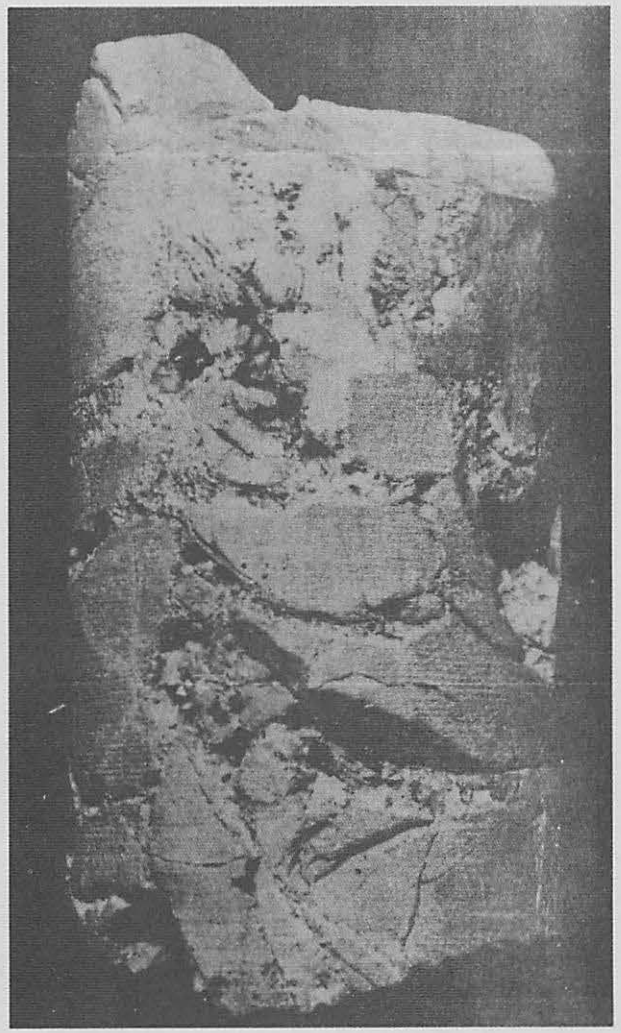
CAMBRO-ORDOVICIAN SUBSURFACE STRATIGRAPHY OF THE BLACK WARRIOR BASIN IN MISSISSIPPI

Kevin S. Henderson



REPORT OF INVESTIGATIONS 2

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF GEOLOGY

S. Cragin Knox
Office Head

Jackson, Mississippi

1991

ERATHEM	SYSTEM	SERIES	STAGE	GROUP	FORMATION	THICKNESS	LITHOLOGIC DESCRIPTION
PALEOZOIC	ORDOVICIAN	MIDDLE	WHITE-ROCKIAN	STONES RIVER	STONES RIVER LIMESTONE	214-680'	LIMESTONE, GRAY TO LIGHT TAN, MICRITIC TO FINELY CRYSTALLINE, ARGILLACEOUS IN TOP, THIN DARK GRAY-BLACK SHALES AT TOP LOCALLY, TRACES SANDY IN BASE
					STONES RIVER DOLOSTONE	289-1535'	DOLOSTONE, GRAY TO TAN, GREENISH-GRAY, VERY FINE TO FINELY CRYSTALLINE, TRACES SANDY, ARGILLACEOUS IN PART, BRECCIATED ZONES ("SNOW ZONE"), BENTONITES
		LOWER	CANADIAN	KNOX	KNOX LIMESTONE	490-2657'	LIMESTONE, GRAY TO TAN, VERY FINE TO FINELY CRYSTALLINE, BIOCLASTIC IN LARGE % (FOSSILS INCLUDE: SPONGE SPICULES, CONODONTS, CRINOID STEMS, ALGAE)
					KNOX DOLOSTONE	650-1906'	DOLOSTONE, GRAY TO TAN, GREENISH-GRAY, FINE TO MEDIUM CRYSTALLINE, CHERTY, VERY SANDY (VERY FINE TO COARSE, WELL ROUNDED, "FROSTED"), BRECCIATED ZONES OF HIGH POROSITY WITH RED AND YELLOW MOTTLING
	CAMBRIAN	UPPER			COPPER RIDGE DOLOSTONE	795-3200'	DOLOSTONE, GRAYISH-TAN TO DARK BROWN, FINE TO COARSELY CRYSTALLINE, SANDY, CHERTY (COMMONLY CONTAINS "FLOATING" EUHEDRAL DOLOMITE CRYSTALS) BRECCIATED ZONES WITH RED AND YELLOW MOTTLING
		MIDDLE			CONASAUGA LIMESTONE	0-1187'	LIMESTONE, GRAYISH-TAN, MICRITIC TO FINELY CRYSTALLINE, DOLOMITIC IN PART, THIN DOLOSTONE BEDS, ARGILLACEOUS, MAY CONTAIN THIN DARK GRAY CALCAREOUS SHALE INTERBEDS, VERY SANDY IN BASE-SAND RANGES FROM VERY FINE TO VERY COARSE (UP TO 1/4" IN DIAMETER), CHALKY IN SMALL PART, RARELY GLAUCONITIC NEAR THE BASE OF THE UNIT
		LOWER			ROME FORMATION	0-708'	SHALE/SILTSTONE, DARK GRAY TO LIGHT BROWN, GREEN; LIMESTONE/DOLOSTONE, GRAYISH-TAN, FINELY CRYSTALLINE
					SHADY DOLOSTONE	220-1152'	DOLOSTONE, LIGHT GRAY TO BROWN, "SALT AND PEPPER," FINE TO MEDIUM CRYSTALLINE, SANDY, OOLITIC
					WEISNER QUARTZITE	0-180'	SANDSTONE, VARICOLORED, FINE TO VERY COARSE GRAINED, QUARTZITIC, FELDSPATHIC IN SM %, GLAUCONITIC IN PART
PRECAMBRIAN BASEMENT							GRANITE AND "GNEISSIC" ROCK

Cover illustration: Photograph of fractured and vuggy porosity of the Knox Dolostone from the Honolulu Oil Corporation #2 Davis, Calhoun County, Mississippi, at the depth of 8378-8379 feet.

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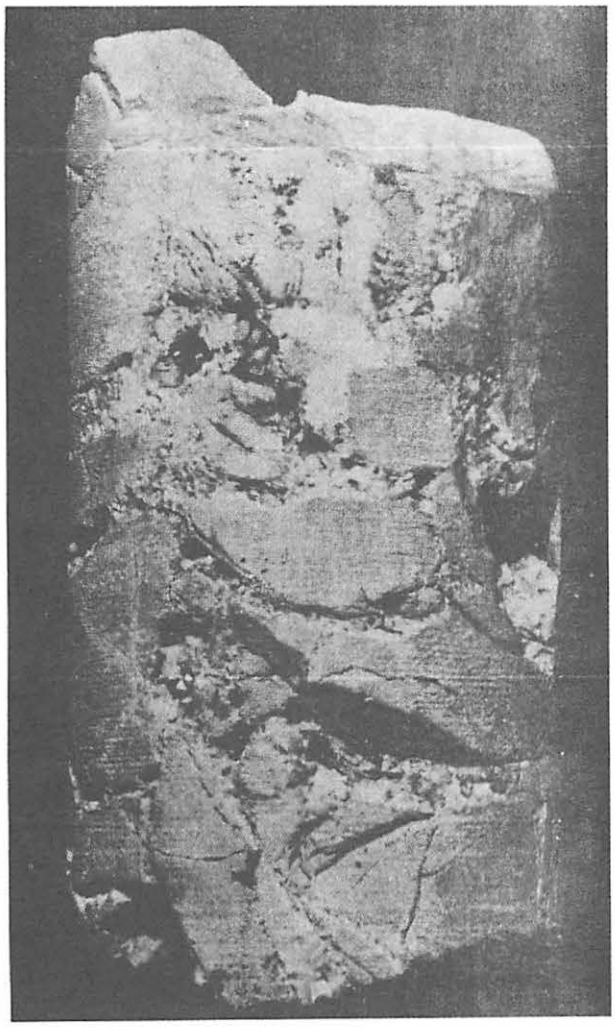

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STATE OF MISSISSIPPI

OFFICE OF THE GOVERNOR
RAY MABUS
GOVERNOR

It is with a great deal of pleasure that I present to the people of Mississippi and this nation a notable scientific report of investigation regarding the Cambro-Ordovician stratigraphy of northern Mississippi.

This report examines the distribution and characteristics of the state's oldest sedimentary formations. There are many in industry and in the scientific community who believe that significant oil and gas discoveries will be made in the future in the areas and formations this report has studied. This report and the others of similar nature are an investment toward the prudent development of Mississippi's natural resources. Let us hope this good labor will bear an abundant harvest for Mississippi and our nation.

The author and the Department of Environmental Quality are to be commended for such an outstanding contribution to our state.

Sincerely,

RAY MABUS
Governor

RM:cd

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STATE OF MISSISSIPPI

DEPARTMENT OF ENVIRONMENTAL QUALITY

RAY MABUS
GOVERNOR

LETTER OF TRANSMITTAL

July 24, 1991

Mr. Thomas L. Goldman, Chairman, and
Members of The Commission
Department of Environmental Quality

Commissioners:

We live in a day when the importance of energy resources cannot be overstated. The economic and hence social welfare of whole countries can be dramatically altered by events that affect oil and gas supplies. The United States is the biggest consumer of energy and is very vulnerable to changes in the supply or price of the crude oil it imports. It is therefore of great importance that the United States do all it can to maximize its own energy resources in an environmentally prudent manner. To that end, each of the producing states has the opportunity of contributing to this necessary task. Each state must do its share in achieving maximum results from existing resources and provide the geologic knowledge that will lead to tomorrow's major discoveries.

The Office of Geology takes pleasure in providing you with a copy of our most recent oil and gas study. Report of Investigations 2 provides the public and the oil and gas industry with valuable information about Mississippi's oldest oil and gas producing formations. Entitled "Cambro-Ordovician Subsurface Stratigraphy of the Black Warrior Basin in Mississippi," this study by Kevin S. Henderson will be a major information resource for those exploring Mississippi's lightly drilled Cambro-Ordovician reservoirs.

Respectfully submitted,

S. Cragin Knox
Director and State Geologist

SCK:cd

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CAMBRO-ORDOVICIAN SUBSURFACE STRATIGRAPHY OF THE BLACK WARRIOR BASIN IN MISSISSIPPI

Kevin S. Henderson

ABSTRACT

The stratigraphy of the Cambro-Ordovician sequence in the Black Warrior Basin of northern Mississippi is known only from subsurface data. Little has been published on this thick sequence of carbonates and a great deal of confusion exists with regard to formational boundaries and ages. A recent study by Alberstadt and Repetski (1989) utilizing conodonts from the Magnolia Petroleum #1 Pierce well (Monroe Co.) affords a much better understanding of the age relationships of the upper portion of the sequence than was previously available.

Of the 151 wells which have reached at least the Ordovician, only nine have reached the Cambrian and just two have penetrated the entire Cambro-Ordovician section. Fifty of the total number of wells were not correlatable, due to a very shallow penetration, or to being located in the structurally complex Central Mississippi Uplift.

Over 8000 feet of Lower Cambrian to Middle Ordovician sediments are present in northern Mississippi. This section is differentiated into nine formations based on lithology. The Cambrian System is subdivided into five formations. In ascending order, these are: Weisner Quartzite, Shady Dolostone, Rome Formation, Conasauga Limestone and Copper Ridge Dolostone. The Ordovician System is differentiated into four formations. In ascending order, these are: Knox Dolostone, Knox Limestone, Stones River Dolostone and Stones River Limestone.

In spite of the fact that only a small amount of oil (7834 bbls) and gas (850,186 MCF) has been produced from the Cambro-Ordovician section to date in Mississippi, large reservoirs may be present in strata analogous to the prolific Ellenburger-Arbuckle trend of Texas and Oklahoma. All production to date has occurred from what is informally referred to as the "Snow Zone" of the Stones River Dolostone. Numerous hydrocarbon shows, excellent reservoir rocks, and the existence of large undrilled structures suggest that commercial oil and gas fields in this vast, relatively unexplored trend await the drill bit in Mississippi.

INTRODUCTION

The Black Warrior Basin is a roughly triangular area occupying northeast Mississippi and northwest Alabama (see Figure 1). The basin is usually defined as being an area bounded on the north by the Nashville Dome, on the southeast by the southwest plunging Appalachian Mountains of Alabama and on the southwest by the buried Ouachita structural front. The Black Warrior is classified as a foreland basin of relatively undisturbed Paleozoic strata with homoclinal dip to the southwest.

In Mississippi, the Paleozoic sequence is truncated by a regional pre-Mesozoic unconformity which gently dips to the southwest. The Paleozoic beds are unconformably overlain by Cretaceous strata of the Gulf Coastal Plain which effectively mask the character of the basin in Mississippi. Because of this, study of the Paleozoic strata is necessarily restricted to subsurface data derived from well logs and geophysical surveys.

Paleozoic beds range in age from Cambrian to Pennsylvanian and form a wedge of sediments of up to 18,000 feet in thickness. The greatest known thickness of Cambro-Ordovician strata is 7950 feet in the subsurface of Mississippi (Pruet and Hughes #1 Dunlap, Lafayette Co.). Cambro-Ordovician strata consist predominantly of carbonates deposited in shallow, open marine, shelf environments along the southern margin of the proto North American continent. Since only two wells have penetrated the entire Cambro-Ordovician section in Mississippi, the nature of the Cambrian strata and the Precambrian basement are for the most part unknown.

ACKNOWLEDGMENTS

The writer is grateful to the staff members of the Office of Geology who have assisted and supported the completion of this report. Special gratitude is extended to S. Cragin Knox (Office Head) for his continual support and assistance. Michael B.E. Bograd is acknowledged for his outstanding editing and contributions in bringing this study to publication. Very special gratitude is extended to Marvin L. Oxley for his assistance in compiling data and sharing his thoughts and knowledge on the problems of Cambro-Ordovician stratigraphy in Mississippi.

I am deeply indebted to my parents, whose support and guidance have made this possible. This paper is dedicated to my father, E.J. "Jack" Henderson.

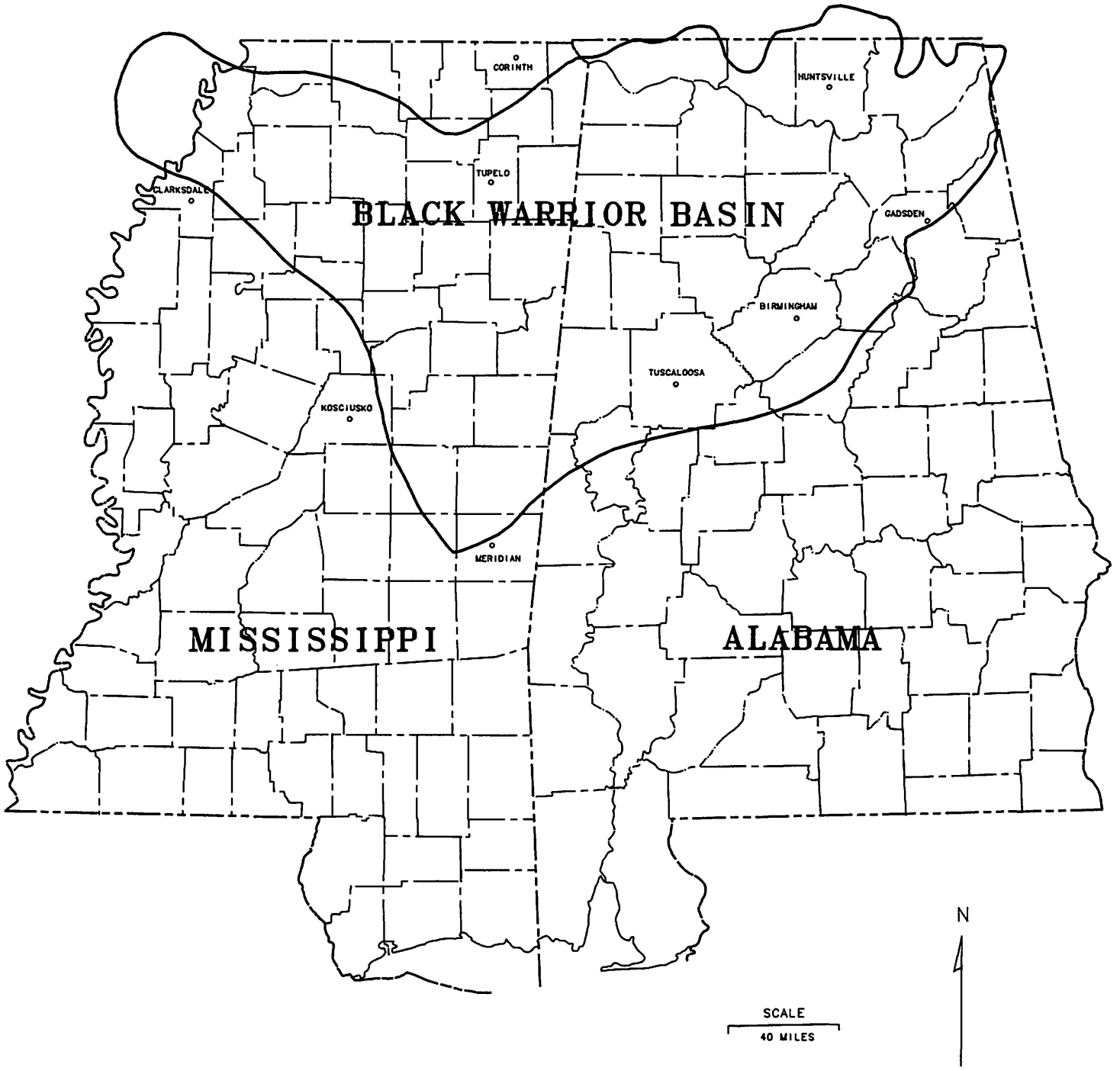


FIGURE 1

BLACK WARRIOR BASIN INDEX MAP

PREVIOUS INVESTIGATIONS

Although little has been published on the Cambro-Ordovician section in the subsurface of Mississippi, a great deal of confusion and conflict exists with regard to nomenclature and age assignments of the formations. The following is a brief synopsis of previous investigations. (See Selected References for a more complete listing of pertinent reports.)

Bramlette (1925) described the Ordovician lithology from two wells in Tishomingo County and discussed the petroleum potential of these strata.

Mellen (1947) described in general terms the stratigraphy of the Black Warrior Basin in relation to the succession described by Butts (1926) from outcrops in the Birmingham, Alabama, area. Due to limited information, Mellen designated the "first dolomite" (Stones River Dolostone of this report) as the top of the Upper Cambrian-Lower Ordovician Knox Group.

Boland and Minihan (1971) described Cambro-Ordovician stratigraphy of the Black Warrior Basin in general terms as related to petroleum potential.

Thomas (1972, 1988a) described the stratigraphy of the Black Warrior Basin in regional terms from the Ouachita Mountains of Arkansas to the southern Appalachians of Alabama. He defined the top of the Knox Group as the top of the "second dolomite" (Knox Dolostone of this report) following the correlations of the Mississippi Geological Society.

Mellen (1974b) described Ordovician lithology in relation to petroleum reservoirs and gave a history of significant hydrocarbon shows encountered in the Ordovician of Mississippi.

Kidd (1975) made a detailed study of pre-Mississippian stratigraphy in the Alabama portion of the basin. He defined the top of the Knox Group as the top of the Stones River Dolostone of this report, following the correlation of Mellen (1947).

Mellen (1977) discussed the Cambrian stratigraphy as revealed in the two basement tests and the stratigraphically deep Texaco #1 Ivey well in Coahoma County. He postulated a very high relief Precambrian basement and its possible implications with regard to petroleum occurrence.

Sauve (1981) described the lithology of the Tennessee Valley Authority Yellow Creek continuous core

in northern Tishomingo County. She correlated the core based on the stratigraphic succession as differentiated in the Central Basin of Tennessee. She placed Black Riverian, Rocklandian and lowermost Kirkfieldian (Nashville Group) strata in the core. This is in contrast to the age assignments of the present report as these strata are of younger age (upper Middle Ordovician).

Mellen (1982) described the lithology of the Stones River Limestone from a core taken in the Florida Exploration #1 Morrison in Pontotoc County. He discussed the reservoir potential of the Stones River Group and also noted that volcanic clasts have been found in the unit. He also identified graptolites occurring in a thin shale at the top of the Stones River Limestone as being of Middle Ordovician age.

Alberstadt and Repetski (1989) studied the Ordovician strata in Alabama, Arkansas, Mississippi and Tennessee. They documented the conodont fauna in the Magnolia Petroleum #1 Pierce in Monroe County, Mississippi. They described the lithology of the "sponge-algal" limestone (Knox Limestone of this report) and its significance with regard to depositional history of the Ordovician. Based on conodonts, they assigned an age of Lower Ordovician to the "sponge-algal" limestone (true top of Knox Group) and documented that no Ordovician strata younger than lowermost Middle Ordovician (Whiterockian) are present in the subsurface of Mississippi.

Mississippi Geological Society (undated) gave age assignments to the Ordovician strata in the Magnolia Petroleum #1 Pierce in Monroe County based on an ostracod and lithologic study by Harris. This study has been the source of much of the confusion and false correlations because it incorrectly places Trenton and Richmond age strata in the subsurface of Mississippi. Based on lithology, the cross section also places the top of the Knox Group at the "second dolomite" (Knox Dolostone of this report).

PRESENT INVESTIGATION

For this study, a comprehensive list of wells penetrating the Cambro-Ordovician was compiled in an effort to obtain and synthesize all available data (Appendix 1). As some of these wells are very old, little information is available for them and they are thus of limited value. Also, a number of the wells are located in the southern portion of the study area (Central Mississippi Uplift) where shallow penetration of the

Paleozoic section and complex structural conditions make correlation very difficult without biostratigraphic data. The concentration of many of the wells in Monroe, Pontotoc and Chickasaw counties (see Plate 1) also constrains state-wide correlations. In addition to the above limitations, many of the wells have penetrated only a small portion of the Cambro-Ordovician section (see Appendix 2). Figures 5-8 are isopach maps of the Stones River Group formations and the upper two formations of the Knox Group. Plates 2-6 are stratigraphic cross sections (see Figure 3 for locations). Figure 4 is a Paleozoic subcrop map of the northern part of the state.

