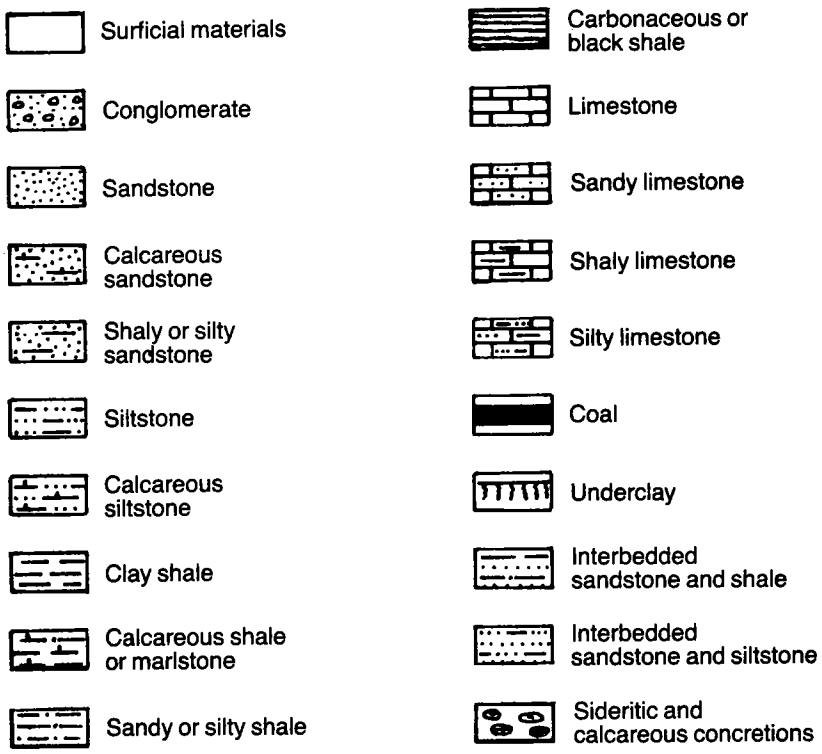


Figure 7. Lithologic symbols.

REFERENCES CITED

Friedman, S. A.; and Woods, R. J., 1982, Map showing potentially strippable coal beds in eastern Oklahoma: Oklahoma Geological Survey Map GM-23, scale 1:125,000, 4 sheets.

Hemish, L. A., 1987a, Elements of an OGS core-drilling project: Oklahoma Geology Notes, v. 47, p. 73-77.

_____ 1987b, Names of coal beds in the northeastern Oklahoma shelf area: Oklahoma Geology Notes, v. 47, p. 96-113.

_____ 1987c, Miscorrelation of the Checkerboard Limestone in Okfuskee County proved by OGS core-drilling: Oklahoma Geology Notes, v. 47, p. 148-177.

_____ [in preparation], Coal geology of McIntosh and Muskogee Counties, Oklahoma: Oklahoma Geological Survey.

Knechtel, M. M., 1949, Geology and coal and natural gas resources of northern Le Flore County, Oklahoma: Oklahoma Geological Survey Bulletin 68, 76 p.

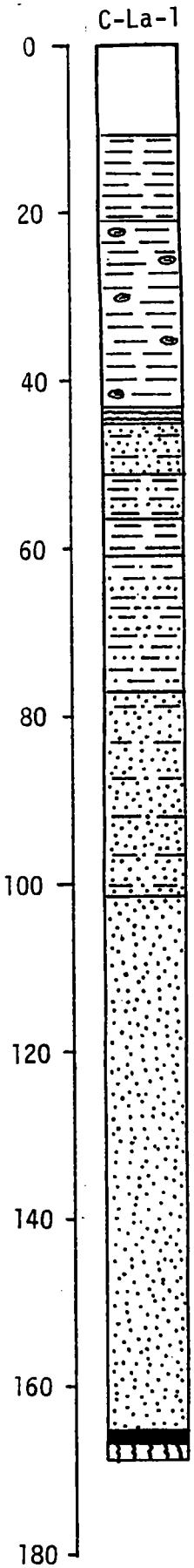
Miser, H. D., 1954, Geologic map of Oklahoma: U.S. Geological Survey and Oklahoma Geological Survey, scale 1:500,000, 2 sheets.

Oklahoma Geological Survey, 1981, Survey purchases drilling rig: Oklahoma Geology Notes, v. 41, p. 137-138.

Trumbull, J. V. A., 1960, Coal fields of the United States, exclusive of Alaska: U.S. Geological Survey Map, scale 1:5,000,000, sheet 1.

APPENDIX

Core-Hole Logs

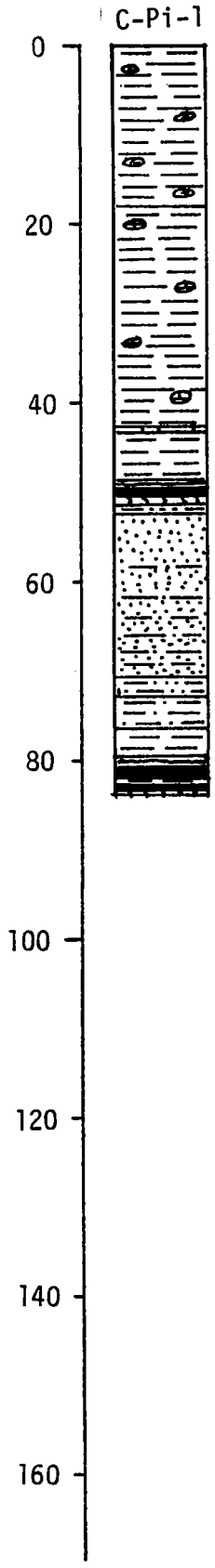


1 (C-La-1)

NE¼SW¼NW¼NW¼NE¼ sec. 12, T. 5 N., R. 20 E., Latimer County. Drilled 50 ft north from edge of gravel road. Surface elevation, estimated from topographic map, 590 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, very fine-grained; contains organic material	0.0	1.0
Sand, dark-yellowish-orange, very fine-grained, clayey; contains gravel-sized, dusky-brown concretion fragments and subangular clasts of moderate-reddish-brown sandstone	1.0	5.7
Sand, as above, but becoming dark-yellowish-brown	6.7	3.8
Krebs Group		
McAlester Formation		
Shale, light-olive-gray, weathered	10.5	1.5
Shale, olive-gray to dark-gray with moderate-brown staining along fracture surfaces	12.0	9.0
Shale, dark-gray, noncalcareous; includes dark-reddish-brown siderite concretions	21.0	5.5
Shale, dark-gray, pyritic, moderately hard; contains abundant sideritic concretions ~2 in. thick, some of which are cut by calcite-filled veinlets; also includes beds of soft, grayish-black carbonaceous shale 1-2 in. thick from 26.5 to 28.5 ft	26.5	17.2
Hartshorne Formation		
Shale, grayish-black, carbonaceous, soft, interbedded with harder dark-gray shale	43.7	1.5
Sandstone, medium-gray to light-olive-gray, very fine-grained, silty, shaly in part; contains well-preserved carbonized and pyritic fossil plant remains, including abundant seed-fern compressions	45.2	5.8
Shale, medium-dark-gray, silty, interbedded with very fine-grained sandstone and siltstone; contains black carbonized plant fossils	51.0	5.2
Shale, medium-dark-gray; contains black carbonized plant fragments	56.2	4.6
Shale, medium-dark-gray with light-gray bands, highly silty; contains abundant layers of very fine-grained sandstone 1/64 to 4 in. thick; includes black carbonized plant fragments, pyrite, and minor streaks of coal	60.8	16.2
Sandstone, medium-gray with light-gray bands, very fine-grained, silty, shaly, wavy-bedded and cross-bedded in part; contains plant fossils, streaks and flecks of black carbonized plant		

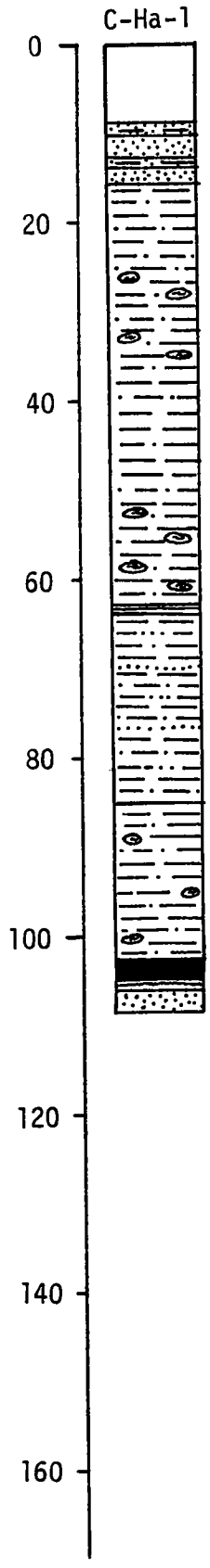
material, as well as minor coal inclusions; includes some pyrite, rare 0.5-in.-thick layers of intraformational conglomerate, burrows filled with medium-grained sandstone and sandy concretionary lenses up to 4 in. thick.....	77.0	24.4
Sandstone, very light-gray to white with medium-dark-gray bands 1/64 to 4.5 in. thick, very fine- to fine-grained, micaceous, cross-bedded; sedimentary structures such as scour-and-fill, plume, soft-sediment deformation, and cross-lamination abundant; black macerated plant materials common on stratification surfaces; contains discoidal sideritic concretions about 2-3 in. in diameter.....	101.4	27.8
Sandstone, very light-gray, fine-grained, massive, noncalcareous.....	129.2	1.3
Sandstone, very light-gray with dark-gray laminae spaced ~1 in. apart, fine-grained, micaceous, noncalcareous; contains black macerated plant material; fractured; includes some 1- to 3-in.-thick, dark-gray, shaly sandstone layers below 52 ft; sedimentary structures such as scour-and-fill, plume, soft-sediment deformation, and cross-lamination abundant; includes some sandy, sideritic concretions averaging ~1 in. thick; contact with underlying unit sharp.....	130.5	34.8
Coal, black, bright, banded, moderately friable; contains veinlets and small nodules of pyrite (Lower Hartshorne coal).....	165.3	1.8
Underclay, dark-gray to grayish-black, shaly, highly carbonaceous; plant compressions abundant.....	167.1	1.2
Total Depth		168.3



SE¼SE¼NE¼SW¼SW¼ sec. 11, T. 7 N., R. 17 E., Pittsburg County. Drilled on bench made for gas well drill site 700 ft from south line and 1500 ft from west line. Surface elevation, estimated from topographic map, 840 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Krebs Group		
Boggy Formation		
Shale, olive-gray to dark-gray, some moderate-reddish-brown iron-oxide staining along fractures, noncalcareous; includes some grayish-brown clay-ironstone concretions about 1-2 in. thick.....	0.0	10.0
Shale, dark-gray with minor moderate-reddish-brown staining; includes some grayish-brown and moderate-reddish-brown clay-ironstone concretions; noncalcareous.....	10.0	8.0
Shale, dark-gray to grayish-black; contains minor crusts of calcite on stratification surfaces and calcareous fossil brachiopods; includes highly calcareous, light-gray concretions 1-2 in. thick..	18.0	25.0
Limestone, grayish-black, highly shaly; contains abundant fossil brachiopods.....	43.0	0.3
Shale, grayish-black, with medium-gray bands, carbonaceous; contains abundant pyrite, some as pyritized brachiopod shells; black carbonized plant compressions common on stratification surfaces.....	43.3	5.7
Shale, black, highly carbonaceous.....	49.0	0.2
Coal, black, bright, moderately friable; includes pyrite as crusts on cleat surfaces and stratification surfaces (Secor rider coal).....	49.2	0.8
Underclay, medium-dark-gray; contains abundant black carbonized plant fragments.....	50.0	1.3
Siltstone, medium-gray, shaly, noncalcareous; includes some very fine-grained sandstone.....	51.3	0.9
Sandstone, light-gray, with medium-dark-gray bands, micaceous, noncalcareous, ripple-marked and cross-bedded, fine-grained to very fine-grained; shaly in part, shale laminae increasing in frequency downward; black macerated plant materials abundant on stratification surfaces.....	52.2	8.2
Sandstone, very light-gray, with abundant dark-gray laminae, shaly, very fine-grained, micaceous, noncalcareous; includes some layers of pyritic coal ~1/64 in. thick and abundant black macerated plant materials on stratification surfaces;		

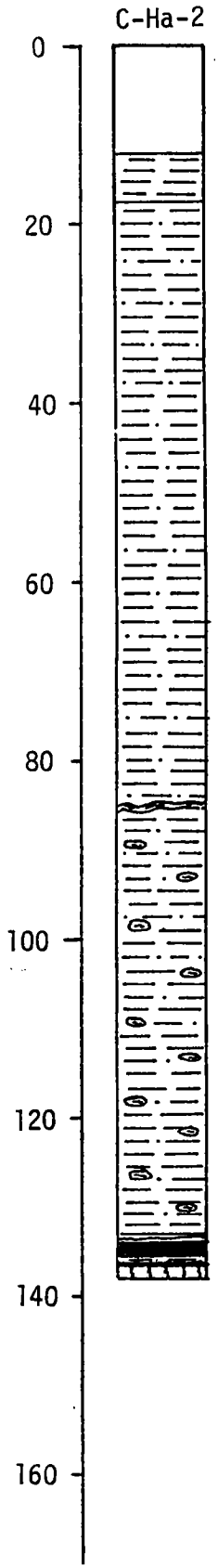
fines downward.....	60.4	10.4
Siltstone, medium-dark-gray with light-brownish-gray bands, shaly; grades into underlying unit....	70.8	2.5
Shale, dark-gray with light-brownish-gray bands, silty.....	73.3	3.5
Shale, grayish-black, carbonaceous.....	76.8	2.2
Shale, grayish-black, carbonaceous; contains small, calcareous fossil brachiopod shells.....	79.0	1.5
Shale, black, hard, coaly; includes abundant laminae of pyrite.....	80.5	0.2
Coal, black, bright, moderately friable; contains pyritic nodules and laminae; includes a 7.5-in.-thick, black, carbonaceous, coaly shale parting in the interval from 19 to 26.5 in. from top of unit (Secor coal).....	80.7	2.9
Underclay, medium-dark-gray, pyritic in upper 1 in.....	83.6	0.4
Total Depth		84.0



NE¼NE¼NW¼NE¼NE¼ sec. 20, T. 9 N., R. 22 E., Haskell County. Hole drilled in pasture 40 ft south of center of gravel road and 75 ft east from center of driveway. Surface elevation, estimated from topographic map, 587 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, very fine, silty; contains organic material	0.0	1.0
Sand, moderate-yellowish-brown to light-brown, very fine, silty, clayey	1.0	3.5
Sand, moderate-reddish-orange, fine-grained, silty; clasts are well-rounded; gravelly at base of unit	4.5	4.0
Krebs Group		
McAlester Formation		
Sandstone, moderate-reddish-brown to dark-yellowish-brown, very fine-grained; noncalcareous; well-indurated; includes some soft grayish-orange to very pale-orange shale layers (Tamaha Sandstone)	8.5	1.5
Sandstone, moderate-olive-brown, very fine-grained, noncalcareous, well-indurated; color change to moderate-reddish-brown between 11 and 12 ft	10.0	2.5
Shale, light-olive-gray, interbedded with olive-gray, very fine-grained sandstone layers 2-3 in. thick	12.5	0.9
Sandstone, olive-gray and moderate reddish-orange, very fine-grained, well-indurated	13.4	2.0
Shale, grayish-orange, soft; color change to olive-gray at 16 ft and to medium-dark-gray at 17 ft with some moderately hard silty stringers	15.4	2.6
Shale, medium-dark-gray to dark-gray, silty, moderately hard and brittle, noncalcareous; softer below 26 ft; sideritic concretions from 26.3 to 26.6 ft, 29.7 to 29.8 ft, 32.8 to 33.0 ft, and numerous concretionary layers from 33.5 to 35.0 ft and 54.5 to 61.2 ft	18.0	44.9
Shale, grayish-black, brittle, highly carbonaceous	62.9	0.4
Shale, dark-gray; contains sparsely distributed, black carbonized plant fragments	63.3	5.0
Shale, dark-gray, silty; includes thin laminae and burrows filled with light-gray siltstone and very fine-grained sandstone; also includes silty brownish-gray sideritic concretions ranging from 0.25 to 1 in. thick, as well as sparsely distributed, black carbonized plant fragments and calcareous fossil shell fragments	68.3	16.8
Shale, grayish-black, silty, hard, noncalcareous;		

includes several silty brownish-gray sideritic concretions 0.5-1.5 in. thick.....	85.1	17.5
Coal, black, bright, finely cleated, friable; white calcite on cleat surfaces and minor pyrite on stratification surfaces (Stigler coal).....	102.6	2.3
Shale, grayish-black, very highly carbonaceous; includes thin, contorted laminae of coal and streaks of white calcite in lower 3 in. of unit...	104.9	0.5
Sandstone, light-gray with very light-gray bands, very fine-grained, noncalcareous, carbonaceous in upper 3 in., bedding contorted and disturbed, bioturbation features abundant, cross-laminated in part (Cameron Sandstone).....	105.4	2.9
Total Depth		108.3



4 (C-Ha-2)

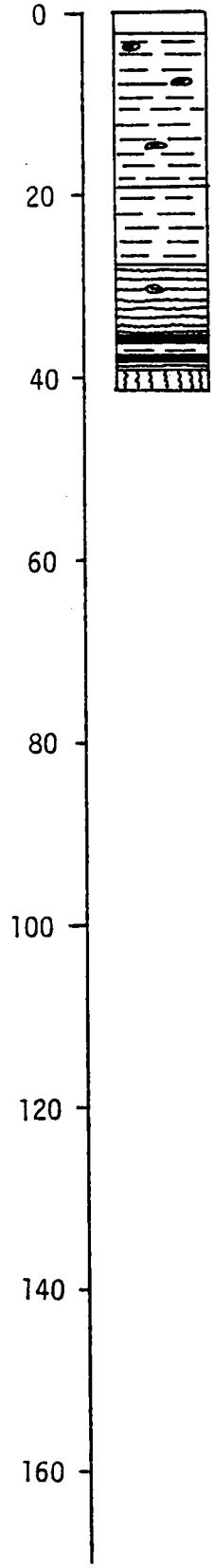
NW¼NW¼NW¼NW¼NW¼ sec. 36, T. 9 N., R. 23 E., Haskell County. Drilled 100 ft south of north line and 100 ft east of west line. Surface elevation, estimated from topographic map, 562 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, grayish-brown, clayey, contains organic material (topsoil).....	0.0	1.4
Clay, light-brown, feels gritty; contains gravel-sized concretionary fragments.....	1.4	1.1
Clay, dark-yellowish-orange to pale-yellowish-brown, feels gritty; contains sand- and gravel-sized concretionary fragments.....	2.5	9.0
Gravel, dusky-yellowish-brown, clayey, sandy; contains subangular clasts of ironstone and sandstone.....	11.5	0.5
Krebs Group		
McAlester Formation		
Shale, olive-gray to olive-black with some grayish-orange iron-oxide staining on fracture surfaces, noncalcareous.....	12.0	5.5
Shale, dark-gray, silty, noncalcareous; stained moderate-reddish-brown in part along fracture surfaces; uniform in character.....	17.5	67.0
Ironstone, moderate-reddish-brown, very hard.....	84.5	0.8
Shale, dark-gray, silty, noncalcareous; includes hard, dark-reddish-brown to moderate-reddish-brown ironstone concretions 1-2 in. thick.....	85.3	19.7
Shale, dark-gray, silty, moderately hard, noncalcareous; contains a few small pyrite nodules up to 0.25 in. in diameter and numerous brownish-gray siderite concretions 1/16 to 1.5 in. thick; also includes thin white calcite deposits occurring in layers and as veinlets; includes scattered lens-shaped, siltstone-filled burrows in lower part.....	105.0	28.2
Hartshorne Formation		
Shale, grayish-black, carbonaceous, pyritic in upper 1 in., includes a 0.25-in.-thick coal layer near base of unit.....	133.2	0.8
Coal, black, bright, moderately friable; contains white calcite on cleat surfaces and minor pyrite in nodular form; includes a 2-in.-thick, grayish-black, highly carbonaceous shale parting in the interval 22-24 in. below top of unit (Hartshorne coal).....	134.0	2.4
Underclay, brownish-gray to medium-gray, carbonaceous and coaly in upper 1 in.....	136.4	1.6
Total Depth		138.0

C-00-2

SE¼NW¼NW¼NE¼SW¼ sec. 22, T. 10 N., R. 12 E., Okfuskee County. Surface elevation, estimated from topographic map, 678 ft.

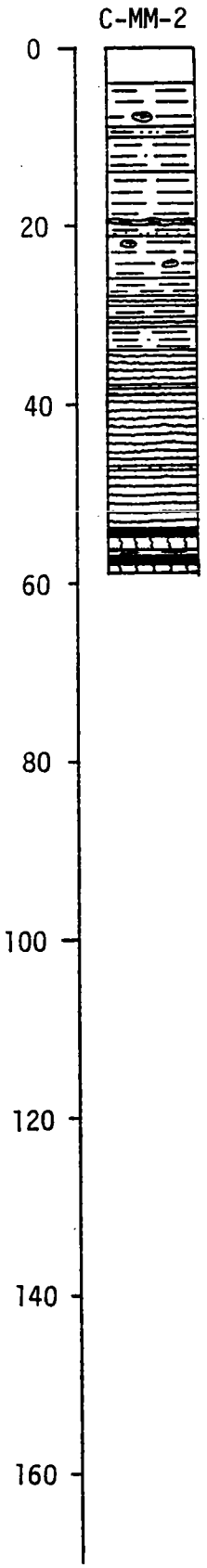
	Depth to unit top (ft)	Thickness of unit (ft)
Cabaniss Group		
Senora Formation		
Shale, grayish-orange, clayey, weathered; contains stringers of moderate-reddish-orange clay-ironstone.....	0.0	4.5
Shale, moderate olive-brown with dark-gray and moderate-reddish-orange bands, some brownish-black staining on stratification surfaces, weathered, clayey.....	4.5	6.0
Shale, olive-gray with some brownish-black staining on stratification surfaces; includes a minor black shale band at 12 ft.....	10.5	4.5
Shale, olive-gray with light-brown bands.....	15.0	1.5
Shale, olive-gray with very dark-gray and light-brown bands.....	16.5	0.3
Shale, black, soft, carbonaceous.....	16.8	0.2
Shale, olive-gray with very dark-gray and moderate-reddish-orange bands.....	17.0	0.8
Ironstone, dark-reddish-brown, hard.....	17.8	0.2
Shale, olive-gray to medium-gray with some moderate-reddish-orange ironstone concretions.....	18.0	1.7
Shale, medium-gray, clayey.....	19.7	5.6
Shale, black, hard; contains light-brown concretions ~0.5 in. thick, 3 in. from top of unit as well as selenite-filled fractures ~1/8 in. thick.....	25.3	4.4
Shale, black, hard, brittle.....	29.7	2.8
Coal, black, hard, banded; pyritic in lower 3 in. (Croweburg coal).....	32.5	1.0
Shale, medium-gray, carbonaceous; contains abundant fossil plant fragments.....	33.5	0.9
Coal, black, impure, shaly (Croweburg coal).....	34.4	0.2
Shale, dark-gray, coaly; contains very thin stringers of bright, hard, coal.....	34.6	0.3
Coal, black, very impure and shaly; includes pyrite and calcite (Croweburg coal).....	34.9	0.5
Underclay, dark-gray to medium-gray; contains abundant black, carbonaceous plant fragments.....	35.4	1.6
Total Depth		37.0



6 (C-00-1)

SE¼SE¼NW¼NE¼SW¼ sec. 28, T. 10 N., R. 12 E., Okfuskee County. Surface elevation, estimated from topographic map, 705 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, grayish-brown to moderate-yellowish-brown, sandy, clayey; contains large, angular boulders of reddish-brown sandstone	0.0	2.2
Clay, moderate-yellowish-brown	2.2	2.3
Cabaniss Group		
Senora Formation		
Shale, grayish-brown with dark-gray and moderate-reddish-orange banding, becomes darker with depth, weathered; includes reddish-brown and moderate-reddish-orange ironstone concretions ~0.75 in. thick	4.5	5.5
Shale, medium-gray to grayish-brown with moderate-reddish-orange banding, partly weathered; contains some hard, reddish-brown ironstone concretions ~0.75 in. thick	10.0	9.5
Shale, moderate-olive-brown with reddish-brown staining on stratification surfaces	19.5	8.5
Shale, black, hard; includes selenite-filled fractures ~1/8 in. thick in upper part	28.0	1.5
Shale, black, hard; includes 1-in.-thick ironstone concretions	29.5	4.5
Shale, black, hard	34.0	1.0
Shale, black, soft, highly carbonaceous; contains a few small brachiopod fossils	35.0	0.5
Coal, black, banded; includes minor pyrite and calcite (Croweburg coal)	35.5	1.2
Shale, medium-gray; clayey; contains streaks of black, bright coal	36.7	1.1
Coal, black, banded, impure; contains 0.75 in. gray clay parting 4 in. from base of unit (Croweburg coal)	37.8	0.9
Shale, black, highly carbonaceous, coaly in part	38.7	0.5
Underclay, medium-gray to light-gray	39.2	0.3
Underclay, light-gray, shaly at bottom of unit	39.5	2.2
	Total Depth	41.7



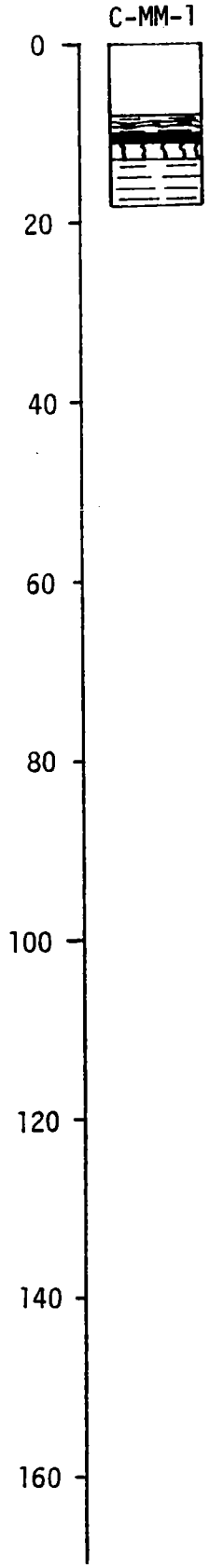
7 (C-MM-2)

NW¼SW¼SW¼NW¼SW¼ sec. 7, T. 10 N., R. 13 E., McIntosh County. Surface elevation, estimated from topographic map, 755 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, grayish-brown; contains organic matter; includes angular cobbles of moderate-brown sandstone.....	0.0	1.0
Clay, grayish-brown, gravelly; includes abundant clasts of moderate-reddish-brown ironstone.....	1.0	3.0
Cabaniss Group		
Senora Formation		
Shale, yellowish-gray to light-olive-gray, clayey; ironstone concretion at 9 ft, weathered; less weathered in bottom 6 in.....	4.0	5.0
Siltstone, pale-brown, well-indurated, interbedded with grayish-brown shale.....	9.0	1.0
Shale, light-olive-gray with yellowish-gray bands, silty; includes layers of moderate-reddish-orange ironstone concretions.....	10.0	4.0
Shale, olive-gray with some thin, very dark-gray streaks.....	14.0	2.0
Shale, medium-gray, clayey; contains moderate-reddish-brown ironstone concretions.....	16.0	3.9
Ironstone, moderate-red, hard.....	19.9	0.1
Shale, olive-gray to pale-brown; includes some orange bands and light-gray stringers of silty sandstone.....	20.0	1.2
Shale, pale-yellowish-brown to grayish-brown, clayey; contains some moderate-reddish-orange streaks along fractures, and a 1-in.-thick layer of moderate-reddish-orange ironstone ~1 ft from bottom of unit.....	21.2	3.8
Shale, dark-gray to grayish-black, noncalcareous; contains a grayish-orange siderite concretion 8 in. from top of unit.....	25.0	1.0
Shale, medium-gray with dark-gray to grayish-black bands up to 2 in. thick, noncalcareous.....	26.0	2.0
Shale, grayish-black, includes some minor medium-gray bands.....	28.0	1.0
Shale, medium-gray with dark-gray bands.....	29.0	1.2
Shale, grayish-black.....	30.2	1.5
Shale, dark-gray, silty; includes some thin, hard siderite layers.....	31.7	2.3
Shale, grayish-black.....	34.0	4.0
Limestone, medium- to light-gray, dense, hard, micritic; very sparsely fossiliferous; contains		

shell fragments and crinoid segments.....	38.0	0.2
Shale, black, soft, highly carbonaceous.....	38.2	1.0
Shale, very dark-gray, weakly calcareous; sparsely fossiliferous; contains scattered brachiopods.....	39.2	8.1
Limestone, medium-gray, dense, hard, micritic; sparry calcite fills fractures; contains a few small marine fossils.....	47.3	0.4
Shale, very dark-gray to grayish-black, weakly calcareous; sparsely fossiliferous, contains scattered brachiopods; small brachiopods abundant in bottom 6 in.....	47.7	6.3
Coal, black, bright; includes white calcite on cleat surfaces (Croweburg coal).....	54.0	1.1
Underclay, light-gray; includes some dark-gray carbonaceous bands in lower 6 in.....	55.1	1.2
Coal, black, impure in upper 2 in.; includes thin brownish-black shale laminae (Croweburg coal).....	56.3	0.3
Shale, grayish-black, highly carbonaceous.....	56.6	0.2
Coal, black, bright; includes white calcite on cleat surfaces, pyritic in upper part (Croweburg coal).....	56.8	1.3
Underclay, brownish-black, contains abundant carbonaceous material.....	58.1	0.9
Total Depth		59.0

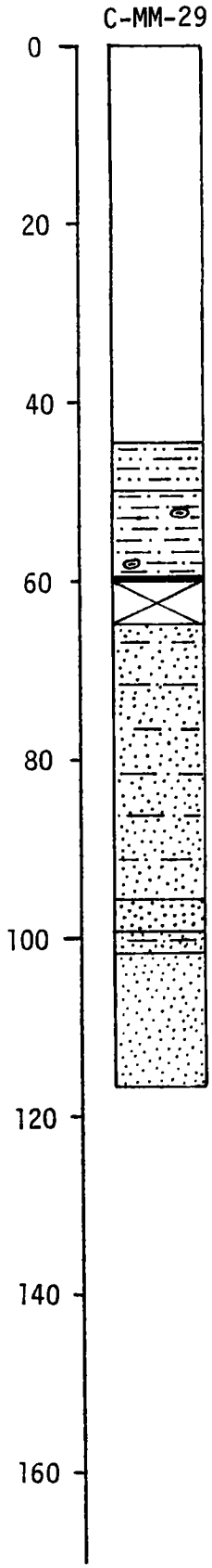
8 (C-MM-1)



NW¼SE¼SW¼SW¼ sec. 7, T. 10 N., R. 13 E., McIntosh County. Surface elevation, estimated from topographic map, 742 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, moderate-brown, sandy; contains abundant organic material (soil).....	0.0	0.5
Gravel, grayish-brown, poorly sorted; clasts range from silt sized to cobble sized; angular fragments of light-brown and dark-reddish-brown sandstone abundant.....	0.5	3.5
Sand, moderate-yellowish-brown, very fine.....	4.0	2.5
Clay, moderate-yellowish-brown with dark-yellowish-orange mottling; contains fragments of weathered clay-ironstone concretions.....	6.5	1.5
Cabaniss Group		
Senora Formation		
Shale, light-olive-gray, clayey; contains abundant layers of dark-yellowish-orange ironstone.....	8.0	0.7
Ironstone, dark-yellowish-orange, clayey, weathered.	8.7	0.2
Shale, light- to medium-gray with black streaks; contains carbonized plant fragments.....	8.9	1.1
Coal, brownish-black, soft, highly weathered (thickness estimated from cuttings) (Croweburg coal)....	10.0	1.0
Underclay, light-gray; contains black carbonized plant fragments.....	11.0	2.0
Shale, light-gray, clayey; includes some minor black plant fragments.....	13.0	2.0
Shale, yellowish-gray with dark-yellowish-orange and pale-purple streaks and bands, clayey.....	15.0	3.0
Total Depth		18.0

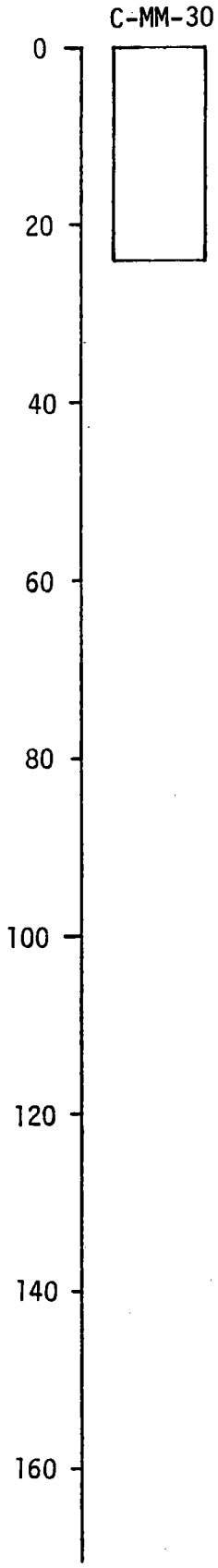
Note: Core was not recovered from the coal and underclay intervals. Log is from cuttings.



SW¼NE¼NE¼NE¼SE¼ sec. 13, T. 10 N., R. 17 E., McIntosh County. Drilled in pasture at southwest corner of farm pond just north of building site 230 ft FEL and 2360 ft FSL. Surface elevation, estimated from topographic map, 616 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, silty, very fine-grained, unbedded; contains organic material (soil).....	0.0	2.0
Sand, moderate-yellowish-brown, silty, very fine-grained, oxidized.....	2.0	2.0
Sand, grayish-orange, fine-grained, unconsolidated, oxidized.....	4.0	4.0
Sand, pale-yellowish-brown to very pale-orange, very fine-grained, silty, unconsolidated; stained moderate-reddish-brown from 18.3 to 18.6 ft; includes moderate-reddish-orange mottles from 18.6 to 19.0 ft.....	8.0	11.0
Sand, grayish-orange with abundant moderate-reddish-orange mottling, highly clayey, very fine- to fine-grained.....	19.0	10.0
Silt, dark-greenish-gray, sandy, clayey.....	29.0	1.0
Sand, dark-greenish-gray, fine- to very fine-grained, clayey; includes some gravel.....	30.0	8.0
Gravel, dark-greenish-gray, sandy, clayey; contains angular to subangular clasts of very fine-grained sandstone up to coarse gravel in size.....	38.0	6.0
Krebs Group		
Boggy Formation		
Siltstone, medium-dark-gray with light-gray laminae, shaly; contains thin laminae of very fine-grained sandstone; includes black carbonized plant fragments on stratification surfaces; burrowed in places.....	44.0	5.3
Shale, medium-dark-gray, silty, noncalcareous; contains black carbonized plant compressions on stratification planes; includes some light-brownish-gray sideritic concretions 0.5-1 in. thick.....	49.3	9.7
Coal, black, bright, friable (Secor? coal).....	59.0	0.4
No cuttings or core.....	59.4	4.6
Sandstone, medium-dark-gray with medium-light-gray bands and laminae, very fine-grained; shaly, noncalcareous, bioturbated, bedding convoluted, cross-laminated in part; scour-and-fill features common; black macerated plant material abundant		

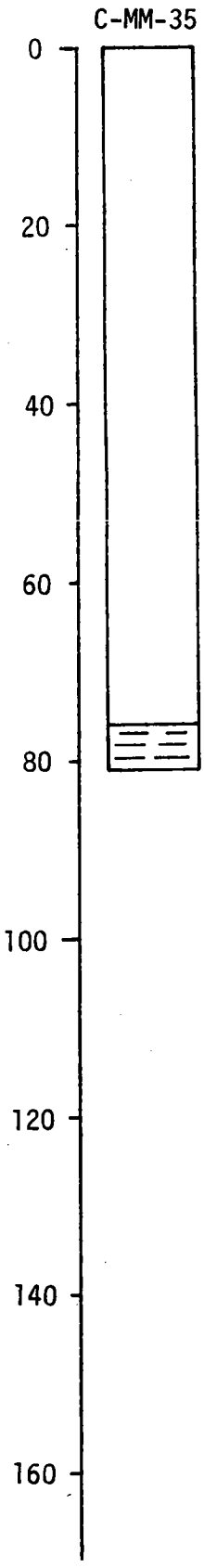
on stratification surfaces.....	64.0	30.2
Sandstone, medium-gray, fine-grained; cross-bedded; contains some black coalifed plant material.....	94.2	3.8
Sandstone, medium-dark-gray with medium-light-gray bands and laminae, very fine-grained, shaly, cross-laminated, noncalcareous; scour-and-fill features common; black macerated plant material abundant on stratification surfaces.....	98.0	2.3
Sandstone, medium-gray, fine-grained; cross-bedded, noncalcareous; contains some black coalified plant material.....	100.3	14.7
Total Depth		115.0



10 (C-MM-30)

SW¼NE¼SE¼NE¼SE¼ sec. 13, T. 10 N., R. 17 E., McIntosh County. Drilled in pasture south of farm house 210 ft FEL and 1760 ft FSL. Surface elevation, estimated from topographic map, 623 ft.

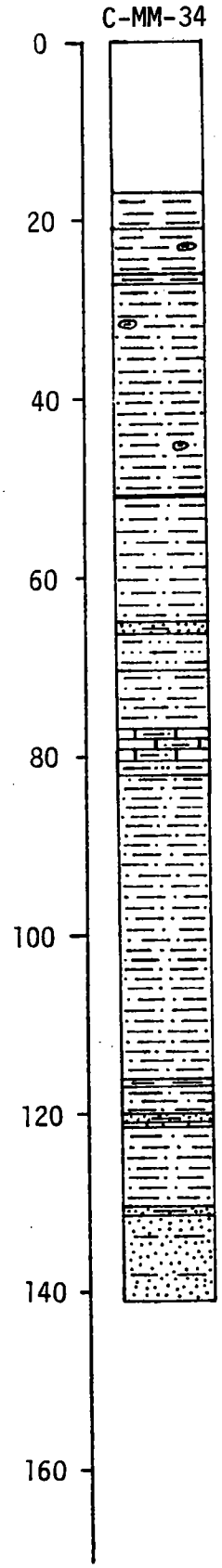
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-yellowish-brown, very fine, unbedded; contains organic material in upper 1 ft (soil)....	0.0	3.0
Sand, light-brown, very fine.....	3.0	4.8
Sand, grayish-orange, very fine.....	7.8	16.2
(Hole abandoned owing to excessive caving of unconsolidated sand.)		
Total Depth		24.0



11 (C-MM-35)

NW¼SE¼NW¼SW¼NW¼ sec. 24, T. 10 N., R. 17 E., McIntosh County. Drilled at northeast edge of farm pond 420 ft FWL and 1740 ft FNL. Surface elevation, estimated from topographic map, 631 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-brown, very fine-grained, silty; contains organic material.....	0.0	2.0
Sand, pale-reddish-brown, fine- to medium-grained, subrounded to rounded; becomes moderate-reddish-brown at 10 ft, oxidized; consists predominately of quartz.....	2.0	26.0
Sand, medium-gray, silty, unoxidized, unconsolidated.....	28.0	7.0
Clay, pale-brown with some grayish-orange tones, silty, sandy.....	35.0	0.5
Peat, dusky-brown, fibrous, mixed with black shaly gravel; poor recovery.....	35.5	4.0
Gravel, dark-yellowish-brown; fine-grained, sandy; poorly sorted; contains a high percentage of subangular black shale flakes and rounded quartz grains; poor recovery.....	39.5	10.5
Clay, olive-gray with pale-reddish-brown bands, silty.....	50.0	12.0
Sand and gravel, dark-yellowish-brown, coarse, clayey; contains clasts of oxidized fine-grained sandstone; some may be cobble to boulder sized; includes coarse sand-sized, well-rounded clasts of colorless quartz and minor light-red clasts of feldspar.....	62.0	13.0
Krebs Group		
Boggy Formation		
Shale, dark-gray to grayish-black, hard.....	75.0	5.0
Total Depth		80.0

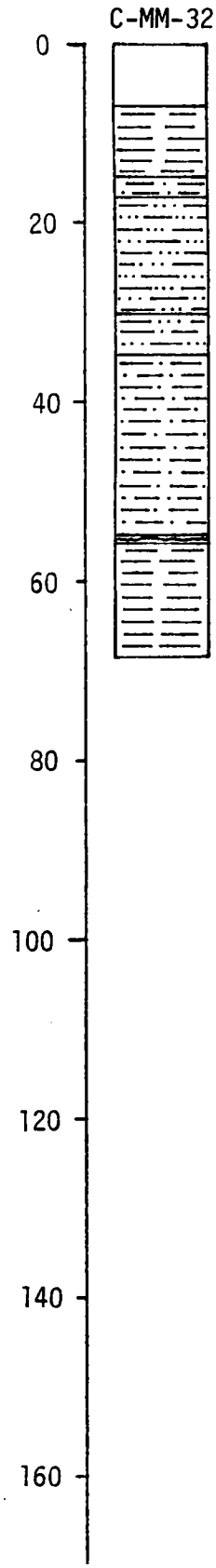


12 (C-MM-34)

SE¼SW¼SE¼SW¼SE¼ sec. 7, T. 10 N., R. 18 E., McIntosh County. Drilled in farm yard just north of blacktop road at west edge of Texanna. Surface elevation, estimated from topographic map, 610 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, grayish-brown, very fine-grained, silty, contains organic material	0.0	0.5
Sand, moderate-yellowish-brown, very fine-grained, silty; contains limonite-cemented, medium-sized gravel particles	0.5	1.5
Sand, grayish-orange, very fine-grained, silty, clayey, oxidized	2.0	6.5
Sand, dark-yellowish-orange to grayish-orange, very fine-grained, mottled; contains a high percentage of silt and clay; includes abundant brownish-black pea-sized concretions	8.5	7.0
Gravel, moderate-brown, coarse; poorly sorted; includes very fine sand, silt, and clay	15.5	1.7
Krebs Group		
Savanna Formation		
Shale, dark-yellowish-brown, with light-brown and dusky-brown bands, highly weathered	17.2	3.8
Shale, light-olive-gray with minor light-brown streaks, partly weathered; includes some hard, blackish-red ironstone concretions	21.0	5.0
Shale, olive-gray to medium-dark-gray; minor iron-oxide staining on fracture surfaces	26.0	1.0
Shale, dark-gray, silty, hard; contains some minor pyrite; includes sparse grayish-brown sideritic concretions ~1 in. thick	27.0	23.5
Coal, black (unnamed)	50.5	0.1
Shale, medium-dark-gray, silty, slickensided	50.6	10.7
Shale, dark-gray, silty; noncalcareous; contains sparse fossil marine shells	61.3	3.0
Sandstone, very light-gray with medium-dark-gray bands, very fine-grained, calcareous, shaly; includes some bioturbation features in upper part, cross-bedded; slump structures abundant	64.3	1.6
Siltstone, medium-dark-gray with minor thin light-gray bands, noncalcareous; sparsely interlaminated with very fine-grained sandstone	65.9	4.1
Shale, medium-dark-gray, silty, noncalcareous	70.0	6.5
Limestone, medium-dark-gray, impure, very silty and shaly; contains abundant brachiopod shell fragments (Sam Creek Limestone)	76.5	3.5
Siltstone, medium-gray, unbedded; contains sparse		

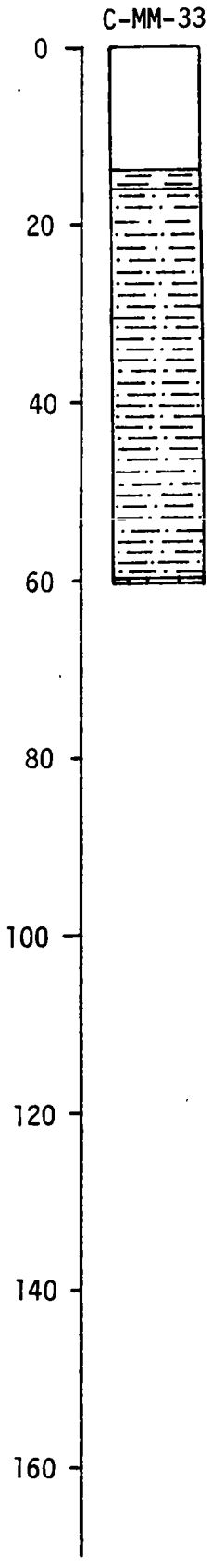
fossil shell fragments in upper part, as well as black carbonized plant fragments; noncalcareous, sandy.....	80.0	1.9
Shale, medium-dark-gray, silty, slickensided, noncalcareous.....	81.9	33.5
Shale, medium-light-gray, noncalcareous, bedding greatly disturbed, bioturbation features abundant.....	115.4	0.6
Shale, medium-gray, silty, noncalcareous; includes minor streaks of very fine-grained sandstone.....	116.0	3.3
Sandstone, medium-dark-gray, very fine-grained, silty, calcareous, contains brachiopod shells and shell fragments.....	119.3	0.7
Limestone, medium-dark-gray, impure, highly silty and shaly, brachiopod shells abundant (Spaniard Limestone).....	120.0	0.2
McAlester Formation		
Shale, medium-gray, noncalcareous, silty.....	120.2	9.3
Sandstone, medium-gray, very fine-grained, silty, shaly, bedding disturbed; includes abundant fossil shells and shell fragments; grades into underlying unit.....	129.5	0.9
Sandstone and shale interstratified, medium-dark-gray with light-gray bands, extensively bioturbated, noncalcareous (Keota Sandstone).....	130.4	9.6
Total Depth		140.0



13 (C-MM-32)

NW¼NW¼SW¼SW¼NW¼ sec. 5, T. 10 N., R. 19 E., Muskogee County. Drilled in pasture at north edge of farm pond 66 ft FWL and 2076 ft FNL. Surface elevation, estimated from topographic map, 626 ft.

