

STATE OF ARKANSAS

ARKANSAS GEOLOGICAL COMMISSION

Norman F. Williams, State Geologist

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INFORMATION CIRCULAR 20-D

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GEOLOGIC FORMATIONS PENETRATED BY THE  
SHELL OIL COMPANY NO. 1 WESTERN COAL AND MINING CO. WELL  
ON THE BACKBONE ANTICLINE, SEBASTIAN COUNTY, ARKANSAS<sup>1</sup>

---

by

Boyd R. Haley and Sherwood E. Frezon  
U. S. Geological Survey  
Denver, Colorado



Prepared in cooperation with the  
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<sup>1</sup> Publication authorized by the Director, U. S. Geological Survey

STATE OF ARKANSAS  
Orval E. Faubus, Governor

ARKANSAS GEOLOGICAL COMMISSION  
Norman F. Williams, State Geologist

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## ABSTRACT

The Shell Oil Co. No. 1 Western Coal and Mining Co. well in Sebastian County, Ark., has penetrated the oldest rocks encountered in any well drilled in the Arkansas Valley in Arkansas. The lithology of the stratigraphic units penetrated by this well is described in this report.

## INTRODUCTION

The Shell Oil Co. No. 1 Western Coal and Mining Co. well in sec. 36, T. 7 N., R. 32 W., Sebastian County, Ark. has penetrated the oldest rocks encountered in any well that has been drilled in the Arkansas Valley section of the Ouachita province in Arkansas. This well penetrates a section of Paleozoic sedimentary rocks 10,924 feet thick and at total depth has not reached the Precambrian basement.

This well is also unique in the development of gas production in Arkansas, because it is the first well in Arkansas to produce commercial quantities of gas from rocks older than the Chattanooga Shale (Mississippian and Devonian). The well at completion was reported to be a shut-in gas discovery with production from the interval of 7,936-7,958 feet in rocks of Silurian age.

This report has been prepared to provide a detailed lithologic description of the rocks penetrated by the well and to present the authors' interpretation of the stratigraphy of these rocks. Formational thicknesses are quoted as though the well drilled through horizontal beds. Corrections accounting for dip ( $2^{\circ}$  N. at the surface) or for faulting (abundant slickensides at depth of 4,610 to 4,618 ft.) have not been applied. It is the hope of the authors that the data presented will serve as a stratigraphic reference for future drilling, especially where wells are drilled in rocks of pre-Mississippian age.

The lithologic descriptions in this report were obtained by a concurrent examination of drill cuttings and electrical logs. The method used in examining and logging the drill cuttings is the method of composite interpretive logging described by Maher (1959).

This report has been prepared in cooperation with the Arkansas Geological and Conservation Commission, Norman F. Williams, Director. The commission also furnished the core of the Shell Oil Co. No. 1 Western Coal and Mining Co. well.

## STRATIGRAPHY

The lithology of the rocks penetrated in this well is shown on plate 1 and is described in the sample log at the end of this report. The authors have used the stratigraphic nomenclature of Arkansas for the rock units in this report. Plate 1.—Lithologic log of Shell Oil Company No. 1 Western Coal and Mining Co. well, Sebastian County, Ark.

### **Pennsylvanian System Des Moines Series Krebs Group McAlester Formation**

The well penetrated 203 feet of the lower part of the McAlester Formation. This part of the formation is predominantly dark-gray shale with the Lower Hartshorne coal bed within 3 feet of the base. The contact between the McAlester Formation and the underlying Hartshorne Sandstone is conformable (Hendricks and Parks, 1950).

### **Hartshorne Sandstone**

The Hartshorne Sandstone is 197 feet thick and consists mostly of light-gray very silty very fine grained sandstone and medium-gray siltstone, with minor amounts of dark-gray shale and light-gray slightly silty very fine to fine-grained sandstone. The Hartshorne Sandstone unconformably overlies the Atoka Formation where exposed at the surface in nearby areas.

### **Atoka Series Atoka Formation**

The Atoka Formation is 6,390 feet thick and is about 65 percent shale, 20 percent siltstone, and 15 percent sandstone. Most of the shale is dark gray; some is dark gray to grayish black. Some is slightly silty to very silty. The siltstone is very light to dark gray, argillaceous to very finely sandy in part, and well cemented in part. The sandstone is very light to medium

gray, very fine to fine grained, slightly silty to silty in part, slightly limy in part, and contains scattered medium to coarse quartz grains in part. Two thin beds of bentonite(?) (Frezon and Schultz, 1961) are present near the base of the Atoka Formation in this well. The base of the upper bentonite(?) bed is 250 feet and that of the lower bentonite(?) bed 137 feet above the base of the Atoka. The contact between the Atoka Formation and the underlying Bloyd Shale is unconformable in northern Arkansas.

#### **Morrow Series Bloyd Shale**

The Bloyd Shale is 334 feet thick and consists mostly of dark-gray shale with some medium-gray limestone, a minor amount of medium-gray siltstone, and 1 sandstone bed 4 feet thick. In the type section in Washington County (about 40 miles north), the Bloyd Shale has the Kessler Limestone Member near its top and the Brentwood Limestone Member near its base. In this report, a limestone 8 feet thick and 20 feet below the top of the Bloyd Shale may be equivalent to the Kessler. A limestone 20 feet thick and 164 feet above the base of the Bloyd Shale may be equivalent to the Brentwood, but it is the authors' opinion that it is not equivalent because it is too far above the base of the Bloyd. The contact between the Bloyd Shale and the underlying Hale Formation is conformable where exposed in northern Arkansas.

#### **Hale Formation Prairie Grove Member**

The Prairie Grove Member is 49 feet thick and consists of about equal amounts of medium-gray very silty very fine grained sandstone, medium-gray siltstone that is very finely sandy in part, and medium-gray limestone that contains scattered rounded very fine to medium quartz grains. The contact between the Prairie Grove Member and the underlying Cane Hill Member is unconformable where exposed in northern Arkansas.

#### **Cane Hill Member**

The Cane Hill Member is 55 feet thick and is mostly dark-gray shale with light- to medium-gray slightly limy very fine to fine-grained sandstone at the base. The contact between the the Cane Hill Member and the underlying Pitkin Limestone is unconformable where the two crop out in northern Arkansas.

#### **Mississippian System Chester Series Pitkin Limestone**

The Pitkin Limestone, about 172 feet thick, is composed dominantly of gray, granular to finely crystalline limestone that is oolitic in part. The limestone sequence is broken by a few beds of dark-gray shale. The Pitkin conformably overlies the Fayetteville Shale in area where the formations crop out.

#### **Fayetteville Shale**

The Fayetteville Shale is 75 feet thick and consists of an interbedded sequence of limestone and shale beds. The shale is dark gray to gray black and most of it is pyritic. Where the shale is not pyritic it is generally slightly limy, but this limy shale is neither abundant nor excessively limy. Interbedded with the shale are thin beds of dark-gray granular silty limestone. In this well the base of the Fayetteville is placed at the base of nonsilty shales that are relatively nonmicaceous and nonlimy when compared with underlying shale. In surface exposures the Fayetteville conformably overlies older rocks of Chester age.

#### **Lower part of Chester and Meramec Series, undivided**

The sequence of rocks, 293 feet thick, underlying the Fayetteville Shale and overlying the Chattanooga Shale, includes rocks of early Chester and of Meramec ages. In the log of the Athletic Mining and Smelting No. 1 W. Ayers well, about 4 miles north of this well, Frezon (1962) assigned rocks in this stratigraphic interval to the Batesville Sandstone and Moorefield Formation, undifferentiated.

The rocks in the interval under discussion can be divided, on the basis of lithology, into two units. The upper unit, about 150 feet thick, is a sequence of dark-gray silty micaceous and mostly limy shale interbedded with dark-gray granular to finely crystalline limestone. The lower unit is composed of dark-gray limy silty micaceous shale and with very little, if any, limestone. Rocks of Meramec age unconformably overlie the Chattanooga Shale were exposed in eastern Oklahoma.

#### **Mississippian and Devonian Systems Chattanooga Shale**

The Chattanooga Shale, 38 feet thick, is dark-gray, pyritic shale with some relatively harder, probably siliceous, shale. In this well the sandstone that is locally developed at the base of the Chattanooga, the Sylamore Sandstone Mem-

ber, is absent. The Chattanooga unconformably overlies the Penters Chert in the normal stratigraphic sequence.

#### **Devonian System Penters Chert**

The Penters Chert is 39 feet thick and is composed of white to light-gray opaque and translucent sandy and dolomitic chert. The samples contain a small amount of light-gray, granular to finely crystalline dolomite. Although the quantity of chert in the samples indicates that the formation is dominantly chert, it is entirely possible that the formation contains more carbonate than indicated if the carbonate was pulverized during the drilling process. The Penters at the surface unconformably overlies rocks of Silurian age.

#### **Silurian System St. Clair equivalent**

Rocks of Silurian age, 115 feet thick, are a sequence of light-gray granular calcareous dolomite. Although these rocks are lithically unlike the coarsely crystalline limestone typical of the St. Clair Limestone, they are similar to beds locally present in the formation and probably are equivalent to the St. Clair to which they are referred. The St. Clair in areas in which it crops out unconformably overlies rocks of Ordovician age.

#### **Ordovician System Upper Ordovician Series Cason Shale**

The Cason Shale, 15 feet thick, consists of dark-gray and greenish-gray shale that is somewhat dolomitic and is finely pyritic in part. The Cason unconformably overlies older rocks of Ordovician age in surface exposures.

#### **Fernvale Limestone**

The Fernvale Limestone is 45 feet thick in this well and it is lithically similar to the formation where penetrated in adjoining areas. The formation is composed of finely to coarsely crystalline limestone that has some reddish crystalline limestone and scattered rhombs of dolomite. Unlike the formation elsewhere in Arkansas, however, grains of fine to coarse, rounded and frosted quartz sand are present throughout the formation. The Fernvale unconformably overlies the Plattin Limestone in the normal stratigraphic sequence in northern Arkansas.

#### **Middle Ordovician Series**

In western Arkansas, rocks of Middle Ordovician age include formations between the top

of the Plattin Limestone and the base of the Everton Formation. In a complete section in western Arkansas these formations are, in descending order, Plattin Limestone, Joachim Dolomite, St. Peter Sandstone, and Everton Formation, and a complete section is present in this well.

The nearest well in Arkansas that completely penetrated rocks of Middle Ordovician age was the Arkansas-Louisiana Gas Co. No. 1 S. M. Hudson well in sec. 15, T. 10 N., R. 24 E., in Johnson County, Ark. The sample description and formation tops for this well have been published (Sheldon, 1954). Despite the fact that the Hudson well is located about 50 miles north-east of the well described in this report, the sequence of lithologic units and thicknesses in parts of the section is remarkably similar in the 2 wells. These similarities will be pointed out in the discussion of the Everton Formation.