With the above constraints in mind, this study was undertaken in an effort to construct a usable framework for future study and revision. The primary goal of this study is to clear up the confusion that exists with regard to the age and nomenclature of the Cambro-Ordovician strata in Mississippi. In the past, various terms and age assignments have been utilized for the Cambro-Ordovician. A very timely conodont study by Alberstadt and Repetski (1989) has served as the basis for the age assignments given to the Upper Cambrian and Ordovician strata, while the nomenclature used is an effort to utilize established names without creating further confusion.

All well-to-well correlations in this study are based on lithology. While it is recognized that these lithostratigraphic correlations probably do not represent accurate time equivalent correlations, subdivision of these strata by lithologic character is the most practical. Without the benefit of extensive biostratigraphic data and cores, facies relationships as they pertain to chronostratigraphically equivalent units would be speculative and of questionable value.

GENERAL STATEMENT OF STRATIGRAPHY

Cambro-Ordovician carbonates represent a persistent shallow marine shelf environment that existed throughout the southern margin of the North American continent during the early Paleozoic. These 8000 feet of strata are remarkably similar lithologically throughout the subsurface of Mississippi. Slight changes in sea level had widespread effects on the stable carbonate shelf; as a result, regressive periods caused several episodes of karstification. These karst surfaces are interpreted to be represented in the subsurface as zones of high porosity and red and yellow (oxidized) intervals. The lack of macrofossils and the recrystallized and

diagenetically overprinted nature of these predominantly carbonate strata prohibit precise correlation.

In Mississippi, only two wells have penetrated the entire Cambro-Ordovician section and reached Precambrian basement. The Pruet and Hughes #1 Dunlap Brothers well in Lafayette County was bottomed in red granite dated at 790 m.y. old (Riggs, 1976) at a total depth of 11,188 feet. "Gneissic rock" of apparent Precambrian age was encountered at the depth of 21,340 feet in the Exxon #1 Fulgham in Oktibbeha County.

Igneous rocks other than Precambrian have been encountered in wells drilled in west-central and northwestern Mississippi. These igneous rocks are believed to represent intrusions of post-Pennsylvanian and pre-Cretaceous basaltic rocks associated with the formation of Triassic and Jurassic rifts during the severe tectonic transition from Paleozoic to Mesozoic time (Mellen, 1979). These volcanic stocks and sills intrude Paleozoic strata ranging from Ordovician to Pennsylvanian in age and are generally believed to be Triassic in age. For a more complete discussion of igneous rocks in the subsurface of Mississippi the reader is referred to Mellen (1979) and Harrelson and Bicker (1979).

The Cambrian System is differentiated into five formations. In ascending order, these are: Weisner Quartzite, Shady Dolostone, Rome Formation, Conasauga Limestone and Copper Ridge Dolostone (see Figure 2). These strata have a maximum composite thickness of 6427 feet in Mississippi and represent the "complete" Cambrian System as it is known in the outcrop belt of the southern Appalachian Mountains of Alabama.

Ordovician strata are differentiated into four formations. In ascending order, these are: Knox Dolostone, Knox Limestone, Stones River Dolostone and Stones River Limestone. Only Lower Ordovician (Canadian) and lowermost Middle Ordovician (Whiterockian) strata are present (see Figure 2). The age assignments of the Ordovician strata are based on a study of conodonts from the Magnolia Petroleum #1 Pierce in Monroe County (Alberstadt and Repetski, 1989) and conodonts and graptolites from the Florida Exploration #1 Morrison in Pontotoc County (Mellen, 1982). Conodonts also support the premise that the well known and widespread "Knox unconformity" at the close of Lower Ordovician time is not present in most of the subsurface of Mississippi. The unconformity is present in the Tipperary #1-X Harpole-Campbell well in northern Quitman County. See Figure 6 for the area where the unconformity is believed to occur.

ERATHEM	SYSTEM	SERIES	STAGE	GROUP	FORMATION	THICKNESS	LITHOLOGIC DESCRIPTION
PALEOZOIC	ORDOVICIAN	MIDDLE	WHITE-ROCKIAN	STONES RIVER	STONES RIVER LIMESTONE	214-680'	LIMESTONE, GRAY TO LIGHT TAN, MICRITIC TO FINELY CRYSTALLINE, ARGILLACEOUS IN TOP, THIN DARK GRAY-BLACK SHALES AT TOP LOCALLY, TRACES SANDY IN BASE
					STONES RIVER DOLOSTONE	289-1535'	DOLOSTONE, GRAY TO TAN, GREENISH-GRAY, VERY FINE TO FINELY CRYSTALLINE, TRACES SANDY, ARGILLACEOUS IN PART, BRECCIATED ZONES ("SNOW ZONE"), BENTONITES
		LOWER	CANADIAN	KNOX	KNOX LIMESTONE	490-2657'	LIMESTONE, GRAY TO TAN, VERY FINE TO FINELY CRYSTALLINE, BIOCLASTIC IN LARGE % (FOSSILS INCLUDE: SPONGE SPICULES, CONODONTS, CRINOID STEMS, ALGAE)
					KNOX DOLOSTONE	650-1906'	DOLOSTONE, GRAY TO TAN, GREENISH-GRAY, FINE TO MEDIUM CRYSTALLINE, CHERTY, VERY SANDY (VERY FINE TO COARSE,WELL ROUNDED,"FROSTED"), BRECCIATED ZONES OF HIGH POROSITY WITH RED AND YELLOW MOTTLING
	CAMBRIAN	UPPER			COPPER RIDGE DOLOSTONE	795-3200'	DOLOSTONE, GRAYISH-TAN TO DARK BROWN, FINE TO COARSELY CRYSTALLINE, SANDY, CHERTY (COMMONLY CONTAINS "FLOATING" EUHEDRAL DOLOMITE CRYSTALS), BRECCIATED ZONES WITH RED AND YELLOW MOTTLING
		MIDDLE			CONASAUGA LIMESTONE	0-1187'	LIMESTONE, GRAYISH-TAN, MICRITIC TO FINELY CRYSTALLINE, DOLOMITIC IN PART, THIN DOLOSTONE BEDS, ARGILLACEOUS, MAY CONTAIN THIN DARK GRAY CALCAREOUS SHALE INTERBEDS, VERY SANDY IN BASE-SAND RANGES FROM VERY FINE TO VERY COARSE (UP TO 1/4" IN DIAMETER), CHALKY IN SMALL PART, RARELY GLAUCONITIC NEAR THE BASE OF THE UNIT
		LOWER			ROME FORMATION	0-708'	SHALE/SILTSTONE, DARK GRAY TO LIGHT BROWN, GREEN; LIMESTONE/DOLOSTONE, GRAYISH-TAN, FINELY CRYSTALLINE
					SHADY DOLOSTONE	220-1152'	DOLOSTONE, LIGHT GRAY TO BROWN, "SALT AND PEPPER," FINE TO MEDIUM CRYSTALLINE, SANDY, OOLITIC
					WEISNER QUARTZITE	0-180'	SANDSTONE, VARICOLORED, FINE TO VERY COARSE GRAINED, QUARTZITIC, FELDSPATHIC IN SM %, GLAUCONITIC IN PART
PRECAMBRIAN BASEMENT							GRANITE AND "GNEISSIC" ROCK

FIGURE 2. CAMBRO-ORDOVICIAN STRATIGRAPHIC COLUMN OF MISSISSIPPI

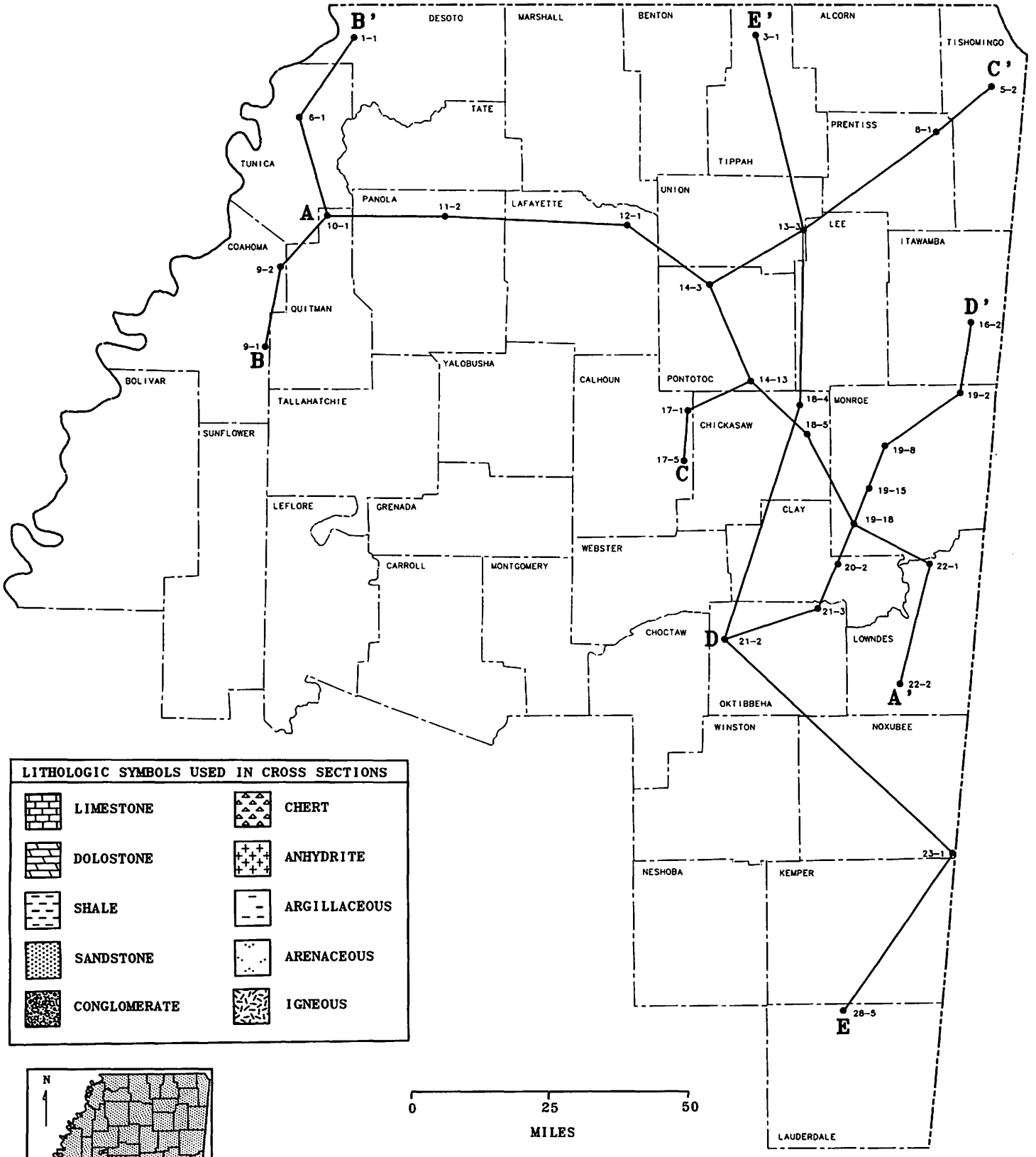


FIGURE 3

CROSS SECTION INDEX MAP

ALL CROSS SECTIONS ARE PLATES (IN POCKET)

WELL NUMBERS REFER TO APPENDIX 1

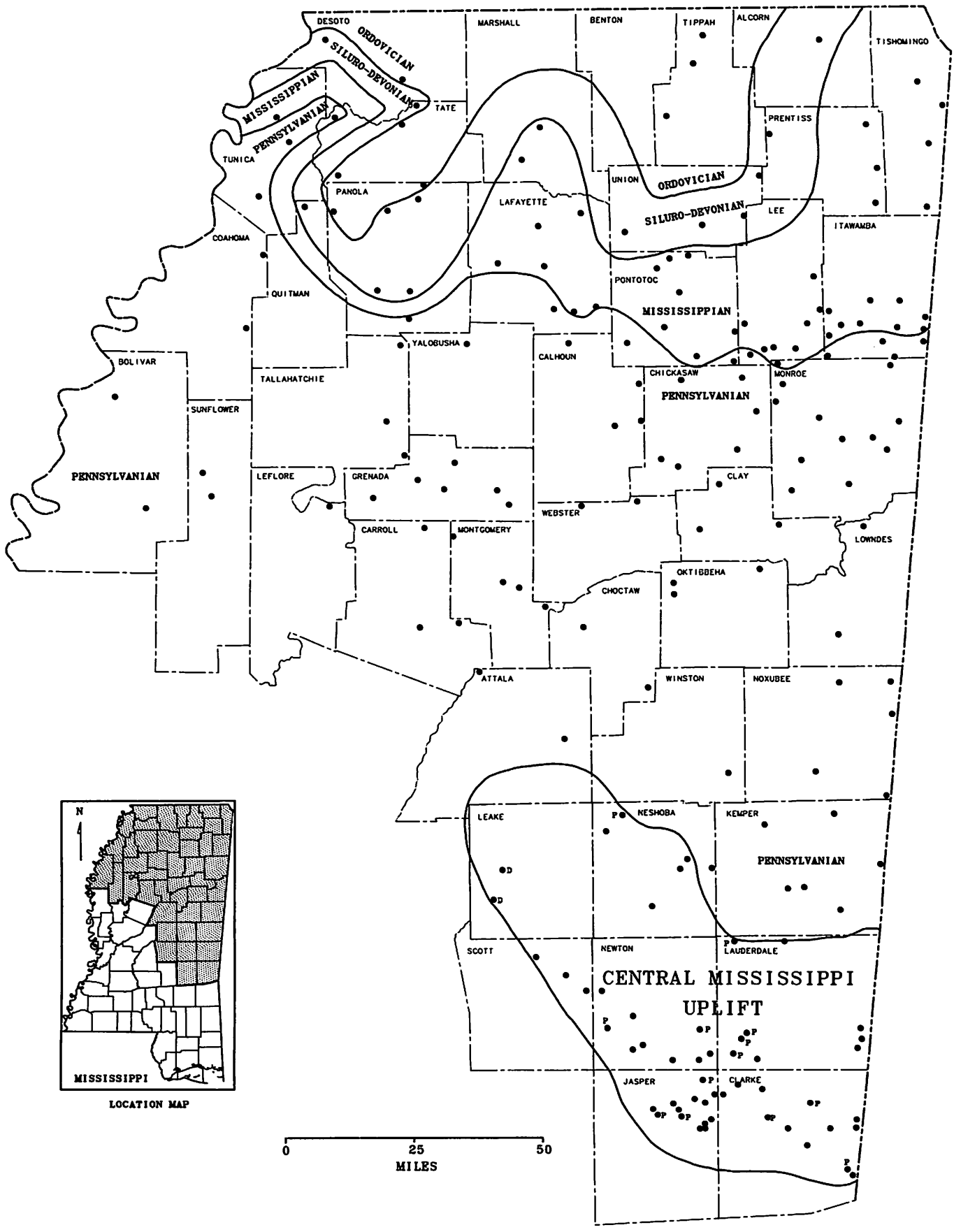


FIGURE 4

PALEOZOIC SUBCROP MAP

NO ATTEMPT HAS BEEN MADE TO DEPICT THE SUBCROP IN THE STRUCTURALLY COMPLEX CENTRAL MISSISSIPPI UPLIFT (IN CMU: P=Pennsylvanian; D=Devonian; Unposted=Ordovician)

PRECAMBRIAN

The Precambrian basement underlying Cambro-Ordovician strata is known from only two wells. These are the Pruet and Hughes #1 Dunlap Brothers in Lafayette County and the Exxon #1 Fulgham in Oktibbeha County. Mellen (1977) postulated that the Precambrian surface has 2000 feet or more of relief and compared this to the well-defined "Tulsa Mountains" (see Chenoweth, 1968) of northeastern Oklahoma. Mellen also believes that many of the domal structures in Alabama, Mississippi and Tennessee represent compaction around and over the rugged peaks of the Precambrian surface. This would imply that reservoir-type reef rocks may have been deposited on the flanks of these structures during Cambrian and later times.

The Dunlap well was bottomed in red granite at a total depth of 11,188 feet after drilling 178 feet of basement. The granite from this well was dated at 790 million years old by K/Ar methods. The granite is described as being composed predominantly of red to reddish-brown microperthite, orthoclase and quartz with minor amounts of plagioclase, hornblende, augite and chlorite also present. The presence of chlorite in the rock is interpreted to represent slight metamorphism of the granite (Riggs, 1976).

The basement rock penetrated in the Fulgham well is described as "gneissic" (Mellen, 1977). No age dating is available on this rock but it is interpreted to be of Precambrian age as it underlies Cambrian strata. The absence of a considerable portion of the Cambrian section in this well supports the concept of extensive topographic relief at the top of the Precambrian. Basement rock was encountered at a depth of 21,340 feet and 51 feet of this "gneiss" was drilled before the well reached a total depth of 21,391 feet.

CAMBRIAN SYSTEM

WEISNER QUARTZITE

The Weisner Quartzite is the basal unit of the Cambrian System and it rests unconformably on Precambrian basement. The deposition of the formation appears to have been restricted by the high relief of the Precambrian erosional surface. Apparently, the Weisner Quartzite represents a thin, locally deposited basal clastic unit of a regionally extensive transgressive sequence (Sauk

sequence of Sloss, 1963). This craton-wide transgression is interpreted to have a northwest onlap.

The Weisner Quartzite is known in the subsurface of Mississippi from only three wells. The only complete penetration is the Pruet and Hughes #1 Dunlap Brothers well in Lafayette County. The formation in this well is a 180 foot thick section of conglomeratic quartz sandstone. The sandstone rests unconformably on Precambrian granite. The upper part of the unit is very calcareous/dolomitic, and a conspicuous amount of glauconite is also present. The occurrence of glauconite is very rare in lower Paleozoic strata in Mississippi. Gray feldspar and kaolinite pseudomorphic after feldspar are common in the lower half of the unit and reflect the proximal source for parts of these clastics. Small amounts of shale containing biotite flakes are also present throughout the section.

In the Texaco #1 Ivey (Coahoma Co.) 73 feet of Weisner Quartzite were penetrated from 17,527 feet to the total depth of 17,600 feet. Here, the formation is a varicolored, fine to coarse grained, quartzitic sandstone. The unit is silty for the most part and also contains a small amount of shale.

The Weisner Quartzite was penetrated in the Tipperary #1-X Harpole-Campbell (Quitman Co.) from 10,632 feet to the total depth of 10,704 feet. These 72 feet of strata consist predominantly of light to medium gray, calcareous siltstone, with varying amounts of fine to medium grained, quartz sand. Thin laminations of dark gray shale are interpreted to be interbedded with the siltstone and sandstone. While the Harpole-Campbell well is apparently situated on a basement uplift, the presence of the Weisner Quartzite suggests that basement faulting associated with this structure is post early Lower Cambrian. Indeed, the presence of a "complete" Cambrian and Lower Ordovician section in this well would indicate that the majority of tectonic movement in the area around this well occurred sometime after the Early Ordovician.

SHADY DOLOSTONE

The Shady Dolostone is the middle unit of the Lower Cambrian section as it is presently differentiated in the subsurface of Mississippi. The unit is widespread and represents the beginning of persistent and extensive carbonate deposition throughout the Lower Paleozoic. The formation is present in three of the four wells that have made a sufficient stratigraphic penetration.

The Shady Dolostone is known in the subsurface from just three wells and it ranges from 220 to 1152 feet in thickness. The unit was penetrated in the Tipperary #1-X Harpole-Campbell (Quitman Co.) from 9480 to 10,632 feet. These 1152 feet of strata consist of a relatively pure, tannish-gray, fine to medium crystalline dolostone. The dolostone contains numerous relict oolites and is very sandy in the basal 400 feet. The sand is quartzose and ranges in size from fine to coarse grained.

The Shady Dolostone is 419 feet thick in the Texaco #1 Ivey (Coahoma Co.) and was penetrated from 17,108 to 17,527 feet. The section in this well is a relatively pure, salt and pepper colored, fine to medium crystalline dolostone. The strata here are highly veined, with quartz and dolomite filling the fractures. An unusual bed of anhydrite about thirty feet thick is present from 17,450 to 17,480 feet.

A thin section of Shady Dolostone was encountered in the Pruet and Hughes #1 Dunlap Brothers (Lafayette Co.) from 10,610 to 10,830 feet. The dolostone in this well is tan to brown and predominantly fine to medium crystalline in texture. Abundant quartz sand is present and ranges from fine to very coarse grained (grains up to 1/4 inch in diameter). Relict oolites are present, as is a small amount of greenish-tan shale.

In the Exxon #1 Fulgham (Oktibbeha Co.) the Shady Dolostone, like the underlying Weisner Quartzite, is absent due to nondeposition. This indicates that the Precambrian erosional surface was of considerable relief. The possibility of the absence of the Shady Dolostone being due to a faulted-out situation is not ruled out.

ROME FORMATION

The Rome Formation is interpreted to mark the top of the Lower Cambrian sequence in the subsurface of Mississippi. The Rome Formation is of variable lithology, apparently reflecting rapidly changing depositional environments. The formation attains a maximum thickness of 708 feet and is present in every well of sufficient stratigraphic penetration with the notable exception of the Exxon #1 Fulgham basement test. The absence of the formation in the Fulgham well is apparently due to non-deposition. The absence of the Rome Formation and the other Lower Cambrian formations in the Fulgham well supports the concept of a high-relief Precambrian erosional surface. The absence of the formation could also be explained by a faulted-out situation.

A 666-foot thick section assigned to the Rome Formation was penetrated from 8814 to 9480 feet in the Tipperary #1-X Harpole-Campbell (Quitman Co.). These strata consist of interbedded limestone and shale. The shale is medium to dark gray, grayish-brown and bright green and is for the most part calcareous. The limestone is predominantly tannish-gray with reddish-brown mottling in the upper half. Oolites and fossils also occur in the upper half of the section.