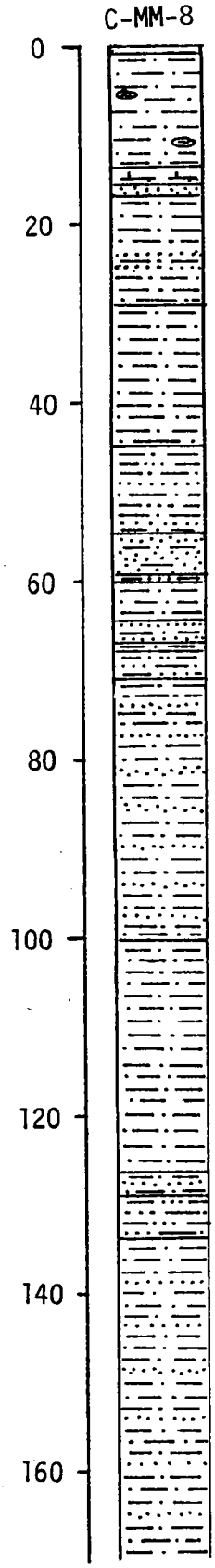
	Depth to unit top (ft)	Thickness of unit (ft)
Clay, dark-yellowish-brown, silty; contains organic material	0.0	2.0
Clay, dark-yellowish-orange, sandy, gravelly, oxidized	2.0	5.0
Krebs Group		
Savanna Formation		
Shale, yellowish-gray and grayish-orange, clayey, weathered	7.0	3.2
Shale, yellowish-gray to dark-yellowish-brown with dark-yellowish-orange bands, partly weathered	10.2	4.8
Shale, dark-gray, silty, noncalcareous, grades into underlying unit	15.0	2.0
Siltstone, medium-dark-gray, contains abundant very fine-grained sandstone, noncalcareous, bioturbated	17.0	13.0
Siltstone, medium-dark-gray, shaly, noncalcareous	30.0	4.5
Shale, dark-gray, silty	34.5	19.7
Shale, black, pyritic	54.2	1.0
Shale, dark-gray, noncalcareous	55.2	12.8
Total Depth		68.0



14 (C-MM-33)

NE¼SW¼NW¼SW¼NE¼ sec. 6, T. 10 N., R. 19 E., Muskogee County. Drilled on east side of small farm pond directly east of farm house. Surface elevation, estimated from topographic map, 620 ft.

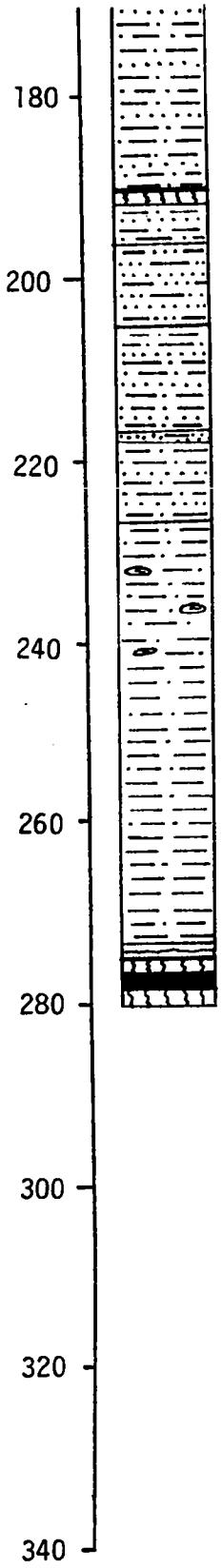
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, very fine-grained, silty, contains organic material.....	0.0	2.0
Sand, grayish-orange, very fine-grained, silty, noncalcareous; includes some fine gravel.....	2.0	5.0
Sand, moderate-yellowish-brown, very fine-grained, noncalcareous, unconsolidated; gravelly in bottom 1 ft.....	7.0	7.0
Krebs Group		
McAlester Formation		
Shale, dusky-yellowish-brown with light-brown bands, partly weathered.....	14.0	2.0
Shale, dark-gray, silty, noncalcareous, very uniform in character.....	16.0	37.5
Shale, dark-gray, silty, noncalcareous, contains sparse fossil shells.....	53.5	6.0
Limestone, dark-gray, impure, shaly, pyritic; contains abundant fossils consisting of brachiopod shells and fossil hash.....	59.5	0.5
Total Depth		60.0



15 (C-MM-8)

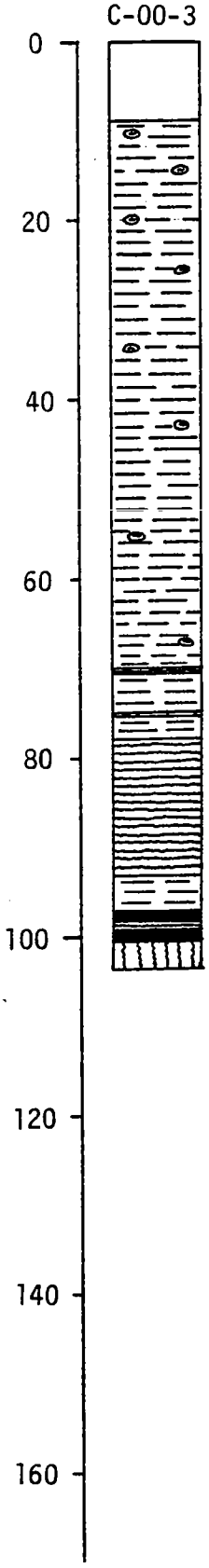
NW¼NE¼SE¼SW¼NE¼ sec. 22, T. 10 N., R. 19 E., Muskogee County. Hole drilled in pasture northwest of buildings 40 ft directly east from pond. Surface elevation, estimated from topographic map, 570 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, silty; contains organic material	0.0	1.0
Krebs Group		
McAlester Formation		
Shale, dark-gray with moderate-reddish-brown iron-oxide deposits on stratification surfaces, silty; includes some moderate-reddish-brown ironstone concretions	1.0	12.5
Shale, medium-light-gray, calcareous	13.5	2.3
Sandstone, medium-light-gray, very fine-grained, noncalcareous	15.8	0.8
Shale, medium-dark-gray, silty, fissile; includes some hard, thin, light-gray sandstone layers at 23.5 and 24.5 ft	16.6	12.4
Shale, dark-gray, silty, fissile, pyritic; includes black carbonized plant fragments on stratification surfaces	29.0	15.8
Shale, dark-gray, silty, fissile, interbedded with thin stringers of light-gray, very fine-grained sandstone and siltstone; includes some minor pyrite	44.8	9.7
Sandstone, medium-gray with black flecks, very fine-grained, well-indurated, interbedded with dark-gray, silty shale and siltstone, noncalcareous (Keota Sandstone)	54.5	3.5
Sandstone, medium-gray with very light-gray bands, very fine-grained, silty, bedding contorted, bioturbation features abundant, noncalcareous (Keota Sandstone)	58.0	1.3
Siltstone, medium-gray with minor light-gray stringers of very fine-grained sandstone, thin-bedded, shaly	59.3	0.7
Shale, dark-gray with light-gray streaks, sandy, silty, bioturbated	60.0	2.3
Shale, dark-gray, silty; contains scattered calcareous fossil brachiopod shell fragments	62.3	2.0
Sandstone, light-gray, very fine-grained, highly calcareous, shaly	64.3	0.1
Shale, medium-dark-gray with brownish-gray sandstone-filled burrows, silty; grades into underlying unit	64.4	1.0



Sandstone, medium-light-gray to light-gray, very fine-grained, silty, highly bioturbated, noncalcareous	65.4	1.5
Shale, medium-gray with light-gray streaks, silty, sandy	66.9	0.4
Shale, dark-gray	67.3	0.2
Siltstone, medium-dark-gray, sandy, becomes shaly downward, bioturbated, noncalcareous	67.5	3.7
Shale, medium-dark-gray, silty, intricately interbedded with light-gray, very fine-grained sandstone, noncalcareous; wavy-bedded, cross-bedded; bioturbation and flow features common in the sandstone; unit consists of ~5% sandstone in upper part and >10% sandstone in lower part	71.2	6.3
Shale, medium-dark-gray, silty; includes some very thin stringers of very fine-grained sandstone; extensively bioturbated, with very fine-grained sandstone fillings in burrows; includes a 3/16-in.-thick grayish-black carbonaceous shale layer at 88.3 ft	77.5	14.5
Shale, dark-gray, silty; contains minor very fine-grained sandstone laminae and burrow fillings in upper 6 ft of unit	92.0	8.0
Shale, dark-gray, silty, hard; includes some minor pyrite and layers of brownish-gray, silty ironstone	100.0	26.0
Shale, dark-gray, silty, includes thin laminae of very fine-grained sandstone; bioturbated in part; grades into underlying unit	126.0	2.7
Siltstone, dark-gray, shaly, includes abundant very fine-grained sandstone in thin laminae and burrow fillings, hard; contains some black carbonized plant compressions	128.7	5.1
Shale, dark-gray, silty, hard; includes thin laminae of very fine-grained sandstone and siltstone; bioturbated in part; contains black carbonized plant material and layers of brownish-gray, silty ironstone up to 2 in. thick; includes scattered brachiopod fossils from 165 to 168 ft	133.8	55.0
Coal, black, bright, moderately friable; contains thin lenses of pyrite and white calcite on cleat surfaces (Tamaha coal)	188.8	0.3
Underclay, medium-gray to medium-dark-gray; silty in lower part; contains black coalified plant roots and white calcite veinlets; slickensides common; grades into underlying unit	189.1	1.1
Shale, dark-gray with very light-gray laminae of very fine-grained sandstone, highly silty; bio-		

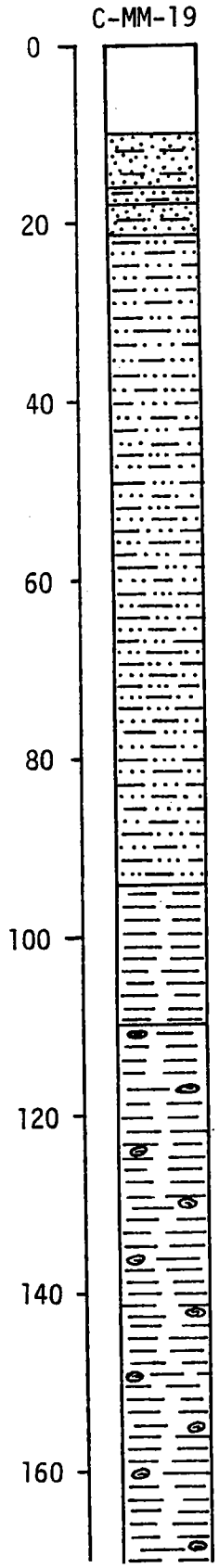
turbation, scour, and soft-sediment deformation features abundant.....	190.2	4.4
Siltstone, dark-gray with very light-gray laminae of very fine-grained sandstone, shaly in part, micaceous; bioturbation, scour, and soft-sediment deformation features abundant; grades into underlying unit.....	194.6	9.2
Shale, dark-gray, silty; includes minor very thin laminae of very fine-grained sandstone.....	203.8	11.0
Sandstone, medium-dark-gray, very fine-grained, silty and shaly, very thin-bedded; basal contact sharp and disconformable (Tamaha Sandstone).....	214.8	0.2
Shale, dark-gray, silty, hard; includes thin laminae of very fine-grained light-gray sandstone and siltstone; extensively bioturbated; contains layers of brownish-gray, silty ironstone up to 1 in. thick.....	215.0	9.4
Shale, dark-gray, silty, hard; contains brownish-gray, silty ironstone lenses up to 1.75 in. thick; includes minor bioturbation features; grades into underlying unit.....	224.4	16.6
Shale, dark-gray, less silty and softer than overlying unit.....	241.0	29.0
Shale, dark-gray; contains small, sparsely distributed calcareous brachiopod fossils.....	270.0	0.8
Shale, black, highly calcareous, fossiliferous; contains a high concentration of white fossil hash consisting mostly of brachiopod shells in lower 1 in.....	270.8	0.5
Shale, dark-gray, silty; contains abundant carbonized plant material.....	271.3	0.2
Coal, black, bright; includes a 0.25-in.-thick carbonaceous shale parting 1 in. from top of unit (Stigler rider coal).....	271.5	0.3
Underclay, medium-dark-gray, shaly; contains abundant black carbonized plant fragments and minor coal streaks in lower part of unit.....	271.8	1.3
Coal, black, bright, finely cleated (Stigler coal)..	273.1	1.8
Underclay, medium-dark-gray, contains black carbonized plant fragments; slickensided surfaces common.....	274.9	2.1
Total Depth		277.0



16 (C-00-3)

NW¼NE¼SE¼NW¼SW¼ sec. 31, T. 11 N., R. 13 E., Okmulgee County. Surface elevation, estimated from topographic map, 738 ft.

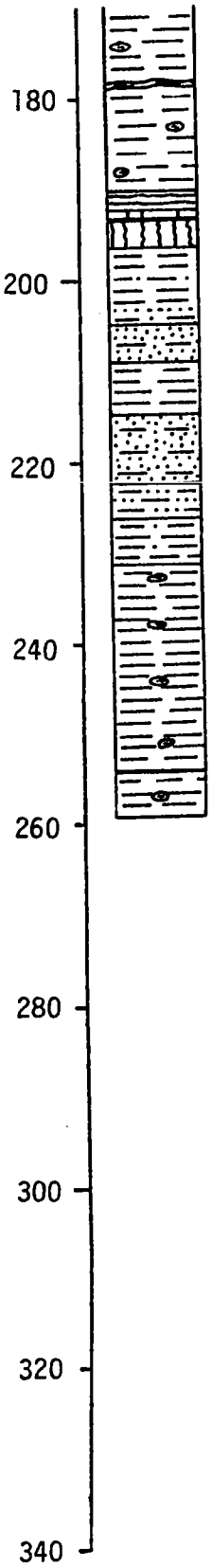
	Depth to unit top (ft)	Thickness of unit (ft)
Silt, grayish-orange, clayey, sandy, unconsolidated; includes angular, reddish-brown sandstone clasts up to boulder size.....	0.0	5.0
Clay, moderate-yellowish-brown, highly weathered; contains some gravel clasts.....	5.0	4.0
Cabaniss Group		
Senora Formation		
Shale, light-olive-gray, clayey, slightly weathered; includes soft moderate-reddish-orange ironstone concretionary layers.....	9.0	9.0
Shale, olive-gray to medium-gray, clayey; includes layers of reddish-brown ironstone concretions.....	18.0	10.0
Shale, medium-gray, clayey; contains a few light-gray siderite concretions about 0.5-1 in. thick...	28.0	42.0
Shale, dark-gray, fissile.....	70.0	0.5
Shale, medium-gray; includes bands of dark-gray fissile shale.....	70.5	4.5
Limestone, light-gray, silty.....	75.0	0.2
Shale, medium-gray, includes bands of dark-gray and grayish-black shale.....	75.2	2.8
Shale, dark-gray to grayish-black, hard.....	78.0	6.0
Shale, grayish-black, hard, carbonaceous.....	84.0	9.5
Shale, dark-gray.....	93.5	3.8
Coal, black, bright; contains white calcite on cleat surfaces; contains pyrite layers and lenses up to 0.5 in. thick (Croweburg coal).....	97.3	1.2
Shale, dark-gray with grayish-black bands, carbonaceous; includes some thin layers of impure coal...	98.5	0.7
Coal, black, bright, impure; contains pyrite and white calcite on cleat surfaces (Croweburg coal)..	99.2	1.2
Underclay, medium-gray; contains dark-gray bands of highly carbonaceous shale in upper 3 in., includes abundant black carbonized plant fragments such as leaves and roots; highly silty in lower 3 ft.....	100.4	3.5
Total Depth		103.9



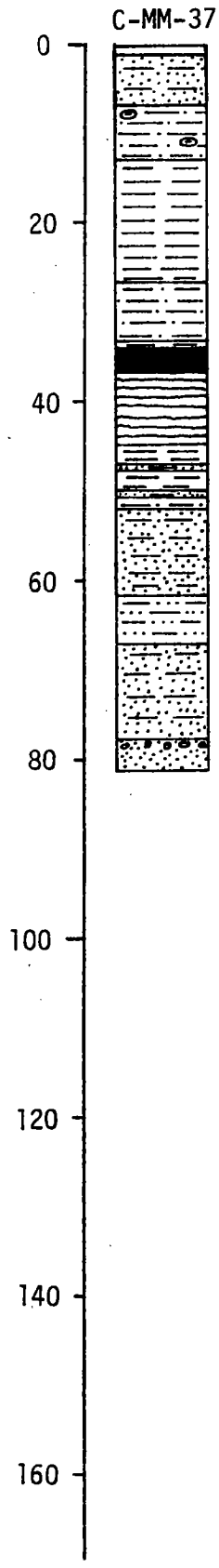
17 (C-MM-19)

SW¼SW¼SE¼NE¼NE¼ sec. 12, T. 11 N., R. 16 E., McIntosh County. Drilled at east edge of farm pond 575 ft FEL and 1100 ft FNL. Surface elevation, estimated from topographic map, 698 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, grayish-orange, very fine-grained, silty; contains organic material (soil).....	0.0	2.0
Sand, moderate-brown, very fine-grained, silty, unconsolidated, oxidized.....	2.0	5.0
Sand, moderate-yellowish-brown, very fine-grained, silty, clayey; contains gravel-sized clasts of weathered dusky-yellowish-brown sandstone, unconsolidated.....	7.0	3.0
Krebs Group		
Boggy Formation		
Sandstone, light-brown to very pale-orange with medium-dark-gray bands, very fine-grained, shaly, noncalcareous, cross-bedded, micaceous, weathered.....	10.0	1.3
Sandstone, light-gray with dark-gray bands, very fine-grained, shaly, wavy-laminated, fractured, oxidized along fracture surfaces, micaceous, noncalcareous.....	11.3	2.7
Siltstone, medium-dark-gray, shaly, noncalcareous, micaceous.....	14.0	2.0
Sandstone, very light-gray with dark-gray laminae, noncalcareous, very fine-grained, silty, cross-laminated, micaceous.....	16.0	5.5
Siltstone, medium-dark-gray, shaly, micaceous, noncalcareous; includes a few laminae of light-gray, very fine-grained sandstone; cross-laminated in part.....	21.5	72.7
Shale, medium-dark-gray, noncalcareous.....	94.2	15.8
Shale, dark-gray, noncalcareous; includes some light-brownish-gray sideritic concretions 0.25-1.5 in. thick; contains sparse calcareous brachiopod fossils in lower part.....	110.0	21.6
Shale, grayish-black, noncalcareous, includes some light-brownish-gray sideritic concretions 0.5-1 in. thick as well as a sideritic concretion 4 in. thick at 179 ft; contains sparse calcareous brachiopod fossils and white calcite deposits on fracture surfaces; slickensided in part.....	131.6	59.4
Shale, black, noncalcareous; contains sparse calcareous brachiopod fossils and white calcite veinlets occurring as fracture fillings.....	191.0	2.2



Limestone, medium-dark-gray, impure, silty, shaly; highly fossilferous, brachiopod shell fragments abundant; interfingered with underlying unit in lower 1 in. (Inola Limestone).....	193.2	0.7
Coal, black, bright, moderately friable, white calcite on cleat surfaces (Bluejacket coal).....	193.9	0.1
Underclay, medium-light-gray, highly silty and sandy, contains sparse black carbonized plant fragments; slickensided; grades into underlying unit.....	194.0	3.0
Shale, medium-dark-gray, sandy, silty; stratification obscure; includes a few thin sideritic concretions.....	197.0	8.7
Sandstone, light-gray and medium-dark-gray, shaly, very fine-grained, noncalcareous, cross-bedded and wavy-laminated, micaceous.....	205.7	4.1
Shale, dark-gray, noncalcareous.....	209.8	5.7
Sandstone, very light-gray with some medium-dark gray bands and laminae, shaly, very fine-grained, noncalcareous, cross-laminated.....	215.5	7.6
Siltstone, dark-gray, highly shaly, noncalcareous; grades into underlying unit.....	223.1	3.9
Shale, dark-gray, silty, noncalcareous; includes sparse calcareous brachiopod fossils.....	227.0	5.0
Shale grayish-black, noncalcareous, includes some light-grayish-brown pyritic, sideritic concretions 1-2 in. thick; contains sparse white calcareous brachiopod fossils; slickensided in part; includes a 1/16-in.-thick layer of bright, black, pyritic coal at 254.6 ft.....	232.0	28.0
Total Depth		260.0

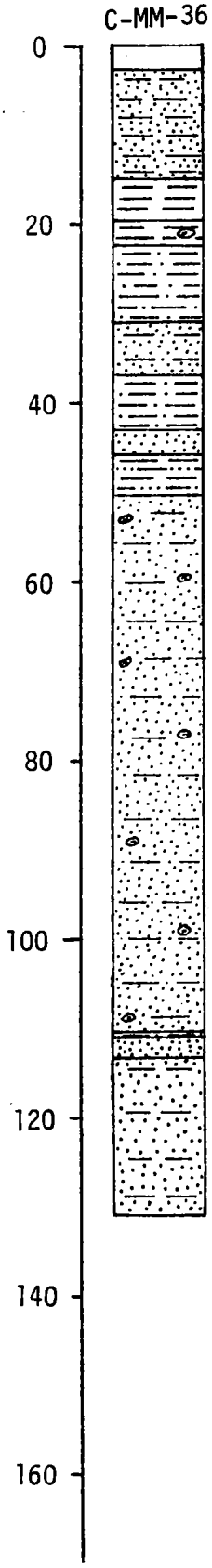


18 (C-MM-37)

SW¼NE¼NW¼SE¼NW¼ sec. 13, T. 11 N., R. 16 E., McIntosh County. Drilled on crown of hill just south of abandoned building site. Surface elevation, estimated from topographic map, 700 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-brown, silty; contains abundant organic material.....	0.0	1.0
Krebs Group		
Boggy Formation		
Sandstone, dark-yellowish-orange, clayey, very fine-grained, highly weathered, soft.....	1.0	5.5
Shale, grayish-orange-pink to dark yellowish-orange, highly silty and sandy, interbedded with 1-in.-thick layers of very fine-grained indurated sandstone, highly weathered; includes some moderate-red ironstone concretions ~1 in. thick; iron-oxide deposits abundant on stratification surfaces; grades into underlying unit.....	6.5	2.5
Shale, grayish-orange-pink, silty; includes dark-yellowish-orange bands of weathered clay-ironstone about 0.5-1.5 in. thick; noncalcareous, weathered.....	9.0	3.7
Shale, dusky-brown with dark-yellowish-orange bands; includes black carbonized plant fragments and abundant iron-oxide deposits on stratification surfaces; becomes brownish-black with depth..	12.7	13.3
Shale, grayish-black with medium-gray bands, noncalcareous; interlaminated with fine-grained siltstone; cross-laminated and wavy-bedded in part....	26.0	6.5
Shale, medium-gray, clayey.....	32.5	1.0
Coal, black, bright, friable; includes three pyrite layers 1/16 to 0.75 in. thick; becomes increasingly impure with depth (Secor coal).....	33.5	2.5
Shale, black to brownish-black, highly carbonaceous; includes numerous coal bands 1/16-0.75 in. thick; contains thin pyritic layers in upper part and small pyrite nodules in lower 1 ft.....	36.0	8.0
Shale, medium-gray, noncalcareous; includes sparse grayish-black carbonaceous stringers.....	44.0	2.1
Sandstone, medium-light-gray, very fine-grained, interlaminated with shale.....	46.1	0.4
Shale, medium-gray.....	46.5	2.5
Sandstone, medium-dark-gray, very fine-grained, shaly, cross-bedded.....	49.0	0.4
Mudstone, dark-gray, silty, contains almond-sized, siltstone-filled burrows in lower 1 ft.....	49.4	1.5

Sandstone and shale, medium-dark-gray, interbedded and interlaminated, slumped, cross-bedded, burrowed in part; contains sparse pyritic nodules, fractured and slickensided.....	50.9	6.1
Sandstone, medium-dark-gray, very fine-grained, highly silty and shaly, unbedded to obscurely bedded, noncalcareous.....	57.0	3.6
Siltstone, medium-dark-gray, shaly, includes some very fine-grained sand clasts, burrowed; interbedded with shale in parts; contains some pyrite nodules; becomes sandy with depth.....	60.6	5.4
Sandstone, medium-dark-gray and light-gray, very fine-grained, shaly; bedding highly contorted; slump features abundant from 66 to 69 ft; includes large abundant burrow features in bottom 6 ft.....	66.0	10.3
Sandstone, medium-light-gray, fine- to medium-grained, noncalcareous, micaceous, cross-bedded; contains abundant black macerated plant material; conglomeratic in upper 18 in.; includes numerous stringers and inclusions of coal (Bluejacket Sandstone).....	76.3	3.7
Total Depth		80.0

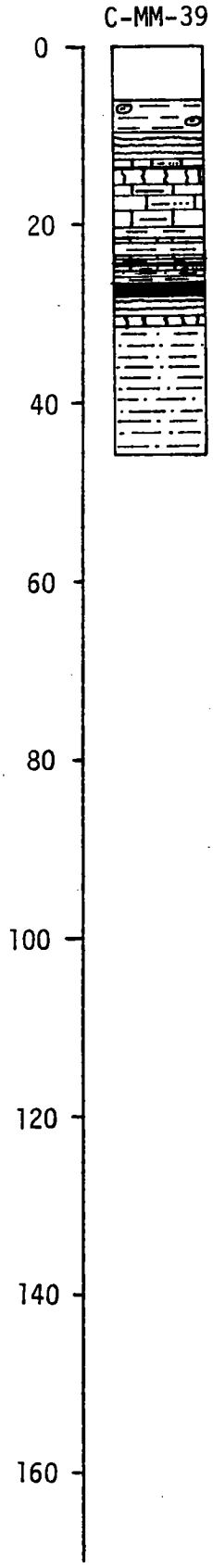


19 (C-MM-36)

NE¼NW¼NE¼NE¼SW¼ sec. 13, T. 11 N., R. 16 E., McIntosh County. Drilled in pasture directly south from large overhead iron gate 2200 ft FWL and 2570 ft FSL. Surface elevation, estimated from topographic map, 700 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-brown, silty; contains abundant organic material	0.0	1.5
Sand, light-brown to dark-yellowish-orange, highly clayey	1.5	1.5
Krebs Group		
Boggy Formation		
Sandstone, grayish-orange, very fine-grained, friable, highly weathered, clayey	3.0	1.8
Sandstone, moderate-reddish-brown to dark-yellowish-orange, very fine-grained, cross-laminated; includes some clayey shale bands; noncalcareous, highly weathered	4.8	10.2
Shale, dark-yellowish-brown with light-brown mottling, clayey, noncalcareous	15.0	4.7
Shale, dusky-yellowish-brown with moderate yellowish-brown bands, noncalcareous; includes some light-brown sideritic concretions ~0.75 in. in diameter	19.7	2.5
Shale, medium-dark-gray to dark-gray, silty, noncalcareous; includes some light-brown iron-oxide staining along fractures and partings in upper 2 ft	22.2	8.8
Sandstone, dark-gray with light-gray streaks, silty and shaly, noncalcareous, cross-bedded in part, bedding contorted in places; fills small channel in underlying unit	31.0	5.7
Shale, dark-gray, silty, noncalcareous; contains two 1-in.-thick sandstone layers in bottom 1 ft	36.7	6.1
Sandstone, medium-light-gray with thin black bands, fine-grained, micaceous, noncalcareous, cross-bedded; contains abundant black carbonized plant materials	42.8	2.8
Shale and siltstone, interlaminated, medium-gray	45.6	4.4
Sandstone, medium-gray with light-gray bands, very fine-grained, shaly, cross-bedded, noncalcareous; slump features, small scour features, and cross-laminae common; includes light-brownish-gray sideritic concretions 0.5-2 in. thick at irregular intervals from a few inches to several feet apart; contains black carbonized plant fragments on stratification surfaces	50.0	59.5

Mudstone, medium-dark-gray, slickensided, noncalcareous, bioturbated, contains sand-filled burrows in lower 2 in.....	109.5	0.5
Sandstone, medium-light-gray, micaceous, fine- to medium-grained, bioturbated in upper part, noncalcareous, cross-bedded; contains black macerated plant material on stratification surfaces; contact with overlying and underlying units sharp (Bluejacket Sandstone).....	110.0	2.5
Sandstone, medium-dark-gray with light-gray bands, very fine-grained, shaly, cross-bedded.....	112.5	1.8
Sandstone, medium-light-gray to light-gray with medium-dark-gray bands, fine-grained to very fine-grained, noncalcareous, cross-bedded; interlaminated with shale in part.....	114.3	2.3
Sandstone, medium-light-gray, fine- to medium-grained, noncalcareous, cross-bedded, micaceous; includes abundant black carbonaceous macerated plant material and coal stringers between 118 and 119 ft and minor amounts throughout; includes numerous dark-gray shaly bands from paper-thin to ~1 in. thick below 124 ft (Bluejacket Sandstone).....	116.6	13.4
Total Depth		130.0

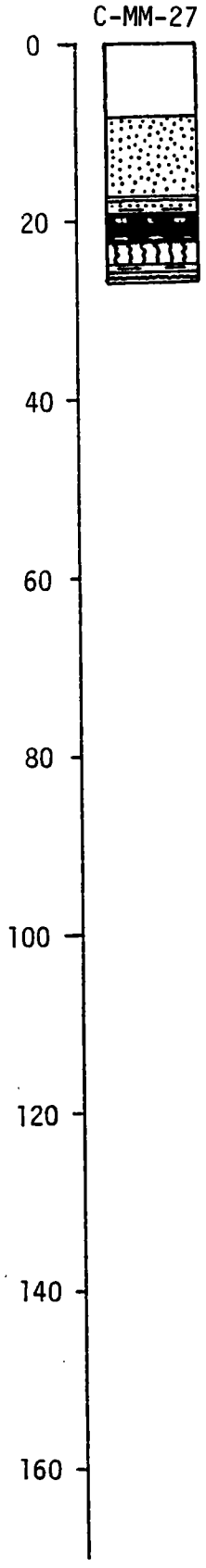


20 (C-MM-39)

SW¼NE¼NE¼NW¼NE¼ sec. 3, T. 11 N., R. 17 E., McIntosh County. Drilled in pasture just northwest from old abandoned strip pit 230 ft FNL and 1400 ft FEL. Surface elevation, estimated from topographic map, 603 ft.

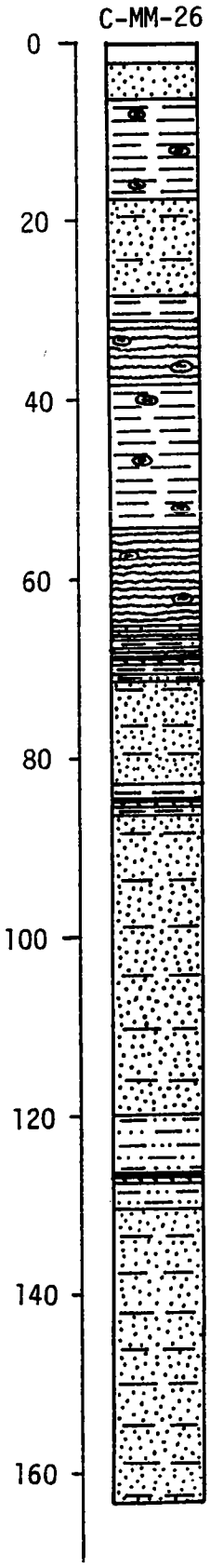
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-brown, silty, contains organic material	0.0	1.8
Sand, moderate-yellowish-brown, clayey, fine-grained	1.8	1.2
Sand, light-brown, clayey, very fine- to fine-grained	3.0	1.5
Clay, pale-yellowish-brown; highly sandy; weathered shale in lower part	4.5	1.5
Krebs Group		
Boggy Formation		
Shale, brownish-gray with moderate-reddish-orange mottling; includes a 1-in.-thick layer of oxidized clay-ironstone at base of unit	6.0	0.7
Shale, medium-dark-gray with moderate-reddish-orange oxidized clay-ironstone deposits on some stratification surfaces	6.7	2.9
Shale, black, brittle, noncalcareous, moderate-reddish-brown iron-oxide deposits on fracture surfaces; fossiliferous in lower 3 in	9.6	2.7
Limestone, dark-gray, impure, silty, highly fossiliferous, brachiopods and crinoids abundant (Inola Limestone)	12.3	1.0
Coal, black, friable, white calcite on cleat surfaces (Bluejacket coal)	13.3	0.1
Underclay, medium-light-gray, hard, blocky fracture, sandy; includes some minor grayish-black carbonaceous layers	13.4	2.0
Limestone, medium-dark-gray with dark-gray bands, impure, silty, shaly; calcareous shale in part; fossiliferous in some parts, broken shell fragments abundant	15.4	4.6
Shale and limestone, interbedded, dark-gray with medium-light-gray bands; limestone layers are fossiliferous	20.0	4.0
Coal, black, impure, shaly, white calcite on cleat surfaces (unnamed coal)	24.0	0.1
Limestone, medium-light-gray, impure, shaly and silty; contains streaks of black carbonaceous shale; contains unidentifiable marine fossils; wavy-bedded	24.1	0.4
Shale, medium-dark-gray with medium-light-gray		

bands, noncalcareous; includes some wavy-bedded, very fine-grained sandstone laminae.....	24.5	0.5
Shale, medium-dark-gray, noncalcareous.....	25.0	0.7
Coal, black, bright, moderately friable; contains some pyrite and black carbonaceous shale laminae (Peters Chapel coal).....	25.7	1.8
Shale, black, coaly; contains abundant layers of hard, bright coal and pyrite.....	27.5	2.2
Underclay, medium-dark-gray; contains abundant disseminated pyrite and black carbonized plant fragments.....	29.7	0.8
Shale, medium-dark-gray to dark-gray, silty, noncalcareous; interlaminated with very fine-grained sandstone in part, bioturbated in places, fractured.....	30.5	14.5
Total Depth		45.0



SE¼NW¼SW¼NW¼NE¼ sec. 3, T. 11 N., R. 17 E., McIntosh County. Drilled in pasture just west of old, small coal pit along bluff of Elk Creek 810 ft FNL and 2430 ft FEL. Surface elevation, estimated from topographic map, 615 ft.

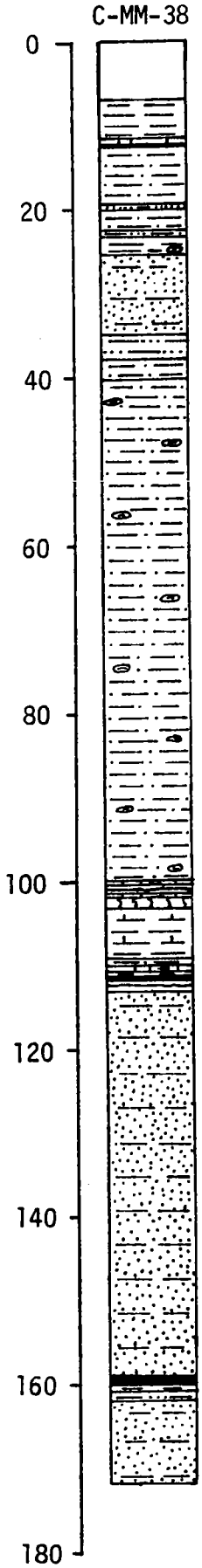
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown to grayish-brown, silty, contains organic material (soil).....	0.0	2.0
Clay, dark-yellowish-brown, sandy.....	2.0	6.0
Krebs Group		
Boggy Formation		
Shale, pale-yellowish-orange to dusky-yellowish-brown, banded, weathered.....	8.0	3.0
Sandstone, moderate-reddish-brown to moderate-brown, very fine-grained, indurated, noncalcareous, contains laminae of black macerated plant material, shaly in part; becomes light-gray with dark-gray bands at ~14 ft.....	11.0	6.0
Shale, black, soft, coaly.....	17.0	0.2
Underclay, dark-gray; includes abundant black carbonized plant material on stratification surfaces.....	17.2	0.3
Shale, medium-dark-gray.....	17.5	0.3
Sandstone, medium-dark-gray with medium-gray bands, interbedded with shale, very fine-grained, noncalcareous, wavy-laminated.....	17.8	1.2
Shale, dark-gray to grayish-black, highly carbonaceous.....	19.0	0.4
Coal, black, impure, contains several layers of pyrite up to 0.5 in. thick.....	19.4	0.5
Pyrite, metallic yellowish-black.....	19.9	0.1
Coal, black, bright, moderately friable (Peters Chapel coal).....	20.0	1.0
Coal, black, impure, includes a 0.5-in.-thick pyrite layer at top.....	21.0	1.1
Shale, grayish-black, very highly carbonaceous; contains some thin layers of coal and pyrite.....	22.1	1.2
Underclay, medium-dark-gray; contains black carbonized plant fragments.....	23.3	1.3
Shale, medium dark-gray, includes light-brownish-gray sideritic concretions.....	24.6	0.4
Shale, black, highly carbonaceous, coaly.....	25.0	1.5
Total Depth		26.5



NW¼NW¼NW¼SW¼NE¼ sec. 3, T. 11 N., R. 17 E., McIntosh County. Drilled in pasture on northwest side of farm pond 2560 ft FEL and 1370 ft FNL. Surface elevation, estimated from topographic map, 618 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, silty, unbedded; contains organic material (soil).....	0.0	2.0
Krebs Group		
Boggy Formation		
Sandstone, moderate-yellowish-brown to moderate-brown, clayey, soft, weathered.....	2.0	4.0
Shale, dark-yellowish-brown to grayish-brown to dusky-yellowish-brown with light-brown bands, weathered; includes clay-ironstone concretions 0.5-1 in. thick.....	6.0	11.5
Sandstone, dusky-yellowish-brown, very fine-grained, noncalcareous, wavy-laminated, shaly; includes black macerated plant material on stratification surfaces; becomes medium-light-gray with dark-gray bands at ~22 ft.....	17.5	10.5
Shale, medium-dark-gray.....	28.0	3.0
Shale, grayish-black, brittle, noncalcareous, fractured; includes light-brownish-gray sideritic concretions 0.5-1 in. in diameter.....	31.0	7.0
Shale, dark-gray, noncalcareous, fractured, slickensided; includes some light-brownish-gray sideritic concretions 0.25-1 in. thick.....	38.0	16.0
Shale, grayish-black, hard, brittle, noncalcareous; includes light-brownish-gray sideritic concretions ~0.5 in. thick.....	54.0	11.0
Limestone, light-brownish-gray, impure, silty, very hard; contains sand-filled fractures and burrows.....	65.0	0.2
Shale, black; contains some rare pyritized brachiopod shells.....	65.2	1.0
Shale, medium-dark-gray, highly silty, slickensided; contains black carbonized plant fragments.....	66.2	0.7
Shale, black, highly carbonaceous, coaly in lower half, flaky.....	66.9	0.5
Coal, black, impure, moderately friable; contains minor pyrite on stratification surfaces (Secor rider coal).....	67.4	0.4
Underclay, dark-gray, slickensided; contains thin stringer of coal.....	67.8	0.5
Shale, medium-dark-gray, silty; contains abundant black carbonized plant material.....	68.3	1.5

Siltstone, medium-dark-gray, shaly, noncalcareous, grades into underlying unit.....	69.8	1.2
Sandstone, medium-gray with light-gray laminae, very fine-grained, shaly, noncalcareous, cross-laminated, includes black carbonized plant fragments; bioturbated in part, silty in lower 1 ft...	71.0	11.3
Shale, dark-gray, silty, contains well-preserved black carbonized plant compressions.....	82.3	1.7
Coal, black, bright, friable, minor pyrite on cleat surfaces (Secor coal).....	84.0	0.5
Underclay, dark-gray; contains abundant black carbonized plant fragments.....	84.5	0.5
Shale, medium-dark-gray, silty; includes abundant black carbonized plant fragments.....	85.0	0.5
Sandstone, medium-gray with light-gray bands and laminae, very fine-grained, noncalcareous, shaly, cross-bedded, extensively bioturbated, wavy-laminated; includes light-brownish-gray sideritic concretions 0.5-1.5 in. thick; becomes light-gray with medium-dark-gray bands and laminae, and less shaly below 108 ft; contains rare black carbonized plant fragments in lower 10 ft.....	85.5	34.0
Siltstone, medium-dark-gray, shaly, noncalcareous; contains some thin laminae of very fine-grained sandstone; includes some light-brownish-gray sideritic concretions 1-1.5 in. thick in upper and lower 1 ft of unit; contains well-preserved black carbonized plant compressions.....	119.5	6.5
Coal, black, bright, friable (Lower Witteville? coal).....	126.0	0.3
Underclay, medium-dark-gray, shaly, slickensided....	126.3	0.2
Siltstone, medium-dark-gray, noncalcareous, shaly; contains black carbonized plant compressions and light-brownish-gray sandstone-filled burrows.....	126.5	3.5
Sandstone, medium-dark-gray with light-gray bands and laminae, very fine-grained, shaly, wavy-laminated, cross-bedded, bioturbated; contains black macerated plant material on stratification surfaces, noncalcareous; becomes predominantly light-gray and fine-grained from 150 to 163 ft....	130.0	33.0
Total Depth		163.0

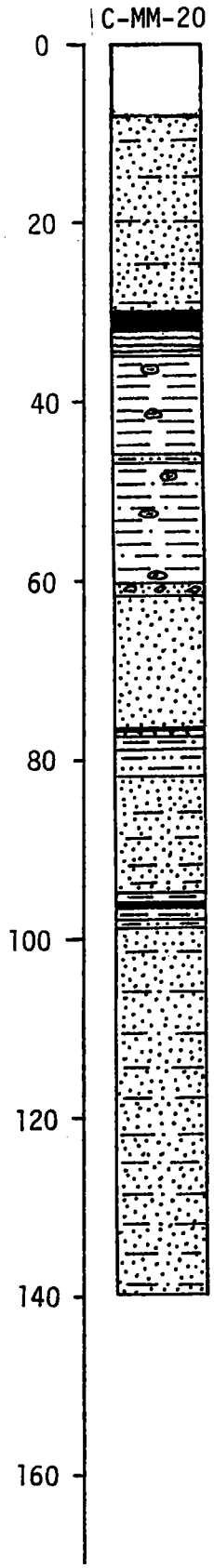


SW¼SE¼SE¼NE¼SE¼ sec. 3, T. 11 N., R. 17 E, McIntosh County. Drilled in pasture just north of small westward-flowing intermittent stream 300 ft FEL and 1380 ft FSL. Surface elevation, estimated from topographic map, 612 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, pale-yellowish-brown, clayey; contains organic matter.....	0.0	1.0
Clay, dark-yellowish-brown, soft; contains brownish-black and dark-reddish-brown gravel-sized clasts of weathered clay-ironstone.....	1.0	6.0
Krebs Group		
Boggy Formation		
Shale, grayish-orange and light-olive-gray, weathered; contains dark-yellowish-orange iron-oxide layers.....	7.0	4.5
Limestone, medium-dark-gray, highly weathered, impure, silty and sandy, fossiliferous, contains brachiopods and crinoids; weathers dark-yellowish-orange; crops out in creek bed 100 ft southeast from drill hole (Inola Limestone).....	11.5	0.5
Coal, brownish-black, smutty, highly weathered (Bluejacket coal).....	12.0	0.1
Shale, medium-gray with dark-yellowish-orange bands, silty, partly weathered.....	12.1	1.4
Shale, medium-gray, silty; includes some grayish-black bands ~0.5 in. thick.....	13.5	5.9
Sandstone, medium-gray, very fine-grained, silty, noncalcareous, cross-bedded, fractured.....	19.4	0.3
Shale, medium-gray, silty.....	19.7	2.7
Siltstone, dark-gray, pyritic.....	22.4	0.2
Shale, dark-gray to grayish-black, carbonaceous; contains well-preserved fossil plant impressions, predominantly seed-fern leaves; includes some burrows in bottom 18 in. and brownish-gray sideritic concretions in bottom 6 in.; contact with underlying unit sharp.....	22.6	2.8
Sandstone, light-gray with black streaks and bands, fine- to very fine-grained, shaly, pyritic, noncalcareous; includes some black carbonaceous shale laminae, some in bands up to 3 in. thick; also contains coalified plant fragments; grades into underlying unit.....	25.4	9.5
Siltstone, black with light-gray streaks, highly carbonaceous and shaly; includes some laminae of very fine-grained sandstone; wavy-bedded and cross-bedded in part.....	34.9	2.9

Shale, grayish-black, highly silty, pyritic, slickensided.....	37.8	2.2
Shale, dark-gray to grayish-black with light-brownish-gray bands, silty; contains abundant sideritic concretionary layers 0.25-2 in. thick; includes scattered calcareous marine shells and shell fragments from 48 to 52 ft; also includes pyrite-filled burrows, small pyritized shells and pyrite laminae from 52 to 54 ft; white calcite veins fill fractures in places; slickensided.....	40.0	59.3
Limestone, grayish-black, impure, shaly; contains abundant fossil shell fragments.....	99.3	0.1
Shale, black, weakly calcareous; contains fossil brachiopods.....	99.4	0.3
Limestone, grayish-black, impure, shaly; contains abundant fossil shell fragments.....	99.7	0.3
Underclay, medium-light-gray, silty, bioturbated; contains black carbonized plant fragments.....	100.0	1.9
Shale, grayish-black, contains sparse pyritized and calcareous shell fragments; weakly calcareous; abundant fossils from 106.5 to 107 ft; includes sparse well-preserved plant fossils.....	101.9	6.4
Shale, grayish-black with light-gray bands; includes a few 1/16-in.-thick coal stringers and wavy-bedded calcareous sandstone beds 0.25-0.5 in. thick; pyritic in part.....	108.3	1.0
Limestone, grayish-black with light-gray laminae, impure, shaly; contains abundant fossil hash.....	109.3	0.2
Shale, grayish-black; contains sparse calcareous shell fragments.....	109.5	0.3
Coal, black, moderately friable; contains pyritic nodules ~0.75 in. thick; includes a 1-in.-thick slickensided, brownish-black shale parting 3 in. from top of unit (Secor coal).....	109.8	0.4
Shale, brownish-black, hard, silty, includes sparse pyritized fossil shells; contains a 0.75-in.-thick layer of highly shaly, fossiliferous, black limestone 2 in. from top of unit.....	110.2	0.9
Shale, black, soft, flaky, noncalcareous.....	111.1	0.8
Sandstone; very light-gray with medium-light gray bands, very fine-grained, noncalcareous, cross-bedded, micaceous, intricately interlaminated with shale; contains sandstone-filled burrows, brecciated shaly sandstone clasts, truncated beds, and highly contorted slump features; includes black macerated plant material on stratification surfaces; becomes finer grained in lower 6 ft.....	111.9	45.8

Coal, black, bright, moderately friable; white calcite on cleat surfaces; contains some pyrite veins and small nodules (Lower Witteville? coal)..	157.7	0.6
Shale, grayish-black, coaly, slickensided, includes abundant black carbonized plant compressions; grades into underlying unit.....	158.3	0.3
Siltstone, medium-dark-gray, shaly, noncalcareous; includes some light-brownish-gray sideritic concretions ~1 in. thick, and well-preserved black carbonized plant fossils; grades into underlying unit.....	158.6	1.4
Sandstone, medium-gray, very fine-grained, highly silty and shaly, even-bedded, noncalcareous; includes several layers of light-brownish-gray sideritic concretions 0.5-1 in. thick; contains well-preserved, black carbonized plant fossils; seed-fern leaves abundant (Bluejacket Sandstone).....	160.0	10.0
Total Depth		170.0