#### **Plattin Limestone**

The Plattin Limestone, 48 feet thick, is dark-gray, dense to finely granular limestone in which dolomite rhombs and calcite crystals ranging from fine to coarse are included. The upper 10 feet of the formation contains dark-gray dense chert. On the surface the Plattin unconformably overlies older rocks of Ordovician age.

#### **Joachim Dolomite**

A sequence of dolomite beds with thin sandstone beds and some thin shale beds beneath the Plattin Limestone is tentatively assigned to the Joachim Dolomite. This sequence of rocks, about 95 feet thick, consists primarily of medium-gray and medium dark-gray, granular to very finely crystalline dolomite that contains fine to medium, rounded and subrounded grains of quartz sand. The interbeds of sandstone are composed of fine to medium rounded and subrounded quartz grains and the comparatively few shale beds are dark gray, finely pyritic, and slightly dolomitic. In the normal sequence the Joachim conformably overlies the St. Peter Sandstone.

#### **St. Peter Sandstone**

The St. Peter Sandstone, which is 72 feet thick, is composed entirely of sandstone. The sand is composed of white to very light gray fine to coarse quartz grains that are subrounded to rounded and generally frosted. Most of the sandstone is friable but some secondary quartz cementation has occurred and some zones of the sandstone are quartzitic. In part the shape of rounded and subrounded grains have been

made more angular by secondary quartz overgrowths. In the normal surface sequence the St. Peter rests unconformably on the Everton Formation.

### Everton Formation

The Everton Formation in this well is 503 feet thick and is composed of dolomite, sandstone, limestone, and shale. The formation can be divided into 3 units which, in descending order, are (1) an upper unit that is primarily dolomite, (2) a middle unit that is primarily sandstone, and (3) a lower unit that is primarily dolomite. This 3-part division of the formation is recognizable and the thicknesses of these units correspond remarkably well with the formation in the previously discussed Hudson well. In the Hudson well the total thickness of the Everton is 502 feet.

The upper unit of the Everton, which occupies the interval between 8,235 and 8,410 feet, is predominantly dolomite with beds of sandstone and relatively few shale beds. The dolomite apparently occurs in relatively thinner beds in the upper half of the unit; the lower half of the unit is composed of only dolomite and shale with fine to medium quartz sand grains included in the dolomite. The sandstone beds, which are apparently restricted to the upper half of this upper unit, are composed of white, fine to medium quartz grains that are rounded and frosted. The shale is dark gray and locally contains very fine pyrite. In the upper part of the unit the shale occurs as streaks and thin partings in the dolomite; in the lower part the shale apparently occurs as thicker interbeds in the dolomite. This upper unit is 175 feet thick in this well and its counterpart in the Hudson well is 177 feet thick.

The middle unit of the Everton, which occupies the interval between 8,410 and 8,640 feet, is composed primarily of sandstone that contains beds of limestone and dolomite. The friable sandstone is composed of white fine to coarse quartz grains that are rounded and frosted. Some grains have secondary quartz additions. The sandstone in the lower 10 feet of the unit contains a trace of white tripolitic chert. Thin dolomite beds in this unit are dark gray and granular and are sandy. The limestone in this unit is medium dark gray or olive gray and is dense. The middle unit in this well is 230 feet thick. The comparable interval in the Hudson well is about 198 feet thick, and the sequence of lithologies in the interval, which are in descending order sandstone, limestone, and sandstone, are present in the Hudson well.

The lower part of the Everton Formation, in

which dolomite is predominant over sandstone, occupies the interval between 8,640 and 8,738 feet in this well. The dolomite is light gray to medium dark gray and is granular to finely crystalline. Some of it has dark-gray finely pyritic shale and fine to medium rounded and frosted sand grains. The sandstone in this lower interval is composed of white fine to coarse quartz grains that are rounded and frosted except where they have secondary quartz additions.

In areas of outcrop the Everton unconformably overlies older rocks of Ordovician age.

### Lower Ordovician Series

The rocks of pre-Everton Ordovician age in this well are equivalent to the upper part of the Arbuckle Group of the Midcontinent region and are considered to be of Early Ordovician age. A number of wells in western Arkansas have completely penetrated these rocks (Caplan, 1960) and the two wells for which detailed lithic information is available nearest the well described in this report are the Independent Oil and Gas Co. No. 1 Banks well in Madison County, Ark. (sec. 6, T. 16 N., R. 27 W.) and the Camden Oil Co. No. 1 Grissom well in Washington County, Ark. (sec. 17, T. 15 N., R. 31 W.). The Banks well is about 60 miles northeast of the well described herein and the Grissom well is about 60 miles north.

In the Banks and Grissom wells the formations of pre-Everton Ordovician age are in descending order the Powell Dolomite, Cotter Dolomite, Jefferson City Dolomite, Roubidoux Formation, and the undifferentiated Gasconade Dolomite and Van Buren Formation. The basal unit of the Van Buren is the Gunter Sandstone Member. All these units are present in the well of this report.

The thickness of rocks of pre-Everton Ordovician age in this well is 1,770 feet. In the Grissom well these rocks are 1,448 feet thick and in the Banks well they are 1,462 feet thick. Although thickness data for these rocks are not abundant for the area of western Arkansas, the greater thickness in this well does agree with the southward increase in thickness described by McCracken (1959). Caplan (1960, table 3) gives formation tops which indicate a south-eastward increase in thickness of these rocks.

### Powell Dolomite

The Powell Dolomite, which occupies the interval between 8,738 and 8,965 feet in this well, is 227 feet thick. The formation is composed of

light-gray to dark-gray granular dolomite. In the interval between 8,780 and 8,810 feet the formation has gray-black dense chert. Another zone that is cherty is from 8,840-8,852 feet but the chert in this zone is olive-gray and translucent. Locally within the formation the dolomite has small amounts of very fine pyrite. Caplan (1960) states that the contact between the Powell and the underlying Cotter Dolomite has been reported as both conformable and unconformable.

The Powell is 162 feet thicker in this well than in the Grissom well and 120 feet thicker than the Powell in the Banks well. Chert is absent in the Powell in both the Banks and Grissom wells. The lower 115 feet of the Powell in the present well is noncherty and is possibly correlative to the Powell of the Grissom and Banks wells. McCracken (1955, p. 58) pointed out that thicker sections of Powell in the "Arkansas trough" contain rocks of Powell age that are younger than any present in the area of outcrop in Missouri and Arkansas where they have been removed by pre-Everton truncation.

#### **Cotter Dolomite**

The Cotter Dolomite, which is 365 feet thick, occupies the interval between 8,965 and 9,330 feet in this well. The Cotter, like the overlying Powell, is primarily a sequence of dolomite. The dolomite in the Cotter is generally more coarsely crystalline than that in the overlying Powell; it ranges upward to finely crystalline in the Cotter. The Cotter has more chert than the Powell and is sandy in some horizons. The cherts are milky, light gray, or pale red (pink chert on plate 1). Some chert is oolitic and in the lower 60 feet of the formation the chert has included fine to medium quartz sand grains. For the most part the quartz sand in the dolomite is fine to medium but in the lower 30 feet of the formation the sand grains range from fine to coarse. The contact between the Cotter and the underlying Jefferson City Dolomite has been described as disconformable and unconformable.

The Cotter in the Banks well is 10 feet thicker than the formation in this well; in the Grissom well the formation is 34 feet thicker.

The Cotter in this well is lithologically both similar to and different than the formation in the Grissom and Banks wells. In all three wells the dolomite crystals are coarser than those of the overlying Powell. The Cotter also has sandy chert in all three wells, which is the highest occurrence of this type of chert. In the Banks and

Grissom wells coarse quartz fragments are present in the formation whereas they are not present in the formation in this well. The sand in the lower part of the formation in the Banks well is fine to medium, and in this well it ranges from fine to coarse.

#### **Jefferson City Dolomite**

The Jefferson City Dolomite at a depth of 9,330 feet is 465 feet thick. The formation is principally dolomite that is light gray to medium dark gray and granular to medium crystalline. The chert in the formation is white, gray, or pale red (pink) and some of the light-gray and medium-dark gray cherts are translucent ("milky" and "smoky" cherts, respectively). Sand in the formation is composed of rounded and frosted quartz grains that range from fine to coarse. The thin shale beds are dark gray or gray black. The Jefferson City unconformably overlies the Roubidoux Formation.

The Jefferson City is thicker in this well than in the Banks well, where it is 376 feet thick, and in the Grissom well, where it is 426 feet thick. In all three wells, the Jefferson City is relatively nonsandy when compared with the lower part of the Cotter and with the underlying Roubidoux.

#### **Roubidoux Formation**

The top of the Roubidoux Formation is at a depth of 9,795 feet and the formation is 230 feet thick. The chief rock type of the formation is dolomite which varies from medium light gray to very light gray and is granular to coarsely crystalline. The formation contains abundant sand of fine to coarse quartz. The chert is white to medium gray, olive gray or pale red (pink) and is variously sandy and oolitic. Some translucent very light gray (milky) and medium-gray (smoky) chert is present. Below 9,950 feet the formation has very coarse dolomite crystals in a matrix of white chert. The formation also contains very coarse fragments of quartz crystals.

In this well, and in the Banks and Grissom wells, the Roubidoux Formation is the most sandy unit in the part of the Arbuckle equivalent above the top of the Gunter Sandstone Member of the Van Buren Formation and apparently this is true of the formation in Missouri and Kansas (McCracken, 1955, fig. 3). The Roubidoux unconformably overlies the Gasconade Dolomite.

#### **Gasconade Dolomite and Van Buren Formation, undifferentiated**

The Gasconade Dolomite and Van Buren Formation, undifferentiated, occupy the interval between 10,025 and 10,508 feet and their combined thickness is 483 feet. For the purposes of discus-

sion of lithology, the rocks representing the undifferentiated formations are divided into two units; the upper unit is a sequence of dolomite that is equivalent to the Gasconade Dolomite and the upper part of the Van Buren Formation, and a lower unit that is dominantly sandstone and is equivalent to the Gunter Sandstone Member which constitutes the lower part of the Van Buren Formation.

The dolomite of the upper unit varies from dark gray to very light gray and from granular to coarsely crystalline. Some scattered grains of fine to coarse quartz sand are present in the dolomite. Chert, which is a common accessory in the unit, varies from white to light gray or pink. The unit has much white chert with dolomite rhombs embedded in it, and coarse fragments of quartz crystals are present. Scattered shale fragments in samples from the upper 15 feet of the unit indicate that thin beds of dark-gray shale are present.