The Rome Formation in the Texaco #1 Ivey (Coahoma Co.) is predominantly siltstone and silty shale with thin limestone interbeds. This 708 foot thick section was encountered from 16,400 to 17,108 feet. The shale is mostly dark gray, carbonaceous, silty and calcareous. A zone of greenish-tan mudstone was encountered in the upper part of the section. The siltstone is medium to dark gray, argillaceous and calcareous. Limestones are thin and predominantly tannish-gray in color. The texture of the limestones is micritic to very finely crystalline and oolites are common.

The section assigned to the Rome Formation in the Pruet and Hughes #1 Dunlap Brothers (Lafayette Co.) was penetrated from 10,017 to 10,610 feet. These 593 feet of strata consist primarily of slightly calcareous dolostone. The dolostone is grayish-tan in color and very fine to medium crystalline. Limestone is present in the basal 200 feet of the section and is tannish-gray to brown, micritic to finely crystalline and is very sandy. A small amount of silty, medium to dark gray shale is also present in the basal part of the section.

CONASAUGA LIMESTONE

The Conasauga Limestone is Middle to early Upper Cambrian in age. Although the unit is dolomitic, limestone dominates the section and is differentiated from the overlying Copper Ridge Dolostone by its nearly pure calcareous composition. The lithologic character of the Conasauga Limestone is known from three complete and one partial penetrations. The unit is present in every well of sufficient stratigraphic penetration with the exception of the Exxon #1 Fulgham (Oktibbeha Co.). The absence of the Conasauga Limestone in the Fulgham well, like the underlying Lower Cambrian formations, is apparently due to nondeposition. These missing strata in the Fulgham well represent over 3000 feet of composite section and support the concept of a high-relief Precambrian erosional surface. The absence of all or part of this 3000-foot section by faulting-out is not dismissed as a possibility. The Conasauga attains a

maximum thickness of 1187 feet (Pruet and Hughes #1 Dunlap Brothers, Lafayette County).

In the Tipperary #1-X Harpole-Campbell (Quitman Co.), strata assigned to the Conasauga Limestone were penetrated from 8560 to 8814 feet. These 254 feet of sediments consist predominantly of grayish-tan, micritic to finely crystalline limestone. Thin interbeds of medium to dark gray, calcareous shale occur throughout the section. Minor amounts of grayish-tan, fine to medium crystalline dolomite also occur within the unit.

The Conasauga Limestone in the Texaco #1 Ivey (Coahoma Co.) is 825 feet thick and was encountered from 15,575 to 16,400 feet. The unit is predominantly a dark tannish-gray, micritic to finely crystalline, argillaceous limestone with scattered fossils (graptolites ?). The unit becomes more argillaceous and dolomitic in the lower half, and a tannish-gray dolomite is present from 16,165 to 16,330 feet. Minor amounts of the rarely occurring mineral glauconite are present in the lower half of the section.

Dolostone and calcareous dolostone dominate the section assigned to the Conasauga in the Pruet and Hughes #1 Dunlap Brothers (Lafayette Co.). The 1187 feet of strata were penetrated from 8830 to 10,017 feet. The upper half of the section is a tan, fine to medium crystalline dolostone and very dolomitic limestone. Most of the limestone is tan and brown, micritic to finely crystalline and argillaceous. Relatively pure, fine to coarsely crystalline, tan dolostone comprises the lower half of the section.

The Young/Browning and Welch #1 Smith (Noxubee Co.) reached total depth in the Conasauga Limestone after penetrating 122 feet of the unit. The section here is a white and dark gray mottled limestone. The limestone is chalky, very finely crystalline and contains traces of medium grained sand and pseudo-oolites.

COPPER RIDGE DOLOSTONE

The Copper Ridge Dolostone is the basal formation of the Upper Cambrian-Lower Ordovician Knox Group. The unit has been completely penetrated in five wells and four other wells have bottomed within the unit. The formation rests unconformably on the rugged Precambrian surface in the Exxon #1 Fulgham (Oktibbeha County). The Copper Ridge ranges from 795 to 3200 feet in thickness and is present in every well that has reached a sufficient stratigraphic depth.

The top of the Copper Ridge Dolostone is interpreted to represent the top of the Cambrian System. The lithologic similarity between the Copper Ridge Dolostone and the overlying Knox Dolostone makes picking the contact between these two units difficult and uncertain. In this study, the Copper Ridge Dolostone is distinguished from the Knox Dolostone lithologically by an increase in the amount of chert and there is normally a marked decrease in resistivity on electric logs. The unit is also characterized by the presence of red and yellow zones of mottling. These zones apparently represent periods of subaerial exposure with subsequent oxidation and weathering. During these periods of subaerial exposure, karst terranes developed. These episodes of karst development are represented in the subsurface as zones of high porosity interpreted to be collapse breccias.

The Copper Ridge Dolostone is a grayish-tan to dark brown, fine to coarsely crystalline dolomite that contains variable amounts of chert. Most of the chert is a pale smokey bluish-gray or is colorless and translucent. Occasional oolite ghosts and "floating" euhedral dolomite rhombs are noted within the chert. The unit is commonly sandy and in the Texaco #1 Ivey (Coahoma Co.) a thick dolomitic sandstone occurs from 15,235 to 15,405 feet. The quartz sand is described as light to medium gray and fine to medium grained. The unit apparently is commonly fractured, as well cuttings frequently contain large fragments of clear to milky calcite and dolomite. Euhedral quartz crystals also occur, probably as vug fillings, and may be as large as 1/2 inch in length.

An apparent brecciated zone of high porosity is developed in the Tipperary #1-X Harpole-Campbell (Quitman Co.) from 7608 to 7725 feet. During drilling of this 117 foot zone, the bit "fell" 24 feet from 7608 to 7632 feet and circulation was lost. A drill stem test was conducted from 7610 to 7725 feet. Although the well subsequently loaded-up and died, it flowed at an average rate of 12,300 barrels of saltwater per day during the first five minutes of the test. It is interesting to note that the water produced from this zone was relatively fresh, containing only 18,100 ppm chlorides. The excellent porosity associated with this zone proves that reservoir quality rocks are present. Because this zone is interpreted to be the result of karstification, similar zones should be found throughout the Cambro-Ordovician carbonate section in the subsurface of Mississippi. The reader is referred to Hooks (1985) for a complete discussion of the types and methods of formation of breccias in the Cambro-Ordovician section as known from outcrops in the southern Appalachians of Alabama.

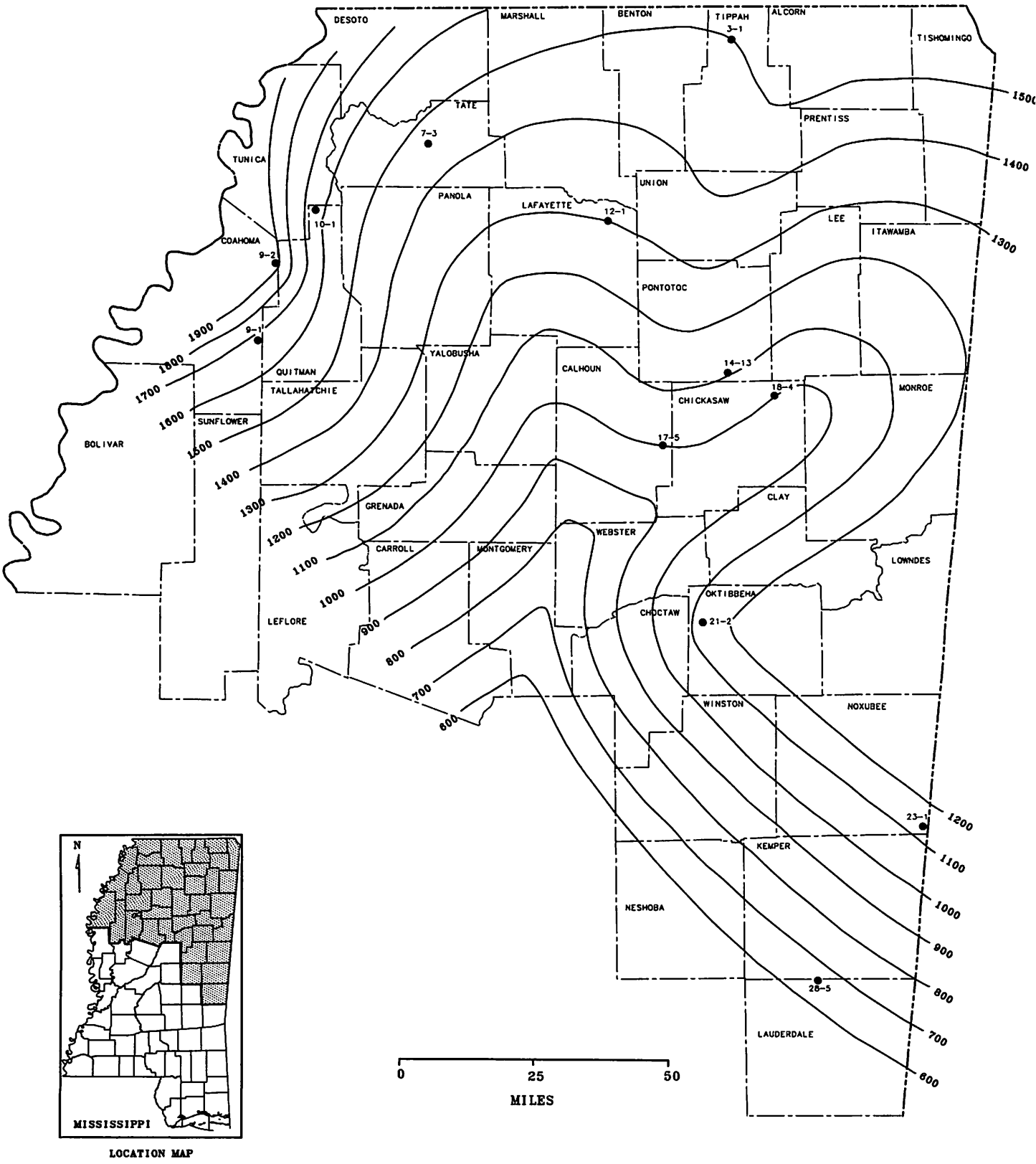
ORDOVICIAN SYSTEM

KNOX DOLOSTONE

The Knox Dolostone is Lower Ordovician (Canadian) in age and is the middle unit of the Upper Cambrian-Lower Ordovician Knox Group. The contact with the overlying Knox Limestone is gradational and makes precise location of the boundary difficult in some cases. The top of the Knox Dolostone is picked where dolomite dominates the lithology and where electric logs show a marked decrease in resistivity. The section has been completely penetrated in nine wells with an additional twelve wells having bottomed in the formation. The unit ranges from 650 to 1906 feet in thickness and is present in every well that has made a sufficient stratigraphic penetration. The unit thickens markedly to the northwest and north (see Figure 5).

The Knox Dolostone is a remarkably uniform sequence of cherty and sandy dolostone. The dolostone is light to dark gray or light to dark tan and is occasionally a dark greenish-gray in color. It is for the most part fine to medium crystalline but is sometimes coarsely crystalline. Varying amounts of chert are present, occurring predominantly as nodules and as secondary mineralization. Apparently, chert commonly fills interstitial voids and other cavities where it may contain "floating" euhedral dolomite rhombs. Minor amounts of oolites have been preserved in the section where chert has replaced the original carbonate. Most of the chert occurs in the lower half of the unit and is white to light bluish-gray in color.

The most distinguishing characteristic of the Knox Dolostone is the presence of rounded quartz sand grains. These sand grains range in size from very fine to coarse and sometimes appear to be frosted. This frosted appearance has led many to infer that the sand is of eolian origin. Due to the very limited amount of core material available, it is difficult to ascertain what the origin of the sand is, but it is believed that most if not all of the sand is of clastic origin. If the sand were of eolian origin, then nearly all of the grains would be frosted and there would not be such a wide range of grain size. The author has not noted appreciable amounts of frosted sand grains in the cores and samples examined. Walker (1957) described the origin of a frosted appearance of sand grains by the process of carbonate replacement of quartz. This process is interpreted to be the source of much of the silica found in the section as interstitial fillings of voids and fractures. A thick



LOCATION MAP

FIGURE 5

KNOX DOLOSTONE ISOPACH

CONTOUR INTERVAL: 100 FEET

WELL NUMBERS REFER TO APPENDIX 1

ONLY THOSE WELLS WHICH FULLY PENETRATED THE UNIT OR WERE OF SIGNIFICANT VALUE ARE SHOWN

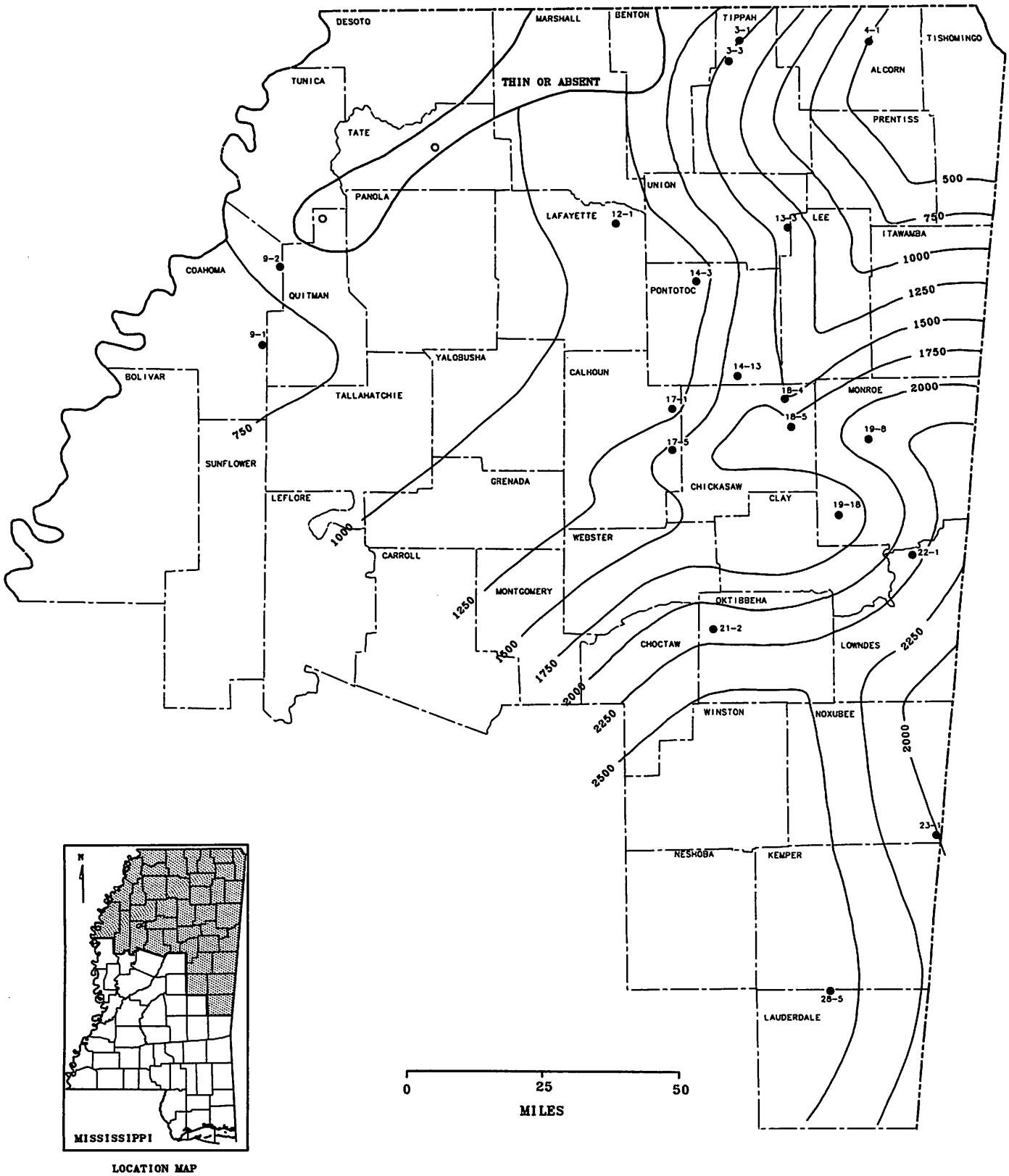
dolomitic sandstone occurring in the subjacent Copper Ridge Dolostone (Texaco #1 Ivey, Coahoma Co.) further supports a clastic origin of the sand. The amount of sand in the Knox Dolostone increases markedly to the north. While quartz sand is not restricted to the Knox Dolostone and is found in minor amounts throughout the Cambro-Ordovician section, it is most prevalent in the Knox Dolostone.

As in the underlying Copper Ridge Dolostone, several zones of red and yellow mottling occur within the Knox Dolostone. These zones of oxidized strata are interpreted to represent episodes of subaerial exposure. Karstification of the Knox Dolostone is inferred and zones of high porosity associated with brecciation are found in the section. One of these zones of porosity was drill-stem tested in the Honolulu #2 Davis well in Calhoun County from a depth of 8134 to 8390 feet. This test recovered 3600 feet of gas and mud-cut salt water in 3 hours, 45 minutes (Mellen, 1974b). The cover illustration is a photograph of a piece of core from this porosity zone in the #2 Davis well.

KNOX LIMESTONE

The Knox Limestone is the uppermost unit of the Lower Ordovician (Canadian) and marks the top of the Upper Cambrian-Lower Ordovician Knox Group. Based on conodonts, Alberstadt and Repetski (1989) placed the top of the Knox Group 216 feet below the top of the Knox Limestone in the Magnolia #1 Pierce well (Monroe County). For this study, the top of the Knox Group is defined as being at the top of the lithologically distinctive Knox Limestone. The contact of the Knox Limestone with the overlying Stones River Dolostone (Middle Ordovician) is commonly gradational and thus difficult to locate precisely. The top of the Knox Limestone is chosen where limestone dominates the lithology and this point is normally accompanied by a marked increase in resistivity on electric logs.

The section ranges from 490 to 2657 feet in thickness. From the 21 wells that have fully penetrated the formation, it averages about 1550 feet in thickness. An additional 16 wells have bottomed in the Knox Limestone and the unit is present in every well that has made a sufficient stratigraphic penetration. The top of the Knox Limestone has been truncated ("Knox unconformity") in a small area in northwest Mississippi. The unit thickens markedly to the southeast (see Figure 6).



LOCATION MAP

FIGURE 6

KNOX LIMESTONE ISOPACH

CONTOUR INTERVAL: 250 FEET

WELL NUMBERS REFER TO APPENDIX 1

ONLY THOSE WELLS WHICH FULLY PENETRATED THE UNIT OR WERE OF SIGNIFICANT VALUE ARE SHOWN

The Knox Limestone is a lithologically persistent unit of light colored, micritic to very finely crystalline limestones and darker colored, fossiliferous, very fine to finely crystalline limestones. The limestones are classified as wackestones for the most part, but packstones also commonly occur. The fossils which make up a relatively large volume of the limestone include: sponges and sponge spicules, conodonts, crinoid stem fragments and algae. The Knox Limestone is easily recognized by its distinctive bioclastic and/or argillaceous character.

As in other Cambro-Ordovician strata, zones of high porosity due to karstification are present in the Knox Limestone. One of these apparent karst surfaces has been termed the "Pierce Zone". In the Magnolia Petroleum #1 Pierce (Monroe County) this zone of porosity was encountered at a depth of 7130 feet. A three hour drill-stem test of the "Pierce Zone" from 7160 to 7176 feet recovered 6210 feet of gas-cut black sulfur water (720 barrels of fluid per day).

In the Memphis Equipment #1 Melton (Tippah County), a porous zone of coquinoid, "reef-type" limestone was encountered from 2980 to 3131 feet. A drill-stem test from 2980 to 3031 feet yielded 2400 feet of salt water in 30 minutes (Mellen, 1974b). This "reef" in the Knox Limestone indicates that potential reservoir rocks other than karst-derived porosity are present in the unit.