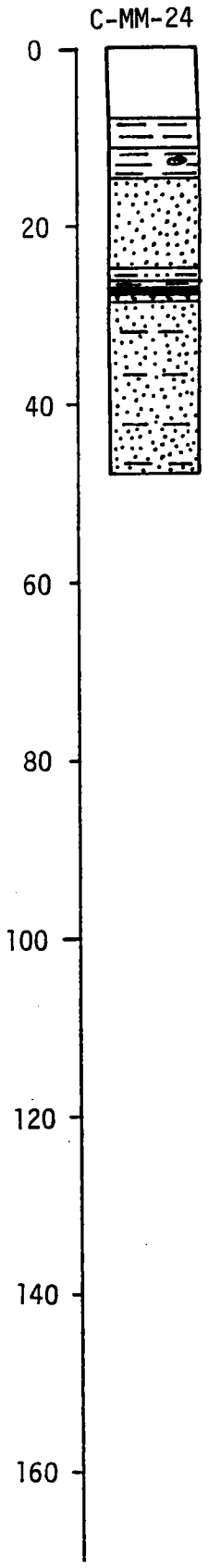


24 (C-MM-20)

NE¼NW¼NE¼NW¼SE¼ sec. 8, T. 11 N., R. 17 E., McIntosh County. Drilled just south of Elk Creek 2580 ft FSL and 1700 ft FEL. Surface elevation, estimated from topographic map, 626 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, grayish-brown to brownish-black, sandy, unbedded; contains abundant organic material (soil).....	0.0	3.0
Silt, dark-yellowish-brown to brownish-gray, sandy, unconsolidated.....	3.0	3.0
Silt, dark-yellowish-brown, clayey; contains some gravel-sized clasts of sandstone and ironstone....	6.0	2.0
Krebs Group		
Boggy Formation		
Sandstone, medium-dark-gray with medium-light-gray bands and streaks, very fine-grained; siltstone in large part, noncalcareous, wavy-laminated and cross-laminated; includes some dark-gray silty shale layers ~0.5 in. thick that are carbonaceous and pyritic; black carbonized plant fragments abundant in places on stratification surfaces; grayish-black and highly carbonaceous from 20.5 to 21.0 ft.....	8.0	22.0
Coal, black, bright, moderately friable, pyritic; includes pyrite layers from laminae to 0.5 in. thick (Peters Chapel coal).....	30.0	2.2
Shale, black, very highly carbonaceous; includes abundant thin stringers of coal, and pyrite layers up to 0.5 in. thick.....	32.2	1.0
Shale, black, carbonaceous; includes sparse thin stringers of coal.....	33.2	2.1
Shale, dark-gray to medium-gray, noncalcareous; includes light-brownish-gray sideritic concretions 1/8 to 1.5 in. thick.....	35.3	10.7
Siltstone, medium-dark-gray; includes abundant grains of very fine sand, noncalcareous, well-indurated.....	46.0	1.0
Shale, dark-gray, silty, noncalcareous; includes light-brownish-gray sideritic concretions 0.5-1 in. thick.....	47.0	13.3
Conglomerate, medium-light-gray, massive; contains rounded shale pebbles, coal streaks, and fragments of coal up to 1 in. long and 0.5 in. thick, matrix is coarse-grained sandstone.....	60.3	1.3
Sandstone, medium-light-gray, medium- to coarse-grained, massive, noncalcareous; contains		

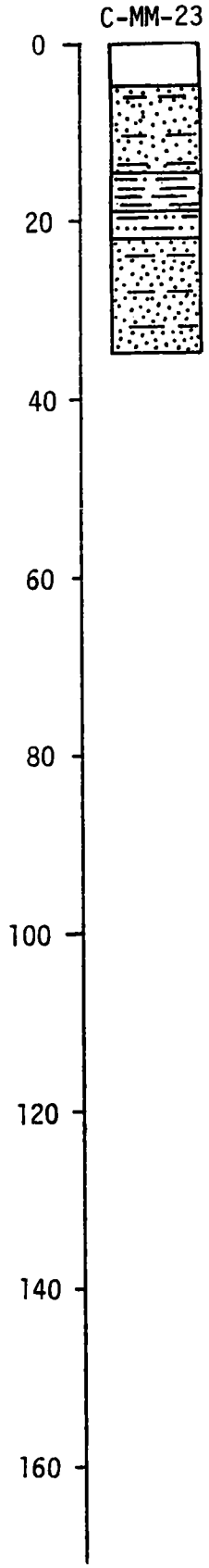
streaks, fragments, and lenses of coal up to 0.75 in. thick; includes some brownish-gray mottling and what appears to be transported chunks of peat; where visible, bedding is greatly disturbed and contorted.....	61.6	15.2
Coal, black, bright; contact with overlying unit irregular; sandstone and coal interfinger in part (Secor rider coal).....	76.8	0.2
Underclay, medium-gray, slickensided.....	77.0	0.3
Shale, medium-gray, silty, grades into underlying unit; contains black carbonized plant fragments...	77.3	2.0
Siltstone, medium-gray; includes some thin laminae of very fine-grained light-gray sandstone; grades into underlying unit, noncalcareous.....	79.3	2.7
Sandstone, medium-gray, very fine-grained, siltstone in part, laminated, noncalcareous; contains black carbonized plant fragments; becomes medium-dark-gray and shaly at 85 ft.....	82.0	13.0
Shale, dark-gray, carbonaceous; contains thin coal stringers in bottom 6 in. of unit.....	95.0	1.0
Coal, black, bright, moderately friable; minor pyrite crusts on stratification surfaces (Secor coal).....	96.0	0.8
Shale, dark-gray, silty; black carbonized plant fragments abundant on stratification surfaces; grades into underlying unit.....	96.8	1.2
Siltstone, medium-dark-gray, shaly; black carbonized plant fragments abundant on stratification surfaces; grades into underlying unit.....	98.0	1.0
Sandstone, medium-dark-gray with light-gray laminae, very fine-grained, silty, shaly, noncalcareous, micaceous; cross-laminated and wavy-bedded; black macerated plant material abundant; includes an 8-in.-thick, massive, fine-grained light-gray layer at 105 ft; contains sparse light-brownish-gray sideritic concretions about 1-2 in. thick.....	99.0	41.0
Total Depth		140.0



25 (C-MM-24)

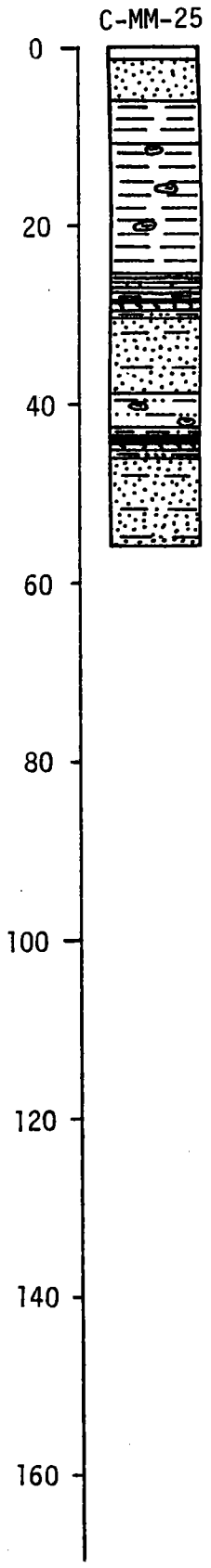
NE¼SE¼NW¼SW¼NW¼ sec. 19, T. 11 N., R. 17 E., McIntosh County. Drilled in pasture just east of new Highway 69, 1350 ft FNL and 420 ft FWL. Surface elevation, estimated from topographic map, 678 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, pale-yellowish-brown, very fine-grained, unconsolidated; contains organic material (soil)..	0.0	2.0
Silt, moderate-yellowish-brown, clayey; contains weathered fragments of dusky-brown ironstone concretions.....	2.0	6.0
Krebs Group		
Boggy Formation		
Shale, dark-yellowish-brown, clayey, weathered.....	8.0	3.5
Shale, grayish-orange with moderate-reddish-orange bands; contains dusky-brown ironstone concretions; weathered; becomes dark-yellowish-brown below 13 ft.....	11.5	3.5
Sandstone, medium-dark-gray with light-gray laminae, some moderate-brown streaks in upper 2 ft, very fine-grained, noncalcareous, well-indurated.....	15.0	10.1
Siltstone, medium-gray, shaly; black carbonized plant material on stratification surfaces.....	25.1	1.1
Shale, medium-dark-gray; grayish-black and highly carbonaceous in lower 1 in.....	26.2	0.4
Coal, black, bright, moderately friable, includes minor pyrite and white calcite on cleat surfaces (Lower Witteville? coal).....	26.6	0.8
Underclay, dark-gray to medium-gray; includes abundant black carbonized plant fragments.....	27.4	0.6
Sandstone, medium-light-gray with medium-dark-gray bands, very fine-grained, shaly, noncalcareous, wavy-laminated and cross-laminated in part; black carbonized plant fragments abundant on stratification surfaces.....	28.0	20.0
Total Depth		48.0



NE¼NE¼NE¼SW¼ sec. 19, T. 11 N., R. 17 E., McIntosh County. Drilled in pasture 1040 ft FSL and 1100 ft FWL. Surface elevation, estimated from topographic map, 675 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, pale-brown, very fine-grained, silty, unbedded; contains organic material (soil).....	0.0	2.0
Sand, light-brown, very fine-grained, silty; contains gravel-sized particles of moderate-reddish-brown sandstone.....	2.0	3.0
Krebs Group		
Boggy Formation		
Sandstone, grayish-orange to moderate-yellowish-brown, highly shaly, very fine-grained, soft, weathered.....	5.0	3.5
Sandstone, grayish-orange to pale-yellowish-brown with light-brown and dusky-red bands, shaly, very fine-grained, cross-laminated in part, contains ironstone concretions 0.5-1 in. thick, noncalcareous, weakly indurated, weathered.....	8.5	6.1
Shale, dark-yellowish-brown with light-brown bands, silty in upper 1 ft.....	14.6	4.4
Siltstone, pale-yellowish-brown to brownish-gray with light-brown bands, shaly; black macerated plant material on stratification surfaces; grades into underlying unit.....	19.0	3.0
Sandstone, medium-gray with light-brown bands in upper part, shaly, very fine-grained, laminated in part, noncalcareous.....	22.0	13.0
Total Depth		35.0

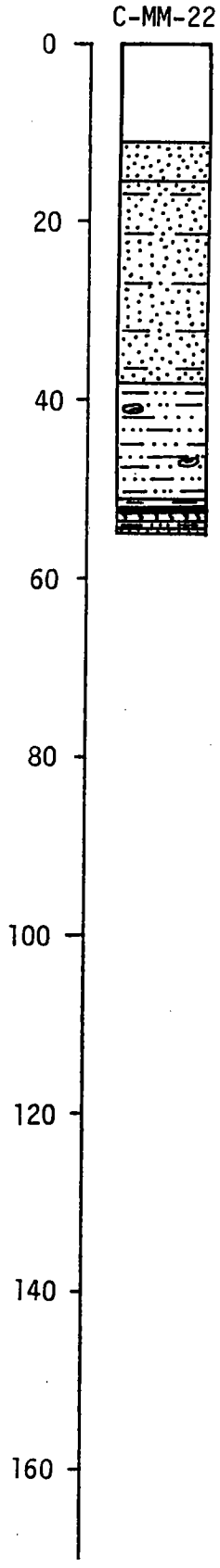


27 (C-MM-25)

SW¼NW¼SW¼SW¼SW¼ sec. 19, T. 11 N., R. 17 E., McIntosh County. Drilled in pasture 75 ft FWL and 564 ft FSL. Surface elevation, estimated from topographic map, 688 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown with light-brown streaks, silty, unbedded; contains organic material (soil).....	0.0	1.5
Krebs Group		
Boggy Formation		
Sandstone, moderate-reddish-orange, very fine-grained, noncalcareous, well-indurated.....	1.5	4.5
Shale, olive-gray, clayey; stained light-brown on stratification surfaces.....	6.0	5.0
Shale, grayish-black with light-brown to moderate-reddish-orange bands; includes oxidized sideritic concretions 0.5-1 in. thick.....	11.0	14.6
Shale, black, noncalcareous.....	25.6	0.2
Limestone, grayish-black, impure, shaly, hard; contains abundant broken fossil shell fragments...	25.8	0.2
Shale, black, brittle, noncalcareous; contains sparse pyritized and calcareous brachiopod shells; highly carbonaceous at contact with underlying unit.....	26.0	0.9
Shale, medium-gray, clayey.....	26.9	0.3
Coal, black, friable, pyrite and light-gray calcite on cleat surfaces (Secor rider coal).....	27.2	0.3
Underclay, medium-light-gray, gypsiferous, slickensided; contains black carbonized plant fragments..	27.5	0.8
Siltstone, medium-gray, gypsiferous; contains black carbonized plant fragments; grades into underlying unit.....	28.3	0.7
Sandstone, medium-light-gray with very light-gray laminae, shaly, very fine-grained, noncalcareous, cross-laminated and wavy-bedded.....	29.0	10.2
Siltstone, medium-gray, sandy in upper part, shaly in lower part, noncalcareous, includes some light-brownish-gray sideritic concretions; pyritic in places.....	39.2	3.6
Shale, medium-dark-gray, silty, carbonaceous in part; contains black carbonized plant fragments...	42.8	0.8
Coal, black, bright, friable; includes some pyrite on stratification surfaces (Secor coal).....	43.6	0.8
Underclay, medium-dark-gray; includes abundant black carbonized plant fragments.....	44.4	0.4
Siltstone, medium-gray, shaly, noncalcareous; black		

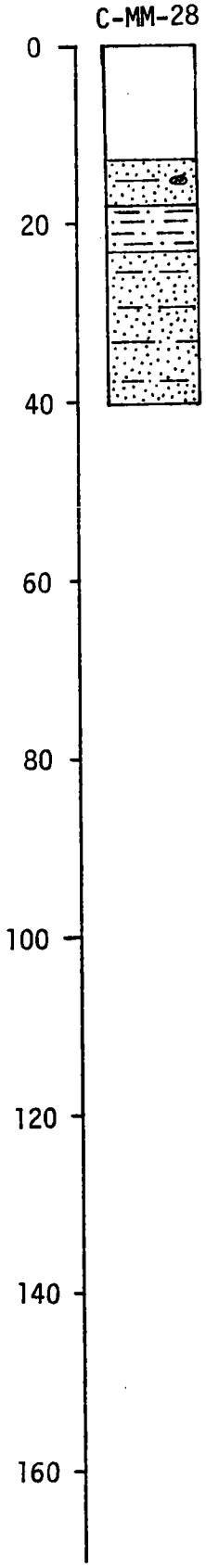
carbonized plant fragments abundant.....	44.8	0.7
Sandstone, medium-light-gray with medium-dark-gray bands, shaly, very fine-grained, noncalcareous, wavy-laminated and cross-laminated; micaceous; includes black macerated plant material on stratification surfaces.....	45.5	10.5
Total Depth		56.0



28 (C-MM-22)

NE¼NE¼SE¼SW¼SW¼ sec. 19, T. 11 N., R. 17 E., McIntosh County. Drilled just west of farm pond situated on west side of old Highway 69 in Onapa 1000 ft FWL and 500 ft FSL. Surface elevation, estimated from topographic map, 666 ft.

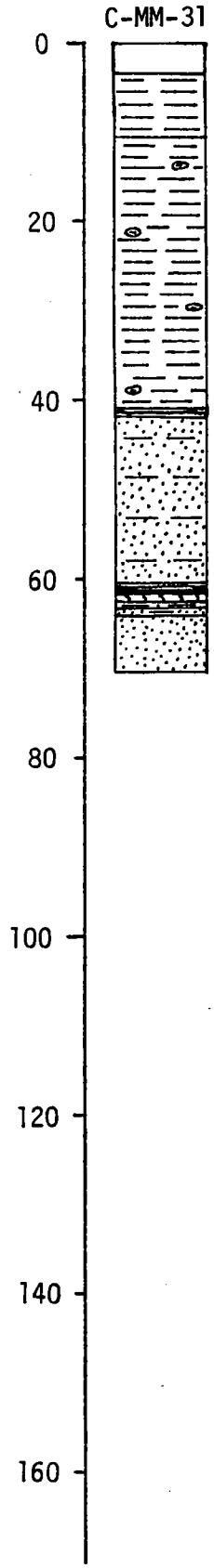
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, pale-yellowish-brown with light-brown mottling, unconsolidated; contains organic material (soil).....	0.0	1.8
Clay, grayish-orange, sandy, soft, weathered.....	1.8	3.2
Sand, moderate-yellowish-brown, soft, clayey; contains gravel-sized clasts of dark-reddish-brown sandstone, highly weathered.....	5.0	5.0
Clay, dark-yellowish-orange, pisolitic, highly weathered.....	10.0	1.0
Krebs Group		
Boggy Formation		
Sandstone, pale-yellowish-brown with dark-yellowish-orange bands, very fine-grained, fractured; contains abundant black carbonized plant fragments on stratification surface; wavy-laminated and cross-bedded in part.....	11.0	4.5
Sandstone, medium-light-gray with medium-dark-gray bands, shaly; very fine-grained, wavy-bedded and cross-laminated, bedding contorted in places, noncalcareous; black macerated plant material abundant on stratification surfaces; grades into underlying unit.....	15.5	22.5
Siltstone, medium-gray, shaly; contains abundant black macerated plant material on stratification surfaces; includes some light-brownish-gray sideritic concretions about 1-1.5 in. thick, and sparse laminae of very fine-grained light-gray sandstone.....	38.0	13.5
Shale, medium-dark-gray, black and coaly in lower 0.5 in. of unit.....	51.5	0.2
Coal, black, bright, moderately friable; minor white calcite and pyrite on cleat surfaces and stratification planes (Lower Witteville? coal)....	51.7	1.0
Sandstone, medium-gray, fine-grained; contains abundant black macerated plant fragments.....	52.7	0.1
Underclay, dark-gray; contains black carbonized plant fragments and coal streaks.....	52.8	0.6
Siltstone, medium-gray, shaly; laminated and bioturbated in part; grades into underlying unit.....	53.4	1.0
Sandstone, medium-light-gray, fine-grained, noncalcareous, massive; includes some black macerated plant material.....	54.4	0.6
Total Depth		55.0



29 (C-MM-28)

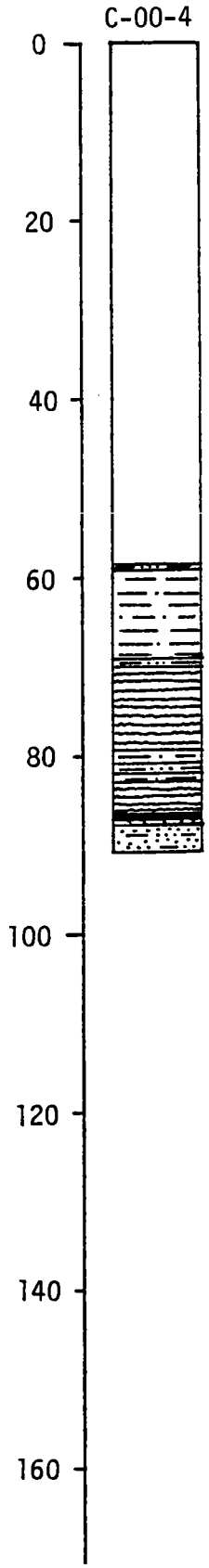
NW¼NE¼NW¼NE¼NW¼ sec. 18, T. 11 N., R. 18 E., McIntosh County. Drilled in pasture at north end of farm pond 1700 ft FWL and 60 ft FNL. Surface elevation, estimated from topographic map, 638 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Clay, brownish-gray, sandy; contains organic matter (soil).....	0.0	2.5
Clay, pale-yellowish-brown, silty, sandy, oxidized	2.5	5.5
Sand, grayish-orange; very fine-grained, with ~20% coarse-grained material; clayey, oxidized.....	8.0	5.0
Krebs Group		
McAlester Formation		
Sandstone, pale-yellowish-brown with grayish-orange bands, very fine-grained; interbedded with shale and clay-ironstone concretions; light-brownish-gray with grayish-black bands below 16 ft.....	13.0	5.0
Shale, grayish-black with light-brownish-gray bands, interbedded with very fine-grained sandstone laminae and layers up to 1.75 in. thick; includes some light-brownish-gray sideritic concretions.....	18.0	5.2
Sandstone, medium-light-gray with dark-gray bands, shaly, very fine-grained, wavy laminated and cross-bedded, noncalcareous; contains abundant black macerated plant material on stratification surfaces.....	23.2	16.8
Total Depth		40.0



NE¼NE¼NW¼NW¼SW¼ sec. 7, T. 11 N., R. 20 E., Muskogee County. Drilled in pasture at northwest edge of stock pond 2400 ft FSL and 575 ft FWL. Surface elevation, estimated from topographic map, 515 ft.

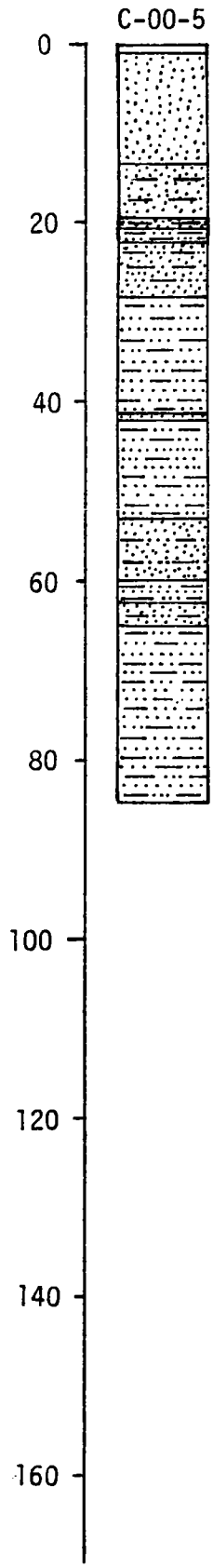
	Depth to unit top (ft)	Thickness of unit (ft)
Silt, moderate-brown, sandy, contains abundant organic material	0.0	2.0
Clay, moderate-yellowish-brown, sandy, weathered	2.0	1.5
Krebs Group		
McAlester Formation		
Shale, brownish-black with abundant dark-yellowish-orange streaks, noncalcareous; includes dark-reddish-brown iron-oxide deposits on stratification surfaces; weathered in part	3.5	4.5
Shale, brownish-black to dark-gray with minor dark-yellowish-orange banding, noncalcareous	8.0	2.3
Shale, medium-dark-gray to dark-gray, noncalcareous; includes a few light-brownish-gray sideritic concretions up to 1 in. thick; also includes a few 0.5- to 1-in.-thick bands of calcareous fossil shell fragments	10.3	9.7
Shale, dark-gray, noncalcareous; includes a few light-brownish-gray sideritic concretions up to 3 in. thick; contains small, thin lenses of pyrite	20.0	20.7
Shale, black, contains sparse calcareous fossil shell fragments	40.7	0.1
Sandstone, light-gray, interbedded with dark-gray shale, very fine-grained, noncalcareous, wavy-bedded, bioturbated in part	40.8	19.2
Shale, black, coaly, slickensided	60.0	0.2
Coal, black, bright, moderately friable (Keefton coal)	60.2	0.5
Underclay, dark-gray, contains compressed plant fragments and rootlet casts	60.7	0.7
Shale, medium-dark-gray, interlaminated with very fine-grained sandstone; grades into underlying unit	61.4	0.7
Sandstone, light-gray, very fine-grained, noncalcareous; interbedded with dark-gray shale	62.1	0.8
Sandstone, medium-light-gray, fine- to medium-grained, noncalcareous, cross-bedded; includes minor shale clasts (Warner Sandstone)	62.9	7.1
Total Depth		70.0



NW¼NW¼SE¼NW¼NE¼ sec. 5, T. 12 N., R. 13 E., Okmulgee County. Surface elevation, estimated from topographic map, 627 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-brown with reddish tones, very fine-grained, silty, unconsolidated; contains organic matter (soil).....	0.0	1.5
Sand, moderate-red, very fine-grained, clayey, unconsolidated; contains a minor amount of fine gravel.....	1.5	2.0
Clay, moderate-red, plastic; contains some sand and gravel streaks.....	3.5	4.5
Silt, moderate-red, highly clayey, soft.....	8.0	13.5
Clay, pale-reddish-brown, becomes light-brown at 25 ft, weathered, soft.....	21.5	8.5
Silt, moderate-red, coarse-grained; includes some clay and very fine sand.....	30.0	8.0
Silt, pale-reddish-brown, clayey; contains some very fine-grained sand.....	38.0	3.0
Silt, grayish-brown, clayey.....	41.0	2.0
Silt, light-gray; includes some very fine-grained sand.....	43.0	4.5
Peat, black and moderate-brown, soft, fibrous; includes some black lignitic material at base of unit.....	47.5	11.0
Sand, light-gray, poorly sorted, coarse, unconsolidated; contains abundant well-rounded clasts of quartz and white chert.....	58.5	0.5
Cabaniss Group		
Senora Formation		
Siltstone, light-bluish-gray, fine-grained, well-indurated.....	59.0	0.5
Shale, medium-gray, silty; contains well-preserved, black carbonized plant compressions and 1/16-in.-thick coal stringers at 63.4 and 69 ft.....	59.5	9.5
Siltstone, medium-gray, hard; contains abundant black carbonized plant fragments.....	69.0	0.3
Shale, olive-gray, silty; contains abundant black carbonized plant fragments.....	69.3	0.4
Shale, grayish-black, coaly; contains layers of coal 1/64-1/8 in. thick.....	69.7	1.8
Shale, dark-gray, highly carbonaceous; black carbonized plant compressions abundant on stratification surfaces.....	71.5	1.5
Shale, grayish-black; contains abundant black carbonized plant compressions and a 1-in.-thick		

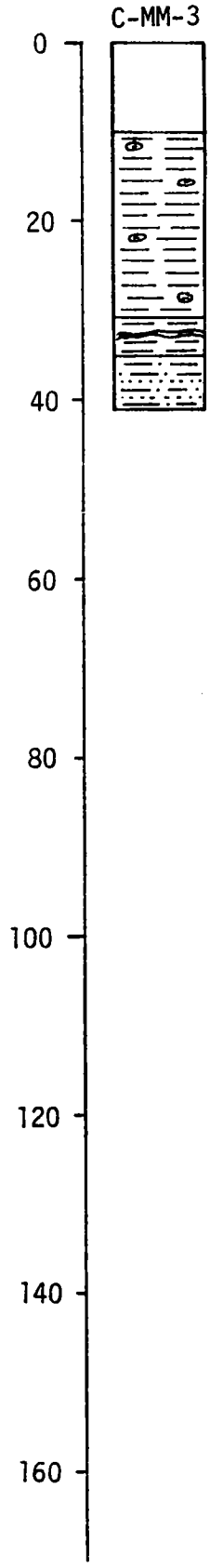
layer of shaly coal 6 in. from bottom of unit.....	73.0	2.0
Shale, dark-gray; contains abundant black carbonized plant compressions on stratification surfaces.....	75.0	4.5
Shale, medium-gray, silty, hard; contains black carbonized plant fragments.....	79.5	1.5
Siltstone, dark-gray, hard; contains sparsely distributed black carbonized plant compressions...	81.0	1.0
Shale, medium-gray; contains black carbonized plant compressions.....	82.0	1.1
Shale, grayish-black with black bands, very highly carbonaceous; contains several thin stringers of bright, hard coal 1/32 to 0.75 in. thick.....	83.1	3.2
Coal, black, bright, moderately friable, impure in upper 2 in.; contains white calcite on cleat surfaces as well as pyrite lenses and crusts (Croweburg coal).....	86.3	0.7
Underclay, dark-gray to black, hard, silty; contains abundant black carbonized plant fragments; grades into underlying unit.....	87.0	0.5
Sandstone, light-gray with dark-gray bands, very fine-grained, silty, cross-laminated, micaceous; soft-sediment deformation structures such as slump-and-flow features common; contains abundant macerated black plant fragments.....	87.5	3.5
Total Depth		91.0



NE¼SE¼SE¼SE¼ sec. 17, T. 12 N., R. 14 E., Okmulgee County. Surface elevation, estimated from topographic map, 650 ft.

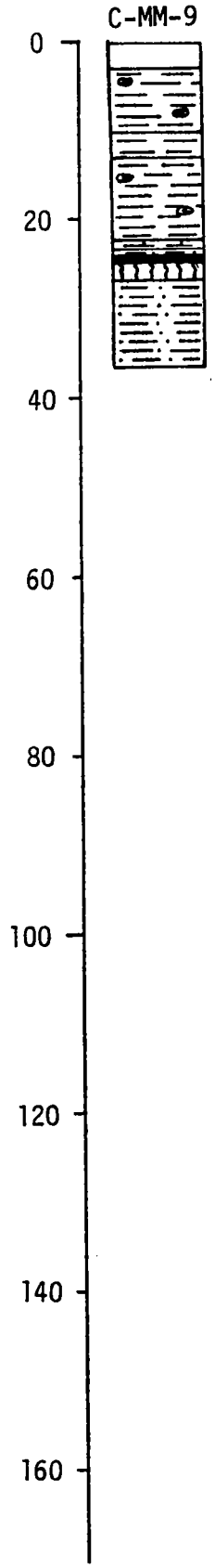
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, grayish-brown, very fine-grained, silty; contains abundant organic material; includes angular clasts of moderate-yellowish-brown sandstone up to cobble size (soil).....	0.0	1.0
Cabaniss Group		
Senora Formation		
Sandstone, moderate-reddish-brown, weathered, very fine- to fine-grained, noncalcareous, friable.....	1.0	12.5
Sandstone, moderate-yellowish-brown, weathered, very fine-grained, silty, noncalcareous, moderately friable.....	13.5	6.0
Sandstone, dark-yellowish-brown, slightly weathered, very fine-grained, silty, clayey.....	19.5	1.0
Siltstone, light-olive-gray, sandy.....	20.5	0.5
Siltstone, medium-gray, well-indurated, sandy; includes some black macerated plant fragments on stratification surfaces.....	21.0	1.0
Sandstone, light-gray, very fine-grained, micaceous; intricately interbedded and interlaminated with dark-gray shaly siltstone and silty shale, cross-laminated; black carbonized plant fragments abundant on stratification surfaces; cut-and-fill features common.....	22.0	6.0
Siltstone, dark-gray, micaceous, shaly in part; contains abundant black macerated, carbonized plant material; intricately interbedded and interlaminated with light-gray, very fine-grained, micaceous sandstone.....	28.0	13.0
Sandstone, light-gray, very fine- to fine-grained, well-indurated, micaceous; includes black carbonized plant fragments on stratification surfaces...	41.0	0.2
Siltstone, dark-gray, micaceous, shaly in part; contains abundant black macerated, carbonized plant material; intricately interbedded and interlaminated with light-gray, very fine-grained, micaceous sandstone.....	41.2	11.5
Sandstone, light-gray, very fine- to fine-grained, micaceous; includes abundant black carbonized plant fragments on stratification surfaces; intricately interbedded and interlaminated with dark-gray, shaly, carbonaceous, micaceous siltstone; even-bedded sandstone units 0.5-4		

in. thick occur at repeated intervals between interlaminated siltstone and sandstone units.....	52.7	6.8
Siltstone, dark-gray, micaceous; contains abundant black carbonized plant fragments; intricately interlaminated and cross-laminated with light-gray, very fine-grained sandstone.....	59.5	2.5
Sandstone, very fine- to fine-grained, micaceous; includes abundant black carbonized plant fragments on stratification surfaces; intricately interbedded and interlaminated with dark-gray, shaly, micaceous siltstone; even-bedded sandstone units 0.5-3 in. thick occur at regular intervals between interlaminated and cross-laminated siltstone and sandstone units.....	62.0	2.4
Siltstone, dark-gray, well-indurated, shaly; contains a few black carbonized plant fragments in upper part of interval; interlaminated with thin laminae of light-gray, very fine-grained sandstone that occasionally widen to form 1/16- to 1/8-in.-thick lenses ~1 in. long.....	64.4	19.6
Total Depth		84.0



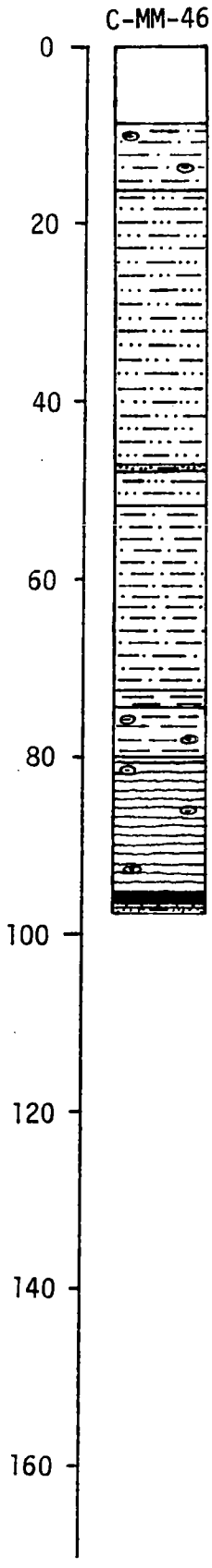
SW¼NW¼SE¼SW¼SE¼ sec. 10, T. 12 N., R. 14 E., McIntosh County. Surface elevation, estimated from topographic map, 684 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, grayish-brown; contains abundant organic material (soil).....	0.0	1.8
Clay, moderate-yellowish-brown, color changes to dusky-yellow at 8 ft, silty; mottled with moderate-reddish-orange spots in upper 2 ft.....	1.8	8.2
Cabaniss Group		
Senora Formation		
Shale, yellowish-gray, moderately weathered, clayey; includes some moderate-reddish-brown ironstone concretions.....	10.0	3.0
Shale, medium- to light-gray, clayey; includes numerous bands of moderate-reddish-orange and dusky-red ironstone concretions.....	13.0	7.0
Shale, olive-gray to medium-gray with moderate-yellowish-brown clay-ironstone concretions 0.5-1 in. thick.....	20.0	10.5
Shale, medium-gray to dark-gray; includes black carbonaceous plant fragments on stratification surfaces; contains several hard, medium-light-gray siderite layers 0.5-1 in. thick.....	30.5	4.5
Shale, grayish-black, silty; interbedded with light-gray, very fine-grained, even-bedded sandstone layers ~1 in. thick irregularly spaced throughout the unit.....	35.0	5.5
Total Depth		40.5



SE¼SE¼SW¼SE¼ sec. 10, T. 12 N., R. 14 E., McIntosh County. Surface elevation, estimated from topographic map, 681 ft.

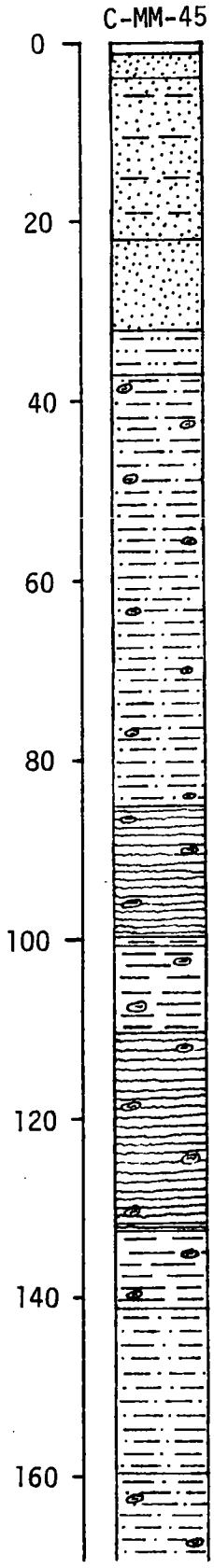
	Depth to unit top (ft)	Thickness of unit (ft)
Silt, pale-yellowish-brown, sandy; contains abundant organic material (soil).....	0.0	1.5
Sand, moderate-brown, silty, well-rounded.....	1.5	1.5
Cabaniss Group		
Senora Formation		
Shale, moderate-brown; contains black and dark-reddish-brown gravel-sized particles of weathered clay-ironstone.....	3.0	3.0
Shale, dark-yellowish-brown, contains brownish-black fragments of ironstone.....	6.0	4.0
Shale, pale-yellowish-brown, clayey, soft, weathered.....	10.0	3.0
Shale, light-olive-gray to olive-gray; contains dark-reddish-brown ironstone concretions ~1 in. in diameter and layers of ironstone ~0.5 in. thick.....	13.0	9.0
Shale, brownish-gray, sandy, very highly calcareous, weakly indurated, feels gritty.....	22.0	0.6
Shale, brownish-gray; sandy; noncalcareous, highly gypsiferous; contains some poorly preserved fossil shells; feels gritty.....	22.6	0.4
Coal, black, moderately friable; light-brown and white gypsum on stratification surfaces (Mineral [Eram] coal).....	23.0	1.0
Underclay, dark-gray, slickensided; contains abundant black carbonized plant fragments.....	24.0	2.3
Shale, medium-dark-gray with medium-gray bands, silty; contains some small lenses of pyrite and abundant black carbonized plant fossils.....	26.3	9.7
Total Depth		36.0



NW¼NW¼NW¼NW¼ sec. 1, T. 12 N., R. 16 E., McIntosh County. Drilled in pasture 40 ft FNL and 2600 ft FEL. Surface elevation, estimated from topographic map, 622 ft.

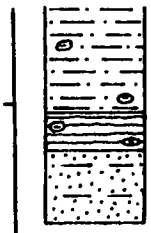
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, grayish-brown, very fine-grained, silty, contains organic material.....	0.0	1.0
Clay, dark-yellowish-brown, gravelly; contains rounded clasts of very fine-grained ferruginous sandstone.....	1.0	7.5
Krebs Group		
Boggy Formation		
Shale, dusky-yellow to light-olive-gray with light-brown bands, silty, noncalcareous; contains weathered clay-ironstone concretions occurring in layers ~0.5 in. thick.....	8.5	3.4
Shale, dusky-yellowish-brown, silty, hard, fractured; contains light-brown layers of clay-ironstone concretions 1/8 to 0.5 in. thick; includes white calcite deposits on some stratification surfaces and in fractures.....	11.9	4.1
Siltstone, medium-dark-gray, shaly; contains small spheroidal pyrite masses ~1/8 in. in diameter, and minor calcite on stratification surfaces; includes sparse laminae of very fine-grained sandstone as well as some small bioturbation features.....	16.0	30.2
Sandstone, medium-gray and light-gray, very fine-grained, shaly, micaceous, noncalcareous, bedding highly contorted; soft-sediment slump features abundant.....	46.2	0.7
Siltstone, medium-dark-gray, shaly, includes sparse laminae of very fine-grained sandstone, bioturbated.....	46.9	4.1
Shale, medium-dark-gray, silty, noncalcareous; includes sparse laminae of very fine-grained sandstone; contains some partially pyritized burrow fillings in upper 10 ft and calcareous brachiopod fossils in lower 3.5 ft of unit.....	51.0	20.5
Shale, dark-gray to grayish-black, contains abundant pyrite-filled burrows ~3/8 in. thick and up to 2 in. long; includes calcareous brachiopod fossils and white calcite on stratification surfaces in lower 5 in. of unit.....	71.5	1.9
Shale, grayish-black, contains abundant white calcareous brachiopod shells; includes several		

light-brownish-gray sideritic concretions 0.5-2.5 in. thick.....	73.4	5.6
Shale, grayish-black to black, hard; contains minor white calcite along fracture surfaces; includes some light-brownish-gray sideritic concretions 0.5-1 in. thick; fossil brachiopod shells sparsely distributed from 90 to 92 ft; highly carbonaceous and coaly with pyrite crusts in bottom 1 in. of unit.....	79.0	15.0
Coal, black, bright, moderately friable; contains white calcite veinlets and pyritic laminae; includes a 0.5-in.-thick, dark-gray shale parting 4 in. above bottom of unit (Wainwright coal).....	94.0	1.3
Underclay, dark-gray, burrowed, slickensided.....	95.3	0.3
Sandstone, medium-gray and light-gray, very fine-grained; wavy-bedded, shaly and bioturbated in upper 2 in.; fine-grained and massive in lower part with black macerated plant fragments abundant.....	95.6	0.6
Total Depth		96.2

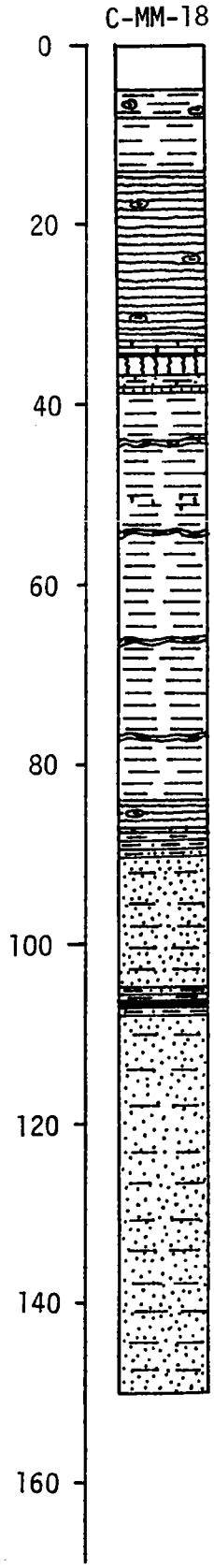


SW¼NE¼NE¼SE¼SE¼ sec. 11, T. 12 N., R. 16 E., McIntosh County. Drilled in pasture at west edge of small farm pond 156 ft FEL and 1140 ft FSL. Surface elevation, estimated from topographic map, 700 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-reddish-brown, silty, unconsolidated, contains organic material.....	0.0	1.5
Krebs Group		
Boggy Formation		
Sandstone, dark-yellowish-orange and moderate-reddish-brown, very fine-grained, clayey, highly broken and weathered.....	1.5	2.5
Sandstone, moderate-yellowish-brown, very fine-grained, well-indurated.....	4.0	4.5
Sandstone, pale-yellowish-brown with moderate-brown bands; very fine-grained, shaly, noncalcareous, cross-laminated, partly weathered.....	8.5	3.0
Sandstone, light-gray and medium-dark-gray, interlaminated with shale, very fine-grained, noncalcareous, cross-laminated, bioturbated; contains abundant black macerated plant fragments on stratification surfaces.....	11.5	10.5
Sandstone, medium-dark-gray with sparse light-gray laminations, very fine-grained, noncalcareous, cross-laminated; contains abundant black macerated plant fragments on stratification surfaces; grades into underlying unit.....	22.0	10.0
Siltstone, medium-dark-gray, shaly, micaceous, noncalcareous, includes sparse laminae of light-gray, very fine-grained sandstone; grades into underlying unit.....	32.0	5.0
Shale, medium-dark-gray, noncalcareous, silty; contains light-brownish-gray sideritic concretions ~0.5 in. thick; minor pyrite on stratification surfaces; includes some medium-dark-gray siltstone containing sparse laminae of light-gray, very fine-grained sandstone; slickensided in places.....	37.0	47.5
Shale, black; includes some light-brownish-gray sideritic concretions ~0.5 in. thick.....	84.5	2.5
Shale, black, calcareous, hard, brittle; includes sparse white calcite laminae and fossil shells; contains some minor pyrite and pyritized brachiopod shells; includes light-brownish-gray sideritic concretions ~1 in. thick that are pyritic in part; slickensided.....	87.0	12.2



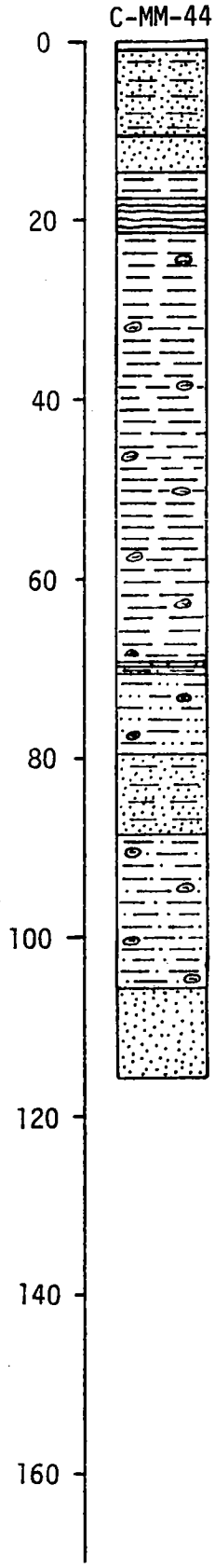
Shale, medium-dark-gray, soft, noncalcareous, bioturbated; contains some pyrite-filled burrows and pyritized shells in upper 6 in. of unit.....	99.2	0.8
Shale, grayish-black, fractured, noncalcareous; contains light-brownish-gray sideritic concretions up to 2 in. thick; includes white calcite on fracture surfaces, in fossil shells, and in sideritic concretions.....	100.0	9.7
Shale, black to grayish-black, noncalcareous, hard, brittle, contains sparse veinlets of white calcite; includes abundant light-brownish-gray sideritic concretions about 1/8 to 1 in. thick; fractured, slickensided.....	109.7	21.0
Shale, black, noncalcareous; contains abundant discontinuous laminae of pyrite and some small pyritized brachiopod shells.....	130.7	0.3
Shale, medium-gray with medium-light-gray and light-brownish-gray bands, laminated, noncalcareous; contains some pyritized brachiopods and sideritic concretions 1/8 to 0.5 in. thick.....	131.0	9.0
Shale, dark-gray to grayish-black, hard, noncalcareous, includes some light-brownish-gray silty laminae, bioturbated in part, slickensided; contains sparsely distributed brachiopod fossils and rare pyritized burrows; pyrite-filled burrows abundant from 154.7 to 155 ft and from 157.5 to 158 ft.....	140.0	18.0
Shale, medium-gray to medium-dark-gray, hard, silty, obscurely cross-laminated, noncalcareous; bioturbated; includes rare pyrite-filled burrows; contains light-gray sideritic concretions up to 2 in. thick.....	158.0	20.5
Shale, black to dark-gray, hard, brittle, weakly calcareous; contains some small pyritized burrows and medium-gray sideritic concretions up to 2 in. thick.....	178.5	3.8
Sandstone, medium-dark-gray and light-gray, very fine-grained, shaly, noncalcareous, cross-laminated to wavy-laminated in part; soft-sediment deformation features common; bioturbated in places; contains abundant black carbonized plant fragments.....	182.3	7.7
Total Depth		190.0



NW¼NE¼SW¼SW¼NW¼ sec. 16, T. 12 N., R. 17 E., McIntosh County. Drilled at east edge of small pond on hill south of old barn 400 ft FWL and 2400 ft FNL. Surface elevation, estimated from topographic map, 583 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, dark-yellowish-brown, clayey, unbedded; contains organic material (soil).....	0.0	2.0
Clay, light-brown, highly sandy, soft; contains some subangular coarse gravel consisting predominantly of sandstone.....	2.0	3.0
Krebs Group		
Boggy Formation		
Shale, dark-yellowish-brown; contains fragments of moderate-reddish-brown ironstone, weathered.....	5.0	1.5
Shale, medium-dark-gray to dark-gray with dark-yellowish-brown mottling; contains fragments of moderate-reddish-brown ironstone, partially weathered.....	6.5	1.5
Shale, grayish-black with light-brown to moderate-reddish-brown staining on stratification surfaces.....	8.0	6.0
Shale, grayish-black to black, hard, brittle; contains sparse white calcitic fossil shell fragments and some light-brownish-gray sideritic concretions ~1 in. thick.....	14.0	19.0
Limestone, medium-gray to medium-dark-gray, impure, shaly, highly fossiliferous, brachiopod shell fragments abundant (Inola Limestone).....	33.0	1.1
Coal, black, bright, moderately friable; pyrite and white calcite on cleat surfaces; includes a highly carbonaceous, coaly, calcareous shale in upper 0.5 in. of unit (Bluejacket coal).....	34.1	0.2
Underclay, very light-gray, bedding obscure or absent, feels soapy; grades into underlying unit..	34.3	2.5
Shale, medium-gray, sandy, bedding obscure.....	36.8	1.2
Sandstone, medium-gray, massive, very hard; very fine-grained; contains disseminated pyrite.....	38.0	0.2
Shale, dark-gray to grayish-black, brittle; includes some 0.5- to 2-in.-thick light-brownish-gray sideritic concretionary layers; calcareous from 50.5 to 52 ft, with sparse white fossil shell fragments included; contains some pyrite nodules up to 1 in. in diameter.....	38.2	45.8
Shale, black, includes some 0.5- to 2.5-in.-thick sideritic concretions; contains sparse, white calcareous fossil shell fragments in lower 1 ft		