The Gunter Sandstone Member of the Van Buren Formation is well developed in this well. The top of the Gunter is at a depth of 10,365 feet and the member is about 143 feet thick. It is dominantly fine- to very coarse grained quartz sandstone. The lower 50 feet of the member has interbeds of very light gray to medium light gray, granular to medium crystalline dolomite that is sandy in part. The dolomite interbeds in this lower part have an aggregate thickness less than the thickness of the associated sandstone. The Gunter Sandstone unconformably overlies rocks of Cambrian age.

#### **Cambrian System Upper Cambrian Series**

In the stratigraphic sequence in the area of outcrop in southern Missouri, the rocks between the base of the Gunter Sandstone Member of the Van Buren Formation and the Precambrian igneous basement are equivalent to the lower part of the Arbuckle Group and are of Late Cambrian age. In this well the top of rocks of Late Cambrian age are at a depth of 10,508 feet and the incomplete thickness of these rocks is 416 feet.

The chief rock type of this part of the section is very light gray to medium-gray and granular to coarsely crystalline dolomite. There is a general darkening of the color of the dolomite downward in the section. Down to a depth of 10,600 feet the dolomite is light gray to very light gray; below this depth medium light-gray and medium-gray dolomite are interbedded with the lighter dolomite.

Sand in the rocks of Cambrian age consists of

fine- to coarse-grained, rounded quartz grains. In the upper 50 feet discrete sandstone beds are present; below this interval sand occurs as either streaks and stringers in the dolomite or as scattered grains in dolomite.

Chert in this interval is white to medium light gray and generally is opaque; some chert is light gray and translucent (smoky).

The rocks in the interval between 10,905 feet and the total depth of the well, 10,924 feet, are lithically different from overlying rocks. In this interval the rock is composed primarily of orange and pink coarse dolomite crystals in a dark-gray matrix. The matrix is composed of silt-sized quartz that has included very fine well-rounded quartz sand grains and detrital feldspar.

The rocks overlying this distinctive rock type are very sandy; the stratigraphic interval between 10,883 and 10,905 feet apparently has some thin beds of fine- to coarse-grained quartz sandstone.

It is not possible to determine accurately what lateral equivalents of formations of the Ozark region are present at total depth in this well. There is, however, some lithic evidence based on insoluble residues to indicate that in terms of the Ozark section and the Arbuckle Mountain section there is still a considerable stratigraphic interval between the total depth of this well and the Precambrian basement.

The lower part of this well did not penetrate rocks that contain any glauconite. This mineral is common in the lower part of the section of Late Cambrian age in Missouri (McCracken, 1955) and in rocks of Late Cambrian age in the Arbuckle Mountains in Oklahoma (Winland, 1955, p. 277). Winland (1955) also points out that feldspar is a common insoluble residue in the rocks of Late Cambrian age in the Arbuckle Mountains. These meager data suggest that the lower 20 feet of this well penetrated rocks possibly equivalent to the upper part of the Derby-Doerun of McCracken (1955) and the Butterfly Dolomite of Winland (1955). If this is so, there may be several hundred feet of sedimentary rocks between the total depth of this well and the Precambrian basement.

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Frezon, S. E., 1962, Correlation of Paleozoic rocks from Coal County, Oklahoma, to Sebastian County, Arkansas: Oklahoma Geol. Survey Circ. 58, 53 p., 2 pls., 1 fig.	3	200-	203	Shale, dark-gray. Base of unit is base of McAlester Formation.
<b>Hartshorne Sandstone</b>				
Hendricks, T. A., and Parks, Bryan, 1950, Geology of the Fort Smith district, Arkansas: U.S. Geol. Survey Prof. Paper 221-E, p. 67-94.	16	203-	219	Siltstone, medium-gray, very finely micaceous, very finely sandy in 210-215.
McCracken, Earl, 1955, Correlation of insoluble residue zones of upper Arbuckle of Missouri and southern Kansas: Am. Assoc. Petroleum Geologists Bull., v. 39, no. 1, p. 47-59.	7	219-	226	Shale, dark-gray, slightly silty, very finely micaceous.
—————1959, Insoluble residues provide good regional correlations [Mo.]: World Oil, v. 149, no. 2, p. 79-82, 110.	12	226-	238	Siltstone, medium- to dark-gray, argilloceous, very finely micaceous.
—————1959, Insoluble residues provide good regional correlations [Mo.]: World Oil, v. 149, no. 2, p. 79-82, 110.	11	238-	249	Sandstone, light- to medium-gray, very fine grained, almost silt size—less than 0.0625 mm in diameter, very silty, very finely micaceous.
Maher, J. C., 1959, The composite interpretive method of logging drill cuttings: Oklahoma Geol. Survey Guidebook 8, 48 p., illus.	2	249-	251	Siltstone, medium-gray, very finely micaceous.
Sheldon, M. G., 1954, Sample descriptions and correlations for selected wells in northern Arkansas: Arkansas Resources and Devel. Comm., Div. Geology, Inf. Circ. 17, 222 p.	3	251-	254	Sandstone, as above.
	6	254-	260	Siltstone, as above
	11	260-	271	Sandstone, as above.
	6	271-	277	Siltstone, as above.
	18	277-	295	Sandstone, as above.
Winland, H. D., 1955, Insoluble residue study and correlation of the Arbuckle Group in southern Oklahoma: Tulsa Geol. Soc. Digest, v. 23, p. 260-288.	10	295-	305	Siltstone, as above.
	5	305-	310	Sandstone, light-gray, very fine grained, very silty, very finely micaceous.

### Sample Log

Shell Oil Co. No. 1 Western Coal and Mining Co. Sec. 36, T. 7N., R. 32W. (620 ft south and 450 ft west of center), Sebastian County, Ark.

Elevation: 505 ft; total depth: 10,924 ft.

Samples from 0 ft to 7,400 ft examined and logged by B. R. Haley; those from 7,400 ft to 10,924 ft by S. E. Frezon.

Lower part of McAlester Formation, Hartshorne Sandstone, Atoka Formation, Bloyd Shale, Hale Formation, Pitkin Limestone, Fayetteville Shale, Chester and Meramec Series, Chattanooga Shale, Penters Chert, St. Clair equivalent, Cason Shale, Fernvale Limestone, Plattin Limestone, Joachim Dolomite, St. Peter Sandstone, Everton Formation, Powell Dolomite, Cotter Dolomite, Jefferson City Dolomite, Roubidoux Formation, Gasconade Dolomite and Van Buren Formation, undifferentiated, and rocks of Late Cambrian age.

Interval (feet)	Depth (feet)	Description				
			62	400-	462	Shale, dark-gray, slightly silty, very finely micaceous.
			28	462-	490	Shale, dark-gray, very silty, very finely to finely micaceous; very finely to coarsely crystalline pyrite in 462-480.
			63	490-	553	Shale, dark-gray, slightly to very silty, very finely micaceous; dense to granular pyrite in 490-520.
100	0-	100 (No sample.)				
85	100-	185 Shale, dark-gray, very finely micaceous; very finely crystalline pyrite in 100-120 and 150-160; grayish-black siderite in 150-170; pyritic dark brownish-gray siderite concretions in 170-185.	168	553-	721	Shale, dark-gray, very finely micaceous; dense to granular pyrite in 620-640.
			74	721-	795	Shale, dark-gray, silty, finely micaceous.
5	185-	190 Shale, medium- to dark-gray, silty, very finely micaceous.	60	795-	855	Shale, dark-gray, slightly silty, very finely micaceous.
8	190-	198 Shale, dark-gray, very finely micaceous.	13	855-	868	Shale, dark-gray, very silty, finely micaceous.
2	198-	200 Coal (Lower Hartshorne coal bed).	5	868-	873	Shale, dark-gray.

### Atoka Series Atoka Formation

9	873-	882	Siltstone, medium-gray, argillaceous, finely micaceous.	33	1278-	1311	Sandstone, light-gray, very fine to fine-grained, silty, finely micaceous.
2	882-	884	Shale, dark-gray, slightly silty, very finely micaceous.	12	1311-	1323	Shale, dark-gray, very finely micaceous.
6	884-	890	Siltstone, as above.	17	1323-	1340	Siltstone, light- to medium-gray, very finely sandy, finely micaceous.
2	890-	892	Shale, as above.	10	1340-	1350	Shale, medium- to dark-gray, very silty, very finely micaceous.
6	892-	898	Siltstone, as above.	10	1350-	1360	Sandstone, light- to medium-gray, very fine grained, very silty, finely micaceous.
4	898-	902	Shale, as above.	10	1360-	1370	Shale, dark-gray, silty, very finely micaceous.
6	902-	908	Sandstone, very light gray, fine- to medium-grained, slightly silty.	5	1370-	1375	Sandstone, light-gray, very fine to fine-grained, very silty, argillaceous, finely micaceous.
2	908-	910	Shale, as above.	6	1375-	1381	Siltstone, medium-gray, very finely to finely micaceous.
2	910-	912	Siltstone, medium-gray, slightly very finely sandy, finely micaceous.	7	1381-	1388	Sandstone, light-gray, very fine to fine-grained, silty.
2	912-	914	Shale, as above.	3	1388-	1391	Siltstone, medium-gray, very finely micaceous.
7	914-	921	Siltstone, as above.	5	1391-	1396	Sandstone, very light gray, very fine to fine-grained, slightly silty, well-cemented.
2	921-	923	Shale, as above.	8	1396-	1404	Shale, dark-gray, very finely micaceous.
13	923-	936	Sandstone, very light gray, fine- to medium-grained, rounded sand grains, slightly silty.	6	1404-	1410	Siltstone, medium-gray, very finely to finely micaceous.
3	936-	939	Shale, as above.	8	1410-	1418	Shale, as above.
6	939-	945	Sandstone, very light gray, very fine grained, very silty, finely micaceous.	3	1418-	1421	Siltstone, as above.
5	945-	950	Shale, dark-gray, very finely micaceous.	7	1421-	1428	Shale, as above.
18	950-	968	Siltstone, medium-gray, slightly very finely sandy, very finely micaceous.	6	1428-	1434	Sandstone, light-gray, very fine grained, very silty, finely micaceous.
2	968-	970	Shale, as above.	4	1434-	1438	Siltstone, medium-gray, finely micaceous.
4	970-	974	Sandstone, light-gray, very fine to fine-grained, silty, finely micaceous.	15	1438-	1453	Sandstone, light-gray, very fine to fine-grained, silty, finely micaceous.
3	974-	977	Siltstone, medium- to dark-gray, argillaceous, very finely micaceous.	4	1453-	1457	Shale, dark-gray, silty, finely micaceous.
9	977-	986	Sandstone, as above.	13	1457-	1470	Sandstone, light- to medium-gray, very fine grained, very silty, finely micaceous.
2	986-	988	Siltstone, as above.	3	1470-	1473	Shale, as above.
39	988-	1027	Sandstone, very light gray, very fine to fine-grained, scattered rounded medium quartz grains; very silty in 991-994, 1000-1003, and 1008-1013.	14	1473-	1487	Siltstone, medium-gray, argillaceous, finely micaceous.
3	1027-	1030	Shale, dark-gray, slightly silty, very finely micaceous.	3	1487-	1490	Sandstone, light-gray, very fine grained, silty, finely micaceous.
51	1030-	1081	Sandstone, light-gray, very fine to fine-grained, slightly silty to silty, finely micaceous.	35	1490-	1525	Shale, dark-gray, silty, very finely to finely micaceous.
19	1081-	1100	Shale, as above; very finely to finely crystalline pyrite in 1090-1100.	120	1525-	1645	Shale, dark-gray, very finely micaceous.
3	1100-	1103	Siltstone, medium-gray, argillaceous, finely micaceous; very finely to finely crystalline pyrite.	5	1645-	1650	Siltstone, medium-gray, argillaceous, very finely micaceous.
8	1103-	1111	Shale, as above.	8	1650-	1658	Shale, as above.
5	1111-	1116	Siltstone, as above.	4	1658-	1662	Siltstone, as above.
2	1116-	1118	Shale, as above.	10	1662-	1672	Shale, as above.
8	1118-	1126	Siltstone, as above; very finely to finely crystalline pyrite in 1120-1126.	5	1672-	1677	Siltstone, light-gray, very finely sandy.
6	1126-	1132	Shale, as above.	5	1677-	1682	Shale, as above.
6	1132-	1138	Siltstone as above; very finely to finely crystalline pyrite.	4	1682-	1686	Siltstone, medium-gray, argillaceous, very finely micaceous.
15	1138-	1153	Shale, as above; very finely to finely crystalline pyrite in 1140-1150.	3	1686-	1689	Shale, as above.
25	1153-	1178	Sandstone, light-gray, very fine grained, very silty; very finely to finely crystalline pyrite in 1160-1178.	9	1689-	1698	Sandstone, light-gray, very fine grained, very silty.
32	1178-	1210	Shale, dark-gray, silty, very finely micaceous.	12	1698-	1710	Siltstone, medium-gray, very finely micaceous.
3	1210-	1213	Siltstone, medium-gray, argillaceous, very finely micaceous.	15	1710-	1725	Shale, dark-gray, slightly silty, very finely micaceous.
7	1213-	1220	Shale, as above.	3	1725-	1728	Siltstone, as above.
7	1220-	1227	Siltstone, as above.	10	1728-	1738	Shale, as above.
51	1227-	1278	Shale, as above.				