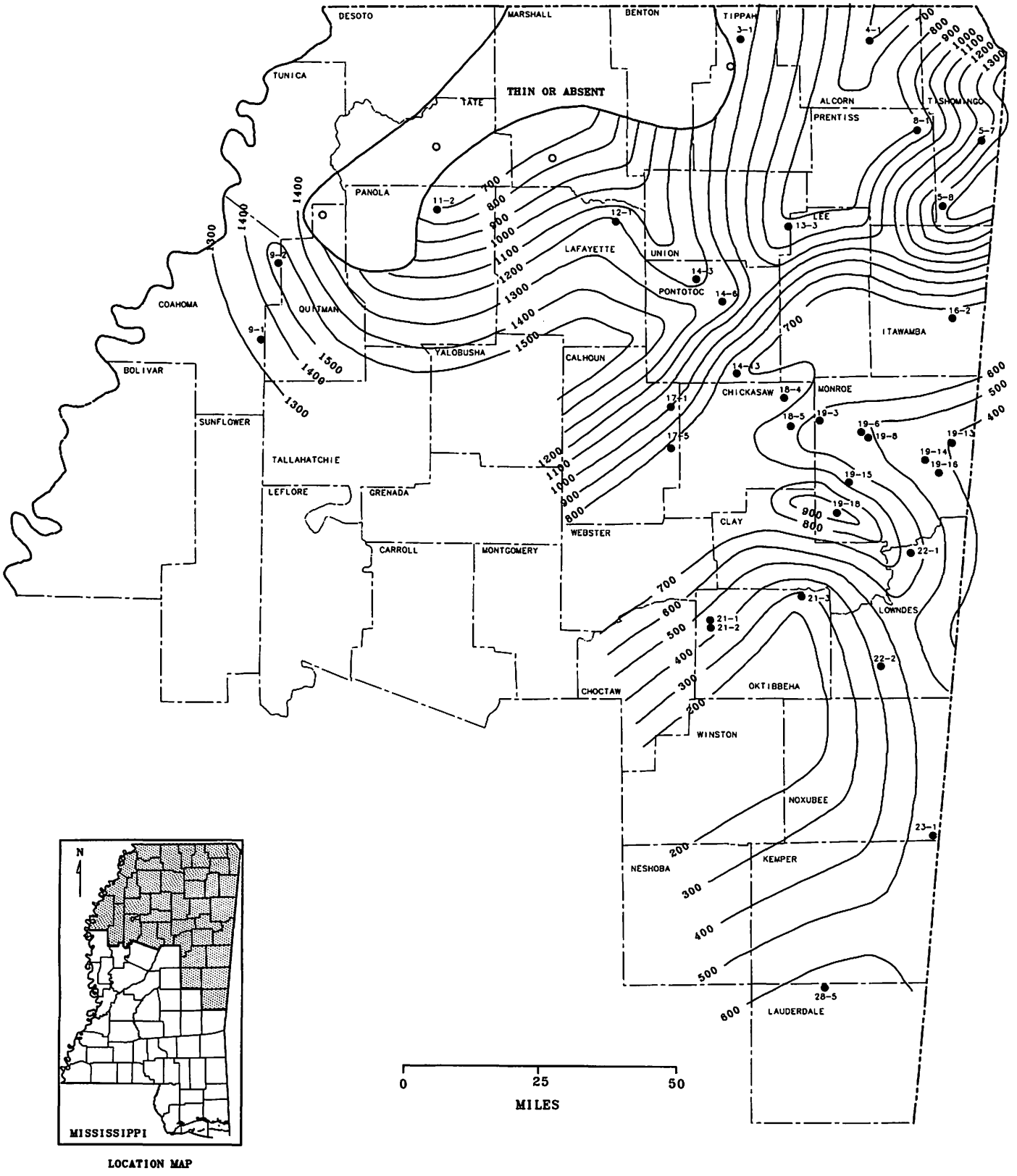
The presence of the questionable alga Nuia (Lower Cambrian to Middle Ordovician) is the most diagnostic characteristic of the Knox Limestone. It is recognized petrographically in thin section along with the algal form-genus Girvanella and the algal genus Sphaerocodium. Nuia is interpreted to have been deposited in a slope environment as highly abraded fragments transported from high-energy environments. The distinctive sponge/algal fossil assemblage of the Knox Limestone is interpreted to have been deposited in open marine, slightly deeper water, shelves or ramps. These deeper water shelves/ramps represent the outer parts of the North American continent during the late Early Ordovician. Conodonts found in the Knox Limestone include cold and deep water species, further supporting an edge-of-the-continent depositional environment (Alberstadt and Repetski, 1989). The Knox Limestone is interpreted to be the deeper water equivalent to dissimiliar, coeval rocks deposited nearer the shore toward the interior of the continent.

STONES RIVER DOLOSTONE

The Stones River Dolostone is early Middle Ordovician (Whiterockian) in age. The contact with the overlying Stones River Limestone is gradational but is picked where dolomite dominates the lithology and a marked decrease in resistivity is observed on electric logs. The section ranges in thickness from 289 to 1535 feet where it is preserved. The Stones River Dolostone is truncated or absent over a wide area in the extreme northern part of the state. The unit thickens markedly to the northeast and in an arcuate belt across the north-central portion of Mississippi. The section thins generally to the east-southeast and to the southwest (see Figure 7).

The Stones River Dolostone is mostly light gray to light grayish-tan with some darker tan and light greenish-gray tints occasionally present. Rarely, the unit is mottled yellow and pink. The dolostone is generally very fine to finely crystalline, with some beds of fine to medium crystalline dolostone occurring in the upper part of the section. Although the unit is a nearly homogeneous dolostone, minor amounts of other constituents occur throughout the section. Varying amounts of argillaceous materials are found within the dolostone and, locally, thin beds of green shale (bentonites ?) are present in the lower half of the section. The amount of argillaceous material generally increases toward the middle of the unit. Though sand is generally absent, small amounts of very fine to fine grained quartz sand may be present locally. The amount of sand increases toward the base of the section. Cores from the sandy parts of the section exhibit cross-stratification and other sedimentary structures associated with an intertidal environment of deposition. The sand occurs as very thin laminations (1/8 inch to 1 inch) and as disseminated "floating" grains. Sand in the Stones River Dolostone is interpreted to have been derived from brief periods of clastic influx reflecting repeated cycles of regression-transgression on the shallow carbonate platform. Very minor amounts of chert are locally present and some may contain "floating" euhedral dolomite rhombs. Most of the chert is apparently secondary, filling voids and occurring as replacement of the original carbonate.

The Stones River Dolostone is the only unit in the Cambro-Ordovician succession to have produced hydrocarbons to date. A small amount of oil was produced from the formation at the New Hope Field in Monroe County. Approximately 7834 barrels of 35 gravity oil was produced from the Magnolia Petroleum #A-1 Snow before abandonment. Completed September 1, 1953, perforations



LOCATION MAP

FIGURE 7

STONES RIVER DOLOSTONE ISOPACH

CONTOUR INTERVAL: 100 FEET

WELL NUMBERS REFER TO APPENDIX 1

ONLY THOSE WELLS WHICH FULLY PENETRATED THE UNIT OR WERE OF SIGNIFICANT VALUE ARE SHOWN

between 4753 to 4756 feet flowed at an initial rate of more than 29 barrels of oil per hour but production declined rapidly. The well produced an average of about 40 barrels per day for several weeks before finally dying. Shortly after this, the well was placed on pump and produced 224 barrels of oil and 25 barrels of water during the first 24 hours (Oil & Gas Journal, 1953). Unfortunately, this production was short lived and the well was abandoned October 23, 1954, after going to water. Over the years, several offset wells have been drilled in the New Hope area but none have been producing completions. The producing zone in the Stones River Dolostone is informally referred to as the "Snow Zone". This zone of porosity can be found in other wells throughout the area extending into Alabama. The "Snow Zone" has produced gas and a small amount of oil from a single well (the Anderman-Smith #4 Gilmer) in the Fairview Field of Lamar County, Alabama. Cumulative production through January, 1991 for the #4 Gilmer well was 509,400,000 cubic feet of gas and 143 barrels of oil. The "Snow Zone" is interpreted to represent a widespread regression of the early Middle Ordovician seas. This regression led to subaerial exposure of the carbonate terrane with the subsequent formation of a karst surface.

The Stones River Dolostone has also produced gas at the one-well Maben Field in Oktibbeha County, Mississippi, approximately 42 miles southwest and 10,000 feet deeper than the New Hope Field. At the Maben Field, the Texaco #1 Sheely was completed in 1971 from a series of perforations between 14,690 and 15,036 feet ("Snow Zone") flowing 1,959,000 cubic feet of gas per day. The well produced 850,186,000 cubic feet of gas before abandonment in 1989.

STONES RIVER LIMESTONE

The Stones River Limestone is the youngest Ordovician unit preserved in the subsurface of Mississippi. The unit is Middle Ordovician (Whiterockian) in age. The contact with the overlying Silurian is unconformable and generally sharp. The Silurian strata are generally clastics and thus easily differentiated from the Ordovician carbonates except where both the basal Silurian and the uppermost Ordovician are shales. Where both are shales, the Ordovician is recognized by its dark gray-black color in contrast with the lighter colored Silurian shales. Rocks ranging in age from Upper Cretaceous to Silurian rest on top of the Stones River Limestone. This is the most extensive and variable unconformity in the study area. Where it is preserved, the Stones River Limestone ranges from 214 to 680 feet in

thickness. The unit is truncated or absent in a broad area of northern Mississippi. The unit generally thickens to the north and southeast (see Figure 8).

The Stones River Limestone is predominantly a light gray or light to dark tan, micritic to finely crystalline limestone. The unit is argillaceous in the upper part and thin beds of green shale (bentonites) occur. Thin beds of pseudo-oolitic limestone are present in the middle of the section. The limestone is sometimes bioclastic and sandy near the contact with the underlying Stones River Dolostone. Thin beds of dolostone are common in the base of the unit, reflecting the generally gradational nature of the lower contact. Chert is generally absent from the section. Mellen (1982) described volcanic clasts in the Stones River Limestone from a core taken in the Salmon #1 Andrews (Pontotoc County).

A thin bed of dark gray-black shale occurs in an area of north-central Mississippi at the top of the unit. Mellen (1982) described this shale from a core taken in the Florida Exploration #1 Morrison (Pontotoc County). He regards this shale as "Athens" Shale in type and stratigraphic position. Mellen also identified conodonts and graptolites in the shale as Middle Ordovician. This shale exhibits very high gamma radiation similar to the Devonian Chattanooga Shale, for which it may be mistaken in correlation of logs. The high gamma radiation of the Stones River Limestone shales is attributed to potassium. This is in contrast with the Chattanooga Shale which is generally believed to give high gamma radiation due to uranium.

The black shales of the Stones River Limestone are inferred to be a possible source rock for hydrocarbons. An analysis of this shale in the Morrison core yielded a total organic carbon content of 2.02 percent (Mellen, 1982). This percentage of total organic carbon is considered favorable for the generation of hydrocarbons. Numerous shows of hydrocarbons have been reported from the Stones River Limestone. A small amount of 38 degree gravity oil was recovered from the Shell #1 McCain in Chickasaw County from a zone 45 feet below the top of the unit. In the Salmon #1 Wilson (Pontotoc County) a drill stem test of the interval 2940 to 3000 feet yielded 525 feet of muddy gas-cut salt water with fluid entry at the rate of 84 barrels per day (Mellen, 1974b). Secondary dolomitization of the dense limestones of the Stones River Limestone could produce an attractive reservoir objective.

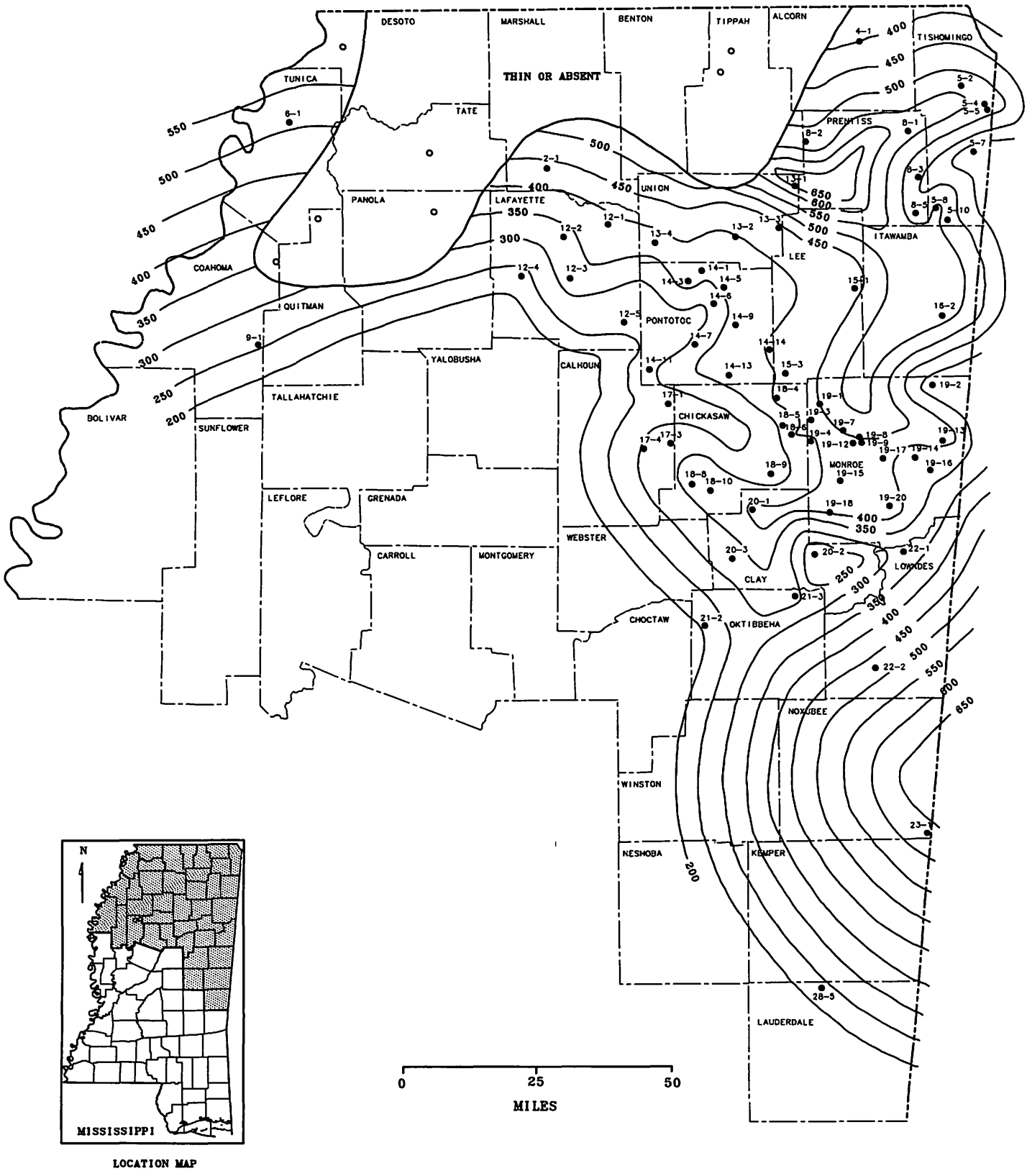


FIGURE 8

STONES RIVER LIMESTONE ISOPACH

CONTOUR INTERVAL: 50 FEET

WELL NUMBERS REFER TO APPENDIX 1

ONLY THOSE WELLS WHICH FULLY PENETRATED THE UNIT OR WERE OF SIGNIFICANT VALUE ARE SHOWN

CONCLUSIONS

The Cambro-Ordovician sequence in the subsurface of Mississippi is a thick section of essentially pure carbonates. These carbonate strata are differentiated into nine formations based on lithologic differences. This report has assigned ages to the Upper Cambrian-Lower Ordovician Knox Group and the early Middle Ordovician Stones River Group based on a conodont study by Alberstadt and Repetski (1989) from a single well in Monroe County, Mississippi (Magnolia #1 Pierce). Previous terminology and age assignments given to Cambro-Ordovician strata in Mississippi by other workers have differed from those used in this report and have also been in conflict with each other. It is hoped that the present report will help clear up much of the conflict and confusion which now exists and will serve as a usable guide for future study and refinement.

Although only two wells have produced hydrocarbons from Cambro-Ordovician strata in Mississippi, the limited number of wells that have tested the section is not sufficient to condemn the potential of these strata. Only two wells have reached basement and just five wells have completely penetrated the Knox Group. The Knox Group is stratigraphically equivalent to the prolific Ellenburger-Arbuckle strata of Texas and Oklahoma. All hydrocarbon production to date in Mississippi has occurred in the Stones River Group, overlying the Knox Group. As only 37 wells have penetrated the entire Stones River Group, these strata are also essentially untested. Of the 151 wells that have made a penetration of the Cambro-Ordovician section, a large number of these have recorded hydrocarbon shows of some kind (see Appendix 3).

Potential reservoir rocks of high porosity have been identified throughout the Cambro-Ordovician section in Mississippi. These high porosity zones are interpreted to be the result of karstification of the carbonates with subsequent formation of breccias and vuggy porosity. In addition to the breccias, secondary dolomitization and the development of reefs are inferred to have enhanced porosity in parts of the section. Complex structural conditions are also interpreted to have enhanced porosity through faulting and fracturing. Complex thrusting along the southwestern margin of the Black Warrior Basin (buried Ouachita trend) has the potential to form numerous hydrocarbon traps. Structural conditions whereby the excellent reservoir rocks of the Cambro-Ordovician section are juxtaposed against the high quality source rocks of the Mississippian and Pennsylvanian strata are inferred. With the recent advances in seismic techniques, the discovery of large hydrocarbon reservoirs in the structurally complex Black Warrior Basin of Mississippi would seem only a matter of time.

SELECTED REFERENCES

Aadland, R.K., 1984, Petrology of the Upper Knox carbonate sequence, Shelby and Talladega counties, Alabama: Geological Society of America, Abstracts with Programs, v. 16, p. 121.

Alberstadt, L.P., and A.L. Reesman, 1978, Significance of authigenic K-feldspar in Cambrian-Ordovician carbonate rocks of the proto-Atlantic shelf in North America: Additional comments regarding the southeastern United States (discussion): Journal of Sedimentary Petrology, v. 48, no. 2, p. 679-683.

Alberstadt, L.P., and J.E. Repetski, 1989, A Lower Ordovician sponge/algal facies in the southern United States and its counterparts elsewhere in North America: Society of Economic Paleontologists and Mineralogists, Research Reports, v. 4, p. 225-242.

Alberstadt, L.P., and J.A. Sauve, 1981, The Ordovician in the Black Warrior basin: Geological Society of America, Abstracts with Programs, v. 13, p. 1.

Arbenz, J.K., 1989, The Ouachita System, in A.W. Bally and A.R. Palmer, eds., The Geology of North America-An Overview: Geological Society of America, The Geology of North America, v. A, p. 371-396.

Batchelder, E.C., 1984, Lithofacies, depositional environments, and diagenesis of the Knox Group exposed along Alligator Creek, Bibb County, Alabama: unpublished M.S. thesis, University of Alabama, 226 p.

Batchelder, E.C., 1985, Diagenesis of Knox Group (Cambro-Ordovician) carbonates exposed along Alligator Creek, Bibb County, Alabama: Gulf Coast Association of Geological Societies, Transactions, v. 35, p. 309-316.

Batchelder, E.C., and D.J. Benson, 1984, Lithofacies and depositional environments of the Copper Ridge and Chepultepec formations (Cambro-Ordovician) exposed along Alligator Creek, Bibb County, Alabama: Geological Society of America, Abstracts with Programs, v. 16, p. 124.

Bellomy, A., 1981, Selected references on the Black Warrior basin-stratigraphy and hydrocarbon potential: Mississippi Geology, v. 1, no. 4, p. 17-19.

Benson, D.J., and R.J. Mink, 1983, Depositional history and petroleum potential of the Middle and Upper Ordovician of the Alabama Appalachians: Gulf Coast Association of Geological Societies, Transactions, v. 33, p. 13-21.

Bentall, R., and J.B. Collins, 1945, Subsurface stratigraphy and structure of the pre-Trenton Ordovician and Upper Cambrian rocks in central Tennessee: Tennessee Division of Geology, Oil and Gas Investigations, Preliminary Chart 4.

Bergstrom, S.M., 1973, Biostratigraphy and facies relations in the Lower Middle Ordovician of easternmost Tennessee: American Journal of Science, Cooper Vol., 273-A, p. 261-293.

Boland, L.F., and E.D. Minihan, 1971, Petroleum potential of the Black Warrior basin: Gulf Coast Association of Geological Societies, Transactions, v. 21, p. 139-158.

Born, K.E., 1940, Lower Ordovician sandy zones ("St. Peter") in middle Tennessee: American Association of Petroleum Geologists Bulletin, v. 24, no. 9, p. 1641-1662.
Bramlette, M.N., 1925, Paleozoic formations penetrated by wells in Tishomingo County, northeastern Mississippi: U.S. Geological Survey, Bulletin 781, p. 1-10.
Bristow, J.D., 1952, Oil and gas prospecting in northeast Mississippi: unpublished M.S. thesis, Mississippi State University, 97 p.
Brockman, G.F., 1973, Middle Ordovician stratigraphy in the Birmingham, Alabama area: Alabama Academy of Science Bulletin, v. 44, p. 184.
Butts, C., 1926, The Paleozoic rocks, in G.I. Adams, C. Butts, and L.W. Stephenson, Geology of Alabama: Geological Survey of Alabama, Special Report 14, p. 84-101.
Caplan, W.R., 1960, Subsurface geology of pre-Everton rocks in northern Arkansas: Arkansas Geological and Conservation Commission, Information Circular 21, 17 p.
Caplan, W.R., 1964, In eastern Arkansas exploration is shifting to Paleozoic prospects: World Oil, March, p. 72.
Cardwell, A.L., 1977, Petroleum source-rock potential of Arbuckle and Ellenburger Groups, southern mid-continent, United States: Quarterly of the Colorado School of Mines, v. 72, no. 3, 134 p.
Cebull, S.E., D.H. Shurbet, G.R. Keller, and L.R. Russell, 1976, Possible role of transform faults in the development of apparent offsets in the Ouachita-southern Appalachian tectonic belt: Journal of Geology, v. 84, p. 107-114.
Chenoweth, P.A., 1968, Early Paleozoic (Arbuckle) overlap, southern mid-continent, United States: American Association of Petroleum Geologists Bulletin, v. 52, no. 9, p. 1670-1688.
Churnet, H.G., K.C. Misera, and K. R. Walker, 1982, Deposition and dolomitization of the Upper Knox carbonate sediments, Copper Ridge district, east Tennessee: Geological Society of America Bulletin, v. 93, no. 1, p. 76-86.
Cloud, P.E., and V.E. Barnes, 1948, The Ellenburger Group of central Texas: University of Texas Publication No. 4621, 473 p.
Denison, R.E., and W.R. Muehlberger, 1963, Buried granite in Mississippi: American Association of Petroleum Geologists Bulletin, v. 47, no. 5, p. 865-867.
Flawn, P.T., A. Goldstein, Jr., P.B. King, and C.E. Weaver, 1961, The Ouachita System: University of Texas Publication No. 6120, 401 p.
Freeman, L.B., 1953, Regional subsurface stratigraphy of the Cambrian and Ordovician in Kentucky and vicinity: Kentucky Geological Survey, Bulletin No. 12, 353 p.
Fritz, M., 1987, Trends are developing in the Arkoma: American Association of Petroleum Geologists, Explorer, June, p. 1, 6, 7.
Fritz, M., 1991, "It's all there" in the Knox play: American Association of Petroleum Geologists, Explorer, February, p. 1, 12, 13, 15.
Haley, B.R., 1982, Geology and energy resources of the Arkoma basin, Oklahoma and Arkansas: University of Missouri-Rolla Journal, no. 3, p. 43-53.