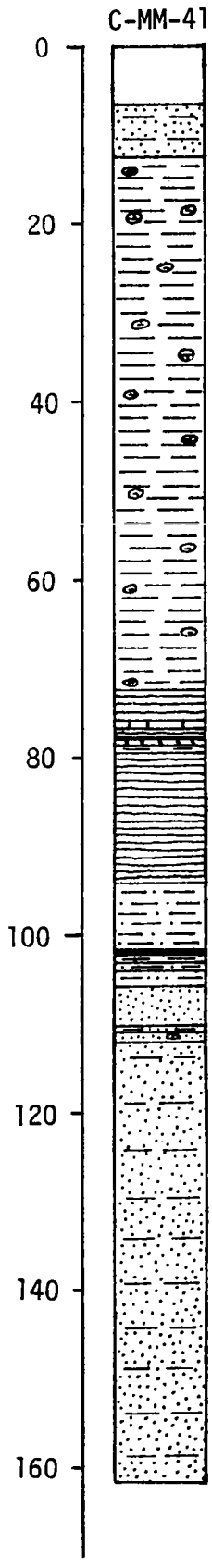
of unit.....	84.0	3.3
Limestone, dark-gray, impure, shaly; contains abundant fossil hash.....	87.3	0.2
Shale, black to grayish-black, noncalcareous; white calcite deposits included in veinlets; silty in lower 1 in.....	87.5	0.3
Shale, medium-dark-gray, silty, noncalcareous, slickensided; grades into underlying unit.....	87.8	0.7
Siltstone, medium-light-gray, shaly, noncalcareous; contains abundant black carbonized plant fossils in lower part.....	88.5	1.1
Sandstone, light-gray, medium-gray in part, silty, very fine-grained; contains abundant black carbonized plant fossils; micaceous, noncalcareous, wavy-laminated in part, bedding contorted in places; cross-bedded; plant fossils well-preserved in bottom 2 ft of unit, seed-fern leaves abundant.....	89.6	15.4
Siltstone, medium-gray, shaly; contains well-preserved, black carbonized plant fossils and streaks of coal.....	105.0	0.5
Shale, black, coaly.....	105.5	0.1
Coal, black, bright, very friable; includes some pyrite and minor white calcite on cleat surfaces (Secor coal).....	105.6	0.8
Shale, dark-gray, silty in lower part; contains coal streaks and abundant black carbonized plant material.....	106.4	0.5
Sandstone, medium-gray to dark-gray with light-gray bands, very fine-grained, silty, shaly, micaceous, wavy-laminated, noncalcareous, bedding contorted in part; contains black carbonized plant fragments, cross-bedded in places; includes some light-brownish-gray concretions up to 1 in. in diameter; contains massive beds of fine-grained sandstone 18-24 in. thick.....	106.9	43.1
Total Depth		150.0



SW¼NE¼NE¼SE¼SW¼ sec. 23, T. 12 N., R. 17 E., McIntosh County. Drilled in meadow at high point on bluff overlooking tributary of Elk Creek 2400 ft FWL and 1040 ft FSL. Surface elevation, estimated from topographic map, 642 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-reddish-brown, very fine-grained, silty; contains organic material.....	0.0	0.8
Krebs Group		
Boggy Formation		
Sandstone, moderate-reddish-brown, clayey, very fine-grained, weathered.....	0.8	2.2
Sandstone, dark-yellowish-orange to grayish-orange to pale-yellowish-brown, very fine-grained, clayey, well-indurated.....	3.0	6.0
Sandstone, pale-yellowish-brown streaked with moderate-reddish-orange, very fine-grained, interbedded with very pale-orange to grayish-orange clay, weathered.....	9.0	1.4
Sandstone, moderate-reddish-brown, fine- to medium-grained, noncalcareous, cross-bedded, oxidized....	10.4	4.1
Shale, grayish-orange to medium-gray, soft, clayey..	14.5	3.2
Shale, black with light-brown bands; iron-oxide deposits on stratification surfaces and in fractures.....	17.7	4.0
Shale, dark-gray to grayish-black; includes some light-brownish-gray sideritic concretions up to 2 in. thick; contains minor pyrite; fractured, slickensided.....	21.7	38.3
Shale, dark-gray, noncalcareous; includes some medium-light-gray sideritic concretions up to 1.5 in. thick; slickensided.....	60.0	9.0
Limestone, medium-dark-gray, impure, silty, fossiliferous, broken shell fragments abundant.....	69.0	0.1
Shale, dark-gray, silty; includes thin layers of white calcite on some stratification surfaces.....	69.1	0.1
Siltstone, medium-dark-gray, shaly, noncalcareous, contains well-preserved black carbonized plant fossils on stratification surfaces; includes light-brownish-gray sideritic concretions up to 1 in. thick, slickensided.....	69.2	10.0
Sandstone, light-gray with medium-gray-bands, very fine-grained, shaly, micaceous, noncalcareous, cross-laminated, contains black macerated plant fragments.....	79.2	0.8
Sandstone, medium-gray with sparse light-gray bands and laminae, very fine-grained, shaly,		

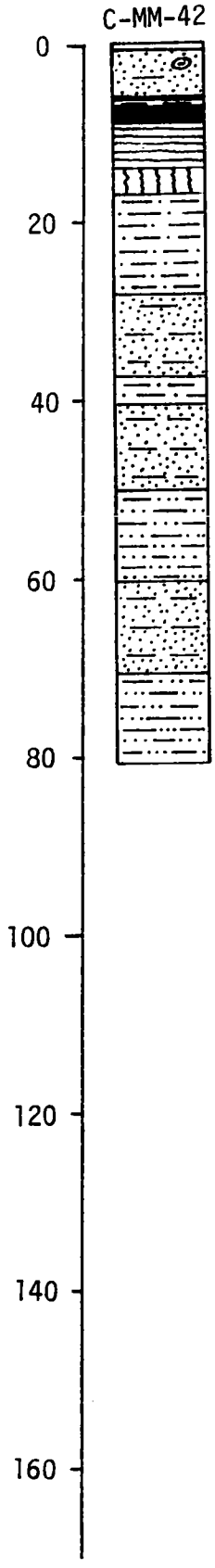
micaceous, noncalcareous, wavy-laminated; contains sparse black carbonized plant fossils.....	80.0	4.2
Sandstone, light-gray and medium-gray, shaly, very fine-grained, micaceous, noncalcareous, cross-laminated in part; includes sedimentary slump features; contains black macerated plant fragments.....	84.2	3.8
Sandstone, medium-gray with light-gray laminae, very fine-grained, micaceous, noncalcareous, uniformly stratified; includes a few bioturbation features; contains sparse black carbonized plant fragments; grades into underlying unit.....	88.0	17.2
Shale, dark-gray, sandy, silty, noncalcareous; contains light-brownish-gray siderite-filled burrows and sideritic concretions up to 1.5 in. thick; slickensided; includes sparse black carbonized plant compressions.....	105.2	5.7
Sandstone, light-gray with dark-gray bands and laminae, very fine- to fine-grained, noncalcareous; micaceous, bedding contorted, cross-bedded in part; includes abundant black macerated plant fragments (Bluejacket Sandstone).....	110.9	4.1
Total Depth		115.0



NW¼SE¼NW¼NW¼NW¼ sec. 25, T. 12 N., R. 17 E., McIntosh County. Drilled in pasture at northwest corner of farm pond 450 ft FNL and 465 ft FWL. Surface elevation, estimated from topographic map, 661 ft.

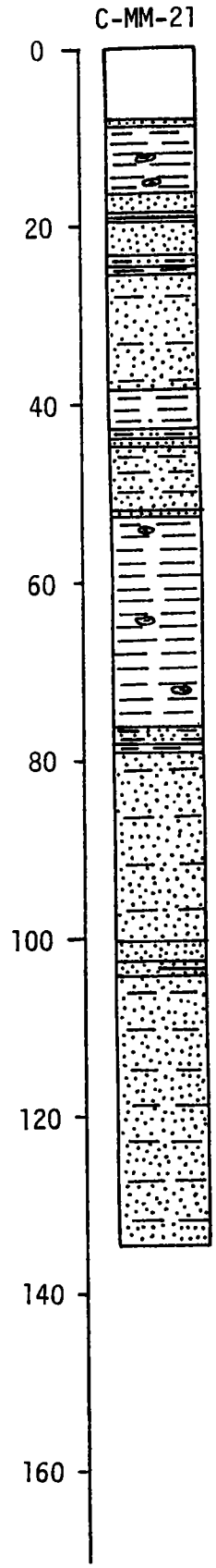
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, grayish-brown, very fine-grained, silty; contains organic material	0.0	1.5
Sand, pale-brown, very fine-grained, clayey	1.5	1.0
Clay, moderate-orange-pink to moderate-reddish-brown, sandy; contains gravel-sized clasts of sandstone	2.5	4.0
Krebs Group		
Boggy Formation		
Sandstone, moderate-reddish-brown, very fine-grained, shaly, bioturbated; oxidized; becomes grayish-orange at 11 ft	6.5	6.0
Shale, grayish-black to dark-gray with moderate-yellowish-brown ironstone concretionary bands; color of bands changes to light-brownish-gray below 20 ft; some pyrite crusts on stratification surfaces; fractured, slickensided; includes rare limestone nodules about 1-1.5 in. in diameter; contains white calcite veinlets and possible shell fragments from 21 to 22.6 ft; 1- to 2-in.-thick sideritic concretions abundant below 25 ft	12.5	59.5
Shale, grayish-black to black; contains scattered, well-preserved white fossil shells and shell fragments	72.0	3.8
Limestone, dark-gray, impure, shaly, highly fossiliferous, brachiopods abundant	75.8	0.2
Shale, black; includes white calcite on some stratification surfaces	76.0	0.4
Coal, black, moderately friable; white calcite on stratification surfaces (Secor rider coal)	76.4	0.1
Underclay, medium-light-gray, silty, extensively burrowed; contains black carbonaceous material	76.5	0.4
Shale, medium-gray, wavy-bedded, burrowed	76.9	0.8
Shale, black; contains pyrite-filled burrows, pyritized and calcareous brachiopods; white calcite on some stratification surfaces; calcareous below 83 ft; silty in part	77.7	15.8
Shale, grayish-black, silty, hard, burrowed; contains numerous thin strata filled with very fine-grained, light-gray calcareous sandstone; pyrite abundant	93.5	7.6

Coal, black, bright, moderately friable; contains thin lenses and laminae of pyrite; calcite on cleat surfaces (Secor coal).....	101.1	0.5
Shale, grayish-black, coaly.....	101.6	0.2
Shale, medium-gray, silty at base of unit.....	101.8	0.2
Siltstone, medium-light-gray, shaly, wavily interlaminated with very fine-grained sandstone, noncalcareous; contains some filled burrows; slump structures abundant.....	102.0	2.9
Sandstone, light-gray, fine-grained, micaceous, noncalcareous; includes abundant black macerated plant material on stratification surfaces; wavy-laminated in part.....	104.9	4.4
Siltstone, light-brownish-gray, sandy, shaly, hard, noncalcareous.....	109.3	0.3
Sandstone, fine- to medium-grained, micaceous, noncalcareous; black macerated plant material abundant on stratification surfaces; wavy-laminated in part; includes rare light-brownish-gray sideritic concretions 0.5-0.75 in. thick (Bluejacket Sandstone).....	109.6	1.3
Sandstone, medium-dark-gray with light-gray wavy bands, very fine-grained, shaly, noncalcareous, micaceous; includes abundant black macerated plant material and some bioturbation features; fine- to very fine-grained and light-gray with medium-dark-gray shaly bands below 126.7 ft.....	110.9	49.1
Total Depth		160.0



SW¼NE¼NW¼NW¼NE¼ sec. 26, T. 12 N., R. 17 E., McIntosh County. Surface elevation, estimated from topographic map, 633 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-brown, silty; contains organic material	0.0	0.5
Krebs Group		
Boggy Formation		
Sandstone, grayish-orange to dark-reddish-brown, very fine-grained; contains hard iron-oxide-cemented concretions; includes some clayey layers, ripple-marked; contains abundant plant impressions	0.5	5.5
Coal, black, very impure and shaly, soft, smutty	6.0	0.2
Shale, grayish-orange-pink and moderate-reddish-orange, weathered	6.2	1.0
Coal, black, very friable, impure, shaly, pyritic, iron oxide on cleat surfaces (Secor coal)	7.2	2.0
Shale, black, coaly; contains abundant plant compressions, pyritic	9.2	4.8
Underclay, medium-light-gray, silty, slickensided	14.0	3.0
Shale, medium-light-gray, silty, fractured, slickensided	17.0	13.0
Sandstone, medium-dark-gray and medium-light-gray, very fine-grained, shaly, noncalcareous; bedding highly contorted; slump and plume features abundant; includes some medium-dark-gray, slickensided, silty shale layers up to 3 in. thick (Bluejacket Sandstone)	30.0	7.3
Shale, medium-dark-gray, highly silty, noncalcareous; slickensided; contains some very fine-grained sand clasts	37.3	2.8
Sandstone, medium-dark-gray and medium-light-gray, very fine-grained, silty, shaly, noncalcareous, cross-bedded in part; contains scour-and-fill, slump, and microfault features; includes slickensided medium-dark-gray shale beds up to 2 in. thick	40.1	9.7
Siltstone, medium-dark-gray, shaly, noncalcareous; includes abundant light-brownish-gray silty shale-filled burrows, slickensided; contains some minor laminae of very fine-grained sandstone	49.8	9.1
Sandstone, medium-dark-gray and light-gray, very fine-grained, shaly, noncalcareous, slump features common, bedding contorted in places, fractured	58.9	11.1
Siltstone, medium-dark-gray, shaly, noncalcareous, slickensided, fractured; bioturbated in places; contains some very fine-grained sand clasts	70.0	10.0
	Total Depth	80.0



41 (C-MM-21)

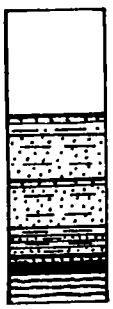
NW¼SW¼SE¼NW¼NW¼ sec. 26, T. 12 N., R. 17 E., McIntosh County. Drilled in pasture at southeast corner of farm pond 1080 ft FNL and 600 ft FWL. Surface elevation, estimated from topographic map, 620 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, grayish-brown with light-brown mottling, sandy, unbedded, contains organic matter (soil)...	0.0	2.0
Silt, dusky-yellowish-brown, unbedded.....	2.0	2.0
Sand, moderate-yellowish-brown, silty, clayey, very fine-grained; contains gravel-sized clasts of light-brown to dark-reddish-brown weathered sandstone.....	4.0	4.0
Krebs Group		
Boggy Formation		
Sandstone, dark-reddish-brown, very fine-grained, well-indurated.....	8.0	0.2
Shale, pale-yellowish-orange, soft, clayey, weathered.....	8.2	2.8
Shale, light-gray with dark-yellowish-orange streaks; includes some weathered stringers of light-brown clay-ironstone.....	11.0	1.1
Shale, dusky-brown with dark-reddish-brown and dusky-red bands; includes several layers of weathered ironstone ~0.5 in. thick; becomes predominantly grayish-black in bottom 18 in.....	12.1	4.3
Sandstone, dusky-yellowish-brown to pale-yellowish-brown with some medium-light-gray layers, very fine-grained, micaceous, noncalcareous, wavy-bedded and cross-laminated, well-indurated.....	16.4	2.1
Shale, brownish-black to grayish-black with light-brown bands containing bluish-white selenite crystals.....	18.5	1.0
Sandstone, very light-gray with moderate-reddish-brown and dark-gray streaks, very fine-grained, micaceous, cross-laminated and wavy-bedded in part, bioturbated in places; abundant black macerated plant material on stratification surfaces....	19.5	4.0
Siltstone, medium-dark-gray, grades into underlying unit.....	23.5	1.2
Shale, medium-gray, silty.....	24.7	0.9
Sandstone, medium-gray, very fine-grained, silty, shaly, micaceous, some pyrite on stratification surfaces; wavy-laminated in upper 6 in.; includes stringers of light-gray sandstone throughout; contains sparse, well-preserved fossil plant material such as seed-fern leaves.....	25.6	12.7

Shale, dark-gray, noncalcareous, includes well-preserved fossil plant compressions; becomes silty in lower 2 ft and grades into underlying unit.....	38.3	4.7
Siltstone, dark-gray, shaly; includes some laminae of very fine-grained sandstone.....	43.0	0.8
Sandstone, medium-gray laminae, very fine-grained, noncalcareous, wavy-laminated.....	43.8	0.6
Sandstone, medium-dark-gray, silty, shaly, very fine-grained, noncalcareous; includes some thin stringers of coal in lower part; contains well-preserved plant compressions; bioturbated in places.....	44.4	7.7
Sandstone, medium-light-gray, massive, fractured, very fine- to fine-grained, noncalcareous; contact with underlying unit irregular; sand-filled burrows extend downward 2-3 in. into unit below.....	52.1	0.4
Shale, dark-gray, slickensided, noncalcareous; includes sparsely distributed light-brownish-gray sideritic concretions ~1 in. thick; becomes grayish-black at 68 ft; includes sparse, white, calcareous brachiopod shells in lower 3 ft of unit.....	52.5	23.9
Siltstone, medium-dark-gray, shaly; bedding disturbed at contact with overlying unit.....	76.4	0.3
Sandstone, medium-dark-gray, silty, shaly, very fine-grained, massive, noncalcareous.....	76.7	0.3
Siltstone, medium-dark-gray, shaly, bioturbated; grades into underlying unit.....	77.0	0.3
Shale, grayish-black, noncalcareous.....	77.3	1.0
Sandstone, medium-dark-gray, very fine-grained, silty, shaly; contains well-preserved fossil plant compressions on stratification surfaces; includes some light-brownish-gray sideritic concretions about 0.5-1.5 in. thick; slicken-sided along fractures.....	78.3	22.2
Sandstone, very light-gray with dark-gray streaks and bands, fine-grained, noncalcareous; bedding highly contorted; scour-and-fill features abundant.....	100.5	2.3
Sandstone, medium-dark-gray, very fine-grained, noncalcareous, laminated; includes some very thin coal stringers.....	102.8	1.4
Sandstone, very light-gray with medium-dark-gray laminae and bands, very fine-grained, shaly, noncalcareous, wavy-laminated.....	104.2	4.3
Sandstone, medium-dark-gray with sparse, very		

light-gray laminae, very fine-grained, silty, shaly, noncalcareous; includes well-preserved plant compressions on stratification surfaces; contains minor coal streaks and macerated plant material in places.....	108.5	26.5
Total Depth		135.0

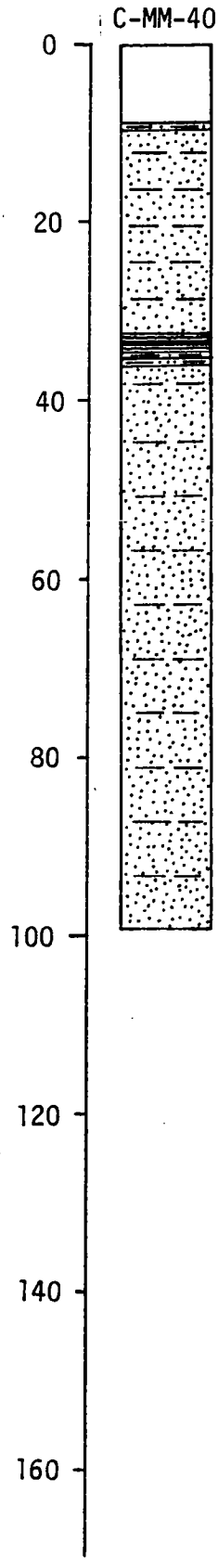
C-MM-43



NE¼SE¼SW¼NW¼NE¼ sec. 26, T. 12 N., R. 17 E., McIntosh County. Surface elevation, estimated from topographic map, 637 ft.

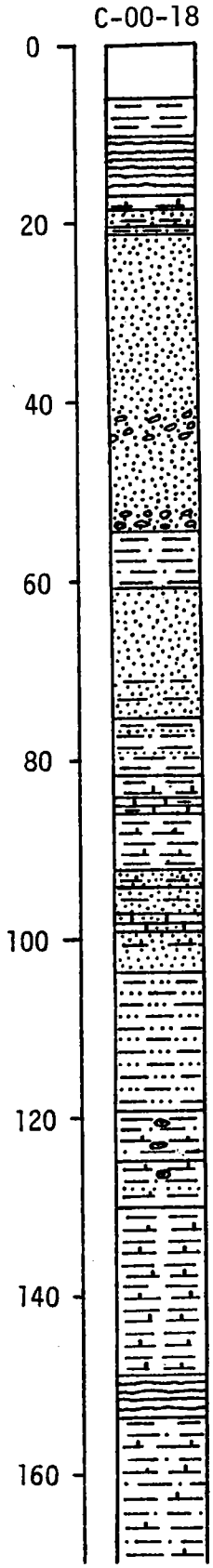
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, pale-yellowish-brown, silty; contains organic material	0.0	1.5
Gravel, moderate-yellowish-brown, clayey; contains rounded sandstone clasts up to coarse gravel size	1.5	6.5
Clay, moderate-yellowish-brown, sandy, soft	8.0	2.0
Sand, moderate-brown, clayey, soft, very fine-grained	10.0	1.0
Krebs Group		
Boggy Formation		
Coal, black, very soft, smutty, weathered (Secor rider coal)	11.0	0.1
Underclay, dusky-yellowish-brown; contains black carbonized plant fragments	11.1	0.2
Shale, dark-yellowish-brown to dark-gray, silty; contains dark-yellowish-orange iron-oxide deposits on stratification surfaces in upper part, weathered	11.3	1.7
Sandstone, medium-dark-gray and medium-light-gray, very fine-grained, wavy-bedded, interlaminated with shale, bioturbated in part; slump features common	13.0	4.7
Coal, black, very shaly, soft, fissile; contains minor pyrite	17.7	0.1
Underclay, medium-gray; contains black carbonized plant fragments; includes some minor veinlets of white calcite	17.8	0.3
Sandstone, medium-dark-gray and medium-light-gray, very fine-grained, interlaminated with shale, noncalcareous, wavy-bedded and cross-laminated; bioturbated in part; contains abundant black carbonaceous plant material	18.1	4.1
Shale, dark-gray and highly carbonaceous in upper part, medium-gray in lower part	22.2	0.9
Sandstone, medium-dark-gray with black coal streaks and medium-gray shale laminae, very fine-grained	23.1	0.2
Shale, medium-gray; includes a 0.25-in.-thick coal stringer at top of unit	23.3	0.3
Sandstone, medium-dark-gray and medium-light-gray with black streaks, very fine-grained, shaly, coaly; bedding highly contorted	23.6	1.0

Coal, black, moderately friable, includes a 0.75-in.-thick pyrite nodule.....	24.6	0.2
Sandstone, medium-dark-gray with medium-light-gray bands, highly carbonaceous, very fine-grained, bedding contorted.....	24.8	0.2
Coal, black, bright, moderately friable; peacock coal; contains some pyrite laminae (Secor coal)...	25.0	1.5
Shale, black, highly carbonaceous, coaly in upper part; contains coal layers up to 0.25 in. thick, pyritic.....	26.5	3.5
Total Depth		30.0



SE¼SW¼NW¼NW¼SW¼ sec. 33, T. 12 N., R. 18 E., McIntosh County. Well drilled in yard 312 ft FWL and 2080 ft FSL. Surface elevation, estimated from topographic map, 661 ft.

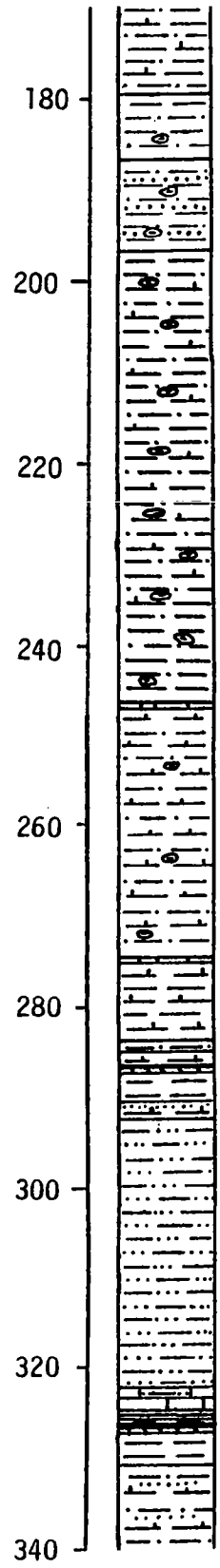
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dusky-yellowish-brown, very fine, silty; contains abundant organic material.....	0.0	1.0
Clay, moderate-brown to dark-yellowish-orange, sandy; contains subangular clasts of grayish-orange sandstone up to coarse gravel size.....	1.0	7.6
Krebs Group		
Boggy Formation		
Shale, moderate-yellowish-brown, interbedded with very fine-grained silty sandstone, weathered.....	8.6	1.1
Sandstone, light-gray with medium-dark-gray bands, very fine-grained, shaly, wavy-bedded, noncalcareous, micaceous, black macerated plant material on stratification surfaces; contains sedimentary slump features; cross-laminated in part.....	9.7	32.0
Shale, dark-gray to grayish-black, highly carbonaceous; includes abundant stringers of bright, hard coal in lower 2 in. of unit.....	41.7	0.4
Coal, black, friable; pyrite on cleat surfaces, impure; contains thin shale partings (Lower Witteville? coal).....	42.1	0.5
Shale, black, carbonaceous; includes abundant thin stringers of bright hard coal.....	42.6	0.8
Shale, dark-gray, silty, burrowed in lower part.....	43.4	1.0
Siltstone, medium-dark-gray with light-gray laminae of very fine-grained sandstone, wavy-bedded, shaly, noncalcareous.....	44.4	0.8
Sandstone, light-gray with medium-gray shale laminae, very fine-grained, micaceous, wavy-bedded, bioturbated in upper part; bedding contorted in part; black macerated plant material abundant on stratification surfaces; cross-bedded.....	45.2	52.8
Total Depth		98.0



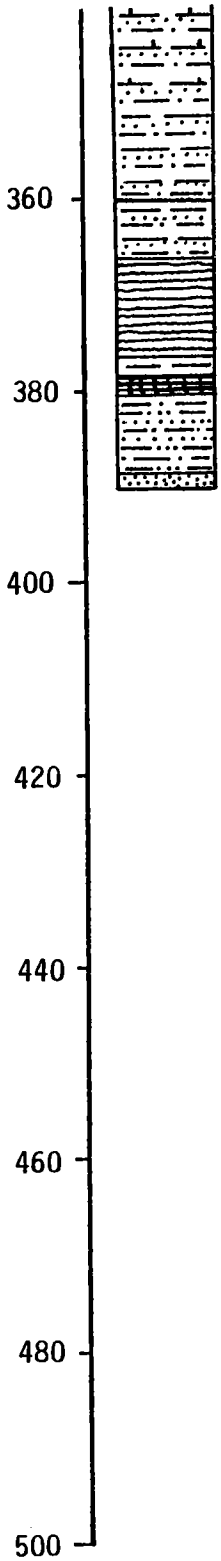
44 (C-00-18)

SE¼SW¼NW¼SW¼SE¼ sec. 31, T. 13 N., R. 10 E., Okfuskee County. Drilled in pasture at southwest corner of farm pond 2420 ft FEL and 700 ft FSL. Surface elevation, estimated from topographic map, 738 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, brownish-gray, contains organic material.....	0.0	3.5
Sand, grayish-orange, clayey, fine- to coarse-grained, poorly sorted.....	3.5	2.5
Sand and gravel, moderate-yellowish-brown, clayey; gravel clasts are predominantly subangular, moderate-reddish-brown sandstone.....	6.0	2.5
Skiatook Group		
Coffeyville Formation		
Shale, pale-yellowish-brown to moderate-brown, soft, clayey, noncalcareous, weathered.....	8.5	1.7
Shale, brownish-gray with moderate-yellowish-brown bands, soft, clayey, noncalcareous, weathered.....	10.2	0.6
Shale, black with moderate yellowish-brown bands, soft, flaky; iron-oxide deposits on stratification surfaces.....	10.8	1.2
Shale, black, hard, brittle, fractured; iron-oxide deposits on fracture surfaces and stratification surfaces; contains small phosphatic nodules; noncalcareous.....	12.0	5.1
Marlstone, medium-gray, soft, silty; contains abundant crinoid columnals, increasing in numbers downward.....	17.1	1.7
Sandstone and mudstone, medium-gray, marly, fine-grained; contains abundant crinoid ossicles.....	18.8	1.6
Shale, medium-gray, sandy, silty, noncalcareous; interfingers with underlying unit.....	20.4	1.1
Sandstone, light-gray with medium-dark-gray laminations, fine- to very fine-grained, noncalcareous, cross-stratified; thick-bedded from about 33.0 to 41.0 ft and uniform in appearance, with grain size increasing to fine- to medium-grained; conglomeratic from 41.0 to 45.0 ft, with greenish-gray shale pebbles abundant; also conglomeratic from about 52.0 to 54.7 ft; includes abundant black macerated plant fragments in lower 5 ft of unit; contact with underlying unit sharp.....	21.5	33.2
Shale, medium-dark-gray, silty, noncalcareous; bioturbated in lower part; includes some interbedded, light-gray, very fine-grained sandstone below 60 ft.....	54.7	6.5
Sandstone, light-gray with medium-dark-gray streaks		



and layers, fine- to very fine-grained, contains black macerated plant fragments, noncalcareous, cross-stratified, extensively bioturbated in part; shaly below 71 ft.....	61.2	14.2
Shale, medium-dark-gray, silty, fossiliferous, noncalcareous, bioturbated in part; interbedded with lenses and layers of very fine-grained, fossiliferous, weakly calcareous sandstone up to 1.5 in. thick.....	75.4	6.6
Shale, medium-dark-gray, silty, calcareous, fossiliferous.....	82.0	2.5
Limestone, medium-dark-gray, very shaly, fossiliferous, contains abundant bryozoans, brachiopods, and crinoid columnals; grades into underlying unit.....	84.5	1.8
Shale, medium-dark-gray, silty, calcareous, fossiliferous; contains abundant crinoid columnals and brachiopod valves, generally concentrated in layers up to 0.5 in. thick.....	86.3	6.5
Sandstone, medium-dark-gray and medium-light-gray, hard, shaly, very calcareous, fossiliferous, bioturbated in part; intricately convoluted and laminated; high-energy depositional features common...	92.8	1.7
Sandstone, medium-dark-gray, medium-light-gray, and dark-gray, very fine-grained, shaly, noncalcareous, bioturbated, bedding contorted; contains fossil fragments.....	94.5	1.5
Sandstone, dark-gray with medium-light-gray contorted bands, very fine-grained, shaly, silty, noncalcareous, bioturbated, fossiliferous.....	96.0	1.5
Limestone, very light-gray with brownish-gray mottling, hard, sandy, fossiliferous, includes abundant brachiopod and pelecypod fossils.....	97.5	2.0
Sandstone, light-greenish-gray, very fine-grained, calcareous; conglomeratic in upper 3 in.; bedding obscure; bioturbated in part; includes some fossil fragments; becomes noncalcareous below 101 ft.....	99.5	4.5
Siltstone, medium-dark-gray, sandy, muddy, calcareous, fossiliferous; contains scattered fossil brachiopod shells and crinoid columnals; laminated; bioturbated in places.....	104.0	15.5
Shale, medium-dark-gray to olive-black, silty, weakly calcareous; contains lens-shaped, brownish-gray sideritic concretions about 0.5-1 in. thick..	119.5	5.8
Shale, medium-dark-gray to olive-black, silty, calcareous, interstratified with occasionally occurring layers of very fine-grained, medium-light-gray, calcareous sandstone 0.25-3 in. thick;		

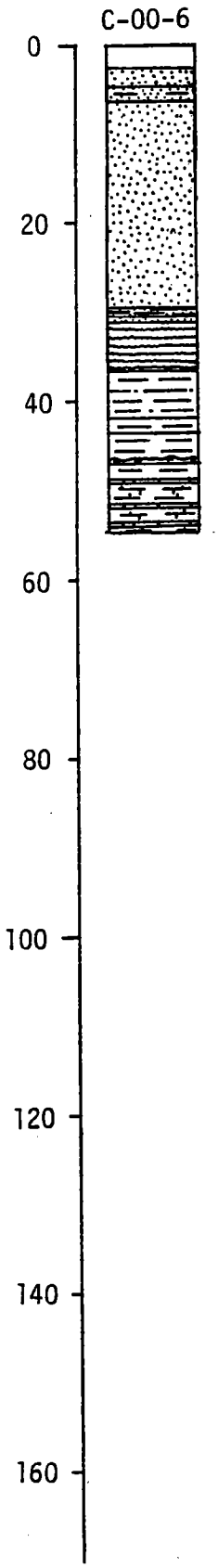


contains lens-shaped, brownish-gray sideritic concretions generally <0.75 in. thick.....	125.3	4.9
Shale, medium-dark-gray to olive-black, calcareous; contains scattered marine fossil fragments and brownish-gray, sideritic burrow fillings; includes minor pyrite associated with trace fossils on stratification surfaces.....	130.2	19.1
Shale, grayish-black to black, brittle, noncalcareous; contains pyritized and calcareous marine fossils; contact with overlying unit sharp.....	149.3	4.7
Shale, dark-gray, very calcareous; includes abundant fossil shells.....	154.0	0.1
Shale, dark-gray, silty, calcareous, fractured; includes pyritized burrow fillings and fossil shells and shell fragments; contains rare brownish-gray sideritic concretions about 1-2 in. thick; burrows and fossils rare below 170 ft; grades into underlying unit.....	154.1	25.9
Shale, dark-gray, silty, noncalcareous; contains rare light-brownish-gray sideritic concretions 0.25-2 in. thick; includes some sparsely distributed brachiopod shells and pyritized trace fossils, as well as minor calcite veins along fracture surfaces.....	180.0	7.4
Shale, medium-gray to medium-dark-gray, silty, hard, noncalcareous; contains rare light-brownish-gray sideritic concretions ~0.5 in. thick and sparse marine fossils.....	187.4	3.4
Shale, medium-dark-gray, silty, noncalcareous, interlaminated with light-gray, very fine-grained sandstone; contains numerous small, elongated, lens-shaped, light-brownish-gray sideritic concretions.....	190.8	4.2
Shale, medium-dark-gray to dark-gray, silty, noncalcareous; includes lens-shaped, light-brownish-gray sideritic concretions up to 1 in. thick that are probably burrows; calcareous from 203 to 239 ft; contains scattered light-brownish-gray fossil-cored concretions ~0.25 in. in diameter, and small pyritized trace fossils; grades into underlying unit.....	195.0	51.7
Limestone, very light-gray and dark-gray, interstratified with calcareous shale, fossiliferous; composed predominantly of small crinoid ossicles; grades into underlying unit.....	246.7	0.5
Shale, dark-gray to medium-dark-gray, silty, calcareous; fossiliferous, with abundant small crinoid ossicles in upper 1 ft; includes a 1.5- in.-thick		

medium-light-gray limestone concretion at 249.5 ft; bioturbated; contains numerous light-brownish-gray sideritic bands and concretions that are probably burrows.....	247.2	27.7
Limestone, dark-gray, impure, shaly, fossiliferous, brachiopod shells and shell fragments abundant....	274.9	0.3
Shale, dark-gray, very calcareous, fossiliferous; contains scattered marine shells and shell fragments; includes some minor pyrite on stratification surfaces as well as pyrite-filled burrows....	275.2	9.0
Shale, medium-dark-gray, noncalcareous; includes abundant closely spaced laminae of siltstone, bioturbated.....	284.2	1.4
Shale, dark-gray to grayish-black, carbonaceous, weakly calcareous; contains gastropods, brachiopod shells and shell fragments; includes coalified plant fossils and stringers of coal up to 3/8 in. thick.....	285.6	0.2
Shale, medium-dark-gray, calcareous, fossiliferous; contains pelecypods and other marine fossils as well as scattered, black carbonized plant fragments; abundance of marine fossils increases markedly in lower 1 in. of unit.....	285.8	1.0
Coal, black, moderately friable; includes calcite on cleat surfaces (unnamed coal).....	286.8	0.1
Underclay, dark-gray to medium-light-gray, carbonaceous in upper part; grades into underlying unit..	286.9	0.2
Shale, medium-bluish-gray, clayey, noncalcareous, slickensided; includes some brownish-black carbonaceous shale layers up to 0.75 in. thick in bottom 2 ft of unit.....	287.1	3.7
Shale, medium-gray, calcareous, bioturbated; includes laminae of very fine-grained, light-brownish-gray sandstone in lower 1 ft of unit.....	290.8	1.9
Siltstone, medium-gray, calcareous, hard, bioturbated; shaly in part; includes some lens-shaped laminae of very fine-grained, light-gray sandstone; contains sparsely distributed marine fossils such as crinoid columnals and brachiopod shells; fossil content increases markedly in bottom 6 in. of unit; grades into underlying unit.....	292.7	29.3
Checkerboard Formation		
Limestone, medium-light-gray, extremely fossiliferous, brachiopods and crinoid columnals most abundant; very silty in upper 1 ft of unit; impure throughout (Checkerboard Limestone).....	322.0	2.3
Seminole Formation		

Shale, brownish-black, silty, very calcareous, carbonaceous; contains scattered small marine fossils.....	324.3	0.5
Shale, brownish-black to black, carbonaceous; contains abundant thin stringers of coal; noncalcareous.....	324.8	0.4
Shale, medium-dark-gray, clayey, noncalcareous, slickensided; becomes dark-gray and carbonaceous in lower 1 in. of unit.....	325.2	0.8
Coal, black, bright, slightly friable; includes white calcite on cleat surfaces (Tulsa coal).....	326.0	0.1
Marmaton Group(?)		
Holdenville Formation(?)		
Underclay, medium-dark-gray, slickensided; grades into underlying unit.....	326.1	0.4
Shale, greenish-gray, blocky fracture, crumbly, noncalcareous, slickensided.....	326.5	3.9
Shale, medium-dark-gray with medium-gray bands, very silty, hard, interstratified with abundant layers of very fine-grained sandstone, extensively bioturbated; calcareous to ~350 ft, then weakly calcareous, and becoming noncalcareous below 353 ft..	330.4	29.6
Shale, dark-gray, silty, noncalcareous; contains thin stringers and small lenses of light-gray, very fine-grained sandstone, bioturbated, hard, fractured, white gypsum fills fractures; grades into underlying unit.....	360.0	6.0
Shale, dark-gray to grayish-black, noncalcareous, hard, brittle, fossiliferous; contains scattered brachiopod shells and shell fragments; includes small, pyritized trace fossils on stratification surfaces; grades into underlying unit.....	366.0	4.2
Shale, grayish-black to black, hard, brittle, noncalcareous; includes some minor pyrite and rare marine fossils; contains phosphatic nodules ~0.5 in. in diameter.....	370.2	6.1
Shale, medium-dark-gray, noncalcareous, bioturbated, fossilferous; contains pyrite-filled burrows and brachiopod valves, slickensided.....	376.3	2.0
Coal, black, bright, pyritic; contains closely spaced veinlets of white gypsum (Dawson coal).....	378.3	0.1
Underclay, greenish-gray, slickensided, thickness of unit irregular.....	378.4	0.2
Coal, black, bright, pyritic, contains closely spaced veinlets of white gypsum, thickness of unit irregular (Dawson coal).....	378.6	0.1
Underclay, greenish-gray, slickensided, thickness of unit irregular.....	378.7	0.2

Coal, black, bright, pyritic, contains closely spaced veinlets of white gypsum, thickness of unit irregular (Dawson coal).....	378.9	0.1
Underclay, greenish-gray, slickensided, includes some brownish-black layers of carbonaceous clay up to 1 in. thick; grades into underlying unit....	379.0	1.0
Mudstone, greenish-gray, noncalcareous, interbedded with brownish-black carbonaceous sandstone and very fine-grained, silty, greenish-gray sandstone.	380.0	8.5
Sandstone, light-gray with medium-light-gray bands, well-indurated, very fine-grained, noncalcareous, cross-bedded.....	388.5	1.5
Total Depth		390.0

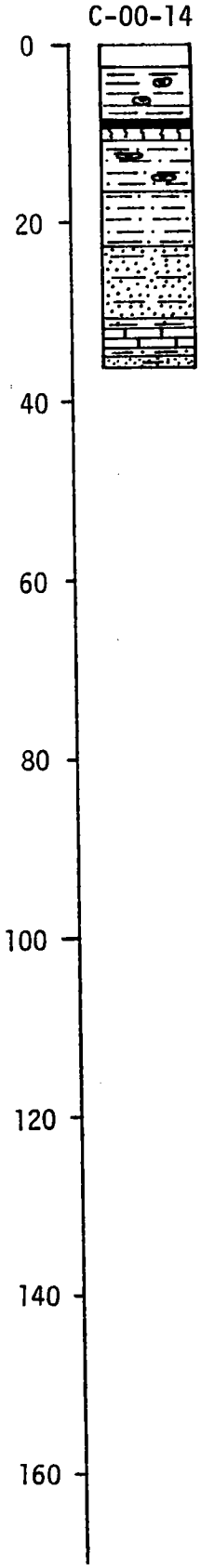


45 (C-00-6)

NE¼NE¼NE¼NE¼SE¼ sec. 35, T. 13 N., R. 13 E., Okmulgee County. Surface elevation, estimated from topographic map, 703 ft.