7	1738- 1745	Siltstone, as above.	10	2763- 2773	Siltstone, light- to medium-gray, very finely sandy, very finely micaceous.
7	1745- 1752	Shale, as above.			
13	1752- 1765	Siltstone, as above; very finely sandy in 1752-1756.	50	2773- 2823	Shale, medium- to dark-gray, very silty, very finely micaceous; dark brownish-gray siderite in 2790-2810; dense to granular pyrite in 2800-2820.
10	1765- 1775	Shale, as above.			
5	1775- 1780	Siltstone, medium-gray, very finely sandy, finely micaceous.	17	2823- 2840	Shale, dark-gray, very silty, very finely micaceous.
5	1780- 1785	Shale, as above.	7	2840- 2847	Siltstone, medium-gray, very finely sandy, argillaceous; dark brownish-gray siderite; dense pyrite.
5	1785- 1790	Siltstone, as above.	16	2847- 2863	Siltstone, dark-gray, very argillaceous, very finely micaceous.
92	1790- 1882	Shale, as above.	22	2863- 2885	Shale, dark-gray, very finely micaceous; dark brownish-gray siderite in 2863-2870.
16	1882- 1898	Sandstone, medium-gray, very fine grained, very silty, well-cemented.	9	2885- 2894	Siltstone, medium- to dark-gray, very finely sandy, argillaceous, finely micaceous.
9	1898- 1907	Shale, as above.	3	2894- 2897	Shale, dark-gray, silty, very finely micaceous.
13	1907- 1920	Sandstone, light- to medium-gray, very fine to fine-grained, silty.	8	2897- 2905	Siltstone, as above.
3	1920- 1923	Siltstone, medium-gray, finely micaceous.	15	2905- 2920	Shale, as above.
9	1923- 1932	Sandstone, very light gray, fine-grained, drills free.	5	2920- 2925	Siltstone, medium- to dark-gray, argillaceous, very finely micaceous.
3	1932- 1935	Siltstone, as above.	22	2925- 2947	Shale, as above; dense pyrite in 2940-2947.
23	1935- 1958	Sandstone, very light gray, fine-grained, scattered medium quartz grains.	13	2947- 2960	Siltstone, as above; dense pyrite in 2950-2960.
5	1958- 1963	Siltstone, as above.	3	2960- 2963	Shale, as above.
6	1963- 1969	Sandstone, as above.	7	2963- 2970	Siltstone, medium- to dark-gray, very finely sandy, argillaceous, finely micaceous; dense pyrite.
27	1969- 1996	Shale, dark-gray, silty, very finely micaceous.	8	2970- 2978	Shale, as above.
4	1996- 2000	Siltstone, medium-gray, argillaceous, finely micaceous.	12	2978- 2990	Sandstone, light- to medium-gray, very fine grained, silty, well-cemented.
120	2000- 2120	(No sample.)	25	2990- 3015	Siltstone, medium-gray, very finely sandy, very finely micaceous.
30	2120- 2150	Siltstone, medium-gray, very finely micaceous.	25	3015- 3040	Siltstone, medium-gray, very finely micaceous.
40	2150- 2190	Sandstone, light- to medium-gray, very fine grained, very silty, very finely micaceous.	5	3040- 3045	Siltstone, medium-gray, very finely sandy, very finely micaceous.
9	2190- 2199	Sandstone, light-gray, very fine to fine-grained, silty.	10	3045- 3055	Shale, dark-gray, silty, very finely micaceous.
9	2199- 2208	Siltstone, as above.	25	3055- 3080	Shale, dark-gray, very silty, very finely micaceous.
7	2208- 2215	Sandstone, light-gray, very fine to fine-grained, very silty, finely micaceous.	53	3080- 3133	Shale, dark-gray to grayish-black, very finely micaceous; dark-gray pyritic dense siderite in 3120-3130.
73	2215- 2288	Siltstone, medium-gray, argillaceous, very finely micaceous.	20	3133- 3153	Siltstone, dark-gray, very argillaceous.
4	2288- 2292	Sandstone, light-gray, very fine grained, silty, finely micaceous.	29	3153- 3182	Shale, dark-gray, silty, very finely micaceous.
68	2292- 2360	Siltstone, medium- to dark-gray, argillaceous, very finely micaceous.	49	3182- 3231	Siltstone- medium- to dark-gray, argillaceous, very finely micaceous; dense pyrite in 3182-3200; grayish-black dense siderite in 3210-3230.
53	2360- 2413	Shale, dark-gray, slightly silty, very finely micaceous.	8	3231- 3239	Shale, dark-gray to grayish-black.
4	2413- 2417	Sandstone, medium-gray, very fine to fine-grained, silty, well-cemented.	61	3239- 3300	Siltstone, medium-gray, very finely micaceous.
35	2417- 2452	Shale, dark-gray, silty, very finely micaceous.	27	3300- 3327	Shale, dark-gray, to grayish black, very finely micaceous.
27	2452- 2479	Siltstone, medium- to dark-gray, very argillaceous, finely micaceous.	13	3327- 3340	Siltstone, as above.
16	2479- 2495	Siltstone, medium- to dark-gray, argillaceous, finely micaceous; very finely crystalline pyrite.	29	3340- 3369	Siltstone, medium- to dark-gray, argillaceous, very finely micaceous.
55	2495- 2550	Siltstone, medium- to dark-gray, very argillaceous, finely micaceous; very finely crystalline pyrite in 2495-2510 and 2540-2550.	7	3369- 3376	Sandstone, light-gray, very fine grained, well-cemented.
93	2550- 2643	Shale, dark-gray, silty, very finely micaceous.			
57	2643- 2700	Shale, dark-gray, very silty, very finely to finely micaceous.			
8	2700- 2708	Siltstone, medium- to dark-gray, very finely sandy, argillaceous, finely micaceous.			
55	2708- 2763	Shale, dark-gray, very finely micaceous.			