Harrelson, D.W., and A.R. Bicker, 1979, Petrography of some subsurface igneous rocks of Mississippi: Gulf Coast Association of Geological Societies, Transactions, v. 29, p. 244-251.
Harris, A.G., L.D. Harris, and J.B. Epstein, 1978, Oil and gas data from Paleozoic rocks in the Appalachian basin: Maps for assessing hydrocarbon potential and thermal maturity: United States Geological Survey, Miscellaneous Investigations Series Map I-917E.
Harris, L.D., 1969, Kingsport Formation and Mascot Dolomite (Lower Ordovician) of east Tennessee: Tennessee Division of Geology, Report of Investigations 23, p. 1-22.
Harris, L.D., 1975, Oil and gas data from the Lower Ordovician and Cambrian rocks of the Appalachian basin: United States Geological Survey, Miscellaneous Investigations Series Map I-917D.
Hass, W.H., 1954, Age of some black shales in cores from northeast Mississippi: Mississippi Geological Society, Guidebook, 11th annual field trip, p. 32-33.
Haynes, F.M., and S.E. Kesler, 1989, Pre-Alleghenian (Pennsylvanian-Permian) hydrocarbon emplacement along Ordovician Knox unconformity, eastern Tennessee: American Association of Petroleum Geologists Bulletin, v. 73, no. 3, p. 289-297.
Hooks, J.D., 1985, Stratigraphy, depositional environments, and silica diagenesis of the Cambro-Ordovician carbonate sequence, Appalachian Valley and Ridge, Alabama: unpublished M.S. thesis, University of Alabama, 199 p.
Howe, J.R., and T.L. Thompson, 1984, Tectonics, sedimentation, and hydrocarbon potential of the Reelfoot Rift: Oil and Gas Journal, v. 82, p. 179-190.
Jewell, J.W., 1969, An oil and gas evaluation of North Alabama: Geological Survey of Alabama, Bulletin 93, 65 p.
Jurick, D.M., 1989, Basement structure of the north-central Gulf Coastal Plain, Mississippi and Alabama: unpublished M.S. thesis, University of Texas at El Paso, 178 p.
Kidd, J.T., 1975, Pre-Mississippian subsurface stratigraphy of the Warrior basin in Alabama: Gulf Coast Association of Geological Societies, Transactions, v. 25, p. 20-39.
Kidd, J.T., and C.W. Copeland, 1971, Review of Ordovician subsurface stratigraphy of north Alabama, in J.A. Drahovzal and T.L. Neathery, The Middle and Upper Ordovician of the Alabama Appalachians: Alabama Geological Society Guidebook, 9th Annual Field Trip, p. 137-151.
Kidd, J.T., and T.L. Neathery, 1976, Correlation between Cambrian rocks of the southern Appalachian geosyncline and the interior low plateaus: Geology, v. 4, no. 12, p. 767-769.
King, P.B., 1975, Ancient southern margin of North America: Geology, v. 3, p. 732-734.
Lee, A., 1982, Lithofacies and depositional environments of Middle Ordovician shelf carbonates in the southern Appalachians: Gulf Coast Association of Geological Societies, Transactions, v. 32, p. 173-183.
Mack, G.H., 1980, Stratigraphy and depositional environments of the Chilhowee Group (Cambrian) in Georgia and Alabama: American Journal of Science, v. 280, p. 497-517.

McCaslin, J.C., 1983, Amoco scores gas discovery in Tennessee: Oil and Gas Journal, v. 81, no. 5, p. 183-184.
McCaslin, J.C., 1988, Deep find brightens Arkoma basin future: Oil and Gas Journal, v. 86, no. 26, p. 65.
McCaslin, J.C., 1990, Recent strikes fire important Arkoma era: Oil and Gas Journal, v. 88, no. 5, p. 101.
McGlamery, W., 1955, Subsurface stratigraphy of northwest Alabama: Geological Survey of Alabama, Bulletin 64, 503 p.
Mellen, F.F., 1947, Black Warrior basin, Alabama and Mississippi: American Association of Petroleum Geologists Bulletin, v. 31, no. 10, p. 1801-1816.
Mellen, F.F., 1953, Black Warrior basin-the geology is favorable: World Oil, July, p. 97-114.
Mellen, F.F., 1971, What's ahead for the Black Warrior basin?: World Oil, August, p. 45-53.
Mellen, F.F., 1972, Regional Paleozoic stratigraphy in Mississippi between Ouachita and Appalachian Mountains: Discussion: American Association of Petroleum Geologists Bulletin, v. 56, p. 2457-2458.
Mellen, F.F., 1974a, Patterson Sandstone, Ordovician or Silurian?: American Association of Petroleum Geologists Bulletin, v. 58, no. 1, p. 143-148.
Mellen, F.F., 1974b, Possible Ordovician carbonate reservoirs in Mississippi: American Association of Petroleum Geologists Bulletin, v. 58, no. 4, p. 870-876.
Mellen, F.F., 1977, Cambrian System in Black Warrior basin: American Association of Petroleum Geologists Bulletin, v. 61, no. 10, p. 1897-1900.
Mellen, F.F., 1979, Vardaman Triassic-Jurassic sill, Calhoun County, Mississippi: American Association of Petroleum Geologists Bulletin, v. 63, no. 11, p. 2103-2104.
Mellen, F.F., 1982, Notes on Middle Ordovician, Mississippi and Alabama: Mississippi Geology, v. 3, no. 1, p. 1-5.
Mellen, F.F., and W.H. Moore, 1962, The Tula prospect, Lafayette County, Mississippi: Mississippi Geological, Economic and Topographical Survey, Bulletin 96, 29 p.
Milici, R.C., 1969, Middle Ordovician stratigraphy in central Sequatchie Valley, Tennessee: Southeastern Geology, v. 11, p. 111-127.
Milici, R.C., and J.W. Smith, 1969, Stratigraphy of the Chickamauga Supergroup in its type area: Georgia Geological Survey, Bulletin 80, p. 1-35.
Mississippi Geological Society, undated, Correlation section, Black Warrior basin, pre-Chester.
Morgan, J.K., 1970, The central Mississippi uplift: Gulf Coast Association of Geological Societies, Transactions, v. 20, p. 91-109.
Neathery, T.L., and C.W. Copeland, 1983, New information on the basement and lower Paleozoic stratigraphy of north Alabama: Geological Survey of Alabama, open-file report, 28 p.
Oil and Gas Journal, 1953, Knox Dolomite discovery makes pumping producer in Mississippi: v. 52, no. 26, p. 186.
Oil and Gas Journal, 1983, Upper Knox yields 100 b-d in eastern overthrust belt: v. 81, no. 25, p. 72.

Oil and Gas Journal, 1989a, Thick Arbuckle pay section yields gas in Anadarko basin: v. 87, no. 29, p. 32.
Oil and Gas Journal, 1989b, More Arbuckle action pops up in Arkoma Basin: v. 87, no. 39, p. 28, 30.
Oil and Gas Journal, 1990, Gas exploration fans out in Arkoma basin: v. 88, no. 1, p. 31.
Patterson, J.R., 1961, Ordovician stratigraphy and correlation in North America: American Association of Petroleum Geologists Bulletin, v. 45, no. 8, p. 1364-1377.
Petzet, G.A., 1989, Gas finds in Arbuckle, Wapanucka heat southern Arkoma exploration: Oil and Gas Journal, v. 87, no. 2, p. 17-19.
Petzet, G.A., 1990, Rank Ordovician wildcats staked in northern Mississippi counties: Oil and Gas Journal, v. 88, no. 42, p. 88.
Petzet, G.A., 1991, Exploration pace fast in Mississippi, Alabama: Oil and Gas Journal, v. 89, no. 9, p. 58.
Pike, S.J., 1968, Black Warrior basin, northeast Mississippi and northwest Alabama, in B.W. Beebe, ed., Natural Gases of North America: American Association of Petroleum Geologists, Memoir 9, v. 2, p. 1693-1701.
Raring, A.M., 1979, Structural configuration in the deep Black Warrior basin, Mississippi; new evidence: Geological Society of America, Abstracts with Programs, v. 11, no. 2, p. 164.
Raymond, D.E., 1991, More wells will expand knowledge of Knox group, Black Warrior Basin: Oil and Gas Journal, v. 89, no. 20, p. 58-62.
Raymond, D.E., and C.W. Copeland, 1987, Selected columnar sections for the coastal plain, Appalachian Plateaus, Interior Low Plateaus, and Valley and Ridge provinces in Alabama: Geological Survey of Alabama, Atlas Series 20, 43 p.
Raymond, D.E., W.E. Osborne, C.W. Copeland, and T.L. Neathery, 1988, Alabama stratigraphy: Geological Survey of Alabama, Circular 140, 97 p.
Read, J.F., 1989, Controls on evolution of Cambrian-Ordovician passive margin, U.S. Appalachians, in Carbonate platform and basin development: Society of Economic Paleontologists and Mineralogists, Special Publication No. 44, p. 147-165.
Riggs, K.A., 1976, Subsurface Precambrian granite, Lafayette County, Mississippi: American Association of Petroleum Geologists Bulletin, v. 60, p. 455-457.
Roberson, K.E., 1988, The post-Knox unconformity and its relationship to bounding stratigraphy, Alabama Appalachians: unpublished M.S. thesis, University of Alabama, 148 p.
Rogers, W.S., 1961, Middle Ordovician stratigraphy of the Red Mountain area, Alabama: Southeastern Geology, v. 2, p. 217-249.
Ross, R.J., et al., 1982, The Ordovician System in the United States: International Union of Geological Sciences, Publication No. 12, 73 p.
Ross, R.J., J.E. Valusek, and N.P. James, 1988, Nuia and its environmental significance: New Mexico Bureau of Mines and Mineral Resources, Memoir 44, p. 115-121.
Sauve, J.A., 1981, The Middle Ordovician of northeastern Mississippi: Implications for the Black Warrior Basin: unpublished M.S. thesis, Vanderbilt University, 113 p.

Schwalb, H.R., 1982, A regional view of the Knox: Kentucky Geological Survey, Special Publication 5, p. 7-10.
Shirley, K., 1989a, Arbuckle ignites Arkoma gas play: American Association of Petroleum Geologists, Explorer, March, p. 1, 4, 8.
Shirley, K., 1989b, Anadarko's Arbuckle play heats up: American Association of Petroleum Geologists, Explorer, July, p. 8-10.
Shirley, K., 1991, Ouachita trend signals potential: American Association of Petroleum Geologists, Explorer, March, p. 12-14.
Sloss, L.L., 1963, Sequences in the cratonic interior of North America: Geological Society of America Bulletin, v. 74, p. 93-114.
Stearns, R.G., and M.V. Marcher, 1962, Late Cretaceous and subsequent structural development of the northern Mississippi Embayment area: Geological Society of America Bulletin, v. 73, p. 1387-1394.
Stearns, R.G., and A.L. Reesman, 1986, Cambrian to Holocene structural history of Nashville Dome: American Association of Petroleum Geologists Bulletin, v. 70, no. 2, p. 143-154.
Stephens, E.V., 1958, The subsurface geology of the Black Warrior basin in Mississippi: unpublished M.S. thesis, University of Oklahoma, 40 p.
Sternbach, L.R., 1984, Carbonate facies and diagenesis of the Cambrian-Ordovician shelf and slope-margin (The Knox Group and Conasauga Formation), Appalachian fold belt, Alabama: unpublished M.S. thesis, Rensselaer Polytechnic Institute, 165 p.
Stevenson, D.L., 1982, The potential of the Knox Dolomite in the Illinois basin for petroleum production: Kentucky Geological Survey, Special Publication 5, p. 1-6.
Suhm, R.W., 1974, Stratigraphy of Everton Formation (Early Medial Ordovician), northern Arkansas: American Association of Petroleum Geologists Bulletin, v. 58, no. 4, p. 685-707.
Thomas, W.A., 1972, Regional Paleozoic stratigraphy in Mississippi between Ouachita and Appalachian Mountains: American Association of Petroleum Geologists Bulletin, v. 56, no. 1, p. 81-106.
Thomas, W.A., 1973, Southwestern Appalachian structural system beneath the Gulf Coastal Plain: American Journal of Science, Cooper Vol. 273-A, p. 372-390.
Thomas, W.A., 1976, Evolution of Ouachita-Appalachian continental margin: Journal of Geology, v. 84, p. 323-342.
Thomas, W.A., 1977a, Evolution of Appalachian-Ouachita salients and recesses from reentrants and promontories in the continental margin: American Journal of Science, v. 277, p. 1233-1278.
Thomas, W.A., 1977b, Structural and stratigraphic continuity of the Ouachita and Appalachian Mountains: Arkansas Geological Commission, Symposium on the geology of the Ouachita Mountains, v. 1, p. 9-24.
Thomas, W.A., 1985, The Appalachian-Ouachita connection: Paleozoic orogenic belt at the southern margin of North America: Annual Review of Earth and Planetary Sciences, v. 13, p. 175-199.
Thomas, W.A., 1986, Early Paleozoic southern margin of North America: Geological Society of America, Abstracts with Programs, v. 18, p. 772.

Thomas, W.A., 1988a, The Black Warrior basin, in L.L. Sloss, ed., Sedimentary Cover-North American Craton: Geological Society of America, The Geology of North America, v. D-2, p. 471-492.
Thomas, W.A., 1988b, The Appalachian-Ouachita orogen beneath the Gulf Coastal Plain between the outcrops in the Appalachian and Ouachita Mountains, in R.D. Hatcher, Jr., W.A. Thomas, and G.W. Viele, eds., The Appalachian-Ouachita Orogen in the United States: Geological Society of America, The Geology of North America, v. F-2, p. 537-553.
Thomas, W.A., 1989, Part II. The Appalachian fold-thrust belt in Alabama, in W.A. Thomas, G.W. Viele, L.B. Platt, and C.J. Schmidt, Contrasts in style of American thrust belts: International Geological Congress, 28th, Field Trip Guidebook, T380, p. 5-35.
Thomas, W.A., 1991, The Appalachian-Ouachita rifted margin of southeastern North America: Geological Society of America Bulletin, v. 103, p. 415-431.
Thomas, W.A., and J.A. Drahovzal, 1973, Regional Paleozoic stratigraphy of Alabama: Alabama Geological Society Guidebook, 11th Annual Field Trip, p. 66-91.
Thomas, W.A., and W.E. Osborne, 1988, Stratigraphic columns, Mississippi, in C.J. Mankin, coordinator, Correlation of Stratigraphic Units of North America--Texas-Oklahoma Tectonic Region Correlation Chart Series.
Twenhofel, W.H., et al., 1954, Correlation of the Ordovician formations of North America: Geological Society of America Bulletin, v. 65, p. 247-298.
Viele, G.W., 1989a, Part III. The Ouachita orogenic belt in Arkansas and Oklahoma, in W.A. Thomas, G.W. Viele, L.B. Platt, and C.J. Schmidt, Contrasts in style of American thrust belts: International Geological Congress, 28th, Field Trip Guidebook, T380, p. 37-63.
Viele, G.W., 1989b, The Ouachita orogenic belt, in R.D. Hatcher, Jr., W.A. Thomas, and G.W. Viele, eds., The Appalachian-Ouachita Orogen in the United States: Geological Society of America, The Geology of North America, v. F-2, p. 695-728.
Walker, T.R., 1957, Frosting of quartz grains by carbonate replacement: Geological Society of America Bulletin, v. 68, p. 267-268.
Williams, C.H., Jr., 1969, Cross section from Mississippi-Tennessee state line to Horn Island in Gulf of Mexico: Mississippi Geological Survey.
Wilson, C.W., 1949, Pre-Chattanooga stratigraphy of Tennessee: Tennessee Division of Geology, Bulletin 56, 407 p.
Yeager, D., 1971, Petrography of the Newala Limestone in northern Shelby County, Alabama: Alabama Academy of Science Journal, v. 42, p. 3-9.

APPENDIX 1

List of wells

MAP #	COUNTY	WELL	LOCATION	T.D.	YEAR	FORMATION AT T.D.
1-1	DESOTO	UNION PRODUCING CO. #1 WITHERS	18-2S-9W	4884	1945	STONES RIVER LIME.
1-2	DESOTO	S.E. RESOURCES #1 CRAIGEN	17-3S-7W	3412	1978	UNCERTAIN
2-1	MARSHALL	SHELL #1 JOHNSON et al	32-5S-3W	4003	1955	STONES RIVER DOLO.
3-1	TIPPAH	MEMPHIS EQUIPMENT #1 MELTON	12-2S-3E	5302	1956	KNOX DOLOSTONE
3-2	TIPPAH	SMACKO, LTD. #1 BLACKWELL	13-2S-3E	3195	1979	KNOX LIMESTONE
3-3	TIPPAH	HOUSTON OIL & MINERALS #1 HARRELL	34-2S-3E	4209	1975	KNOX DOLOSTONE
3-4	TIPPAH	FAULKNER #1 JACKSON	2-3S-3E	1220	1966	UNCERTAIN
3-5	TIPPAH	CHILDERS #1 FINGER	14-4S-2E	2334	1955	UNCERTAIN
4-1	ALCORN	ALCORN PETROLEUM #1 MATHEWS	14-2S-7E	2683	1931	KNOX DOLOSTONE
5-1	TISHOMINGO	T.V.A. #1 YELLOW CREEK CORE HOLE	35-1S-10E	1330	1972	STONES RIVER DOLO.
5-2	TISHOMINGO	LEVAN & AKERS #1 WHITAKER	23-3S-10E	2117	1945	STONES RIVER DOLO.
5-3	TISHOMINGO	LEVAN et al #1 RUSSELL	3-4S-10E	1513	1947	STONES RIVER LIME.
5-4	TISHOMINGO	IUKA DEVELOPMENT #1 JOURDAN	9-4S-11E	1902	1921	STONES RIVER DOLO.
5-5	TISHOMINGO	HAWKEYE OIL & GAS #1 FREDERICK	15-4S-11E	2345	1986	STONES RIVER DOLO.
5-6	TISHOMINGO	MELLEN & GEAR #1 WOOD	21-4S-11E	1845	1940	STONES RIVER DOLO.
5-7	TISHOMINGO	MISSISSIPPI OIL #1 SOUTHWARD	18-5S-11E	2875	1924	STONES RIVER DOLO.
5-8	TISHOMINGO	JOHNSON & DANIEL DRLG. #1 ALLEN	1-7S-9E	3510	1973	STONES RIVER DOLO.
5-9	TISHOMINGO	MAURY #1 BOSTIC	13-7S-10E	1843	1956	UNCERTAIN
5-10	TISHOMINGO	MAURY et al #1 MAY-STAR	18-7S-10E	2217	1964	STONES RIVER DOLO.
5-11	TISHOMINGO	FULLER #1 TAYLOR	7-7S-11E	1810	1953	STONES RIVER LIME.
6-1	TUNICA	AMERADA PETROLEUM #1 ABBAY	21-4S-11W	5937	1962	STONES RIVER DOLO.
7-1	TATE	JOHNSON-PERRY #1 PRICHARD	28-4S-7W	3165	1945	UNCERTAIN
7-2	TATE	SEABOARD OIL #4 COREHOLE	20-5S-6W	2904	1954	UNCERTAIN
7-3	TATE	SMITH & HESS PRODUCTION #1 WALDROP	15-5S-7W	4816	1961	KNOX DOLOSTONE
7-4	TATE	SEABOARD OIL #2 COREHOLE	26-5S-8W	3364	1954	UNCERTAIN
7-5	TATE	BOWLES #1 MOORE	2-6S-8W	3890	1984	UNCERTAIN
7-6	TATE	SINCLAIR OIL & GAS #1 MOORE	9-6S-9W	3586	1962	UNCERTAIN
8-1	PRENTISS	JOHNSON & DANIELS DRLG. #1 SMITH	31-4S-9E	3006	1972	KNOX LIMESTONE
8-2	PRENTISS	MICHAEL & VAN DRESSER #1 KNIGHT	7-5S-6E	2613	1955	STONES RIVER DOLO.
8-3	PRENTISS	PELTO OIL #1 RIDDLE	9-6S-9E	2311	1973	STONES RIVER DOLO.
8-4	PRENTISS	HUNTINGTON #1 TAYLOR	28-6S-9E	2850	1954	STONES RIVER DOLO.
8-5	PRENTISS	HOME DEVELOPMENT #1 ALLEN	8-7S-9E	2145	1941	STONES RIVER DOLO.
9-1	COAHOMA	TEXACO-EXXON #1 IVEY	36-27N-3W	17600	1974	WEISNER QUARTZITE
9-2	COAHOMA	EXXON #1 DAWSON et al	28-29N-2W	11495	1980	COPPER RIDGE DOLO.
10-1	QUITMAN	TIPPERARY #1-X HARPOLE-CAMPBELL	8-7S-10W	10704	1979	WEISNER QUARTZITE
11-1	PANOLA	SEABOARD OIL #1 COREHOLE	24-6S-7W	3032	1954	UNCERTAIN
11-2	PANOLA	PINE #1 POINTER	11-7S-7W	4339	1956	KNOX LIMESTONE
11-3	PANOLA	SEABOARD OIL #6 COREHOLE	18-7S-9W	3587	1954	UNCERTAIN
12-1	LAFAYETTE	PRUET & HUGHES #1 DUNLAP BROTHERS	18-7S-1W	11188	1974	PRECAMBRIAN
12-2	LAFAYETTE	PETROMAR et al #1 HODGE	35-7S-3W	4510	1980	STONES RIVER DOLO.
12-3	LAFAYETTE	SOHIO PETROLEUM #1 SULLIVAN	1-9S-3W	5119	1977	STONES RIVER DOLO.
12-4	LAFAYETTE	SOHIO PETROLEUM #1 BURT	4-9S-4W	5010	1975	STONES RIVER DOLO.
12-5	LAFAYETTE	ADAMS OIL & GAS #1 LEWELLEN	9-10S-1W	4184	1939	STONES RIVER DOLO.
12-6	LAFAYETTE	FRITZ OPERATING #1 RUSSELL	9-10S-1W	4319	1981	STONES RIVER DOLO.
13-1	UNION	GULF #1 MORRIS et al	15-6S-5E	2509	1955	STONES RIVER DOLO.
13-2	UNION	CULLET #1-A NABORS	36-7S-3E	2759	1947	STONES RIVER DOLO.
13-3	UNION	GULF #1 BASDEN et al	20-7S-5E	5010	1954	KNOX DOLOSTONE
13-4	UNION	RICHARDSON OILS #1 ROBBINS	3-8S-1E	3477	1953	STONES RIVER DOLO.
14-1	PONTOTOC	SALMON #1 GRADDY et al	36-8S-2E	2710	1957	STONES RIVER DOLO.
14-2	PONTOTOC	TEXACO #1 STOKES	28-8S-3E	2213	1963	STONES RIVER LIME.
14-3	PONTOTOC	SALMON #1 ANDREWS	3-9S-2E	5735	1955	KNOX DOLOSTONE
14-4	PONTOTOC	MOON-HINES-TIGRETT #1 GRAHAM	12-9S-2E	3218	1982	STONES RIVER DOLO.
14-5	PONTOTOC	SALMON #1 HENDERSON	15-9S-3E	2947	1956	STONES RIVER DOLO.
14-6	PONTOTOC	SALMON #1 WILSON	29-9S-3E	4504	1954	KNOX LIMESTONE
14-7	PONTOTOC	TERRA RESOURCES #1 MILLER	34-10S-2E	3685	1982	STONES RIVER DOLO.
14-8	PONTOTOC	MOON-HINES-TIGRETT #1 BISHOP	3-10S-3E	3416	1984	STONES RIVER LIME.
14-9	PONTOTOC	SALMON #1 NAUGHER	13-10S-3E	4508	1954	STONES RIVER DOLO.
14-10	PONTOTOC	FLORIDA GAS EXPLORATION #1 MILLER	16-11S-1E	6643	1976	STONES RIVER DOLO.
14-11	PONTOTOC	FLORIDA EXPLOR. #1 MORRISON et al	20-11S-1E	5846	1981	STONES RIVER DOLO.
14-12	PONTOTOC	SALMON #1 PATTERSON	21-11S-1E	5904	1953	STONES RIVER DOLO.
14-13	PONTOTOC	MAGNOLIA PETROLEUM #1 WARREN	26-11S-3E	7419	1955	KNOX DOLOSTONE
14-14	PONTOTOC	HARRIS et al #1 DABBS-MALLORY	1-11S-4E	4021	1973	STONES RIVER DOLO.
15-1	LEE	EVANS #1 WHITESIDE	16-9S-7E	3205	1928	STONES RIVER DOLO.
15-2	LEE	LL & E #1 ROGERS	22-10S-6E	2498	1984	STONES RIVER LIME.