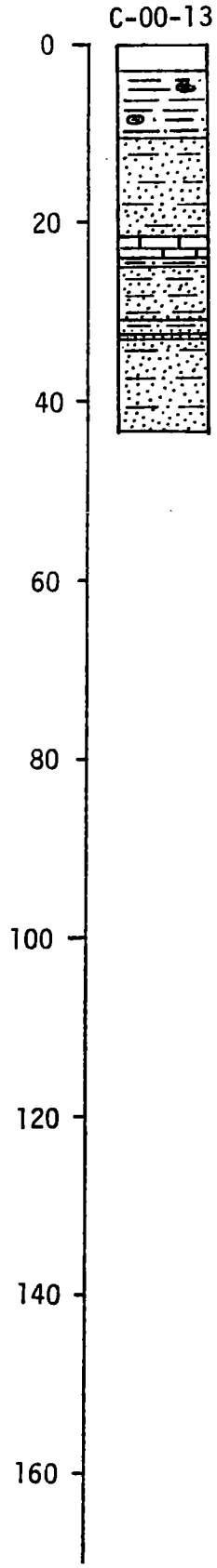
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-brown, very fine-grained; contains organic material	0.0	2.8
Cabaniss Group		
Senora Formation		
Sandstone, moderate-yellowish-brown, very fine-grained, silty, friable, noncalcareous	2.8	2.2
Sandstone, moderate-reddish-brown, very fine-grained, silty, well-indurated	5.0	1.5
Sandstone, grayish-orange, very fine-grained, silty, moderately friable	6.5	1.5
Sandstone, dusky-yellow to moderate-yellowish-brown, fine-grained; contains cross-bedded intervals alternating with even-bedded intervals ~2 ft thick; includes a bioturbated zone from 17.3 to 17.8 ft; contains a few limonitic concretions ~0.25 in. thick and 0.5 in. long; contains black carbonaceous flecks in bottom 10 in	8.0	12.9
Sandstone, light-olive-gray to light-olive-brown with black streaks, very fine-grained, noncalcareous; irregularly interlaminated with black, bright coal	20.9	4.2
Sandstone, medium-light-gray with black streaks, very fine-grained, noncalcareous; irregularly interlaminated with black, bright coal; contains lenses of coal 1/32 to 0.25 in. thick	25.1	4.6
Sandstone, medium-light-gray and black, very fine-grained, noncalcareous; consists of ~25% black, bright coal occurring as very thin beds and laminae; includes a 3/16-in.-thick layer of coal at top and bottom of interval (Croweburg coal)	29.7	0.6
Sandstone, medium-light-gray, very fine-grained, noncalcareous; includes a few thin laminae of black coal in upper 2 in	30.3	0.6
Shale, dark-gray to grayish-black; includes a few brownish-gray siderite concretions 0.5-1 in. thick in upper 1 ft of unit	30.9	6.1
Shale, dark-gray; includes brownish-gray, very fine-grained silt bands; contains a few 0.25-in.-thick pyrite nodules	37.0	5.0
Shale, dark-gray, noncalcareous	42.0	1.8
Shale, dark-gray, weakly calcareous; includes a		

0.75-in.-thick siderite layer at base of unit.....	43.8	3.5
Shale, medium-dark-gray, highly calcareous; contains several light-olive-gray layers of silty limestone 1/64 to 0.5 in. thick (McNabb Limestone).....	47.3	7.5
Total Depth		54.8



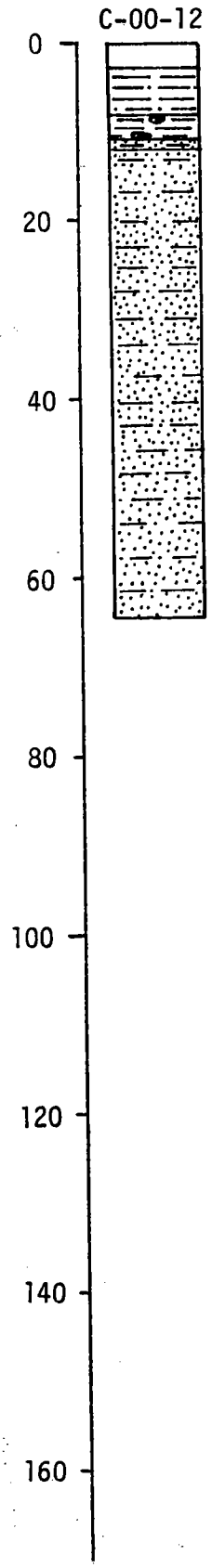
NE¼NE¼NW¼SE¼ sec. 14, T. 13 N., R. 14 E., Okmulgee County. Surface elevation, estimated from topographic map, 680 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, pale-yellowish-brown, sandy; contains organic material.....	0.0	2.5
Cabaniss Group		
Senora Formation		
Shale, moderate-yellowish-brown, clayey; contains dusky-brown, gravel-sized particles of ironstone; weathered.....	2.5	4.5
Shale, dark-yellowish-orange, weathered.....	7.0	1.5
Coal, black, very soft, highly weathered (Mineral [Eram] coal).....	8.5	0.9
Underclay, light-gray to medium-gray with dark-yellowish-orange streaks, soft; includes abundant coalified plant material.....	9.4	1.4
Shale, dark-yellowish-brown to olive-gray, silty; includes several 0.5- to 0.75-in.-thick layers of dark-reddish-brown ironstone; stained light-brown on stratification surfaces; includes some black carbonized plant fragments.....	10.8	5.7
Shale, dark-gray, silty, some moderate-brown staining on stratification surfaces in upper 12 in.....	16.5	6.0
Sandstone, medium-gray, shaly, very fine-grained, wavy-laminated, bioturbated; includes black macerated plant material on stratification surfaces, noncalcareous.....	22.5	7.8
Shale, dark-gray, calcareous.....	30.3	1.1
Limestone, light-gray to medium-gray, impure, sandy, highly fossilferous, brachiopods most abundant....	31.4	2.5
Shale, dark-gray, interbedded with light-gray, very fine-grained calcareous sandstone.....	33.9	0.5
Sandstone, light-gray, fine-grained, interstratified with dark-gray shale, cut-and-fill features abundant, noncalcareous.....	34.4	1.6
Total Depth		36.0



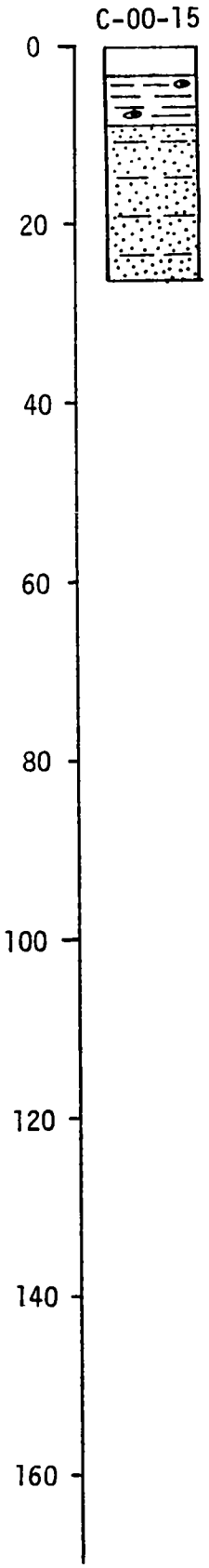
NW¼NE¼NW¼SE¼ sec. 14, T. 13 N., R. 14 E., Okmulgee County. Surface elevation, estimated from topographic map, 690 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, pale-yellowish-brown, contains organic material, well-sorted (soil).....	0.0	3.0
Cabaniss Group		
Senora Formation		
Shale, moderate-yellowish-brown, clayey; contains brownish-black gravel-sized particles of ironstone; highly weathered; becomes sandy in lower part.....	3.0	7.5
Sandstone, moderate-yellowish-brown to dark-yellowish-brown, highly silty and shaly, weathered.....	10.5	2.0
Sandstone, dark-yellowish-brown with brownish-black staining, silty, micaceous, noncalcareous, laminated; includes black macerated plant fragments on stratification surfaces, weakly cemented.....	12.5	1.5
Sandstone, brownish-gray to medium-dark-gray, silty, shaly, very fine-grained, noncalcareous.....	14.0	2.3
Sandstone, medium-dark-gray to medium-light-gray, very fine-grained, silty, bioturbated; interlaminated with black carbonaceous shaly sandstone in some places, micaceous; grades into underlying unit.....	16.3	5.2
Limestone, light-gray, impure, sandy, highly fossiliferous, brachipods most abundant.....	21.5	2.4
Shale, medium-gray, silty, noncalcareous, hard.....	23.9	0.1
No core recovery, cuttings unreadable, drilled like shaly sandstone.....	24.0	6.7
Shale, dark-gray, silty, sandy.....	30.7	0.3
Shale, dark-gray, silty, interlaminated with light-gray, very fine-grained sandstone.....	31.0	1.1
Sandstone, light-gray, fine-grained, noncalcareous, well-indurated.....	32.1	0.2
Sandstone, medium-dark-gray with light-gray bands, shaly, very fine-grained, noncalcareous, wavy-bedded, cross-laminated in part; includes some bioturbation features in upper 6 in.....	32.3	2.2
Sandstone, medium-light-gray with dark-gray laminae, very fine-grained, noncalcareous, cross-laminated; shaly in part; includes thin layers of highly carbonaceous sandstone; black macerated plant material abundant, well-indurated.....	34.5	8.5
Total Depth		43.0



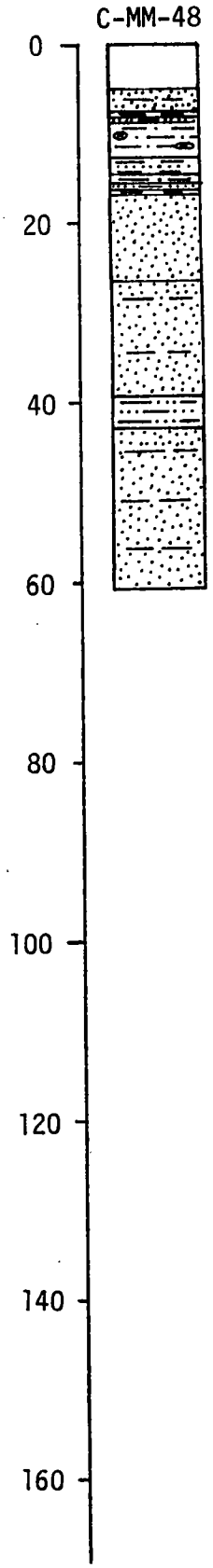
NW¼NW¼NW¼SE¼ sec. 14, T. 13 N., R. 14 E., Okmulgee County. Surface elevation, estimated from topographic map, 705 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, pale-yellowish-brown; contains organic material	0.0	3.0
Cabaniss Group		
Senora Formation		
Shale, moderate-yellowish-brown, sandy; includes particles of moderate-reddish-brown ironstone; highly weathered	3.0	5.0
Shale, grayish-orange, includes abundant dusky-brown ironstone concretions	8.0	3.0
Sandstone, light-brown, micaceous, very fine-grained, silty, weathered	11.0	1.0
Sandstone, grayish-orange, micaceous, very fine-grained, silty, partly weathered; weakly cemented; includes 0.5-in.-thick light-brown ferruginous layers, noncalcareous	12.0	4.0
Sandstone, grayish-brown to brownish-black, very fine-grained, shaly, interlaminated with layers of very highly carbonaceous sandstone; includes some soft-sediment deformation features	16.0	4.5
Sandstone, medium-light-gray with dark-gray laminae, very fine-grained, noncalcareous, cross-laminated; shaly in part; includes thin layers of highly carbonaceous sandstone; well-indurated; bioturbated from 31 to 64 ft	20.5	43.5
Total Depth		64.0



SW¼NE¼SW¼SE¼ sec. 14, T. 13 N., R. 14 E., Okmulgee County. Surface elevation, estimated from topographic map, 681 ft.

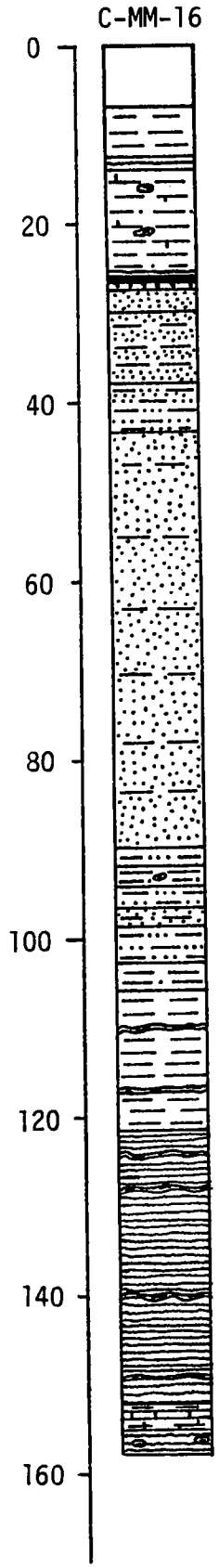
	Depth to unit top (ft)	Thickness of unit (ft)
Silt, dark-yellowish-brown, sandy; contains organic material; unbedded (soil).....	0.0	3.5
Cabaniss Group		
Senora Formation		
Shale, moderate-yellowish-brown, highly clayey, weathered; includes dusky-brown, gravel-sized particles of ironstone.....	3.5	3.0
Shale, grayish-orange, clayey, weathered; includes light-brown, gravel-sized particles of ironstone..	6.5	2.5
Sandstone, moderate-yellowish-brown with dusky-yellowish-brown bands, partly oxidized, noncalcareous, shaly, wavy-laminated, very fine-grained; includes abundant black macerated plant material on stratification surfaces.....	9.0	4.7
Sandstone, dark-gray with light-gray bands, very fine-grained, noncalcareous, cross-laminated in part, shaly; includes abundant black macerated plant material on stratification surfaces; contains some bioturbation features.....	13.7	12.3
Total Depth		26.0



SW¼NE¼NE¼SE¼SE¼ sec. 14, T. 13 N., R. 16 E., Muskogee County. Drilled in pasture at northeast end of pond 350 ft FEL and 1100 ft FSL. Surface elevation, estimated from topographic map, 666 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-brown, silty, contains organic material	0.0	1.8
Clay, moderate-yellowish-brown, sandy; contains some gravel-sized clasts of oxidized, very fine-grained sandstone	1.8	3.2
Krebs Group		
Boggy Formation		
Sandstone, moderate-yellowish-brown, very fine-grained, clayey, highly weathered	5.0	2.5
Shale, moderate-yellowish-brown, clayey, weathered	7.5	0.3
Sandstone, dusky-yellow with dark-yellowish-orange and dusky-brown bands, wavy-bedded and cross-laminated, very fine-grained, shaly, weathered	7.8	0.5
Shale, pale-yellowish-brown with dark-yellowish-orange bands, sandy; contains abundant 0.5- to 1-in.-thick layers of clay-ironstone	8.3	4.1
Shale, grayish-black, and sandstone, light-gray, interstratified, wavy-laminated, bioturbated, micaceous; contains black macerated plant fragments; includes a 0.25-in.-thick lens of smutty coal at base of unit	12.4	1.8
Shale, olive-gray to medium-gray, silty, micaceous, contains black carbonized plant compressions and light-brown layers of iron oxide	14.2	0.9
Sandstone, moderate-brown with moderate-yellowish-brown laminae, very fine-grained, shaly, noncalcareous, cross-laminated, weathered	15.1	0.2
Shale, pale-yellowish-brown, clayey, weathered	15.3	0.2
Sandstone, grayish-orange to dark-yellowish-orange; becomes medium-light-gray with grayish-brown bands at ~18 ft, fine-grained, micaceous, noncalcareous, cross-bedded, contains black macerated plant material on stratification surfaces	15.5	10.5
Sandstone, medium-gray with light-gray and grayish-black bands, very fine-grained, shaly in part, micaceous, cross-bedded, noncalcareous, bioturbated in part, abundant black macerated plant material on stratification surfaces; includes some layers of fine-grained sandstone	26.0	12.6
Siltstone, medium-dark-gray, sparsely interlaminated		

with light-gray, very fine-grained sandstone, noncalcareous, micaceous, bioturbated.....	38.6	3.5
Sandstone, medium-gray with light-gray and dark-gray bands, fine- to very fine-grained, shaly in part, micaceous, wavy-bedded, noncalcareous, bioturbated in part, abundant black macerated plant fragments on stratification surfaces.....	42.1	17.9
Total Depth		60.0

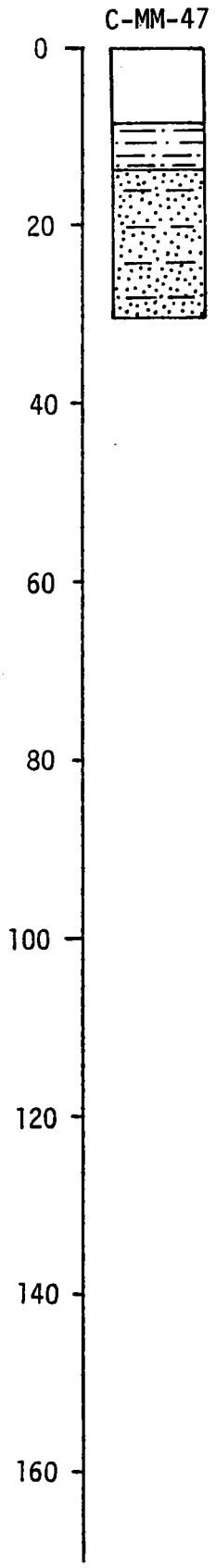


51 (C-MM-16)

NE¼NW¼SE¼SW¼SE¼ sec. 25, T. 13 N., R. 16 E., Muskogee County. Drilled in hay meadow at north edge of farm pond 400 ft FSL and 1600 ft FEL. Surface elevation, estimated from topographic map, 617 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, dark-yellowish-orange, sandy, unbedded; contains organic material (soil).....	0.0	3.0
Clay, moderate-yellowish-brown, silty, sandy; contains some fine gravel-sized clasts of dusky-brown clay-ironstone, soft, weathered.....	3.0	4.0
Krebs Group		
Boggy Formation		
Shale, dusky-yellowish-brown, clayey; moderate-brown staining on stratification surfaces.....	7.0	3.0
Shale, dark-gray with minor brownish-gray streaks...	10.0	2.4
Shale, black, hard, brittle, fractured.....	12.4	1.8
Shale, dark-gray, calcareous, silty; includes sparse fossil shell parts; contains some light-brownish-gray sideritic concretions.....	14.2	11.2
Shale, grayish-black, carbonaceous; black and highly carbonaceous in lower 1 in.....	25.4	0.6
Coal, black, bright, moderately friable, white calcite and pyrite on cleat surfaces (Wainwright coal).....	26.0	0.8
Underclay, medium-gray, shaly, contains black carbonized plant fragments.....	26.8	0.7
Sandstone, medium-light-gray with black streaks, very fine-grained, wavy-laminated, micaceous, noncalcareous; contains abundant black macerated plant material on stratification surfaces.....	27.5	2.5
Sandstone and shale, interbedded, light-gray and medium-dark-gray, noncalcareous, micaceous, wavy-laminated in part, bioturbated in places, thin-bedded; contains abundant black macerated plant material on stratification surfaces.....	30.0	8.0
Siltstone, medium-dark-gray; highly shaly, noncalcareous; includes some thin lenses and stringers of light-gray, very fine-grained sandstone, wavy-laminated in part.....	38.0	5.5
Sandstone, medium-dark-gray with light-gray bands, shaly, very fine-grained, cross-laminated and cross-bedded, noncalcareous; abundant black macerated plant material on stratification surfaces; grades into underlying unit.....	43.5	46.5
Siltstone, medium-dark-gray; contains some light-gray, very fine-grained sandstone laminae in		

upper part, noncalcareous, shaly; includes some light-brownish-gray sideritic concretions about 0.5-1 in. thick in lower part.....	90.0	2.0
Shale, dark-gray, noncalcareous, silty; includes some light-brownish-gray sideritic concretions ~0.5 in. thick.....	92.0	2.3
Siltstone, medium-dark-gray, shaly; includes some laminae of light-gray, very fine-grained sandstone.....	94.3	2.4
Sandstone, medium-dark-gray with light-gray bands, very fine-grained, shaly, bioturbated in part, wavy-laminated, noncalcareous, micaceous.....	96.7	2.1
Siltstone, medium-dark-gray, shaly; includes some laminae of light-gray, very fine-grained sandstone; noncalcareous.....	98.8	4.1
Shale, medium-dark-gray with dark-gray bands, silty, noncalcareous.....	102.9	3.1
Shale, dark-gray to grayish-black, noncalcareous; includes some sideritic concretionary layers 1/16 to 1 in. thick.....	106.0	15.7
Shale, grayish-black to black, noncalcareous, hard, brittle; contains sparse white calcareous and pyritized brachiopod shell fragments; includes sideritic concretion layers 1.5-2 in. thick from 122 to 129 ft, 140 to 142 ft, and at 149.5 ft; number of calcareous fossil shells increases markedly in lower 3 ft.....	121.7	30.5
Coal, black, moderately friable, includes white calcite along stratification surfaces and a 1/8-in.-thick pyritic layer at top of bed (Bluejacket[?] coal).....	152.2	0.2
Shale, dark-gray, soft, noncalcareous.....	152.4	0.3
Limestone, dark-gray; very light-gray in part where fossil hash is abundant; highly impure, shaly; fossils broken and unidentifiable (Inola Limestone).....	152.7	1.0
Shale, dark-gray with very light-gray contorted layers composed of fossil hash, highly calcareous.....	153.7	1.3
Shale, grayish-black, noncalcareous; contains white calcareous shell fragments and 1- to 2-in.-thick sideritic concretions.....	155.0	3.0
Total Depth		158.0



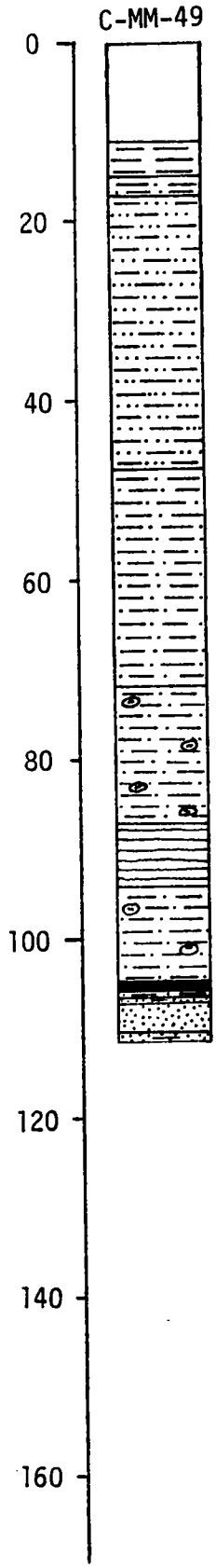
SE¼SE¼NE¼NE¼SE¼ sec. 35, T. 13 N., R. 16 E., Muskogee County. Drilled in pasture at northeast end of farm pond 60 ft FEL and 2000 ft FSL. Surface elevation, estimated from topographic map, 637 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, very fine-grained, silty, contains organic material.....	0.0	1.5
Sand, pale-yellowish-brown, clayey, contains spheroidal limonite concretions ~1/32 in. in diameter.....	1.5	1.5
Clay, moderate-yellowish-brown, sandy, contains particles of limonite concretions and some gravel clasts.....	3.0	5.2
Krebs Group		
Boggy Formation		
Shale, moderate-yellowish-brown with dusky-brown and dark-yellowish-orange bands, silty, weathered.....	8.2	5.5
Sandstone, dark-gray with minor light-gray laminae, very fine-grained, shaly, noncalcareous, sparsely bioturbated.....	13.7	16.3
Total Depth		30.0

C-MM-17

SW¼SE¼NE¼NE¼NE¼ sec. 36, T. 13 N., R. 16 E., Muskogee County. Drilled in pasture 540 ft FNL and 210 ft FEL. Surface elevation, estimated from topographic map, 611 ft.

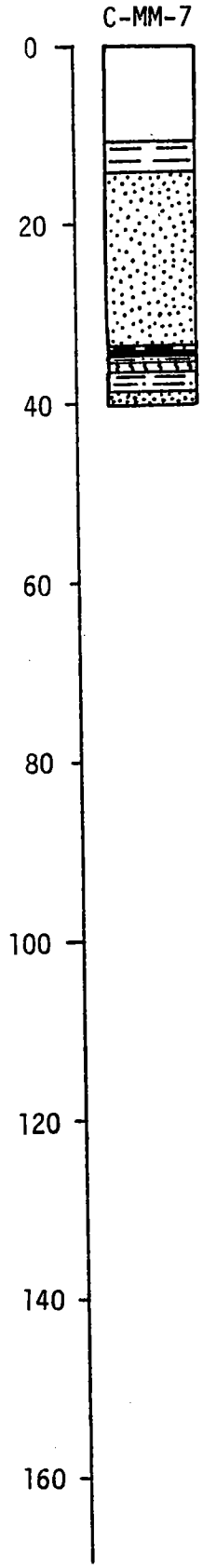
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, pale-yellowish-brown, very fine-grained, silty, unconsolidated; contains organic matter (soil).....	0.0	2.0
Sand, light-brown to dark-yellowish-orange, very fine-grained, silty, oxidized, unconsolidated.....	2.0	3.0
Krebs Group		
Boggy Formation		
Shale, dark-yellowish-brown to dusky-yellowish-brown.....	5.0	3.0
Shale, dark-gray to grayish-black, calcareous; contains sparse white calcitic fossil shell fragments.....	8.0	2.5
Shale, dark-gray to grayish-black, noncalcareous; includes several 0.5- to 1-in.-thick, light-brownish-gray sideritic concretions.....	10.5	9.2
Shale, medium-dark-gray, soft, noncalcareous.....	19.7	0.3
Coal, black, bright, moderately friable; contains small lenses and veins of pyrite (Wainwright coal).....	20.0	0.8
Underclay, medium-gray, shaly; contains coal laminae, black carbonized plant fragments and some pyritic deposits.....	20.8	0.6
Siltstone, medium-dark-gray, highly shaly.....	21.4	1.4
Sandstone, medium-dark-gray with light-gray bands, very fine-grained, shaly, wavy laminated, bioturbated in part, noncalcareous.....	22.8	5.2
Total Depth		28.0



NW¼NE¼SW¼NE¼SE¼ sec. 36, T. 13 N., R. 16 E., Muskogee County. Drilled in pasture at south edge of farm pond 1000 ft FEL and 1900 ft FSL. Surface elevation, estimated from topographic map, 617 ft.

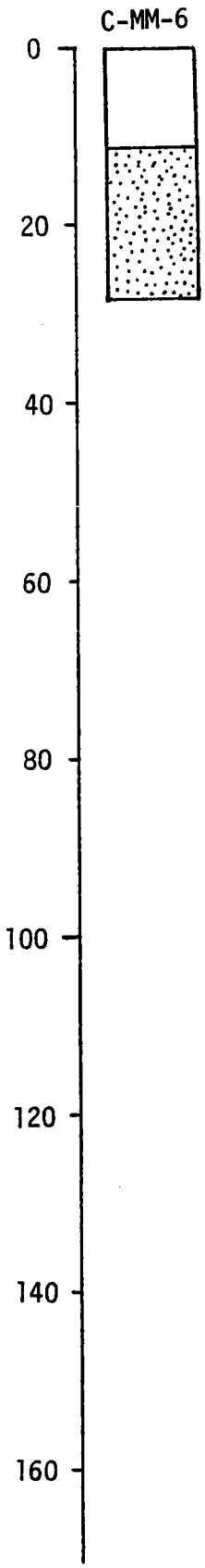
	Depth to unit top (ft)	Thickness of unit (ft)
Silt, grayish-brown, sandy, mottled dark-reddish-brown, contains organic material.....	0.0	1.5
Silt, dark-yellowish-brown, clayey; contains some dark-reddish-orange oxidized streaks.....	1.5	5.5
Clay, grayish-orange to dark-yellowish-orange; contains gravel-sized iron-oxide concretions.....	7.0	2.0
Gravel, moderate-brown, clayey; clasts are predominantly subrounded sandstone and clay-ironstone....	9.0	1.9
Krebs Group		
Boggy Formation		
Shale, moderate-yellowish-brown, clayey; becomes dark-yellowish-brown at ~11.5 ft, weathered.....	10.9	3.9
Shale, brownish-black, silty, noncalcareous.....	14.8	2.0
Siltstone, medium-dark-gray, shaly, noncalcareous; includes minor pyrite crusts on bedding surfaces and in burrow fillings; contains some sparsely distributed laminae of light-gray sandstone; also contains some laminae of black macerated plant fragments from 43 to 43.5 ft; grades into underlying unit.....	16.8	30.2
Shale, medium-dark-gray, silty, hard, noncalcareous, bioturbated; contains thin brownish-gray calcite crusts on some stratification surfaces; also contains some pyrite-filled burrows and calcareous brachiopod valves; grades into underlying unit....	47.0	24.0
Shale, dark-gray to grayish-black, hard, silty, noncalcareous; contains some pyrite-filled burrows up to 1.5 in. long and deep, white calcareous brachiopod shell fragments, and abundant light-brownish-gray sideritic concretions 1/8 to 2.5 in. thick.....	71.0	15.0
Shale, black, noncalcareous, carbonaceous, slickensided.....	86.0	7.0
Shale, dark-gray to grayish-black, hard, silty; contains white calcite-filled laminae and white calcitic brachiopod shells; burrowed in part; includes light-gray and light-brownish-gray sideritic concretions 1/8 to 2.5 in. thick.....	93.0	10.6
Coal, black, bright, moderately friable; includes white calcite and pyrite on cleat surfaces (Wainwright coal).....	103.6	1.0

Shale, medium-dark-gray, silty, noncalcareous; includes a 0.75-in.-thick black and grayish-black, coaly, pyritic layer at top of unit.....	104.6	0.2
Sandstone, medium-dark-gray with light-gray laminae, noncalcareous, very fine-grained, shaly, bioturbated, bedding contorted and faulted.....	104.8	0.4
Sandstone, medium-light-gray, fine-grained, massive, micaceous, noncalcareous; contains thin streaks of black macerated plant fragments.....	105.2	3.8
Sandstone, medium-light-gray with dark-gray bands, very fine- to fine-grained, shaly, cross-laminated, bioturbated, micaceous, noncalcareous..	109.0	1.0
Total Depth		110.0



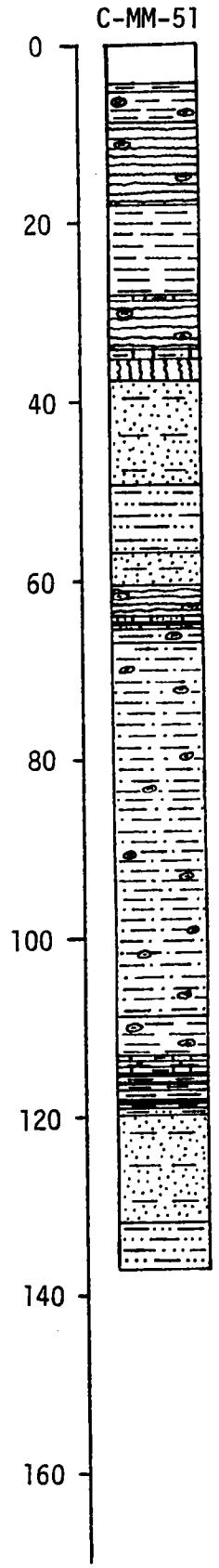
NE¼NE¼NE¼SE¼NE¼ sec. 4, T. 13 N., R. 18 E., Muskogee County. Drilled 1370 ft from N. line and 50 ft from E. line. Surface elevation, estimated from topographic map, 611 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, grayish-brown, very fine-grained, silty; contains organic material.....	0.0	1.6
Sand, moderate-reddish-brown, very fine-grained, silty, clayey.....	1.6	0.9
Sand, moderate-yellowish-brown, very fine-grained, clayey; contains brownish-black fragments of iron-oxide concretions.....	2.5	8.0
Krebs Group		
Boggy Formation		
Shale, very light-gray with dark-yellowish-orange streaks.....	10.5	0.5
Shale, light-olive-gray with dark-yellowish-orange streaks; becomes olive-gray in lower 10 in. of unit.....	11.0	3.0
Sandstone, light-olive-gray with light-brown and grayish-black bands, very fine-grained, micaceous, cross-laminated, wavy-bedded; bedding distorted in part; abundant black carbonized plant debris on stratification surfaces (Crekola Sandstone).....	14.0	1.6
Sandstone, light-gray with grayish-black bands, micaceous, very fine-grained, cross-laminated, wavy-bedded; bedding highly distorted in part; includes abundant black carbonized plant debris on stratification surfaces (Crekola Sandstone)....	15.6	18.2
Shale, medium-gray, silty; includes coalified plant material on stratification surfaces.....	33.8	0.2
Coal, black bright, friable; minor pyrite on cleat surfaces (Secor coal).....	34.0	0.6
Siltstone, medium-gray, shaly; includes a 0.25-in.-thick layer of grayish-black, highly carbonaceous shale at top of unit as well as black carbonized plant fragments distributed throughout.....	34.6	0.3
Underclay, medium-gray, silty; contains black carbonized plant fragments; slickensides common.....	34.9	1.3
Shale, medium-gray, silty; contains black carbonized plant fragments.....	36.2	2.5
Sandstone, medium-light-gray with dark-gray bands, fine- to very fine-grained, micaceous, cross-stratified; black macerated plant debris abundant on stratification surfaces (Bluejacket Sandstone).	38.7	1.3
Total Depth		40.0



SW¼NE¼NW¼SE¼NE¼ sec. 4, T. 13 N., R. 18 E., Muskogee Co., Oklahoma. Drilled 20 ft from east edge of stock pond. Surface elevation, estimated from topographic map, 610 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, grayish-brown, very fine-grained, silty; contains organic material	0.1	1.5
Sand, moderate-reddish-brown, very fine-grained, silty	1.6	1.0
Sand, moderate-yellowish-brown, very fine-grained, clayey	2.6	1.5
Sand, pale-yellowish-orange, highly clayey	4.1	3.0
Sand, grayish-orange, highly clayey; includes brownish-black iron-oxide particles	7.1	1.4
Clay, dark-yellowish-orange with very pale-orange mottling, sandy; contains subangular to subrounded clasts of very fine-grained, light-brown sandstone and brownish-black iron-oxide concretions	8.5	2.6
Krebs Group		
Boggy Formation		
Sandstone, yellowish-gray with dark-reddish-brown and moderate-brown bands, fine- to very fine-grained, noncalcareous, cross-bedded, micaceous; includes abundant black carbonized plant debris on stratification surfaces (Crekola Sandstone)	11.1	3.0
Sandstone, light-gray with dark-gray bands, fine- to very fine-grained, cross-bedded, micaceous, noncalcareous; includes abundant black macerated plant debris on stratification surfaces (Crekola Sandstone)	14.1	14.0
Total Depth		28.1

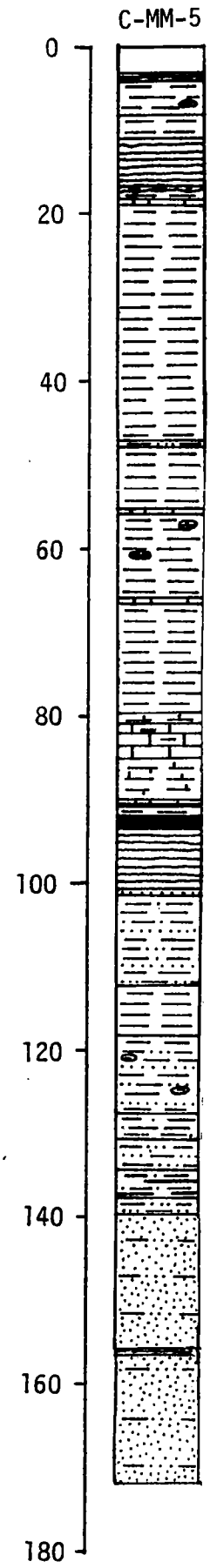


SE¼NW¼SE¼NE¼NW¼ sec. 7, T. 13 N., R. 18 E., Muskogee County. Drilled in pasture at north edge of farm pond 2220 ft FWL and 890 ft FNL. Surface elevation, estimated from topographic map, 566 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, grayish-orange, sandy, clayey; contains organic material	0.0	1.0
Sand, dark-yellowish-orange, clayey, very fine-grained	1.0	2.0
Clay, moderate-yellowish-brown; contains gravel-sized clasts of clay-ironstone	3.0	1.3
Krebs Group		
Boggy Formation		
Shale, dark-yellowish-brown, weathered	4.3	0.7
Shale, medium-dark-gray with light-brown and dark-reddish-brown layers; contains oxidized clay-ironstone concretions	5.0	4.0
Shale, black, brittle; contains dark-reddish-brown sideritic concretions	9.0	9.0
Shale, dark-gray to grayish-black with some olive-gray bands	18.0	10.0
Limestone, dark-gray, impure, shaly	28.0	0.4
Shale, grayish-black to black, hard; includes sideritic concretions 1-2 in. thick; contains calcite in veins, and pyrite-filled burrows, as well as white calcareous brachiopod shells in lower 2 ft of unit	28.4	5.6
Limestone, dark-gray; impure, silty, very fossiliferous; fossil hash abundant; bioturbated at contact with underlying unit; includes a thin stringer of grayish-black, carbonaceous, silty shale at base of unit (Inola Limestone)	34.0	1.0
Underclay, medium-light-gray, blocky fracture; includes some brownish-gray carbonaceous stringers and a 1-in.-thick sandy interval ~1.5 ft from top of unit	35.0	2.5
Sandstone, medium-gray, very fine-grained, calcareous in upper 4 in., bioturbated; includes black macerated plant fragments; shaly in part; medium-dark-gray with medium-light-gray bands and cross-bedded below 44 ft	37.5	11.5
Siltstone, dark-gray, shaly; contains pyrite-filled burrows several inches long; also contains some well-preserved, black plant compressions and stringers of very fine-grained sandstone	49.0	7.5
Sandstone, medium-dark-gray and medium-light-gray,		

very fine-grained, shaly, cross-bedded, bioturbated; contains abundant black macerated plant fragments (Crekola Sandstone).....	56.5	3.5
Shale, black, hard, brittle; includes light-brownish-gray sideritic concretions up to 2 in. thick; contains white calcareous fossil shell fragments from 60.8 to 61.2 ft.....	60.0	3.7
Limestone, medium-light-gray, impure, sandy, bioturbated; interbedded with 0.25- to 0.5-in.-thick coal stringers.....	63.7	0.2
Coal, black, moderately friable; contains some minor pyrite (Peters Chapel coal).....	63.9	0.2
Limestone, medium-light-gray, impure, shaly, sandy, coaly, bioturbated.....	64.1	0.3
Shale, medium-dark-gray, silty, sandy, bioturbated; includes light-brownish-gray sideritic concretions ~2 in. thick; grades into underlying unit.....	64.4	2.1
Shale, dark-gray, hard, silty, noncalcareous; includes numerous light-brownish-gray sideritic concretions 1/8 to 2 in. thick; contains rare fossil shells and thin veins of white calcite along fracture fillings.....	66.5	41.5
Shale, grayish-black, noncalcareous, slickensided; includes light-brownish-gray sideritic concretions up to 2.5 in. thick; contains white calcareous fossil shells and shell fragments, with abundant occurrences from 110.2 to 110.6 ft and from 111.8 to 111.9 ft.....	108.0	4.3
Limestone, grayish-black, impure, very shaly; contains abundant white fossil shell fragments....	112.3	0.1
Shale, grayish-black, calcareous, carbonaceous; contains abundant fossil brachiopods.....	112.4	0.3
Limestone, grayish-black, impure, shaly; contains abundant fossil shell fragments.....	112.7	0.1
Coal, black, moderately friable, white calcite on cleat surfaces (Secor rider coal).....	112.8	0.1
Shale, medium-dark-gray, slickensided.....	119.9	0.6
Coal, black, very impure, shaly; white calcite on cleat surfaces.....	113.5	0.3
Shale, grayish-black, coaly; contains abundant thin stringers of bright, hard coal.....	113.8	0.3
Shale, dark-gray to grayish-black; contains coalified plant material and a few thin stringers of bright, hard coal.....	114.1	1.8
Coal, black, bright, moderately friable; includes white calcite on cleat surfaces and pyrite masses up to 0.5 in. thick (Secor coal).....	115.9	0.3
Shale, dark-gray, coaly, slickensided, noncal-		

careous.....	116.2	0.4
Siltstone, medium-dark-gray; noncalcareous; includes abundant black carbonized plant compressions on stratification surfaces.....	116.6	1.0
Sandstone, medium-gray and light-gray, very fine-grained, shaly, noncalcareous, micaceous, even-bedded to cross-bedded; thick-bedded in part; contains black macerated plant fragments; bioturbated in part; includes soft-sediment deformation features in places; grades into underlying unit (Bluejacket Sandstone).....	117.6	17.4
Siltstone, medium-gray, noncalcareous; contains some thin laminae of very fine-grained sandstone..	135.0	1.0
Total Depth		136.0

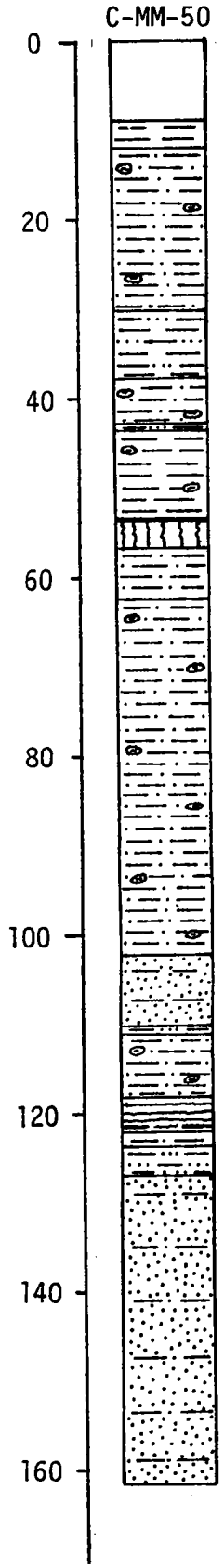


NW¼SW¼NW¼NW¼NE¼ sec. 18, T. 13 N., R. 18 E., Muskogee County. Drilled 12 ft south from the south edge of stock pond. Surface elevation, estimated from topographic map, 567 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, dark-yellowish-brown, sandy; contains organic material (soil).....	0.0	1.4
Gravel, moderate-yellowish-brown, fine to medium, sandy, clayey; clasts predominantly subrounded to subangular ironstone and very fine-grained sandstone.....	1.4	1.6
Krebs Group		
Boggy Formation		
Shale, grayish-black; contains very dark-red ironstone concretions.....	3.0	1.0
Shale, light-olive-gray, clayey; includes a moderate-reddish-brown ironstone concretion at 7.0 ft..	4.0	4.0
Shale, light-olive-gray with moderate-brown and brownish-black deposits on stratification surfaces, jointed.....	8.0	3.0
Shale, grayish-black, brittle, includes streaks of soft, grayish-orange clay from 15.0 to 15.5 ft; some interbedded dark-gray shale in upper part of unit.....	11.0	5.3
Ironstone, medium-gray with some moderate-brown staining, hard.....	16.3	0.2
Shale, dark-gray.....	16.5	0.3
Limestone, medium-light-gray, very fine-grained, hard, nonfossiliferous.....	16.8	0.4
Shale, dark-gray; contains some minor pyrite crusts on stratification planes and joint surfaces; thin calcite deposits occasionally occur on bedding planes; includes sparsely distributed pyritic and calcareous brachiopod shells and shell fragments; weakly calcareous.....	17.2	29.3
Siltstone, medium-dark-gray, highly shaly.....	46.5	0.2
Shale, dark-gray; contains scattered pyritized brachiopod shells and sandy pyritic lenses up to 0.5 in. thick and 1 in. long; weakly calcareous...	46.7	7.8
Limestone, light-brownish-gray, dense, hard, nonfossiliferous.....	54.5	0.2
Shale, dark-gray, noncalcareous, includes some thin calcite crusts on stratification surfaces; contains 3-in.-thick, light-brownish-gray limestone layers at 56.5 and 60 ft.....	54.7	10.3
Limestone, light-brownish-gray, very hard, non-		

fossiliferous	65.0	0.4
Shale, dark-gray, noncalcareous	65.4	12.8
Shale, dark-gray, highly calcareous; contains calcareous and pyritic brachiopod shells	78.2	1.6
Limestone, medium-gray, impure, shaly; includes abundant fossil brachiopod shells and fragments	79.8	0.2
Limestone, dark-gray, highly shaly, fossil brachiopod shells sparsely distributed	80.0	0.8
Limestone, medium-gray, hard, very highly fossiliferous, brachiopods abundant, shaly in part (Inola Limestone)	80.8	3.1
Shale, dark-gray, hard, very highly calcareous; includes some 1- to 2-in.-thick bands of shaly, highly fossiliferous limestone as well as several horizontal and diagonal veinlets of white calcite	83.9	4.8
Limestone, light-gray with dark-gray matrix, hard, pyritic at base; very highly fossiliferous; brachiopod shells and fossil hash abundant	88.7	0.2
Coal, black, bright, banded, moderately friable, pyritic at top (unnamed coal)	88.9	0.3
Shale, grayish-black, hard, pyritic, noncalcareous	89.2	0.7
Coal, black, shaly, highly pyritic (Peters Chapel coal)	89.9	0.6
Coal, black, bright, moderately friable (Peters Chapel coal)	90.5	1.4
Shale, brownish-black, highly carbonaceous; contains thin stringers of irregularly spaced, bright coal throughout unit	91.9	7.4
Sandstone, medium-gray, very fine-grained, impure, silty and shaly	99.3	0.5
Shale, medium-dark-gray to dark-gray with light-gray and light-brownish-gray bands; interbedded at regular intervals with very fine-grained sandstone and siltstone layers 1/64 to 1.5 in. thick that are cross-laminated, contorted in part, and bioturbated in places; noncalcareous	99.8	11.5
Shale, medium-dark-gray, noncalcareous	111.3	5.5
Shale, dark-gray with light-brownish-gray bands; interbedded at irregular intervals with very fine-grained sandstone and siltstone layers 1/64 to 1 in. thick that are cross-laminated and bioturbated in places; noncalcareous; includes some hard light-olive-gray ironstone concretions occurring as layers ~0.5 in. thick and as spheroidal masses up to 8 in. in diameter	116.8	9.2
Shale, medium-dark-gray, highly silty; contains some pyrite nodules up to 2 in. long and 0.5 in.		

thick; includes abundant coalified plant compressions; grades into underlying unit.....	126.0	3.0
Siltstone, medium-dark-gray; includes a minor amount of very fine-grained sandstone; bioturbated; contains abundant coalified plant compressions.....	129.0	3.7
Shale, dark-gray, very highly silty, carbonaceous; contains abundant, very thin stringers of coal; coaly shale from 135.7 to 136.0 ft (Secor coal interval?).....	132.7	3.3
Siltstone, medium-dark-gray, shaly, interlaminated with minor, very fine-grained sandstone; grades into underlying unit.....	136.0	2.0
Sandstone, medium-gray with light-gray bands, very fine-grained, shaly, interlaminated with siltstone, wavy-bedded, bioturbated, noncalcareous, micaceous; contains black carbonized, macerated plant debris on stratification surfaces (Bluejacket Sandstone).....	138.0	15.6
Shale, grayish-black, hard, brittle, noncalcareous..	153.6	1.0
Sandstone, medium-gray with light-gray bands, very fine-grained, bioturbated, noncalcareous, micaceous; includes abundant black carbonized plant debris on stratification surfaces; wavy-bedded to even-bedded; siltstone in part (Bluejacket Sandstone).....	154.6	15.4
Total Depth		170.0

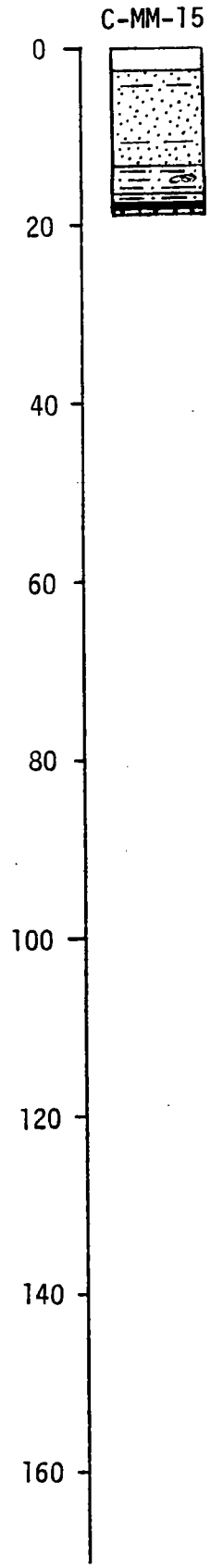


SW¼SW¼NW¼NE¼NW¼ sec. 29, T. 13 N., R. 18 E., Muskogee County. Drilled at south edge of farm pond directly east of driveway 560 ft FNL and 1400 ft FWL. Surface elevation, estimated from topographic map, 540 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, very fine, silty, contains organic material	0.0	1.0
Sand, pale-yellowish-brown, very fine, silty	1.0	1.0
Sand, dark-yellowish-orange, very fine, clayey, oxidized	2.0	2.5
Sand and gravel, light-brown, clayey, weathered	4.5	2.5
Clay, grayish-orange, sandy, gravelly	7.0	2.0
Krebs Group		
McAlester Formation		
Shale, pale-yellowish-brown with dark-yellowish-orange bands, clayey, weathered	9.0	1.5
Shale, dark-yellowish-brown to brownish-gray, partly weathered	10.5	1.5
Shale, dark-gray; contains abundant siltstone-filled burrows and thin siltstone lenses, fractured; includes some white calcite along fracture surfaces; contains light-brownish-gray sideritic concretions ~0.5 in. thick	12.0	18.0
Siltstone and shale, interbedded, medium-dark-gray and medium-light-gray; includes some stringers of very fine-grained sandstone; extensively burrowed, fractured, slickensided; includes white calcite occurring in vertical veins up to 1/8 in. thick	30.0	7.5
Shale, dark-gray with medium-light-gray siltstone laminae, bioturbated, fractured; includes light-brownish-gray sideritic concretions up to 1.5 in. thick; contains white calcite in vertical veins	37.5	5.0
Siltstone, medium-light-gray, shaly; wavy-bedded, extensively bioturbated; noncalcareous; includes some contorted thin strata of very fine-grained sandstone	42.5	0.7
Shale, dark-gray, noncalcareous, fractured, slickensided; includes light-brownish-gray sideritic concretions up to 2.5 in. thick	43.2	10.1
Coal, black, moderately friable, very impure, shaly (unnamed coal)	53.3	0.1
Underclay, medium-light-gray, bioturbated, slickensided, silty in part; includes some brownish-black carbonaceous streaks; grades into underlying		