2	3376- 3378	Shale, dark-gray, slightly silty, very finely micaceous.			medium quartz grains, quartzose; drills free.
7	3378- 3385	Sandstone, as above.	2	4154- 4156	Shale, as above.
13	3385- 3398	Shale, as above.	5	4156- 4161	Sandstone, as above.
4	3398- 3402	Sandstone, medium-gray, very fine grained, slightly silty.	9	4161- 4170	Shale, dark-gray, silty, very finely micaceous.
18	3402- 3420	Shale, dark-gray, very finely micaceous.	4	4170- 4174	Sandstone, light-gray, very fine to fine-grained, silty.
319	3420- 3739	Shale, dark-gray, slightly silty to very silty, very finely micaceous.	2	4174- 4176	Shale, as above.
12	3739- 3751	Siltstone, medium-gray, argillaceous, very finely micaceous.	3	4176- 4179	Sandstone, as above.
7	3751- 3758	Sandstone, light-gray, very fine grained, very silty.	1	4179- 4180	Shale, as above.
4	3758- 3762	Shale, dark-gray, very finely micaceous.	2	4180- 4182	Sandstone, as above.
10	3762- 3772	Sandstone, as above.	7	4182- 4189	Shale, as above.
7	3772- 3779	Shale, as above.	2	4189- 4191	Sandstone, as above.
2	3779- 3781	Sandstone, as above.	16	4191- 4207	Shale, as above.
5	3781- 3786	Shale, as above.	5	4207- 4212	Siltstone, medium-gray, argillaceous, scattered rounded medium to very coarse quartz grains, pebbles of light-brown shale.
6	3786- 3792	Sandstone, very light gray, very fine to medium-grained, widely scattered, rounded coarse quartz grains, silty.	8	4212- 4220	Shale, dark-gray, slightly silty, very finely micaceous.
7	3792- 3799	Shale, dark-gray, slightly silty, very finely micaceous.	3	4220- 4223	Sandstone, light-gray, very fine to fine-grained, silty, well-cemented.
7	3799- 3806	Sandstone, very light gray, very fine to fine-grained, abundant rounded medium quartz grains.	8	4223- 4231	Shale, as above.
4	3806- 3810	Shale, dark-gray, very finely micaceous.	6	4231- 4237	Sandstone, as above.
3	3810- 3813	Sandstone, very light gray, very fine to fine-grained, silty.	4	4237- 4241	Shale, as above.
13	3813- 3826	Shale, as above.	3	4241- 4244	Sandstone, as above.
3	3826- 3829	Sandstone, as above.	2	4244- 4246	Shale, as above.
19	3829- 3848	Shale, as above.	3	4246- 4249	Sandstone, as above.
4	3848- 3852	Sandstone, as above.	5	4249- 4254	Shale, as above.
16	3852- 3868	Shale, as above.	4	4254- 4258	Sandstone, as above.
4	3868- 3872	Sandstone, very light gray, very fine to medium-grained, scattered rounded coarse quartz grains.	13	4258- 4271	Shale, as above.
16	3872- 3888	Shale, as above.	5	4271- 4276	Sandstone, as above.
2	3888- 3890	Sandstone, as above.	2	4276- 4278	Shale, as above.
107	3890- 3997	Shale, as above.	2	4278- 4280	Sandstone, as above.
8	3997- 4005	Siltstone, dark-gray, very finely sandy, argillaceous, carbonaceous, very finely micaceous.	9	4280- 4289	Shale, as above.
5	4005- 4010	Shale, as above.	2	4289- 4291	Sandstone, as above.
2	4010- 4012	Siltstone, as above.	14	4291- 4305	Shale, as above.
23	4012- 4035	Shale, as above.	5	4305- 4310	Sandstone, as above.
19	4035- 4054	Shale, dark-gray, silty, very finely micaceous.	16	4310- 4326	Shale, as above.
10	4054- 4064	Sandstone, light-gray, very fine to medium-grained, silty, well-cemented.	2	4326- 4328	Sandstone, as above.
4	4064- 4068	Shale, as above.	8	4328- 4336	Shale, as above.
2	4068- 4070	Siltstone, medium-gray, argillaceous, finely micaceous.	4	4336- 4340	Sandstone, light-gray, very fine to fine-grained, widely scattered rounded medium quartz grains.
7	4070- 4077	Shale, as above.	48	4340- 4388	Shale, medium- to dark-gray, slightly silty to silty.
2	4077- 4079	Siltstone, as above.	17	4388- 4405	Siltstone, light-gray, very finely sandy, well-cemented.
8	4079- 4087	Shale, as above.	57	4405- 4462	Siltstone, medium-gray, argillaceous, very finely micaceous.
3	4087- 4090	Siltstone, as above.	20	4462- 4482	Shale, dark-gray, very finely micaceous.
9	4090- 4099	Shale, as above.	136	4482- 4618	Shale, dark-gray to grayish-black; granular to very finely crystalline pyrite in 4482-4520 and 4560-4580; dark brownish-gray dense siderite in 4482-4560; slickensided fragments 4540-4580; sample from 4610-4620 is 80 percent slickensided fragments.
4	4099- 4103	Siltstone, as above.	10	4618- 4628	Shale, medium- to dark-gray, very silty, very finely micaceous; scattered slickensided fragments.
7	4103- 4110	Sandstone, very light gray, very fine fine-grained, silty, quartzose, well-cemented.	20	4628- 4648	Shale, dark-gray, very finely micaceous.
35	4110- 4145	Shale, dark-gray, slightly silty, very finely micaceous.	25	4648- 4673	Shale, dark-gray to grayish-black; grayish-black dense siderite in 4660-4670.
9	4145- 4154	Sandstone, very light gray, very fine to fine-grained, scattered rounded	5	4673- 4678	Siltstone, medium- to dark-gray, very argillaceous.

111	4678- 4789	Shale, dark-gray to grayish-black; slickensided fragments in 4673-4700; very finely crystalline pyrite in 4770-4779.	5	5649- 5654	Siltstone, medium-gray, very finely micaceous.
41	4789- 4830	Shale, dark-gray, slightly silty, very finely micaceous; very finery crystalline pyrite in 4790-4800.	2	5654- 5656	Shale, dark-gray to grayish-black, very finely micaceous.
93	4830- 4923	Shale, dark-gray, very finely micaceous; very finely crystalline pyrite in 4830-4840 and 4860-4880; scattered slickensided fragments in 4830-4840.	4	5656- 5660	Siltstone, as above.
29	4923- 4952	Sandstone, medium-gray, very fine grained, very silty, argillaceous, finely micaceous.	2	5660- 5662	Shale, as above.
31	4952- 4983	Shale, dark-gray to grayish-black, very finely micaceous.	6	5662- 5668	Siltstone, as above.
5	4983- 4988	Siltstone, medium- to dark-gray, very argillaceous, very finely micaceous.	10	5668- 5678	Shale, as above.
30	4988- 5018	Shale, dark-gray, very finely micaceous; very finely crystalline pyrite in 5010-5018.	3	5678- 5681	Siltstone, as above.
3	5018- 5021	Sandstone, light-gray, very fine grained, silty, very finely micaceous.	80	5681- 5761	Shale, as above.
9	5021- 5030	Shale, as above.	4	5761- 5765	Shale, dark-gray, silty, finely micaceous; dense to granular pyrite.
10	5030- 5040	Sandstone, medium-gray, very fine grained, very silty, very argillaceous.	9	5765- 5774	Shale, grayish-black.
260	5040- 5300	Shale, as above; scattered slickensided fragments in 5110-5120.	20	5774- 5794	Shale, dark-gray, silty, finely micaceous; dense to granular pyrite.
103	5300- 5403	Shale, dark-gray to grayish-black, very finely micaceous; very finely crystalline pyrite in 5370-5380.	28	5794- 5822	Siltstone, medium-gray, finely micaceous; dense to granular pyrite.
5	5403- 5408	Siltstone, medium-gray, very argillaceous, very finely micaceous.	6	5822- 5828	Shale, dark-gray to grayish-black, very finely micaceous; dense to granular pyrite.
12	5408- 5420	Shale, dark-gray, silty, very finely micaceous.	3	5828- 5831	Shale, dark-gray, very silty, finely micaceous.
3	5420- 5423	Siltstone, as above.	22	5831- 5853	Shale, dark-gray to grayish-black, very finely micaceous; dense to granular pyrite; grayish-black dense siderite in 5840-5850.
7	5423- 5430	Shale, as above.	6	5853- 5859	Sandstone, very light gray, very fine grained, slightly silty.
2	5430- 5432	Siltstone, as above.	5	5859- 5864	Shale, dark-gray, slightly silty, very finely micaceous.
18	5432- 5450	Shale, as above.	5	5864- 5869	Siltstone, medium-gray, finely micaceous.
4	5450- 5454	Siltstone, as above; very finely crystalline pyrite.	3	5869- 5872	Shale, as above.
6	5454- 5460	Shale, as above.	6	5872- 5878	Siltstone, as above.
5	5460- 5465	Siltstone, as above; very finely crystalline pyrite.	2	5878- 5880	Shale, as above.
15	5465- 5480	Shale, as above; very finely crystalline pyrite in 5470-5480.	8	5880- 5888	Siltstone, very light gray, quartzose.
78	5480- 5558	Shale, dark-gray to grayish-black, very finely micaceous; very finely crystalline pyrite in 5500-5510.	6	5888- 5894	Shale, as above.
8	5558- 5566	Siltstone, medium-gray, very argillaceous, very finely micaceous.	12	5894- 5906	Sandstone, very light gray, very fine grained.
6	5566- 5572	Shale, dark-gray, slightly silty, very finely micaceous.	12	5906- 5918	Shale, dark-gray, very finely micaceous.
5	5572- 5577	Siltstone, as above.	6	5918- 5924	Sandstone, light- to medium-gray, very fine grained, silty.
11	5577- 5588	Shale, as above.	25	5924- 5949	Shale, as above.
1	5588- 5589	Siltstone, as above.	26	5949- 5975	Siltstone, light- to medium-gray.
2	5589- 5591	Shale, as above.	25	5975- 6000	Shale, dark-gray, silty, very finely micaceous.
7	5591- 5598	Siltstone, as above.	30	6000- 6030	Shale, dark-gray, very finely micaceous, very finely crystalline pyrite in 6010-6020.
5	5598- 5603	Shale, as above.	40	6030- 6070	Shale, dark-gray to grayish-black, very finely micaceous; very finely crystalline pyrite in 6050-6060.
6	5603- 5609	Siltstone, as above.	5	6070- 6075	Siltstone, light-gray.
5	5609- 5614	Shale, as above.	25	6075- 6100	Shale, dark-gray to grayish-black.
9	5614- 5623	Siltstone, as above.	50	6100- 6150	(No sample.)
5	5623- 5628	Shale, as above; very finely crystalline pyrite.	7	6150- 6157	Siltstone, very light gray, quartzose.
5	5628- 5633	Siltstone, as above.	15	6157- 6172	Shale, as above.
3	5633- 5636	Shale, as above.	5	6172- 6177	Sandstone, light-gray, very fine grained, very silty.
3	5636- 5639	Siltstone, as above.	5	6177- 6182	Shale, dark-gray, very finely micaceous.
10	5639- 5649	Shale, as above.	3	6182- 6185	Siltstone, medium-gray.
			5	6185- 6190	Shale, as above.
			12	6190- 6202	Sandstone, very light gray, quartzose.
			6	6202- 6208	Siltstone, light- to medium-gray, very finely sandy.
			5	6208- 6213	Sandstone, as above.
			5	6213- 6218	Siltstone, as above.
			6	6218- 6224	Sandstone, as above.