MAP#	COUNTY	WELL	LOCATION	T.D.	YEAR	FORMATION AT T.D.
15-3	LEE	ELLISON #1 NEELY	28-11S-5E	4257	1953	STONES RIVER DOLO.
16-1	ITAWAMBA	ARMOUR & RUNYON #1 JUSTICE	8-10S-9E	3373	1970	STONES RIVER DOLO.
16-2	ITAWAMBA	GRASTY #1 KENTUCKY LUMBER	7-10S-10E	3530	1939	KNOX LIMESTONE
17-1	CALHOUN	HONOLULU OIL #2 DAVIS	27-12S-1E	8390	1954	KNOX DOLOSTONE
17-2	CALHOUN	CLEARY PETROLEUM #1 MURPHEE	33-12S-1E	6434	1975	STONES RIVER DOLO.
17-3	CALHOUN	PAN AM PETROLEUM #1 ASHBY	25-13S-1E	9175	1962	STONES RIVER DOLO.
17-4	CALHOUN	CARTER OIL #1 CRANE	31-13S-1E	9231	1954	STONES RIVER DOLO.
17-5	CALHOUN	SEABOARD OIL/STACK #1 WILLIAMS	35-13S-1E	12994	1974	COPPER RIDGE DOLO.
18-1	CHICKASAW	SOUTHLAND ROYALTY #1 EASLEY	19-12S-3E	5188	1985	STONES RIVER LIME.
18-2	CHICKASAW	MAGUIRE et al #1 HOUSTON DAIRIES	33-12S-3E	5353	1977	STONES RIVER LIME.
18-3	CHICKASAW	PRUET et al #1 FEDERAL LAND BANK	25-12S-4E	3911	1978	STONES RIVER LIME.
18-4	CHICKASAW	TRIAD OIL & GAS et al #1 ANDERSON	18-12S-5E	10025	1984	COPPER RIDGE DOLO.
18-5	CHICKASAW	SHELL OIL #1 McCAIN et al	8-13S-5E	7495	1960	KNOX DOLOSTONE
18-6	CHICKASAW	LL & E #1 DEMOVILLE	15-13S-5E	6502	1980	KNOX LIMESTONE
18-7	CHICKASAW	PRUET & HUGHES #1 GREGORY	18-13S-5E	4155	1975	STONES RIVER LIME.
18-8	CHICKASAW	PHILLIPS PETROLEUM #1 CRAWFORD "C"	33-14S-2E	11018	1957	STONES RIVER DOLO.
18-9	CHICKASAW	CARTER OIL #1 PULLIAM	24-14S-4E	7026	1953	STONES RIVER DOLO.
18-10	CHICKASAW	GETTY OIL #1 BENEKA	6-15S-3E	10025	1982	STONES RIVER DOLO.
19-1	MONROE	PURE OIL #1 MURPHREE	28-12S-6E	4489	1956	STONES RIVER DOLO.
19-2	MONROE	McALPINE #1 COWART	2-12S-9E	3795	1931	STONES RIVER DOLO.
19-3	MONROE	PRUET PRODUCTION #1 GREGORY	7-13S-6E	6305	1980	KNOX LIMESTONE
19-4	MONROE	PAN AM PETROLEUM #1 MURPHREE	30-13S-6E	4992	1956	STONES RIVER DOLO.
19-5	MONROE	GUERNSEY & TIDEWAY #1 WICKS	15-13S-7E	4675	1974	STONES RIVER DOLO.
19-6	MONROE	PRUET PRODUCTION et al #1 BRADLEY	16-13S-7E	7190	1982	KNOX LIMESTONE
19-7	MONROE	REBSTOCK & REEVES #1 PENNOCK	18-13S-7E	4731	1955	STONES RIVER DOLO.
19-8	MONROE	MAGNOLIA PETROLEUM #1 PIERCE	22-13S-7E	7993	1954	KNOX DOLOSTONE
19-9	MONROE	HYCO #1 SNOW	27-13S-7E	4807	1959	STONES RIVER DOLO.
19-10	MONROE	MAGNOLIA PETROLEUM #A-1 SNOW	27-13S-7E	4769	1953	STONES RIVER DOLO.
19-11	MONROE	SIERRA PRODUCTION #1 NASH	27-13S-7E	4770	1986	STONES RIVER DOLO.
19-12	MONROE	TRIAD OIL & GAS #1 UNIT 28-8	28-13S-7E	4902	1978	STONES RIVER DOLO.
19-13	MONROE	PRUET PRODUCTION #1 SPLUNGE TIMBER	14-13S-17W	5002	1981	KNOX LIMESTONE
19-14	MONROE	MOON & HINES #1 HUBBARD	36-13S-18W	4871	1980	KNOX LIMESTONE
19-15	MONROE	SHELL & FEAZEL #1 HARRINGTON	25-14S-6E	6120	1952	KNOX LIMESTONE
19-16	MONROE	VAUGHEY & VAUGHEY #1 BD. OF SUPER.	16-14S-17W	5036	1954	KNOX LIMESTONE
19-17	MONROE	SHELL #1 DALRYMPLE	1-14S-19W	5138	1957	STONES RIVER DOLO.
19-18	MONROE	UNION PRODUCING #2 SANDERS	22-15S-6E	10910	1962	KNOX DOLOSTONE
19-19	MONROE	WARRIOR DRLG. et al #1 THOMPSON	17-15S-18W	6300	1980	UNCERTAIN
19-20	MONROE	SHELL #1 WILLIS	18-15S-18W	7203	1963	STONES RIVER DOLO.
20-1	CLAY	UNION OF CALIFORNIA #1 PEARSON	21-15S-4E	13308	1981	STONES RIVER DOLO.
20-2	CLAY	SHELL #1 FEDERAL LAND BANK et al	31-16S-6E	11265	1960	KNOX LIMESTONE
20-3	CLAY	GRACE PETROLEUM et al #1 DAVIS	32-21N-13E	12683	1978	STONES RIVER DOLO.
21-1	OKTIBBEHA	TEXACO #1 SHEELY	28-19N-12E	17422	1970	KNOX LIMESTONE
21-2	OKTIBBEHA	EXXON #1 FULGHAM	33-19N-12E	21391	1973	PRECAMBRIAN
21-3	OKTIBBEHA	McALESTER FUEL #1-A SUDDUTH	6-19N-15E	11414	1959	KNOX LIMESTONE
22-1	LOWNDES	MICHIGAN OIL #1 GRANT	21-16S-18W	10341	1982	KNOX DOLOSTONE
22-2	LOWNDES	SOCONY MOBIL #1 HARDY et al	3-17N-17E	10999	1963	KNOX LIMESTONE
23-1	NOXUBEE	YOUNG et al #1 SMITH	28-13N-19E	12022	1975	CONASAUGA LIME.
24-1	NESHOBA	SOUTHERN NATURAL GAS #1 SMITH	1-9N-11E	6876	1943	UNCERTAIN
24-2	NESHOBA	PURE OIL #1 REA	36-11N-12E	5642	1950	UNCERTAIN
24-3	NESHOBA	PURE OIL #1 JONES	19-11N-13E	5610	1951	UNCERTAIN
24-4	NESHOBA	SLICK & PLAINS #1 BREAZEALE	28-12N-10E	6131	1947	UNCERTAIN
25-1	KEMPER	AMOCO #1 LEGGETTE	20-10N-16E	12203	1986	UNCERTAIN
26-1	SCOTT	LEWIS #1 WARREN	6-7N-9E	9988	1988	UNCERTAIN
26-2	SCOTT	HAMILTON & LL & E #1 WILLIAMS	23-7N-9E	11026	1967	UNCERTAIN
26-3	SCOTT	SOUTHEASTERN DRILLING #1 ELEY	19-8N-8E	9814	1952	UNCERTAIN
27-1	NEWTON	LL & E #1 NICHOLSON et al	10-5N-11E	10554	1966	UNCERTAIN
27-2	NEWTON	RADZEWICZ #1 NICHOLSON-MONROE	17-5N-11E	12756	1974	UNCERTAIN
27-3	NEWTON	WYATT #1 HORNE	27-5N-12E	11062	1964	UNCERTAIN
27-4	NEWTON	SUN OIL #1 CITIZENS NATIONAL BANK	23-5N-13E	8340	1945	UNCERTAIN
27-5	NEWTON	SUN OIL #1 WALL	28-5N-13E	10114	1943	UNCERTAIN
27-6	NEWTON	TEXACO #1 EVERETTE	17-6N-11E	8699	1961	UNCERTAIN
27-7	NEWTON	SE DRLG. #1 BAND CHOCTAW INDIANS	20-7N-10E	11499	1972	UNCERTAIN
28-1	LAUDERDALE	LEWIS OIL #1 FLINTKOTE	29-5N-15E	8141	1985	UNCERTAIN
28-2	LAUDERDALE	DAMSON OIL et al #1 DEEMER LUMBER	3-5N-18E	6808	1970	UNCERTAIN
28-3	LAUDERDALE	SCIENTIFIC RESOURCES #1 REYONLDS	16-5N-18E	7408	1987	UNCERTAIN
28-4	LAUDERDALE	DAMSON OIL #1 CATLETT	27-6N-18E	6013	1971	UNCERTAIN
28-5	LAUDERDALE	AMOCO/STACK #1 LUCKY	6-8N-16E	14110	1975	CARBONIFEROUS
29-1	JASPER	HARRIS & ASSOCIATES #1 MITTS	1-3N-11E	14044	1970	UNCERTAIN
29-2	JASPER	HAGAN & MARLINE OIL #1 UNIT 2-7	2-3N-12E	13680	1979	UNCERTAIN
29-3	JASPER	STONE OIL #1 MASONITE	14-3N-13E	10764	1980	UNCERTAIN

MAP#	COUNTY	WELL	LOCATION	T.D.	YEAR	FORMATION AT T.D.
29-4	JASPER	STONE OIL #1 MASONITE	22-3N-13E	12962	1981	UNCERTAIN
29-5	JASPER	PAN AM PETROLEUM #1 MASONITE	27-3N-13E	12960	1969	UNCERTAIN
29-6	JASPER	CITIES SERVICE #1 ENB "A"	28-3N-13E	12858	1984	UNCERTAIN
29-7	JASPER	SYSTEM FUELS #1 McCORMICK	34-4N-12E	13280	1982	UNCERTAIN
29-8	JASPER	SHELL OIL #1 DAVIS	35-4N-12E	13065	1968	UNCERTAIN
29-9	JASPER	VASSER #1 JOHNSON	24-4N-13E	9005	1962	UNCERTAIN
29-10	JASPER	BLACK RIVER et al #1 FOWLER	29-4N-13E	11925	1974	UNCERTAIN
29-11	JASPER	THOMPSON-MONTEITH #1 LEWIS	33-4N-13E	12166	1984	UNCERTAIN
30-1	CLARKE	PLACID OIL #1 LAND	8-1N-18E	12703	1968	UNCERTAIN
30-2	CLARKE	MOBIL #1 LONG BELL PETROLEUM	12-3N-16E	10200	1988	UNCERTAIN
30-3	CLARKE	SUN OIL #1 CULPEPPER-KIRKLAND	29-3N-16E	10819	1967	UNCERTAIN
30-4	CLARKE	BROOKS et al #1 McCLENDON et al	27-3N-17E	10876	1969	UNCERTAIN
30-5	CLARKE	CENTRAL OIL #1 BOARD OF SUPER.	16-3N-18E	9667	1968	UNCERTAIN
30-6	CLARKE	CENTRAL OIL #1 McCLENDON	28-3N-18E	9852	1967	UNCERTAIN
30-7	CLARKE	LEWIS OIL #1 JONES	10-4N-14E	8468	1985	UNCERTAIN
30-8	CLARKE	STATE EXPLORATION #1 COIT	19-4N-14E	12361	1963	UNCERTAIN
30-9	CLARKE	GETTY OIL #1 BOARD OF EDUCATION	16-4N-15E	9800	1982	UNCERTAIN

APPENDIX 2

Formation Tops

Elevations and tops are in feet measured from K.B.
* designates top of Ordovician undifferentiated

MAP#	WELL	ELEV	SRLS	SRDO	KNOXL	KNOXD	CPRDG	CONAS	ROME	SHADY	WEISR	PRECAM
1-1	WITHERS	221	4430									
1-2	CRAIGEN	395	*3265									
2-1	JOHNSON et al	400	3463	3900								
3-1	MELTON	458	1170	1230	2387	3887						
3-2	BLACKWELL	547	1276	1439	2371							
3-3	HARRELL	515	ABSNT	1240	2190	3705						
3-4	JACKSON	495	*1200									
3-5	FINGER	?	*1263									
4-1	MATHEWS	424	900	1300	1900	2390						
5-1	T.V.A.	501	475	1130								
5-2	WHITAKER	613	1246	1775								
5-3	RUSSELL	560	1285									
5-4	JOURDAN	495	1090	1616								
5-5	FREDERICK	656	1162	1704								
5-6	WOOD	540	950	1600								
5-7	SOUTHWARD	499	1195	1555								
5-8	ALLEN	390	1512	2020								
5-9	BOSTIC	390	*1608									
5-10	MAY-STAR	390	1608	2076								
5-11	TAYLOR	560	1690?									
6-1	ABBAY	203	5342	5863								
7-1	PRICHARD	236	*3030									
7-2	C.H. #4	292	*2886									
7-3	WALDROP	273	ABSNT	ABSNT	3043	3380						
7-4	C.H. #2	290	*3265									
7-5	MOORE	268	*3212									
7-6	MOORE	239	*3530									
8-1	SMITH	500	1258	1830	2617?							
8-2	KNIGHT	547	1359	1885								
8-3	RIDDLE	506	1255	1710								
8-4	TAYLOR	495	1445	1830?								
8-5	ALLEN	440	1557	2018?								
9-1	IVEY	188	10810	11086	12442	13097	14780	15575	16400	17108	17527	
9-2	DAWSON et al	190	5903	6022	7557	8511	10417					
10-1	HARPOLE	196	ABSNT	ABSNT	4350	4590	6225	8560	8814	9480	10632	
11-1	C.H. #1	334	*2945									
11-2	POINTER	380	ABSNT	3560	4293?							
11-3	C.H. #6	180	*3534									
12-1	DUNLAP	389	3060	3447	4652	5810	7112	8830	10017	10610	10830	11010
12-2	HODGE	461	3797	4140								
12-3	SULLIVAN	351	3697	4030								
12-4	BURT	437	4426?	4650								
12-5	LEWELLEN	439	3775	4040								
12-6	RUSSELL	435	3635	3940								
13-1	MORRIS et al	473	1280	1960								
13-2	NABORS	418	1868	2268								
13-3	BASDEN et al	368	1443	1888	2727	4030						
13-4	ROBBINS	402	2312	2691								
14-1	GRADDY et al	404	2150	2503								
14-2	STOKES	455	2197									
14-3	ANDREWS	414	2498	2857	4038	5170						
14-4	GRAHAM	420	2650	2975								
14-5	HENDERSON	479	2377	2750								
14-6	WILSON	472	2860	3170	4453?							
14-7	MILLER	377	3100	3423								
14-8	BISHOP	547	3180									
14-9	NAUGHER	428	3270	3640								
14-10	MILLER	390	5340	5630								
14-11	MORRISON	445	5348	5640								
14-12	PATTERSON	352	5323	5577								
14-13	WARREN	513	3560	3930	4643	6263						
14-14	DABBS-MALLORY	369	3210	3611								

MAP#	WELL	ELEV	SRLS	SRDO	KNOXL	KNOXD	CPRDG	CONAS	ROME	SHADY	WEISR	PRECAM
15-1	WHITESIDE	411	2170?	2615								
15-2	ROGERS	290	2264									
15-3	NEELY	315	3440	3855								
16-1	JUSTICE	383	2510?	2803								
16-2	KENTUCKY LBR.	349	2275	2780	3400							
17-1	DAVIS	370	5127	5408	6418	7590						
17-2	MURPHEE	465	5122	5569?								
17-3	ASHBY	315	8755	9078								
17-4	CRANE	393	8600	8902								
17-5	WILLIAMS	323	8532	8798	9547	11160	12161					
18-1	EASLEY	364	5082									
18-2	HOUSTON DAIR.	434	5236									
18-3	F.L.B.	356	3786									
18-4	ANDERSON	355	3741	4148	4925	6439	7440					
18-5	McCAIN et al	340	4034	4390	5039	6910						
18-6	DEMOVILLE	340	4057	4456	5009							
18-7	GREGORY	277	4092									
18-8	CRAWFORD "C"	414	10089	10465								
18-9	PULLIAM	305	6217	6550								
18-10	BENEKA	351	9191	9556								
19-1	MURPHREE	314	3673	4124								
19-2	COWART	342	2752	3075								
19-3	GREGORY	276	3951	4372	4945							
19-4	MURPHREE	318	4180	4570								
19-5	WICKS	224	4010	4430								
19-6	BRADLEY	310	4072	4494	5000							
19-7	PENNOCK	305	4086	4537								
19-8	PIERCE	310	4155	4605	5132	7178						
19-9	SNOW	284	4130	4569								
19-10	SNOW A-1	296	4139	4569								
19-11	NASH	308	4158	4594								
19-12	UNIT 28-8	283	4179	4620								
19-13	SPLUNGE TIMB.	383	3661	4073	4462							
19-14	HUBBARD	390	3990	4352?	4795							
19-15	HARRINGTON	244	4990	5400	6031							
19-16	BD. OF SUPER.	281	4050	4420	4853							
19-17	DALRYMPLE	236	4430	4840								
19-18	SANDERS	292	6942	7346	8296	9900						
19-19	THOMPSON	240	5752?									
19-20	WILLIS	232	6375	6798								
20-1	PEARSON	413	12482	12888?								
20-2	F.L.B. et al	215	10466	10692	11190							
20-3	DAVIS	278	11968	12305?								
21-1	SHEELY	470	14528	14669	15088?							
21-2	FULGHAM	428	14596	14810	15263	17410	18583	ABSNT	ABSNT	ABSNT	ABSNT	21340
21-3	SUDDUTH 1-A	401	10623	10931	11220							
22-1	GRANT	228	6680?	7013?	7630	9783						
22-2	HARDY et al	259	9518	9987	10420							
23-1	SMITH	127	4379	5017	5560	7560	8700	11900				
24-1	SMITH	558	*6370									
24-2	REA	528	*5510									
24-3	JONES	494	*5381									
24-4	BREAZEALE	399	*5809									
25-1	LEGGETTE	369	?									
26-1	WARREN	450	*9042									
26-2	WILLIAMS	473	*10400									
26-3	ELEY	384	*9655									
27-1	NICHOLSON	387	*10303									
27-2	NICHOLSON	446	*12480									
27-3	HORNE	455	*10573									
27-4	C.N.B.	390	*8314									
27-5	WALL	407	*8760									
27-6	EVERETTE	423	*8683									
27-7	CHOCTAW IND.	449	*11130?									
28-1	FLINTKOTE	397	*7549									
28-2	DEEMER LBR.	?	*5950									
28-3	REYNOLDS	456	?									
28-4	CATLETT	279	*5630									
28-5	LUCKY	326	6901	7190	7832	10489	11139?					