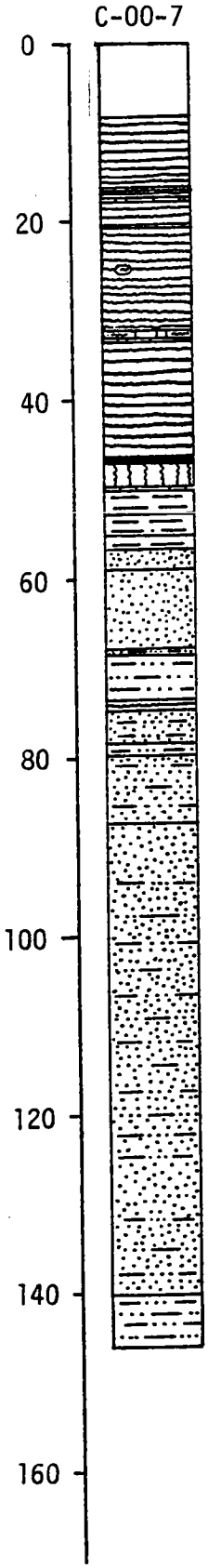
shale unit.....	53.3	0.1
Shale, medium-gray, silty, bioturbated.....	56.2	1.8
Shale, dark-gray, silty; contains fossil plant leaf compressions in upper 1 ft; includes pyritized and calcareous brachiopod fossils, bioturbation features and sideritic concretions up to 1 in. thick, and white calcite occurring as fracture fillings.....	58.0	4.0
Shale, dark-gray, silty; includes bioturbation features and light-brownish-gray sideritic concretions 1/8 to 2 in. thick; contains sparsely distributed calcareous brachiopod shells and minor pyrite; slickensided; grayish-black in bottom 5 ft.....	62.0	39.7
Sandstone, medium-light-gray with dark-gray bands, very fine-grained, shaly, massive to wavy-laminated in part, noncalcareous, bioturbated; includes streaks of coal and black macerated plant material; cross-bedded in places.....	101.7	7.9
Siltstone, medium-dark-gray, sandy, noncalcareous; includes thin streaks of coal in lower 2 in.....	109.6	0.5
Shale, dark-gray, very silty, noncalcareous; includes abundant light-brownish-gray sideritic concretions 1/8 to 1 in. in diameter; contains some thin laminae of very fine-grained sandstone; slickensided.....	110.1	7.4
Shale, black, noncalcareous, carbonaceous; contains abundant plant compressions and thin stringers of coal; coaly shale in bottom 8 in. of unit.....	117.5	3.8
Shale, dark-gray, silty, slickensided; contains black carbonized plant compressions; grades into underlying unit.....	121.3	1.5
Siltstone, medium-dark-gray, noncalcareous, bioturbated; contains thin, wavy laminae of light-gray, very fine-grained sandstone; includes some black carbonized plant compressions; grades into underlying unit.....	122.8	3.2
Sandstone, medium-dark-gray with very light-gray laminae, very fine-grained, even-bedded, shaly, extensively bioturbated; below 132 ft becomes light-gray with medium-dark-gray bands (Warner Sandstone).....	126.0	34.0
Total Depth		160.0

60 (C-MM-15)



NE¼NW¼NW¼NW¼NW¼ sec. 3, T. 13 N., R. 19 E., Muskogee County. Drilled in pasture north of building site 270 ft FWL and 115 ft FNL. Surface elevation, estimated from topographic map, 658 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-yellowish-brown, very fine-grained, silty, unbedded; contains organic material (soil).....	0.0	2.5
Krebs Group		
McAlester Formation		
Sandstone, moderate-reddish-brown to dark-yellowish-orange, very fine- to fine-grained, noncalcareous, well-indurated; includes some soft shaly layers (Warner Sandstone).....	2.5	5.5
Sandstone, grayish-orange to very pale-orange with light-brown bands, very fine- to fine-grained, micaceous, noncalcareous, cross-bedded; includes some shaly layers and some ferruginous concretions ~1.5 in. long and 0.25 in. thick (Warner Sandstone).....	8.0	5.8
Shale, grayish-orange and dark-yellowish orange, banded, micaceous, interbedded with very fine-grained sandstone, silty; includes some light-brown concretionary layers.....	13.8	2.7
Shale, medium-gray with dark-gray bands, silty.....	16.5	0.8
Shale, black, highly carbonaceous; includes laminae of bright coal.....	17.3	0.2
Coal, black, bright, moderately friable, moderate-reddish-brown iron-oxide deposits on cleat surfaces (Keefton coal).....	17.5	0.7
Underclay, light-gray; contains black carbonized plant fragments.....	18.2	0.3
Total Depth		18.5

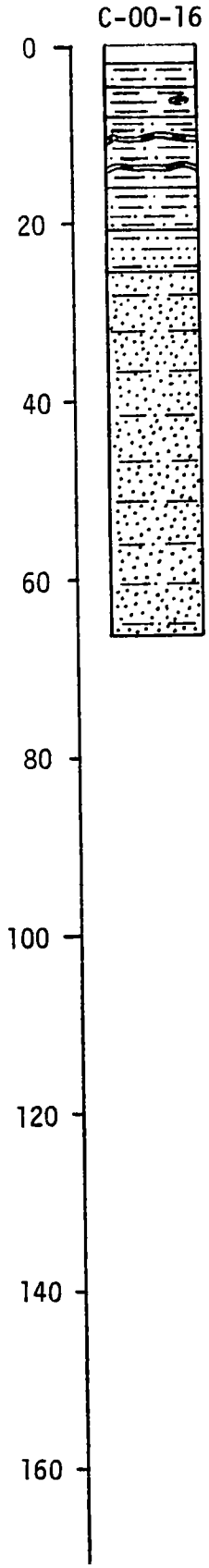


SW¼NW¼NE¼NW¼NE¼ sec. 25, T. 14 N., R. 14 E., Okmulgee County. Surface elevation, estimated from topographic map, 652 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, grayish-brown; contains abundant organic matter (soil)	0.0	1.8
Sand, dusky-brown, very highly weathered, silty, clayey, friable; contains gravel-sized clasts of reworked sandstone; contains minor organic matter	1.8	1.2
Sand, dark-yellowish-brown with dark-yellowish-orange bands, becoming dusky-yellowish-brown at 7 ft, weathered, gravelly, silty, clayey, poorly sorted, friable	3.0	5.0
Cabaniss Group		
Senora Formation		
Shale, black, weathered to grayish-brown with dusky-yellow streaks in upper 6 in., brittle; includes some dark-reddish-brown iron-oxide deposits on joint surfaces; pyritic at 11 ft; contains a few brachiopod fossils	8.0	5.2
Shale, dark-gray to grayish-black	13.2	2.5
Shale, grayish-black, calcareous; contains a few small pyrite lenses	15.7	1.0
Limestone, dark-gray, impure, shaly; contains fossil brachiopods	16.7	0.2
Shale, grayish-black, highly calcareous	16.9	0.5
Limestone, dark-gray, impure, shaly; contains abundant fossil brachiopods along stratification surfaces	17.4	0.4
Shale, black, brittle, calcareous; contains pyrite nodules and veinlets	17.8	2.6
Limestone, medium-gray, nonfossiliferous; probably a concretion	20.4	0.1
Shale, grayish-black, hard, brittle, calcareous; pyritic zone from 22.5 to 23.0 ft; contains fossil brachiopods from 23.2 to 23.6 ft; includes a medium-gray siderite concretion from 25.3 to 25.5 ft; contains a pyritic zone from 28.2 to 28.4 ft	20.5	11.5
Limestone, medium-light-gray to medium-dark-gray, impure, silty; contains disseminated pyrite and pyritized fossil brachiopods; very highly fossiliferous, includes some fossil hash	32.0	0.8
Shale, black, brittle, pyritic	32.8	0.4
Limestone, medium-dark-gray, impure, silty, shaly;		

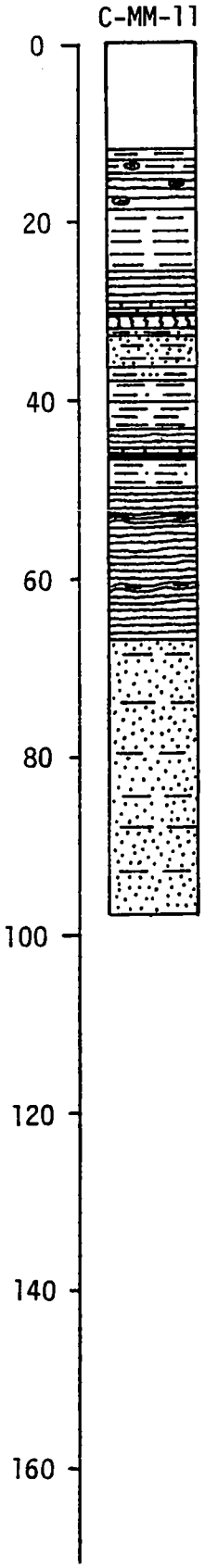
highly fossiliferous, contains fossil hash.....	33.2	0.1
Shale, grayish-black to black, calcareous; contains scattered phosphatic nodules, small brachiopod fossils, and disseminated pyrite, as well as crusts, veinlets, and laminae of pyrite.....	33.3	12.7
Coal, black, bright, moderately friable; includes pyrite and white calcite on cleat surfaces (Tebo coal).....	46.0	0.6
Underclay, medium-gray, calcareous in lower 24 in.; includes some oblate impure limestone nodules 0.5 in. in diameter in lower 1 ft.....	46.6	3.0
Limestone, gray, fine-grained, hard, impure, silty; contains sparsely distributed, poorly preserved plant fossils.....	49.6	0.4
Shale, medium-gray, noncalcareous; contains disseminated pyrite.....	50.0	1.5
Shale, medium-dark-gray.....	51.5	1.0
Shale, dark-gray, silty, hard.....	52.5	2.5
Shale, medium-dark-gray, soft.....	55.0	1.3
Sandstone, light-gray, very fine-grained, micaceous; bioturbated; includes a 2-in.-thick zone of poorly preserved marine fossils directly below overlying shale unit.....	56.3	2.5
Sandstone, medium-gray with dark-gray laminae, very fine-grained, becomes fine-grained with depth, micaceous, bedding disturbed in places; contains scattered lenses of pyrite about 1/32 to 1/8 in. in diameter.....	58.8	9.2
Siltstone, medium-gray; includes some very fine-grained sandstone; contains sparsely distributed fossil brachiopods.....	68.0	0.2
Siltstone, dark-gray, hard; contains sparsely distributed fossil brachiopods.....	68.2	5.2
Shale, grayish-black.....	73.4	1.0
Sandstone, medium-gray with dark-gray bands, very fine- to fine-grained, noncalcareous, micaceous; bedding alternates from parallel- to wavy- to cross-bedded; interlaminated with siltstone in part.....	74.4	3.7
Siltstone, dark-gray, hard, micaceous; includes abundant black carbonized plant fragments on stratification surfaces.....	78.1	1.4
Sandstone, medium-gray with dark-gray bands, very fine-grained, noncalcareous, micaceous; interbedded with dark-gray siltstone; black carbonized plant fragments abundant; stratification alternates from cross-laminated to wavy-bedded to parallel-bedded; bioturbated in lower 1 ft of		

unit.....	79.5	7.8
Sandstone, light-olive-gray with grayish-black bands, fine-grained, noncalcareous, micaceous; even-bedded to cross-bedded; contains abundant black carbonized plant fragments; soft-sediment deformation features common; includes some burrow fillings and bioturbation features; becomes predominantly medium-gray with light-olive-gray and grayish-black bands, very fine-grained, and silty from 93.0 to 127.5 ft and 131.0 to 140.0 ft.....	87.3	52.7
Siltstone, medium-dark-gray, noncalcareous, micaceous; even-bedded and cross-bedded, interbedded with medium-gray, very fine-grained sandstone, coarsens upward; contains minor black carbonized plant fragments; includes some burrow fillings....	140.0	6.0
Total Depth		146.0



NE¼NE¼NE¼NE¼ sec. 4, T. 14 N., R. 15 E., Okmulgee County. Surface elevation, estimated from topographic map, 648 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, pale-yellowish-brown, sandy, unbedded, contains organic material (soil).....	0.0	2.0
Cabaniss Group		
Senora Formation		
Shale, dark-yellowish-brown, silty, highly weathered, soft.....	2.0	3.0
Shale, dark-yellowish-brown; clayey, weathered; contains gravel-sized particles of moderate-brown clay-ironstone.....	5.0	3.0
Shale, grayish-orange to light-olive-gray, silty, micaceous; includes numerous 0.25-in.-thick dusky-brown clay-ironstone layers; becomes dark-yellowish-brown below 10 ft; stained light-brown on stratification surfaces; sandy in lower 4 ft...	8.0	8.0
Shale, moderate-yellowish-brown to dusky-yellowish-brown, highly sandy; stained moderate-brown on stratification surfaces.....	16.0	1.4
Shale, light-olive-gray to medium-dark-gray, highly silty and sandy, contains thin, lensing stringers of light-gray, very fine-grained sandstone.....	17.4	3.3
Siltstone, medium-dark-gray to dark-gray, noncalcareous; contains numerous thin stringers and lenses of light-gray, very fine-grained sandstone, micaceous.....	20.7	5.1
Sandstone, medium-dark-gray, very fine-grained, highly silty and shaly; noncalcareous; includes stringers and burrows filled with light-gray, very fine-grained sandstone; cross-laminated in part; soft-sediment deformation features common; some black macerated plant material on stratification surfaces.....	25.8	40.2
Total Depth		66.0

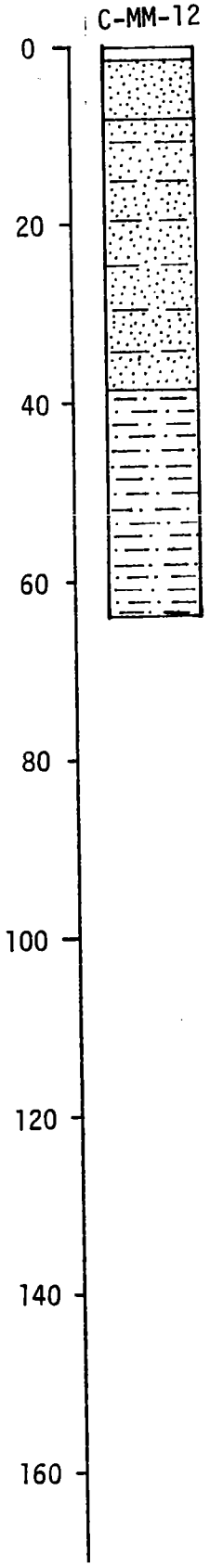


63 (C-MM-11)

SW¼NW¼NW¼SW¼ sec. 4, T. 14 N., R. 17 E., Muskogee County. Surface elevation, estimated from topographic map, 572 ft.

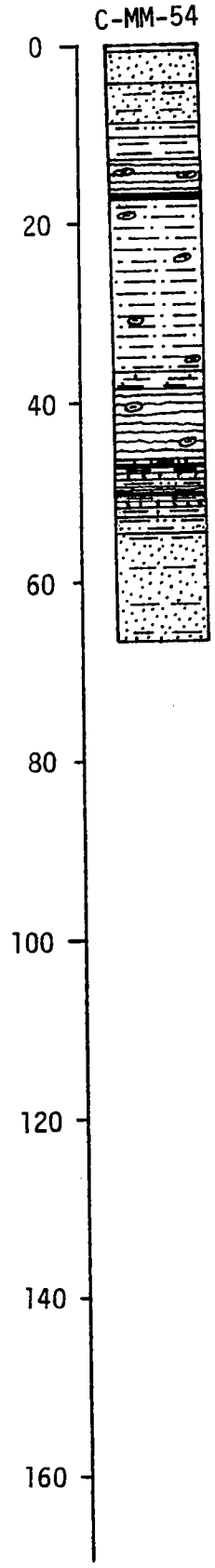
	Depth to unit top (ft)	Thickness of unit (ft)
Silt, pale-yellowish-brown, sandy, unbedded; contains organic matter (soil).....	0.0	2.0
Gravel, light-brown, fine-grained, clayey.....	2.0	0.3
Clay, moderate-yellowish-brown, soft, weathered.....	2.3	9.7
Krebs Group		
Boggy Formation		
Shale, medium-dark-gray with dark-yellowish-orange mottling, weathered.....	12.0	1.4
Shale, dusky-yellowish-brown with moderate-brown and black bands; includes some moderate-yellowish-brown ironstone concretions ~1 in. thick.....	13.4	1.6
Shale, black, fissile; includes light-brown ironstone concretions.....	15.0	4.0
Shale, dark-gray to grayish-black, soft.....	19.0	6.8
Shale, black, brittle; contains pyritic stringers and white calcite veinlets.....	25.8	3.6
Limestone, dark-gray, impure, silty, fossiliferous; brachiopod and pelecypod shell fragments abundant (Inola Limestone).....	29.4	0.9
Coal, black; interfingers with limestone in upper part and grades into carbonaceous shale in lower part (Bluejacket coal).....	30.3	0.1
Underclay, medium-gray, sandy; contains black coalified plant roots; grades into underlying unit.....	30.4	1.6
Shale, medium-gray, sandy, soft.....	32.0	0.7
Sandstone, very light-gray with medium-gray bands, very fine-grained, shaly, noncalcareous; grades into underlying unit.....	32.7	3.7
Siltstone, light-gray, interbedded with medium-gray shale, noncalcareous.....	36.4	1.6
Shale, medium-dark-gray with medium-light-gray bands, silty, noncalcareous.....	38.0	2.2
Shale, dark-gray with medium-gray bands, noncalcareous, sparsely fossiliferous.....	40.2	3.3
Shale, black, hard, fossiliferous, calcareous.....	43.5	2.3
Limestone, dark-gray, impure, silty, shaly, fossiliferous; contains broken shell fragments.....	45.8	0.2
Coal, black, bright, moderately friable; white calcite on cleat surfaces (Peters Chapel coal)....	46.0	0.9
Shale, dark-gray, silty, noncalcareous.....	46.9	3.1
Shale, grayish-black to black, hard, brittle; includes numerous pinkish-gray sideritic concretion-		

ary layers 0.5-2.5 in. thick; contains sparsely distributed calcareous fossil brachiopod shells in upper half.....	50.0	17.2
Sandstone, medium-light-gray, very fine- to fine-grained, noncalcareous, wavy-laminated and cross-bedded, well-indurated; contains a few poorly preserved fossil shells in upper 3 ft; includes abundant layers of medium-gray shale, and laminae containing black macerated plant fragments in lower 22 ft.....	67.2	30.8
Total Depth		98.0



NW¼NW¼NE¼SW¼ sec. 14, T. 14 N., R. 17 E., Muskogee County. Surface elevation, estimated from topographic map, 710 ft.

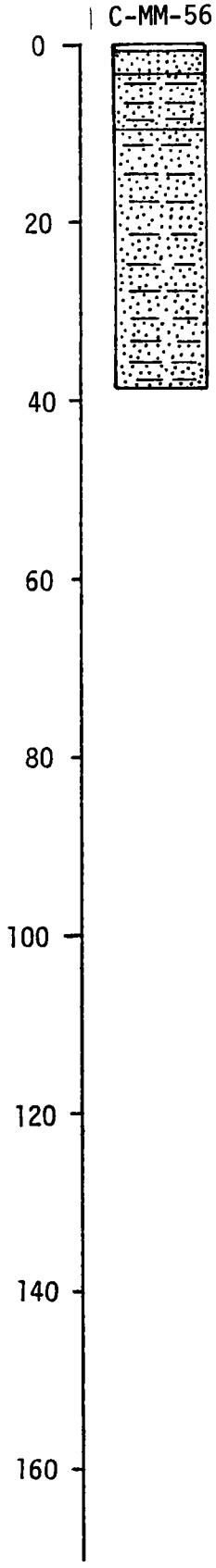
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, unbedded, very fine-grained, silty; contains organic material.....	0.0	1.8
Krebs Group		
Boggy Formation		
Sandstone, light-brown, fine- to very fine-grained, soft, weathered, unconsolidated, noncalcareous.....	1.8	2.7
Sandstone, dark-yellowish-orange, fine- to very fine-grained, noncalcareous, weathered; includes some hard layers.....	4.5	3.5
Sandstone, grayish-orange with moderate-brown banding, fine- to very fine-grained, noncalcareous; includes some grayish-orange to medium-gray shale layers about 0.5-1 in. thick.....	8.0	15.5
Sandstone, yellowish-gray with medium-dark-gray shale layers up to 0.25 in. thick, fine- to very fine-grained, cross-laminated, micaceous, noncalcareous; becomes medium-light-gray at 27.5 ft; includes abundant laminae of black macerated plant material (Bluejacket Sandstone).....	23.5	14.5
Savanna Formation(?)		
Shale, dark-gray silty, noncalcareous, uniform in character.....	38.0	25.0
Total Depth		63.0



NE¼NW¼SW¼NE¼NE¼ sec. 15, T. 14 N., R. 17 E., Muskogee County. Drilled in pasture about 100 ft southwest from pole shed 700 ft FNL and 1100 ft FEL. Surface elevation, estimated from topographic map, 642 ft.

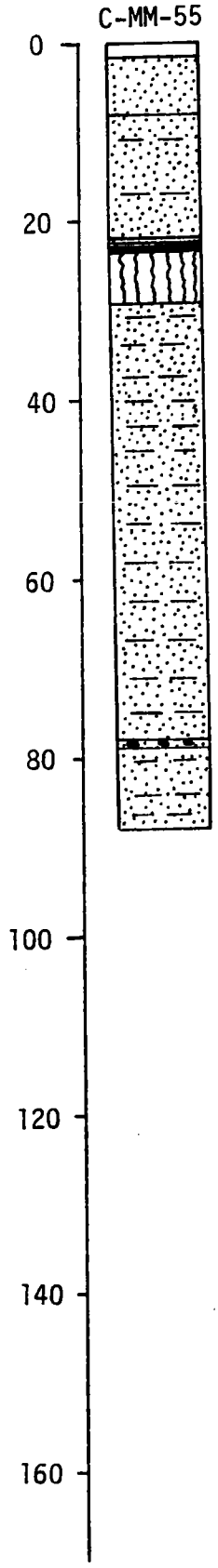
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, very fine-grained, silty, contains organic material.....	0.0	0.5
Krebs Group		
Boggy Formation		
Sandstone, moderate-brown, ferruginous, very fine-grained, weathered.....	0.5	0.5
Sandstone, light-brown, fine- to very fine-grained, ferruginous, weathered.....	1.0	3.2
Sandstone, moderate-reddish-brown with grayish-orange and dark-yellowish-orange bands, very fine-grained, silty, clayey; wavy-laminated and cross-laminated (Crekola Sandstone).....	4.2	4.8
Siltstone, pale-yellowish-brown, shaly, sandy.....	9.0	1.2
Shale, dusky-yellowish-brown with dark-yellowish-orange and dark-gray bands, clayey.....	10.2	2.8
Shale, grayish-black with dark-yellowish-orange bands; includes thin layers of clay-ironstone.....	13.0	3.6
Shale, black, carbonaceous.....	16.6	0.4
Coal, black, moderately friable; dark-reddish-brown iron-oxide deposits on cleat surfaces; includes some pyritic laminae (Peters Chapel coal).....	17.0	0.6
Shale, medium-gray to medium-dark-gray, silty, non-calcareous, bioturbated; contains some pyritic burrows and 0.5- to 1-in.-thick, light-brownish-gray sideritic concretions.....	17.6	18.5
Shale, dark-gray, calcareous; contains some sparsely distributed, white, fossil brachiopod shells.....	36.1	1.9
Shale, grayish-black to black, noncalcareous; includes some hard, dense, pyritic, sideritic concretions 0.5-3 in. thick.....	38.0	7.5
Shale, black, very calcareous, carbonaceous; contains small pyrite-filled burrows and marine shell fragments.....	45.5	0.4
Limestone, medium-dark-gray, hard, impure, silty; contains abundant fossil shell fragments.....	45.9	0.2
Coal, black, impure, interlaminated with carbonaceous shale; contains disseminated pyrite (Secor rider coal).....	46.1	0.2
Shale, grayish-black, very carbonaceous, pyritic, bioturbated in lower part.....	46.3	0.1
Underclay, medium-light-gray, bioturbated,		

kaolinitic.....	46.4	0.2
Siltstone, medium-gray, hard, bioturbated, unbedded.....	46.6	0.2
Shale, black, silty, hard, carbonaceous, bioturbated.....	46.8	0.3
Coal, black, impure and shaly in upper 0.5 in.; contains numerous pyrite lenses ~0.25 in. thick and 0.75 in. long (Secor coal).....	47.1	0.2
Shale, dark-gray, slickensided; includes a 1/8-in.-thick layer of black, bright coal at base of unit.	47.3	0.4
Underclay, medium-light-gray; includes abundant black carbonized plant compressions and disseminated pyrite.....	47.7	0.7
Shale, medium-light-gray, noncalcareous, silty, bioturbated; grades into underlying unit.....	48.4	1.6
Siltstone, medium-gray, shaly, noncalcareous, laminated, bioturbated; includes some thin laminae of light-gray, very fine-grained sandstone; grades into underlying unit.....	50.0	3.3
Sandstone, medium-gray and light-gray, very fine-grained, silty, shaly, noncalcareous, laminated, microfaulted in places, bioturbated; contains black macerated plant fragments; includes numerous soft-sediment deformation features (Bluejacket Sandstone).....	53.3	5.7
Sandstone, medium-dark-gray with light-gray laminae, very silty and shaly, very fine-grained, even-bedded, noncalcareous; includes black macerated plant fragments on some stratification surfaces (Bluejacket Sandstone).....	59.0	7.0
Total Depth		66.0



SW¼NE¼SE¼NE¼SW¼ sec. 15, T. 14 N., R. 17 E., Muskogee County. Drilled in pasture at crest of hill directly west of corral 1740 ft FSL and 2570 ft FWL. Surface elevation, estimated from topographic map, 710 ft.

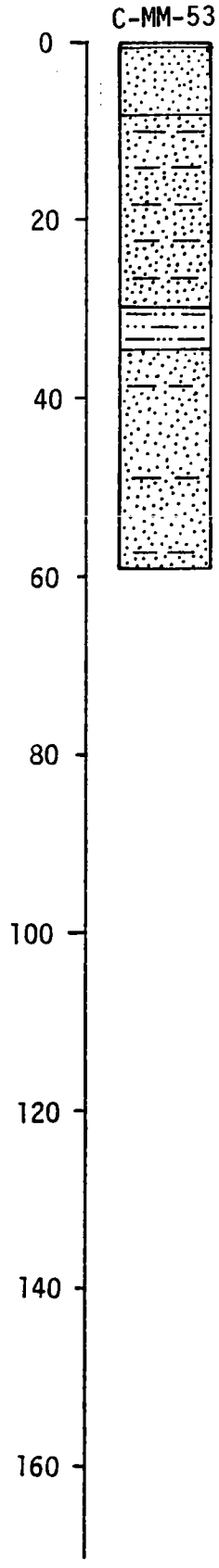
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-yellowish-brown, very fine-grained, silty, contains organic material.....	0.0	1.0
Krebs Group		
Boggy Formation		
Sandstone, dark-reddish-brown, very fine-grained, indurated, ferruginous, weathered.....	1.0	2.5
Sandstone, moderate-orange-pink, very fine-grained, very clayey, soft, weathered.....	3.5	6.0
Sandstone, grayish-orange with dark-yellowish-orange bands, fine- to very fine-grained, cross-bedded; contains iron-oxide deposits on parting surfaces.....	9.5	3.3
Sandstone, light-olive-gray, fine- to very fine-grained, noncalcareous; includes a 2-in.-thick shaly layer from 14.5 to 14.7 ft; contains thin wisps of medium-dark-gray shaly siltstone; massive, with some interbeds of laminated, shaly sandstone; contains black macerated plant fragments.....	12.8	7.2
Sandstone, medium-light-gray to light-olive-gray with dark-gray bands, very fine-grained, shaly, noncalcareous, cross-bedded, wavy-laminated in part; contains black macerated plant fragments on stratification surfaces; includes soft-sediment deformation features and broken, disrupted beds in places (Bluejacket Sandstone).....	20.0	18.0
Total Depth		38.0



SE¼SW¼NW¼SW¼SW¼ sec. 15, T. 14 N., R. 17 E., Muskogee County. Drilled in a hay meadow 190 ft FWL and 560 ft FSL. Surface elevation, estimated from topographic map, 710 ft.

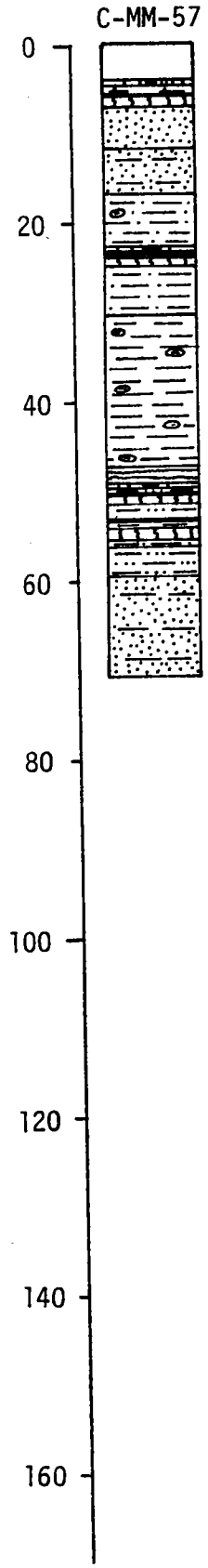
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, very fine-grained, silty, unconsolidated, contains organic material	0.0	1.5
Krebs Group		
Boggy Formation		
Sandstone, moderate-reddish-orange to light-brown, very fine-grained, well-sorted, well-rounded, friable, weathered, noncalcareous (Crekola Sandstone)	1.5	2.5
Sandstone, grayish-orange to dark-yellowish-orange with moderate-reddish-brown flecks, very fine-grained, well-sorted, well-rounded, moderately friable, weathered, noncalcareous	4.0	4.0
Sandstone, light-brown to grayish-orange with moderate-reddish-brown bands and black streaks, very fine- to fine-grained, noncalcareous, cross-bedded; contains some clayey shale layers and thin coal laminae as well as black macerated plant material	8.0	8.3
Sandstone, medium-gray, fine- to medium-grained, noncalcareous; cross-bedded; contains abundant laminae of black coal; includes some sparsely distributed medium-dark-gray clay-shale layers up to 1/8 in. thick	16.3	4.4
Sandstone, medium-dark-gray with medium-gray bands, very fine-grained, shaly, noncalcareous, wavy, laminated	20.7	0.8
Shale, brownish-gray to olive-black, clayey, very carbonaceous; contains black carbonized plant material	21.5	1.0
Coal, black, bright, moderately friable; contains minor pyritic laminae (Secor coal)	22.5	0.7
Underclay, light-gray, kaolinitic, bioturbated, contains black carbonized plant fragments	23.2	5.8
Sandstone, medium-dark-gray with light-gray bands, very silty and shaly, very fine-grained, cross-bedded and cross-laminated, micaceous, noncalcareous, bioturbated in places	29.0	7.4
Sandstone, light-olive-gray with medium-dark-gray bands, very fine- to fine-grained, shaly in part, noncalcareous, bioturbated in part, cross-		

bedded; contains some shaly laminated beds interbedded with thicker massive beds; massive, with thin wisps of medium-dark-gray shaly siltstone from 48 to 57 ft and from 62.5 to 77.0 ft; includes some black macerated plant fragments in places.....	36.4	40.6
Conglomerate, light-brownish-gray; contains numerous rounded shale pebbles up to 1 in. long and 0.25 in. thick; contact with overlying and underlying units sharp.....	77.0	0.1
Sandstone, dark-gray with light-gray bands, very fine-grained, shaly, noncalcareous, extensively bioturbated, cross-laminated; includes abundant black macerated plant material on stratification surfaces.....	77.1	9.9
Total Depth		87.0



SW¼NW¼SW¼SW¼NW¼ sec. 16, T. 14 N., R. 17 E., Muskogee County. Drilled in pasture directly north of farm pond 120 ft FWL and 2200 ft FNL. Surface elevation, estimated from topographic map, 605 ft.

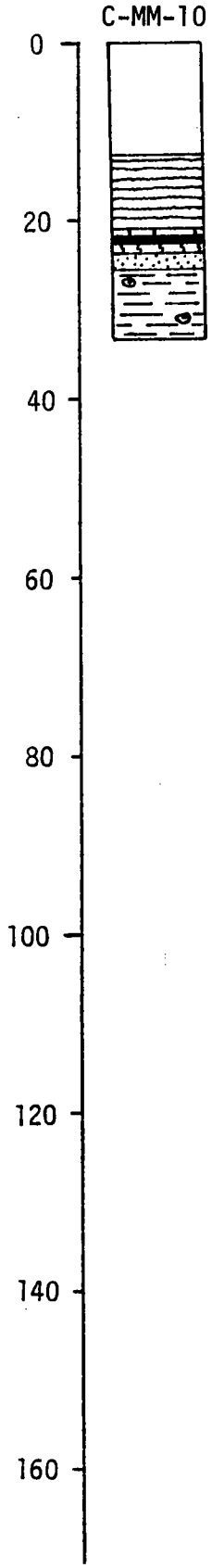
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dark-yellowish-brown, silty, contains organic material	0.0	0.5
Krebs Group		
Boggy Formation		
Sandstone, grayish-orange, very fine-grained, non-calcareous, micaceous, ripple-marked, oxidized; crops out sporadically near drill site	0.5	5.5
Sandstone, medium-light-gray with light-brown flecks, very fine-grained, well-indurated	6.0	2.0
Sandstone, medium-light-gray with medium-dark-gray bands, very fine-grained, shaly, noncalcareous, cross-laminated, cross-bedded, wavy-bedded in part; contains black macerated plant fragments on stratification surfaces; includes some scour-and-fill features and soft-sediment deformation features	8.0	21.3
Siltstone, medium-dark-gray, shaly, noncalcareous, even- to wavy-laminated; includes minor streaks and small lenses of light-gray, very fine-grained sandstone	29.3	4.7
Sandstone, light-olive-gray; predominantly fine- to medium-grained and massive, but includes some interbeds of medium-dark-gray and very light-gray, cross-laminated, shaly, very fine-grained sandstone; noncalcareous; bioturbated in part; contains some black macerated plant material; contact with overlying unit sharp (Bluejacket Sandstone)	34.0	24.0
Total Depth		58.0



SW¼NW¼NE¼NW¼SW¼ sec. 17, T. 14 N., R. 17 E., Muskogee County. Drilled in hay meadow just west of shallow ravine 860 ft FWL and 2380 ft FSL. Surface elevation, estimated from topographic map, 573 ft.

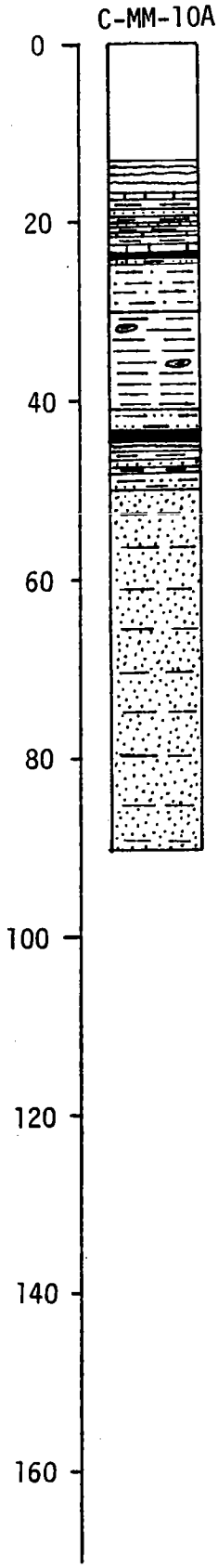
	Depth to unit top (ft)	Thickness of unit (ft)
Silt, dusky-brown, contains organic material.....	0.0	3.0
Silt, moderate-brown, clayey, sandy, gravelly at base of unit; gravel contains abundant clasts of hard, black, brittle shale.....	3.0	1.0
Krebs Group		
Boggy Formation		
Limestone, medium-dark-gray, hard, impure, silty, highly fossiliferous, crinoid columnals abundant, weathers brownish-gray (Inola Limestone).....	4.0	0.5
Clay, grayish-brown to dark-yellowish-brown, calcareous.....	4.5	0.4
Coal, brownish-black, soft, smutty, highly weathered (Bluejacket coal).....	4.9	0.1
Underclay, light-gray with dark-yellowish-orange mottling, kaolinitic, calcareous; contains black carbonized plant fragments.....	5.0	1.5
Sandstone, dark-reddish-brown to medium-light-gray, very fine-grained, micaceous, noncalcareous, massive.....	6.5	5.0
Sandstone, dark-yellowish-orange, very fine-grained, shaly, soft, oxidized, friable.....	11.5	0.5
Sandstone, light-gray with medium-gray bands, very fine-grained, silty, shaly, laminated, noncalcareous (Crekola Sandstone).....	12.0	4.5
Shale, dark-gray, silty, becomes grayish-black around 19.5 ft, noncalcareous; contains sparsely distributed brachiopod fossils; includes rare light-brownish-gray sideritic concretions up to 1 in. thick.....	16.5	6.0
Limestone, grayish-black, impure, shaly, carbonaceous; contains abundant brachiopod fossils.....	22.5	0.1
Coal, black, bright, moderately friable; contains minor pyrite and light-gray calcite on cleavage surfaces (Peters Chapel coal).....	22.6	0.8
Underclay, medium-dark-gray, bioturbated; contains black carbonized plant fossils.....	23.4	0.9
Shale, medium-dark-gray, silty, bioturbated; contains numerous pyrite-filled burrows.....	24.3	5.7
Shale, dark-gray to grayish-black, contains pyrite-filled burrows, noncalcareous; includes light-brownish-gray sideritic concretions 0.5-3 in.		

thick, generally spaced in vertical intervals 8-18 in. apart	30.0	16.8
Shale, black, noncalcareous	46.8	1.0
Shale, black, very highly calcareous, fossil marine shells abundant	47.8	0.6
Limestone, dark-gray, hard, impure, highly fossiliferous, fossil marine shells and shell fragments abundant	48.4	0.2
Siltstone, grayish-black, hard, carbonaceous; grades into underlying unit	48.6	0.1
Coal, black, moderately friable, impure and silty in upper 0.5 in. (Secor rider coal)	48.7	0.2
Underclay, medium-gray, carbonaceous in upper 1 in., slickensided, bioturbated, kaolinitic	48.9	0.8
Siltstone, medium-light-gray, shaly, contains black carbonized plant fragments, bioturbated, noncalcareous	49.7	2.5
Coal, black, bright, moderately friable (Secor coal)	52.2	0.2
Shale, grayish-black, very carbonaceous; contains coal stringers up to 0.25 in. thick in upper 3 in. of unit	52.4	0.6
Underclay, medium-light-gray, slickensided, bedding disturbed; contains black carbonized plant fossils and minor pyrite	53.0	1.5
Shale, medium-gray, silty, contains well-preserved plant fossils; grades into underlying unit	54.5	1.0
Siltstone, medium-gray, shaly, noncalcareous, laminated; includes some thin stringers of light-gray, very fine-grained sandstone; grades into underlying unit	55.5	3.5
Sandstone, medium-gray with light-gray laminae, shaly, noncalcareous, even-bedded to cross-bedded below 62 ft; soft-sediment deformation features common; bioturbated in places (Bluejacket Sandstone)	59.0	11.0
Total Depth		70.0



SE¼SE¼NE¼SE¼ sec. 18, T. 14 N., R. 17 E., Muskogee County. Surface elevation, estimated from topographic map, 580 ft.

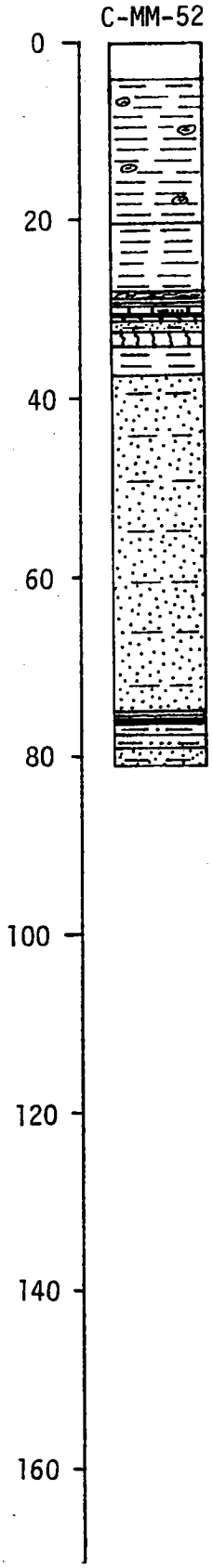
	Depth to unit top (ft)	Thickness of unit (ft)
Silt, pale-yellowish-brown, sandy, unbedded; contains organic material (soil).....	0.0	2.0
Gravel, dusky-brown, highly silty; gravel fraction predominantly fragments of ironstone concretions..	2.0	0.5
Clay, grayish-brown, highly silty and sandy.....	2.5	3.5
Clay, dark-yellowish-brown, sandy, soft, weathered..	6.0	6.7
Krebs Group		
Boggy Formation		
Shale, black, laminated, soft and grayish-brown in upper 6 in.....	12.7	8.3
Limestone, medium-dark-gray, impure, shaly, highly fossiliferous, brachiopods most abundant (Inola Limestone).....	21.0	0.8
Coal, black, bright, moderately friable (Bluejacket coal).....	21.8	0.7
Shale, grayish-black, very highly carbonaceous.....	22.5	0.1
Underclay, medium-gray; includes some black carbonized plant fragments.....	22.6	0.9
Sandstone, very light-gray to medium-light gray, very fine-grained, cross-bedded and wavy-laminated, well-indurated.....	23.5	2.0
Sandstone, grayish-black, highly carbonaceous, very fine-grained.....	25.5	0.1
Shale, medium-dark-gray, slickensided; contains a few medium-light-gray sideritic concretions ~1 in. thick; fractured.....	25.6	7.4
Total Depth		33.0



SE¼SE¼NE¼SE¼ sec. 18, T. 14 N., R. 17 E., Muskogee County. Surface elevation, estimated from topographic map, 580 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, pale-yellowish-brown, sandy, unbedded; contains organic material	0.0	2.0
Gravel, dusky-brown, highly silty; gravel fraction predominantly fragments of ironstone concretions	2.0	0.5
Clay, grayish-brown, highly silty and sandy	2.5	3.5
Clay, dark-yellowish-brown, sandy, soft, weathered	6.0	7.3
Krebs Group		
Boggy Formation		
Shale, black, laminated; soft and grayish-brown in upper 6 in.	13.3	3.5
Limestone, medium-dark-gray, impure, shaly, highly fossiliferous, brachiopods most abundant; most shaly in lower part	16.8	0.9
Shale, medium-gray, clayey; contains black carbonized root fragments	17.7	1.0
Sandstone, very light-gray to medium-light-gray, very fine-grained, massive, calcareous	18.7	0.4
Shale, medium-dark-gray with dark-gray bands	19.1	0.4
Sandstone, medium-gray with dark-gray bands, very fine-grained, laminated; includes some layers of black macerated plant material	19.5	0.1
Shale, dark-gray, soft, slickensided	19.6	0.7
Limestone, medium-dark-gray; hard, shaly; contains a few fossil shell fragments	20.3	0.2
Shale, dark-gray to grayish-black	20.5	1.5
Limestone, medium-dark-gray, impure, shaly, laminated, highly fossiliferous, brachiopods most abundant; highly shaly in lower 8 in.; black and carbonaceous in lower 2 in. (Inola Limestone)	22.0	1.3
Coal, black, bright, moderately friable; includes some pyritic laminae; white calcite on cleat surfaces (Bluejacket coal)	23.3	0.6
Sandstone, dark-gray, carbonaceous, silty, shaly, fine-grained, noncalcareous, bedding disturbed	23.9	0.4
Shale, medium-dark-gray, silty	24.3	5.7
Shale, grayish-black, slickensided; includes layers of medium-light-gray sideritic concretions 0.5-2 in. thick	30.0	10.4
Siltstone, medium-light-gray, shaly, laminated; includes some very fine-grained sandstone	40.4	2.6
Coal, black, bright, very friable (Peters Chapel coal)	43.0	1.2

Shale, black, carbonaceous; interlaminated with thin layers of bright coal.....	44.2	0.2
Shale, dark-gray, slickensided; contains black carbonized plant compressions.....	44.4	0.5
Sandstone, light-gray, fine-grained; wavy-laminated, with black streaks of macerated plant fragments in upper 3 in.; massive in lower 5 in.....	44.9	0.7
Shale, dark-gray, soft.....	45.6	0.1
Siltstone, medium-gray, shaly, noncalcareous; grades into underlying unit.....	45.7	3.6
Sandstone, medium-light-gray, silty, shaly, very fine-grained, cross-laminated.....	49.3	1.7
Sandstone, medium-dark-gray with light-gray bands, shaly, very fine-grained, wavy-laminated, cross-laminated in part, noncalcareous; includes minor bioturbation; microfaulted in part; well-indurated; becomes predominantly light-gray below 55 ft; grain size increases downward and shale laminae occur less frequently; includes abundant black macerated plant material on stratification surfaces.....	51.0	38.0
Total Depth		89.0

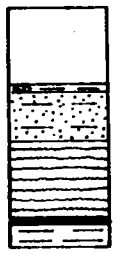


NE¼NW¼NW¼SE¼SW¼ sec. 21, T. 14 N., R. 17 E., Muskogee County. Drilled in hay meadow at west edge of pond 1550 ft FWL and 1180 ft FSL. Surface elevation, estimated from topographic map, 630 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, pale-yellowish-brown, sandy; contains organic material	0.0	2.0
Silt, dusky-yellowish-brown, sandy	2.0	2.0
Krebs Group		
Boggy Formation		
Shale, moderate-brown to moderate-yellowish-brown, soft, clayey; contains weathered particles of dark-reddish-brown clay-ironstone	4.0	4.5
Shale, grayish-orange, pale-yellowish-brown and light-gray; weathered; contains abundant stringers of dark-yellowish-orange and moderate-reddish-brown clay-ironstone	8.5	7.5
Shale, medium-dark-gray; contains several 0.25- to 0.5-in.-thick, moderate-reddish-brown and very dark-red clay-ironstone layers	16.0	4.0
Shale, grayish-black, fractured, slickensided	20.0	7.5
Ironstone, medium-light-gray with light-brownish-gray bands, very hard; includes calcite occurring as fracture fillings, particularly in brecciated bands	27.5	0.4
Shale, black, brittle, slickensided	27.9	0.5
Limestone, medium-gray, impure, silty, very fossiliferous; fossil shell fragments predominant (Inola Limestone)	28.4	0.6
Coal, black, impure and shaly in upper and lower 0.5 in., pyritic (Bluejacket coal)	29.0	0.2
Underclay, medium-dark-gray; bioturbated, slickensided, kaolinitic; contains pyrite-filled burrows.	29.2	0.6
Sandstone, medium-light-gray, very fine-grained, silty, clayey, bioturbated, kaolinitic; contains black carbonized plant fragments; bedding disturbed and obscure	29.8	2.2
Underclay, medium-light-gray, silty, bioturbated, kaolinitic	32.0	1.5
Shale, medium-dark-gray with black streaks; carbonaceous in upper 6 in.; noncalcareous; contains black carbonized plant fossils on stratification surfaces; slickensided	33.5	3.3
Sandstone, medium-light-gray with light-gray bands, very fine-grained, very silty, thinly laminated, noncalcareous, bioturbated, contains rare pyrite-		

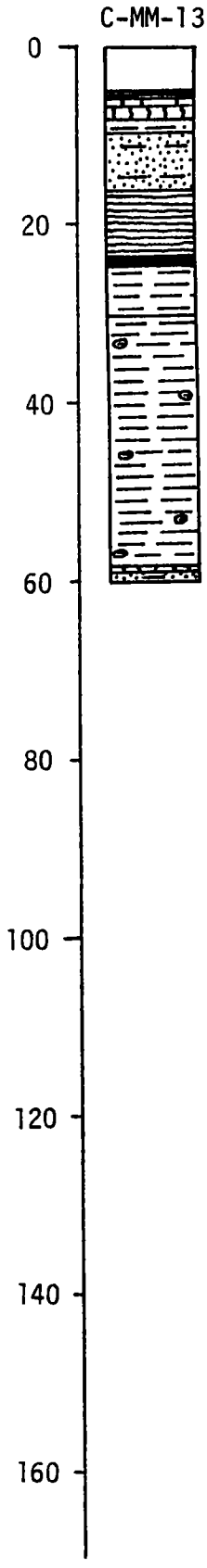
filled burrows; cross-laminated and cross-bedded, fines upward; becomes medium-dark-gray with medium-light-gray bands at ~50 ft; includes some sparsely distributed, black carbonized plant fragments (Crekola Sandstone).....	36.8	37.2
Shale, brownish-black with light-brownish-gray bands, hard, laminated, noncalcareous.....	74.0	0.4
Coal, black, moderately friable; includes some thin shaly and pyritic laminae in upper 1 in. of unit (Secor coal).....	74.4	0.4
Shale, dark-gray; contains some thin black layers of coalified plant material in upper 3 in.; extensively bioturbated; becomes silty downward and grades into underlying unit.....	74.8	2.0
Siltstone, medium-gray, shaly, grades into underlying unit.....	76.8	1.2
Sandstone, medium-gray, very fine-grained, silty, shaly, noncalcareous; contains some black, well-preserved plant fossils; thinly laminated.....	78.0	2.0
Total Depth		80.0

C-MM-14



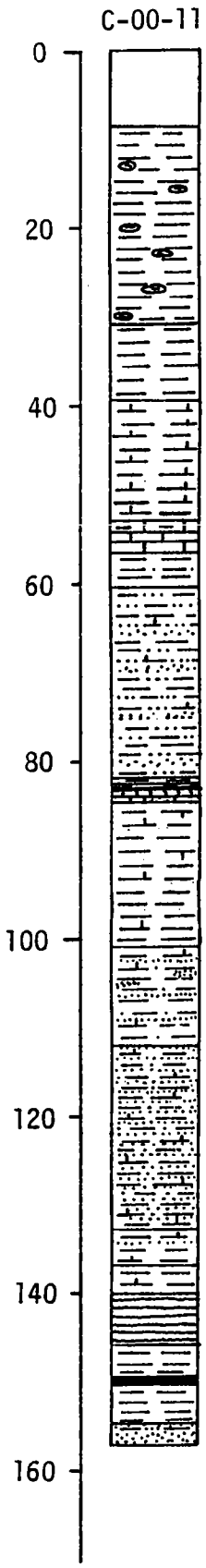
SW¼NE¼NE¼NW¼ sec. 32, T. 14 N., R. 18 E., Muskogee County. Surface elevation, estimated from topographic map, 602 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, grayish-brown, silty, unbedded, contains organic material (soil).....	0.0	2.0
Sand, moderate-reddish-brown, fine-grained, unconsolidated.....	2.0	2.0
Clay, moderate-yellowish-brown, gravelly; gravel clasts consist predominantly of very dusky-red ironstone; possibly highly weathered shale in part.....	4.0	4.0
Krebs Group		
Boggy Formation		
Shale, very pale-orange to dark-yellowish-orange, soft, weathered; includes light-brown ironstone concretions.....	8.0	0.8
Sandstone, dusky-yellow to grayish-orange, shaly, micaceous, very fine-grained, soft, oxidized, contains black carbonized plant fragments; includes a well-indurated, dark-reddish-brown to dusky-brown 1-ft-thick layer of well-sorted sandstone at bottom of unit (Crekola Sandstone).....	8.8	5.2
Shale, dark-gray to black; includes some light-brownish-gray sideritic concretions.....	14.0	7.9
Shale, black, coaly, highly pyritic.....	21.9	0.1
Coal, black, bright, moderately friable; includes minor small pyritic lenses (Peters Chapel coal)...	22.0	0.5
Shale, dark-gray, noncalcareous.....	22.5	2.5
Total Depth		25.0



SW¼NW¼NW¼NW¼ sec. 32, T. 14 N., R. 18 E., Muskogee County. Surface elevation, estimated from topographic map, 587 ft.