15	6224- 6239	Siltstone, medium-gray, very finely micaceous.	30	6720- 6750	(No sample.) Probably shale as above.
11	6239- 6250	Shale, dark-gray, very finely micaceous.	5	6750- 6755	Sandstone, medium-gray, very fine grained, silty, limy.
50	6250- 6300	Sandstone, very light gray, very fine grained, quartzose, well-cemented.	11	6755- 6766	Sandstone, light-gray, very fine to fine-grained, silty, limy.
40	6300- 6340	(No sample.)	4	6766- 6770	Shale, as above.
4	6340- 6344	Shale, as above.	5	6770- 6775	Sandstone, light-gray, very fine grained, very silty, limy.
4	6344- 6348	Sandstone, very light gray, very fine grained, well-cemented.	3	6775- 6778	Shale, as above.
2	6348- 6350	Siltstone, light- to medium-gray, very finely micaceous.	4	6778- 6782	Sandstone, as above.
7	6350- 6357	Sandstone, as above.	8	6782- 6790	Siltstone, medium-gray, well-cemented. Base of unit is base of Atoka Formation.
7	6357- 6364	Siltstone, as above.			
4	6364- 6368	Sandstone, as above.			
5	6368- 6373	Siltstone, as above.			
7	6373- 6380	Sandstone, as above.			
29	6380- 6409	Siltstone, as above.			
13	6409- 6422	Shale, dark-gray, very finely micaceous.			
10	6422- 6432	Siltstone, medium-gray, argillaceous, very finely micaceous.			
24	6432- 6456	Shale, as above.			
22	6456- 6478	Shale, grayish-black; dense to very finely crystalline pyrite.			
5	6478- 6483	Siltstone, medium- to dark-gray, slightly very finely sandy, argillaceous; dense to very finely crystalline pyrite.			
2	6483- 6485	Shale, dark-gray, very finely micaceous.	8	6790- 6798	Shale, dark-gray, silty, very finely micaceous.
5	6485- 6490	Siltstone, as above; dense to very finely crystalline pyrite.	2	6798- 6800	Siltstone, light- to medium-gray, argillaceous, finely micaceous.
49	6490- 6539	Shale, as above; dense to very finely crystalline pyrite in 6490-6500 and 6520-6539; grayish-black dense siderite in 6530-6539.	5	6800- 6805	Shale, as above.
1	6539- 6540	Shale, light-gray, light-brownish tinge, waxy luster, very finely micaceous; bentonite(?).	3	6805- 6808	Siltstone, as above.
15	6540- 6555	Shale, dark-gray, silty, very finely micaceous.	2	6808- 6810	Shale, as above.
72	6555- 6627	Shale, dark-gray, very finely micaceous; dense to very finely crystalline pyrite in 6620-6627; grayish-black dense siderite in 6610-6620.	8	6810- 6818	Limestone, medium- to dark-gray, granular, slightly silty, argillaceous; abundant crinoid fragments. May be equivalent to Kessler Limestone Member.
19	6627- 6646	Shale, grayish-black.	64	6818- 6882	Shale, dark-gray, very finely micaceous; very finely crystalline pyrite in 6860-6882.
3	6646- 6649	Siltstone, medium-gray, argillaceous.	5	6882- 6887	Limestone, medium-gray, granular, slightly silty; crinoid fragments; widely scattered very finely crystalline pyrite.
3	6649- 6652	Shale, as above.	2	6887- 6889	Shale, as above.
1	6652- 6653	Shale, white to very light gray, waxy luster, very fine crystals of dolomite; bentonite(?).	4	6889- 6893	Shale, medium- to dark-gray, silty, very finely micaceous.
3	6653- 6656	Shale, dark-gray, very finely micaceous.	20	6893- 6913	Shale, dark-gray, very finely micaceous.
3	6656- 6659	Siltstone, medium-gray, very finely to finely sandy, argillaceous, very finely micaceous.	2	6913- 6915	Limestone, medium-gray, granular, slightly silty; crinoid fragments.
5	6659- 6664	Shale, as above.	1	6915- 6916	Shale, as above.
6	6664- 6670	Sandstone, light-gray, very fine grained, very silty.	7	6916- 6923	Limestone, as above.
6	6670- 6676	Shale, as above.	7	6923- 6930	Shale, dark-gray, slightly silty, very finely micaceous.
29	6676- 6705	Sandstone, very light to light-gray, very fine to fine-grained, scattered subrounded medium to coarse quartz grains, slightly silty in part, slightly limy in part.	3	6930- 6933	Limestone, brownish-gray, granular to very finely crystalline.
5	6705- 6710	Shale, as above.	7	6933- 6940	Shale, as above.
3	6710- 6713	Sandstone, light-gray, very fine to fine-grained, limy.	5	6940- 6945	Limestone, medium-gray, granular to very finely crystalline, slightly silty; crinoid fragments.
7	6713- 6720	Shale, as above.	15	6945- 6960	Limestone, medium-gray, granular; widely scattered granular pyrite; abundant fine to coarse grayish-black oolites.
			5	6960- 6965	Siltstone, medium- to dark-gray, silty, slightly limy.
			40	6965- 7005	Shale, dark-gray.
			16	7005- 7021	Shale, dark-gray, silty, very finely micaceous.
			4	7021- 7025	Siltstone, medium-gray, very finely sandy, argillaceous, limy.
			21	7025- 7046	Shale, as above.
			4	7046- 7050	Sandstone, light- to medium-gray, very fine grained, silty, limy, well-cemented; very finely crystalline pyrite.

**Morrow Series  
Bloyd Shale**

74 7050- 7124 Shale, as above; very finely crystalline pyrite in 7090-7120. Base of unit is base of Bloyd Shale.

**Hale Formation**

14 7124- 7138 Limestone, light- to medium-gray, granular to very finely crystalline, scattered rounded fine to medium quartz grains; crinoids. Top of unit is top of Prairie Grove Member.

7 7138- 7145 Siltstone, medium-gray, well-cemented.

17 7145- 7162 Sandstone, medium-gray, very fine grained, very silty, well-cemented.

8 7162- 7170 Siltstone, medium-gray, very finely micaceous.

3 7170- 7173 Siltstone, light- to medium-gray, very finely sandy, finely micaceous. Base of unit is base of Prairie Grove Member.

40 7173- 7213 Shale, dark-gray. Top of unit is top of Cane Hill Member.

7 7213- 7220 Sandstone, light- to medium-gray, very fine to fine-grained, abundant rounded medium quartz grains, silty, argillaceous, slightly limy; granular to finely crystalline pyrite.

8 7220- 7228 Covered interval. Base of covered interval is base of Cane Hill Member and of Hale Formation.

**Mississippian System**

**Chester Series**

**Pitkin Limestone**

21 7228- 7249 (No sample.) Probably limestone.

3 7249- 7252 (No sample.) Probably shale.

16 7252- 7268 Limestone, light-gray, granular; very abundant light-gray medium to very coarse oolites.

4 7268- 7272 Shale, dark-gray.

18 7272- 7290 Limestone, light- to medium-gray, granular; abundant light- to medium-gray medium to very coarse oolites.

20 7290- 7310 Limestone, light- to medium-gray, dense to granular; abundant light-gray fine to coarse oolites.

3 7310- 7313 Limestone, medium-gray, granular.

5 7313- 7318 Shale, as above.

11 7318- 7329 Limestone, as above.

2 7329- 7331 Shale, as above.

18 7331- 7349 Limestone, as above.

3 7349- 7352 Shale, as above.

33 7352- 7385 Limestone, light- to medium-gray, granular; scattered crinoids; scattered dark-gray fine to medium oolites.

15 7385- 7400 Limestone, medium- to dark-gray, granular to very finely crystalline, slightly argillaceous. Base of unit is base of Pitkin Limestone.

**Fayetteville Shale**

5 7400- 7405 Shale, dark-gray to grayish-black.

15 7405- 7420 Shale, dark-gray to grayish-black, slightly limy, pyritic; and limestone, dark-gray, granular, silty.

55 7420- 7475 Shale, dark-gray, slightly pyritic; and limestone, as above. Base of unit is base of Fayetteville Shale.

**Lower Part of Chester Series and Meramec Series, undivided**

15 7475- 7490 Shale, dark-gray, silty, micaceous, limy, slightly pyritic; and limestone, dark-gray, granular to finely crystalline, silty.

15 7490- 7505 Shale, dark-gray, silty, micaceous, limy.

128 7505- 7633 Shale, as above; and limestone, dark-gray, granular to finely crystalline, silty.

77 7633- 7710 Shale, dark-gray, very silty, slightly limy to very limy, most is very limy.

58 7710- 7768 Shale, dark-gray, micaceous, very silty, very slightly limy. Base of unit is the base of Meramec Series.

**Mississippian and Devonian Systems**

**Chattanooga Shale**

38 7768- 7806 Shale, gray-black, pyritic; trace of hard siliceous shale in 7780-7790. Base of unit is the base of Chattanooga Shale.

**Devonian System**

**Penters Chert**

14 7806- 7820 Chert, very light gray translucent, and very light gray to medium dark gray opaque, all is finely pyritic; and dolomite, medium light-gray, granular, finely sandy.

25 7820- 7845 Chert, white to very light gray, milky, translucent; and dolomite, very light gray, granular to finely crystalline. Interval from 7806-7845 ft. may be a cherty dolomite. Base of unit is base of Penters Chert.

**Silurian System**

**St. Clair equivalent**

78 7845- 7923 Dolomite, very light gray, granular, limy.

37 7923- 7960 Dolomite, very light gray, finely crystalline, limy, vuggy; abundant fine rhombs of dolomite in part. Base of unit is base of St. Clair equivalent.

**Ordovician System**

**Upper Ordovician Series**

**Cason Shale**

10 7960- 7970 Shale, dark-gray, very slightly dolomitic.

5 7970- 7975 Shale, as above; and shale, greenish-gray, dolomitic, very finely pyritic. Base of unit is base of Cason Shale.

**Fernvale Limestone**

45 7975- 8020 Limestone, light-gray, finely to coarsely crystalline, rounded frosted fine to coarse sand, scattered fine dolomite rhombs, widely scattered very fine pyrite; and limestone, reddish crystalline or mottled dark gray. Base of unit is base of Fernvale Limestone.