MAP#	WELL	ELEV	SRLS	SRDO	KNOXL	KNOXD	CPRDG	CONAS	ROME	SHADY	WEISR	PRECAM
29-1	MITTS	462	*13830									
29-2	UNIT 2-7	416	*13335									
29-3	MASONITE	311	*12410									
29-4	MASONITE	366	*12550?									
29-5	MASONITE	335	*12304									
29-6	ENB "A"	401	*12760									
29-7	McCORMICK	614	*12834									
29-8	DAVIS	404	*12093									
29-9	JOHNSON	307	*8840									
29-10	FOWLER	341	*10953?									
29-11	LEWIS	390	*11918									
30-1	LAND	354	*12680									
30-2	LONG BELL	407	*8508									
30-3	CULPEPPER	312	*10470									
30-4	McCLENDON	374	*10800									
30-5	BD. OF SUPER.	?	*9460									
30-6	McCLENDON	447	*9843									
30-7	JONES	334	*8056									
30-8	COIT	353	*8700?									
30-9	BD. OF ED.	368	*9720									

APPENDIX 3

Shows of oil or gas

S=Sample C=Core ML=Mud log
OHT=Open hole drill-stem test PT=Perforated drill-stem test
PROD=Produced from tubing
*Designates Ordovician undifferentiated

All available data have been used in compiling this appendix; additional shows of oil or gas have probably been logged but no information is available for these wells. Asphaltic and "dead oil" shows have not been included.

MAP#	WELL	SRLS	SRDO	KNOXL	KNOXD	CPRDG	CONAS	ROME	SHADY	WEISR	PRECAM
1-1	WITHERS										
1-2	CRAIGEN	*S									
2-1	JOHNSON et al										
3-1	MELTON		S								
3-2	BLACKWELL										
3-3	HARRELL										
3-4	JACKSON										
3-5	FINGER										
4-1	MATHEWS				S						
5-1	T.V.A.										
5-2	WHITAKER										
5-3	RUSSELL	S									
5-4	JOURDAN										
5-5	FREDERICK										
5-6	WOOD										
5-7	SOUTHWARD										
5-8	ALLEN										
5-9	BOSTIC										
5-10	MAY-STAR										
5-11	TAYLOR										
6-1	ABBAY										
7-1	PRICHARD										
7-2	C.H. #4										
7-3	WALDROP										
7-4	C.H. #2										
7-5	MOORE										
7-6	MOORE										
8-1	SMITH	C									
8-2	KNIGHT										
8-3	RIDDLE	S	S								
8-4	TAYLOR		S								
8-5	ALLEN	S									
9-1	IVEY										
9-2	DAWSON et al										
10-1	HARPOLE			ML							
11-1	C.H. #1										
11-2	POINTER										
11-3	C.H. #6										
12-1	DUNLAP	S	ML								
12-2	HODGE										
12-3	SULLIVAN										
12-4	BURT										
12-5	LEWELLEN		S								
12-6	RUSSELL										
13-1	MORRIS et al		S								
13-2	NABORS		S								
13-3	BASDEN et al										
13-4	ROBBINS		C-OHT								
14-1	GRADDY et al										
14-2	STOKES	S									

MAP#	WELL	SRLS	SRDO	KNOXL	KNOXD	CPRDG	CONAS	ROME	SHADY	WEISR	PRECAM
14-3	ANDREWS	C-S	S								
14-4	GRAHAM										
14-5	HENDERSON	S	OHT								
14-6	WILSON	S	OHT								
14-7	MILLER										
14-8	BISHOP										
14-9	NAUGHER		OHT								
14-10	MILLER										
14-11	MORRISON	C									
14-12	PATTERSON		C-OHT								
14-13	WARREN		C-OHT								
14-14	DABBS-MALLORY	S									
15-1	WHITESIDE										
15-2	ROGERS										
15-3	NEELY		C								
16-1	JUSTICE										
16-2	KENTUCKY LBR.										
17-1	DAVIS		OHT		OHT						
17-2	MURPHEE		S								
17-3	ASHBY										
17-4	CRANE										
17-5	WILLIAMS		S								
18-1	EASLEY										
18-2	HOUSTON DAIR.										
18-3	F.L.B.										
18-4	ANDERSON										
18-5	McCAIN et al	OHT	OHT								
18-6	DEMOVILLE										
18-7	GREGORY	C									
18-8	CRAWFORD "C"		ML-S								
18-9	PULLIAM	C	C-OHT								
18-10	BENEKA										
19-1	MURPHREE		C-OHT								
19-2	COWART										
19-3	GREGORY	ML-PT									
19-4	MURPHREE		C-OHT								
19-5	WICKS		OHT								
19-6	BRADLEY										
19-7	PENNOCK		C-OHT								
19-8	PIERCE		OHT		S-OHT						
19-9	SNOW		OHT								
19-10	SNOW A-1	C	PROD								
19-11	NASH										
19-12	UNIT 28-8										
19-13	SPLUNGE TIMB.										
19-14	HUBBARD										
19-15	HARRINGTON		OHT								
19-16	BD. OF SUPER.										
19-17	DALRYMPLE		S								
19-18	SANDERS										
19-19	THOMPSON										
19-20	WILLIS		C								
20-1	PEARSON		ML								
20-2	F.L.B. et al		PT								
20-3	DAVIS										
21-1	SHEELY		PROD	ML							
21-2	FULGHAM		ML								
21-3	SUDDUTH 1-A		OHT								
22-1	GRANT		ML	ML	ML						
22-2	HARDY et al										
23-1	SMITH				S	OHT					
24-1	SMITH										
24-2	REA										
24-3	JONES										
24-4	BREAZEALE										
25-1	LEGGETTE	*ML									
26-1	WARREN										
26-2	WILLIAMS										
26-3	ELEY										
27-1	NICHOLSON										

MAP#	WELL	SRLS	SRDO	KNOXL	KNOXD	CPRDG	CONAS	ROME	SHADY	WEISR	PRECAM
27-2	NICHOLSON										
27-3	HORNE										
27-4	C.N.B.										
27-5	WALL										
27-6	EVERETTE										
27-7	CHOCTAW IND.										
28-1	FLINTKOTE	*S									
28-2	DEEMER LBR.										
28-3	REYNOLDS										
28-4	CATLETT										
28-5	LUCKY										
29-1	MITTS										
29-2	UNIT 2-7										
29-3	MASONITE										
29-4	MASONITE										
29-5	MASONITE	*ML									
29-6	ENB "A"										
29-7	McCORMICK										
29-8	DAVIS										
29-9	JOHNSON										
29-10	FOWLER										
29-11	LEWIS										
30-1	LAND										
30-2	LONG BELL										
30-3	CULPEPPER										
30-4	McCLENDON										
30-5	BD. OF SUPER.										
30-6	McCLENDON										
30-7	JONES										
30-8	COIT										
30-9	BD. OF ED.										

LOCATION MAP

○ STONES RIVER LIMESTONE (10)	ORDOVICIAN
● STONES RIVER DOLOSTONE (53)	ORDOVICIAN
□ KNOX LIMESTONE (16)	ORDOVICIAN
■ KNOX DOLOSTONE (12)	ORDOVICIAN
△ COPPER RIDGE DOLOSTONE (4)	CAMBRIAN
▲ CONASAUGA LIMESTONE (1)	CAMBRIAN
○ ROME FORMATION (0)	CAMBRIAN
● SHADY DOLOSTONE (0)	CAMBRIAN
☆ WEISNER QUARTZITE (2)	CAMBRIAN
★ PRECAMBRIAN BASEMENT (2)	
◆ CORRELATION UNCERTAIN (51)	

MAP #	OPERATOR	WELL NAME	S	T	R	COUNTY	TD	DATE
1-1	UNION PROD.	#1 WITHERS	18	2S	9W	DESOTO	4884	1945
1-2	S.E. RESOURC.	#1 CRAIGEN	17	3S	7W	DESOTO	3412	1978
2-1	SHELL	#1 JOHNSON et al	32	5S	3W	MARSHALL	4003	1955
3-1	MEMPHIS EQUIP.	#1 MELTON	12	2S	3E	TIPPAH	5302	1956
3-2	SMACKO	#1 BLACKWELL	13	2S	3E	TIPPAH	3195	1979
3-3	HOUSTON	#1 HARRELL	34	2S	3E	TIPPAH	4209	1975
3-4	FAULKNER	#1 JACKSON	2	3S	3E	TIPPAH	1220	1966
3-5	CHILDERS	#1 FINGER	14	4S	2E	TIPPAH	2334	1955
4-1	ALCORN PETR.	#1 MATHEWS	14	2S	7E	ALCORN	2683	1931
5-1	T.V.A.	YEL. CRK. C.H.	35	1S	10E	TISHOMINGO	1330	1972
5-2	LEVAN & AKERS	#1 WHITAKER	23	3S	10E	TISHOMINGO	2117	1945
5-3	LEVAN et al	#1 RUSSELL	3	4S	10E	TISHOMINGO	1513	1947
5-4	IUKA DEVELOP.	#1 JOURDAN	9	4S	11E	TISHOMINGO	1902	1921
5-5	HAWKEYE	#1 FREDERICK	15	4S	11E	TISHOMINGO	2345	1986
5-6	MELLEN & GEAR	#1 WOOD	21	4S	11E	TISHOMINGO	1845	1940
5-7	MISS. OIL	#1 SOUTHWARD	18	5S	11E	TISHOMINGO	2875	1924
5-8	JOHNSON/DANIEL	#1 ALLEN	1	7S	9E	TISHOMINGO	3510	1973
5-9	MAURY	#1 BOSTIC	13	7S	10E	TISHOMINGO	1843	1956
5-10	MAURY	#1 MAY-STAR	18	7S	10E	TISHOMINGO	2217	1964
5-11	FULLER	#1 TAYLOR	7	7S	11E	TISHOMINGO	1810	1953
6-1	AMERADA	#1 ABBAY	21	4S	11W	TUNICA	5937	1962
7-1	JOHNSON	#1 PRICHARD	28	4S	7W	TATE	3165	1945
7-2	SEABOARD	#4 COREHOLE	20	5S	6W	TATE	2904	1954
7-3	SMITH & HESS	#1 WALDROP	15	5S	7W	TATE	4816	1961
7-4	SEABOARD	#2 COREHOLE	26	5S	8W	TATE	3384	1954
7-5	BOWLES	#1 MOORE	2	6S	8W	TATE	3890	1984
7-6	SINCLAIR	#1 MOORE	9	6S	9W	TATE	3586	1962
8-1	JOHNSON-DANIEL	#1 SMITH	31	4S	9E	PRENTISS	3006	1972
8-2	MICHAEL et al	#1 KNIGHT	7	5S	6E	PRENTISS	2613	1955
8-3	PELTO	#1 RIDDLE	9	6S	9E	PRENTISS	2311	1973
8-4	HUNTINGTON	#1 TAYLOR	28	6S	9E	PRENTISS	2850	1954
8-5	HOME DEVELOP.	#1 ALLEN	8	7S	9E	PRENTISS	2145	1941
9-1	TEXACO-EXXON	#1 IVEY	36	27N	3W	COAHOMA	17600	1974
9-2	EXXON	#1 DAWSON et al	28	29N	2W	COAHOMA	11495	1980
10-1	TIPPERARY	#1 HARPOLE-CAMP.	8	7S	10W	QUITMAN	10704	1979
11-1	SEABOARD	#1 COREHOLE	24	6S	7W	PANOLA	3032	1954
11-2	PINE	#1 POINTER	11	7S	7W	PANOLA	4339	1956
11-3	SEABOARD	#6 COREHOLE	18	7S	9W	PANOLA	3587	1954
12-1	PRUET & HUGHES	#1 DUNLAP BROS.	18	7S	1W	LAFAYETTE	11188	1974
12-2	PETROMAR et al	#1 HODGE	35	7S	3W	LAFAYETTE	4510	1980
12-3	SOHIO	#1 SULLIVAN	1	8S	3W	LAFAYETTE	5119	1977
12-4	SOHIO	#1 BURT	4	9S	4W	LAFAYETTE	5010	1975
12-5	ADAMS	#1 LEWELLEN	9	10S	1W	LAFAYETTE	4184	1939
12-6	FRITZ	#1 RUSSELL	9	10S	1W	LAFAYETTE	4319	1981
13-1	GULF	#1 MORRIS et al	15	6S	5E	UNION	2509	1955
13-2	CULLET	#1-A NABORS	36	7S	3E	UNION	2759	1947
13-3	GULF	#1 BASDEN et al	20	7S	5E	UNION	5010	1954
13-4	RICHARDSON	#1 ROBBINS	3	8S	1E	UNION	3477	1953
14-1	SALMON	#1 GRADDY et al	36	8S	2E	PONTOTOC	2710	1957
14-2	TEXACO	#1 STOKES	28	8S	3E	PONTOTOC	2213	1963
14-3	SALMON	#1 ANDREWS	3	9S	2E	PONTOTOC	5735	1955
14-4	M-H-T	#1 GRAHAM	12	9S	2E	PONTOTOC	3218	1982
14-5	SALMON	#1 HENDERSON	15	9S	3E	PONTOTOC	2947	1956
14-6	SALMON	#1 WILSON	29	9S	3E	PONTOTOC	4504	1954
14-7	TERRA	#1 MILLER	34	10S	2E	PONTOTOC	3685	1982
14-8	M-H-T	#1 BISHOP	3	10S	3E	PONTOTOC	3416	1984
14-9	SALMON	#1 NAUGHER	13	10S	3E	PONTOTOC	4508	1954
14-10	FLORIDA	#1 MILLER	16	11S	1E	PONTOTOC	6643	1976
14-11	FLORIDA	#1 MORRISON	20	11S	1E	PONTOTOC	5846	1981
14-12	SALMON	#1 PATTERSON	21	11S	1E	PONTOTOC	5904	1953
14-13	MAGNOLIA	#1 WARREN	26	11S	3E	PONTOTOC	7419	1955
14-14	HARRIS et al	#1 DABBS-MALLORY	1	11S	4E	PONTOTOC	4021	1973
15-1	EVANS	#1 WHITESIDE	16	9S	7E	LEE	3205	1928
15-2	LL & E	#1 ROGERS	22	10S	6E	LEE	2498	1984
15-3	ELLISON	#1 NEELY	28	11S	5E	LEE	4257	1953
16-1	ARMOUR & RUNY.	#1 JUSTICE	8	10S	9E	ITAWAMBA	3373	1970
16-2	GRASTY	#1 KENTUCKY LBR.	7	10S	10E	ITAWAMBA	3530	1939
17-1	HONOLULU	#2 DAVIS	27	12S	1E	CALHOUN	8390	1954
17-2	CLEARY	#1 MURPHEE	33	12S	1E	CALHOUN	8434	1975
17-3	PAN AM	#1 ASHBY	25	13S	1E	CALHOUN	9175	1962
17-4	CARTER	#1 CRANE	31	13S	1E	CALHOUN	9231	1954
17-5	SEABOARD/STACK	#1 WILLIAMS	35	13S	1E	CALHOUN	12994	1974
18-1	SOUTHLAND	#1 EASLEY	19	12S	3E	CHICKASAW	5188	1985
18-2	MAGUIRE et al	#1 HOUSTON DAIR.	33	12S	3E	CHICKASAW	5353	1977
18-3	PRUET et al	#1 F.L.B.	25	12S	4E	CHICKASAW	3911	1978
18-4	TRIAD et al	#1 ANDERSON	18	12S	5E	CHICKASAW	10025	1984
18-5	SHELL	#1 McCAIN et al	8	13S	5E	CHICKASAW	7495	1980
18-6	LL & E	#1 DEMOVILLE	15	13S	5E	CHICKASAW	6502	1980
18-7	PRUET & HUGHES	#1 GREGORY	18	13S	5E	CHICKASAW	4155	1975
18-8	PHILLIPS	#1 CRAWFORD C	33	14S	2E	CHICKASAW	11018	1957
18-9	CARTER	#1 PULLIAM	24	14S	4E	CHICKASAW	7026	1953
18-10	GETTY	#1 BENEKA	6	15S	3E	CHICKASAW	10025	1982
19-1	PURE	#1 MURPHREE	28	12S	6E	MONROE	4489	1956
19-2	McALPINE	#1 COWART	2	12S	9E	MONROE	3795	1931
19-3	PRUET	#1 GREGORY	7	13S	6E	MONROE	6305	1980
19-4	PAN AM	#1 MURPHREE	30	13S	6E	MONROE	4992	1956
19-5	GUERNSEY et al	#1 WICKS	15	13S	7E	MONROE	4675	1974
19-6	PRUET et al	#1 BRADLEY	16	13S	7E	MONROE	7190	1982
19-7	REBSTOCK et al	#1 PENNOCK	18	13S	7E	MONROE	4731	1955
19-8	MAGNOLIA	#1 PIERCE	22	13S	7E	MONROE	7993	1954
19-9	HYCO	#1 SNOW	27	13S	7E	MONROE	4807	1959
19-10	MAGNOLIA	#1-A SNOW	27	13S	7E	MONROE	4769	1953
19-11	SIERRA	#1 NASH	27	13S	7E	MONROE	4770	1986
19-12	TRIAD	#1 UNIT 28-8	28	13S	7E	MONROE	4902	1978
19-13	PRUET	#1 SPLUNGE TBR.	14	13S	17W	MONROE	5002	1981
19-14	MOON & HINES	#1 HUBBARD	36	13S	18W	MONROE	4871	1980
19-15	SHELL & FEAZEL	#1 HARRINGTON	25	14S	6E	MONROE	6120	1952
19-16	VAUGHEY et al	#1 BD. OF SUPR.	16	14S	17W	MONROE	5036	1954
19-17	SHELL	#1 DALRYMPLE	1	14S	19W	MONROE	5138	1957
19-18	UNION PROD.	#2 SANDERS	22	15S	6E	MONROE	10910	1962
19-19	WARRIOR et al	#1 THOMPSON	17	15S	18W	MONROE	6300	1980
19-20	SHELL	#1 WILLIS	18	15S	18W	MONROE	7203	1963
20-1	UNION OF CAL.	#1 PEARSON	21	15S	4E	CLAY	13308	1981
20-2	SHELL	#1 F.L.B. et al	31	16S	6E	CLAY	11265	1960
20-3	GRACE	#1 DAVIS	32	21N	13E	CLAY	12683	1978
21-1	TEXACO	#1 SHEELY	28	19N	12E	OKTIBBEHA	17422	1970
21-2	EXXON	#1 FULGHAM	33	19N	12E	OKTIBBEHA	21391	1973
21-3	McALESTER	#1-A SUDDUTH	6	19N	15E	OKTIBBEHA	11414	1959
22-1	MICHIGAN	#1 GRANT	21	16S	18W	LOWNDES	10341	1982
22-2	SOCONY MOBIL	#1 HARDY et al	3	17N	17E	LOWNDES	10999	1963
23-1	YOUNG et al	#1 SMITH	28	13N	19E	NOXUBEE	12022	1975
24-1	SONAT	#1 SMITH	1	9N	11E	NESHOBA	6876	1943
24-2	PURE	#1 REA	36	11N	12E	NESHOBA	5842	1950
24-3	PURE	#1 JONES	19	11N	13E	NESHOBA	5610	1951
24-4	SLICK & PLAINS	#1 BREAZEALE	28	12N	10E	NESHOBA	6131	1947
25-1	AMOCO	#1 LEGGETTE	20	10N	16E	KEMPER	12203	1986
26-1	LEWIS	#1 WARREN	6	7N	9E	SCOTT	9988	1988
26-2	HAMILTON	#1 WILLIAMS	23	7N	9E	SCOTT	11026	1967
26-3	S.E. DRILLING	#1 ELEY	19	8N	8E	SCOTT	9814	1952
27-1	LL & E	#1 NICHOLSON	10	5N	11E	NEWTON	10554	1966
27-2	RADZEWICZ	#1 NICHOLSON-M.	17	5N	11E	NEWTON	12756	1974
27-3	WYATT	#1 HORNE	27	5N	12E	NEWTON	11062	1964
27-4	SUN	#1 C.N.B.	23	5N	13E	NEWTON	8340	1945
27-5	SUN	#1 WALL	28	5N	13E	NEWTON	10114	1943
27-6	TEXACO	#1 EVERETTE	17	6N	11E	NEWTON	8699	1961
27-7	S.E. DRILLING	#1 CHOCTAW IND.	20	7N	10E	NEWTON	11499	1972
28-1	LEWIS	#1 FLINTKOTE	29	5N	15E	LAUDERDALE	8141	1985
28-2	DAMSON	#1 DEEMER LBR.	3	5N	18E	LAUDERDALE	6808	1970
28-3	SCIENTIFIC R.	#1 REYNOLDS	16	5N	18E	LAUDERDALE	7408	1987
28-4	DAMSON	#1 CATLETT	27	6N	18E	LAUDERDALE	6013	1971
28-5	AMOCO-STACK	#1 LUCKY	6	8N	16E	LAUDERDALE	14110	1975
29-1	HARRIS	#1 MITTS	1	3N	11E	JASPER	14044	1970
29-2	HAGAN	#1 UNIT 2-7	2	3N	12E	JASPER	13680	1979
29-3	STONE	#1 MASONITE	14	3N	13E	JASPER	10764	1980
29-4	STONE	#1 MASONITE	22	3N	13E	JASPER	12962	1981
29-5	PAN AM	#1 MASONITE	27	3N	13E	JASPER	12960	1969
29-6	CITIES SERVICE	#1 ENB-A	28	3N	13E	JASPER	12858	1984
29-7	SYSTEM FUELS	#1 McCORMICK	34	4N	12E	JASPER	13280	1982
29-8	SHELL	#1 DAVIS	35	4N	12E	JASPER	13065	1968
29-9	VASSER	#1 JOHNSON	24	4N	13E	JASPER	9005	1962
29-10	BLACK RIVER	#1 FOWLER	29	4N	13E	JASPER	11925	1974
29-11	THOMPSON-MONT.	#1 LEWIS	33	4N	13E	JASPER	12166	1984
30-1	PLACID	#1 LAND	8	1N	18E	CLARKE	12703	1968
30-2	MOBIL	#1 LONG BELL	12	3N	16E	CLARKE	10200	1988
30-3	SUN	#1 CULPEPPER-K.	29	3N	16E	CLARKE	10819	1967
30-4	BROOKS	#1 McCLENDON	27	3N	17E	CLARKE	10876	1969
30-5	CENTRAL	#1 BD. OF SUPR.	16	3N	18E	CLARKE	9667	1988
30-6	CENTRAL	#1 McCLENDON	28	3N	18E	CLARKE	9852	1967
30-7	LEWIS	#1 JONES	10	4N	14E	CLARKE	8468	1985
30-8	STATE EXPLOR.	#1 COIT	19	4N	14E	CLARKE	12361	1963
30-9	GETTY	#1 BD. OF ED.	16	4N	15E	CLARKE	9800	1982