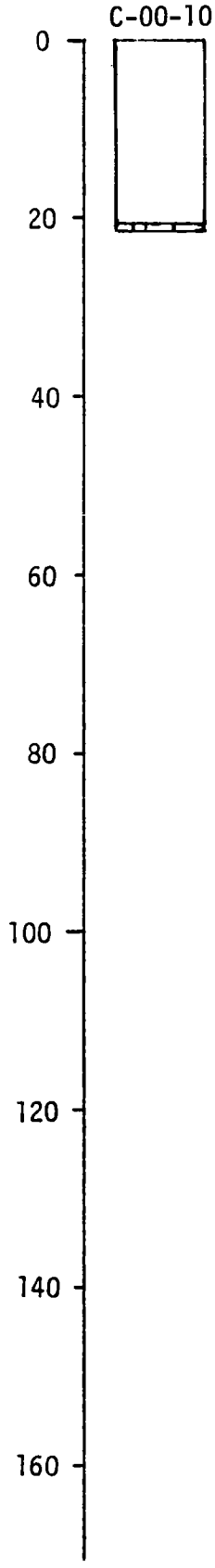
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, moderate-brown, silty, unbedded; contains organic matter	0.0	2.0
Sand, moderate-reddish-brown to grayish-orange, highly clayey, weathered	2.0	3.0
Krebs Group		
Boggy Formation		
Shale, black, brittle	5.0	1.0
Limestone, medium-gray, hard, impure; contains abundant fossil hash (Inola Limestone)	6.0	0.8
Underclay, very pale-orange to pale-yellowish-orange, soft, weathered; contains black coaly streaks	6.8	1.1
Shale, dark-yellowish-orange to grayish-orange, soft, weathered; becomes silty downward	7.9	1.8
Sandstone, very light-gray with medium-dark-gray bands, shaly, very fine-grained, bioturbated in part, wavy-laminated; includes abundant black macerated plant material on stratification surfaces below 15 ft (Crekola Sandstone)	9.7	6.3
Shale, black with light-gray bands, fissile, carbonaceous; includes wavy-laminated stringers of siltstone and very fine-grained sandstone	16.0	7.4
Shale, black, coaly, pyritic	23.4	0.1
Coal, black, moderately friable (Peters Chapel coal)	23.5	0.8
Shale, dark-gray, noncalcareous, sparsely fossiliferous	24.3	5.7
Shale, grayish-black, noncalcareous, includes scattered light-brownish-gray sideritic concretions up to 1.5 in. thick; pyritic in places	30.0	28.6
Underclay, brownish-gray, sandy; contains black carbonized plant compressions and streaks of black carbonaceous shale, brecciated in upper half	58.6	0.3
Sandstone, medium-light-gray, silty, very fine-grained, noncalcareous, bedding obscure; contains inclusions of black carbonaceous shale (Bluejacket Sandstone)	58.9	1.1
Total Depth		60.0



SW¼NE¼NE¼NE¼SE¼ sec. 1, T. 15 N., R. 11 E., Okmulgee County. Surface elevation, estimated from topographic map, 781 ft.

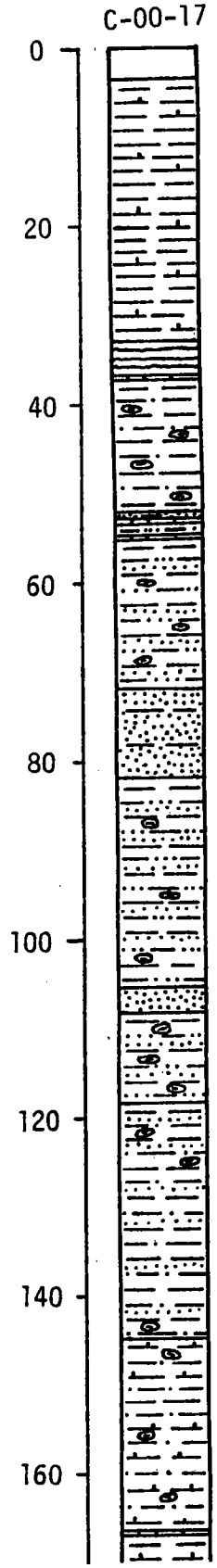
	Depth to unit top (ft)	Thickness of unit (ft)
Silt, grayish-brown to dark-yellowish-brown, coarse; contains some very fine sand grains and organic material (soil).....	0.0	4.0
Silt, pale-yellowish-brown, clayey.....	4.0	2.0
Clay, yellowish-gray, silty.....	6.0	2.5
Skiatook Group		
Coffeyville Formation		
Shale, yellowish-gray with dark-yellowish-orange mottling, weathered, soft.....	8.5	1.5
Shale, olive-gray with dark-yellowish-orange mottling and streaks, partly weathered, soft; includes several layers of moderate-reddish-brown clay-ironstone 0.5-1 in. thick; jointed, with limonite deposits along fracture surfaces....	10.0	21.0
Shale, medium-bluish-gray, jointed; moderate-yellowish-brown limonite deposits on fracture surfaces.....	31.0	8.6
Shale, medium-bluish-gray to medium-gray, highly calcareous.....	39.6	13.4
Checkerboard Formation		
Limestone, medium-dark-gray and brownish-gray, hard, vuggy, fractured, shaly in upper 4 in.; highly fossiliferous, brachiopods predominant (Checkerboard Limestone).....	53.0	3.5
Seminole Formation		
Shale, dark-gray, highly silty, noncalcareous.....	56.5	3.7
Siltstone, dark-gray with light-gray banding, shaly; interstratified with shale and very fine-grained sandstone; cross-bedded and cross-laminated in part; contains several 0.25- to 1-in.-thick layers of brownish-gray calcareous siltstone spaced at irregular intervals; includes black macerated plant debris on stratification surfaces of sandstone layers.....	60.2	21.6
Shale, medium-gray.....	81.8	0.4
Shale, brownish-black, very highly carbonaceous; contains abundant thin stringers of bright, hard coal 1/64 to 1/8 in. thick (Tulsa coal interval)..	82.2	0.7
Coal, black, bright, hard (Tulsa coal).....	82.9	0.2
Marmaton Group		
Holdenville Formation		
Underclay, grayish-black, carbonaceous, slicken-		

sided	83.1	0.1
Underclay, greenish-gray, noncalcareous	83.2	0.6
Limestone, light-olive-gray to greenish-gray, sandy; fossiliferous, brachiopods abundant in lower part, bioturbated in upper part	83.8	0.5
Shale, greenish-gray in upper 6 in.; medium-gray in lower part, calcareous	84.3	2.7
Shale, dark-gray, calcareous	87.0	14.0
Shale, dark-gray with light-gray streaks and spots, silty, calcareous; contains abundant very thin streaks and lenses of very fine-grained sandstone; also contains numerous round sandstone-filled burrows ~1/16 in. in diameter and lens-shaped burrows ~0.75 in. long and 0.25 in. thick; grades into underlying unit	101.0	11.0
Shale, dark-gray with light-gray laminae and spots, silty, sandy; as above, but with thin sandstone layers and streaks more closely spaced (4-8 per in.)	112.0	21.0
Shale, dark-gray with light-gray streaks and spots, weakly calcareous; includes minor bioturbation traces and thin streaks of very fine-grained sandstone, diminishing in frequency of occurrence downward; cut by vertical veins of white calcite ~1/32 in. thick	133.0	4.0
Shale, dark-gray, weakly calcareous; cut by vertical veins of white calcite ~1/32 in. thick	137.0	3.0
Shale, grayish-black, hard; cut by vertical veins of white calcite; contains sparsely distributed fossil shells in bottom 1 ft of unit; noncalcareous	140.0	5.8
Shale, dark-gray, noncalcareous; carbonaceous in bottom 0.5 in	145.8	3.7
Coal, black, hard; white calcite on cleat surfaces (Dawson coal)	149.5	0.7
Shale, medium-gray, soft, flaky; contains abundant compressed, black, carbonized plant fragments	150.2	3.0
Shale, light-greenish-gray, noncalcareous	153.2	1.6
Sandstone, light-gray with some medium-gray streaks in upper part; very fine-grained and silty in upper part, becoming very fine- to fine-grained in lower 18 in.; wavy-bedded and cross-bedded in upper part, massive in lower part	154.8	2.2
Total Depth		157.0



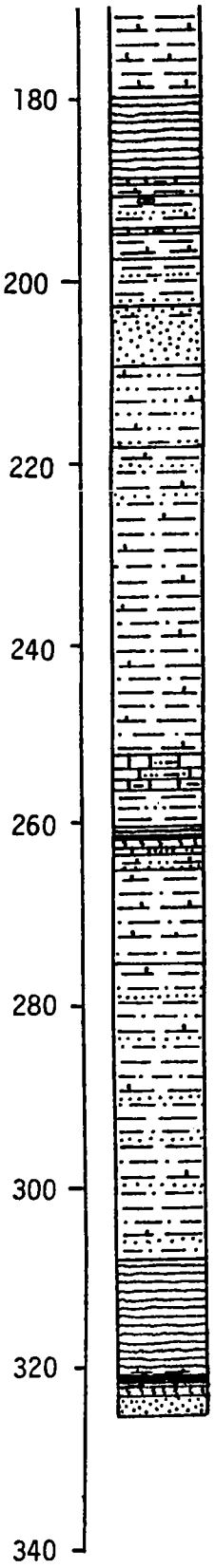
NW¼NW¼NW¼NE¼NW¼ sec. 13, T. 15 N., R. 11 E., Okmulgee County. Surface elevation, estimated from topographic map, 745 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, dark-yellowish-brown; contains abundant grains of very fine-grained sand; includes organic matter (soil).....	0.0	2.6
Clay, grayish-orange, weathered, sandy, silty.....	2.6	5.2
Sand, moderate-reddish-brown, very fine-grained, clayey.....	7.8	3.0
Sand, moderate-yellowish-brown with light-gray streaks, very fine-grained, clayey.....	10.8	8.0
Gravel, moderate-reddish-brown, coarse, clayey in part; contains clasts of rounded sandstone and ironstone.....	18.8	3.7
(No recovery; drill chattering; lost circulation and had to abandon hole. Probably drilled into the highly fractured Checkerboard Limestone).....	22.5	0.5
Total Depth		23.0



NW¼NW¼NE¼SW¼NW¼ sec. 31, T. 15 N., R. 11 E., Okmulgee County. Drilled at northwest edge of pond 550 ft FWL and 1450 ft FNL. Surface elevation, estimated from topographic map, 748 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, brownish-gray, includes some moderate-reddish-orange mottling, unbedded; contains organic material	0.0	3.5
Skiatook Group		
Coffeyville Formation		
Shale, grayish-orange, clayey, weakly calcareous; includes some dark-yellowish-orange limonitic concretions; weathered	3.5	5.5
Shale, light-olive-gray to olive-gray with dark-yellowish-orange mottling, clayey, calcareous, partly weathered; becomes olive-gray and dark-yellowish-brown at ~12 ft; fractured; gypsum and calcite occur as crusts along fractures; medium-light-gray in unweathered parts in lower part of unit	9.0	13.5
Shale, dark-gray and dark-yellowish-brown with dark-yellowish-orange bands, calcareous	22.5	1.5
Shale, dark-gray to brownish-black with dark-yellowish-orange limonitic crusts on parting surfaces, calcareous, fractured; contains some bioturbation traces and rare marine shell fragments	24.0	9.1
Shale, grayish-black to black, hard, brittle, non-calcareous; includes some disseminated pyrite and pyrite crusts on parting surfaces; contains phosphatic nodules up to 1 in. long and 0.5 in. thick	33.1	3.8
Limestone, dark-gray to medium-dark-gray, very shaly, fossiliferous; grades into underlying unit	36.9	0.2
Shale, medium-gray, silty, bioturbated, weakly calcareous in upper 3 in., noncalcareous in lower part; contains some pyritic trace fossils; includes numerous light-brownish-gray sideritic concretionary bands about 1/8 to 0.5 in. thick	37.1	15.0
Sandstone, medium-dark-gray, very fine-grained, shaly, calcareous; contains small fossil particles	52.1	0.4
Limestone, medium-gray, impure, silty, hard, non-fossiliferous, micritic	52.5	0.2
Mudstone, medium-dark-gray, noncalcareous	52.7	1.3



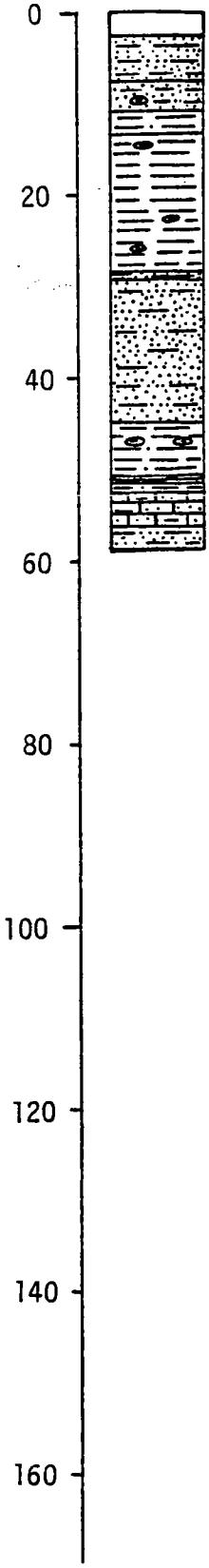
Limestone, light-brownish-gray, hard, nonfossiliferous, micritic.....	54.0	0.1
Shale and siltstone, medium-gray, interstratified with light-gray, very fine-grained sandstone, extensively bioturbated in part; noncalcareous, but some of the sandstone layers are highly calcareous; sandstone units are contorted and cross-laminated in part, with scour-and-fill features abundant; interstratified units range from thin laminae to beds up to 12 in. thick; includes some light-brownish-gray sideritic concretions about 0.5-1 in. thick.....	54.1	17.9
Sandstone, medium-gray, very silty, noncalcareous, wavy-laminated and cross-laminated in part; micro-faulted in places, with soft-sediment deformation and scour features abundant; fines upward.....	72.0	10.0
Shale and siltstone, medium-gray, interstratified with light-gray, very fine-grained sandstone, noncalcareous, bioturbated, laminated; interstratified sandstone units are cross-laminated and contorted in places; scour-and-fill features abundant; includes light-brownish-gray sideritic concretions up to 1.5 in. thick; becomes medium-dark-gray and finer grained below 96 ft.....	82.0	23.5
Sandstone, medium-light-gray to medium-gray, very fine-grained, noncalcareous, bioturbated, unbedded to cross-bedded; slump features common; shaly below 105.8 ft.....	105.5	2.7
Shale and siltstone, medium-dark-gray; sparsely interstratified with light-gray, very fine-grained sandstone; noncalcareous, bioturbated; includes some interbedded units of medium-light-gray, very fine-grained, highly contorted sandstone up to 1 ft thick; contains light-brownish-gray sideritic concretions about 0.25-0.5 in. thick.....	108.2	10.5
Shale, medium-dark-gray, very silty, noncalcareous; contains light-brownish-gray concretions up to 1 in. thick; includes several contorted beds of light-gray to medium-light-gray, very fine-grained sandstone 0.5-10 in. thick.....	118.7	8.3
Shale, medium-dark-gray to medium-gray, silty; includes abundant light-brownish-gray sideritic layers and burrow fillings; noncalcareous, but contains some widely spaced, thin layers of very fine-grained calcareous sandstone; includes a 0.25-in.-thick layer of black coal at ~137.5 ft;		

contains sparsely distributed, calcareous fossil shells; includes a fossiliferous, 1.5-in.-thick sideritic concretion at 144.7 ft.....	127.0	18.4
Shale, medium-dark-gray to dark-gray, silty, calcareous; contains fossil marine shells as well as light-brownish-gray sideritic concretions and burrow fillings up to 1.25 in. thick; noncalcareous from 150 to 154 ft; includes rare, black carbonized and pyritic plant fossils; proportion of brachiopod fossil increases markedly at 165 ft; grades into underlying unit.....	145.4	21.2
Limestone, dark-gray, impure, shaly, fossiliferous, fossil hash abundant, brachiopod and crinoid parts common, bioturbated in lower part.....	166.6	0.4
Shale, dark-gray, calcareous; contains some small, pyritic trace fossils and sparsely distributed calcitic and pyritic brachiopod shells.....	167.0	I3.2
Shale, grayish-black to black, calcareous; contains disseminated pyrite, pyrite-filled burrows, and pyritic brachiopod shells; fossils sparsely distributed.....	180.2	9.1
Limestone, dark-gray, impure, shaly, fossiliferous, fossil hash abundant; light-gray and nonfossiliferous in lower 1 in.....	189.3	0.5
Shale, dark-gray, silty, calcareous; includes a 1.5-in.-thick limestone concretion 3 in. above base of unit.....	189.8	1.2
Shale, dark-gray, silty, calcareous, interstratified with thin layers of siltstone and very fine-grained sandstone, bioturbated in lower part; contains several light-gray limestone concretions up to 2 in. thick.....	191.0	3.8
Limestone, medium-light-gray, impure, silty, shaly, fossiliferous, fossil hash abundant; includes a 1.5-in.-thick, medium-dark-gray shale parting in about the middle of the unit.....	194.8	0.5
Shale, dark-gray, calcareous, fossiliferous, well-preserved brachiopods abundant; contains pyritized burrow fillings.....	195.3	2.8
Shale, medium-dark-gray, silty, noncalcareous, bioturbated, contains pyrite and pyritized burrow fillings; includes abundant medium-light-gray laminae of siltstone to very fine-grained sandstone; scour-and-fill features common; proportion of sandstone increases markedly below 201 ft; unit grades into shaly sandstone downward; bedding greatly contorted from 203 to 203.5 ft; sequence fines upward.....	198.1	5.4

Sandstone, medium-light-gray, very fine-grained, calcareous from 203.5 to 206.6 ft; extensively bioturbated in upper 4 ft of unit; bedding disturbed and contorted; cross-laminated in part, pyritic in places; contains rare pelecypod shells; color darkens downward.....	203.5	6.5
Siltstone, medium-gray, sandy, calcareous; contains abundant fossil pelecypod shells from 211.8 to 214.4 ft; bioturbated in part, laminated; grades into underlying unit.....	210.0	9.0
Shale, medium-gray, silty, bluish-gray in lower part, calcareous; contains sparsely distributed marine shells and shell fragments; includes some thin wisps of light-gray, very fine-grained sandstone in upper part of unit; contains rare pyritic trace fossils; grades into underlying unit.....	219.0	33.8
Checkerboard Formation		
Limestone, medium-gray to light-gray, silty, hard, fossiliferous, marine shells and crinoid columnals abundant; shaly in bottom 4 in. (Checkerboard Limestone).....	252.8	3.6
Seminole Formation		
Shale, medium-dark-gray with medium-light-gray, very fine-grained, silty sandstone laminae, noncalcareous; contains rare brachiopod valves and plant fragments, as well as small pyritized trace fossils.....	256.4	3.9
Shale, dark-gray, carbonaceous, noncalcareous; contains disseminated pyrite and black carbonized plant fragments on stratification surfaces...	260.3	0.6
Coal, black, bright, very friable, shaly in part; pyrite on cleat surfaces (Tulsa coal).....	260.9	0.4
Marmaton Group		
Holdenville Formation		
Underclay, greenish-gray, noncalcareous, silty, bioturbated; contains black carbonized plant fragments.....	261.3	1.3
Limestone, light-olive-gray to light-brownish-gray, impure, sandy, fossiliferous; contains brachiopod shell fragments and fossil hash, particularly in upper 2 in. (Glenpool? Limestone).....	262.6	0.8
Siltstone and sandstone, greenish-gray, hard, extensively bioturbated, very calcareous, shaly in part.....	263.4	1.7
Shale, medium-dark-gray, silty, calcareous; contains rare, small limestone concretions, sparse marine fossils, and minor pyrite.....	265.1	10.4
Shale, dark-gray, very silty, hard, weakly calcar-		

eous, extensively bioturbated; contains abundant thin laminae and lenses of light-gray, very fine-grained sandstone; includes minor pyrite on stratification surfaces; grades into underlying unit...	275.5	32.5
Shale, dark-gray to grayish-black, silty, calcareous; contains sparsely distributed marine fossils such as nautiloids and ammonoids, as well as trace fossils; grades into underlying unit.....	308.0	9.0
Shale, grayish-black to black, brittle, noncalcareous; contains lens-shaped phosphatic nodules; includes sparsely distributed, partially pyritized cephalopods and rare brachiopod shells and shell fragments.....	317.0	3.9
Shale, dark-gray to grayish-black, calcareous, slickensided, pyritic and carbonaceous in lower 1 in. of unit.....	320.9	0.5
Coal, black, slightly friable, includes white veinlets of gypsum; contains minor pyrite (Dawson coal).....	321.4	0.5
Shale, brownish-black, very carbonaceous; includes thin stringers of coal.....	321.9	0.2
Underclay, medium-gray, soft; kaolinitic; contains black carbonized plant fragments.....	322.1	0.9
Sandstone, light-gray with medium-dark-gray and brownish-black streaks, bedding disturbed and indistinct, noncalcareous, fractured, fine- to very fine-grained; contains some oil stains.....	323.0	2.0
Total Depth		325.0

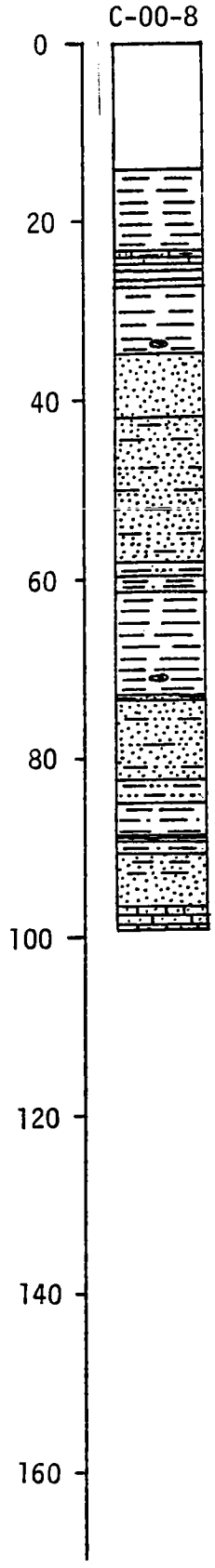
C-00-9



NW¼SW¼NW¼SW¼NW¼ sec. 11, T. 15 N., R. 14 E., Okmulgee County. Surface elevation, estimated from topographic map, 777 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, dusky-brown, silty; contains sub-angular clasts of dark-reddish-brown sandstone up to cobble size.....	0.0	1.0
Sand, moderate-brown, silty, highly gravelly.....	1.0	1.5
Cabaniss Group		
Senora Formation		
Sandstone, grayish-orange with brownish-black and dark-reddish-brown streaks, highly weathered, very fine-grained, clayey, weakly indurated, silty, micaceous.....	2.5	5.1
Sandstone, moderate-yellowish-brown with olive-gray streaks, weathered, very fine-grained, cross-bedded in lower 10 in., silty, clayey, weakly indurated, micaceous; includes some limonitic concretions ~3 in. in diameter.....	7.6	3.4
Shale, olive-gray with dark-yellowish-brown streaks, brownish-black deposits on fracture surfaces, partially weathered, silty.....	11.0	2.4
Shale, medium-dark-gray to dark-gray; includes some thin, dark-yellowish-orange clay-ironstone layers in upper 3 ft, as well as light-olive-gray siderite layers ~0.75 in. thick at 23.5 and 26 ft.....	13.4	14.8
Sandstone, brownish-gray with black streaks, very fine-grained; contains abundant carbonized plant material including thin streaks of coal (Croweburg coal interval?).....	28.2	0.2
Sandstone, medium-light-gray with dark-gray bands, very fine- to fine-grained, silty, micaceous, bedding distorted, wavy-bedded, cross-bedded, cross-laminated, bioturbated, noncalcareous; includes abundant black carbonized plant fragments; becomes predominantly dark-gray with medium-light-gray bands and finer grained below 40 ft.....	28.4	16.9
Shale, dark-gray, silty; includes a 0.5-in.-thick light-olive-gray siderite layer at 46.5 ft.....	45.3	5.1
Shale, black, carbonaceous.....	50.4	0.3
Shale, medium-dark-gray, silty.....	50.7	0.6
Limestone, medium-dark-gray and light-gray, impure, highly silty and sandy, includes some thin, shaly streaks; fossiliferous, with greatest concentration of fossils in upper 4 in., brachiopods pre-		

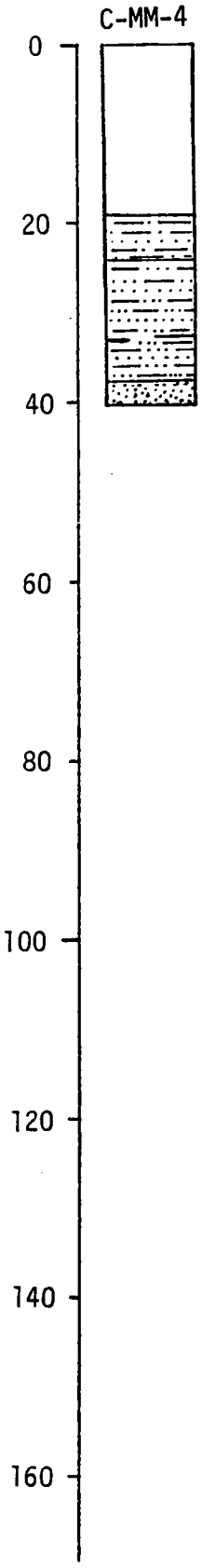
dominant; grades into underlying unit (McNabb Limestone).....	51.3	4.9
Siltstone, medium-dark-gray and light-gray, bedding disturbed, very highly calcareous; contains sparsely distributed fossils; includes minor very fine-grained sandstone.....	56.2	2.8
Total Depth		59.0



NE¼NE¼NW¼SW¼SW¼ sec. 15, T. 15 N., R. 14 E., Okmulgee County. Surface elevation, estimated from topographic map, 802 ft.

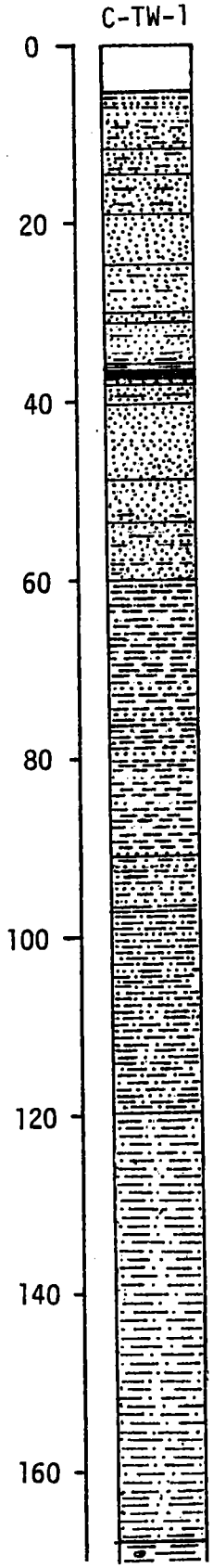
	Depth to unit top (ft)	Thickness of unit (ft)
Clay, moderate-yellowish-brown with pale-yellowish-orange and dark-yellowish-orange mottling, sandy, gravelly; contains sub-angular clasts of moderate-reddish-brown, fine-grained sandstone up to large cobble size.....	0.0	2.0
Sand, grayish-red, weathered, silty, clayey, gravelly.....	2.0	3.0
Sand, moderate-yellowish-brown, weathered, very fine-grained, silty, clayey; contains some gravel-sized clasts of sandstone.....	5.0	4.0
Clay, dusky-yellow, sandy, silty; contains gravel-sized clasts of sandstone and ironstone.....	9.0	5.0
Cabaniss Group		
Senora Formation		
Shale, dark-yellowish-brown with moderate-brown bands; light-olive-gray at 15 ft with light-brown and olive-gray bands; includes very thin beds of limonite-cemented siltstone at 2- to 4-in. intervals.....	14.0	2.0
Shale, medium-dark-gray with light-brown sideritic bands.....	16.0	1.0
Shale, dark-gray with some thin layers of light-olive-gray, silty siderite.....	17.0	6.2
Limestone, medium-dark-gray, impure, sandy, silty in upper 1 ft; contains abundant marine fossils with crinoid columns most common; includes 2 in. of dark-gray shale 2 in. from top of unit (Verdigris Limestone).....	23.2	1.5
Shale, black, very highly carbonaceous; includes a 1-in.-thick layer of shaly coal at top of unit....	24.7	2.5
Shale, medium-dark-gray; includes some 0.25-in.-thick layers of brownish-gray siderite in lower 1 ft of unit.....	27.2	7.5
Sandstone, medium-light-gray with grayish-black laminae, very fine- to fine-grained, cross-laminated, noncalcareous, micaceous; includes abundant black carbonized plant fragments on stratification surfaces.....	34.7	5.3
Sandstone, light-olive-gray, fine-grained, even-bedded, micaceous; contains minor black carbonized plant fragments.....	40.0	1.9
Sandstone, medium-dark-gray, interlaminated with		

dark-gray siltstone, cross-bedded in part.....	41.9	16.1
Siltstone, medium-dark-gray.....	58.0	1.5
Shale, medium-dark-gray, silty.....	59.5	1.9
Shale, dark-gray; includes 0.5-in.-thick layers of light-olive-gray siderite at 69.2 and 69.9 ft.....	61.4	11.4
Sandstone, medium-dark-gray to brownish-gray with black streaks, very fine-grained, massive; contains horizontal layers of white calcite ~1/64 in. thick near base; includes numerous streaks of coalified plant remains (Croweburg coal interval?).....	72.8	0.3
Sandstone, medium-dark-gray with thin medium-light-gray bands, very fine-grained, finer grained near bottom of unit, silty, noncalcareous, micaceous, even-bedded to cross-laminated in part; contains some distorted bedding and burrows in upper 3 ft; contains abundant black, macerated plant debris; grades into underlying unit.....	73.1	9.0
Siltstone, medium-dark-gray, shaly; contains some minor streaks of light-gray, very fine-grained sandstone in upper part of unit; includes sparsely distributed fossil pelecypods; grades into underlying unit.....	82.1	2.9
Shale, dark-gray, silty.....	85.0	4.3
Shale, grayish-black, silty.....	89.3	0.2
Shale, medium-dark-gray, silty.....	89.5	1.3
Sandstone, light-olive-gray with thin, grayish-black bands, becoming dark-gray downwards, fine- to very fine-grained, shaly in upper part, weakly calcareous; includes abundant black macerated plant debris; contains scattered fossil brachiopod shells in lower part.....	90.8	5.6
Limestone, medium-dark-gray, impure, highly sandy; very highly fossiliferous in middle 10 in. of unit; brachiopod fossils abundant; includes some fossil hash (McNabb Limestone).....	96.4	2.6
Total Depth		99.0



SW¼SW¼NW¼SW¼NW¼ sec. 19, T. 16 N., R. 15 E., Muskogee County. Surface elevation, estimated from topographic map, 707 ft.

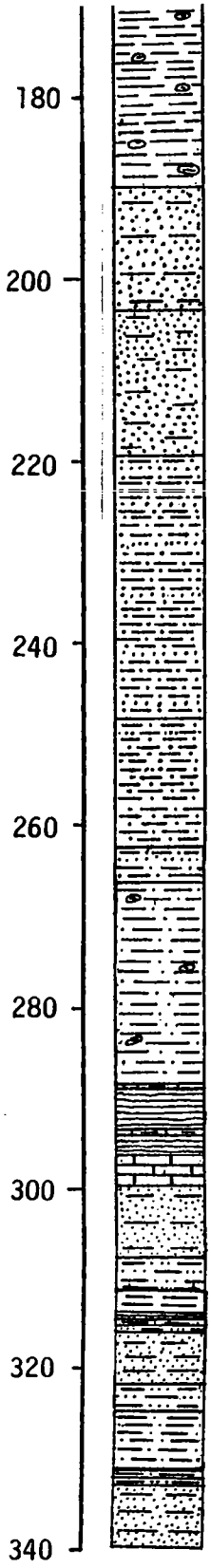
	Depth to unit top (ft)	Thickness of unit (ft)
Sand, pale-yellowish-brown, very fine-grained, silty; contains gravel-sized clasts of grayish-orange sandstone and organic material.....	0.0	1.0
Sand, moderate-yellowish-brown, fine- to very fine-grained, clayey; contains brownish-black and grayish-orange gravel-sized clasts of sandstone.....	1.0	6.5
Clay, pale-yellowish-brown to light-brownish-gray with light-brown and blackish-red mottling, sandy, gravelly, unbedded; contains subangular clasts of dark-reddish-brown and grayish-orange, very fine-grained sandstone and ironstone; highly gravelly in lower 2.5 ft.....	7.5	11.5
Cabaniss Group		
Senora Formation		
Shale, dark-yellowish-brown, weathered, silty; contains thin laminae of very fine-grained sandstone.....	19.0	5.0
Siltstone, medium-dark-gray with light-olive-gray bands, shaly, even-bedded to cross-laminated with some contorted bedding, noncalcareous, micaceous; includes numerous laminae of very fine-grained sandstone; contains abundant black macerated plant debris below 33 ft and minor coal streaks from 34.2 to 34.5 ft (Mineral coal interval?).....	24.0	13.6
Sandstone, light-olive-gray, very fine- to fine-grained, massive, noncalcareous, micaceous; includes abundant black macerated plant debris (Chelsea Sandstone).....	37.6	2.4
Total Depth		40.0



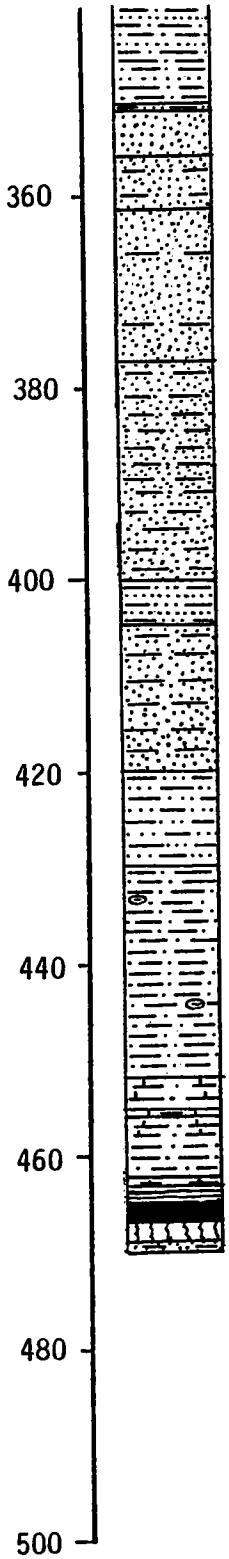
81 (C-TW-1)

SE¼SW¼NE¼NE¼SE¼ sec. 6, T. 22 N., R. 13 E., Tulsa County. Drilled in pasture at north edge of small farm pond 310 ft FEL and 2200 ft FSL. Surface elevation, estimated from topographic map, 686 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, dusky-yellowish-brown, contains organic material	0.0	2.0
Sand, moderate-yellowish-brown, silty, clayey, noncalcareous, unconsolidated	2.0	3.5
Skiatook Group		
Coffeyville Formation		
Siltstone, moderate-yellowish-brown to grayish-orange with dark-yellowish-orange bands, shaly, micaceous, noncalcareous, bioturbated; interstratified with well-indurated, very fine-grained sandstone layers 1-2 in. thick	5.5	6.2
Sandstone and silty shale, medium-light-gray and medium-dark-gray with some moderate-yellowish-bands, interstratified, noncalcareous, extensively bioturbated; includes some black macerated plant fragments	11.7	2.7
Sandstone and silty shale, medium-light-gray and medium dark-gray, interstratified, noncalcareous, extensively bioturbated; includes some black macerated plant fragments	14.4	4.6
Sandstone, medium-light-gray, very fine-grained, interlaminated with medium-dark-gray shale, wavy-bedded, noncalcareous, bioturbated; contains black macerated plant material	19.0	5.5
Sandstone, medium-gray, fine- to very fine-grained, massive, noncalcareous; contains black macerated plant fragments	24.5	5.5
Sandstone, medium-dark-gray with medium light-gray bands, silty, micaceous, noncalcareous; contains abundant black macerated plant fragments	30.0	1.0
Sandstone, medium-gray, very fine-grained, cross-laminated; siltstone in part, includes black macerated plant material; contains a repetitive sequence of fining-upward units 1-5 in. thick with scour-and-fill features at the base of each unit; shaly in bottom 6 in.	31.0	4.9
Shale, medium-dark-gray, contains black carbonized plant material, noncalcareous	35.9	0.3
Coal, black, very friable, includes abundant pyrite and white calcite on cleat surfaces (Cedar Bluff coal)	36.2	1.2



Underclay, medium-light-gray, contains black carbonized plant fragments.....	37.4	0.6
Sandstone, medium-gray and light-greenish-gray, very fine-grained, silty, noncalcareous, interstratified with thin shale laminae, cross-stratified, scour and slump features common.....	38.0	2.2
Sandstone, light-greenish-gray with medium-gray bands, fine- to very fine-grained, noncalcareous; soft-sediment deformation features common; includes abundant black macerated plant fragments...	40.2	8.5
Sandstone, light-gray, fine-grained, massive, noncalcareous; contains black macerated plant fragments and some light-brownish-gray sideritic concretions ~1 in. thick; includes some thin laminae and rare interbedded medium-dark-gray shale stringers in bottom 2 ft of unit.....	48.7	5.0
Sandstone, medium-dark-gray and light-greenish-gray, very fine-grained, shaly, banded, cross-bedded in part, noncalcareous, soft-sediment deformation features common; contains black macerated plant material.....	53.7	6.3
Shale, medium-dark-gray, silty, interstratified with laminae and thin beds of very fine-grained, light-greenish-gray sandstone, cross-bedded in part, noncalcareous; contains some soft-sediment deformation features; includes some minor bioturbation features and black macerated plant fragments.....	60.0	31.0
Shale, medium-dark-gray, silty, noncalcareous, contains sparse bioturbation features; includes some light-greenish-gray sandstone layers 1/32 to 0.5 in. thick generally spaced at intervals of 12 to 18 in. apart.....	91.0	6.0
Shale, medium-dark-gray, silty, noncalcareous, interbedded with thin layers of hard siltstone, bioturbated in places; includes a 5-in.-thick layer of bioturbated, very fine-grained, silty sandstone from 105.3 to 105.7 ft; includes some black macerated plant fragments.....	97.0	23.0
Shale, medium-dark-gray, silty, noncalcareous.....	120.0	48.0
Shale, dark-gray, to medium-dark-gray, noncalcareous, includes several medium-light-gray to light-brownish-gray, 0.5- to 2-in.-thick sideritic concretions.....	168.0	22.4
Sandstone, dark-gray with pale-blue bands, impure, shaly, noncalcareous, very fine-grained, micaceous, extensively bioturbated, evenly laminated; includes some minor scour-and-fill features and		