<b>Middle Ordovician Series</b>					
<b>Plattin Limestone</b>			30	8360- 8390	Dolomite, dark-gray, granular, widely scattered rounded fine to medium sand; and shale, dark-gray.
48	8020- 8068	Limestone, dark-gray, dense to finely granular, scattered very fine dolomite rhombs and clear calcite blebs up to coarse size; dark-gray dense chert in 8020-8030. Base of unit is base of Plattin Limestone.	20	8390- 8410	Dolomite, dark-gray, granular to very finely crystalline, finely sandy, very finely pyritic.
<b>Joachim Dolomite</b>			30	8410- 8440	Sandstone, white, fine- to medium-grained, rounded and frosted, sand grains, friable.
4	8068- 8072	Sandstone, white, fine- to medium-grained.	10	8440- 8450	Sandstone, as above; some coarse sand.
24	8072- 8096	Dolomite, medium-gray to medium dark-gray, granular, finely to medium sandy.	15	8450- 8465	Sandstone, as above; no coarse sand.
24	8096- 8120	Dolomite, as above; and sandstone, very light gray, fine- to medium-grained, friable.	15	8465- 8480	Sandstone, white to very light gray, fine- to coarse-grained, rounded and frosted sand grains, friable. And dolomite, dark-gray, granular.
16	8120- 8136	Dolomite, medium dark-gray and dark-gray, granular to very finely crystalline; and shale, dark-gray, finely pyritic, slightly dolomitic.	8	8480- 8488	Sandstone, white, fine- to medium-grained, rounded and frosted sand grains, friable.
27	8136- 8163	Dolomite, dark-gray, granular, very finely pyritic, finely sandy; and sandstone, very light gray, fine- to medium-grained, rounded frosted grains with secondary quartz, friable. Base of unit is base of Joachim Dolomite.	4	8488- 8492	Limestone, olive-gray, dense.
<b>St. Peter Sandstone</b>			10	8492- 8502	Sandstone, as above.
27	8163- 8190	Sandstone, white to very light gray, fine- to medium-grained, subrounded frosted grains with secondary quartz, friable.	20	8502- 8522	Limestone, medium dark-gray to olive-gray, dense.
10	8190- 8200	Sandstone, white to very light gray, fine- to medium-grained, quartzitic.	18	8522- 8540	Sandstone, white, fine-grained, rounded sand grains with much secondary quartz.
20	8200- 8220	Sandstone, white to very light gray, fine- to coarse-grained, rounded frosted grains with secondary quartz, friable.	5	8540- 8545	Limestone, as above.
15	8220- 8235	Sandstone, white to very light gray, fine- to medium-grained, subrounded and rounded frosted grains, friable. Base of unit is base of St. Peter Sandstone.	15	8545- 8560	Sandstone, white, fine- to medium-grained, rounded sand grains with secondary quartz, friable.
<b>Everton Formation</b>			43	8560- 8603	Sandstone, as above; some coarse grains.
20	8235- 8255	Dolomite, dark-gray, granular to very finely crystalline; sandstone as above; and shale, dark-gray, very finely pyritic.	17	8603- 8620	Limestone, medium-gray, dense to granular.
15	8255- 8270	Sandstone and dolomite as above.	10	8620- 8630	Sandstone, white, fine- to coarse-grained, rounded and frosted sand grains with secondary quartz.
25	8270- 8295	Dolomite, dark-gray, granular to finely crystalline; and sandstone, very light gray to white, fine-grained.	10	8630- 8640	Sandstone, as above; trace of white tripolitic chert.
15	8295- 8310	Sandstone, white, very fine to fine-grained, subrounded and rounded, friable.	10	8640- 8650	Dolomite, medium-gray, granular.
17	8310- 8327	Dolomite, dark-gray, granular to finely crystalline, rounded finely to medium sandy.	10	8650- 8660	Dolomite, light- to medium-gray, granular to very finely crystalline; inclusions of white very coarsely crystalline dolomite.
13	8327- 8340	Dolomite, as above, not sandy.	10	8660- 8670	Dolomite, medium light-gray, granular to very finely crystalline, very finely pyritic; and shale, dark-gray, pyritic.
20	8340- 8360	Dolomite, dark-gray, granular to finely crystalline, rounded and frosted finely to medium sandy.	10	8670- 8680	Dolomite, light - gray, granular, rounded and frosted finely to medium sandy.
			7	8680- 8687	Sandstone, white, fine- to coarse-grained, subrounded sand grains with secondary quartz; trace of white tripolitic chert.
			23	8687- 8710	Dolomite, medium- to dark-gray, finely crystalline; trace of very fine pyrite.
			10	8710- 8720	Sandstone, white, fine- to coarse-grained, rounded sand grains with secondary quartz, friable.
			10	8720- 8730	Dolomite, medium light-gray to light-gray, granular, finely to medium sandy at base.
			8	8730- 8738	Sandstone, white, fine- to medium-grained, some scattered coarse grains, rounded and frosted sand grains with secondary quartz. Base of unit is base of Everton Formation.

<b>Lower Ordovician Series</b>					
<b>Powell Dolomite</b>					
22	8738- 8760	Dolomite, light-gray to medium light-gray, very finely granular, slightly pyritic.	20	9280- 9300	Dolomite, light-gray, very finely crystalline, slightly rounded and frosted finely to medium sandy, milky chert.
10	8760- 8770	Dolomite, medium dark-gray, granular.	10	9300- 9310	Dolomite, medium dark-gray, granular to finely crystalline, scattered rounded fine to coarse sand grains.
10	8770- 8780	Dolomite, medium-gray, granular, speckled with very fine pyrite.	20	9310- 9330	Dolomite, as above, milky finely to medium sandy chert. Base of unit is base of Cotter Dolomite.
10	8780- 8790	Dolomite, medium dark-gray, granular; abundant dark-gray to black smooth chert.	<b>Jefferson City Dolomite</b>		
20	8790- 8810	Dolomite, as above; less chert than above.	10	9330- 9340	Dolomite, medium-gray, granular to very finely crystalline white chert, some chert is oolitic.
30	8810- 8840	Dolomite, medium dark-gray, granular.	15	9340- 9355	Dolomite, as above; no oolitic chert.
12	8840- 8852	Dolomite, medium dark-gray, granular; abundant olive-gray translucent smooth chert.	25	9355- 9380	Dolomite, medium-gray to medium dark-gray, granular to finely crystalline, milky and smoky chert.
10	8852- 8862	Dolomite, very light gray, granular.	20	9380- 9400	Dolomite, as above; slightly more chert.
18	8862- 8880	Dolomite, medium dark-gray, granular.	20	9400- 9420	Dolomite, medium light-gray to medium-gray, granular to very finely crystalline, scattered rounded and frosted fine to medium sand grains, clear, milk or smoky chert.
10	8880- 8890	Dolomite, light-gray, dense to very finely granular.	10	9420- 9430	Dolomite, as above; slightly more sand.
10	8890- 8900	Dolomite, medium light-gray, dense to very finely granular.	20	9430- 9450	Dolomite, light-gray to medium light-gray, granular to finely crystalline, white and milky chert.
13	8900- 8913	Dolomite, dark-gray, granular.	20	9450- 9470	Dolomite, as above; some smoky chert.
10	8913- 8923	Dolomite, medium light-gray, very finely granular, very finely pyritic.	12	9470- 9482	Dolomite, medium-gray and medium light-gray, granular, very finely sandy, scattered rounded and frosted fine to medium sand grains, translucent chert.
7	8923- 8930	Dolomite, very light gray, finely crystalline, some has pinkish cast.	13	9482- 9495	Dolomite, as above; no sand and less chert.
35	8930- 8965	Dolomite, dark-gray, granular to finely crystalline; some white finely crystalline dolomite. Base of unit is base of Powell Dolomite.	5	9495- 9500	Dolomite, medium dark-gray, granular to very finely crystalline, blebs of white crystalline dolomite as much as 5 mm. in diameter.
<b>Cotter Dolomite</b>			5	9500- 9505	(No sample.)
5	8965- 8970	Shale, greenish-gray, pyritic, hard, a metabentonite?.	27	9505- 9532	Dolomite, as above.
105	8970- 9075	Dolomite, light olive-gray, granular, slightly pyritic, milky and gray translucent smooth chert.	18	9532- 9550	Dolomite, medium-gray to medium dark-gray, granular to finely crystalline, white or milky chert; 2 pieces of brilliant green, very glauconitic, dolomite in 9540-9550.
8	9075- 9083	Dolomite, very light gray, very finely crystalline, finely to medium sandy.	10	9550- 9560	Dolomite, medium-gray to medium dark-gray, granular to finely crystalline, scattered rounded and frosted fine to medium sand grains, pale-red chert.
17	9083- 9100	Dolomite, very light gray, very finely crystalline; abundant light-gray or pinkish-gray translucent smooth chert.	17	9560- 9577	Dolomite, as above; no chert.
50	9100- 9150	Dolomite, medium-gray, granular and finely crystalline.	3	9577- 9580	Sandstone, white, fine- to coarse-grained, rounded and frosted sand grains, dolomitic.
10	9150- 9160	Dolomite, as above.	20	9580- 9600	Dolomite, medium light-gray to medium-gray, granular to very finely crystalline; and shale, dark-gray, hard.
10	9160- 9170	Dolomite, medium-gray, granular to very finely crystalline, translucent chert, some chert is oolitic.	15	9600- 9615	Dolomite, medium light-gray to medium-gray, granular to very finely crystalline, light-gray and pale-red chert.
25	9170- 9195	Dolomite, as above; dolomite, fine- to medium-crystalline, finely sandy; and chert, oolitic, banded.			
45	9195- 9240	Dolomite, light olive-gray to medium light-gray, granular to very finely crystalline.			
10	9240- 9250	Dolomite, as above, some is finely sandy.			
30	9250- 9280	Dolomite, medium light-gray to medium dark-gray, granular to very finely crystalline, very light gray translucent chert, some chert is finely sandy.			

15	9615- 9630	Dolomite, medium-gray, granular to very finely crystalline, light-gray to dark-gray chert; and shale, dark-gray.			
10	9630- 9640	Dolomite, light-gray to medium-gray, granular to very finely crystalline, scattered fine to medium sand grains.	10	9970- 9980	Dolomite, as above; no sandy chert, some smoky and pale-red chert.
20	9640- 9660	Dolomite, as above, trace light-gray opaque or translucent chert.	23	9980-10003	Dolomite, light-gray to medium light-gray, granular to very finely crystalline, scattered rounded and frosted fine to medium sand, white to light-gray translucent smooth chert, some very coarse dolomite rhombs in white chert.
27	9660- 9687	Dolomite and chert, as above; no sand; and shale, gray to dark-gray.	17	10003-10020	Dolomite, light gray to medium light-gray, granular and finely to medium crystalline, finely to medium sandy, some white chert containing coarse dolomite rhombs.
13	9687- 9700	Dolomite, light-gray, finely granular, light-gray translucent chert.	5	10020-10025	Dolomite, as above; some smooth milky and pale-red chert. Base of unit is base of Roubidoux Formation.
8	9700- 9708	Dolomite, medium dark-gray, granular to very finely crystalline; and shale, dark-gray.			
32	9708- 9740	Dolomite, light-gray to medium-gray, granular to medium-crystalline, medium-gray translucent chert.			
10	9740- 9750	Dolomite, medium light-gray, medium-crystalline, very light gray and pale-red chert.			
30	9750- 9780	Dolomite, light-gray, granular to finely crystalline, light- to medium-gray chert.			
10	9780- 9790	(No sample.)			
5	9790- 9795	Dolomite, with chert, as above. Base of unit is base of Jefferson City Dolomite.			