CAMBRO-ORDOVICIAN PENETRATION MAP

0 10 20 30
MILES

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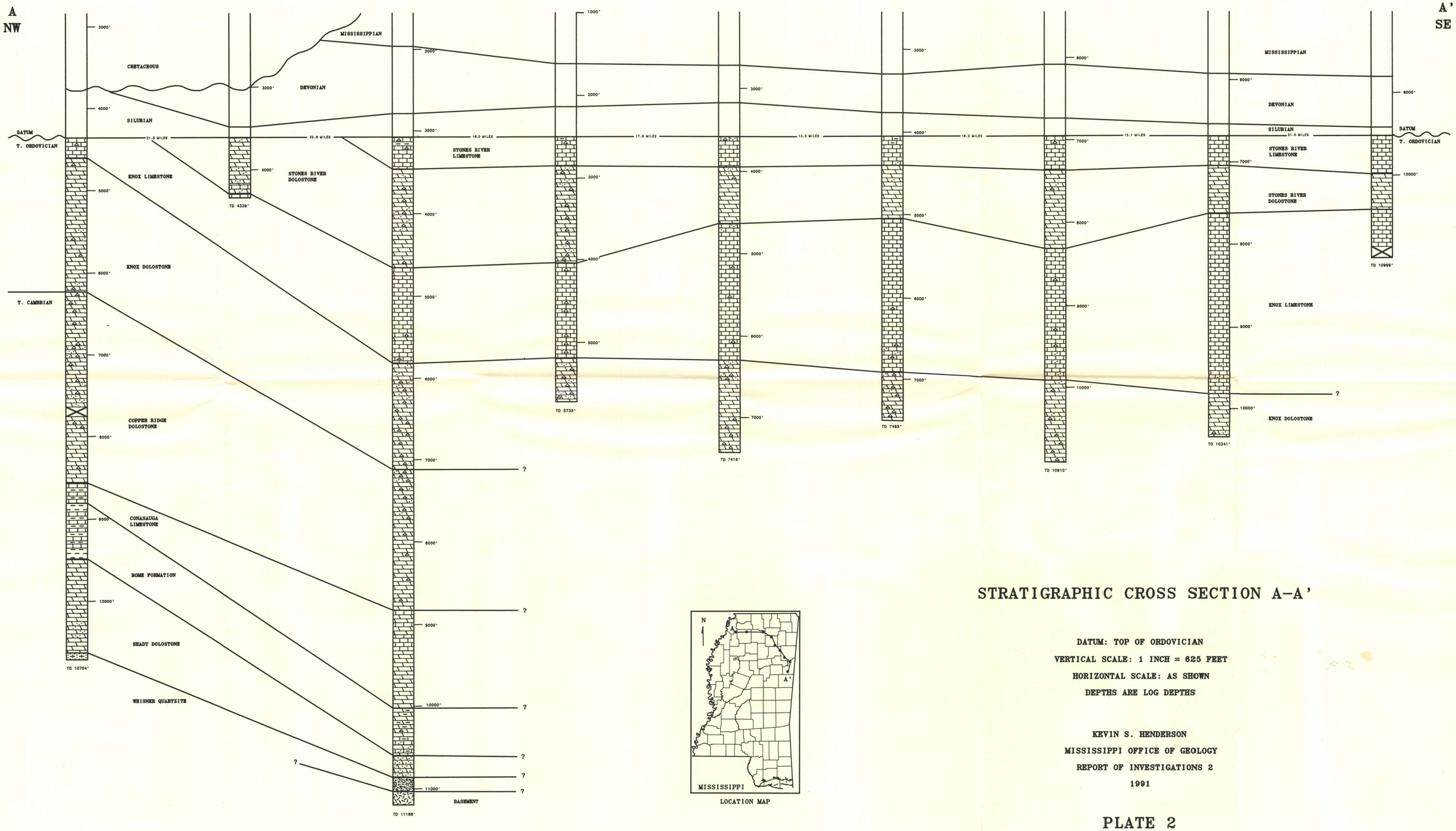
1991

PLATE 1



LOCATION MAP

STRATIGRAPHIC CROSS SECTION A–A'

DATUM: TOP OF ORDOVICIAN

VERTICAL SCALE: 1 INCH = 625 FEET

HORIZONTAL SCALE: AS SHOWN

DEPTHS ARE LOG DEPTHS

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PLATE 2

B
S

B'
N

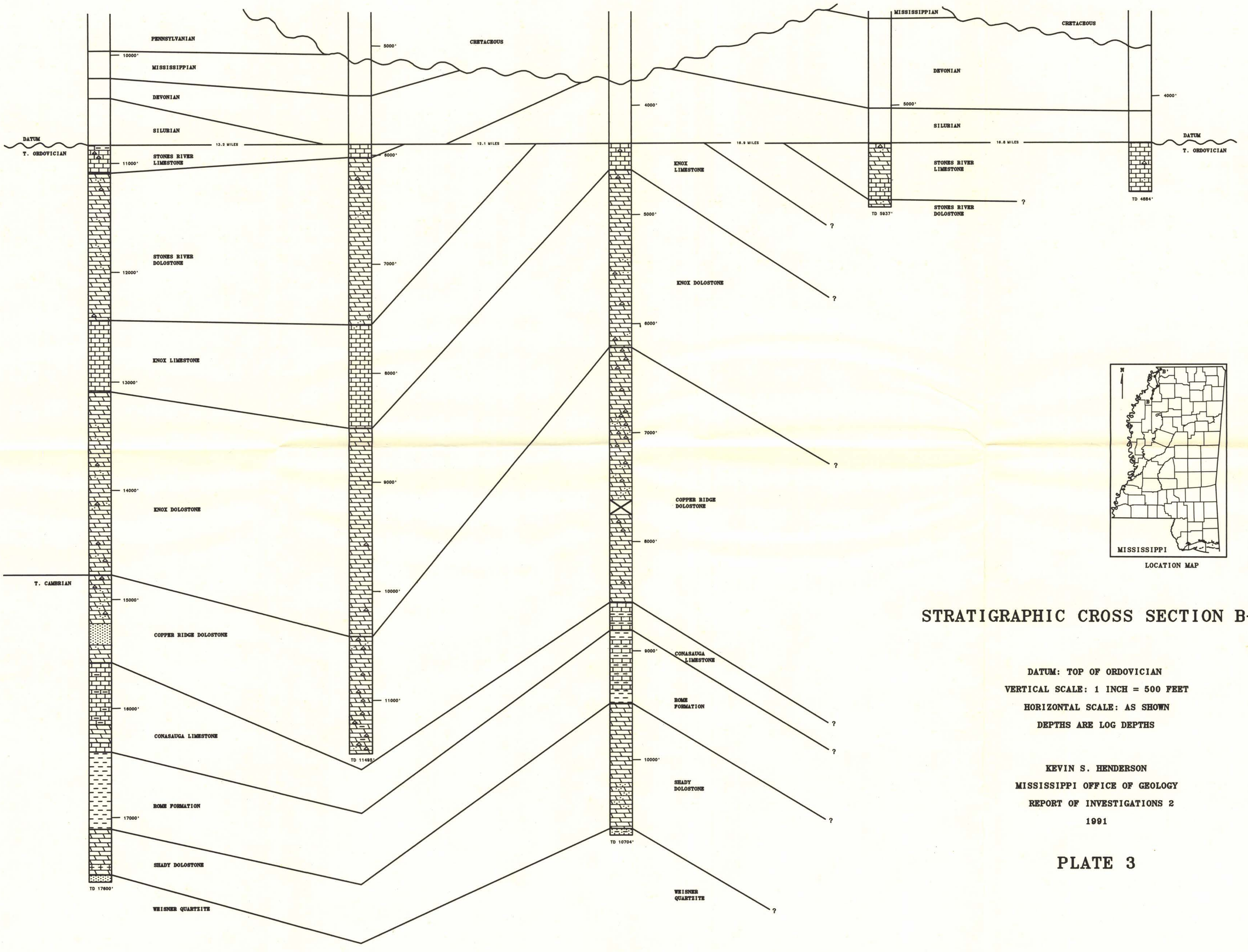
9-1
TEXACO-EXXON
#1 IVEY
36-27N-3W
COAHOMA CO., MS

9-2
EXXON
#1 DAWSON et al
28-29N-2W
COAHOMA CO., MS

10-1
TIPPERARY
#1-X HARPOLE-CAMPBELL
8-7S-10W
QUITMAN CO., MS

6-1
AMERADA
#1 ABBAY
21-4S-11W
TUNICA CO., MS

1-1
UNION
#1 WITHERS
18-2S-9W
DESOTO CO., MS



LOCATION MAP

STRATIGRAPHIC CROSS SECTION B-B'

DATUM: TOP OF ORDOVICIAN
VERTICAL SCALE: 1 INCH = 500 FEET
HORIZONTAL SCALE: AS SHOWN
DEPTHS ARE LOG DEPTHS

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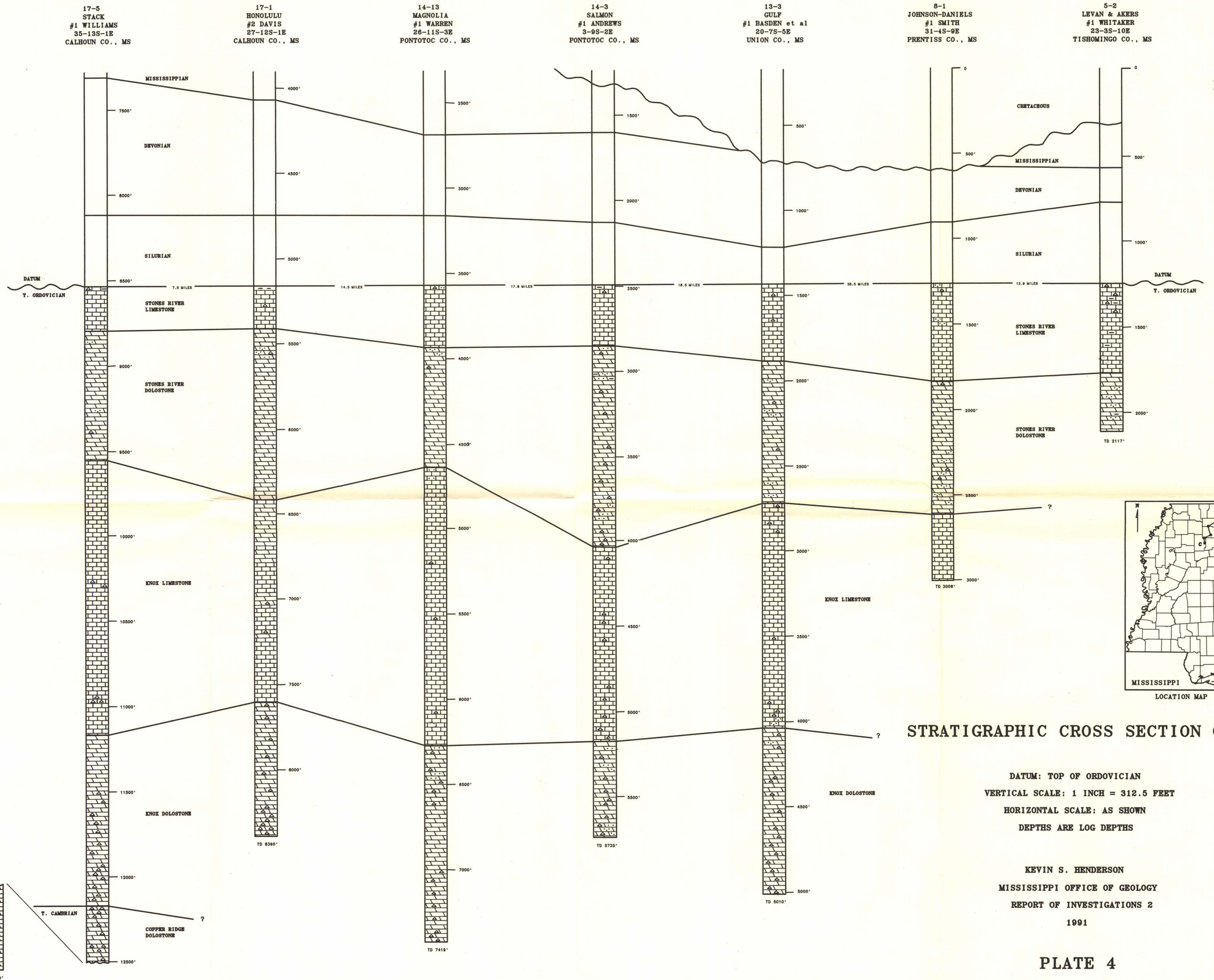
PLATE 3



STRATIGRAPHIC CROSS SECTION C–C'

DATUM: TOP OF ORDOVICIAN

VERTICAL SCALE: 1 INCH = 312.5 FEET

HORIZONTAL SCALE: AS SHOWN

DEPTHS ARE LOG DEPTHS

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PLATE 4

D
SW

D'
NE

21-2
EXXON
#1 FULGHAM
33-19N-12E
OKTIBBEHA CO., MS

21-3
McALESTER FUEL
#1-A SUDDUTH
6-19N-15E
OKTIBBEHA CO., MS

20-2
SHELL
#1 FLB et al
31-16S-6E
CLAY CO., MS

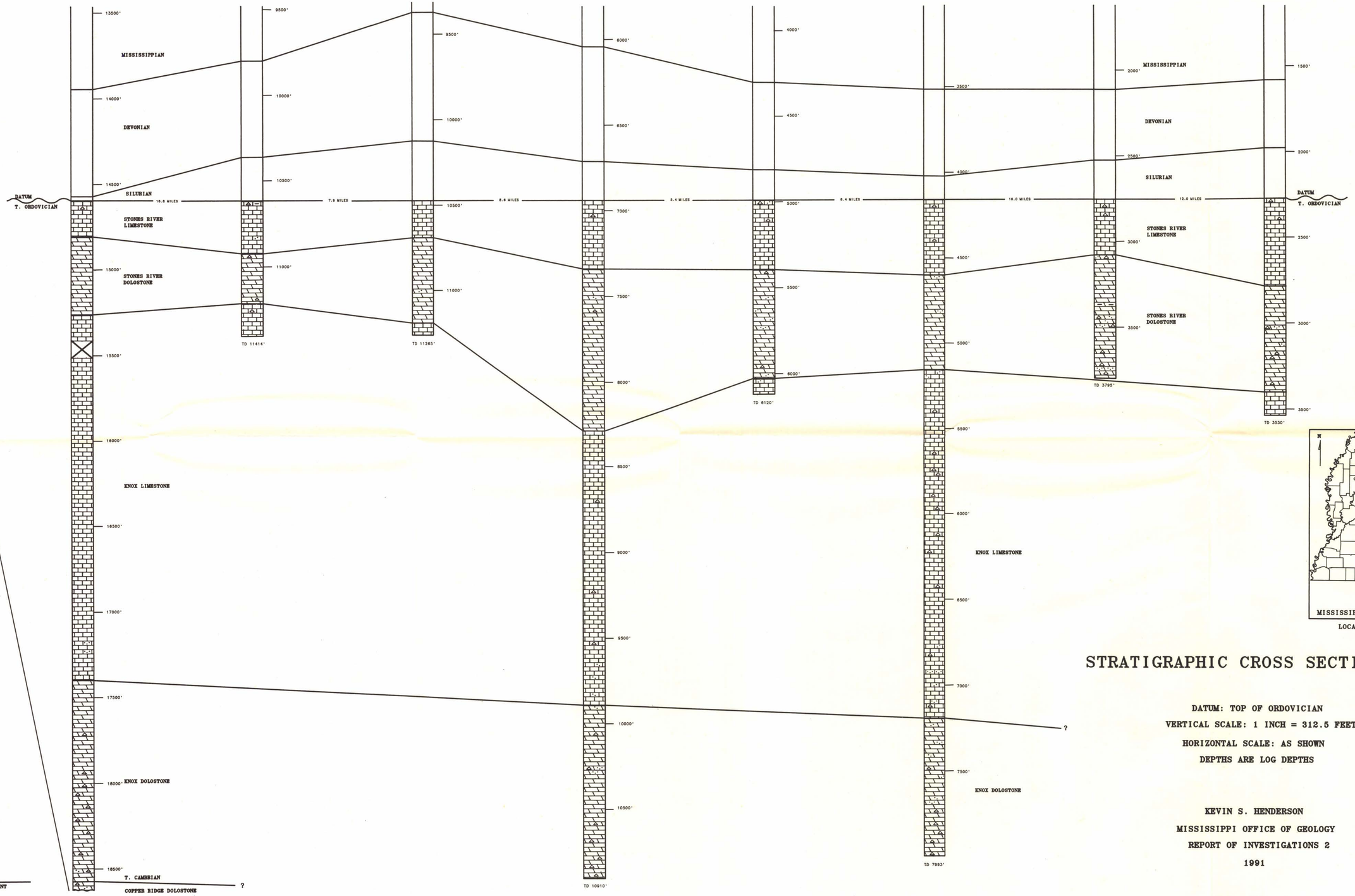
19-16
UNION PRODUCING
#2 SANDERS
22-15S-6E
MONROE CO., MS

19-15
SHELL & FEAZEL
#1 HARRINGTON
25-14S-6E
MONROE CO., MS

19-8
MAGNOLIA
#1 PIERCE
22-13S-7E
MONROE CO., MS

19-2
McALPINE
#1 COWART
2-12S-9E
MONROE CO., MS

16-2
GRASTY
#1 KENTUCKY LBR.
7-10S-10E
ITAWAMBA CO., MS



LOCATION MAP

STRATIGRAPHIC CROSS SECTION D-D'

DATUM: TOP OF ORDOVICIAN

VERTICAL SCALE: 1 INCH = 312.5 FEET

HORIZONTAL SCALE: AS SHOWN

DEPTHS ARE LOG DEPTHS

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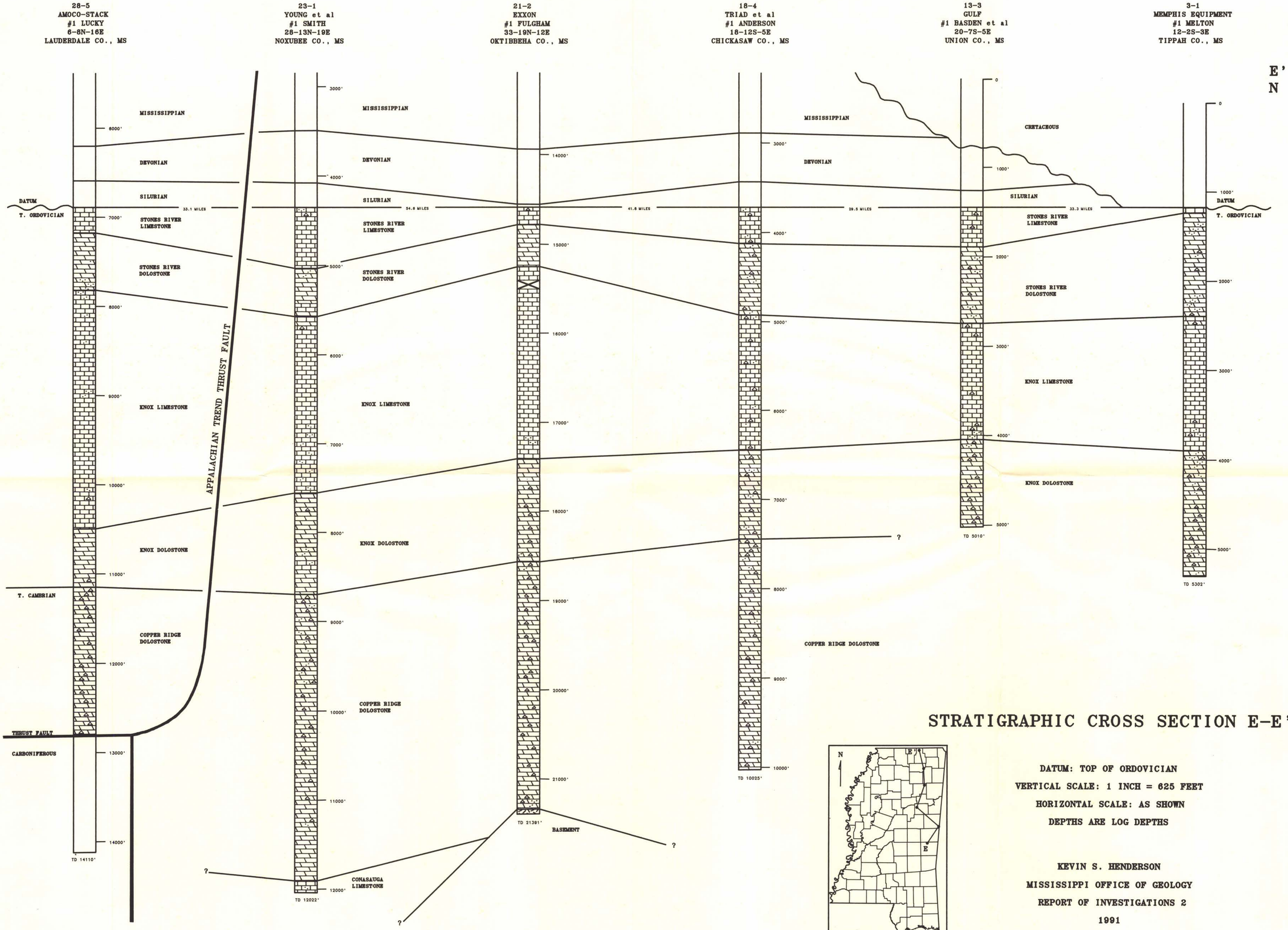
PLATE 5



STRATIGRAPHIC CROSS SECTION E–E'

LOCATION MAP

DATUM: TOP OF ORDOVICIAN
VERTICAL SCALE: 1 INCH = 625 FEET
HORIZONTAL SCALE: AS SHOWN
DEPTHS ARE LOG DEPTHS

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PLATE 6