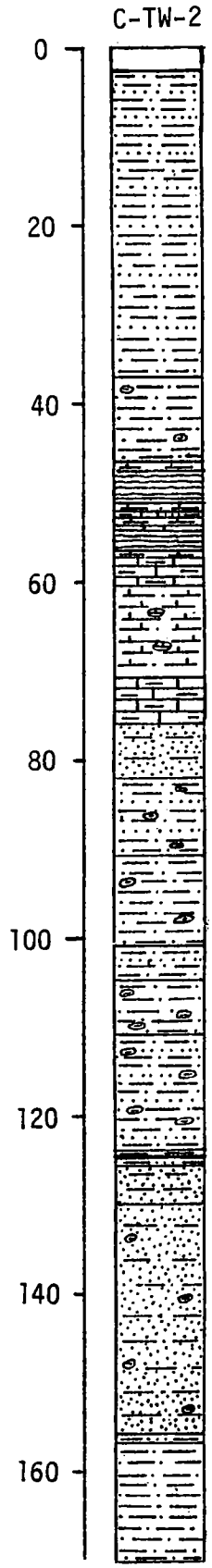


soft-sediment deformation features; contains abundant black macerated plant material on stratification surfaces.....	190.4	13.6
Sandstone, pale-blue and dark-gray, very fine-grained, shaly, noncalcareous, micaceous, bioturbated, wavy-bedded; includes abundant black macerated plant fragments as well as some laminae of black, bright coal; contains minor soft-sediment deformation features; ratio of sand-sized grains to silt- and clay-sized grains greater than in overlying unit; grades into underlying unit.....	204.0	16.0
Shale, dark-gray, silty, noncalcareous, interstratified with lenses and thin layers of very fine-grained, medium-light-gray sandstone, bioturbated; contains black macerated plant fragments on stratification surfaces; includes some soft-sediment deformation features.....	220.0	29.0
Shale, dark-gray to medium-dark-gray, silty, noncalcareous; contains some bioturbation features and siltstone laminae in upper 7 ft of unit.....	249.0	14.0
Shale, dark-gray, silty, noncalcareous, interstratified with cross-laminated layers of medium-light-gray, very fine-grained sandstone 1/64 to 1.75 in. thick; includes some minor bioturbation features..	263.0	4.1
Shale, medium-dark-gray, silty, noncalcareous; contains minor black carbonized plant fragments and pyrite on stratification surfaces; includes sparsely distributed light-brownish-gray sideritic concretions ~1 in. thick; contains some siltstone strata 1/16 to 1 in. thick in middle part of unit; rare pyritized pelecypods observed from 278 to 279 ft; grades into highly calcareous, fossiliferous shale in lower 2 in.....	267.1	22.2
Limestone, dark-gray, impure, highly shaly, fossiliferous, contains abundant small crinoid columnals; interfingers with underlying unit.....	289.3	0.1
Shale, black, hard, brittle, pyritic in upper parts; contains some calcite fracture fillings; includes some phosphatic nodules and thin coal stringers...	289.4	4.6
Shale, black, brittle, very calcareous; contains pyritized fossil shell fragments; grades into underlying unit.....	294.0	0.2
Limestone, dark-gray, impure, shaly, very shaly in upper 2 in., fossiliferous; contains abundant small brachiopod shell fragments and crinoid columnals.....	294.2	0.5
Shale, black, hard, brittle, noncalcareous;		

contains phosphatic nodules.....	294.7	2.4
Checkerboard Formation(?)		
Limestone, light-gray to medium-dark-gray, hard, dense, fine-grained, contains abundant fossil shell fragments and small crinoid columnals (Checkerboard Limestone).....	297.1	3.2
Seminole Formation		
Sandstone, medium-dark-gray with closely spaced, thin light-gray bands, very fine-grained, shaly, noncalcareous, flat-bedded to wavy-bedded with some cross-laminations, bioturbated; grades into underlying unit.....	300.3	7.7
Siltstone, medium-dark-gray, shaly, includes some sandstone laminae in upper 6 in., noncalcareous; contains some pyritic burrows; becomes weakly calcareous in about the lower 12 in.; includes a 3-in.-thick, dense, medium-gray calcareous concretion at base of unit.....	308.0	3.9
Shale, dark-gray, noncalcareous, contains black carbonized and pyritic plant fragments.....	311.9	2.6
Shale, brownish-black, very carbonaceous; contains thin stringers of bright black coal; includes calcite and minor pyrite on fracture surfaces.....	314.5	0.4
Shale, medium-dark-gray, silty, noncalcareous; contains black carbonized and pyritic plant fragments; grades into underlying unit.....	314.9	0.2
Siltstone, medium-dark-gray, noncalcareous, sandy, contains black carbonized and pyritic plant fragments.....	315.1	0.2
Sandstone, medium-light-gray with medium-dark-gray bands, very fine-grained, shaly, noncalcareous, wavy-laminated and cross-bedded, micaceous, contains abundant black macerated plant material on stratification surfaces; grades into underlying unit.....	315.3	6.7
Siltstone, medium-dark-gray with closely spaced light-gray laminations, interlaminated with very fine-grained sandstone, noncalcareous, bioturbated; grades into underlying unit.....	322.0	3.5
Shale, medium-dark-gray, very silty, noncalcareous; includes numerous light-brownish-gray sideritic concretions 1/8 to 1 in. thick.....	325.5	6.2
Coal, black, moderately friable; includes pyrite on stratification surfaces (Tulsa coal).....	331.7	0.2
Shale, medium-dark-gray, silty, noncalcareous, contains black carbonized plant compressions.....	331.9	0.1
Siltstone, medium-dark-gray, noncalcareous; contains abundant black carbonized plant fragments		

on stratification surfaces.....	332.0	0.6
Sandstone, medium-dark-gray with light-gray bands, very fine-grained, shaly, noncalcareous, wavy-laminated and cross-bedded in part; contains some soft-sediment deformation features; includes black macerated plant material on stratification surfaces; bioturbated in places.....	332.6	7.4
Shale, medium-dark-gray, silty; interbedded with several 4- to 5-in.-thick units of very fine-grained, massive to cross-bedded sandstone spaced 1-3 ft apart vertically, noncalcareous; includes some light-brownish-gray sideritic concretions 0.25-1 in. thick, contains abundant black macerated plant fragments on stratification surfaces...	340.0	10.6
Marmaton Group		
Holdenville Formation		
Siltstone, dark-gray to grayish-black, carbonaceous, very fine-grained, dense, hard, noncalcareous (paleosol zone?).....	350.6	0.2
Siltstone, medium-dark-gray, dense, hard, massive, contains black carbonized plant remains.....	350.8	0.4
Sandstone, greenish-gray, very fine- to fine-grained, noncalcareous, extensively bioturbated; thin-bedded in lower part; bedding mostly obscured in upper part.....	351.2	4.8
Sandstone and siltstone, medium-gray with light-gray bands, very fine-grained, shaly, noncalcareous, extensively bioturbated, even-bedded; includes some light-brownish-gray sideritic concretions; contains black carbonized plant fragments, fines upward.....	356.0	5.8
Sandstone, medium-light-gray, massive, fine- to very fine-grained, noncalcareous, interbedded with medium-dark-gray, wavy-bedded, bioturbated, shaly sandstone containing black macerated plant fragments.....	361.8	15.6
Sandstone, medium-dark-gray, very fine-grained, noncalcareous, wavy-laminated, shaly in part; contains abundant silt-sized grains; includes some contorted layers of light-gray, very fine-grained sandstone.....	377.4	22.9
Siltstone, medium-dark-gray, noncalcareous, contains closely spaced laminae of light-gray, very fine-grained sandstone in places; grades into underlying unit.....	400.3	5.2
Sandstone, medium-dark-gray with light-gray bands, very fine-grained, shaly, noncalcareous, wavy-laminated; bioturbated in part; contains black		

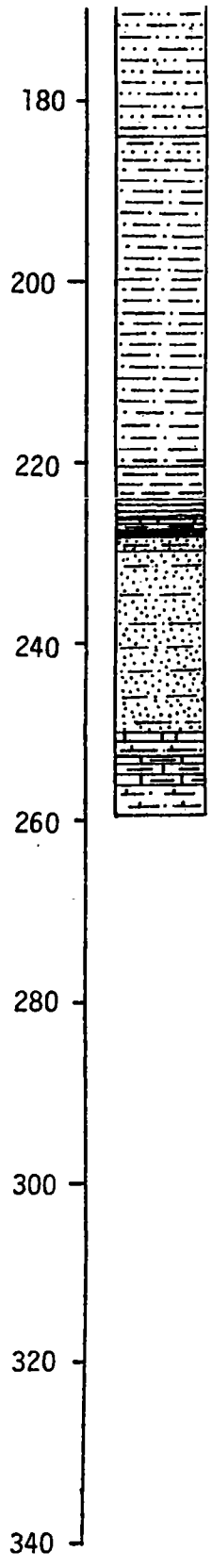
macerated plant fragments on stratification surfaces.....	405.5	6.5
Sandstone, medium-dark-gray, very fine-grained, noncalcareous, laminated, shaly; contains abundant silt-sized grains; grades into underlying unit.....	412.0	8.0
Siltstone, medium-dark-gray, shaly, contains some laminae of medium-light-gray, very fine-grained sandstone, noncalcareous; grades into underlying unit.....	420.0	10.0
Shale, medium-dark-gray, very silty, noncalcareous; includes rare light-brownish-gray sideritic concretions ~0.25 in. thick.....	430.0	22.0
Shale, medium-dark-gray, silty, calcareous, contains marine fossils such as brachiopods and gastropods(?); also contains pyritized trace fossils on stratification surfaces; becomes dark-gray and extremely calcareous in lower 2 ft of unit.....	452.0	3.8
Limestone, dark-gray to grayish-black, hard, shaly, nonfossiliferous; exhibits cone-in-cone structure.....	455.8	0.3
Shale, dark-gray, hard, silty, calcareous in upper 12 in.; includes some light-brownish-gray sideritic concretions ~0.25 in. thick; contains pyritized trace fossils on stratification surfaces....	456.1	6.0
Shale, dark-gray to grayish-black, calcareous, contains sparsely distributed marine fossils and pyritized trace fossils.....	462.1	1.2
Shale, black, hard, brittle, noncalcareous; contains white calcite on fracture surfaces; includes well-preserved brachiopod fossils and phosphatic nodules; lower 1 in. contains abundant pyritized fossils.....	463.3	1.9
Coal, black, bright, moderately friable; includes minor calcite and pyrite on cleat surfaces (Dawson coal).....	465.2	1.8
Underclay, medium-dark-gray, silty, bioturbated; contains black carbonized plant fragments; includes some calcareous fossil remnants in lower part of unit.....	467.0	2.0
Sandstone, medium-gray, very silty and clayey, noncalcareous, contains streaks of black carbonaceous material, bedding disturbed.....	469.0	1.0
Total Depth		470.0



82 (C-TW-2)

SE¼SE¼SE¼SW¼SE¼ sec. 32, T. 24 N., R. 14 E., Washington County. Drilled in pasture at northwest edge of pond 90 ft FSL and 1500 ft FEL. Surface elevation, estimated from topographic map, 655 ft.

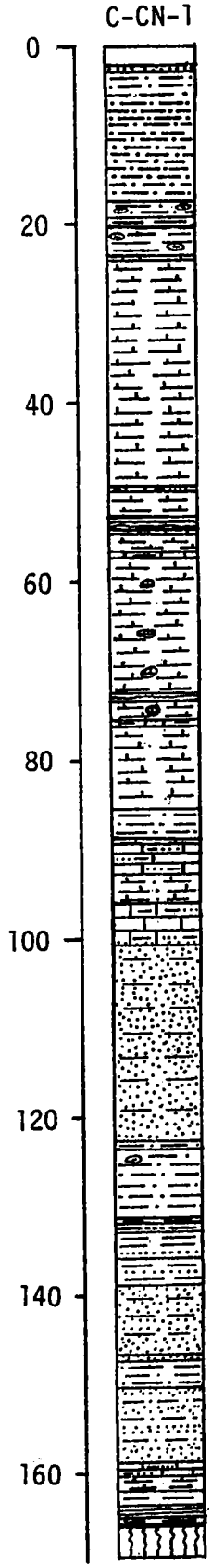
	Depth to unit top (ft)	Thickness of unit (ft)
Silt, brownish-gray, clayey, contains organic material	0.0	1.0
Silt, dark-yellowish-brown, clayey, contains some gravel-sized clasts of moderate-reddish-brown ironstone	1.0	1.5
Skiatook Group		
Coffeyville Formation		
Shale, grayish-orange to pale-yellowish-brown, flaky, oxidized; contains interstratified layers of very fine-grained sandstone	2.5	6.5
Shale, light-olive-gray with some dark-yellowish-orange bands, interlaminated with very fine-grained sandstone, bioturbated; includes some medium-gray bands in lower 2 ft; partly weathered	9.0	4.3
Shale, medium-dark-gray, interstratified with very fine-grained, light-gray sandstone, noncalcareous, bioturbated; includes sparsely distributed brachiopods; contains black macerated plant fragments and rare calcite crusts on stratification surfaces; proportion of sandstone decreases markedly below 30 ft	13.3	23.8
Shale, medium-dark-gray, silty, noncalcareous; contains widely spaced, light-brownish-gray sideritic concretions ~1 in. thick; bioturbated in part; includes some calcitic brachiopods on stratification surfaces	37.1	9.4
Shale, medium-dark-gray, weakly calcareous, contains some fossil hash and small crinoid columnals	46.5	0.1
Shale, black, hard, brittle, noncalcareous, includes some white calcite along fractures, pyritic, contains phosphatic nodules	46.6	4.5
Shale, grayish-black, extremely calcareous, pyritic, silty, contains some small, poorly preserved fossil fragments; grades into underlying unit	51.1	0.6
Limestone, dark-gray with white mottling, impure, silty, shaly, pyritic, fossiliferous, contains abundant fossil hash	51.7	1.0
Shale, grayish-black, weakly calcareous, pyritic, hard, brittle, contains small phosphatic nodules	52.7	0.4
Limestone, dark-gray, fine-grained, extremely		



hard, dense, sparsely fossiliferous.....	53.1	0.4
Shale, black, hard, brittle, calcareous, pyritic, contains phosphatic nodules.....	53.5	3.0
Checkerboard Formation(?)		
Shale, grayish-black, silty, extremely calcareous; contains sparsely distributed fossils; grades into underlying unit.....	56.5	0.4
Limestone, dark-gray, extremely impure and shaly; contains abundant deformed bivalve shells up to 2 in. long; grades into underlying unit.....	56.9	3.6
Shale, dark-gray, silty, very calcareous, contains fossil marine shells.....	60.5	1.8
Shale, dark-gray, silty, calcareous, bioturbated; contains some sparsely distributed marine shells and minor pyrite; includes some hard, dense, medium-gray calcareous concretions up to 3 in. thick; grades into underlying unit.....	62.3	8.7
Limestone, dark-gray in part and very light-gray in about equal part; impure and shaly in dark parts, particularly in upper 6 in. and lower 6 in.; very fossiliferous, marine shells and crinoid fragments abundant; dense and hard in light-colored parts; carbonaceous in lower 6 in. (Checkerboard Limestone).....	71.0	5.0
Seminole Formation		
Sandstone, medium-dark-gray with closely spaced light-gray bands, very fine-grained, shaly, noncalcareous, cross-laminated, scour-and-fill features and soft-sediment deformation features common; contains black macerated plant fragments on stratification surfaces.....	76.0	6.0
Shale, medium-gray, closely interlaminated with medium-light-gray very fine-grained sandstone, noncalcareous, even-bedded; includes some minor black macerated plant fragments on stratification surfaces; contains light-brownish-gray sideritic concretion ~1 in. thick in lower part of unit; proportion of sand-sized grains decreases downward.....	82.0	9.0
Shale, medium-dark-gray, silty, noncalcareous; contains light-brownish-gray sideritic concretions 1/8 to 1 in. thick and minor black carbonized plant compressions.....	91.0	10.1
Shale, medium-dark-gray, silty, noncalcareous; includes laminae of very fine-grained sandstone spaced at ~0.5-in. intervals; contains several light-brownish-gray sideritic concretions about 0.5-1 in. thick.....	101.1	3.7

Shale, medium-dark-gray, silty, noncalcareous; contains several ironstone concretions about 1/8 to 0.5 in. thick; includes black carbonized plant compressions in lower 2 ft of unit.....	104.8	6.2
Shale, medium-dark-gray, silty, noncalcareous; interstratified with cross-laminated layers of very fine-grained sandstone in part; includes abundant black macerated plant fragments on stratification surfaces; contains light-brownish-gray sideritic concretions 0.5-1 in. thick.....	111.0	13.4
Shale, grayish-black, carbonaceous.....	124.4	0.2
Coal, black, bright, very friable; includes pyrite on cleat surfaces (Tulsa coal).....	124.6	0.1
Marmaton Group		
Holdenville Formation		
Siltstone, dark-gray, hard, unbedded; contains black carbonized plant material in upper 6 in.; appears to be a paleosol; grades into underlying unit.....	124.7	1.0
Sandstone, greenish-gray, very fine-grained, clayey, noncalcareous, extensively bioturbated, fines upward; bedding disturbed in upper 1 ft of unit; becomes obscurely thin-bedded in lower part; grades into underlying unit.....	125.7	4.3
Sandstone, medium-gray and light-gray, very fine-grained, shaly, thin-bedded in part, extensively bioturbated, bedding contorted in part, noncalcareous, micaceous; contains black macerated plant material on stratification surfaces; cross-laminated in some places; includes light-brownish-gray sideritic concretions 1/8 to 1 in. thick.....	130.0	26.0
Siltstone, medium-gray, shaly, noncalcareous; grades into underlying unit.....	156.0	1.0
Shale, medium-gray, silty and sandy, noncalcareous..	157.0	13.5
Siltstone, medium-gray, shaly, hard, noncalcareous; contains abundant laminae of light-gray, very fine-grained sandstone; becomes finer grained downward and grades into underlying unit.....	170.5	14.5
Shale, medium-gray, silty, hard, noncalcareous; contains minor black carbonized plant fragments below 200 ft; includes rare laminae of very fine-grained sandstone in upper few feet of unit; contains some small pyritized trace fossils.....	185.0	36.4
Shale, dark-gray, noncalcareous, contains small pyritized trace fossils.....	221.4	3.9
Shale, black, hard, brittle, pyritic, noncalcareous; contains rare brachiopod fossils; includes white calcite in fracture fillings.....	225.3	2.2

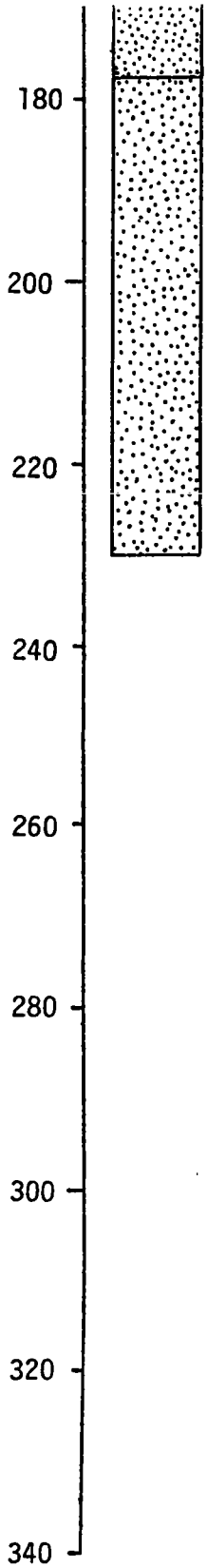
Limestone, dark-gray, dense, hard, nonfossiliferous.	227.5	0.2
Shale, grayish-black, very carbonaceous, coaly.....	227.7	0.3
Coal, black, bright, moderately friable, contains minor pyrite and white calcite on cleat surfaces (Dawson coal).....	228.0	0.9
Sandstone, medium-light-gray to light-bluish-gray, clayey, extensively bioturbated; includes black carbonaceous material in upper 6 in.....	228.9	1.8
Sandstone, medium-light-gray with medium-dark-gray bands, very fine- to fine-grained, shaly, thin- to thick-bedded, noncalcareous; contains numerous soft-sediment deformation features; bioturbated in upper part; includes abundant black macerated plant fragments on stratification surfaces; becomes increasingly shaly downward.....	230.7	20.4
Limestone, very light-gray, hard, conglomeratic, contains rounded clasts of reworked limestone up to 1.5 in. long and 0.5 in. thick; includes some crinoid columnals.....	251.1	0.8
Shale, medium-dark-gray, silty, extremely calcareous, contains minor pyritic trace fossils and rare small flecks of black carbonized plant fragments on stratification surfaces.....	251.9	1.9
Limestone, medium-dark-gray with abundant white fossils, impure, silty, very fossiliferous; bivalves $\geq$1 in. long abundant; interbedded with layers of extremely calcareous shale 1-4 in. thick.....	253.8	3.5
Shale, medium-dark-gray, silty, extremely calcareous, fossiliferous, contains white bivalves and crinoid columnals; includes a 1-in.-thick, shaly, very fossiliferous limestone layer ~1.5 ft below top of unit.....	257.3	2.7
Total Depth		260.0



83 (C-CN-1)

NE¼SE¼SE¼NE¼NE¼ sec. 32, T. 26 N., R. 15 E., Nowata County. Drilled in pasture at west edge of pond 50 ft FEL and 1100 ft FNL. Surface elevation, estimated from topographic map, 840 ft.

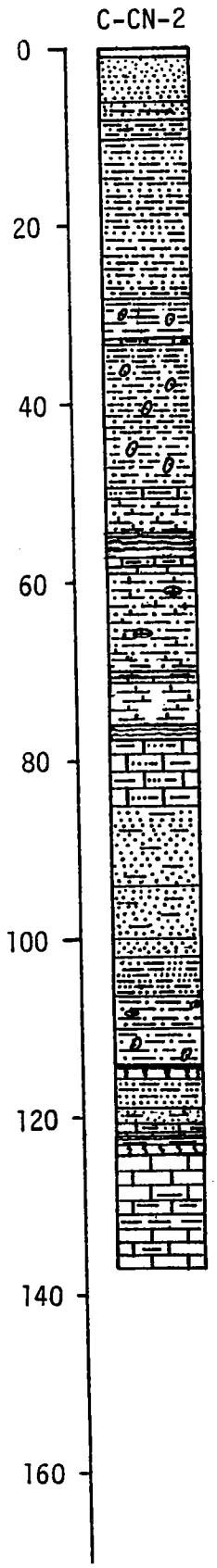
	Depth to unit top (ft)	Thickness of unit (ft)
Sand and gravel, grayish-brown, contains clasts of dark-yellowish-orange sandstone up to cobble size, organic.....	0.0	1.0
Sand, dark-yellowish-orange, gravelly.....	1.0	1.0
Skiatook Group		
Coffeyville Formation		
Sandstone, dark-yellowish-orange, clayey, very fine-grained, micaceous, noncalcareous, wavy-bedded, bioturbated.....	2.0	1.0
Shale, grayish-orange to dark-yellowish-orange, noncalcareous, interstratified with thin layers of micaceous, ripple-marked siltstone and sandstone in upper part, weathered.....	3.0	14.5
Shale, medium-dark-gray, silty; includes thin layers of light-brown, oxidized, ferruginous concretions.....	17.5	1.7
Shale, dark-gray with light-olive-gray coloration along fractures, noncalcareous; includes a 1-in.-thick light-brownish-gray sideritic concretion at top of unit.....	19.2	1.0
Shale, dark-gray, hard, noncalcareous; includes several 1/8- to 0.25-in. layers of sideritic concretions.....	20.2	3.5
Limestone, dark-gray, bioclastic, contains small crinoid columnals and sand grains, protrudes downward into a 1-in.-deep burrow at contact with underlying shale unit.....	23.7	0.1
Shale, grayish-black, hard, calcareous; contains rare poorly preserved marine fossils and calcarenite-filled burrows.....	23.8	25.8
Limestone, dark-gray to grayish-black, impure, sandy, silty, contains sparsely distributed fossil shells, grades into underlying unit.....	49.6	0.4
Shale, grayish-black, hard, silty; calcareous, contains scattered marine fossils.....	50.0	2.6
Shale, black, hard, brittle, noncalcareous, contains some calcite on fracture surfaces.....	52.6	1.5
Limestone, grayish-black, extremely shaly, fossiliferous; contains broken marine shell fragments, grades into underlying unit.....	54.1	0.1
Shaly, grayish-black, silty, calcareous, contains		



rare, poorly preserved marine fossils.....	54.2	2.6
Limestone, grayish-black, impure, silty, shaly, interbedded with calcareous shale, fossiliferous; contains bivalves and abundant small crinoid columnals in upper 2 in.; fossil hash concentrated in lower 1 in.; grades into underlying unit.....	56.8	0.5
Shale, grayish-black, silty, very calcareous, fossiliferous, contains scattered gastropods, brachiopods, pelecypods, and crinoid columnals; includes some 2- to 3-in.-thick medium-dark-gray limestone concretions as well as scattered pyrite-filled burrows and rare black carbonized plant compressions.....	57.3	15.2
Shale, black, hard, brittle, noncalcareous, includes rare pyrite-filled burrows and phosphatic nodules; includes some white shell fragments in lower 1 in. of unit.....	72.5	0.9
Checkerboard Formation(?)		
Shale, grayish-black, silty, very calcareous, fossiliferous, contains white shell fragments and burrows; includes medium-dark-gray limestone concretions ~1.25 in. thick.....	73.4	2.4
Limestone, grayish-black, impure, silty, shaly, fossiliferous, contains white shells and shell fragments; grades into underlying unit.....	75.8	0.3
Shale, grayish-black, silty, very calcareous; contains rare burrows and shell fragments; fossil content increases from 80.5 to 81.5 ft; numerous burrows in bottom 6 in. of unit; contact with underlying unit sharp.....	76.1	9.6
Shale, dark-gray, silty, noncalcareous, contains abundant pyrite- and calcite-filled burrows.....	85.7	3.2
Shale, dark-gray; silty, very calcareous, contains abundant bivalve shells up to 1 in. long; very impure, shaly and silty limestone in part; grades into underlying unit.....	88.9	1.1
Limestone, dark-gray, impure, silty, extremely fossiliferous, bivalves and other marine fauna abundant; grades into underlying unit.....	90.0	3.0
Shale, dark-gray, very silty, hard, calcareous, contains fossil shells and other marine fauna, grades into underlying unit.....	93.0	3.0
Limestone, dark-gray alternating with pinkish-gray to light-brownish-gray bands 7-12 in. thick; impure, silty and shaly--particularly in dark-gray portion; very fossiliferous, contains a variety of marine fauna as well as fossil hash in part; crinoid columnals and brachiopod shells		

abundant; becomes sandy in lower 2 in. of unit (Checkerboard Limestone).....	96.0	4.7
Seminole Formation		
Sandstone, medium-dark-gray with medium-light-gray bands, very fine-grained, shaly, noncalcareous, wavy-bedded in part, cross-laminated in part, soft-sediment deformation features common; includes black macerated plant fragments on some stratification surfaces.....	100.7	21.7
Shale, medium-dark-gray, silty, contains thin laminae of light-gray, very fine-grained sandstone...	122.4	1.0
Shale, medium-dark-gray to dark-gray, silty, noncalcareous, includes some light-brownish-gray sideritic concretions 1-2 in. thick in upper 2.5 ft of unit.....	123.4	8.1
Marmaton Group		
Holdenville Formation		
Claystone, medium-dark-gray with grayish-black streaks, carbonaceous, bioturbated, appears to be the upper part of a paleosol zone.....	131.5	0.1
Siltstone, light-olive-gray, clayey, sandy, noncalcareous, slickensided, bedding obscured by extensive bioturbation; grades into underlying unit....	131.6	0.8
Claystone, greenish-gray, noncalcareous, interbedded with very fine-grained sandstone and siltstone in part, extensively bioturbated; bedding mostly obscured except in lower 6 in., which is interlaminated with sandstone.....	132.4	3.6
Shale, medium-gray, interstratified with closely spaced laminae of very fine-grained, light-gray sandstone, noncalcareous, bioturbated; includes black macerated plant fragments on stratification surfaces; grades into underlying unit.....	136.0	3.0
Sandstone, medium-gray with medium-light-gray bands, interstratified with silty shale, noncalcareous, bioturbated, cross-laminated in part; contains several light-brownish-gray sideritic concretions ~0.5 in. thick; includes black macerated plant fragments on stratification surfaces.....	139.0	7.8
Sandstone, medium-light-gray, fine- to very fine-grained, noncalcareous, massive, includes a few lenses of medium-dark-gray shale in upper one-third of unit; faintly cross-bedded in part; contact with underlying unit sharp.....	146.8	0.9
Shale, medium-dark-gray, silty, noncalcareous, bioturbated; includes numerous thin laminae and lenses of light-gray, very fine-grained sandstone; grades into underlying unit.....	147.7	2.8

Sandstone and silty shale, medium-dark-gray and light-gray, interstratified, laminated, bioturbated, noncalcareous; contains small cut-and-fill features and some low angle cross-stratification..	150.5	8.9
Limestone, brownish-gray, bioclastic, impure, silty, fossiliferous, contains bivalve shells and fossil hash.....	159.4	0.9
Shale, medium-gray, extremely calcareous in upper part to weakly calcareous in lower part, burrowed, very fossiliferous, crinoids and bivalves abundant; grades into underlying unit.....	160.3	1.7
Shale, medium-gray, noncalcareous, fossiliferous in upper 1 ft, sparsely fossiliferous in lower part..	162.0	1.6
Shale, dark-gray, noncalcareous.....	163.6	0.3
Shale, black, hard, brittle, noncalcareous, contains phosphatic nodules.....	163.9	1.1
Shale, dark-gray, noncalcareous; black, carbonaceous, and fossiliferous in lower 0.5 in. of unit.	165.0	0.8
Coal, black, bright, slightly friable; contains minor pyrite (Dawson coal).....	165.8	0.3
Underclay, medium-light-gray, slickensided; contains black carbonized plant compressions in upper 0.5 ft; extensively bioturbated in lower 2 ft.....	166.1	3.4
Sandstone, grayish-blue-green, very fine-grained, noncalcareous; bedding obliterated by bioturbation; contains abundant white to brownish-gray, calcareous burrow features, fossil bivalves, and crinoid columnals up to 0.5 in. in diameter.....	169.5	8.3
Sandstone, grayish-blue-green, fine-grained, massive, noncalcareous; contains some faint to well-defined, low angle, cross-bedding features with mica and black macerated plant fragments on stratification surfaces below 187 ft.....	177.8	52.2
Total Depth		230.0



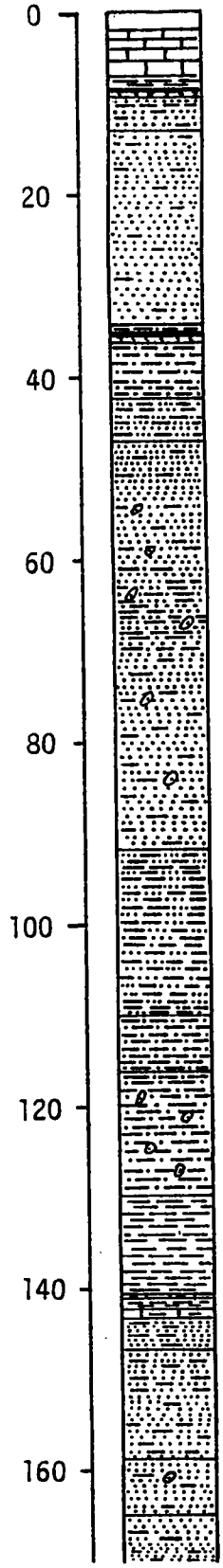
SW¼NE¼NW¼SE¼SE¼ sec. 9, T. 27 N., R. 15 E., Nowata County. Drilled at northeast corner of farm pond 940 ft FEL and 1100 ft FSL. Surface elevation, estimated from topographic map, 789 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Sand, grayish-brown with moderate-reddish-brown spots, contains organic material.....	0.0	1.0
Skiatook Group		
Coffeyville Formation		
Sandstone, light-brown to dark-yellowish-orange, very fine-grained, oxidized.....	1.0	5.0
Sandstone, grayish-orange, very fine-grained, shaly.....	6.0	2.0
Shale, olive-gray with light-olive-brown and dark-gray bands, silty, noncalcareous, slightly weathered.....	8.0	2.2
Shale, dark-gray with medium-light-gray laminations, silty, noncalcareous, bioturbated; contains laminae of very fine-grained sandstone; fractured; includes some olive-gray, weathered layers up to 1 in. thick, and olive-gray weathered zones along fractures down to ~16 ft; sandy laminae decrease below 20 ft; grades into underlying unit.....	10.2	17.8
Shale, dark-gray, silty, noncalcareous; contains rare crinoid columnals; grades into underlying unit.....	28.0	1.5
Shale, grayish-black, noncalcareous; contains widely spaced, light-brownish-gray sideritic concretions up to 0.75 in. thick.....	29.5	3.6
Limestone, dark-gray, extremely impure, silty, shaly, fossiliferous, contains bivalves and crinoid columnals.....	33.1	0.1
Shale, dark-gray to grayish-black, silty, noncalcareous; includes a 0.5-in.-thick fossiliferous layer at ~33.7 ft and rare fossils throughout; contains some light-brownish-gray sideritic concretions up to 1 in. thick; becomes calcareous at ~48 ft; grades into underlying unit.....	33.2	16.5
Limestone, dark-gray, very impure, silty and shaly, contains small crinoid columnals; grades into underlying unit.....	49.7	0.8
Shale, dark-gray to grayish-black, very silty, calcareous; includes a fossiliferous layer from 53.4 to 53.8 ft; contains scattered fossils and small fossil fragments throughout, including		

brachiopods and cephalopods; also includes minor pyritized trace fossils.....	50.5	4.2
Shale, black, hard, noncalcareous, contains phosphatic nodules; pyritic in places; includes some calcite veinlets.....	54.7	2.5
Shale, black, hard, calcareous; contains some scattered shell fragments.....	57.2	0.2
Limestone, medium-dark-gray, muddy and very fossiliferous in upper 16.5 in.; contains abundant fossil fragments, crinoid columnals, and brachiopod shells; very fine-grained, dense, massive and pyritic with rare fossil fragments in lower 6 in.....	57.4	1.9
Shale, medium-dark-gray to dark-gray, calcareous, hard, silty, contains some poorly preserved, pyritized marine fossils and trace fossils; also contains some medium-gray limestone concretions 0.75-3.5 in. thick.....	59.3	10.7
Shale, grayish-black, hard, silty, weakly calcareous.....	70.0	0.6
Limestone, medium-gray, hard, dense, fine-grained, massive, pyritic; contains rare, poorly preserved fossils.....	70.6	0.3
Shale, dark-gray to grayish-black, calcareous, hard, brittle, contains abundant pyrite-filled burrows; grades into underlying unit.....	70.9	5.1
Shale, grayish-black to black, calcareous, fossiliferous, contains abundant brachiopod shells.....	76.0	1.9
Checkerboard Formation		
Limestone, dark-gray, impure, silty, shaly, very fossiliferous, contains abundant brachiopod shells; interfingers with underlying unit in bottom 2 in. (Checkerboard Limestone).....	77.9	7.1
Seminole Formation		
Sandstone, medium-gray and medium-light-gray, very fine-grained, shaly, banded, noncalcareous, extensively bioturbated in upper 1 ft, cross-laminated in part, microfaulted in places; contains abundant soft-sediment deformation features.....	85.0	9.0
Sandstone, medium-light-gray, fine-grained, massive, noncalcareous; includes some thin, medium-dark-gray shaly streaks in upper 3 ft, and interstratified shaly layers up to 3/8 in. thick in lower 3 ft of unit.....	94.0	6.0
Sandstone, medium-gray with light-gray laminae, very fine-grained, shaly, noncalcareous; includes some low-angle cross-stratification features.....	100.0	2.0
Siltstone, medium-dark-gray, shaly, interlaminated		

with light-gray, very fine-grained sandstone, noncalcareous; grades into underlying unit.....	102.0	4.5
Shale, medium-dark-gray, very silty, contains abundant laminae of light-gray, very fine-grained sandstone, noncalcareous, bioturbated; includes some black macerated plant fragments on stratification surfaces; contains widely spaced, light-brownish-gray sideritic concretions 1/8 to 0.75 in. thick; fines downward.....	106.5	3.5
Shale, medium-dark-gray, silty, noncalcareous; contains minor siltstone-filled burrows and laminae in upper 3 ft; includes rare, light-brownish-gray sideritic concretions ~0.25 in. thick.....	110.0	4.8
Coal, black, slightly friable, contains bands of pyrite (Tulsa coal).....	114.8	0.1
Marmaton Group		
Holdenville Formation		
Underclay, medium-dark-gray grading downward to dark-greenish-gray, contains black carbonaceous streaks in upper 3 in.....	114.9	1.0
Siltstone, greenish-gray, clayey, noncalcareous, bedding obscure; contains light-brownish-gray, calcareous, siltstone-filled burrows.....	115.9	0.5
Siltstone, greenish-gray, noncalcareous, interstratified with closely spaced laminae of very fine-grained weakly calcareous sandstone, extensively bioturbated; includes some light-brown, calcareous, fine-grained, fossiliferous sandstone layers 0.25-1 in. thick just above contact with underlying unit.....	116.4	3.2
Sandstone, light-gray to light-greenish-gray, calcareous, very fine-grained, interstratified with greenish-gray shale laminae in part; contains some obscure high-angle cross-beds in upper part; also contains some light-brown layers of medium-grained, very calcareous sandstone; bedding contorted and fossiliferous just above contact with underlying unit.....	119.6	1.4
Limestone, medium-gray to brownish-gray, very impure, silty and shaly, fossiliferous, contains abundant crinoid columnals; interfingers with underlying unit.....	121.0	0.8
Shale, black, hard, brittle, noncalcareous; contains phosphatic nodules.....	121.8	1.2
Shale, medium-dark-gray, noncalcareous, contains some pyritized fossil shells.....	123.0	0.5
Underclay, medium-gray, slickensided; includes dark-gray, carbonaceous, shale-filled burrows		

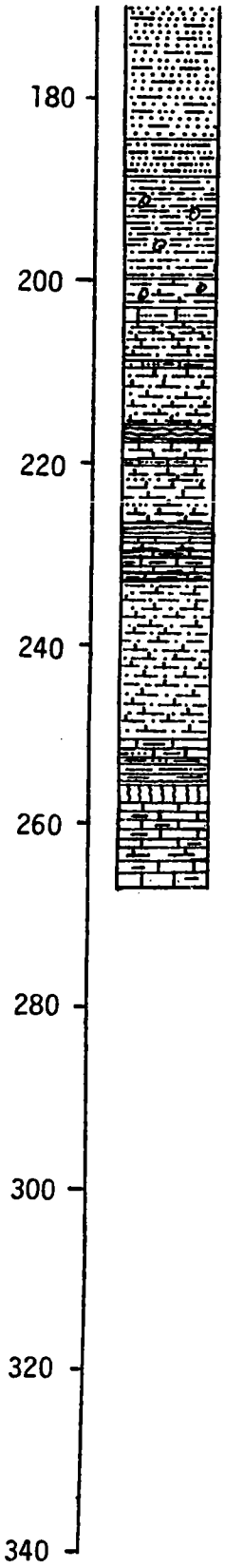
extending ~2 in. downward at top of unit.....	123.5	1.0
Lenapah Limestone		
Limestone, light-brownish-gray, hard, coarse-textured, contains abundant fossil hash; becomes light-gray with minor contorted, greenish-gray clay layers from 129 to 130 ft (Upper Lenapah Limestone).....	124.5	6.9
Shale, greenish-gray, noncalcareous, bioturbated; contains some limestone-filled burrows up to 2 in. thick, and scattered fossil fragments.....	131.4	0.9
Limestone, very light-gray to light-greenish-gray, hard, fine-grained; contains some crinoid columnals; includes some minor shale; bioturbated (Lower Lenapah Limestone).....	132.3	4.7
Total Depth		137.0



85 (C-CN-3)

SW¼SW¼SW¼NW¼SW¼ sec. 28, T. 29 N., R. 15 E., Nowata County. Drilled in field just east of township road near crest of hill capped by limestone 25 ft FWL and 1330 ft FSL. Surface elevation, estimated from topographic map, 799 ft.

	Depth to unit top (ft)	Thickness of unit (ft)
Silt, dusky-brown, clayey, contains organic material, moderate-brown in lower 1 ft.....	0.0	2.0
Skiatook Group		
Hogshooter Formation		
Limestone, grayish-orange to pale-yellowish-brown, weathered, bioclastic, contains abundant brachiopod shells and crinoid columnals; occurs as broken slabs in a matrix of grayish-orange, calcareous clay (Hogshooter Limestone).....	2.0	2.0
Limestone, light-gray with some pale-yellowish-brown weathered zones, fossiliferous, brachiopods and crinoid columnals abundant (Hogshooter Limestone).....	4.0	1.5
Limestone, light-gray, hard, very fossiliferous, crinoid columnals and brachiopods abundant (Hogshooter Limestone).....	5.5	1.5
Coffeyville Formation		
Shale, medium-light-gray to medium-dark-gray, clayey.....	7.0	1.4
Coal, black, moderately friable, contains flecks of pyrite (5/8 in. unnamed coal).....	8.4	0.1
Underclay, light-bluish-gray; includes minor black carbonaceous streaks in upper part of unit; shaly in lower part.....	8.5	0.5
Sandstone, medium-light-gray to light-bluish-gray, very fine-grained, shaly, noncalcareous, cross-laminated.....	9.0	0.8
Shale, medium-dark-gray and light-gray, noncalcareous, interstratified with closely spaced laminae of very fine-grained sandstone.....	9.8	1.0
Sandstone, medium-light-gray with medium-dark-gray laminae, very fine-grained, shaly, noncalcareous; grades into underlying unit.....	10.8	2.7
Sandstone, medium-light-gray with minor medium-dark-gray streaks, very fine-grained, shaly in part, fine-grained and massive in part, noncalcareous, cross-laminated in places; includes soft-sediment deformation features; contains black carbonized plant fragments on stratification surfaces; bioturbated in places.....	13.5	20.9
Shale, medium-dark-gray, interlaminated with		



medium-light-gray, very fine-grained sandstone, noncalcareous	34.4	0.3
Coal, black, bright, moderately friable, includes pyrite and white calcite on cleat surfaces (Cedar Bluff coal)	34.7	0.3
Shale, black, soft, flaky, very carbonaceous	35.0	0.1
Underclay, medium-gray, contains black carbonized plant material	35.1	0.2
Shale, medium-gray, silty, noncalcareous, contains abundant black carbonized plant compressions on stratification surfaces and widely spaced thin coal laminae; includes rare, dark-gray siltstone-filled burrows ~1 in. long and 0.75 in. deep; grades into underlying unit	35.3	7.0
Siltstone, medium-gray, shaly in upper part, sandy in lower part, noncalcareous; contains abundant well-preserved, black carbonized plant compressions on stratification surfaces; grades into underlying unit	42.3	5.2
Sandstone, medium-dark-gray with medium-light-gray laminations, very fine-grained, silty, shaly, flat-bedded to wavy-bedded, bioturbated, noncalcareous; includes black carbonized plant fragments on stratification surfaces; cross-stratified in places; contains some soft-sediment deformation features; includes rare light-brownish-gray sideritic concretions up to 1 in. thick; extremely shaly from about 61 to 70 ft; grades into underlying unit	47.5	44.5
Siltstone, medium-dark-gray, very shaly, noncalcareous, bioturbated; black macerated plant material abundant on stratification surfaces; interstratified with thin, lensing beds and laminae of very fine-grained, medium-light-gray sandstone, small-scale cross-laminae and scour-and-fill features common; fines downward	92.0	18.3
Shale, medium-dark-gray, silty, noncalcareous; includes some thin beds and laminae of very fine-grained sandstone, bioturbated; contains black carbonized plant fragments on stratification surfaces	110.3	6.3
Shale, medium-dark-gray, silty, noncalcareous; includes some beds of cross-stratified, light-gray siltstone up to 1.75 in. thick, as well as rare light-brownish-gray sideritic concretions 0.25-0.5 in. thick	116.6	13.4
Shale, dark-gray, noncalcareous, uniform in appearance	130.0	11.0

Limestone, pinkish-gray with brownish-gray bands, bioclastic, contains abundant shell fragments and crinoid columnals; includes several shaly layers about 1/8 to 0.25 in. thick.....	141.0	0.4
Shale, dark-gray, noncalcareous; contains some 0.25-in.-thick bioclastic limestone layers in upper and lower parts of unit.....	141.4	1.3
Limestone, medium-dark-gray, impure, shaly, fossiliferous, contains abundant crinoid columnals and shell fragments.....	142.7	1.1
Sandstone, medium-light-gray with medium-dark-gray bands, shaly, very fine-grained, noncalcareous, wavy-bedded, micaceous; contains black macerated plant fragments on stratification surfaces.....	143.8	0.6
Sandstone, medium-light-gray with widely spaced medium-dark-gray bands, fine- to very fine-grained, noncalcareous, bioturbated in places, wavy-bedded; includes some shaly layers.....	144.4	2.6
Sandstone, medium-light-gray with closely spaced medium-dark-gray bands, very fine-grained, shaly, wavy-bedded, micaceous, noncalcareous; contains black macerated plant material on stratification surfaces; includes some soft-sediment deformation features and cut-and-fill features; bioturbated in part; coarser grained and less shaly from 152.4 to 153.2 ft.....	147.0	12.3
Sandstone, medium-light-gray, medium-grained, massive to cross-bedded, noncalcareous; contains minor shale laminae and light-brown clay pebbles; includes black macerated plant fragments on some stratification surfaces, and a light-brownish-gray 1.5-in.-thick sideritic concretion at 161.3 ft.....	159.3	6.6
Sandstone, medium-light-gray with closely spaced, medium-dark-gray bands, very fine-grained, shaly, wavy-bedded, micaceous, noncalcareous, bioturbated in part; contains black macerated plant material on stratification surfaces; includes some 6-in.-thick layers of fine-grained sandstone from 167 to 170 ft; grades into underlying unit.....	165.9	19.6
Siltstone, medium-dark-gray with light-gray bands, noncalcareous, flat-bedded, extensively bioturbated, contains black macerated plant material on some stratification surfaces; includes abundant laminae of very fine-grained sandstone; grades into underlying unit.....	185.5	3.9
Shale, medium-dark-gray, silty, noncalcareous, bioturbated; includes some thin laminae of very		

fine-grained sandstone, and widely spaced brownish-gray sideritic concretions up to 1.5 in. thick; contains well-preserved brachiopod fossils; fines downward.....	189.4	11.1
Shale, medium-dark-gray, weakly calcareous, bioturbated; contains some light-brownish-gray sideritic concretions ~0.25 in. thick; includes minor small pyritized trace fossils.....	200.5	3.3
Limestone, dark-gray, impure, silty, fine-grained, fossiliferous; contains abundant small crinoid columnals and broken shell fragments; grades into underlying unit.....	203.8	1.2
Shale, dark-gray, silty, very calcareous, hard; contains rare small brachiopods and small pyritized trace fossils; grades into underlying unit.....	205.0	4.7
Limestone, dark-gray, very impure, silty and shaly, fossiliferous; contains abundant small brachiopod shells; grades into underlying unit.....	209.7	0.3
Shale, dark-gray, silty, very calcareous, hard; becomes grayish-black in bottom 6 in. of unit.....	210.0	6.3
Shale, black, hard, noncalcareous; contains thin crusts of white calcite in veinlets and on some stratification surfaces; includes abundant phosphatic nodules, some of which contain pyrite.....	216.3	2.1
Shale, grayish-black, very calcareous, silty, fossiliferous; contains some brachiopod shells and fossil fragments; grades into underlying unit.....	218.4	1.7
Limestone, dark-gray, impure, silty, shaly, fossiliferous; contains abundant small crinoid columnals and shell fragments in upper 4 in.; dense, massive, and nonfossiliferous in lower 2.5 in.....	220.1	0.7
Shale, dark-gray to grayish-black, calcareous; contains some brachiopods; includes thin stringers of sandstone and small lens-like burrows filled with sandstone in bottom 6 in. of unit.....	220.8	6.8
Shale, black, hard, noncalcareous; contains phosphatic nodules and minor white calcite along fracture surfaces.....	227.6	1.1
Checkerboard Formation		
Shale, grayish-black, very calcareous; contains small marine fossils.....	228.7	0.2
Limestone, grayish-black, very impure, shaly, fossiliferous; contains abundant brachiopods and fossil fragments.....	228.9	0.3
Shale, grayish-black, very calcareous, contains small marine fossils and pyritic trace fossils....	229.2	0.9
Limestone, medium-dark-gray, impure, shaly, fossiliferous; contains abundant broken shell fragments,		

gastropods, and brachiopods (Checkerboard Limestone).....	230.1	3.9
Seminole Formation		
Shale, medium-dark-gray, silty, calcareous; contains scattered fossil shells and shell fragments; includes rare, small, pyritic trace fossils; becomes weakly calcareous with diminishing fossil content below 247 ft.....	234.0	17.4
Limestone, medium-dark-gray, impure, silty, shaly, fossiliferous, contains abundant broken shell fragments.....	251.4	1.7
Siltstone, medium-dark-gray, shaly, weakly calcareous, not visibly bedded; contact with underlying unit very irregular; clasts of underlying unit incorporated in bottom 1 in. of unit.....	253.1	0.2
Marmaton Group		
Holdenville Formation		
Claystone, greenish-gray, hard, unbedded, silty, blocky fracture, noncalcareous; includes some dark-gray, carbonaceous, silty streaks in upper 2 in. of unit.....	253.3	1.5
Shale, dark-greenish-gray with black streaks and thin beds of black carbonaceous shale, noncalcareous; contains black, pyritic, phosphatic nodules.....	254.8	1.1
Underclay, dark-greenish-gray, slickensided, blocky fracture.....	255.9	2.1
Lenapah Limestone		
Limestone, light-gray to light-brownish-gray, very hard, massive, medium-grained; contains thin, irregular streaks of greenish-gray clay; bioturbated; includes some poorly preserved brachiopods and fossil hash (Upper Lenapah Limestone).....	258.0	5.0
Shale, light-olive-gray, calcareous; includes abundant limestone-filled burrows ~1 in. or more in diameter; fossiliferous; contact with underlying unit very irregular and gradational.....	263.0	1.3
Limestone, light-gray to light-brownish-gray, very hard, impure, fine- to medium-grained; contains fossil fragments; includes irregular streaks of olive-gray to brownish-gray clay; bioturbated; brecciated in part (Lower Lenapah Limestone).....	264.3	3.1
Total Depth		267.4