#### Roubidoux Formation

15	9795- 9810	Dolomite, light-gray to medium light-gray, granular to coarsely crystalline, light-gray chert, scattered fine sand grains.	17	10025-10042	Dolomite, medium light-gray to medium-gray, granular to finely crystalline; and shale, dark-gray.
20	9810- 9830	Dolomite, with chert, as above; scattered fine to medium sand; some pale-red chert; some oolitic chert.	32	10042-10074	Dolomite, light-gray to medium-gray, finely to coarsely crystalline, very light gray and translucent or white chert, some white chert has fine dolomite rhombs; crystalline quartz in 10042-10052.
20	9830- 9850	Dolomite, very light gray to medium light-gray, granular to coarsely crystalline, fine to coarse sand grains, white to light-gray chert, some finely sandy chert, some finely crystalline quartz.	6	10074-10080	Dolomite, very light gray to light-gray, very finely crystalline.
20	9850- 9870	Dolomite, as above; no sandy chert.	15	10080-10095	Dolomite, as above, white dense chert, finely crystalline quartz.
25	9870- 9895	Dolomite, very light gray to medium light-gray, granular to coarsely crystalline, scattered rounded and frosted fine to coarse sand grains, white and opaque or translucent and smoky or pale-red chert, trace pale-red oolitic chert.	25	10095-10120	Dolomite, as above, scattered rounded fine to medium sand; crystalline quartz in 10095-10105.
15	9895- 9910	Dolomite, light-gray to medium light-gray, granular to very finely crystalline, rounded and frosted finely to coarsely sandy. Basal 3 ft. of unit is a dolomitic sandstone.	25	10120-10145	Dolomite, light-gray to medium light-gray, granular to coarsely crystalline, scattered fine to coarse sand, dense white chert, some chert has dolomite rhombs.
13	9910- 9923	Dolomite, light-gray to medium light-gray, granular to coarsely crystalline, scattered rounded fine to coarse sand, light-gray, medium-gray, and olive-gray smooth chert.	5	10145-10150	Dolomite, as above; milky translucent chert.
27	9923- 9950	Dolomite, as above; no chert.	50	10150-10200	Dolomite, light-gray, finely to coarsely crystalline, white and pale-red chert, some what chert has dolomite rhombs; crystalline quartz in 10170-10180.
20	9950- 9970	Dolomite, light-gray to medium light-gray, fine to coarsely crystalline, scattered rounded fine to medium sand, white and granular or milky and smooth chert, some white	10	10200-10210	Dolomite, medium light-gray to medium-gray, granular to coarsely crystalline, scattered rounded fine to medium sand, light-gray to very light gray dense chert.
			20	10210-10230	Dolomite, as above; pale-red chert.
			70	10230-10300	Dolomite and chert, as above; no sand; crystalline quartz in 10230-10240, 10250-10270, 10280-10290.
			25	10300-10325	Dolomite, light-gray to medium light-gray, granular to coarsely crystalline, dense and white or translucent and smoky or pale-red chert, some white chert with dolomite rhombs; crystalline quartz in 10320-10325.

#### Gasconade Dolomite and Van Buren Formation, undifferentiated

20	10325-10345	Dolomite with chert, as above; dolomite, dark-gray, granular; and shale, dark-gray.	25	10600-10625	Dolomite, very light gray to medium light-gray, granular to very coarsely crystalline, scattered rounded fine to medium sand; and sandstone, fine- to medium-grained, rounded sand grains, dolomitic.
10	10345-10355	Dolomite with chert, some dark-gray smooth chert; and shale, as above.	15	10625-10640	Dolomite, as above; trace of sandstone; trace of light-gray and smoky translucent chert.
10	10355-10365	Dolomite with chert, some dark-gray pyritic chert; and shale, as above.	60	10640-10700	Dolomite, very light gray to medium light-gray, granular to very coarsely crystalline, rounded finely to coarsely sandy, light-gray and translucent smoky chert.
<b>Gunter Sandstone Member of Van Buren Formation</b>					
35	10365-10400	Sandstone, very light gray to light-gray, fine- to coarse-grained, most is fine- to medium-grained.	20	10700-10720	Dolomite, very light gray to medium-gray, granular to coarsely crystalline, light-gray chert.
20	10400-10420	Sandstone, white to very light gray, fine- to coarse-grained, most is fine- to medium-grained.	30	10720-10750	Dolomite, very light gray to medium-gray, granular to coarsely crystalline; and dolomite, medium dark-gray to dark-gray, granular to finely crystalline, clayey.
30	10420-10450	Sandstone, white to very light gray, fine- to coarse-grained, widely scattered very coarse sand grains, some of which are rounded slightly dolomitic.	30	10750-10780	Dolomite, very light gray to medium-gray, trace light-gray and smoky translucent chert; crystalline quartz in 10750-10770.
5	10450-10455	Sandstone, as above; trace light-gray dense detrital chert.	30	10780-10810	Dolomite, medium light-gray, finely to coarsely crystalline; and dolomite, medium dark-gray, finely crystalline, clayey.
10	10455-10465	Sandstone, as above; no chert; and dolomite, medium light-gray, granular to finely crystalline, finely to coarsely sandy.	20	10810-10830	Dolomite, medium light-gray, medium-gray, and medium dark-gray, finely crystalline, scattered fine to medium sand grains; dolomite, dark-gray, very clayey; and dolomite, pale-red.
5	10465-10470	Sandstone, white to very light gray, fine- to coarse-grained, siliceous, some slightly dolomitic.	35	10830-10865	Dolomite, medium light-gray to medium-gray, granular to finely crystalline, scattered rounded fine to medium sand grains, some pale-red dolomite.
38	10470-10508	Sandstone, as above; and dolomite, very light gray, granular to medium-crystalline, finely to medium sandy. Base of unit is base of Gunter Sandstone Member of Van Buren Formation.	10	10865-10875	Dolomite, as above, pellets of dolomite up to coarse size in matrix of dark-gray granular silty dolomite.
<b>Cambrian System</b>					
<b>Upper Cambrian Series</b>					
22	10508-10530	Dolomite, very light gray to light-gray, granular to medium crystalline, finely to medium sandy; and sandstone, fine- to coarse-grained, dolomitic, siliceous.	8	10875-10883	Dolomite, as above, no "pellet" dolomite.
10	10530-10540	Dolomite and sandstone, as above, trace of very light gray to light-gray translucent chert and white finely sandy chert.	22	10883-10905	Dolomite, as above, but more sandy; and sandstone, fine- to coarse-grained, dolomitic or siliceous.
15	10540-10555	Dolomite, very light gray to light-gray, granular to coarsely crystalline, rounded finely to medium sandy, scattered coarse sand grains.	10	10905-10915	Dolomite, medium light-gray to medium-gray, granular to very coarsely crystalline, finely sandy, trace very fine pyrite. Small amount of sample composed of coarse dolomite rhombs in dark-gray, nondolomitic, clastic matrix of silt and very fine sand-sized quartz, some feldspar in the matrix.
20	10555-10575	Dolomite, very light gray, granular to coarsely crystalline; and sandstone, very light gray, fine- to medium-grained, rounded sand grains; crystalline quartz in 10555-10560.	9	10915-10924	Dolomite, as above, amount of rhombic dolomite in dark matrix increases. Total depth 10,924 feet.
25	10575-10600	Dolomite, as above; some light-gray to medium light gray chert; crystalline quartz in 10595-10600.			



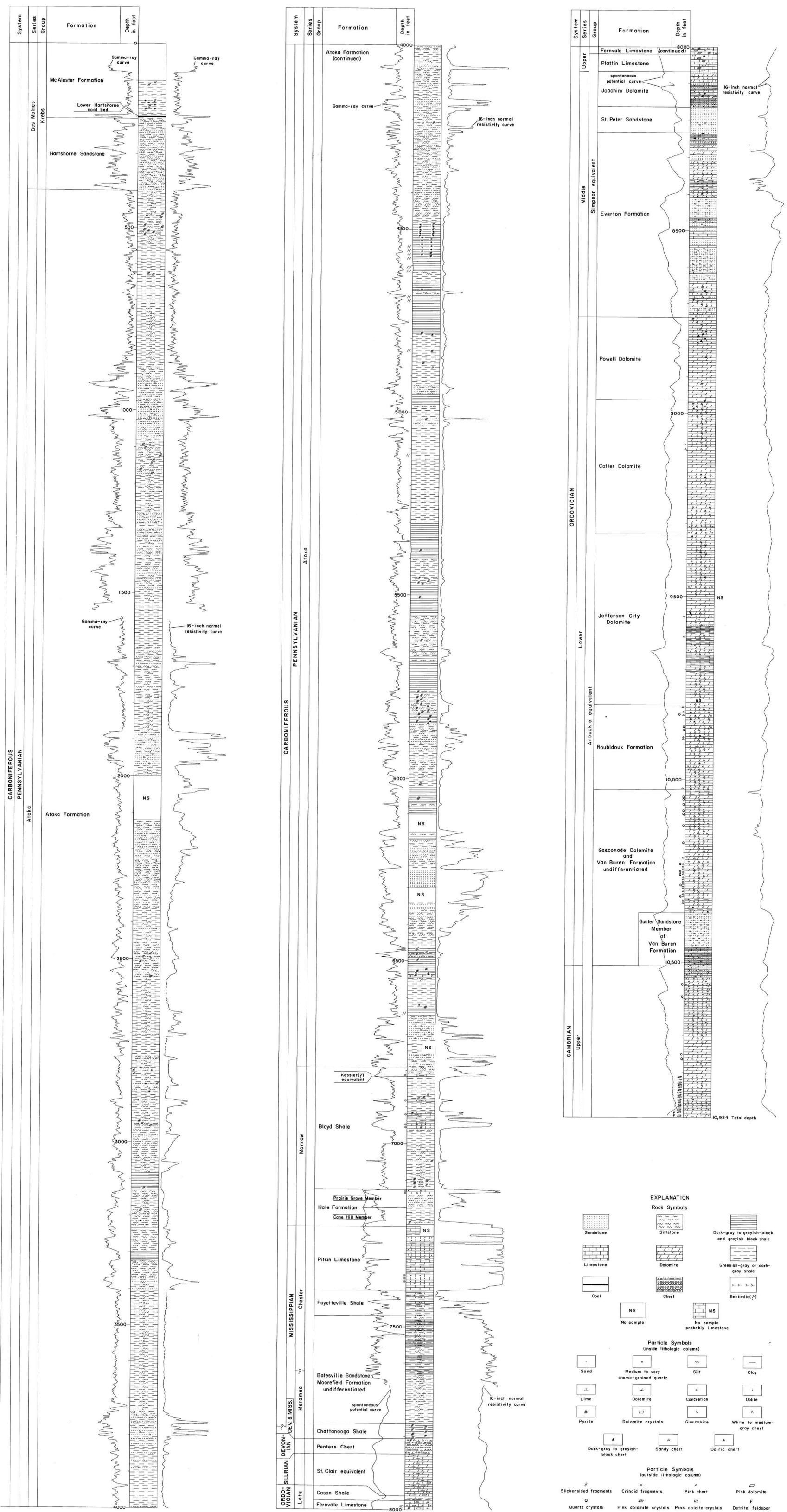


PLATE I.-- LITHOLOGIC LOG OF SHELL OIL CO. NO. 1 WESTERN COAL AND MINING CO. WELL,  
SEC. 36, T. 7 N., R. 32 W., SEBASTIAN COUNTY, ARK.

by  
Boyd R. Haley and Sherwood E. Frezon  
U. S. Geological Survey  
1962